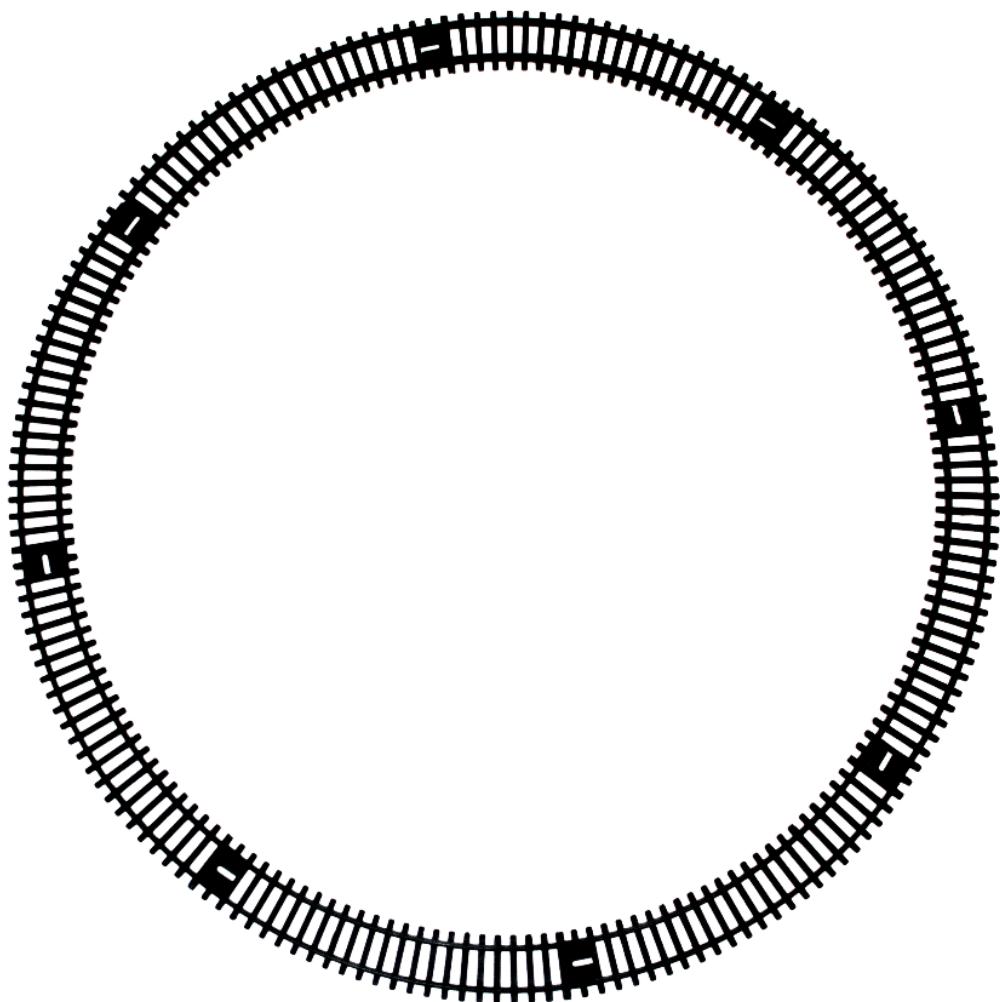


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Independent Review into Auckland Metro Rail System Issues Final Report

February 2022



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Glossary

Abbreviation	
Above rail	Refers to locomotives, rolling stock and stations
AMRN	Auckland metropolitan rail network
ANAA	Auckland Network Access Agreement
ARDP	Auckland Rail Development Programme
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
Below rail	Refers to the underlying railway infrastructure, including track, tunnels, bridges, traction and signals
CAF	Construcciones y Auxiliar de Ferrocarriles
CAT	Common Access Terms
EMU	Electric multiple unit passenger train
GPS	Government Policy Statement on land transport
GWRC	Greater Wellington Regional Council
KPI	Key performance indicator
KR	KiwiRail
MROM	Metropolitan Rail Operating Model
NLTF	National Land Transport Fund
NLTP	National Land Transport Programme
NMP	Network Management Plan
NRIAF	National Rail Industry Advisory Forum
NRSS-E	National Rail System Standards Executive
NZUP	New Zealand Upgrade Programme
OAG	Office of the Auditor General
PcG	Auckland Metro Programme Control Group
RCF	Rolling contact fatigue
RLTP	Regional Land Transport Plan
RNGIM	Rail Network Growth Impact Management
RNIP	Rail Network Investment Programme
SSA	Special Safety Assessment
TCO	Total cost of ownership
TDAK	Transdev Auckland
TSRs	Temporary speed restrictions
WK	Waka Kotahi
WRI	Wheel-rail interface

Executive Summary

The Ministry of Transport has engaged Deloitte to identify and articulate whether any system level issues may have contributed to recent infrastructure issues on the Auckland metro rail network (AMRN), and to make recommendations on future changes.

This review responds to emergence of advanced rolling contact fatigue on the AMRN

The AMRN is a critical asset for both passenger and freight traffic. Auckland's rail system is the backbone of Auckland's rapid transport network and a critical enabler of the New Zealand supply chain.

The identification of advanced rolling contact fatigue (RCF) on the AMRN in 2019 and 2020 caused significant disruption. Blanket speed restrictions were imposed and urgent repairs to network infrastructure were required. While RCF is a normal feature of railways, advanced RCF presents a serious safety risk.

“Auckland’s rail system is the backbone of Auckland’s rapid transport network and a critical enabler of the New Zealand supply chain.”

The review has a system level focus

The focus of this review has been on determining the role system level factors played in the emergence of advanced RCF and determining practical steps to resolve system issues. System level issues include those associated with system governance, incentives, funding, and capacity and capability.

The technical root causes of advanced RCF on the AMRN have been explored through a separate assessment, which identified issues with the underlying infrastructure, maintenance practice, and the interface between the railway and rolling stock.

The key organisations involved in the governance, operation and monitoring of the Auckland metro rail (AMR) system are:

- KiwiRail, which owns and maintains the AMRN and operates freight and long distance passenger services,
- Auckland Transport (AT), which procures metro rail passenger services and has strategic oversight for the Auckland transport system,
- Waka Kotahi, which regulates rail safety and invests in the land transport system,
- Ministry of Transport, which provides policy oversight for the rail sector,
- Transdev Auckland (TDAK), which operates metro passenger train services at the time of writing (to be replaced by a new operator from 2022),
- Construcciones y Auxiliar de Ferrocarriles (CAF), which maintains Auckland’s electric passenger trains.

The allocation of roles and responsibilities within the AMR system largely reflects a framework known as the Metropolitan Rail Operating Model (known as MROM). Established in 2009, MROM applies across both Auckland and Wellington. The Auckland Network Access Agreement (ANAA) between AT and KiwiRail is the key

commercial agreement in the system. The ANAA provides metro passenger rail services with access to KiwiRail's network, and includes mechanisms for managing the performance and development of the AMRN. Separately, the Railways Act 2005 regulates rail safety.

The Future of Rail review has also recently resulted in changes to better integrate the development of KiwiRail's network infrastructure with the land transport funding and planning framework. These changes are relevant to this review's recommendations.

Our core finding is that a lack of system maturity allowed RCF to worsen and remain unresolved

The AMR system has grown significantly in usage, in asset value and broader strategic importance over the past decade. However, system maturity did not keep pace with the demands on the network.

In a rail system with a clear set of objectives and requirements, with appropriate checks and balances, and with the right enablers such as funding, equipment and capabilities, it is unlikely that RCF would reach an advanced state requiring expensive and disruptive remediation.

We found there was a lack of an enduring vision and plan required under a disaggregated model to ensure the AMRN was fit for purpose. The system suffered from unclear roles and responsibilities in certain areas and also lacked sufficient checks and balances to ensure issues like RCF were anticipated and resolved early. The system was constrained by a combination of insufficient capability, capacity and resource to evolve in line with growing demands. Our key findings are outlined below.

Table 1: Key Findings

Key findings

1. The AMR system is fragmented and lacking a unified set of objectives and supporting planning & coordination mechanism that brings all the parties together to agree and maintain those objectives.
2. There is no detailed, and integrated, above and below rail asset management plan for the AMR system, optimising the total cost of ownership based on agreed levels of service.
3. Maintenance standards did not keep pace with the requirements of a modern metro system, raising questions over how these standards were governed and assured.
4. The safety regulator was passive and lacked the maturity and resourcing to clarify its role and work proactively.
5. The ANAA commercial model does not create incentives for the access provider to lift the quality of network access services to that required for a modern metro system.
6. There was an absence of effective industry governance arrangements to raise and resolve system concerns.
7. The funding model focused on short term affordability and did not enable catch up renewals or investment in capability and capacity to deliver ongoing maintenance and renewals for the long term.
8. There were competing objectives/priorities within the AMR system, which led to insufficient access for maintenance.
9. The capacity and capability needed to support an effective cyclical maintenance programme were insufficient given usage growth and the age and condition of assets.

The system has taken steps in the right direction, but there is still much work to be done

In recent years, steps have been taken to improve the resilience of the AMRN, including joint work by system participants to address catch up renewals and improve capability. There have also been wider changes to the rail planning and funding framework as a result of the Future of Rail review.

While we acknowledge recent steps, our view is that further change is required to ensure the system has the right focus, incentives and resources.

We considered three packages of options to address our findings and discussed these with stakeholders. The three packages were:

- **Option A – embed recent AMR changes**, which drew on changes that have already occurred, or that are underway. These include the Future of Rail changes, the RNGIM investment programme, and progressive changes to the ANAA performance regime.
- **Option B – expand recent AMR changes**, which would involve more extensive changes to the ANAA, AMR system governance, and asset management planning.
- **Option C – expand Future of Rail framework**, which would further expand the Future of Rail changes into the metro environments, using new statutory mechanisms such as the Rail Network Investment Programme and track user charges to address performance and funding issues, with Waka Kotahi’s investment function playing a greater role in monitoring system performance.

Of these options, it was clear that Option B had the widest stakeholder support and would be the most tractable. There was a view across the system participants that the system had to evolve beyond existing arrangements. Several participants noted that elements of Option B were already underway. For example, there is an intention to reset AMRN governance arrangements, to develop an AMRN specific asset management plan, and to reset the ANAA. Similar arrangements are being discussed in relation to the Wellington rail system. While Option C had the potential to go furthest in terms of improving the system, there were complex option design considerations.

On balance, our core recommendation is for the AMR system to implement Option B. As quality of execution of Option B will be critical, we recommend that the Ministry of Transport closely monitor progress against Option B. We also recommend the new governance arrangements for the metro rail networks should incorporate the Ministry of Transport and Waka Kotahi’s investment function in a strategic governance forum, which would monitor system development and performance.

In our view, in addition to implementing Option B, an in-depth review of the MROM is also required. With Option B, we are still concerned that this might not completely address the system issues identified in this review, particularly the issues around funding and the incentives in the commercial framework. Elements of Option C were also not able to be fully developed through this review and warrant further development and evaluation. Certain system changes such as the introduction of economic regulation or changes to industry structure were also outside of the scope of this review and would benefit from detailed consideration. This is best managed through a fundamental review of the MROM. The quality of progress against Option B would be a significant input into the MROM review.

We have also developed a separate set of recommendations to address issues with the functioning of the regulatory system identified through this review. We recommend an ongoing focus on KiwiRail's codes and standards, the maturity of the safety regulator, and the functioning of institutions for system participants to collaborate on regulatory matters.

Finally, this review took place over a six-month period, during which several initiatives were launched and / or completed by system participants with the objective of improving system performance. We have been advised by several participants that progress has been towards some of our recommendations. While we have endeavoured to capture these in this report, it has not been practicable to do so in all instances, or to verify the outcomes of such work, at the late stages of this review.



Introduction

This review examines the relationship between recent infrastructure issues experienced on Auckland's rail network and the system that governs and operates this railway.

The Auckland metropolitan rail network (AMRN) plays a key role in the movement of freight and passengers. It carries a third of all rail freight in New Zealand. On a typical weekday about 40 freight trains travel through the AMRN. Passenger use has experienced enormous growth in the past two decades. There were 22.5 million commuter trips in the year to December 2019 on the AMRN, compared to 2.5 million in mid-2003 when Britomart Station opened. Between 2005 and 2018, passenger rail patronage increased 13% a year on average.¹

Demands on the AMRN are only expected to increase. Major projects like the City Rail Link are expected to result in significant further growth in passenger services. A new interregional passenger service between Auckland and Hamilton has recently been introduced. Rail freight volumes are also expected to grow significantly, with tonnage forecast to increase 50% by 2042 from 2012 levels.²

The identification of advanced rolling contact fatigue (RCF) on the AMRN resulted in significant disruption to services and required urgent repairs. In December 2019, the safety regulator issued a notice restricting further growth in train services after

¹ WSP 'Rail Network Growth Impact Management (RNGIM) Single Stage Business Case' (2019) at 13.

² Ibid, at 14.

identifying that the condition of the AMRN track infrastructure was poor. It also identified that the maintenance regime in place had been insufficient and management of RCF was inadequate. In 2020, further investigations by KiwiRail identified the wide extent of advanced RCF on AMRN, resulting in blanket 40 kmph speed restrictions and rolling closures of lines as extensive repairs were carried out.

Purpose and scope of this review

Deloitte has been asked to identify and articulate any system level issues that may have contributed to the emergence of advanced RCF on the AMRN. In developing our findings, we have been asked to consider whether:

- the roles, responsibilities and implementation of the metropolitan rail operating model (MROM)³ may have contributed to the RCF issue,
- MROM incentivised the right levels and types of funding for the network,
- the existing network agreements place appropriate incentives on the parties involved, in practice,
- the user charge framework in the network access agreements is appropriate to achieve desired network outcomes,
- the system had the right capacity and capability to ensure the network was maintained and safe, and
- any other system-level factors that were key contributors.

To ensure these issues are not repeated, we have also been asked to make recommendations on how to mitigate future risks. The recommendations are expected to consider any changes within the MROM to achieve a resilient and reliable rail network, including in relation to:

- current track access arrangement and charges,
- negotiation practices for those access arrangements and charges,
- funding levels and sources for the network, and
- capability and capacity of the system to implement the proposed changes.

While the review is focused on the Auckland metro rail (AMR) system, we have also been asked to consider implications for Wellington's metropolitan rail system.

