Transport for NSW

Asset Resilience Strategy

3rd Edition – November 2023

NSW GOVERNMENT

OFFICIAL

transport.nsw.gov.au

Document Control

Document Owner	Director Asset Management Partnering and Services

Change history

Version	Amendment	Date
1st Edition	Endorsed by the Asset Management Steering Committee	July 2021
2nd Edition	Endorsed by the Asset Management Steering Committee	July 2022
3rd Edition	Endorsed by the Asset Management Steering Committee	November 2023

Review

To provide continuous improvement this document should be reviewed at least on an annual basis or after any significant business process changes.

Preface

Resilience has emerged as an important focus for our customers and communities. A resilient and reliable transport system supports freight and passenger journeys and successful places. Transport networks contribute to the overall resilience of our places and communities.

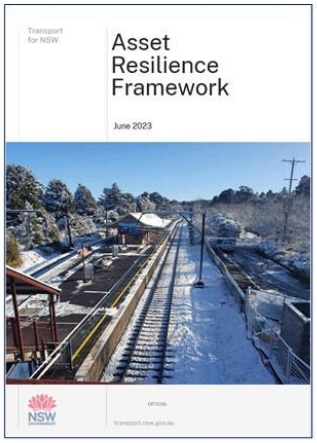
Transport for NSW (TfNSW) will meet the challenges of climate change, human-induced threats and economic uncertainty head-on by building resilience into our systems. We have begun to transition our transport fleet to net zero and we will support the roll out of electric vehicles across NSW.

TfNSW will identify risks and create new physical and digital pathways to keep people safe, moving and informed in the event of disruption. We will 'build back better' after extreme weather events, reduce waste, and ensure transport infrastructure makes a positive contribution to places and the environment.

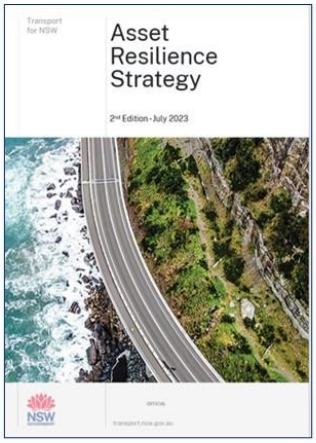
Our focus is on ensuring resilient journeys, communities and infrastructure that can withstand future shocks and stresses.

When damaging events occur, we need to reduce the risk and impact on communities and build back to a more resilient standard. Affected assets being renewed or replaced need to be designed to withstand the pressure they may be exposed to over their life, and the changing role they may play in making the entire system more resilient.

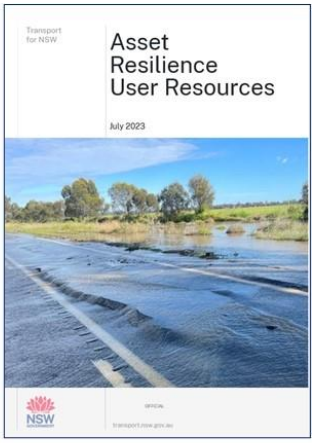
Many transport assets have long life cycles and need to be resilient to withstand shocks and stresses that compromise cost, risk and performance. Supporting a structured and systematic approach to asset resilience TfNSW have developed the following suite of artefacts:



Providing a consistent whole of life cycle approach to asset resilience



Strategic directions and responses that support a resilient transport system



Details current resources to support improved resilience outcomes

These artefacts focus on the resilience of the transport system. Proactive preparedness and resilience requires a whole-of system approach that considers both the resilience of individual assets and the contribution of these assets to the resilience of the overall system.

The NSW Reconstruction Authority is an agency within the Department of Planning and Environment which is responsible for facilitating disaster prevention, preparedness, recovery, reconstruction, and adaptation to the effects of natural disasters in NSW. TfNSW works closely with the NSW Reconstruction Authority to ensure consistency across government.

Table of contents

1. Introduction

1.1 Purpose

The Asset Resilience Strategy outlines the TfNSW strategic directions and responses that support a resilient transport system for the next 20 years and beyond.

