NHVR

Camera Enforcement Compliance Framework

2025 – 2027

NOV 2025

INTRODUCTION

PURPOSE

This document sets out the National Heavy Vehicle Regulator's (NHVR) vision for modernising, harmonising and improving camera based regulatory compliance activities over the short to medium term. This framework fits within the NHVR's larger suite of policy documentation including the Regulatory Intervention Strategy and Compliance and Enforcement Policy.

The long-term vision of the NHVR's office-based compliance functions centres on establishing an agile data rich operating environment.

This framework is designed to move the NHVR's camera based enforcement activities from a limited, legacy based, process driven function to a holistic, integrated, risk-based approach to the identification and disruption of potentially high risk heavy vehicle journeys and behaviours.

Through Section 659 of the *Heavy Vehicle National Law* (HVNL) the NHVR is given functions to monitor compliance with the HVNL and investigate contraventions or potential contraventions of the HVNL. Where appropriate, either or both of these powers could result in the NHVR taking regulatory actions i.e. education and enforcement activities.

Through doing this the NHVR;

- promotes public safety
- manages the impact of heavy vehicles on the environment, road infrastructure and public amenity, and;
- promotes industry productivity and efficiency in the road transport of goods and passengers by heavy vehicles.

The framework aligns with the NHVR's corporate goals outlined in the NHVR Corporate Plan 2024-2027 of:

Safety – Improve the national operations of roadside cameras to strengthen safety outcomes.

Productivity – Develop a revised system and process for the regulation of data initiated investigations (i.e. camera enforcement).

Regulatory Capability – Improve risk-based targeting of on-road intercepts.

CURRENT STATE

CAMERA ENFORCEMENT BACKGROUND

The NHVR's first active involvement with camera based enforcement occurred in 2018 through the transition of heavy vehicle regulatory services in South Australia.

Progressively from 2018 to 2025 and ongoing, the NHVR has continued to advance its camera operating model through the acquisition of different sets of camera data, both through the transition of further state jurisdictions but also through various data sharing arrangements.

The current camera footprint of the NHVR is provided in Table 1.

Table 1.

LOCATION	QUANTITY
New South Wales (ACT)	27
Queensland	22
Victoria	5
Tasmania	0
South Australia	14

The cameras outlined above constitute the National Camera Safety Network (NCSN), and are fixed cameras. These cameras are owned and maintained by agencies independent of the NHVR, with the data and images made available to the NHVR for regulatory purposes.

In addition to these cameras the NHVR owns and operates number of mobile cameras. These cameras have no fixed location and are deployed nationally as needed. The asset breakdown is outlined in Table 1.2.

Table 1.2

CAMERA ASSET TYPE	QUANTITY
Trailer	8
Vehicle	42

A subset of the fixed cameras available to the NHVR throughout New South Wales and South Australia comprise what is known collectively as the Safe-T-Cam network, Safe-T-Cam is historically the most direct form of camera based enforcement for the heavy vehicle industry.

Additional camera sources are available to the NHVR either on a consistent ongoing basis or ad hoc as required. These sources include:

- Police agencies
- Third party monitoring cameras (e.g. toll road operators)
- Other relevant agencies.

Each asset type has certain benefits that are distinct. For example, key benefits of fixed cameras are their ability to achieve high sightings volumes due to their placement most often being on primary routes. Conversely, mobile cameras have the ability to access multiple parts of the network allowing for a greater diversity of sightings type and tactical operational opportunities. These complementary benefits are why the NHVR favours a mix of asset types.

Camera data is exchanged with the NHVR either via the relevant organisation's systems or direct from the vendor of the camera product. In all circumstances the NHVR is entitled to the receipt and use of the data as empowered directly from the HVNL, through Memorandum of Understanding or Data Sharing Agreement between entities.

Section 659 of the *Heavy Vehicle National Law* (HVNL) sets out the functions of the NHVR. Camera enforcement technology is used to when carrying out those functions, including when monitoring compliance with the HVNL and investigating contraventions or possible contraventions of the HVNL. Camera enforcement technology used by the NHVR uses numberplate recognition; captures time date and location; records vehicle axle spacing and axle groupings and records length and speed of the vehicle. Use of camera enforcement technology is subject to the *Heavy Vehicle National Law*, *Information Privacy Act* 2009 (Qld) (IP Act) including the Queensland Privacy Principles, relevant surveillance device legislation of the various HVNL jurisdictions and the Human Rights legislation enacted in Queensland, Victoria and ACT. The use of machine learning technology is subject to NHVR policies and procedures and the IP Act.