This review is intended to complement the findings of a separate technical report into RCF, which was developed by the Auckland Metro RCF Working Group.⁴ Our review instead takes a system level focus (i.e. examining issues associated with system governance, incentives, funding, and capacity and capability).

The purpose of this review is not to identify any wrongdoing or compliance issues from the parties involved. This review also excludes consideration of entity ownership issues (such as KiwiRail's entity form, which is being considered by a separate review, or changes to industry structure). Further, this review is not a detailed review of MROM itself.

³ MROM is a framework for the allocation of roles and responsibilities in the Auckland and Wellington metropolitan rail systems.

⁴ See Auckland Metro RCF Working Group 'Root Cause Assessment' available at https://at.govt.nz/media/1986377/18_app1_rail-infrastructure-final-attachmen.pdf.

How we approached this review

We undertook this review over two phases:

- **Phase 1**, which involved identification of system issues that may have contributed to the emergence of advanced RCF. We held individual interviews with AMR system participants to identify key themes. We also reviewed a range of materials supplied by the stakeholders. We held a stakeholder workshop to present and discuss emerging themes. Following this, we provided stakeholders with a draft Phase 1 report for comment and to seek further information.
- **Phase 2**, which involved identifying recommendations on how to mitigate future risks. We developed a list of proposed recommendations responding to our Phase 1 findings, which we consulted individually with relevant system participants and through a stakeholder workshop.

The participants in this review included KiwiRail, Auckland Transport (AT), Waka Kotahi (both its investment and regulatory teams), the Ministry of Transport, Transdev Auckland (TDAK), Construcciones y Auxiliar de Ferrocarriles (CAF), Greater Wellington Regional Council (GWRC) and the Rail & Maritime Transport Union.

Limitations to the review

Our role has been to distil industry perspectives and supporting evidence into key themes and findings. We drew on evidence from interviews, workshops, and a review of a wide ranging set of documents that we have been provided.

The nature of a system level review is necessarily qualitative. There are areas of consensus and divergence amongst industry participants with respect to the issues that contributed to RCF and how these issues could be resolved. Where there were divergent views amongst participants or differing recollections, we placed greater emphasis on documentary evidence. We have not had complete access to information requested. For example, there are events dating back over 10 years, relevant to this review, where there is incomplete information.

It was not within our scope to verify all information provided or to pursue information requested but not supplied by participants given the limited review timeframe and its collaborative mandate.

Structure of this report

This report is structured into three key sections:

- 1) **Context**, which outlines the key features of the AMR system, its recent evolution, and key information on RCF and AMRN, including the technical root causes,
- 2) **Findings**, which outlines our findings and supporting reasons,
- 3) **Options**, which outlines and discusses options for addressing our findings, and
- 4) **Recommendations**, which outlines a series of recommendations to strengthen the system.

Review Context

This section describes the AMR system and its evolution. It also provides context on RCF and the AMRN.

The AMR System

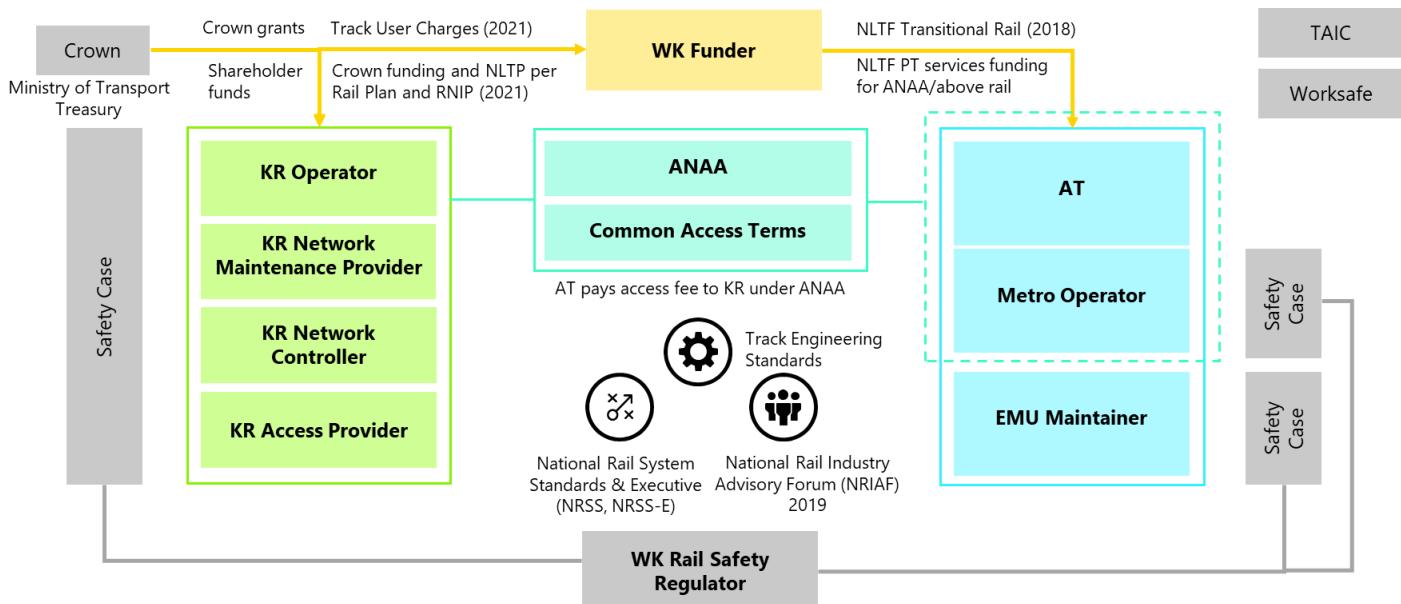
By system, we mean the key organisations that work to plan, resource, and monitor the effective and safe delivery of services on the AMRN.

Under the MROM framework, which was established in 2009, the AMR system is vertically disaggregated.⁵ Above rail metro passenger services are specified by AT, with commercial access arrangements in place allowing access to KiwiRail's below rail infrastructure.⁶ Freight and long distance passenger services are vertically integrated with KiwiRail's below rail network. Equivalent arrangements exist in Wellington. These arrangements are supported by a safety regulation and co-funding model involving Waka Kotahi's separate safety and investment arms. The Ministry of Transport oversees transport policy.

The core structure of the AMR system has remained largely unchanged since the ANAA was adopted in 2012. However, planning and funding arrangements for KiwiRail's rail network have recently changed. KiwiRail is now able to access funding from the National Land Transport Fund (NLTF) for its below rail infrastructure.

The figure below outlines the system, including key participants, contractual and regulatory interfaces, and funding streams.

Figure 1: Overview of the AMR system (as at December 2021)



⁵ See Cabinet Economic Growth and Infrastructure Committee Paper (EGI (09) 180), 22 September 2009.

⁶ The term 'above rail' refers to locomotives, rolling stock and stations, while the term 'below rail' refers to the underlying railway infrastructure, including track, tunnels, bridges, traction and signals.

Roles and responsibilities within the system

Under MROM, and the regulatory framework in the Railways Act 2005, system roles and responsibilities are disaggregated across several different parties. The table below provides a high level overview of each party's role in the AMR system. Below we also outline key relevant contractual, regulatory and governance arrangements in the system. Appendix A also contains further detail on system roles and responsibilities.

Table 2: Overview of system participants and roles

Entity	Roles
KiwiRail	KiwiRail is a state-owned enterprise that owns and maintains the AMRN below rail assets. KiwiRail is the network controller, managing train movements on the AMRN. It also operates freight and long distance passenger train services on the AMRN.
AT	AT is the specifier of metro passenger rail services. It plays the lead role in planning Auckland's transport system. AT has contracted an operator to provide metro passenger rail services. It owns the electric multiple unit passenger (EMU) rolling stock and holds running rights from KiwiRail for these trains to operate on the AMRN. AT also provides the passenger stations. Through the ANAA, AT effectively part funds the ongoing maintenance and renewal of the AMRN. It works with KiwiRail to plan the development of the AMRN.
Waka Kotahi	<p>Waka Kotahi has two key roles in the AMR system:</p> <ul style="list-style-type: none"> Investor: Waka Kotahi administers the NLTF, which funds a 51% share of public transport activities such as metro passenger rail services. From 2021, Waka Kotahi also now funds KiwiRail's below rail infrastructure at a national level and, at a metro level, KiwiRail's share of the AMR and Wellington network budgets. It provides the Minister of Transport with advice on KiwiRail's Rail Network Investment Programme (RNIP) and monitors RNIP implementation. Safety regulator: Waka Kotahi's Safer Rail team regulates the rail sector. The team provides independent assurance to the Ministry of Transport and the public that safety risks are being effectively managed by all participant in the rail system. The team regulates the rail industry in accordance with the Railways Act 2005, which requires that all rail licence holders have an adequate safety case that drives the safety performance of rail operations <p>Throughout this report, we refer to Waka Kotahi as 'Waka Kotahi (Investment)' and 'Waka Kotahi (Regulatory)' when referring to the specific function.</p>
TDAK⁷	TDAK is currently contracted to provide metro passenger services for AT using AT's EMU rolling stock.
CAF	CAF designed and manufactured Auckland's EMUs and is currently contracted by AT to maintain this rolling stock.
Ministry of Transport	The Ministry of Transport oversees policy settings for New Zealand's rail industry and advises the Minister of Transport. The Ministry of Transport also monitors Waka Kotahi.

In addition to the role of the Ministry of Transport, the Crown has a wider role in the system. The Treasury monitors KiwiRail's commercial performance. The Crown is also a significant funder of the rail system through contributions to the NLTF (see below), shareholder injections to KiwiRail, and funding for major capital projects, including City Rail Link and New Zealand Upgrade Programme (NZUP) projects. The Transport Accident Investigation Commission and Worksafe also have a role in the system in terms of health and safety and investigating accidents.

For the Wellington metro rail network, GWRC carries out equivalent functions to AT.

⁷ Both TDAK and CAF will be replaced by a new combined metro passenger operator and maintainer, Auckland One Rail. TDAK will be replaced from 2022 and CAF from 2025.

Key contractual, planning, funding and regulatory frameworks

The structure and evolution of the AMR system within the MROM is also the function of several key frameworks, some of which are contractual, while others are more regulatory in nature. These form important context to the review and are outlined in the table below.

Table 3: Overview of key frameworks relevant to the review

Framework	Description
ANAA	<p>The ANAA is an 85-year contract between KiwiRail and AT. The ANAA provides for AT's access to the AMRN in return for paying an access fee to KiwiRail. It also outlines the key performance indicators (KPIs) for KiwiRail's performance as access provider and network controller. While the ANAA is a 'best endeavours' agreement, a portion of the access fee is at risk if KiwiRail does not meet these KPIs. The ANAA, and the accompanying Common Access Terms (CAT), also contain governance mechanisms for planning operations.</p> <p>Under the ANAA, KiwiRail is required to prepare a Network Management Plan (NMP) (which is approved by AT) every three years. The NMP takes a 10-year view of the maintenance and renewal of the AMRN, and outlines a budget on a triennial basis. In practice, the ANAA budget is negotiated and agreed annually.</p>
Railways Act 2005	<p>The Railways Act sets out the framework for the regulation of railways in New Zealand. Under the Railways Act, entities operating rail vehicles and managing rail networks must be licensed and have an accompanying safety case, which outlines the licence holder's safety management system. The regulator, Waka Kotahi, reviews safety cases and is empowered under the Act to undertake safety assessments and take enforcement action. The Minister of Transport also has powers under the Act to set rail safety rules and standards.</p>
Government Policy statement on land transport, (GPS), NLTF, NLTP and RLTP	<p>The GPS sets out the Government's strategic direction for the land transport system over the next 10 years and is updated every three years. It provides guidance on how Waka Kotahi is to invest the NLTF, and how to assess and prioritise activities for Regional Land Transport Plans (RLTPs) and the National Land Transport Programme (NLTP).</p> <p>Under current settings, public transport services such as AMRN metro passenger rail services receive a 51% subsidy from the NLTF. However, from 2021, KiwiRail's share of below rail investment is funded from the NLTF. KiwiRail now pays track user charges into the NLTF.</p>
Rail Plan and RNIP	<p>The Rail Plan outlines the government's priorities for rail. The RNIP is prepared by KiwiRail and outlines its programme for below rail investment and is a statutory requirement for it to access NLTF funding. The RNIP is approved by the Minister of Transport on the advice of Waka Kotahi. These are new mechanisms and were both adopted for the first time in 2021.</p>
Codes and standards	<p>Codes and standards play an important role in safe management of the railway. There are two distinct codes and standards relevant to this review:</p> <ul style="list-style-type: none"> • KiwiRail's engineering codes and standards: These form part of KiwiRail's safety case under the Railways Act. They are internal to KiwiRail and govern below rail inspection, maintenance and renewal requirements. • National Rail System Standards (NRSS): These govern operations on KiwiRail's network, including interoperability requirements for users of KiwiRail's network. They are maintained by the NRSS Executive (see below).

System governance and collaboration

The parties also come together through various institutions to plan and monitor the system. During the review, we were not able to develop a definitive picture of current governance arrangements based on the information provided, and some arrangements are historic. However, the following arrangements are of most relevance to the review:

- **Operational groups:** These are primarily based around the ANAA and the CAT. They include the ANAA Relationship Committees and the Auckland Timetable Committee and Steering Committee.
- **Ad-hoc groups:** These include the ANAA Working Group, which has now been overtaken by the Auckland Metro Programme Control Group (PcG)⁸ established following the emergence of advanced RCF.
- **National Rail System Standards Executive (NRSS-E),** which maintains the NRSS and is chaired by KiwiRail and includes other rail operators using KiwiRail's network, but has not met since 2019, and
- **National Rail Industry Advisory Forum (NRIAF),** which was first convened in late 2018 by Waka Kotahi to identify, discuss, resolve and implement solutions to rail industry wide matters. It consists of the main participants in the New Zealand rail industry alongside industry regulators and the Ministry of Transport. However, the scope and focus of this group is currently under review.

For completeness, there are also separate governance mechanisms, facilitated by KiwiRail, overseeing major capital improvements to the AMRN. These are not a core focus of this review.

Evolution of the AMR System

The AMR system, and wider New Zealand rail system, has undergone significant change over the past two decades. At the beginning of the 2000s, the AMRN was owned and run by a private enterprise with limited passenger services. The below rail assets comprising the national rail system were acquired by the Crown in 2004, followed by the above rail assets in 2008.