Asset resilience is the resilience planned for, designed and built into assets, networks and systems[1].

Resilience is the adaptive capacity of an organisation in a complex and changing environment

Source: AS 5334-2013

Statewide context and guidance to the Asset Resilience Strategy is provided by the resilience strategic directions and recommendations outlined in the State Infrastructure Strategy 2022-2042.

Organisational context is provided in the Future Transport Strategy which sets out the long term vision for transport and provides guidance on our strategic directions for future planning, investment delivery and operations.

1.2 Scope

This Strategy focuses on identifying, analysing, planning, monitoring, and improving or adapting the resilience of transport assets. The Strategy focusses on operational service outcomes, where function and performance may be adversely affected by natural hazards or human-induced risks.

Resilience is an increasingly critical element to whole-of-life asset management. This strategy provides guidance to asset resilience planning activities and aspects of the Strategic Asset and Services Plans (Strategic Plan (SASPs)) and the Asset and Services Plans (ASPs).

1.3 Principles

The key principles which serve as the foundation for improved asset resilience across the transport network are outlined in Table 1.

Table 1: Key principles

	**Whole of life cycle and system** Delivering the desired balance of cost, risk and performance outcomes across the life of the asset together with the contribution of the asset to the resilience of the overall system
	**Informed decision making** Timely, accurate, relevant and governed information is used to inform asset resilience decision making

[1] NSW Critical Infrastructure Resilience Strategy 2018 (Office of Emergency Management)

	**Risk-based management** Risk management processes are used to identify, analyse, evaluate, prioritise and treat risks and evaluate responses
	**Alignment** There is a consistent transport wide approach with alignment to broader NSW Government outcomes
	**Innovation and improvement** Continuous improvement is delivered through intelligent, outcomes-based compliance
	**Build back better** Not only restore assets and services to normal, but to further strengthen those assets and services against future events of increasing likelihood and severity

1.4 Key stakeholders

The Asset Resilience Strategy provides stakeholders with an understanding of TfNSW's strategic directions and responses that support a resilient transport system.

Table 2 identifies the key TfNSW asset resilience stakeholders with an interest in the Strategy.

Table 2: Key TfNSW stakeholders

Stakeholder	Interest
Secretary of Transport	Transport portfolio oversight and assurance that asset resilience is incorporated into the transport network and services
Customer, Strategy & Technology	Development of Transport's future transport strategies to deliver resilient transport assets
Safety, Environment & Regulation	Hosts the centre of excellence for climate change Establishes the framework, strategy and standards to implement asset resilience planning into asset management decision-making Provides risk-based assurance that the framework, strategy and standards are applied
Finance & Investment	Provides assurance that asset resilience is factored into economic analysis, business cases and investment decisions

Stakeholder	Interest
Enterprise Governance & Assurance	Provides advice at an enterprise level on business continuity and resilience
Asset Custodians	Ensures that their assets, as part of the broader transport network, are resilient against natural hazard and human-induced risks taking into consideration whole of life cycle outcomes
Asset Stewards	Ensures the resilience of their services in delivering, operating or maintaining transport assets
Client	For capital project delivery ensures the resilience of the outcomes and that it meets the customer needs

In addition to TfNSW stakeholders, there are many external stakeholders that have an interest in the Strategy. A sample of the key external stakeholders and their interest is provided in Table 3.

