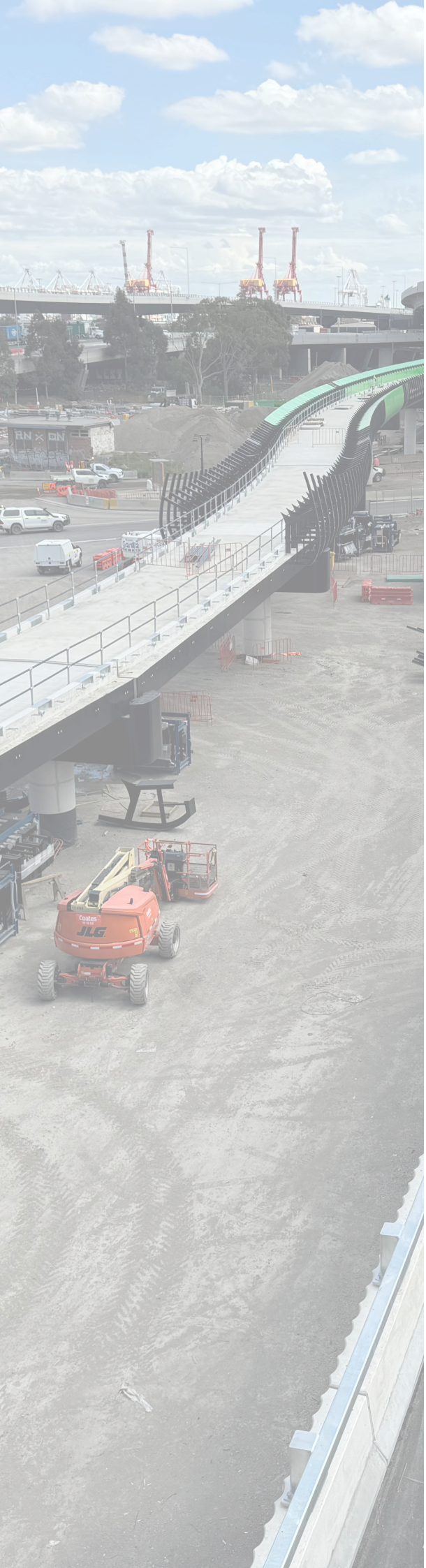
# The Future of Temporary Traffic Management

## Technology & Innovation Insights 2026

TransIA
Transport Infrastructure Advisory



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# Executive Summary

The role of traffic management has changed and continues to evolve as road networks become busier and more complex. Adding to the complexity is the rate at which new technologies and innovations are becoming available.

Technology is not simply changing the tools used in traffic management, it is also changing the operating environment in which temporary traffic management must function.

The purpose of this report is to identify the key technology and innovation trends that are impacting on **Temporary Traffic Management in Australia** to provide insights on its future role, function and opportunity areas.

It has been prepared to help organisations and busy professionals that are either directly or indirectly involved in the traffic management industry, understand the key changes to be able to make decisions that continue to reduce risk, increase safety and efficiencies as the construction traffic management environment becomes more complex.

Based on a combination of industry desktop research and practical experience, the report identifies the key existing and emerging technology and innovation trends in traffic management.

One of the key findings is that the technology is not just changing the devices and tools used in temporary traffic management but is also changing the function of traffic management itself.

With the overall trend being an increase in digitisation and automation, temporary traffic managment is increasingly needing to operate within a digitally-enabled network environment.

An important part of understanding the future impacts of technology and innovation on traffic management is by recognising that there are changes happening in two different but related road network environments - the permanent road network and temporary road network.

Within the permanent road network environment, the innovation focus is on the growth on Cooperative Intelligent Transport Systems (C-ITS) and preparing the the network for emerging mobility technologies such as Connected and Automated Vehicles (CAV). This focus is increasingly supported by government policy, agency-led research, trials and strategic investment.

Within the temporary traffic environment, the innovation focus is on deployable, proactive, adaptive and increasingly automated solutions for managing traffic and safety. However, activity in this area is more fragmented, with limited dedicated research, guidance or policy direction to support how these technologies are applied in temporary environments.

Innovation in traffic management is not being driven by individual devices but by a convergence of enabling technologies including: AI, advanced sensing, connectivity and real-time processing.

The impacts of technology on temporary traffic management extend across safety, efficiency, compliance, planning and delivery, workforce capability and overall network performance, creating both opportunities and operational challenges that need to be considered.

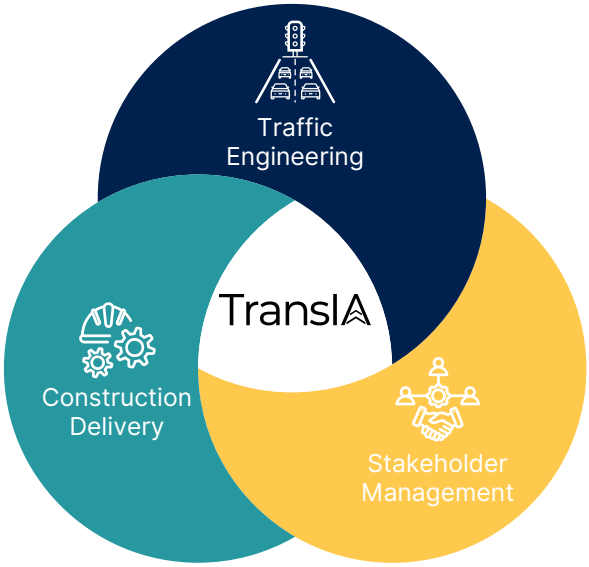
Greater automation, real-time monitoring, connected systems and digital planning are shifting the focus from largely reactive site-based traffic control activities, to a more proactive and strategic function of managing the broader road network during construction.

As road networks become more complex and expectations on safety, efficiency and network performance increase, temporary traffic management must continue to evolve. The future of temporary traffic management lies in a more strategic, digitally-enabled and network-aware approach.

# About Transia

**Transia** provides strategic leadership and advisory services to government clients and contractors on how to effectively manage the road network during construction.

We bring unparalleled experience in the areas of traffic engineering, construction delivery, stakeholder and people management to provide clients with a more integrated and innovative approach to enhance the safety and efficiency of major transport infrastructure projects.




## Contact

If you have any comments, insights or examples of innovation you would like to share, please contact Transia via our website or LinkedIn page:

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Technology is changing the operating environment in which Temporary Traffic Management must function.

# Contents

# 01 Overview

The role of traffic management has changed. Today's road networks are larger, busier and more complex. In addition, new technologies and innovations are becoming available at unprecedented rates creating further changes, challenges and opportunities.

The industry is evolving at all stages and is reshaping how roads are planned, built, operated and maintained.

The overall trend is about increasing digitisation and automation - all with the aim of enhancing safety, efficiency and reducing costs.

**Technology is not simply changing the tools used in Temporary Traffic Management, it is changing the function of traffic management itself.**

Greater automation, real-time monitoring, connected systems and digital planning are shifting the focus from reactive site-based traffic control to more proactive traffic management across the broader road network.

This shift also highlights an important industry challenge. Insights on innovation in traffic and transport often conflate developments across the permanent road network and the temporary conditions during construction activities. In practice, the challenges, constraints and technology requirements are very different in the two environments.

This report recognises the important distinction between these two different but inter-related environments so that a better understanding of the technology impacts can be identified.

### What's the purpose of this report?

This report has been prepared to provide an overview of the existing and future technology and innovation landscape impacting **Temporary Traffic Management (TTM) in Australia**. Although aimed at major road infrastructure projects, it also has relevance to smaller scale projects.

It goes beyond just identifying the key technological tools and devices that are existing and emerging to also providing valuable insights on how these changes are impacting the role and function of TTM.