Since 2006, the AMR system has received significant investment, including the EMU trains, improved stations, double tracking and electrification. As a result of this investment, passenger use has grown significantly. In FY 2005, just over 40,000 passenger services operated, which grew to over 160,000 passenger services in FY2018. Freight volumes have also grown steadily. However, there was limited investment in the underlying track infrastructure – resulting in the imposition of additional temporary speed restrictions (TSRs) as below rail infrastructure faults increased. Delay incidents attributable to the underlying network were trending upwards by approximately 20% a year.⁹

We have identified three periods relevant to this review:

- **2002-2014,** a period of significant investment in the AMRN to electrify the network and increase system capacity, but also a period of ongoing 'managed decline' for the wider rail system.
- **2014-2018,** a period where investigations into the AMRN uncovered significant further renewal requirements but where there was a missed

⁸ The PcG involves the Crown in addition to AT, KiwiRail and TDAK.

⁹ Above n 1, at Section 2.

- opportunity to address these and evolve the system in line with growing passenger and freight demands.
- **2018-onwards**, a period of change where the extent of RCF was uncovered, funding for below rail infrastructure increased, the AMR system worked to improve underlying track infrastructure, and where the Future of Rail review has better integrated the planning and funding of the national rail system with the wider land transport system.

Table 4 outlines key developments in each period in further detail. Appendix 2 also contains a more comprehensive timeline of events.

Table 4: Evolution of the AMR system

Timeline
2002-2014
The Crown became increasingly involved in the rail system with the acquisition of the AMRN in 2002, and the formation of KiwiRail in 2008. This was accompanied by significant Crown investment to expand AMRN capacity for metro passenger services, including double tracking, new stations, and electrification ahead of the introduction of the EMUs in 2014. AT and KiwiRail collaborated to procure the new EMUs, with the process beginning under KiwiRail before shifting to AT in its final phases. Existing track and formation infrastructure did not receive significant investment at this time.
The Crown adopted the MROM in 2009. Under this model, AT was tasked with planning and commissioning metro passenger rail services, and KiwiRail was responsible for freight services, long distance passenger services, and network infrastructure. AT and KiwiRail entered into the ANAA in 2012, providing AT with access to the AMRN for an 85 year term.
In 2010, the KiwiRail Turnaround Plan was implemented, which focused on ensuring KiwiRail financial sustainability and growing its freight business.
Waka Kotahi was formed in 2008 as a merger of earlier organisations. It has responsibility for administering the NLTF and for regulating safety in the rail sector. Concerns with the performance of its rail regulatory function were identified in 2013.
2014-2018
In 2014, AT commissioned an independent review into the AMRN. This review concluded that the network required a ~\$100m programme of catch up renewals and new maintenance practices to ensure the AMRN was fit for purpose. However, this catch up programme was not funded.
The EMUs were introduced in 2014. In 2016, the Crown and Auckland Council agreed to fund City Rail Link to further expand AMRN passenger capacity.
The ANAA parties formed working groups to address concerns over the wheel rail interface (WRI) between the EMUs and AMRN track (the WRI Group, 2017-2019), and wider network performance issues (the ANAA Working Group, formed in 2018).
At a national level, Waka Kotahi began increasing the capability of its regulatory branch and developing a business case for further expanding its regulatory team. A 2016 review of the NRSS for Waka Kotahi (Regulatory) identified deficiencies with the NRSS, including out of date standards and ineffective governance.
2018-onwards
The 2018 GPS introduced an increased focus on metro passenger rail and public transport, with specific funding for below rail infrastructure investment to improve passenger services.
The ANAA Working Group commissioned an independent review of AMRN infrastructure and subsequently developed the Rail Network Growth Impact Management (RNGIM) business case to fund below rail catch up renewals and new maintenance approaches. Waka Kotahi (Investment) approved the full RNGIM business case in 2020. (<i>continues over page</i>)

RCF emerged as a critical issue for the AMRN during this period. In 2019, Waka Kotahi (Regulatory) carried out a special safety assessment (SSA) into the AMRN, which identified significant deficiencies in the management of the network, including the presence of RCF. In 2020, new testing revealed the extent of the RCF issue, resulting in network wide TSRs being imposed. Urgent works were undertaken to enable TSRs to be removed.

Waka Kotahi (Regulatory) also convened the NRIAIF for the first time in 2018. However, a work programme for the NRIAIF has yet to be implemented.

The Future of Rail review, which began in 2017, found that ‘managed decline’ of rail infrastructure and short-term funding arrangements were key problems facing the national rail system. Changes to the rail funding and planning framework resulting from the review were implemented in 2021, including the Rail Plan and the RNIP.

RCF and the AMRN

As context to our findings, this section outlines what RCF is and why it is a concern, as well as the recent history of RCF on the AMRN. It also outlines the technical root causes identified as being responsible for advanced RCF on the AMRN by the RCF Working Group. These technical root causes form important context for this review.

RCF is a feature of all railways

RCF is a natural result of wheels passing over rail. In effect, cracks develop in the rail. If untreated, these cracks grow and can create the risk of sudden rail failure. RCF can be managed through regular inspections and by replacing rail. However, to optimise the total cost of ownership (TCO), regular grinding can be used to remove the RCF and extend the life of rail, avoiding the expense of rail replacements.

The initiation of RCF itself can be slowed through preventative track maintenance, compatible wheel and rail profiles, minimising vehicle effects, and lubrication.

The fatal Hatfield crash in the UK (see the case study over page) highlighted the risks of “managing” RCF rather than removing it.

Case Study – Hatfield Disaster¹⁰

Case Study – Hatfield disaster

The Hatfield Crash occurred in October 2000 and focused global attention on the risks of RCF. The Hatfield Crash occurred in Hatfield, Hertfordshire, where a train derailed. The derailment was caused by poor maintenance of the tracks, resulting in the rail fracturing as the train passed over it. 4 people died and over 70 people were injured.

Cause

The rail failure was due to multiple and pre-existing fatigue cracks in the rail. The maintenance contractor had failed to manage these effectively in accordance with industry standards. The investigation also found that Railtrack, the infrastructure controller at the time, failed to manage effectively the work of the maintenance contractor. Railtrack had also failed to implement an effective rail renewal operation. Railtrack lacked an overall strategy to manage the maintenance of rail. Railtrack's Asset Database was incomplete and inaccurate as to what assets they had, their condition, and expected life expiry. There was no system in Railtrack that recorded the total number and types of rail defects present in their infrastructure at any one time.

Consequences

An Investigation Board was established in 2000, making its final report in 2006. Railtrack was also prosecuted and convicted.

Public confidence in rail safety was undermined. Railtrack imposed TSRs across the rail network resulting in service levels falling. It also increased levels of maintenance and renewals rapidly, resulting in a sharp rise in its costs and in the company entering administration in 2001. As a result, Network Rail was created in 2002 as a public body to manage track infrastructure. In addition, regulatory settings were reviewed. This resulted in the establishment of the Rail Safety and Standards Board in 2003, to facilitate continuous improvement in health and safety by the rail industry. It also resulted in the merger of regulatory responsibilities into the Office of Rail Regulation (now the Office of Road and Rail Regulation), to oversee both rail safety and economic regulation.

Network Rail will soon form part of a new state-owned body to oversee rail transport in Great Britain, to be called Great British Railways. This change follows the recommendations of the 2021 Williams-Shapps Rail Review.

RCF and the AMRN

In 2019, engineering consultancy WSP completed a high level review of the AMRN's condition and of network maintenance practices (the WSP Infrastructure Review). This review identified RCF in a number of locations and recommended urgent action to monitor and assess RCF. Action was taken to test the level of RCF in the AMRN, and several TSRs were imposed.¹¹

WSP's findings were brought to the attention of Waka Kotahi (Regulatory), which prompted a Special Safety Assessment (SSA) of the AMRN. The SSA identified a number of deficiencies with KiwiRail's maintenance and inspection regime and noted that RCF appeared to be widespread across the AMRN.¹² In December 2019, Waka

¹⁰ See Office of Rail Regulation 'Train Derail at Hatfield: A Final Report by the Independent Investigation Board' (July 2006); and see UK Government 'Great British Railways: Williams-Shapps plan for rail' (20 May 2021) available at <https://www.gov.uk/government/publications/great-british-railways-williams-shapps-plan-for-rail>

¹¹ WSP 'Draft Auckland Rail Network High Level Infrastructure Review' at [3.2] and [4.2.2.2].

¹² Waka Kotahi '2019 Special Safety Assessment – Auckland Metropolitan Rail Network Status – Final Report' (September 2019).

Kotahi issued a section 28 notice under the Railways Act to KiwiRail, the first time this power had been used. This notice restricted further growth in AMRN usage until KiwiRail had created, and could demonstrate, an appropriate maintenance programme.¹³

In June 2020, Waka Kotahi closed out its SSA, noting it was satisfied that KiwiRail had initiated several key programmes of work to improve the AMRN. This was subject to ongoing monitoring, including progress reporting on RCF testing and on the RNGIM programme.¹⁴ However, in August 2020, as a result of further testing for RCF, blanket 40 kmph TSRs were imposed and urgent repairs were undertaken across the AMRN.¹⁵

Technical root causes

As a response to advanced RCF being identified on the AMRN, a working group, comprised of AT, KiwiRail and Transdev was created to investigate the technical root causes of RCF on the AMRN, specifically causes that unreasonably accelerated RCF formation.

In 2021, the RCF Working Group released a report identifying the technical root causes (the Root Cause Report).¹⁶ This report identifies that RCF in Auckland was due to a widespread set of localised causes stemming from a track asset that was not “fit for purpose” prior to the commencement of a more frequent, more demanding modern EMU passenger operation.¹⁷

The Root Cause Report states that the closest single root cause could ‘be stated as a missed opportunity during 2014-17 to implement the recommendations of the 2014 Network Rail Consulting report’, which had identified a series of required investments in the renewal of AMRN below rail infrastructure and changes in maintenance and renewal practices.¹⁸

The RCF Working Group divided the root causes into three categories: (1) condition of track and maintenance practices (2) the impact from the stiffness and wheel profile of the EMU vehicles, and (3) the wheel-rail interface (WRI). Their findings are outlined in more detail in the table over the page. The group also made eight recommendations including renewal of the infrastructure, rail grinding, improved asset management planning and further investigations into the WRI.

¹³ Waka Kotahi ‘Section 28 Notice: imposition of conditions on Auckland Metropolitan Network’ (19 December 2019).

¹⁴ Waka Kotahi ‘2019 Special Safety Assessment – Auckland Metropolitan Rail Network status report close out and ongoing monitoring’ (5 June 2020).

¹⁵ See KiwiRail ‘Auckland Track Repair Project’ (September 2020) available at <https://www.kiwirail.co.nz/assets/Uploads/Projects/AKL-Metro-2020/Auckland-Track-Repair-Project-FAQs-September.pdf>.

¹⁶ See above n 4.

¹⁷ Ibid, at [9.5].

¹⁸ Ibid, at [9.6].

Table 5: Root Cause Report

Root Cause Report findings	
Track: Sub-optimal track condition, under-investment and insufficient rail grinding	Track related root causes include: <ul style="list-style-type: none"> Historic under-investment prior to 2014 and through to August 2020, with the report noting that ‘a significant underlying cause is most likely to be aged track on historic formation’. Insufficient rail grinding from 2015 through to August 2020. Suboptimal track condition at multiple sites on the network (including aged sleepers and track, and gauge exceedances). Auckland’s climate was also identified as a partial contributor to the growth of track defects.
Vehicle: High yaw stiffness may increase EMU’s propensity to create RCF on non-perfect track	Vehicle related root causes include: <ul style="list-style-type: none"> High primary yaw stiffness in the EMUs (to improve passenger comfort), which may increase a vehicle’s propensity to cause RCF on non-perfect track, although modelling to demonstrate this was not included in the root cause brief. An EMU wheel profile, which was modified from KiwiRail’s standard profile to counteract wheel flange wear from vehicle stiffness, has a greater propensity to cause RCF formation over the most common KiwiRail profile (based on modelling done as part of the root cause analysis). The Root Cause Report notes that the KiwiRail profile is also unlikely to be optimal.
Wheel rail interface (WRI): Insufficient emphasis on wheel rail profile that optimises total cost of ownership (TCO)	WRI related root causes include: <ul style="list-style-type: none"> A lack of comprehensive grinding since 2015. A lack of artificial rail inclination on track structures. Insufficient emphasis on developing and adopting a wheel-rail profile that optimises the TCO of the rail system.

Stakeholder perspectives

Stakeholder feedback provided during Phase 1 of this review identified different areas of emphasis and remaining areas of disagreement amongst the stakeholders on some root cause elements. KiwiRail emphasised the contribution of the EMUs. AT stated that the RCF Working Group and supporting experts were conclusive that track, formation and associated asset management issues were contributing factors, but that studies were inconclusive in regard to vehicle and WRI as root causes. CAF noted that it did not agree that EMU stiffness or the wheel profile were root causes.

Further insight into the root causes of RCF

In 2019, the ANAA Working Group identified and agreed three problem statements relating to the performance of the AMRN.¹⁹ They shed further light on the technical contributing factors:

- ‘Investment in the underlying rail network has failed to keep pace with growth, risking the success of planned and major projects and asset failure,
- Current approaches to operating, maintaining and renewing the network struggle to cope with growth and ageing assets, and are inadequate for a future Metro environment, and
- Time and access for maintenance is limited and reducing with service growth, leading to inefficiencies and limiting progress on renewals needed prior to major projects.’

¹⁹ Above n 1, at section 2.

Findings

Our core finding is that the AMR system lacked the maturity to ensure the AMRN was fit for purpose during a period of rapid growth. We have identified weaknesses across system planning, the checks and balances within the system, and the wider enabling environment that likely contributed to the root causes of advanced RCF.

This section outlines our specific findings and supporting reasons. These have been structured in line with the analytical framework developed to support this review.

Analytical framework

RCF is a technical phenomenon. A variety of system issues may have contributed to the technical ‘root causes’ of advanced RCF on the AMRN. System level issues include those associated with system governance, incentives, funding, and the capacity and capability of system participants. Through our engagement with system participants and review of key documents we have identified issues spanning each of these areas.