Table 3: Key external asset resilience stakeholders

Stakeholder	Interest
TAHE	Asset owner requires oversight and assurance that asset resilience is incorporated into the transport network
NSW Treasury	Treasury requires NSW government agencies to assess and predict all hazard risks to their assets and services and maintain whole-of-life asset resilience measures
Infrastructure NSW (INSW)	In partnership with NSW Treasury, INSW form part of the gateway to fund NSW government agencies according to asset attestation and asset resilience requirements
Department of Planning and Environment (DPE)	The NSW Reconstruction Authority is an agency within DPE which is dedicated to disaster prevention, preparedness, recovery, and reconstruction
Local Government Authorities (LGAs)	Provide and maintain localised stormwater, sewage and potable water services that need to integrate to Transport drainage infrastructure A key contractor to Transport for NSW for the maintenance of state roads Maintain local and regional roads and the local level prevention and preparation activity for 'risk events' LGAs often have their own asset resilience strategies

Stakeholder	Interest
Various emergency and enforcement services	For example: Fire and Rescue NSW, NSW Rural Fire Service, State Emergency Services, NSW Police Force Improved asset resilience contributes to the planning, assessing and responding to threats and events by this group of stakeholders
Transport customers and the NSW community	Confidence that Transport has a system to provide a consistent, whole of life cycle approach to asset resilience
National Emergency Management Agency (NEMA)	Manages the Disaster Ready Fund (DRF) for natural disaster resilience and risk reduction across Australia

1.5 Transport asset resilience roadmap 2023-26

A three-year roadmap (Figure 1) has been developed in order to effectively embed asset resilience into TfNSW's asset management systems, processes and decision making.

Figure 1: Three-year roadmap

The Asset Management Branch is accountable for the three-year roadmap including evaluating and reporting on overall outcomes achieved. Progress will be reported periodically to the Asset Resilience Working Group (ARWG) and the Asset Management Steering Committee (AMSC).

Each Asset Custodian and Asset Steward is accountable for implementation of the roadmap actions within their business as demonstrated in their Strategic Plan (SASP) and ASP.

Year 1: Establish the foundation

Key actions:

- Develop and implement the Asset Resilience Framework
- Issue the 2nd edition of the Asset Resilience Strategy
- Core content requirements developed for inclusion in Strategic Plan (SASPs) and ASPs
- Review Strategic Plan (SASPs) and ASPs for alignment with the Asset Resilience Strategy
- Identify gaps or shortfalls against the Asset Resilience Strategy and develop a plan for continuous improvement
- Identify asset information requirements and assign responsibility for collection, mapping and sharing asset information

- 2nd edition of the TfNSW Business Case Guide issued with additional information on how resilience should be factored into investments

Outcomes:

- Clarity across the current asset resilience baseline across TfNSW
- Resilience specifically considered in all infrastructure business cases
- A documented plan for continuous improvement

Year 2: Build and scale for the future

Key actions:

- Complete initial resilience assessment across all existing infrastructure
- Implement agreed actions in the continuous improvement plan
- Review Strategic Plan (SASPs) and ASPs for alignment with the Asset Resilience Strategy
- Identify gaps or shortfalls against the Asset Resilience Strategy and update the plan for continuous improvement

Outcomes:

- Uplift in organisational asset resilience capability

Year 3: Ongoing continuous improvement

Key action:

- Implement agreed actions in the continuous improvement plan

Outcome:

- Asset resilience is embedded in our asset management systems, processes and decision making across the whole of asset life cycle

2. State Infrastructure Strategy

The 20-year State Infrastructure Strategy (the SIS), published by INSW, sets the state-wide context and provides independent advice on the current state of NSW's infrastructure and the needs and priorities over the next 20 years.

The SIS outlines the importance of applying a structured and systematic approach to resilience across multiple asset types, multiple risks and embedding resilience across the infrastructure asset life cycle.

The potential impacts of climate change require the NSW Government to be more alert, proactive and thorough in planning, developing, operating, maintaining and upgrading infrastructure assets.

> *Note: This section provides a summary extract from the SIS of infrastructure resilience needs and priorities relevant to TfNSW. Refer to the Asset Resilience User Resources Guide for further details on the SIS.*

2.1 A whole of system approach

Proactive preparedness and resilience requires a whole-of system, all-hazards approach that addresses the resilience of individual assets and the contribution of these assets to the resilience of the overall system. This requires:

- Identification of weak links and interdependencies in infrastructure systems. This will enable bolstering of likely points of failure by redundancy and asset hardening clear accountability across state organisations responsible for infrastructure resilience.
- Prioritisation of maintenance and upgrades as a critical element of the investment program collaboration. This will be done through partnership with asset owners in local government, non-government agencies, the private sector, and local communities that contribute to system resilience.