The report provides a useful starting point to understand how traffic management is changing, where digital transformation is already happening, where future demand/ opportunities are expected and the potential implications for consideration.

### Who is this report for?

This report is aimed at organisations and busy professionals that are either directly or indirectly involved in the traffic management industry that want to understand where the real and potential changes are so they can start thinking about the:

- impacts on safety, efficiency and network disruption;
- impacts to their work/team, existing processes and implementation; and
- opportuities to innovate to add value to their projects, products or services.

## Lead authors


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Strategy & Innovation

Over 20 years' experience across transport, urban planning and smart cities with qualifications in AI Strategy and a technology and innovation-focused MBA.

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Chartered civil engineer with over 25 years experience in the transport industry working in both design, consulting and construction delivery for major transport infrastructure projects.

# 02 Why Technology and Innovation Matters

The changes and digital transformations that are taking place both directly and indirectly on the road network impact everyone on some level *(see Figure 1)*.

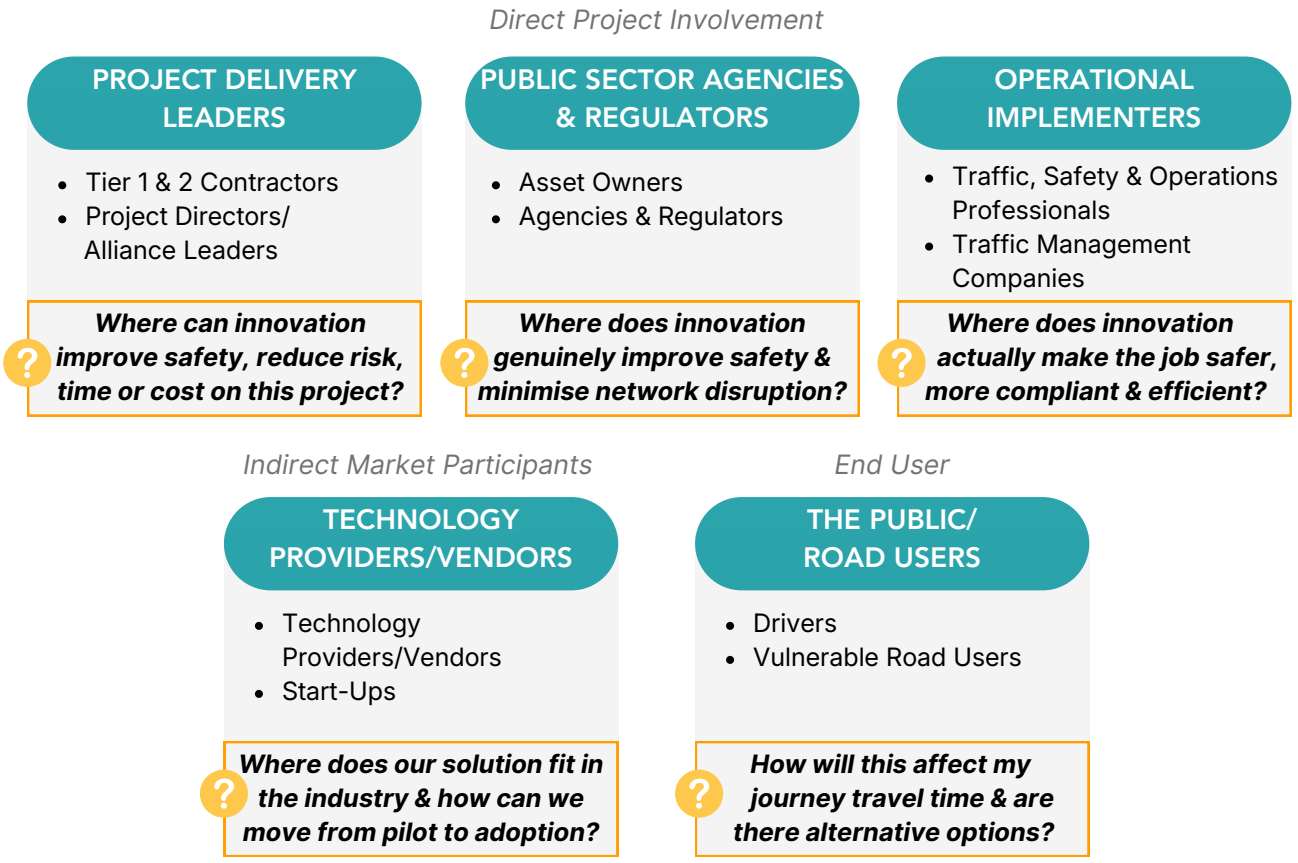
Whether you understand the technology or not, the road infrastructure and the way the road network is being managed is changing.

It is not about chasing innovation. It is about understanding the changing landscape enough to be able to **make decisions that continue to reduce risk, increase safety and efficiencies** as the temporary traffic management environment becomes more complex.

### Implications of not understanding the industry changes

- Undermine safety outcomes
- Delivery risk increases
- Missed opportunities to minimise disruption
- Reacting to changes rather than proactively managing - increases project costs and delivery uncertainty
- Delivery and implementation becomes harder to manage
- Capability gaps widen over time
- Investing in the wrong areas
- Governance frameworks become outdated
- Reputation and credibility risk increases

**Figure 1: Stakeholders Impacted by Technology and Innovation Change**



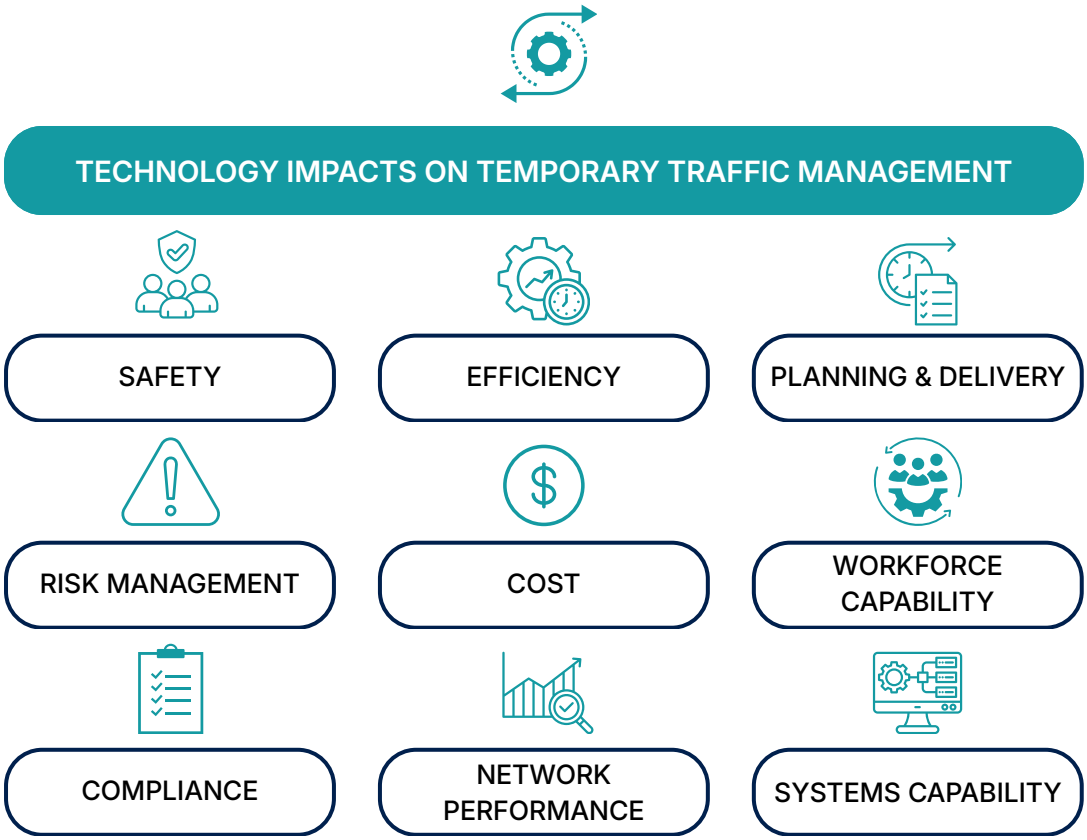
# 03 The Impacts of Technology on Temporary Traffic Management

Technology is changing the operating environment in which Temporary Traffic Management must function. The changes in technology and innovation are impacting across all stages of traffic management - from planning and design, to delivery, operation and maintenance.