To assess and categorise each issue, we have developed a framework to enable issues to be separated and evaluated in a clear, coherent manner. We have separated each of these issues into three categories that detracted from a well-functioning rail system. In developing these categories, we considered how a mixed-use rail system, with multiple participants, should have operated to avoid RCF reaching the point of criticality and safety risk that it did. We have used the characteristics of this well-functioning system as a benchmark to evaluate the system issues raised through this review.

In our view, a well-functioning mixed-used rail system would incorporate the following three elements:

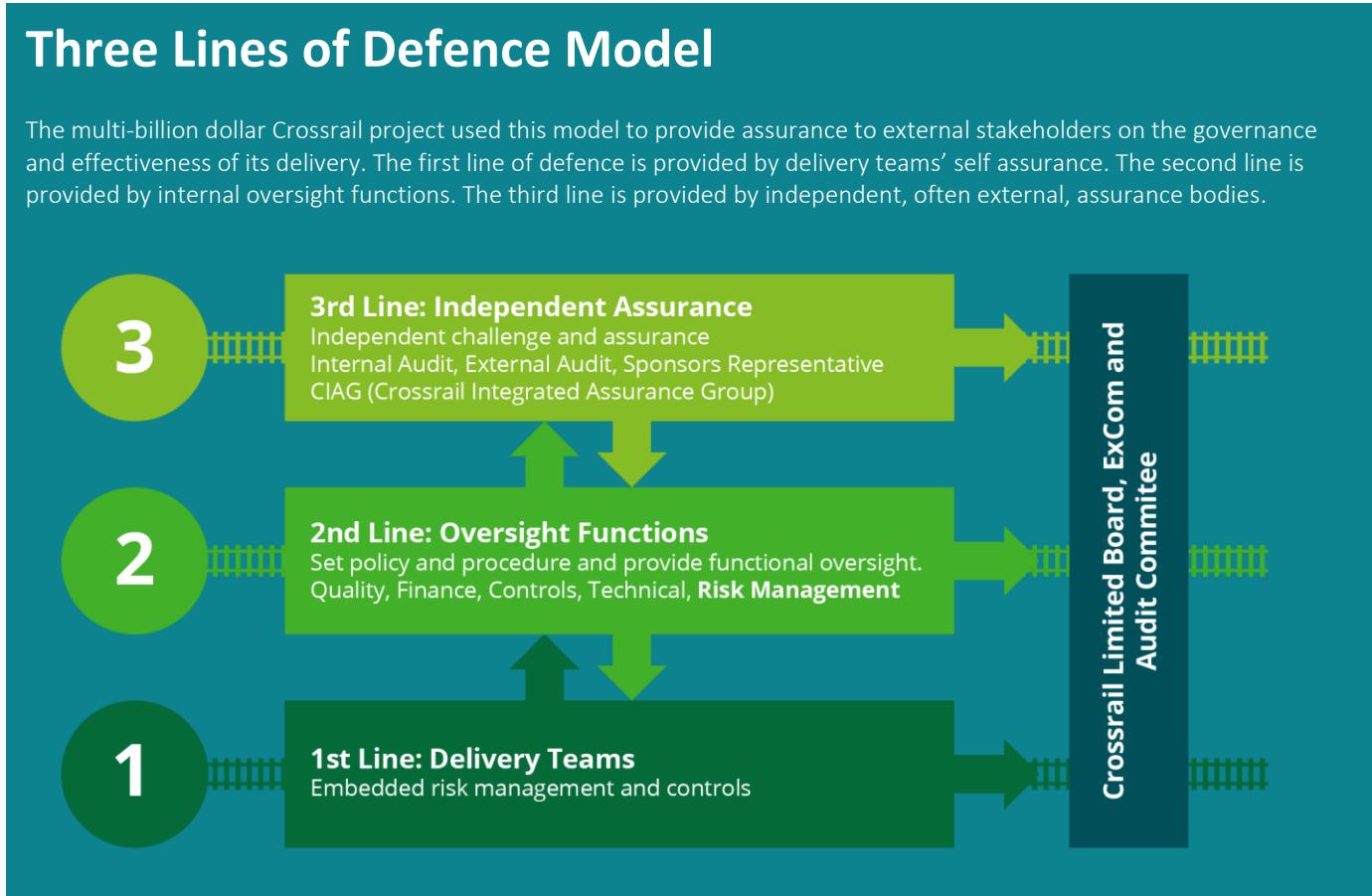
- A unified set of system objectives for planning and delivering the desired levels of service (i.e. planning and coordination).
- Appropriate checks and balances to ensure system participants are effectively carrying out their functions (i.e. safeguards and incentives).
- An enabling environment that allows participants to achieve the desired service levels. This would include sufficient funding, capacity and capability, clear accountabilities, and mechanisms to allow the system to respond appropriately to changed needs through time (i.e. minimising constraints or inhibitors on parties delivering the system objectives).

In a system that had each of these three elements, it is unlikely that RCF would have gone undetected and unmitigated as occurred on the AMRN.

In developing this framework, we have also drawn on the Three Lines of Defence model created by the Crossrail project in UK in relation to risk and assurance (see case study below).

“In developing these categories, we considered how a rail system should have operated to have avoided RCF reaching the point of criticality and safety risk that it did.”

Figure 2: Three Lines of Defence Model²⁰



Findings – overview

From our document review and interviews, we found evidence that the system lacked the elements of a well-functioning system. In our view there was no one system level factor that was responsible for the emergence of RCF. Instead, several different issues, reflecting an overall lack of system maturity, are likely to have contributed to the emergence, and delayed identification, of advanced RCF. We have categorised our analysis of these issues these issues into the following three areas:

- Lack of unifying objectives and planning,
- Ineffective safeguards and incentives, and
- Constraints and inhibitors to the enabling environment.

Our findings are connected to the emergence of advanced RCF and, therefore, largely reflect the period between 2014-2018. We acknowledge that there have been several relevant developments to the AMR system since then, and these are reflected in the discussion below and in our recommendations.

²⁰ See Rob Halstead' Crossrail Learning Legacy Risk and Assurance' (14 March 2017) available at <https://learninglegacy.crossrail.co.uk/documents/risk-and-assurance/>.

Key findings – unified objectives and planning

Finding 1: The AMR system is fragmented and lacked a unified set of objectives and supporting planning & coordination mechanism that brings all the parties together to agree and maintain those objectives.

The effective management of a rail system like the AMR requires balancing a complex set of interests such as passenger and freight timetables, access for regular maintenance and improvement projects, and stakeholder funding constraints.

When the system is disaggregated, as is the case with the AMR system, effective governance and planning mechanisms are required to ensure the system has a clear strategy. Given the capital-intensive nature of railways, these strategies need to take a long term perspective.

The AMR system lacked a clear, long term strategy that brought and defined together the desired levels of service across freight and passenger services. It also lacked a clear mechanism to integrate the objectives of central government, AT and KiwiRail into this strategy.

In the period leading up to the discovery of advanced RCF, AMR system objectives and service level expectations were fragmented. They were spread across the ANAA (and NMPs prepared under the ANAA), KiwiRail's corporate objectives, and planning mechanisms such as the RLTP, NLTP and Auckland Transport Alignment Project (ATAP). Further, the objectives in the ANAA do not provide for a long term view of AMRN development. The ANAA also does not capture KiwiRail's above rail services, and neither the Crown nor the Waka Kotahi are party to the ANAA. The NMPs prepared under ANAA that we reviewed appeared to take a more tactical rather than strategic approach, and do not provide a view beyond 10 years.

There were efforts to create a long term strategy for the AMRN. For example, AT and KiwiRail developed the Auckland Rail Development Pathway in 2014, which was followed by the Auckland Rail Development Programme (ARDP) in 2015. However, the ARDP outputs we have reviewed did not express clear objectives for the AMRN as a whole, appeared orientated towards proposed capital projects, and were expressed as interim outputs.²¹ While the ARDP informed the ATAP and RLTP processes, central government was not a clear partner to the ARDP and there was a lack of a national level rail strategy during this period.

If there had been a clear set of long term objectives and service levels agreed between the Crown, AT and KiwiRail, this may have enabled better planning of system interventions to support the uplift in network usage during the 2010s. It would have provided for more transparency over the discrepancy between the quality of the infrastructure and asset management approaches (see below) and the increasing demands on the AMRN. This may have forced conversations between different parts of the system on how to address this discrepancy before the issues became critical.

²¹ See, for example, AT and KiwiRail, 'Auckland Rail Development Programme - Interim Report - December 2015 DRAFT 0.1' at [1.1]: 'This report does not comprise a definitive statement of the future rail strategy and investment pathway (The Auckland Rail Development Programme) for Auckland. Further detailed investigation and modelling is required to confirm assumptions made in this report and refine the medium term programme.'

Following the Future of Rail review, the Crown has now adopted its first Rail Plan, which sets out strategic objectives for the rail system. The RNIP, prepared by KiwiRail, needs to align with this plan, and is reviewed by Waka Kotahi (Investment) and approved by the Minister of Transport. While a feature of the RNIP, the maintenance and renewal of the Auckland and Wellington metro networks is still primarily governed by KiwiRail's respective access agreements with AT and GWRC. KiwiRail and AT are currently developing a programme business case to refresh the ARDP. We understand this business case is intended to capture all stakeholder requirements for the AMRN over the next 30 years.

Finding 2: There is no detailed, and integrated, above and below rail asset management plan for the AMRN that optimises the total cost of ownership based on agreed levels of service.

For the AMRN to work successfully as a system, a detailed asset management plan to realise the objectives for the system is critical. This plan would define the optimal programme interventions required over the short, medium and long term to meet the expected levels of service. It would also identify the funding, network access, and capabilities required to achieve this plan, and how asset management interventions will be prioritised. However, in the years preceding the discovery of advanced RCF, there was no detailed asset management plan for the AMRN, let alone an asset management plan integrating a whole of life view of both above rail and below rail assets.

A lack of detailed asset management planning and understanding appears to have been a long standing issue. In 2008, the Auditor-General identified that there was no long-term plan for the below rail network as a whole and limited asset information.²² While we understand KiwiRail has a national asset management plan covering both its rail and ferry assets, no detailed AMRN asset management plan was developed. The NMPs prepared under the ANAA contain high level, rather than detailed, asset management strategies and interventions to maintain and renew the AMRN. AT stated they have raised repeated concerns around the quality of these NMPs. We also understand efforts between 2017 and 2019 to optimise interfaces between above and below rail assets have resulted in no agreement on a way forward.

The lack of a detailed plan was likely partly the result of limited funding, but also reflected an apparent lack of comprehensive asset condition awareness. This lack of asset condition information was identified by the Auditor-General in 2008 and, based on the findings in the 2019 SSA and WSP's 2019 review, appears to be an ongoing issue despite the introduction of an asset management software system, Maximo, in 2014. A strong understanding of the underlying asset condition is needed for an effective asset management plan to be created.

If there had been a good understanding of the asset condition, this may have provided the evidence needed to prompt earlier intervention to prevent RCF.

A key recommendation contained in both the Root Cause Report and WSP Infrastructure Review is for the development of a detailed, multi-year asset management plan for the AMRN.²³ The Root Cause Report also recommends the development of a separate 30-year plan for rail grinding. Improvements to KiwiRail's asset management maturity is a focus of the first RNIP. However, we were not provided with the results of KiwiRail's recent asset

²² Office of the Auditor-General 'Performance audit report: maintaining and renewing the rail network' (June 2008) available at <https://oag.parliament.nz/2008/ontrack/docs/ontrack.pdf> at Part 5.

²³ Root Cause Report, above n 4 , at 16; and High Level Infrastructure Review, above n 11, at [5.4]

management maturity assessment. We understand KiwiRail intends to develop an AMRN asset management plan and will work with AT on developing this plan.

Key findings – safeguards and incentives

Finding 3: Maintenance standards did not keep pace with the requirements of a modern metro system, raising questions over how these standards were governed and assured.

KiwiRail’s engineering codes and standards play a critical role in ensuring the AMRN is fit for purpose. However, KiwiRail’s codes and standards were not up the standard required for a modern metro network. In addition, Waka Kotahi has raised concerns regarding KiwiRail’s adherence to these codes and standards.

System participants stated that KiwiRail managed the AMRN in accordance with codes and standards that were more appropriate for a freight network rather than a metro passenger system. In 2014, a report by Network Rail Consulting noted that these codes and standards required updating, particularly to ensure grinding and inspection regimes were better planned and more frequent due to increasing passenger and freight operations.²⁴ KiwiRail advised that it undertook a review of these standards in 2015. However, we are unsure to what extent Network Rail’s observations were addressed. In addition, the WSP Infrastructure Review recommended enhancements to these codes and standards to align with other jurisdictions with metropolitan and mixed traffic.²⁵

KiwiRail’s adherence to codes and standards has also been an issue. The 2019 SSA found that the condition of the AMRN indicated that the track infrastructure was not being maintained in accordance with relevant standards. The SSA also raised concerns that KiwiRail was able to modify their standards to suit business requirements.²⁶ In 2020, Waka Kotahi undertook a further SSA into track infrastructure, focusing on inspections and preventative maintenance. This found further instances of where preventative maintenance and inspections may not have met KiwiRail’s codes and standards, and identified a need to improve elements of governance and oversight of adherence to codes and standards.²⁷ When combined with the 2019 SSA, this raises questions over the effectiveness of KiwiRail’s controls over codes and standards (particularly taking account of the three lines of defence model, see Figure 2). We requested detailed information on these controls and were only provided with high level information.

Fit for purpose codes and standards, and an accompanying inspection and maintenance regime that adhered to these standards, would have been an important safeguard in terms of the early identification of RCF.

As part of the RNGIM programme, funding has been set aside for changes to KiwiRail’s codes and standards to better align them with equivalent international standards for high capacity metropolitan and mixed-traffic rail networks. Waka

²⁴ Network Rail Consulting ‘Auckland Metro Network Management Plan Track Study: Final Report’ (12 June 2014) at [4.1.9].

²⁵ Above n 11, at [6].

²⁶ Above n 12, at 14-16.

²⁷ See Waka Kotahi ‘2020 KiwiRail Special Safety assessment – Track Infrastructure – Inspection and Preventative maintenance’ (30 April 2021).

Kotahi (Regulatory) has noted they have a current focus on the ensuring KiwiRail's adherence to codes and standards.

Finding 4: The safety regulator was passive and lacked the maturity and resourcing to clarify its role and work pro-actively.