The NHVR derives a number of regulatory outcomes from the current camera enforcement model. These can be categorised into the following six broad categories:

Fatigue

The NHVR currently monitors fatigue compliance in two ways. The first is through Safe-T-Cam. Safe-T-Cam is a series of point to point cameras integrated with a travel time data base. If a heavy vehicle is sighted between two cameras with a timing that indicates the trip that has occurred would breach maximum work time/minimum rest time requirements a Notice to Produce is issued to the registered operator of the vehicle to obtain work diary records for the driver. If the work diary records are not received or they confirm a work and rest hours non-compliance, enforcement action is taken.

Enforcement Avoidance

In NSW cameras associated with Heavy Vehicle Safety Stations (HVSS) are utilised to identify vehicle that fail to follow a direction to enter the HVSS, this can result in an infringement being issued.

In other states, mobile ANPR cameras can be used to monitor traffic on alternative routes when enforcement activity is occurring, however this monitoring does not result in direct regulatory action.

Registration

Also in NSW the Safe-T-Cam cameras can be used for the identification of unregistered vehicles and associated action taken.

In other states mobile ANPR cameras are utilised to identify unregistered vehicles and if intercepted, regulatory action can be taken on road.

Speed

In Victoria in some locations ANPR cameras are integrated with other speed detecting technology. The NHVR undertakes a regulatory intervention if a high speed is identified. The intervention is not a speeding fine.

Risk identification

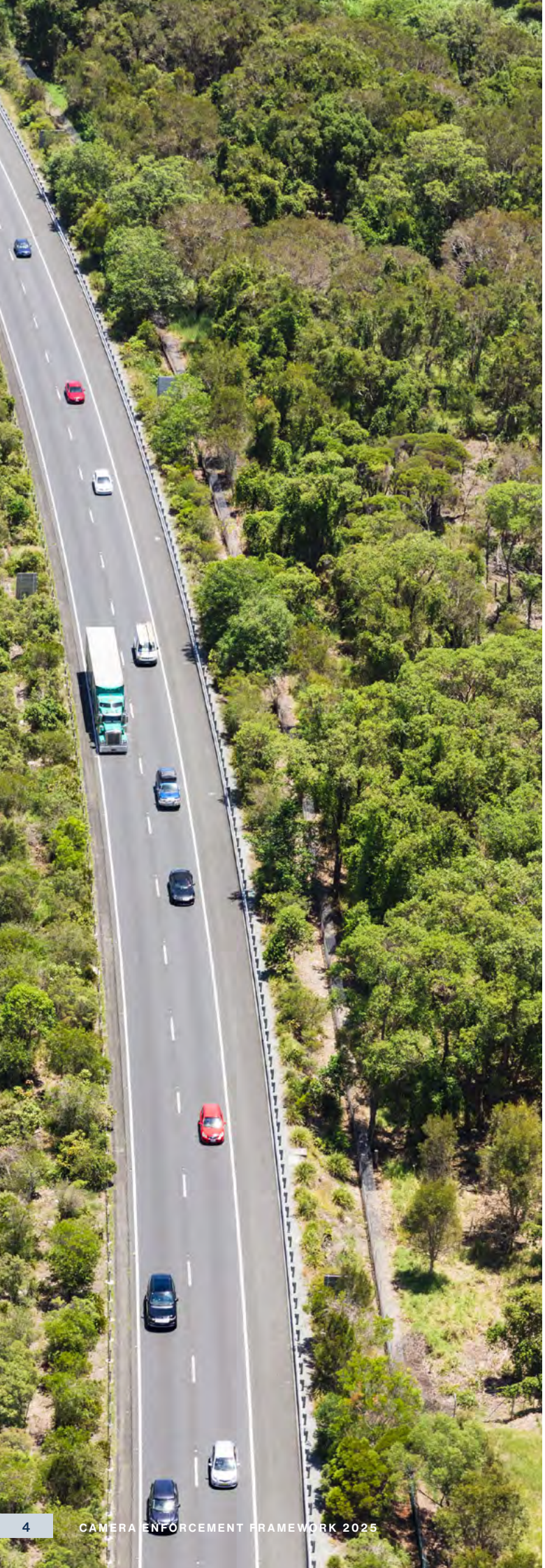
The NHVR operates risk algorithms in the area of unregistered vehicles, fatigue and mechanical.

Mobile ANPR cameras are used to identify vehicles that are present in one, or a combination of these risk profiles. An alert is sent to nearby SCOs to assist in facilitating an intercept of the high risk vehicle.