These changes create both direct and indirect impacts across how TTM is planned, delivered and managed, influencing safety, efficiency, compliance and broader road network performance.

**Figure 2** highlights the nine key areas where technology is impacting TTM. This report explores these technology trends and what they mean for the future considerations and strategic implications of TTM.

**Figure 2: The Impacts of Technology on Temporary Traffic Management**



# 04 Two Road Network Environments

Traffic on the road network is managed in two distinct environments. The permanent road network with infrastructure that supports normal traffic operations and the temporary conditions created during construction where traffic must be actively managed.

There are numerous new digital devices, systems and software entering the market that have implications for traffic management. Before identifying the key technology and innovation trends, it is important to recognise that the changes in technology and innovation are impacting on both the permanent and temporary road network environments.

Understanding these two environments is important to identify how technology and innovation are shaping the future of traffic management.

### Environment 1: Permanent road network infrastucture

This refers to the long-term physical, digital and operational systems that make up the road network outside of construction activities.

This includes fixed road assets (such as pavements, intersections and structures), permanent traffic control devices (signals, signage and line marking) and the digital and communications infrastructure used to monitor, manage and optimise network performance.

Technology and innovation at this level is focused on **connected, data-enabled** and increasingly **automated systems** that **manage traffic at a network scale.**

**Where change is happening**

**Environment 1:**
Permanent road network infrastructure

**Environment 2:**
Temporary Traffic Management

### Environment 2: Temporary Traffic Management

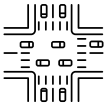
This refers to the environment that is created when modifications to the permanent road network for short-medium term traffic management measures and practices are implemented to provide access for construction activities.

It includes temporary traffic control devices, work zone infrastructure, mobile technologies and operational practices used to safely manage traffic, workers and network performance while works are underway.

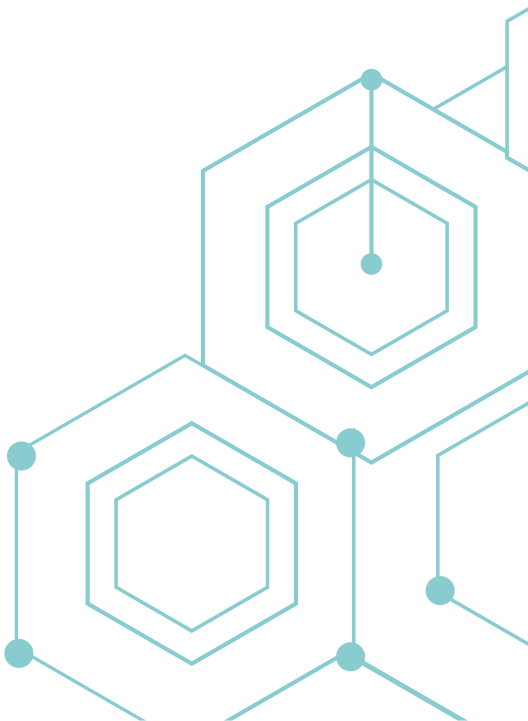
Technology and innovation at this level focus on **deployable, adaptive** and increasingly **automated solutions** for **managing traffic and safety** in **active work zones.**

The permanent road network and temporary construction environments operate under very different conditions. **Table 1** below highlights the key differences that shape how traffic is planned, managed and innovated across each level.

**Table 1: Permanent and Temporary Road Network Environments Comparison**

| |  **Environment 1:** Permanent road network infrastructure |  **Environment 2:** Temporary Traffic Management |
|---|---|---|
| **Description** | Long-term, permanent physical, digital and operational systems that make up the road network. | Short-medium term, non-permanent traffic management measures and practices implemented during construction activities. |
| **Objective/ Function** | Keeping the network moving safely and efficiently for all road users. | Keeping the network moving safely (for workers & public) and efficiently whilst enabling infrastructure projects to be built. |
| **Assets/ Infrastructure** | **Fixed** (e.g. signals, gantries, line marking, permanent barriers, detectors). | **Portable/modular** (e.g. cones, temporary barriers, trailer-mounted VMS, traffic controllers). |
| **Planning & Decision Making** | Linear design process with treatments/solutions engineered for a long-term asset. **Time horizon: 10 - 30 years.** | Iterative design and implementation process - responding to construction needs and environmental conditions. **Time horizon: flexible, staged (Hours/days/months/years).** |
| **Risk Profile** | Stable geometry and speed - statistical accident risks, mitigation through engineered solitutions, enforcement and education. | Dynamic changes (geometry, speed, sightlines). Workers and vehicles within close proximity - immediate worker and driver safety. |
| **User Experience** | Consistent, predictable and familiar driving environment *(under normal incident-free network conditions)*. Low-moderate cognitive load. | Variable changes to speed, geometry and visual communication (e.g. signs and devices). Higher cognitive load. |
| **Innovation Focus** | **Connected, data-enabled** and increasingly **automated** systems that manage traffic movement and safety at a **network scale.** | **Deployable, adaptive** and increasingly **automated** solutions for managing traffic and safety in **active work zones in the network.** |

# Technology &
# Innovation Trends



# 08 Technology and Innovation Trends

Changes in technology and innovation have been impacting industries globally, particularly with recent advances in AI which is rapidly evolving and reshaping how industries operate.

To understand these changes, examples of technologies and innovations have been grouped into four stages based on the current **level of adoption** in Australia: Ageing, Maturing, Growing and Emerging (refer **Figure 3**).

The left side of the graphic shows the traditional legacy technologies and systems that are **ageing or reaching maturity** (high adoption rates).

Whereas the right side shows the technologies that are **growing and emerging** (lower adoption rate/trials) as a potential future solution to improve existing processes and systems.

The overall trend is an increase in **digitisation and automation** as well as integration and synergy between technology, infrastructure and user.

## Permanent Road Network Trends

Increasing congestion, digital policy shifts, real-time data, cost pressures, safety goals and preparation for autonomous vehicles are driving Australia's move from static infrastructure to **smarter, connected and predictive systems.**

At the planning and design stage, a "digital by default" approach is being promoted by governments, including the use of Digital Twins and Building Information Modelling (BIM).

Maturing systems like **Intelligent Transport Systems (ITS)** are being enhanced with **AI** and **real-time analytics**, paving the way for growing technologies like **Cooperative-ITS (C-ITS)** and vehicle connectivity (**Connected and Automated Vehicles**).

Innovation in traffic management is not being driven by individual devices but by a convergence of enabling technologies including AI, advanced sensing, connectivity and real-time processing. These technologies are enabling new approaches to both permanent road operations and temporary traffic management.

New and emerging technology is also transforming operations in the maintenance phase. For example, the use of AI and Internet of Things (IoT) sensors for infrastructure/asset monitoring.

## Temporary Traffic Management Trends

The construction and temporary traffic management environment is evolving from static, labour-intensive methods to **smarter, automated and connected systems.**

Legacy tools remain widespread, but there is growing momentum towards **automation and improved communications** (e.g. Detection and Warning System technology) for both road users and workers.