2.2 Increasing frequency and severity

Much of the recent attention on climate-induced events in NSW has focused on droughts, floods and bushfires, with well-demonstrated impacts on communities, local economies and infrastructure. These events have caused considerable suffering across NSW from 2019 to 2022. However, other climate risks have implications for infrastructure, such as coastal hazards and extreme heat.

In the coming decades, NSW's changing climate is expected to result in a greater likelihood and severity of natural disasters.

NSW Treasury has estimated that the economic costs of more frequent and severe natural disasters could cost the State between $15.8 billion and $17.2 billion a year on average by 2060-61 (real 2019-20 dollars). This is up from $5.1 billion in 2020-21, more than a three-fold increase.

These economic costs come in the form of business and community disruption, lower productivity, health and safety impacts and damaged infrastructure among others.

The COVID-19 pandemic has demonstrated the value of resilience planning which factors in low likelihood, high impact events. Some forms of infrastructure, such as public transport, require an ability to be put on low operational footing, with implications for design, automation and financing arrangements.

Critical infrastructure requires a capacity for contactless, smart operation and maintenance.

2.3 Evidence based assessment

Management of risks is improved by comprehensive data on the shocks and stresses to which infrastructure networks might be exposed. This information is critical at the asset planning phase so that risks and resilience measures are identified early in the asset life cycle.

Collection and application of natural hazard data currently occurs in a fragmented way across a range of national, state and local government authorities.

Integration of data allows a statewide, place-based risk assessment that also considers future climate scenarios. This identifies high risk zones across NSW and the key assets and services most vulnerable, or most important, in each high-risk location – enabling development of a prioritised, efficient and effective whole-of-system resilience response.

Hazard and asset data should be integrated into a common model on a publicly accessible platform and should be supported by regularly updated guidance material.

2.4 Building back better

When shocks and damage occur, replacement assets need to be designed to withstand the pressure they may be exposed to over their operational lives and to fulfil the changing role they may play in system-wide resilience. This may involve adopting design standards now that build in resilience to events that currently seem improbable but are increasingly likely under changing climate conditions.

Assets that are being renewed, upgraded or replaced should also incorporate digital technology where value can be demonstrated. This can enable greater insights into and support decisions about how best to manage the asset, as well as enabling remote operations for routine maintenance and in times of shock or stress.

Investment in 'building back better' can deliver significant whole-of-life avoidance costs for infrastructure assets, as well as ensuring that communities experiencing distress have more reliable infrastructure and services.

2.5 Interdependencies and integrated risk mitigation

Critical interdependent links in infrastructure asset systems can require back-up or contingency management to prevent cascading system failures. Recent climate-related events in NSW demonstrated the cascading system failures that can result from low levels of resilience or redundancy in telecommunications, road and rail infrastructure. Floods and fires have illustrated that when one part of the network is unavailable, multiple assets could be compromised.

Recent events have also reinforced the importance of the transport network in supporting evacuation, which is a primary response strategy to many climate and human-induced emergencies. Road network planning needs to take account of mass evacuation capacity for major events.

The Hawkesbury-Nepean flood evacuation model simulates how populations in the valley evacuate to safe locations on a defined evacuation road network under a range of different floods and conditions. The 2019-2020 bushfires highlighted the

challenges of moving large numbers of people on roads, with people isolated in their cars for many hours by the extensive fire fronts across the NSW road network.

2.6 Funding resilience initiatives

Prioritising funding for investment into infrastructure resilience, including physical and green infrastructure responses, has proven to be a challenge. Investment that avoids the costs from low likelihood but high impact events is often difficult to justify when compared to traditional investment in assets with more certain economic returns.