Intelligence

Camera sightings in general form part of the NHVR's intelligence capabilities. This includes establishing heavy vehicle footprints and specific movements. Sightings may also identify operators that are not conforming to a previous enforcement outcome.

The following points are relevant in relation to the NHVR's camera based enforcement activities which culminate in a regulatory intervention.



Authorised Officer review and verification

The way that the NHVR operates enforcement cameras is that irrespective of the type of non-compliance event detected, before regulatory action is taken it is reviewed by an authorised officer to determine the circumstances and validity of the non-compliance as well as any additional information that may need to be gathered. This means that unlike other types of camera enforcement e.g. speed cameras, a penalty is not automatically issued. No NHVR camera operations utilise automated decision making.

Strict liability

Some agencies utilise camera enforcement technology for strict liability purposes. Examples of this include speed cameras and red light cameras. Cameras used for these purposes on occasion also have a shared purpose with the NHVR or the data from them is made available to the NHVR. Where a camera has strict liability purposes most often it is prescribed in a relevant road transport act and gazetted. Gazettal serves the purpose of defining specific makes and models of cameras as well as their certification and maintenance requirements.

Limitations to current model

Travel time database

The NHVR's agility to undertake point to point based fatigue compliance in new and variable locations is hampered by the current travel time database and associated measurement practices. This means that numerous key routes have a camera monitoring deficiency potentially leading to a greater level of safety risk through increased fatigue non-compliance. Current practices also exclude the consideration of travel time sightings from mobile cameras.

Jurisdictional

Jurisdictional limitations are two-part. The first relates to the historical practices and technology supporting Safe-T-Cam operations. The Safe-T-Cam fatigue compliance model, when under the remit of state agencies, was only adopted in New South Wales and South Australia, consequently these are the only two jurisdictions where the NHVR has transitioned staff and applications to support this function. This creates a fatigue compliance regulatory gap in Queensland, Victoria and Tasmania.

The second jurisdictional limitation relates to the ownership status of fixed enforcement cameras. The NHVR does not own camera assets in the road reserve (or affixed to associated infrastructure) which limits the locations the NHVR can undertake operational compliance activities. Relatedly despite the data from most relevant cameras being provided to the NHVR, the jurisdiction retains control of camera performance which may impact the technical capabilities of what the camera can record or how fast the information is exchanged with the regulator. Legislative and fiscal constraints limit the fixed camera location opportunities for the NHVR

Technology platform

The systems used by the NHVR are not harmonised to provide a consistent risk based approach to the identification of non-compliance through cameras. This limits the geographical locations and areas of the HVNL that the NHVR is able to undertake regulatory actions for camera detected offences.

LIMITATION	RESOLUTION	REALISED BENEFIT
TRAVEL TIME DATABASE	Implement an Australian Measurement Institute certified advanced travel time database that triangulates multiple datapoints to establish timings.	The ability to conduct point to point based work and rest hour compliance checking from any ANPR camera integrated with the NHVR's Enterprise Data Platform.
JURISDICTIONAL	Establishment of business processes that support identifying and assessing camera detected non-compliance that is replicable nationally. Continued investment in mobile or semi moved ANPR technology and underlying processing software scalable across fixed and mobile cameras.	Expansion to a national model for fatigue related back office compliance checking. Options to pursue areas of offending beyond current areas of operation.
TECHNOLOGY PLATFORM	Ingestion of camera sightings into a consolidated software to assess images and associated metadata.	Enhanced risk-based operations and situational awareness of safety issues.

FUTURE STATE

OBJECTIVES OF THE CAMERA COMPLIANCE FRAMEWORK

By enhancing the NHVR's compliance monitoring capabilities under the HVNL, the Camera Compliance Framework aims to achieve the following objectives:

1) Encourage and promote safe business practices through a higher level of general deterrence of unsafe activities through expanded monitoring capabilities.
2) Manage the impact of heavy vehicle driver fatigue on road safety and redress regulatory inequities by implementing Camera Enforcement fatigue non-compliance detection nationally.
3) Integrate advanced technologies into Camera Enforcement operations to improve proactive safety capabilities in more areas of HVNL compliance and risk profiling.
4) Enable a monitoring platform that allows for effective identification of non-compliance and freight movements to help direct relevant resources to promote safe behaviour.