The increasing use of **AI, real-time monitoring** and **vehicle connectivity** signals a shift toward safer, faster and **more adaptive approaches** to managing traffic during construction.

## A Mixed Landscape

Despite the rapid technological advancements, the reality is that the industry operates in a mixed landscape; **traditional legacy systems**, ageing technologies and infrastructure layered with **newer technologies** and innovative processes.

For example, the use of static road signs, paper-based planning, manual traffic control and Advanced Traffic Management Systems, (e.g. ramp metering, variable speed limits) still prevail. In addition, the same project may also be piloting trials of new technologies such as AI-powered traffic signals or robotic line markers.

# 09 Technology Adoption Stages

**Figure 3** below provides examples of technologies and innovations used across both permanent road networks and in road construction and temporary traffic management.

They are grouped into four stages based on their current level of adoption: **Ageing, Maturing, Growing and Emerging.** This provides an indication of the trends happening in the industry (in Australia) and where future potential opportunities may exist.

**Figure 3: Adoption of Technology and Innovation Examples (Australia)**

*Trend: Increasing digitisation & automation*




| | AGEING | MATURING | GROWING | EMERGING |
|---|---|---|---|---|
| | Legacy tools/processes that may still serve a purpose but lack the safety & efficiency of newer alternatives | Commonly used tools/technologies with reliable performance but approaching their peak utility | Technologies gaining traction, with strong potential to improve safety & efficiency but not yet industry-wide | Early-stage technologies with high innovation potential, currently in trial or limited use |
| **Permanent Network** | **Examples:**<br>• Static road signs<br>• Fixed-timing traffic signals<br>• Traditional traffic counters<br>• Guardrails | **Examples:**<br>• Intelligent Transport Systems (e.g. Ramp metering, Permanent Variable Message Signs)<br>• Traditional fixed speed cameras<br>• SCATS | **Examples:**<br>• Cooperative Intelligent Transport Systems (C-ITS)<br>• AI-powered traffic prediction & management<br>• Digital twins<br>• AI-enabled speed cameras | **Examples:**<br>• Connected & Automated Vehicles (CAV) infrastructure<br>• Vehicle-to-Everything (V2X) technology<br>• AI powered pothole/defect detection |
| **Temporary Traffic Management** | • Static road signs<br>• Traffic cones<br>• Concrete barriers<br>• Manual traffic control<br>• Basic roadside CCTV | • Portable traffic lights<br>• Portable boom gates<br>• Temporary rumble strips<br>• Traditional Truck Mounted Attenuators<br>• Work zone ITS (e.g. Trailer Variable Message & Speed Limit Signs)<br>• Steel barriers<br>• Mobile gantry cranes<br>• Automated Machine Guidance | • AI-powered traffic cameras<br>• Rapidly-deployable modular barriers<br>• Work zone ITS (e.g. End-of-Queue warning systems, radar activated messaging)<br>• Geofenced work zones<br>• Automated Cone Trucks<br>• Drones (real-time insights)<br>• Wearable safety tech for workers | • Smart traffic cones<br>• Automated line markers<br>• AI-enabled traffic control & predictive analytics<br>• Vehicle-to-Everything (V2X) technology (real-time road work alerts)<br>• Work zone intrusion detection systems<br>• Autonomous Truck Mounted Attenuators |

# 10 Enabling Technologies Driving Change

Innovation in traffic management is not being driven by individual devices but by a convergence of enabling technologies including: AI, Advanced Sensing, Connectivity and Real-Rime Processing. This section discusses the role of these enabling technologies in the traffic management context.


## ARTIFICIAL INTELLIGENCE (AI)

*Improves Decision-Making*

**What is it?**

Artificial Intelligence (AI) refers to technology that enables machines to perform tasks that typically require human intelligence. Recent advances in key AI subsets such as machine learning, computer vision and natural language processing are rapidly creating new applications in traffic management.

**It's role in traffic management:**

In traffic management, various subsets of AI are commonly used to interpret video feeds, sensor data and traffic patterns in real time.

**Current application examples:**

- Near-miss detection
- Queue prediction
- Unsafe driver behaviour analysis
- Traffic flow optimisation
- Automated alerts and escalation

**Potential future applications:**

- Predictive modelling of congestion before queues form
- AI-assisted Traffic Guidance Schemes/ Traffic Management Plan design and compliance checking
- Autonomous work zone monitoring

## ADVANCED SENSING TECHNOLOGIES

*Improves Detection*

**What is it?**

Advanced sensing technologies detect and interpret physical movement and environmental conditions in real time. This includes LiDAR (Light Detection and Ranging), radar, AI-enabled cameras, thermal detection, and other smart sensors that provide detailed visibility of traffic behaviour.

**It's role in traffic management:**

These technologies provide the "eyes" of modern traffic management. They improve visibility in live road environments and support accurate detection of vehicles, pedestrians, queues and unsafe interactions.

**Current application examples:**

- End-of-queue warning systems
- Adaptive traffic signals
- Work zone intrusion detection
- Vehicle speed and trajectory analysis
- Pedestrian and cyclist detection
- Lane compliance monitoring

**Potential future applications:**

- Traffic control compliance monitoring
- Fully portable smart work zones with automated detection
- Real-time worker proximity alerts
- Smart taper systems with live hazard detection

## CONNECTIVITY & WIRELESS COMMUNICATIONS

*Improves Communication*

**What is it?**

Connectivity refers to the ability for vehicles, infrastructure, devices and control systems to exchange real-time information.

This includes C-ITS, V2X communications, 4G/5G networks, roadside communication units and connected work zone systems.

**It's role in traffic management:**

Connectivity enables traffic management to move beyond traditional roadside signs and physical controls by delivering live information directly to operators, systems and increasingly to vehicles/users themselves.

**Current application examples:**

- Queue warning alerts
- Connected work zones
- C-ITS work zone trials (V2X communications
- Dynamic speed management

**Potential future applications:**

- Direct in-vehicle work zone alerts for road users
- Vehicle-to-work zone communication
- Automated response to temporary hazards
- Connected autonomous vehicle interaction with TTM sites

## REAL-TIME PROCESSING (EDGE COMPUTING)

*Improves Response*

**What is it?**

Real-time processing refers to the ability to analyse and respond to traffic conditions instantly, often at the roadside rather than through delayed centralised systems.

Edge computing allows data to be processed where it is collected, reducing latency and enabling immediate action.

**It's role in traffic management:**

Temporary traffic management requires fast decision-making in high-risk live environments. Real-time processing enables immediate response to changing traffic conditions rather than relying on delayed reporting.

**Current application examples:**

- End-of-queue warning systems
- Smart intersections with live signal adjustments
- Real-time work zone alerts
- Automated traffic monitoring platforms
- Faster incident management

**Potential future applications:**

- Dynamic lane closure activation based on live conditions
- Real-time traffic management decision making
- Fully automated work zone response systems
- Integrated real-time network management across construction corridors

These enabling technologies are not standalone innovations, they are the foundation driving change across both permanent road networks and temporary traffic management. Together they are reshaping traffic management from a manual, reactive function into a connected, data-driven proactive operating system.

# 12 Innovation Policy Context

Changes in technology and innovation have been impacting industries globally, particularly with recent advances in AI which is rapidly evolving and reshaping how industries operate.

Understanding the broader higher level strategic and policy landscape relating to road network management is important as it sets the backdrop for innovation and transformation opportunities in the industry.

Australia's transport and construction sectors are undergoing a profound **digital transformation**, driven by a national imperative to improve **efficiency, safety and sustainability** in how infrastructure is planned, delivered and operated.

These changes are occurring across all stages, from planning and design through to construction, operation and maintenance. These changes are not only impacting on how **road networks** are managed, but also how they are experienced by **road users**.