This is compounded by:

- a mismatch between those who typically benefit from investment and those who typically bear the costs
- difficulty accounting for project value (typically avoided cost and risk reduction benefits, as opposed to economic productivity or revenue benefits)
- a lack of financial partnership models to enable shared responses to risk (such as with the private sector)
- low levels of capability and capacity to fund and deliver the appropriate responses (particularly at the local government level where much of the resilience investment is needed).

In line with other jurisdictions experiencing similar challenges, integrating economic externality values for resilience into business case calculations, and dedicated multi-year funding and financing facilities can help to overcome these obstacles.

2.7 Recommendations

The SIS includes recommendations to enable informed decision making on infrastructure investment and policy priorities during the next 20 years.

A number of resilience resources have been developed by various NSW Government agencies that outline and support resilience in infrastructure planning, design and operation. Refer to the Asset Resilience User Resources Guide for details of current resources.

TfNSW is the lead agency for two resilience recommendations:

Recommendation	Implementation Timeframe
Establish a program of prioritised resilience infrastructure and accelerate project delivery: local road improvements in the Hawkesbury Nepean Valley	Immediate Priority
Improve transport network response and recovery performance through service continuity planning, investment in evacuation and alternative routes, and infrastructure upgrades, guided by place-based strategies	Extended program

Implementation Timeframe	Description

Immediate Priority (0-5 years)	Recommendations are to be initiated immediately and implemented as a matter of priority, with the view to deliver outcomes in the next 1 to 5 years. Recommendations are predominantly non-build initiatives for which the work should commence / progress immediately.
Extended program (multiple years / 10+)	Rolling programs that require ongoing planning and progressive investments in the medium to long term. Other recommendations cater to the State's long-term needs, with some potentially requiring significant capital investment. An example includes the Fast Rail Strategy network program.

3. Organisational context

3.1 Alignment

The direction of asset resilience planning within TfNSW is set through legislation, government priorities, state and transport strategies. The Asset Resilience Strategy seeks to align these requirements as input into Strategic Plan (SASPs) and ASPs (Figure 2).

Figure 2 - Hierarchy of resilience planning

Organisational context is provided in the Future Transport Strategy which sets out the long term vision for transport and provides guidance on our strategic directions for future planning, investment delivery and operations.

This document, the Asset Resilience Strategy, draws together our long term vision as it specifically relates to asset resilience.

The Asset Resilience Strategy also aligns with the Transport Net Zero and Climate Change Policy (released October 2023). The Policy prescribes the principles and requirements to:

- achieve Transport's Net Zero emissions and climate change targets;
- support the transport sector's transition to Net Zero; and
- continue creating a transport network that is resilient, responsive and optimally adapted to a changing climate.

3.2 Asset resilience planning

Asset resilience is a core requirement in Divisional Strategic Plan (SASPs). Key elements required in the Strategic Plan (SASP) include:

- An outline of the Asset Custodian's role in implementing the Asset Resilience Strategy
- Identification of actions required to implement the Asset Resilience Strategy
- Governance processes including how future predicated natural hazard (including climate change), human-induced risks (including cyber-security)

and associated asset resilience actions will be considered and embedded as an integral part of any future transport service planning and investment.

- Identification of adverse precursor conditions for the risks that affect the resilience of the Division's assets and services
- Metrics to be used to monitor and report progress in the ASP

Asset resilience is also a core requirement in Divisional and Modal ASPs. Asset resilience threats should be identified, assessed and quantified and mitigations should be identified and prioritised in the ASP.

Key elements required in the ASP include:

- Why asset resilience is important and how it is being addressed
- How key actions identified in the Asset Resilience Strategy are being implemented and monitored
- Identification of any additional resilience strategies
- The current state-of-resilience for assets and services and their vulnerability to natural hazards or human-induced risks
- How has recovery from past events been carried out
- Details regarding how unpredictable or sudden events will be responded to
- The allocation of funds and resources that is held for unpredictable events

The Cluster SASP and ASP provide an integrated, whole of system view that brings together both the resilience of the individual assets and the contribution of the assets to the resilience of the overall system.