ENCOURAGE AND PROMOTE SAFE BUSINESS PRACTICES	MANAGE THE IMPACT OF HEAVY VEHICLE DRIVER FATIGUE	INTEGRATE ADVANCED TECHNOLOGIES INTO CAMERA ENFORCEMENT	ENABLE A MONITORING PLATFORM
Implement camera enforcement coverage to more locations	Implement location and camera agnostic point to point travel time calculations	Acquire effective mobile ANPR technology	Utilise camera data to assist in compliance trend identification to inform industry education priorities
Monitor non-compliant and unsafe behaviour trends detected by cameras to guide industry education	Create national processes for the back office detection and assessment of work and rest hour offences	Advance the acquisition of suitable periphery camera technology	Establish reporting that gives clearer insights in to freight movement (e.g. volume, types)
Undertake high viability mobile camera deployment activities	Apply the NHVR inform educate enforce model	Implement machine learning capabilities across camera images and metadata	Develop processes that assist with the identification of high risk behaviours and recidivist offending on the road network using cameras
Provide identified trends and feedback to police and jurisdictions for multi-agency response	Develop an implement a risk algorithm to target the highest risk fatigue events	Enable more risk algorithm inputs and camera activations	Capture reliable and admissible evidence for use in court or as a basis for administrative decision making in appropriate circumstances
		Research and adopt suitable emerging technologies	Identify and acquire new data sources

The NHVR will seek to achieve the objectives of the compliance framework through the following:

Harnessing new and emerging technologies

Camera and camera related technologies are continuing to advance. Many legacy camera platforms in use for compliance purposes are not taking full advantage of options presented through modern software applications.

In particular, the NHVR will continue to evolve object identification and machine learning outputs for camera sightings. This means that sophisticated insights beyond the license plate reading and vehicle photo will be available giving the NHVR near real time situational awareness of potential risk. This can include metrics on vehicle dimensions and configuration, load type or dangerous good identification.

AI and Machine Learning

Artificial Intelligence and Machine learning based on image recognition is a fast evolving area of technology. The NHVR will seek to maximise the regulatory benefits these technologies offer, consistent with the NHVR Ethical use of Artificial Intelligence Policy.

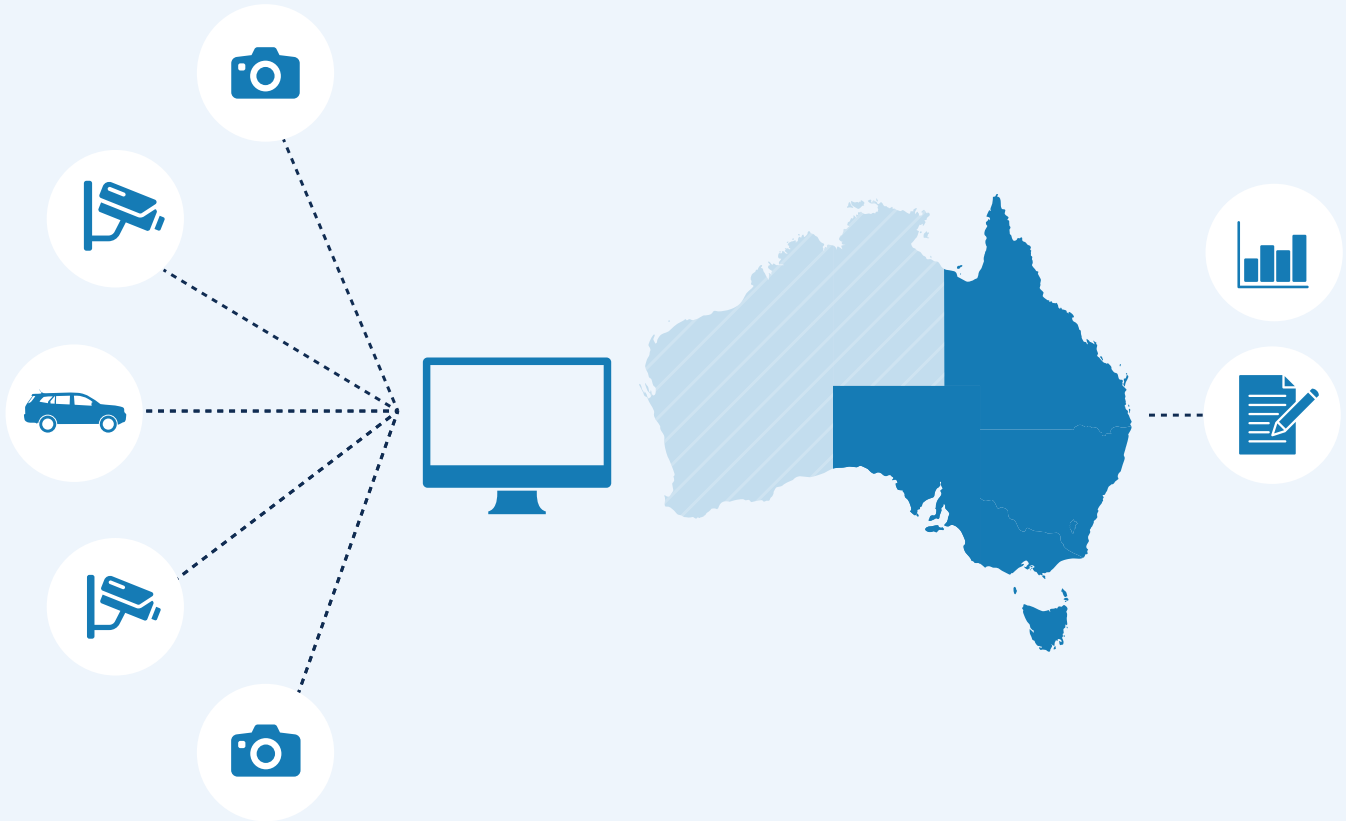
Deeper integration of systems and harmonisation of processes