## National Policy & Innovation Activities

A summary of the key policies, strategies and technology/innovation trials across Australia has been undertaken and presented in **Table 2.**

It shows that the dominant focus is on the transformations happening at the permanent **road network infrastructure level** to accommodate emerging mobility technologies (e.g. CAV, EVs and AVs).

A major focus for the Australian government is preparing infrastructure and the regulatory environment for **automated vehicles,** with some states/territories piloting these new technologies to contribute to the research and investment in this growing area.

Across Australia, governments are digitising transport infrastructure through **data-driven, automated and connected systems**. The progress and level of activity varies across the nation.

**The policy focus in Australia is on preparing road network infrastructure for emerging mobility technologies.**

Victoria, New South Wales, Queensland and Western Australia are advancing with **Cooperative Intelligent Transport Systems (C-ITS)**, **Connected and Automated Vehicles (CAV)** and **digital twins**, while SA has recently trialled **AI traffic cameras**. TAS and NT remain in the early stages of exploration.

Examples of some of these digital technology trials are provided on pages 14-15.

Most trials have focused on **infrastructure readiness and interoperability** with data on actual benefits (e.g. increase in safety performance) still unclear as the findings are still being collated or are publicly unavailable*.

## Temporary Traffic Management

The review of national innovation policies and strategies indicates that the primary focus remains on transformation at the permanent road network infrastructure level.

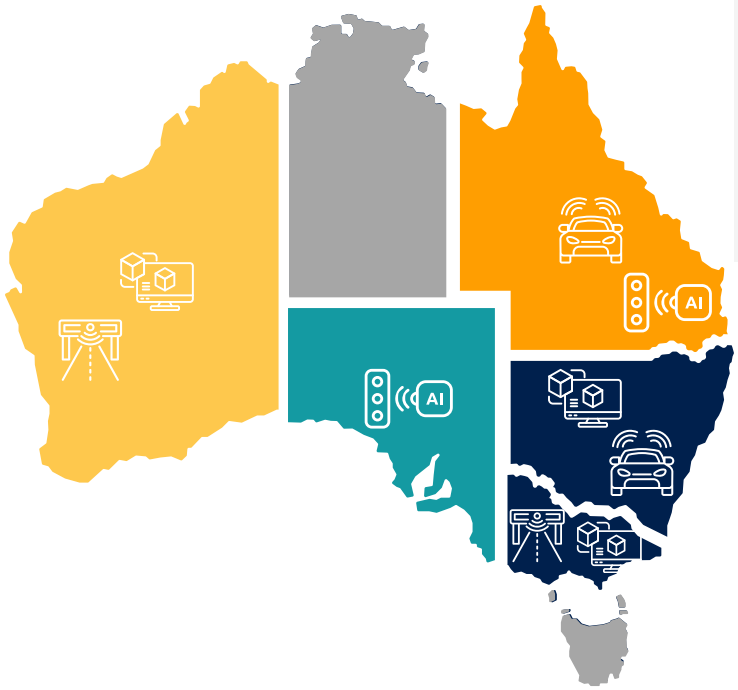
There is a lack of strategic attention regarding innovation in temporary traffic management, despite its central role in managing safety and network performance during construction.

The exception is the *Austroads Innovative Temporary Traffic Management Device and Solution Assessment (AITDSA) Scheme (2022),* which provides a structured approach to assessing emerging devices, however does not constitute a broader, integrated innovation strategy for temporary traffic management.

Examples of innovations being used in temporary traffic management are provided on pages 16-17.

**Correct at the time of research - noting that this is an dynamic space with new trials & pilot projects progressing.*

# 13 National Innovation Snapshot




**Legend:**

- Cooperative Intelligent Transport System (C-ITS)
- Connected & Automated Vehicles (CAV)
- AI-powered Traffic Signals
- Digital Twins & Building Information Modelling (BIM)

**Table 2: Key transport policies, strategies and digital technology projects (Australia)**

| LOCATION | STRATEGIES/DIGITAL TECHNOLOGY INITIATIVES |
|---|---|
| NATIONAL | • Austroads Innovative Temporary Traffic Management Device and Solution Assessment (AITDSA) Scheme (2022)<br>• Principles for a National Approach to Co-operative Intelligent Transport Systems (C-ITS) in Australia (2024)<br>• National Road Transport Technology Strategy & Action Plan (2024-27)<br>• Austroads Guide to Digital Engineering (2024)<br>• National Connected and Automated Vehicle (CAV) Action Plan (2024-27) |
| QUEENSLAND | • Queensland Transport Strategy (2020-50)<br>• Transport and Main Roads Digital Strategic Plan (2021–25)<br>• Cooperative & Automated Vehicle Initiative (2017-23)<br>• Smarter Suburban Corridors Brisbane Initiative (AI signals) (2025-ongoing) |
| NEW SOUTH WALES | • Future Transport Strategy (2056)<br>• Transport Technology Strategy (2024)<br>• Future Transport Technology Roadmap (2021-24)<br>• NSW Spatial Digital Twin (2020-ongoing)<br>• Connected and Automated Vehicles (CAV) Readiness Strategy (2022)<br>• Smarter Highways Program (2025) |
| VICTORIA | • Victoria's Infrastructure Strategy (2025-55)<br>• Smarter Roads Program (2020-ongoing)<br>• Digital Twin VIC Program (2021-24) |
| TASMANIA | • Draft Infrastructure Strategy (2019) *(Being updated)* |
| SOUTH AUSTRALIA | • South Australia's 20-Year State Infrastructure Strategy (2025)<br>• South Australia's Transport Strategy (2025)<br>• AI Traffic Camera Trial (Adelaide) (2024/25) |
| WESTERN AUSTRALIA | • State Infrastructure Strategy: Foundations for a Stronger Tomorrow (2022-42)<br>• Intelligent Transport Systems (ITS) Master Plan (2022-30)<br>• Our Roadmap to enabling C-ITS in Western Australia (2024-28)<br>• PoC C-ITS Trial (2024)<br>• Spatial WA *(Digital Twin)* Program (2024-ongoing) |
| NORTHERN TERRITORY | • NT Infrastructure Strategy (2022–30)<br>• NT Drone Industry Strategy (2024 *draft*)<br>• Digital Territory Strategy (2018) |

**Correct at the time of research (March 2026)*

# 14 Innovation Examples: Permanent Road Network

Road networks operate in complex environments where road agencies must manage safety, traffic flow and changing conditions across both busy urban corridors and quieter regional roads. Advances in digital technology are enabling improved monitoring and management and help optimise existing infrastructure. Examples of these innovations are highlighted below.

SOUTH AUSTRALIA

**AI-powered cameras, Adelaide**

*April 2025*


https://www.youtube.com/watch?v=8Vfssp0u530&t=61s

In 2025, South Australia became the first Australian state to deploy **AI-powered traffic signal optimisation**. Four smart AI cameras were installed on Adelaide's busiest arterials to detect vehicles and automatically adjust traffic signals in real time.

The AI system linked to Adelaide's Traffic Management Centre, successfully reduced congestion and rear-end crash risk by dynamically changing signal timing based on live traffic conditions. Following the trial's success (peak-hour queues and delays were notably reduced), the SA government plans to expand AI signal control to more intersections.

NEW SOUTH WALES

**Smarter Highways Program, Regional**

*January 2025*


https://www.youtube.com/watch?v=8Vfssp0u530&t=61s

Transport for NSW launched the **Smarter Highways Program** to trial a suite of low-cost, scalable technologies designed to improve journey reliability and safety across regional road corridors.