An effective regulator is a critical third line of defence for ensuring that the AMR system is operating safely. However, in 2013, an independent review of the rail regulator found that it was perceived as 'too soft' and 'passive'. It also noted that the regulator had limited ability 'to conduct safety critical lead indicator "near miss" type incident analysis' to identify emerging issues.²⁸

Steps were taken to implement the 2013 review's findings, but in 2018 it was identified that Waka Kotahi still had insufficient funding to effectively carry out its rail safety regulatory function. The regulator was still not resourced to achieve the intended safety outcomes in its operating model. Waka Kotahi noted that the 'opportunity cost of this approach is that wider, risk-based activities cannot occur (systems and incident investigations, intelligence regarding critical risk, and management of identified critical risk) all of which are related to avoiding a catastrophic accident occurring.'²⁹

In the period leading up to 2019, the rail regulator, therefore, lacked the maturity and resourcing to pro-actively identify the infrastructure issues emerging on the AMRN. A more robust regulator may have taken action sooner to prevent the RCF situation.

In 2018, Waka Kotahi revised their Rail Safety Regulatory Operating Model, and the associated uplift in funding for the rail regulator was approved and implemented. In 2019, Waka Kotahi (Regulatory) took an active role in investigating the state of the AMRN's infrastructure, when it became aware of the findings of the WSP Infrastructure Review. However, we understand that Waka Kotahi's rail regulatory function is still part way through its maturity journey and they are in the process of reviewing and updating their operating model to further align with Waka Kotahi's wider regulatory strategy. A review of the rail regulator's funding model and requirements was anticipated for 2020, but we understand this has not taken place.³⁰

Finding 5: The ANAA commercial model does not create incentives for the access provider to lift the quality of network access services to that required for a modern metro system.

The access framework needs to create the right incentives for the rail network owner to provide a network that meets the requirements of the access seekers. The ANAA is the key mechanism in the AMR system for monitoring KiwiRail's performance and incentivising improvements to AMRN below rail infrastructure.

²⁸ See ARTS 'Independent Review Report into Rail Systems Team' (December 2013) available at <https://www.nzta.govt.nz/assets/site-resources/content/commercial/docs/atrs-rail-systems-team-review.pdf>.

²⁹ Waka Kotahi 'Rail Safety: the case for an enhanced New Zealand regulator' (October, 2018) available at <https://www.nzta.govt.nz/assets/consultation/rail-safety-regulator-funding-review/rail-safety-funding-business-case-oct-2018.pdf>, at [27].

³⁰ Waka Kotahi 'Stage 2 Cost Recovery Impact Statement: Sustainable funding for the rail safety regulator' (14 December 2018) at [95]-[96].

The structure of the ANAA is likely to have had some influence on the state of the asset between 2014 and 2019. Funding arrangements had a short term focus compared to the long lived, capital intensive nature of railways. While the ANAA has a triennial basis, budget negotiations between the parties occurred annually. The absence of a longer term funding commitment is unlikely to have provided an optimal environment for KiwiRail to grow its capacity and capability, nor would it have facilitated transparency over the asset condition through investment in the inspection regime.

The ANAA obliges KiwiRail to use its best endeavours to meet the KPIs in the agreement and does not contain ‘high powered’ incentives and enforcement mechanisms. Incentives within the ANAA include a performance fee based on achieving KPIs (the performance fee represents 7% of the maintenance and network control fee paid by AT under the ANAA).³¹ This performance fee, and AT’s overall access fee itself, is small relative to the scale of KiwiRail’s commercial business and the Crown funding put into the system. Additionally, the monopolistic nature of the network means that AT cannot practicably terminate the agreement if it is dissatisfied with the services KiwiRail provides.

Interviewees noted KPI targets in the ANAA do not reflect the passenger experience and are not aligned with above rail KPIs within the passenger train operator’s contract, creating misalignment within the system. Agreement of both parties is required to reset KPI targets and change KPIs. KPI bands were tightened ahead of FY 2017-2018, but we understand further changes have not been agreed. We also understand that the original ANAA network performance KPIs were not fully defined and were intended to be developed further, but this did not occur.

Overall, it is likely the incentives in the ANAA were insufficient to incentivise KiwiRail to lift network performance to levels required for frequent metro passenger services. The short term funding focus is likely to have contributed to an inability to renew the network and to modernise maintenance practices. The agreement also lacks the non-financial enforcement mechanisms that would normally work in tandem with KPIs in a commercial agreement with a non-monopolistic supplier.

We understand that an ANAA ‘reset’ programme of work is commencing between KiwiRail and AT to ensure the ANAA is updated ahead of CRL coming into service. The addition of the RNIP, where Waka Kotahi scrutinises KiwiRail’s below rail infrastructure investment, has created another potential mechanism for monitoring network performance.

Finding 6: There was an absence of effective industry governance arrangements to raise and resolve system concerns.

When system responsibilities are disaggregated, like with the AMR, effective governance mechanisms are required to ensure the service outcomes are delivered. For the AMR system to work effectively, we would have expected there to be clear governance arrangements that engage key system participants in the development and performance of the system.

In the period leading up to the discovery of advanced RCF, there was an absence of effective governance. The ANAA governance mechanisms only involved a subset of the stakeholders in the system: KiwiRail, AT and TDAK. Interviewees noted that there

³¹ See ANAA, Schedule 7.

was an inability to escalate issues beyond the ANAA parties to address issues such as funding. We are not aware of a standing forum that existed during this time involving the Crown or Waka Kotahi (Investment). This is despite the 2009 MROM cabinet paper stating that Waka Kotahi would play a pivotal role in making sure MROM was working and that the Ministry of Transport would be a referee and negotiator between the parties where necessary.³² Such a forum could have provided line of sight across the system of emerging issues.

Governance arrangements between the ANAA parties do not appear to have been effective either. Waka Kotahi's 2019 SSA stated that parties' 'inability to compromise was apparent to the assessor', with the assessor suggesting that an independent chair be appointed to the ANAA Working Group.³³ At one level, the ANAA Working Group exhibited successful collaboration, with the parties working together to successfully secure funding for the RNGIM programme. But the fact that an ad-hoc group had to be created to address declining system performance suggested the formal governance mechanisms in the ANAA itself were not effective. Further, other efforts at collaboration, such as 2017-2019 WRI Group, appear to have reached no conclusion on how to ensure above and below maintenance approaches were optimised.

During Phase 1 of this review, we requested, but were not provided with, a clear stocktake of AMR system governance arrangements. However, we understand governance arrangements are currently subject to a degree of ambiguity and overlap. We are aware that AT and KiwiRail are currently reviewing AMRN governance arrangements and we have seen a high level overview of one proposal. It will be critical that governance structures and processes are clarified to ensure key stakeholders have a clear picture of system performance, can contribute to strategic decision making, and that issues can be escalated appropriately as they emerge.

From a regulatory perspective, the main industry forum that existed was the NRSS-E, which governed the standards for operations on KiwiRail's network. Given KiwiRail's concerns that the EMUs may have been a root cause of the RCF issues, this group could have played a role in resolving WRI concerns. However, reviews in 2013 and 2016 found that the NRSS were obsolete and identified issues with ineffective governance.³⁴ We understand that the NRSS-E is effectively dormant, having last met in 2019. Further, the NRSS-E only comprises a subset of industry participants. It does not appear that the recommendations of the Martin Jenkins's review have been implemented (noting that KiwiRail advised that it undertook an informal review of the NRSS in 2018). Waka Kotahi's Safer Rail team is not actively monitoring progress against that review's findings and regards this as a role for KiwiRail.

A truly national industry forum, the NRIAIF, was created in late 2018. NRIAIF's objective is to create a collaborative forum for the main players in the New Zealand rail industry alongside industry regulators, and the Ministry of Transport, to identify, discuss, resolve and implement solutions to rail industry wide matters.³⁵ However, this forum was created too late to have any impact on RCF on the AMRN. Additionally, this forum is yet to substantially progress its work programme, which could include working groups on regulatory systems, risk and safety systems, and interface and

³² Above n 5, at 5.

³³ Above n 12, at 16.

³⁴ Above n 28, at 31; and Martin Jenkins 'Review of the governance, operation and management of the National Rail System Standards: Final Report' (5 December 2016) at 21.

³⁵ Waka Kotahi 'Signal: A year in rail safety 2019/20' (December 2020) available at <https://www.nzta.govt.nz/assets/resources/signal-a-year-in-rail-safety/Signal-a-year-in-rail-safety-2019-20.pdf>.

interoperability (potentially interfacing with the NRSS-E). Waka Kotahi (Regulatory) is currently reviewing NRIA's objectives and scope.

Key findings – enabling environment

Finding 7: The funding model focused on short term affordability and did not enable catch up renewals or investment in capability and capacity to deliver ongoing maintenance and renewals for the long term.

The funding model in the ANAA is likely to have had some influence on the state of the AMRN during this period. This was further complicated by an ambiguous dividing line between 'business as usual' renewals and 'catch up' renewals.

Both AT and KiwiRail faced affordability constraints during this period. KiwiRail's financial environment, in particular, was constrained during this period as it sought to implement its Turnaround Plan. KiwiRail proposed a NMP budget of over \$22.2 million in FY 2015/16 but noted this was reduced to \$18.4 million to match AT's budget constraints. This meant capital renewals and other service levels were reduced.³⁶ Over the period from 2015 to 2020, the Root Cause Report notes there was little renewals investments, against an infrastructure deficit exceeding \$100 million.³⁷ While the ANAA has a triennial basis, budget negotiations between the parties have in practice occurred annually. The absence of both a long term focus and funding certainty would not have provided an environment for KiwiRail to grow its capacity and capability.³⁸

During Phase 1 of this review, system participants noted that the ANAA was intended to fund steady state maintenance and renewals, rather than to fund the rehabilitation of the AMRN. Documents reviewed suggest that the Crown was responsible for funding catch up renewals (to bring the respective metro rail networks to a steady state condition following many years of deferred maintenance before the MROM was introduced), a view also held by several stakeholders. The 2015 RLTP noted that AT and KiwiRail had prepared a rail development pathway setting out investments required to deliver a robust and reliable rail system to support growth in both passenger and freight services. However, it noted a lack of funding for catch up renewals with '*no clear avenue for the funding of rail infrastructure improvements. The Transport Agency is currently unable to fund rail infrastructure [before 2018] and KiwiRail's investment is limited to freight projects where there is a demonstrated commercial return*'.³⁹ A 2017 Ministry of Transport paper highlighted views that the issue of catch up renewals had not been resolved.⁴⁰

In summary, between 2014 and 2017 the AMR system was unable to secure sufficient funding to address the underlying infrastructure issues that contributed to the RCF situation, resulting in a missed opportunity to remediate the track infrastructure and thereby address one of the root causes of RCF identified by the RCF Working Group.

³⁶ See at Auckland Network Management Plan, Starting 1 July 2015 (Version 13) at ii; AT noted an unwillingness to invest additional funds until KiwiRail's asset management planning and practices were improved.

³⁷ Above n 4, at [4.10]; The 2014 review of the AMRN by Network Rail Consulting concluded that the network was not fit for purpose and recommended an investment of ~\$100 m.

³⁸ As is noted by WSP, see above n 11, HLIR, at [5.4.5.1].

³⁹ Auckland Transport 'Regional Land Transport Plan 2015-2025' available at <https://at.govt.nz/media/1191335/Regional-Land-Transport-Plan-Adopted-Version-July-2015.pdf>, at [8.2.7].

⁴⁰ Ministry of Transport 'Metropolitan Rail Operating Model Review: Phase 1 – Draft Issues paper for consideration / comment' (13 April 2017) at 17-19.

Changes introduced from 2018 onwards have gone some way to improve the funding situation. The introduction of the NLTF Transitional Rail activity class in 2018 enabled the RNGIM programme to be funded, which comprises over \$300 million in investment into the AMRN. However, the RNGIM programme on its own is unlikely to be sufficient to achieve a modern metro standard.⁴¹ The RNIP, first agreed in 2021, now provides additional certainty for KiwiRail's share of the ANAA budget, with this share now funded from the NLTF on a triennial basis.

AT and KiwiRail are jointly working to identify the ongoing asset management and related funding requirements for the AMRN. This work should identify any residual infrastructure deficit post-RNGIM as well as the funding required to deliver the ongoing maintenance and renewals programme.

An ongoing challenge is there is no dedicated funding for further Auckland renewals from the NLTF. Instead, funding must come through the ANAA or from the Crown. AT's share of the ANAA budget is funded at 51% FAR from the NLTF, which could mean there is an ongoing affordability constraint driven by AT's ability to contribute the remaining 49%.

Finding 8: There were competing objectives/priorities within the AMR system, which led to insufficient access for maintenance.

Railway systems have to balance the demands of access seekers with the need to ensure sufficient access for infrastructure maintenance, renewal and improvement.

Under the ANAA, track possession plans are agreed by the Auckland Network Timetable Committee, which includes representatives from KiwiRail and AT. We understand that the committee works through unanimity, where the mixed incentives of participants may have impacted maintenance access.

During Phase 1 of this review, questions were raised around whether there was sufficient provision, and effective use, of access windows. With increased network use in the 2010s, access windows were reducing. In 2019, WSP identified that the efficiency of the work programme was being compromised by lack of track access, resources, and codes and standards not tailored to the AMRN.⁴² Waka Kotahi's 2019 SSA also noted that the then operational situation on the AMRN was limiting maintenance access and not contributing to successful maintenance outcomes, with 'a lack of clear understanding of each party's needs, constraints and their inability to compromise [being] apparent to the assessor'.⁴³

During Phase 1, questions were also raised by review participants regarding the productivity of the block of lines, with freight trains running through these blocks, and KiwiRail not adopting modern maintenance practices, particularly in relation to the equipment being used. A lack of daylight inspections due to the frequency of daytime services was also noted by WSP in 2019.⁴⁴ Waka Kotahi also raised specific concerns around the lack of in-depth daylight inspections, which reduces the detection of faults.⁴⁵ One interviewee noted that there was lack of cyclical maintenance windows to perform pro-active maintenance.

⁴¹ Above n 4, at [4.14].

⁴² Above n 12, at 7.

⁴³ Ibid, at 16.

⁴⁴ Above n 11, at [5.4.2].

⁴⁵ Above n 12, at 19.