4. Transport asset resilience outcomes

This section outlines the TfNSW asset resilience directions, responses and required actions that are the key input into the asset resilience planning process.

Where relevant to the Asset Custodian's assets and services, these are required to inform development of and be considered in the Divisional Strategic Plan (SASP) and ASP, together with the modal ASPs.

4.1 Connecting our customers' whole lives

Direction: Our transport networks are safe

Keeping our networks safe requires targeted and proven initiatives that consider how people, vehicles, infrastructure and technology work together to create a safe system.

Response: Improve resilience to human threats and disruption

Transport networks are exposed to human actions such as vandalism, trespass, terrorism, cybercrime and impact of geopolitical events.

We have extensively invested in barriers and controls to minimise trespass and vandalism and reduce the risk of terrorism in crowded places. TfNSW will continue to incorporate good security measures in new projects and infrastructure upgrades. We will continually review our preparedness for major security incidents, including coordinating requirements under State-level emergency management and crisis management arrangements.

The potential consequences of cyberattacks have grown as our systems become interconnected, with more reliance on data for decisions and connected technologies for everyday operations, and more third parties supplying services. TfNSW is implementing the NSW Cyber Security Policy and working closely with national authorities to continually improve our capability and defences.

Geopolitical and supply chain (e.g. fuel) risks are managed at a national level, but the transport sector has an important role to play. Take-up of zero emissions buses and light vehicles powered by locally generated energy, as supported by the NSW Electric Vehicles Strategy, will reduce reliance on fuel imports and may eventually offer mobile back-up power during grid outages and natural disasters.

C4.7	Actions	Timing
C4.7a	Review our preparedness and response capabilities for major security incidents	● ○ ○
C4.7b	Improve systems to avoid and manage cyber-attacks	● ● ●
C4.7c	Support the uptake of zero emission vehicles to reduce the reliance on fuel imports	● ● ●

● Priority actions ● Progress planning ● Long-term need

4.2 Successful places for communities

Direction: Transport is resilient and adaptable to shocks and stresses

Any disruption of the transport system affects our customers, our communities and the economy. Global trends show risk is increasing with climate change, geopolitical uncertainty and increasing natural disasters.

To improve the resilience of our network we must anticipate and plan for short- and long-term risks, with strategies for mitigation, adaptation and recovery.

Response: Provide customer journey resilience

In the future, events such as heat waves, storms, bushfires and flooding will become more frequent and intense. As these events unfold, we must keep people safe, informed and moving. To achieve this goal, we must identify the risks now and plan ways to mitigate them. Ensuring customer journey resilience will require targeted capital investments to maintain and improve assets with a focus on 'building back better'.

This shift from 'resilient infrastructure' to 'infrastructure for resilience' requires us to focus on the unique characteristics of places. This includes their vulnerability to different types of extreme weather and natural hazards, the level of redundancy in their road and rail networks, the capacity of evacuation routes, and the capability of local resources to restore and repair networks after major events. To do this, we need to collaborate with multiple levels of government and work with diverse stakeholders, from logistics companies to transport operators.

We will use technology to improve risk forecasting, planning and monitoring, and to rapidly communicate with our customers during emergency responses. TfNSW will actively work with local communities and councils in planning and building early warning systems, clear evacuation routes, resilient transport infrastructure and well-resourced emergency management transport response teams. Getting this right will allow customers to make safe and informed decisions about their journeys as events unfold.

We will continue to provide information across multiple platforms, from the Live Traffic app to social media and live feeds to third-party mapping and travel applications. This is important in regional areas prone to natural hazards.

C5.1	Actions	Timing
C5.1a	Improve strategic oversight and coordination of resilient operations, including capacity for coordination and response activities, across State and local networks and across state jurisdictions	● ● ●
C5.1b	Improve customer information and alerts providing real-time information and monitoring of emerging conditions and threats	● ○ ○
C5.1c	Improve responses to disruptions and provide alternative journey options	● ○ ○

● Priority actions ● Progress planning ● Long-term need

Response: Plan and monitor for shocks and stresses

We know that local and global trends will shape our state and transport system in future. We will plan with those trends in mind to create a transport network that is protected against sudden shocks and long-term stresses. This will result in the network being more resilient and adaptable to the changing needs of customers.