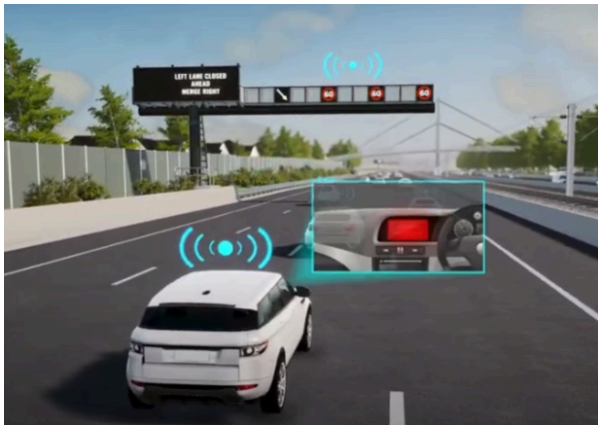
The program included solar-powered smart signage, machine-learning hazard detection systems, real-time vehicle counters and Rural Intersection Activated Warning Systems (RIAWS).

The program confirmed technical readiness for pilot deployment in regional NSW. However, outcome data on safety, travel-time improvements and full behavioural impact remains under review.

WESTERN AUSTRALIA

**Trial of C-ITS, Mitchell Freeway**

*May 2024*



https://www.youtube.com/watch?v=8Vfssp0u530&t=61s

In May 2024, Main Roads Western Australia (MRWA) began a **Cooperative Intelligent Transport System (C-ITS)** trial on a section of the Mitchell Freeway (southbound from Hester Avenue to Vincent Street) to test readiness and systems operability.

The technology used included **Vehicle-to-Infrastructure (V2I)** and **Infrastructure-to-Vehicle (I2V)** communications. Test vehicles were given real-time messages such as advanced warning of roadworks and reduced speed zones.

According to MRWA and Kapsch TrafficCom, the trial successfully demonstrated infrastructure readiness for wider C-ITS deployment across WA. However no quantitative data on safety benefits and performance improvements have yet been publicly released.

QUEENSLAND

**CAV Pilot, Brisbane/South East region**

*2019 onwards*


https://www.youtube.com/watch?v=8Vfssp0u530&t=61s

The Queensland's Cooperative and Highly Automated Driving (CHAD) Pilot, led by the Department of Transport and Main Roads (TMR) was part of a suite of tests under the **Connected and Automated Vehicle (CAV)** Initiative (2017-2023).

The pilot tested a Level 4 automated vehicle (ZOE2) on public roads to explore how highly automated driving systems interact with road infrastructure, traffic signals, signage and human driver. It investigated complex scenarios unique to Australia, such as mixed traffic conditions, wildlife hazards and remote driving environments.

The pilot provided critical insights to help TMR assess what adaptations (e.g. signage, road markings, signal standards) are needed to safely accommodate CAVs in real-world environments.

# 16 Innovation Examples: Temporary Traffic Management

Road works create inherently high-risk operating environments where workers, vehicles and road users must operate in close proximity on live road networks. In response, new technologies are emerging to improve safety and efficiency in temporary traffic management. Examples of these innovations are highlighted below.

VICTORIA

**Automated Cone Trucks (ACT)**

*2023*


https://bigbuild.vic.gov.au/news/victorias-big-build/automated-traffic-cone-truck-a-safety-innovation-on-our-projects/_nocache

**Automated Cone Trucks (ACT)** were first introduced in Australia on major infrastructure projects in Victoria through the Big Build program, including trials on the M80 Upgrade and later the Eastern Freeway Upgrades. In Western Australia, Main Roads WA has also deployed the technology on the Stephenson Avenue Extension project.

The trucks use a mechanical system that automatically places and retrieves traffic cones as the vehicle travels along the roadway, removing the need for workers to manually deploy cones in live traffic lanes.

The primary aim of the technology is to reduce worker exposure to traffic while also improving efficiency and consistency when establishing and removing temporary traffic management.

VARIOUS

**Barriers**

*2020*

HighwayGuard Barrier

**Modern barrier systems** have advanced to provide higher levels of protection and easier install and modification capabilities, helping improve efficiency and worker protection.

For example, the MDS TL4/TL5 Bridge Barrier (currently used on the North East Link project, Victoria) offers low dynamic deflection, minimising lateral movement on impact making them suited to constrained environments such as bridges and narrow work zones.

In addition, innovations such as curved barrier systems and modular units with wheel-set mobility allow for easier on-site modifications, reducing reliance on heavy lifting equipment and improving deployment efficiency.

VICTORIA

**AI Near-Miss Detection**

*2025*


https://www.realtimetraffic.com.au/case-studies

**AI-powered near-miss detection technology** is being used to enhance safety monitoring around temporary traffic management and construction zones.

On the North East Link project in Victoria, AI-enabled camera systems were deployed to analyse vehicle movements and interactions in real time across active work areas where traffic conditions frequently change due to lane closures and construction staging.

The system uses video analytics to automatically detect and classify near-miss events, monitor heavy vehicle interactions and analyse vehicle speeds and trajectories near work zones. This provides project teams with continuous data to identify risk hotspots and implement proactive safety improvements within construction zones.

NEW SOUTH WALES

**Workzone Digitisation**

*2024*

Digital Workzone Case Studies

**Digitised work zones** are emerging as a new approach to improving safety and visibility around temporary traffic management sites. On major infrastructure projects in New South Wales, connected devices and location data are being used to create a real-time digital representation of active roadworks.

The system captures the location of traffic management assets such as cones, barriers and vehicles, establishing a digital work zone that can be monitored and integrated with traffic management platforms.

This improves situational awareness, allows work zone boundaries to be tracked in real time, and supports safer interactions between road users and construction activities.


AI

# What's the Future of Temporary Traffic Management?

# 20 The Future of Temporary Traffic Management

The future of Temporary Traffic Management is being shaped by more than the introduction of new devices and digital tools. It is being driven by two connected shifts: changes in technology and changes in function.

New technologies such as automation, AI, advanced sensing, connected systems and real-time data are changing the operating environment in which TTM must function.

These innovations are creating new opportunities to improve how traffic is planned, monitored and managed during construction, while also increasing expectations around safety, efficiency, compliance and broader road network performance.

As the operating environment changes, the role of TTM itself must also evolve. It is moving beyond a largely reactive, site-based activity focused on deploying signs, cones and barriers, toward a more proactive and strategic function of managing road network performance during construction.

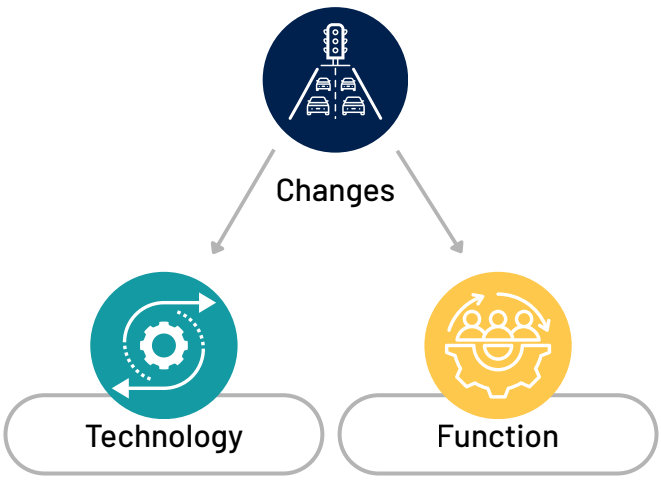
This means the future of TTM is not simply about adopting new technology and innovations, it is also about rethinking how traffic management is planned and delivered as a critical part of road network management during construction of transport projects.

Understanding both of these key shifts is important. Focusing only on new technology without recognising the changing function of TTM risks treating innovation as isolated devices rather than part of a broader operational and strategic transformation.