Overall, the evidence suggests that an inability to achieve an effective compromise between AMRN maintenance requirements and the demands of access seekers prevented required inspections and maintenance from going ahead.

We would expect that future access requirements and provision to be addressed through the new asset management plan, updated codes and standards, the ANAA reset, and proposed changes to AMR system governance.

Finding 9: The capacity and capability needed to support an effective cyclical maintenance programme were insufficient given usage growth and the age and condition of assets.

An appropriately resourced maintenance programme working to a detailed asset management plan is critical to preventing RCF reaching an advanced state on railway systems like the AMRN. However, it is clear that KiwiRail lacked the capacity and capability to carry out an effective maintenance and renewals programme given the demands on the network.

In 2019, both WSP and Waka Kotahi's 2019 SSA identified that the maintenance programme was not keeping pace with network requirements. Below rail asset management practices on the AMRN were largely reactive rather than proactive. They needed to be proactive to meet international best practice for a modern metropolitan railway.⁴⁶

The Waka Kotahi SSA noted that the maintenance programme was insufficient to keep pace with the deterioration of the AMRN. Extensive TSRs were being used to manage risk, which was unsustainable due the maintenance backlog this approach creates.⁴⁷

In addition to insufficient access (see finding 8), for the maintenance programme to be effective, there was a requirement for more people to carry out the programme, staff training, new technology and higher throughput equipment. A key finding of the Root Cause Report was insufficient grinding between 2015 and 2020.⁴⁸ Waka Kotahi's 2019 SSA also identified a lack of suitable grinding equipment in New Zealand, with equipment having to be imported from Australia when required. The SSA recommended that a rail grinder be permanently based in New Zealand.⁴⁹

The connection between a lack of capacity and capability to maintain the AMRN, and the emergence of advanced RCF is clear. However, we acknowledge this situation was also a function of the inadequacies in planning, funding and oversight identified above.

The RNGIM programme is funding new equipment and training with the objective of improving access productivity and asset management practices. However, we do not have information on the extent to which asset management practices have improved. The ongoing resource requirements for the AMRN below rail maintenance programme will also be determined through the development of a detailed asset management plan.

⁴⁶ Above n 1, at 4 and 19.

⁴⁷ Above n 12, at 12.

⁴⁸ Above n 4, at 11.

⁴⁹ Above n 12, at 15 and 19.

Themes from stakeholder interviews and feedback

We also sought feedback on our draft findings during Phase 1 of this review. The stakeholder feedback received was generally in agreement with our high level findings, or otherwise did not raise objections to our findings. However, there were differences of emphasis in the stakeholder feedback.

KiwiRail's feedback emphasised funding as a key system issue, noting that while there were many contributing factors to the RCF situation, the most significant was the lack of funding to enable an appropriate asset management planning and investment programme. Prior to the Future of Rail review, KiwiRail stated it was underfunded and the rail system was in managed decline.

AT saw the underlying reason for the existing situation as a lack of asset management planning, and a lack of maintenance and renewals in line with increased use and use by various parties.

As noted in the 'Review Context' section of this report, there were different stakeholder perspectives on the role of the EMUs as a root cause to the RCF situation. Given the historical nature of the EMU procurement and differing recollections of the parties, we were not able to confidently attribute any issues with EMU design and procurement as 'system issues'. The inability to optimise the total cost of ownership between below and above rail is reflective of lack of asset management planning and an inability to achieve consensus through groups such as the WRI Group.

Options

This section considers potential options for addressing our key findings. In developing these options, we have considered recent changes to the AMR system as well as stakeholder feedback and a set of option design considerations.

Context for option design and recommendations

Relevant changes since 2018

The ‘Findings’ section of this report outlines the system level factors that, together, likely contributed to the emergence of advanced RCF. At a high level, these were a lack of unified system objectives and planning, ineffective checks and balances, and constraints and inhibitors to the enabling environment. These findings were based on analysing the functioning of the system primarily between 2014-2018, when there was a missed opportunity to prevent RCF reaching a critical state. Our options for addressing these findings, therefore, also need to account for subsequent changes.

Since the establishment of the ANAA Working Group in 2018, the AMR system has taken several positive steps when measured against the characteristics of a well-functioning rail system. These include:

- The Crown has created a Rail Plan with strategic objectives for the rail system, including for both freight and passenger. Through the RNIP, rail is now better integrated into the land transport planning and funding framework.
- KiwiRail is currently developing a national rail asset management plan. KiwiRail and AT are collaborating to ensure better integration of their above and below rail asset management planning and decisions. At a late stage of this review, we were also informed that KiwiRail intends to create an AMRN specific asset management plan.
- The safety regulator’s resourcing and presence has increased, with the regulator playing a critical role in bringing focus to the RCF issue.
- The establishment of NRIAF in late 2018 was intended to improve rail industry collaboration and provide input on industry-wide regulatory issues. However, the objectives and scope of NRIAF are currently under review by Waka Kotahi (Regulatory).
- Funding for the RNGIM programme, approved in 2019, is intended to improve the condition of AMRN below rail infrastructure, modernise codes and standards, and introduce new equipment.
- The KiwiRail share of the AMRN budget is now funded through the NLTF for the next 3 years, which partially addresses the affordability constraint on network maintenance and renewals.

At a late stage of this review, we were also informed of plans for an Auckland metro governance reset. While these steps are positive, many of these changes are still work in progress. The implementation and effectiveness of these changes will need to be monitored over time.

Considerations for option design

To help guide option design and recommendations we developed a set of principles.

These considerations complement our characteristics of a well-functioning system (see the ‘Findings’ section) and draw on our findings, the Future of Rail framework, and international case studies.

These considerations are:

- Governments (central and local), working closely with KiwiRail, should set the strategy for rail to reflect the degree of public benefits associated with the rail network and services. The strategy should include setting the funding envelope that is needed to facilitate effective system planning and prioritisation.
- Asset management processes and a whole-of-life perspective (integrating above and below rail) are crucial to optimising system outcomes (including safety and operational performance outcomes).
- Both funders and beneficiaries have a critical role in overseeing the development of the system and monitoring the realisation of public benefits. This is to ensure value for money from investment and to ensure customer expectations are met.
- Track and train should work to a consistent customer-focused performance framework to deliver passenger and freight benefits. This to ensure that the performance of the underlying network infrastructure is aligned with end user expectations.
- Funding arrangements need to provide certainty to reflect the capital intensive and long-life nature of railways and to enable effective planning and delivery of works.
- Below rail infrastructure has natural monopoly characteristics, which means there are risks in relying solely on contractual arrangements and collaboration to respond to changes in desired outcomes over time. There needs to be mechanisms in place to ensure ‘best for system’ outcomes are achieved where access seekers cannot reach agreement with the network owner.

These considerations were discussed with system participants and they were broadly in agreement with them.

Scope

The terms of reference for this review also limited the scope of our recommendations. Changes that can be made within the current system architecture, such as the ANAA and the framework created as a result of the Future of Rail review, were in scope. However, changes to industry structure and ownership, including KiwiRail’s organisational form and structure, independent economic regulation and major project governance and delivery were not in scope. This review was not a comprehensive stocktake of the MROM.

Options to enhance planning and operational performance of the AMR system

There are a range of options to strengthen AMR system planning and performance

In response to our findings, we prepared a spectrum of option packages focused on system planning and performance. These options were discussed and tested with stakeholders to inform our final recommendations. The options have been prepared

with consideration to changes that have been implemented since 2018 and all options represent an evolution within the current MROM settings.

The three option packages were:

- **Option A – embed recent AMR changes**, which drew on changes that have already occurred, or that are well underway.
- **Option B – expand recent AMR changes**, which would involve extending changes to the ANAA and asset management planning.
- **Option C – expand Future of Rail framework**, which would further expand the Future of Rail changes into the metro rail systems.

Each option consists of elements to strengthen planning, the commercial framework, funding, and system governance, taking account of the design considerations outlined above.

Table 6: Options to strengthen AMR system planning and performance

Options
Option A – embed recent AMR changes
Option A captures the changes that have been implemented since 2018, and moderately evolves some of these elements. Option would A consist of the following key elements:
<ul style="list-style-type: none"> • Through the ANAA, AT and KiwiRail to agree an improved 10-year NMP for the AMRN based on the requirements identified through the refreshed ARDP (to create a more unified vision for the AMR system and to improve AMRN planning). • KiwiRail to complete development of a national rail asset management plan, which will inform RNIP and the NMP (to improve system planning). To support this exercise, and the improved NMP, KiwiRail and AT to collaborate to ensure better integration of their above and below rail asset management planning and decisions. • Funding arrangements remain unchanged, AT funds the metro share of the agreed NMP with a committed one-year affordable budget. KiwiRail pays AMRN track user charges to the NLTF. • KiwiRail to implement the RNGIM programme (to improve codes and standards, the underlying asset condition, and asset management capability and capacity). • AT and KiwiRail to negotiate ANAA KPI changes to reflect the progressive improvement of the AMRN under the RNGIM programme (to strengthen the commercial incentives on KiwiRail to deliver a higher performing AMRN). • AT and KiwiRail to agree a reset of governance arrangements (in line with the high level proposal supplied by KiwiRail during Phase 2 of this review) (to strengthen checks and balances in the system). • The ANAA would remain the primary mechanism for monitoring NMP delivery and system performance, with Waka Kotahi (Investment) monitoring RNIP delivery and Waka Kotahi (Regulatory) monitoring system safety.
While Option A might strengthen some elements of the system, it would rely heavily on collaboration between KiwiRail and AT. Our view is that there remains a risk of advanced RCF re-emerging, or another similar issue, if the system continues on this basis. The changes would not necessarily resolve ongoing affordability constraints, and only moderately improve the commercial incentives to provide a modern metro rail network. We also question whether or not a governance framework, which does not involve the Crown and Waka Kotahi (Investment) at a strategic level (as proposed by KiwiRail during Phase 2), will be truly effective.
Option B – expand recent AMR changes
Option B extends the key elements of Option A, and would include:
<ul style="list-style-type: none"> • AT and KiwiRail to develop a joint statement of system requirements for the AMRN, updated on a three year cycle, to guide asset management planning and identification of improvement projects (to provide for alignment on network strategy). • KiwiRail and AT to develop a standalone, long term asset management plan for AMRN to inform RNIP and NMP, with this plan to be regularly updated in line with system requirements (to improve system planning).
<i>Continues over page</i>

- AT extends its committed funding for the metro share of the NMP to 3 years, aligned with RNIP (to provide KiwiRail with additional funding certainty).
- The Crown, Waka Kotahi (investment) and AT to work to resolve regional affordability to ensure a sustainable level of maintenance renewals funded under the ANAA (e.g. through a FAR review), and also to work with KiwiRail to resolve the funding on any remaining catch up renewals.
- AT and KiwiRail to agree a reset of governance arrangements, incorporating both the Crown and Waka Kotahi (Investment), to ensure key system participants are involved in system development and can monitor emerging issues. This option could also incorporate changes to access governance, through an independent or Crown representative on the network access committee.
- Waka Kotahi (investment) to work jointly with AT and KiwiRail to monitor cost and delivery of RNIP improvement projects within the Auckland region.
- AT continues to monitor NMP delivery and ANAA KPI performance.

Our view is that successful implementation of Option B will materially improve system performance. It would embed improvements to strategy and asset management planning, and provide for more funding certainty. However, there would remain some risk of advanced RCF re-emerging, or for another similar issue to emerge, as the option:

- Does not completely resolve affordability constraints, and
- Still relies heavily on sustained and effective collaboration between KiwiRail and AT.

Option C – expand Future of Rail framework

Option C would involve a fundamental change in AMR system's commercial and governance frameworks, and would include:

- AT, KiwiRail, Waka Kotahi (investment) and the Crown collectively to develop a statement of network objectives and requirements as an input to the RNIP and AMRN AMP (to ensure alignment on strategy). This could form part of the Rail Plan or be a separate standalone document.
- KiwiRail to develop a 30-year AMRN asset management plan, which becomes a requirement for acceptance of the RNIP (to ensure the asset management plan is developed, and to involve Waka Kotahi (Investment) in scrutinising this plan, given its more active role in the system under Option C).
- AT to pay track user charges into the NLTF for their use of the AMRN, which would potentially require further NLTF support to make up any resulting funding shortfall (so that AT and KiwiRail are paying for network use on an equivalent basis, and to address affordability constraints).
- AT and Waka Kotahi (Investment) to jointly develop a revised ANAA performance regime with KiwiRail, which becomes a requirement for acceptance of the RNIP (to create a backstop to ensure the performance regime is aligned between the AMRN and rail operations).
- The NMP and associated delivery monitoring to be removed from the ANAA and replaced by joint monitoring by Waka Kotahi (Investment) and AT (to both reflect the additional requirements in the RNIP, which are monitored by Waka Kotahi, while ensuring AT, as the representative of the metro passenger, is still closely involved in performance monitoring.)
- ANAA scope to be reduced to access rights and day-to-day network performance monitoring and management (to reflect the changes above, while also reflecting that Waka Kotahi is not directly involved in the provision of public transport services and that a framework for network operations is still required).

This option has the potential to strengthen oversight of the system and resolve affordability issues. The RNIP is leveraged to provide a backstop in case collaboration between the parties does not result in agreement on improved asset management planning and an improved performance regime. However, joint monitoring of system performance between AT and Waka Kotahi (Investment) would require careful design to ensure roles and accountabilities are clearly defined, as would the design of any track user charge regime applying to metro passenger rail services.

Stakeholder feedback on Options A, B and C

We tested Options A, B and C with system participants. Stakeholders recognised a need to further evolve the system beyond the status quo. However, stakeholders also noted that this review's recommendations should recognise that change is underway.

They also noted that more wholesale changes to the system would be disruptive and require careful consideration, including detailed design and analysis.

Option A

Stakeholders noted that several important workstreams were underway across both metro rail networks focused on improving system performance. However, stakeholders agreed that there are still critical issues to be resolved with the status quo, including across:

- **Strategy:** There is still a lack of alignment on objectives across the system. One stakeholder noted that nationally focused strategies, such as the Rail Plan, are still relatively high level and currently have limited impact at the metro rail level.
- **Funding:** There are still unresolved issues with funding, both in terms of ensuring the funding model is sufficient for ongoing maintenance and renewal requirements, and resolves the issue of catch up renewals. This issue applies across both the AMRN and Wellington metro network.
- **Governance and decision making:** Some stakeholders noted that while there have been improvements, including in collaboration, trust and engagement, this is still a work in progress and there are still limitations in the system. Transparency and quality of information was also noted as an issue, which needs to be improved to enable better decision making. Both the AT and GWRC noted that they have historically found it hard to ensure central government is at the table.