Transport resilience planning will continue to focus on proactive approaches to meet increasing risks. In collaboration with government, industry and community partners, we will incorporate climate resilience mitigation measures into the planning and design of all transport assets and services.

Improved data and information sharing will enable us to have an evidence-based approach in decision making for all our projects, and clearly define roles and responsibilities for climate change adaptation planning. Information and insights from monitoring the network will be crucial to assessing risk, prioritising preventative and predictive maintenance, and ensuring resilient journeys.

C5.2	Actions	Timing
C5.2a	Work with other agencies on State-level emergency risk assessments	● ● ○
C5.2b	Improve strategic oversight and coordination of resilience outcomes across State and local networks and across state jurisdictions	○ ● ○
C5.2c	Strengthen and embed resilience into network and place-based transport plans. For example, identifying constraints on evacuation routes in vulnerable parts of the network and planning and delivering appropriate mitigation measures	● ● ●
C5.2d	Identify infrastructure and service sector interdependencies and monitor and evaluate resilience outcomes across all sectors to inform a coordinated approach to future asset management, operational delivery and emergency response.	● ● ●

● Priority actions ● Progress planning ● Long-term need

Response: Build and upgrade for shocks and stresses

Transport infrastructure is vitally important for local communities during the response stage of an emergency to provide safe evacuation, passage and relocation of disaster-affected communities. The recovery of transport services and infrastructure is equally important to ensure critical supplies are provided to isolated communities, emergency services organisations have access to disaster areas, and the impact to businesses, schools and the economy is minimised.

The impacts from climate change, including damaging weather events, will continue to pose a significant risk to our infrastructure assets and the communities we serve. When these events occur, we need to reduce the risk and impact on communities and build back to a more resilient standard.

Affected assets being renewed or replaced need to be designed to withstand the pressure they may be exposed to over their life and the changing role they may play in making the system more resilient. 'Building back better' can deliver significant whole-of-life cost savings for infrastructure and strengthen the resilience of communities.

C5.3	Actions	Timing
C5.3a	Identify and prioritise key sections of the road and rail networks for resilience improvements (regardless of who manages them)	
C5.3b	Establish a clear pipeline of maintenance projects to improve resilience with a focus on adaptability and 'building back better' after a disruption	

Priority actions Progress planning Long-term need

Response: Consider climate change in all our decisions

NSW is already feeling the effects of climate change. We must act now to ensure our transport system remains resilient. Mapping transport networks for vulnerability to climate change can inform our design and planning of new infrastructure and services. It will also help reduce the impacts associated with climate-related disruptions over the longer term.

Business cases for long-life infrastructure projects must address resilience risks appropriate to the longevity of the asset or service provision i.e. at 20, 50, 100 and 100+ years, and consider climate-induced trends in population distribution, the make-up of industry, and the flow of commodities.

Embedding climate risk and resilience in our work provides leadership to the transport industry and strengthens our organisational capability and skills, so the NSW transport system and networks are sufficiently robust. This includes working with Aboriginal communities to incorporate traditional knowledge to assist in climate adaptation.

C5.4	Actions	Timing
C5.4a	Map networks for vulnerability to climate change and understand the interdependencies and potential impacts on the communities they serve	
C5.4b	Update our business case and economic evaluation guidelines to embed considerations of climate change, including project alternatives and mitigation measures	
C5.4c	Consider climate change impacts (including on Country, culture and heritage) and incorporate climate resilience measures in the planning and design of all transport assets and services	
C5.4d	Incorporate climate adaption measures in the design and construction of new and replacement assets	

C5.4e	Work collaboratively with Aboriginal people to address climate change impacts through traditional methods