The following section outlines in further detail the two key shifts that are changing the future of TTM:

- The Technology
- The Function.

**Figure 4: The Future of Temporary Traffic Management - Changes in Technology & Function**



# 21 Changes in Temporary Traffic Management: The Technology

Technology-driven solutions in Temporary Traffic Management are increasingly focused on being more automated, responsive, data-driven and better integrated with the broader road network.

Traffic management tools and systems used during construction must operate in highly dynamic environments where layouts, traffic conditions and risk profiles can change daily.

As a result, innovation in this space is increasingly focused on technologies that can be rapidly deployed, respond to changing conditions, increase efficiencies through automating manual processes and reduce the need for workers to operate close to live traffic.

Drawing on industry developments, research studies and emerging technology trials, **four key drivers** are shaping the future of TTM technology and innovation solutions (refer **Figure 5**):

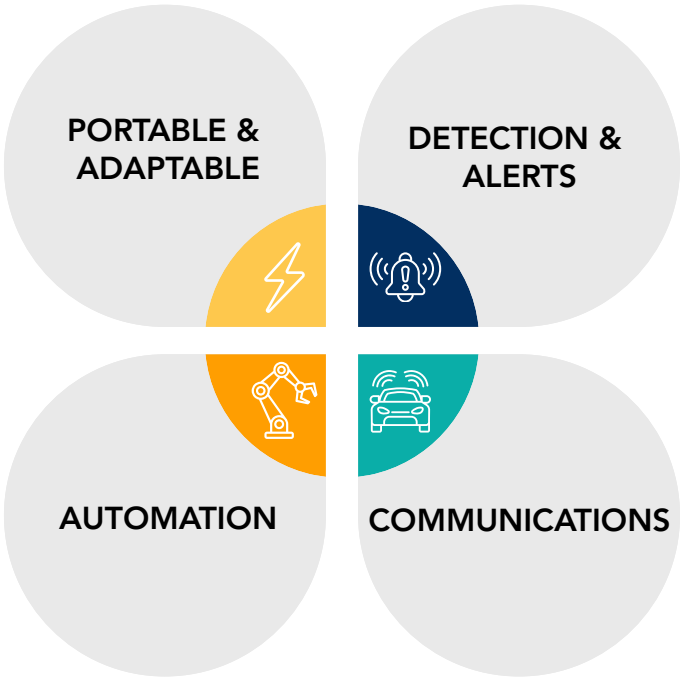
**1) Portable and Adaptable** - devices that can be rapidly deployed and adapt based on real-time conditions

**2) Detection and Alerts** - proactively detecting hazards and providing timely alerts

**3) Automation** - replacing manual processes to improve safety and efficiency

**4) Communications** - improving how information about work zones is communicated to users.

**Figure 5: Key Drivers for Future Technology & Innovation Solutions in Temporary Traffic Management**



## Portable & Adaptable

Temporary traffic management solutions must be able to be deployed quickly and operate effectively across a wide range of site conditions. **This is driving innovation in portable, modular and rapidly deployable systems** that can be relocated or reconfigured as works progress.

Technologies emerging in this area include portable sensor systems, mobile traffic monitoring devices, smart work zone equipment and AI-enabled traffic control tools that can adapt signal timing, warnings or messaging based on real-time traffic conditions.

These solutions allow traffic management strategies to respond dynamically to changing site layouts, traffic demand and incident conditions without requiring extensive fixed infrastructure.

## Detection & Alerts

Improving situational awareness within work zones is a major focus of current innovation. **Detection technologies are increasingly being used to identify hazards or abnormal traffic conditions and provide timely alerts** to workers, operators or approaching drivers.

Examples include radar-based queue detection, computer vision systems, connected vehicle alerts and wearable technologies for site personnel.

Research such as the iMOVE "Working Near Traffic – End-of-Queue" study highlights the potential for automated queue detection systems to provide earlier warnings of sudden traffic slowdowns approaching work zones, helping reduce the risk of rear-end crashes.

As sensor costs fall and AI-based detection improves, these systems are becoming more viable for temporary deployments.

## Automation

Automation is emerging as a key pathway to improving safety and efficiency in traffic management operations. By **reducing the need for workers to perform tasks in high-risk** live traffic environments, automated and semi-automated systems can significantly improve safety outcomes.

Recent developments include automated cone trucks, robotic line markers and automated traffic control systems. There is also growing potential for automation to be applied in planning processes, with digital tools expected to support the development of TMPs and TGS.

These technologies are particularly relevant for repetitive or high-exposure tasks where automation can reduce worker exposure to live traffic and improve overall operational efficiency.

## Communications

A growing focus of innovation is **improving how information about work zones is communicated** to road users, vehicles and network operators.

This includes technologies that enable real-time information exchange between vehicles, roadside infrastructure and traffic management systems. Examples include Cooperative Intelligent Transport Systems (C-ITS), Vehicle-to-Infrastructure (V2I) communications and digital work zone messaging systems.

Improved communications enable earlier warnings to drivers, better coordination of network operations and the potential for automated vehicles to respond appropriately to temporary traffic conditions.

# 23 Changes in Temporary Traffic Management: The Function

Technology is not simply changing the tools used in Temporary Traffic Management, it is also changing the function of traffic management itself.

The role and function of traffic management has been changing over the years in response to busier and more complex road networks.

The operating environment for traffic management continues to become more complex with the use of new technolgies, causing an increasing need to be able to function within a digitally-enabled network environment.

Greater automation, real-time monitoring, connected systems and digital planning are shifting the focus from largely reactive site-based traffic control activities, to a more proactive and strategic function of managing the broader road network performance during construction.

This creates significant **opportunities** to improve safety, efficiency and compliance, while also requiring new skills, new delivery models and a more strategic approach to managing temporary road environments.

It also creates significant **challenges**. Not all technology delivers immediate or clear benefits, and in many cases the value depends on how effectively it is applied within the project environment.

Adopting new approaches often requires changes in capability, procurement, project planning and operational decision-making, as well as a clear understanding of where innovation genuinely improves outcomes - rather than simply adding cost, complexity or isolated pilot projects with limited long-term value.

### How is the function of Temporary Traffic Management changing?

TTM is increasingly expected to:

- operate within a more digitally-enabled road network environment (both permanent and temporary environments), where connected vehicles, smart infrastructure and real-time network management are becoming standard future expectations
- plan for both human and machine users of the road network
- predict and respond to traffic conditions in real-time rather than rely only on static traffic management plans and guidance schemes
- use live operational data to optimise staging, traffic flow and safety outcomes throughout construction
- integrate with wider network operations and traffic management centres rather than operate as an isolated worksite
- reduce manual, high-risk site activities through automation and remote monitoring
- manage and maintain new digital systems such as sensors, smart devices, connected work zones and automated equipment as part of normal operations
- interpret performance data and use it to support decision-making, compliance and continuous improvement
- provide measurable performance, compliance and network outcomes rather than simply physical traffic control
- support broader project delivery decisions by considering traffic management as part of overall construction planning, not just site implementation.

# 24 The Future of Temporary Traffic Management - Key Considerations

The technology and innovation changes in Temporary Traffic Management are creating delivery, operational and network impacts. Understanding these changes is critical to improving safety, efficiency and long-term project performance.

**Table 3** below outlines the nine key technology impacts on TTM and provides a brief summary of the main insights for consideration.

These considerations help inform where technology can deliver genuine value and support a more strategic approach to innovation planning and future delivery.

For individuals/organisations seeking to explore these nine impact areas in greater detail, a more comprehensive strategic considerations framework is available as a supporting resource.

The resource provides practical questions to guide technology adoption and more informed decision-making in Temporary Traffic Management.