Option B

Several system participants noted that Option B would be workable. They also noted that the AMR system was already moving towards some elements of Option B:

- The intention is now to develop a dedicated, long term AMRN asset management plan.
- Both metro rail systems are also developing programme business cases to define the long term development of each rail system.
- Both metro rail systems are also considering resets to their access agreements and revisions to governance arrangements.

For Option B to improve system performance, it was noted that checks and balances would be essential to ensure momentum is maintained and desired outcomes achieved. There would need to be a governance framework that draws all key participants together, including KiwiRail, AT, GWRC, Waka Kotahi (Investment) and Ministry of Transport. AT and GWRC also noted they would like to be more closely involved in the development of the next Rail Plan and RNIP.

It was also noted that Option B may not fix affordability constraints if it does not:

- clarify responsibility for catch up renewals, or
- provide sufficient funding to enable an uplift in system capability and capacity.

Option C

The view across the stakeholders was that Option C would be difficult to achieve given the current condition of the network and allocation of roles in the system. With Option C, there would be challenges in terms of Waka Kotahi (Investment)'s rail capability and its proximity, as it is not directly responsible for services provided on the AMRN. Joint monitoring between Waka Kotahi (Investment) and AT and GWRC

would have to be carefully designed to ensure clear accountabilities and that the metro councils were appropriately involved. There was also concern expressed about the potential for duplication of roles. The introduction of a track user charge applying to metro passenger services would also require careful consideration. Finally, relying on the NLTF to make up any shortfall in funding may not resolve funding issues. The NLTF has to balance funding across several competing priorities.

Overall, Option C would require further development and would be best evaluated through a fundamental MROM review, rather than through this review. One stakeholder noted that changes already underway need an opportunity to embed. Several stakeholders noted that Option C could be achieved once the system had improved in terms of asset management maturity.

Options to strengthen safety regulation

In addition to an effective framework for planning and monitoring the operational performance of the AMR system, it is critical that there is a well-functioning safety regulatory framework as a check and balance, or third line of defence. A number of areas for improvement or ongoing focus became apparent through this review. These include:

- The currency of KiwiRail's engineering codes and standards and KiwiRail's adherence to those codes and standards,
- The maturity of the safety regulator, and
- The functioning of NRSS-E and NRIA, which both have a regulatory focus.

Our recommendations responding to these are outlined below.

In response to the Options A-C, there was also discussion around integration with the safety regulatory system. This included a suggestion that safety performance should be incorporated into the monitoring of system performance, rather than being separate. One stakeholder also noted that there were challenges in monitoring system safety as the system lacks a collective safety view, with data scattered across system participants.

Recommendations

While the AMR system has taken steps in the right direction in recent years, further change is required to strengthen the system for the long term.

Our recommendations are segmented into two key areas: enhancing planning and operational performance of the AMR system, and then specific recommendations to address the performance of the safety regulatory system.

Recommendations to strengthen AMR system planning and operational performance

Recommendation 1: AMR system participants implement the package of changes described as Option B in this report, taking account of our governance comments below.

On balance, we recommend that the AMR system implement Option B. These changes generally have the support of system participants and are, therefore, likely to be tractable. If implemented, the proposed changes would likely improve how the system is planned and the monitoring of performance.

The key elements of Option B include:

- AT and KiwiRail to develop a joint statement of system requirements for the AMRN, updated on a three year cycle, to guide asset management planning and identification of improvement projects.
- KiwiRail and AT to develop a standalone, long term asset management plan for the AMRN to inform the RNIP and NMP, with this plan to be regularly updated in line with system requirements.
- AT to extend its committed funding for the metro share of the NMP budget to 3 years, aligned with the RNIP.
- The Crown, Waka Kotahi (Investment) and AT to work to resolve regional affordability to ensure a sustainable level of maintenance renewals is funded under the ANAA (e.g. through a FAR review), and also to work with KiwiRail to resolve the funding of any remaining catch up renewals.
- AT and KiwiRail to agree a reset of governance arrangements, incorporating both the Crown and Waka Kotahi (Investment), to ensure key system participants are involved in system development and can monitor emerging issues. This option could also incorporate changes to access governance, through an independent or Crown representative on the network access committee (see below).
- Waka Kotahi (Investment) to work jointly with AT and KiwiRail to monitor cost and delivery of RNIP improvement projects within the Auckland region. AT to continue monitoring NMP delivery and ANAA KPI performance.

We have also reviewed KiwiRail's proposed revisions to AMR governance arrangements, which are currently at a high level. However, we believe the structure

we reviewed would be enhanced if it included a system ‘oversight’ or ‘steering’ group consisting of KiwiRail, AT, Waka Kotahi (Investment) and the Ministry of Transport. This group would have a strategic focus on system performance and development. It would build trust and confidence in the system, and ensure central government is at the table. The specific functions of this group could include:

- Receiving regular updates on operational performance, development and implementation of the AMRN asset management plan, and capital project delivery (including emerging issues),
- Identifying and overseeing implementation of system improvements,
- Input into the next RNIP and Rail Plan,
- Input into the MROM review (see below), and
- Escalation of issues that the parties have been unable to resolve through other mechanisms.

This group could be an extension of the proposed KiwiRail-AT joint governance group. Alternatively, it could be a standalone group that also includes GWRC, providing oversight across both metro rail networks. Given the similarities between both metro rail networks, this should be given serious consideration.

Our proposed new governance arrangements are not intended to change or remove individual accountabilities in the system. The objective is to provide for greater line of sight over the performance of the system and to build consensus on its future direction.

Responding to Finding 8 above, regarding competing objectives and maintenance access, we also recommend that the Ministry of Transport work with AT and KiwiRail on future AMRN access arrangements to ensure they take a ‘best for system’ approach. This could involve an independent chair or a Crown representative on the access group. Their role would be to ensure an optimal trade-off between the requirements of different access seekers, including access for maintenance supported by mature analysis of system objectives, requirements and capability. In addition, given the significant amount central government funding for the AMRN, that access is working to deliver the outcomes that the government is purchasing through its funding of the system.

Recommendation 2: The Ministry of Transport monitor progress against implementation of Option B, as well as the implementation of similar changes in relation to the Wellington metro network.

Close monitoring of Recommendation 1 will be critical to ensure Option B is implemented and benefits realised. Option B relies on collaboration between the parties to deliver outputs such as an improved ANAA performance regime, an asset management plan that integrates above and below rail considerations, and funding to enable that plan to be delivered. If collaboration breaks down, or if the execution of change is slow and below the standard required, then issues like advanced RCF may re-emerge. We, therefore, recommend that the Ministry of Transport should closely monitor the implementation of Option B. Progress with implementing Option B would also inform the proposed review of the MROM (see below).

While our recommendation is for Option B to be implemented in Auckland, similar arrangements should be considered for the Wellington metro network given that the governance and commercial framework is extremely similar to that of the AMR

system. The Ministry of Transport should monitor progress on the Wellington Network Access Agreement reset and accompanying efforts to improve asset management planning and interventions.

Recommendation 3: The Ministry of Transport undertake a fundamental review of the MROM across both the AMRN and Wellington metro network.

We recommend that the Ministry of transport undertake a fundamental review of the MROM across Auckland and Wellington. Our concern is that, while system participants are currently collaborating on improvements across the respective metro rail systems, this collaboration does not resolve some of the key drivers that gave rise to RCF, particularly issues such as insufficient funding and incentives in the commercial framework. Elements of Option B, if implemented effectively, will help optimise the AMR system over the short to medium term. However, they do not necessarily ensure the AMR system will continue to evolve in line with growing demands on the system in the decades to come, particularly if there is a breakdown in collaboration.

The AMR system architecture needs to ensure early detection and escalation of issues, like advanced RCF, before they significantly disrupt rail services – or cause a major safety incident. We are concerned that other issues of equivalent severity to advanced RCF may emerge. This is because Option B is reliant on effective collaboration between the parties to ensure that AMRN asset management planning and practice, or the ANAA performance regime, is fit for purpose.

The rail system is complex and the introduction of changes that shift performance management away from the existing access agreements, such as with Option C, require detailed design and evaluation. In addition, there may be a case to introduce economic regulation to the metro rail networks or to make changes to industry structure. Such changes were out of scope for this review. They would best be evaluated through a review of the MROM itself.

Recommendations to strengthen safety regulation and performance

Recommendation 4: Ministry of Transport and Waka Kotahi (Regulatory) to review currency of, and progress against, the rail safety regulator's operating model.

It is clear that Waka Kotahi (Regulatory) has made significant progress since the 2013 review and is playing a more active role in the system. However, it appeared the safety regulator was still part way through its maturity journey. Following the Future of Rail review, the rail system is clearly increasing in strategic importance. It is likely to grow further in usage by both freight and passenger services. It is important that the regulator's operating model evolves with the system. Given its operating model was last formally reviewed in 2018, we would recommend a further review to ensure it is fit for purpose, and that it has the right resourcing and tools to ensure it can deliver on this operating model.

Recommendation 5: KiwiRail to review and respond to Martin Jenkins NRSS-E recommendations in consultation with the Ministry of Transport and Waka Kotahi (Regulatory).

It was clear that institutions such as the NRIA and NRSS-E are not working effectively. While we did not find a direct connection between the NRSS and advanced RCF on the AMRN, interoperability standards are important to the safe functioning of the railway. The NRSS-E would have been a natural forum for discussing any issues between rolling stock and the track. The fact the NRSS-E is currently dormant, and that the findings of the 2016 review into the NRSS have not apparently been addressed, is a matter of concern. We, therefore, recommend KiwiRail review the recommendations of the 2016 review and provide a formal response to the Ministry of Transport and Waka Kotahi (Regulatory).

Recommendation 6: Waka Kotahi (Regulatory) to complete its review of NRIA and operationalise the forum.

NRIA is an important addition to the system in our view. With a clear work programme, it would help enable an industry wide view of safety to be formed. It would also help Waka Kotahi (Regulatory) and the Ministry of Transport identify areas where the regulatory framework needs to evolve, including areas requiring the attention of the regulator or new regulations. Given NRIA was created in 2018, the fact it has not been fully operationalised at this point is a concern. We recommend that Waka Kotahi (Regulatory) swiftly complete its review of the NRIA and operationalise this forum.

Recommendation 7: KiwiRail to complete the review and update of codes and standards as recommended in the RNGIM business case.

KiwiRail's engineering codes and standards are an area of concern. WSP recommended that these standards be reviewed to ensure they are fit for a modern metropolitan system. KiwiRail should complete its review of relevant codes and standards as recommended by the RNGIM business case. KiwiRail should also ensure required changes to codes and standards are implemented, along with supporting capacity and capability, such as additional training and equipment.

Recommendation 8: KiwiRail and Waka Kotahi (Regulatory) to ensure that KiwiRail's codes and standards, and adherence to those codes and standards, are subject to appropriate ongoing assurance consistent with the KiwiRail's safety case.

Waka Kotahi's safety assessments have also highlighted concerns regarding KiwiRail's adherence to its engineering codes and standards, including internal KiwiRail oversight over adherence to codes and standards.

We recommend that KiwiRail and Waka Kotahi (Regulatory) ensure that KiwiRail's codes and standards, and adherence to those codes and standards, are subject to

appropriate ongoing assurance consistent with KiwiRail's safety case under the Railways Act. Appropriate assurance includes ensuring codes and standards are adhered to, any derogations are subject to appropriate review, and that codes and standards are fit for purpose.

Appendix A: AMR Roles and Responsibilities

This Appendix provides an overview of current key AMR system roles and responsibilities. The overview is high level and intended to aid understanding of the system. It is not a definitive picture of roles and responsibilities across the AMR system.

Table 7: Outline of key accountabilities and responsibilities related to the ANRN budget

	Crown	Auckland Transport	KiwiRail	Waka Kotahi (Investment)	Metro Operator	EMU Maintainer
Network budget	AMRN metro passenger access fee	Pays access fee based on its share of the AMRN network budget	Invoices Auckland Transport for access	Pays share of AT access fee at 51% FAR	Checks KR access fee invoices through wash up process	
	AMRN network budget	The Minister of Transport approves the RNIP, which incorporates the AMRN budget	Influences AMRN budget as pays large share, approves NMP	Develops the AMRN network budget for inclusion in the NMP. Also develops the RNIP, which incorporates the AMRN budget	Reviews the RNIP, which incorporates the AMRN budget	
	AMRN KiwiRail freight and long distance passenger share of network budget		Pays TUC into NLTF	Pays KR share of AMRN budget, which forms part of the RNIP		

Table 8: Outline of key accountabilities and responsibilities related to safety and standards

	Crown	Auckland Transport	KiwiRail	Waka Kotahi (Regulatory)*	Metro Operator	EMU Maintainer
Safety and standards	NRSS & Executive		Convenes NRSS-E, develops standards for interoperability in consultation with other NRSS-E members	Observes NRSS-E	Participates in NRSS-E	Participates in NRSS-E
	National Rail Industry Advisory Forum	Observer (MoT)	Member	Member	Convenor	Member
	Track Engineering Standards		KR sets its standards and codes for maintenance and inspection	Some degree of oversight of major changes that relate to KR's safety case		
	Safety regulation	Minister has the power to set rail safety rules	Rail sector participant, but is unlicensed	Owes safety case for the network infrastructure, network control and its freight and long-distance passenger services	Grants safety licences, reviews safety cases, conducts annual audits and conducts safety enforcement activities, facilitates NRIAIF, can recommend rail safety rules to the Minister	Owes safety case for metro passenger rail services

We also note that Transport Accident Investigation Commission and Worksafe are involved in safety oversight alongside Waka Kotahi (Regulatory).