**If you would like a copy, please contact Transia:** innovation@transia.com.au

**Table 3: Key Insights for the Technology Impacts on Temporary Traffic Management**

| Technology Impact | Key Insights |
|---|---|
| Safety | The effectiveness of technology is reflected in how well it reduces worker exposure to live traffic environments and improves protection for both workers and all road users. |
| Risk Management | Real-time monitoring and connected systems enabling the ability to proactively identify and respond to risks rather than relying only on post-incident reporting. |
| Compliance | Digital tools should strengthen compliance by improving visibility, accountability and the quality of decision-making rather than simply increasing administration. |
| Efficiency | Technology influences efficiency through automation to reduce repetitive manual processes, improved consistency and reduce disruption across planning and delivery. |
| Cost | The value of technology is better measured through whole-of-life benefits such as labour savings, reduced disruption and avoided project delays rather than upfront cost alone. |
| Network Performance | Temporary traffic management will require consideration of the technology and operating systems on the broader road network and the opportunities to integrate and share data. |
| Planning & Delivery | Planning is shifting from static traffic control layouts toward more dynamic, integrated network-focused decision-making supported by tools that can automate planning and delivery. |
| Workforce Capability | As TTM becomes more technology-enabled, capability increasingly depends on the effectiveness of teams to have the skills to operate, interpret and manage new systems effectively. |
| Systems Capability | The effectiveness of new technology depends on how well it integrates with wider systems and supports future operating processes and minimise new legacy constraints. |

# 25 Conclusion

The future of Temporary Traffic Management is being reshaped by the rapid availability of new technologies and innovations.

Temporary traffic management is increasingly required to operate within a wider digitally-enabled network environment, adding new layers of complexity to how it is planned and delivered.

To be able to do so effectively requires a more **strategic, integrated** and **proactive** approach to managing the road network during construction.

Traditionally, TTM has been viewed as a reactive site-based activity focused on the physical implementation of traffic control measures to keep workers and road users safe around a worksite. While this function remains essential, new technologies such as AI real-time monitoring, automated deployment systems, connected work zones and C-ITS are changing its role.

These changes will fundamentally impact the physical infrastructure used in temporary traffic management, such as signs, signals and line markings. Significant research, testing and validation will be needed to translate emerging technologies into industry design standards and guidelines.

This shift away from traditional temporary traffic management models requires more than an awareness of different technologies. It calls for a clear understanding of how these technologies influence planning, delivery and operations in practice.

The key requirement is to be able to make decisions that continue to reduce risk, improve safety and efficiences.

The technology and innovation trends in Australia are opening up new opportunities to improve safety, efficiency and compliance but there is also a lot of noise and hype which can be hard to navigate.

## Transia can help you navigate these changes

**Transia** provides a more strategic and integrated approach to managing the road network during construction. We bridge the gap between traffic engineering and construction delivery.

With decades of experience across major transport infrastructure projects in Australia, we understand the realities of delivering traffic management in complex, high-pressure environments. This enables us to apply a technology and innovation lens in a more holistic way - translating emerging capabilities into practical opportunities that align with project and network outcomes.

### Our Services

**Transia** provides strategic advisory services to help organisations navigate the changing role of Temporary Traffic Management.

#### For Project Delivery

**Transia** can help you identify where innovation can reduce risk, improve safety, enhance efficiency, optimise cost and minimise network disruption during construction.

#### For Technology Providers/Vendors

**Transia** can help you understand where your temporary traffic management solution/ product fits or how it could be improved to add value in the industry.

For more information, please visit:

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# 26 Glossary

**Active Traffic Management Systems (ATMS)** – Systems that dynamically manage traffic flow using tools such as variable speed limits, lane control signals and ramp metering.

**Artificial Intelligence (AI)** – Computer systems capable of performing tasks that typically require human intelligence, such as pattern recognition, prediction and decision-making.

**Automation** – The use of technology to perform tasks with minimal human intervention.

**Automated Cone Trucks (ACTs)** – Vehicles that automatically deploy and retrieve traffic cones to reduce worker exposure to live traffic.

**Automated Vehicle (AV)** – A vehicle with systems capable of performing some or all aspects of the driving task, depending on the level of automation and operating conditions.

**Building Information Modelling (BIM)** – A digital approach using 3D models and data to plan, design and manage infrastructure assets.

**Cooperative Intelligent Transport Systems (C-ITS)** – Advanced transport systems where vehicles, infrastructure and devices communicate to share real-time information and improve safety and efficiency.

**Communications** – Technologies that enable the exchange of information between systems, devices, workers and road users.

**Computer Vision** – AI capability that enables systems to interpret and analyse visual data such as images and video.

**Connected and Automated Vehicles (CAV)** – Vehicles that can communicate with their environment and/or operate with varying levels of automation.

**Connected Work Zones** – Work zones that are digitally integrated with the broader transport network through real-time communication.

**Connectivity** – The ability for systems and devices to communicate via networks such as 4G, 5G or V2X.

**Data Analytics** – The process of analysing data to extract insights and support decision-making.

**Data-Enabled Decision Making** – The use of data to inform planning, operations and strategic decisions.

**Digital Engineering** – The use of integrated digital tools, data and models across the asset lifecycle to improve the planning, design, delivery and operation of infrastructure.

**Digital Transport Infrastructure** – Physical transport infrastructure enhanced with digital systems, sensors and connectivity.

**Digital Twin** – A virtual representation of a physical asset or system used to simulate, monitor and optimise performance.

**Electric Vehicle (EV)** - A vehicle powered wholly or partly by electricity, typically using a rechargeable battery rather than relying solely on an internal combustion engine.

**Geofencing** – The use of location data to create virtual boundaries that trigger actions or alerts.

**Innovation** – The application of new or improved technologies, processes or approaches to create value through better outcomes.

**Intelligent Transport Systems (ITS)** – Integrated applications using data, sensors and communications to improve transport network operations.

**Lane Use Management Signals (LUMS)** – Signals used to indicate lane availability, such as open, closed or merging lanes.

**LiDAR (Light Detection and Ranging)** – A sensing technology that uses laser pulses to measure distances and generate detailed 3D environments.

**Machine Learning (ML)** – A subset of AI that enables systems to learn from data and improve performance over time.

**Natural Language Processing (NLP)** – AI capability that enables systems to understand and generate human language.

**Network Performance** – The efficiency and effectiveness of a road network in moving people and goods.

**SCATS (Sydney Coordinated Adaptive Traffic System)** – An adaptive traffic signal system that adjusts signal timings based on real-time traffic conditions.

**Sensing Technologies** – Devices such as cameras, radar and LiDAR used to detect and measure physical conditions.

**Smart Work Zones** – Work zones that use connected technologies and real-time data to improve safety and traffic flow.

**Technology** – The tools, systems and technical capabilities used to perform tasks and enable new ways of operating.

**Technology Maturity** – The stage of development and adoption of a technology, such as emerging, growing or mature.

**Temporary Traffic Management (TTM)** – The planning and implementation of traffic control measures to manage road users and workers during construction activities.

**Variable Message Signs (VMS)** – Electronic signs that display real-time information to road users.

**Vehicle-to-Everything (V2X)** – A communication framework enabling interaction between vehicles, infrastructure and other road users.

**Vehicle-to-Infrastructure (V2I)** - A form of communication where road infrasttructure (e.g. signals, or signs) sends real-time information directly to vehicles to improve safety, awareness and traffic flow.

**Wearable Safety Technology** – Devices worn by workers to monitor conditions, detect hazards and provide alerts.

**Work Zone Intrusion Detection Systems** – Technologies that detect unauthorised entry into work zones and alert workers.

**Queue Detection Systems** – Technologies that identify traffic congestion and queue formation using sensors or cameras.

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