Table 9: Outline of key accountabilities and responsibilities related to planning and funding

	Crown*	Auckland Transport	KiwiRail	Waka Kotahi (Investment)	Metro Operator	EMU Maintainer
Planning and funding	Network renewal funding	Responsible for share of steady-state renewals funding	Responsible for seeking funding for renewals from WKI and AT	Some catch up renewals currently funded by WKI	Consulted with as part of NMP development	
	Network upgrades funding	Current programme of network upgrades are largely funded by the Crown	Works with KR on strategic planning for network, half funds CRL	Develops business cases and executes programmes	WKI can fund additional metro rail upgrades via NLTF at 51% FAR for AT's share	
	Network Management Plan	AT reviews and accepts the NMP	KR develops the NMP in consultation with AT and Transdev		Consulted with as part of NMP development	
	Asset management planning (below rail)	Interest in below rail asset management approach as seeks to maximise network performance for metro passenger rail services	Responsible for asset management planning for below track infrastructure	Provides asset management advice through RNIP approval process		
	Asset management planning (above rail)	Funds new KR rolling stock	Plans and procures new PT rolling stock and passenger stations	Grants running rights to rolling stock, plans and procures freight rolling stock, interest in above rail asset management to extent it has implications for below rail assets	Pays share of AT capital costs	Manages EMU rolling stock
	Long term planning	Party to ATAP, since 2021 has also set objectives through the Rail Plan and approves the RNIP	Works with KR to develop ARDP, which informs RLTP, RNIP, ATAP	Works with AT to develop ARDP, which informs RLTP, RNIP, ATAP	Party to ATAP	

*We note the Ministry of Transport monitors performance of the transport system and advises on system settings, with Treasury monitoring KR's commercial performance as an SOE. Both the Ministry and Treasury advise on system funding

Table 10: Outline of key accountabilities and responsibilities related to network operations

	Crown	Auckland Transport	KiwiRail	Waka Kotahi (Investment)	Metro Operator	EMU Maintainer
Operations	Below rail maintenance and renewal delivery	Influences access to network for infrastructure works through timetable committee, and funding available through NMP	Responsible for planning and executing maintenance and renewal programme		Influences access to network for infrastructure works through timetable committee	
	Metro passenger operations	AT is responsible for planning and commissioning metro passenger services	Consulted as access provider, network controller and maintainer		Responsible for delivering metro passenger services.	
	Freight and long distance passenger operations		KR plans and operates freight and long distance passenger services			
	Network access	Member of the network timetable committee, has access rights granted under ANAA	KiwiRail chairs and has majority of representatives on network timetable committee, and controls access to network		Observer on the network timetable committee	
	Station maintenance	Awards contract for maintenance and renewal works		Pays share of AT operating costs		
	EMU maintenance	Owns rolling stock and has running rights, and contracts CAF to maintain EMUs				Responsible for maintaining EMUs
	DMU maintenance	Contracts KiwiRail to maintain metro passenger DMUs	Responsible for maintaining DMUs			

Appendix B: System Evolution

Timeline of events: Pre-2014

The transformation of the AMR system began with the Crown investment of \$600m for the Developing Auckland's Rail Transport (DART) programme between 2006 and 2012, followed by the electrification of the network (AEP) and the procurement of a fleet of modern EMUs.

Table 11: Timeline of events pre-2014

Event	Date	Description	Relevance
Crown reacquisition of rail assets	2002-2008	The AMRN was acquired in 2002, and all below rail assets forming the national rail system in 2004, leading to the formation of Ontrack. In 2008, the above rail assets were acquired and merged with Ontrack to form KiwiRail.	Resulted in significant changes in industry structure, with first vertical disaggregation between above and below rail services, and then reintegration into a Crown-owned SOE.
Railways Act 2005	2005-onwards	Established the current licensing regime where rail participants assess and control their safety risks and provide assurance to Waka Kotahi (Regulatory).	Created the current regulatory framework, with Waka Kotahi (initially Land Transport NZ) as regulator.
DART	2006-2012	Significant investment to expand capacity of system through double tracking, upgraded stations, reopening the Onehunga line, and a new connection to Manukau.	New infrastructure enabled more intensive use of network, however infrastructure already in place only received relatively minor improvement.
AEP	2007-2013	Electrification of most of the AMRN (Papakura to Swanson) and total replacement of the signaling system.	Enabled EMU use and more intensive use of network.
Matangi procurement	2007-2010	Greater Wellington Regional Council acquired new electric metro passenger fleet.	KiwiRail have stated that they were closer to the Matangi than the AM Class EMU procurements, with the Matangi trains not having the equivalent design features as the AM Class EMUs.
AM Class EMU procurement	2009-2014	The procurement of the new Auckland electric passenger fleet was first managed by ARTA (AT's predecessor) and transferred to KiwiRail in 2009. AT then completed the process in 2011.	Resulted in the introduction of new rolling stock that saw patronage grow significantly. EMU design features have been identified as one of the contributing factors to RCF, although the extent of this contribution is not agreed between KiwiRail and AT (and CAF).
KiwiRail Turnaround Plan and Metropolitan Rail Operating Model (MROM)	2009-onwards	The Turnaround Plan focused on improving KiwiRail's financial viability and its freight business, and MROM clarified that regional transport authorities were responsible for planning and procuring metro rail services.	Created existing AMRN industry arrangements, with split between freight and metro passenger services and adoption of ANAA for metro passenger access and associated fee.

Aurecon Track Study	2011	KiwiRail commissioned study into existing track quality and to identify routine or catch up renewals; found track to be in fair condition with isolated deterioration.	Did not identify a significant infrastructure or funding deficit, but highlighted the need for a preventive maintenance programme and long term investment programme, and potential EMU impacts.
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Timeline of Events: 2014 -2018

During this period catch up infrastructure renewals were identified by Network Rail Consulting. However, these were not funded. There was also a review that identified issues with the forum that governs system interoperability (the NRSS-E). Steps were also taken to increase the capacity and capability of the regulator. The ANAA parties formed new working groups to address network performance issues.

Table 12: Timeline of events 2014-2018

Event	Date	Description	Relevance
Independent Review of NZTA Rail Safety Team	2013	Waka Kotahi (Regulatory) engaged an international consultant to review the performance of its rail regulatory function.	Highlighted 'considerable room for improvement' in terms of the regulator's performance and resourcing.
Network Rail Consulting Report	2014	AT commissioned Network Rail Consulting to undertake an independent review of the track condition for Auckland to identify the works needed to bring the track asset condition up to the standard required to support reliable EMU operation.	Identified a need for a five-year programme of catch up track and formation renewals (~\$100 million in value), and suggested reviews of engineering standards and maintenance planning procedures.
Running rights granted for AM Class EMU	2014	KiwiRail granted running rights to the AM Class EMUs in 2014, noting that it had concerns the modified EMU wheel profile would impact on rail maintenance requirements. Both AT and CAF have noted that they are not aware of these concerns being raised at the time, and that the wheel profile was approved by all stakeholders during the EMU design stage.	Allowed EMUs to begin operating on the AMRN.
Auckland Rail Development Implementation Pathway and Auckland Rail Development Programme (ARP)	2014-onwards	In 2014, an AT report proposed a pathway for development of the Auckland rail network through to 2031, including the catch up renewal programme suggested by Network Rail. In 2015, this was formulated into the ARDP, a joint AT and KiwiRail passenger and freight infrastructure plan from 2016 – 2045, setting out the network and infrastructure investments required to meet forecast demand.	Identified an indicative programme of works to enable the network to meet post-City Rail Link (CRL) service levels. The 2014 report identified securing funding, resourcing and access as key implementation issues.
Review of National Rail System Standards (NRSS)	2016	WK (Regulatory) commissioned review that assessed the governance, operation and management of the NRSS.	Identified deficiencies with the NRSS, including out of date standards and ineffective governance.
Rail safety funding business case and regulator maturity model	2017-2019	In 2017, WK (Regulatory) commissioned a review to identify and provide evidence-based recommendations for managing priority safety risks for New Zealand rail operations. From 2017 through to 2019, Waka Kotahi (Regulatory) developed a maturity model to enhance its rail regulatory capability and performance, and to fund those enhancements.	Enabled the rail safety regulator to expand its capacity and capability.

Future of Rail review	2017-2019	In 2017, the Future of Rail review began examining the future role rail could play in New Zealand's transport system. The review found the rail network was facing a state of managed decline due to long-term underinvestment, and that short-term funding arrangements for the rail network through the annual budget process were inadequate for a long-term network asset.	Led to significant changes in how rail is planned and funded at a national level. The Future of Rail had a component which was reviewing the MROM. However, it was agreed to maintain MROM within the new system, recognising that a future review was required.
GPS 2018	2018-2021	GPS 2018 introduced an increased focus on public transport, with a dedicated transitional activity class for metro rail infrastructure improvements.	Provided funding to address AMRN catch up renewals, introduce new equipment, and review maintenance codes and standards.
ANAA Working Group	2018	A working group was formed, consisting of AT, KiwiRail, and Transdev, in light of increasing demands on network and service failures, to review the AMRN infrastructure, maintenance and asset renewal strategy.	Brought together the ANAA parties to address declining system performance, and led to the RNGIM business case.
Joint KiwiRail-AT Wheel Rail Interface (WRI) Working Group 2018 – 2019	2018-2019	Following engagement on WRI issues in 2017, AT and KiwiRail formed a working group in 2018 to examine issues with EMU stiffness. This was in the context of granting running rights to an additional tranche of EMUs. This group last met in September 2019. The parties have agreed to re-establish a WRI group.	Illustrates that the parties were aware of WRI issues but also highlights that the WRI discussion is ongoing.

Timeline of Events: After 2018

While the AMR system participants developed a business case to secure funding for AMRN infrastructure renewals, the state of the AMRN became a focus of the regulator. RCF emerged as a prominent issue with the AMRN. The identification of widespread advanced RCF in 2020 required the imposition of blanket speed restrictions and urgent track repairs. The parties have now reached a position on the technical causes of the RCF. The government has also made significant changes to the planning and funding framework for rail in New Zealand with the introduction of the Rail Plan and the Rail Network Investment Programme.

Table 13: Timeline of events after 2018

Event	Date	Description	Relevance
High level infrastructure review	2019	Independent review by WSP reporting to the ANAA working group into the specification and condition of AMRN rail assets, maintenance standards and maintenance plan.	Reconfirmed extensive track and track bed renewals were required and provided the basis for the RNGIM business case. The review identified that urgent action was needed to monitor and assess RCF and mitigate RCF through grinding or rail replacement.
RNGIM Single Stage Business Case	2019-2020	Business case prepared by WSP identifying a preferred set of interventions to address the findings of the high level infrastructure review.	Secured funding from the new NLTF transitional rail activity class to undertake catch up renewals and to improve maintenance approaches, capacity and capability. While approved in 2020, a funding portion was released in 2019 for urgent renewals and new RCF testing approaches.

Significant Information Notice T19-004	2019	KiwiRail issued a track engineering advisory notice in relation to RCF, which modified existing inspection and mitigation requirements.	Highlighted the increasing focus on RCF, although this modification of standards became a matter of concern during the SSA.
Special Safety Assessment (SSA)	2019-2020	WK (Regulatory) initiated an SSA into the AMRN asset condition in July 2020, which identified significant concerns with the condition of the network and maintenance practices. The SSA report is dated September 2019 and remedial actions were closed out during June 2020, with ongoing monitoring in place.	The SSA made a number of significant findings, including that the levels of maintenance activities at the time were insufficient and that RCF appeared to be widespread throughout the network. The SSA also raised concerns in relation to adherence to maintenance standards, and the process for changed standards, including relation to Significant Information Notice T19-004.
Railways Act s 28 notice	2019-2020	Statutory notice from Waka Kotahi (Regulatory) imposing conditions on the operation and use of AMRN (including no increase in train services beyond existing timetables and a requirement on KiwiRail to demonstrate an appropriate maintenance programme) due to the condition of the AMRN and inadequate management of RCF. The notice was revoked in May 2020.	Highlighted the severity of the RCF issue and wider AMRN condition.
National Rail Industry Advisory Forum	Late 2018-onwards	New industry grouping convened by WK (Regulatory) consisting of the main participants in the New Zealand rail industry alongside industry regulators, and the Ministry of Transport.	Provided for a new forum, with wider membership than the NRSS-E, to identify, discuss, resolve and implement solutions to rail industry wide matters.
Significant Information Notice T20-004	2020	KiwiRail issued a revised track engineering advisory notice in relation to RCF, which replaced Significant Information Notice T19-004.	Updated the RCF inspection and management approach taking account of WK (Regulatory)'s concerns raised during the SSA.
Temporary speed restrictions (TSR)	2020	In August 2020, additional testing identified advanced RCF throughout the AMRN. A network wide 40 kmph TSR was applied to manage the safety risks while repairs were undertaken.	Demonstrates the impacts stemming from advanced RCF on the AMRN.
Auckland Metro Recovery project	2020-2021	Work to remediate RCF began in August 2020 with much of the urgent track work completed by Easter 2021, funded through RNGIM.	Replaced affected rail and end of sleep sleepers to enable the speed restrictions to be lifted. Ongoing work on formation and improving maintenance practices will occur under the RNGIM programme.
RCF Root Cause Working Group	2019-2021	RCF root cause assessment reports were prepared in 2019 and 2020 by two different consultancies. In 2021, the joint working group examining the technical causes of the accelerated RCF prepared and released a report identifying the technical root causes. These broadly relate to the (1) condition of track and maintenance practices (2) the impact from the stiffness and wheel profile of the EMU vehicles, and (3) the wheel-rail interface.	Identifies the technical root causes of the accelerated RCF on the AMRN, and a series of recommendations to ensure RCF does not again become a critical issue on the AMRN. Stakeholder feedback on this report identified different areas of emphasis and remaining areas of disagreement amongst the stakeholders on some root cause elements.

The NZ Rail Plan and Rail Network Investment Programme (RNIP)	2021	<p>The Future of Rail review confirmed the value of rail to New Zealand and highlighted that the rail network was facing a state of managed decline due to long-term underinvestment. The New Zealand Rail Plan sets out the Government's long-term vision for rail investment as an integrated part of the land transport investment system, and has identified resilience and reliability are key priorities for rail. It states that the long-term vision is for the rail network to provide modern transit systems in New Zealand's largest cities, and to enable increasing volumes of freight to be moved by rail.</p> <p>To replace the transitional rail activity class, there is a new rail network activity class to support investment in KiwiRail's network maintenance and renewal programme. The RNIP, developed by KiwiRail and approved by the Minister of Transport, sets out KiwiRail's planned below rail maintenance, renewal and improvement activities.</p>	Highlights ongoing importance of the AMRN for delivering on the government's objectives for rail. There is now ongoing funding from the NLTF to deliver the RNIP, noting that existing metro access arrangements remain in place.
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