The NHVR is currently utilising disparate hardware and software solutions in relation to camera technology. To enable the Camera Compliance Framework the NHVR will pursue opportunities for the cross functionality of camera systems and associated outcomes.

A noteworthy inclusion in this reform is the travel time database underpinning Safe-T-Cam fatigue compliance checking. The NHVR intends to implement a new travel time database with reformed data led point to point measures which will be repeatable and location agnostic allowing for the integration of more sites, inclusive of mobile sites, into fatigue checking.

Expanding the reach of existing services

New technologies and greater harmonisation gives the NHVR the ability to broaden the application of its current camera based monitoring and intervention approaches. This means that the NHVR can detect more non-compliant behaviours in more places, more often. Improved technologies will also enable the NHVR to ingest images from third parties, e.g. police, to maximise efficient network coverage and risk identification opportunities.



AN EXPANSION OF OFF-ROAD COMPLIANCE MONITORING

As a risk-based intelligence led regulator the NHVR sees 'back-office' enforcement activities as an evolving area of compliance activity with an increasing focus especially across the longer term.

Case Study – Access Compliance

Working to maximise camera-based compliance by enhancing the use of data from fixed and mobile camera networks, alongside integrated road access information, to detect off-route heavy vehicles.

By combining detection, intelligence gathering and data sharing, this coordinated approach will enable real time interruption of unauthorised journeys through enforcement action.

In addition to on-road enforcement, camera data will also support office-based compliance activities by identifying instances of unauthorised heavy vehicle travel.

Mobile cameras offer a unique advantage, as they can be strategically deployed on routes where heavy vehicles are restricted or prohibited, expanding the NHVR's reach to locations that were previously unmonitored and improving the detection of non-compliance.

The approach will allow for easy identification and validation of vehicles 'running hot' without the appropriate permit or notice compliance requirements.

The NHVR can also generate off-route reporting to assist efficient network access and protecting road networks and vulnerable assets.

Evolution of the current model

Each of the six categories of the NHVR's current camera compliance model stand to be enhanced through this framework.

1) Fatigue – a broadening of camera detected fatigue offences into all NHVR regions
2) Enforcement avoidance – the ability to apply penalties for failure to follow directions to enter an enforcement site nationally
3) Registration – unregistered vehicle detection from all fixed cameras
4) Speed – consolidation of speed detections into risk profiling and utilisation of indicative spot speeds for potential speed limiter tampering
5) Risk identification – ingestion of additional datapoints into NHVR risk profiles and provision of associated alerts expanded to fixed camera network
6) Intelligence – additional data and richer data derived from more locations allows for a greater level of analysis of current and emerging compliance issues.

More generally the approach of the Compliance Framework reimagines camera enforcement from being process driven with compliance action in a small number of areas to being based on undertaking interventions based on the highest risk activities identified, consistent with the concepts of the NHVR's Intelligent Transport System Compliance Framework.

RISK-BASED APPROACH TO ENCOURAGE BEHAVIOURAL CHANGE

For confirmed non-compliant events, the NHVR will determine the appropriate intervention response for the liable person or party by considering the severity of the risk and pattern of behaviour of the industry participant. For low severity events with low frequency, no action will be taken, and records will be deleted after a period which is regulated by the *Public Records Act* 2002.

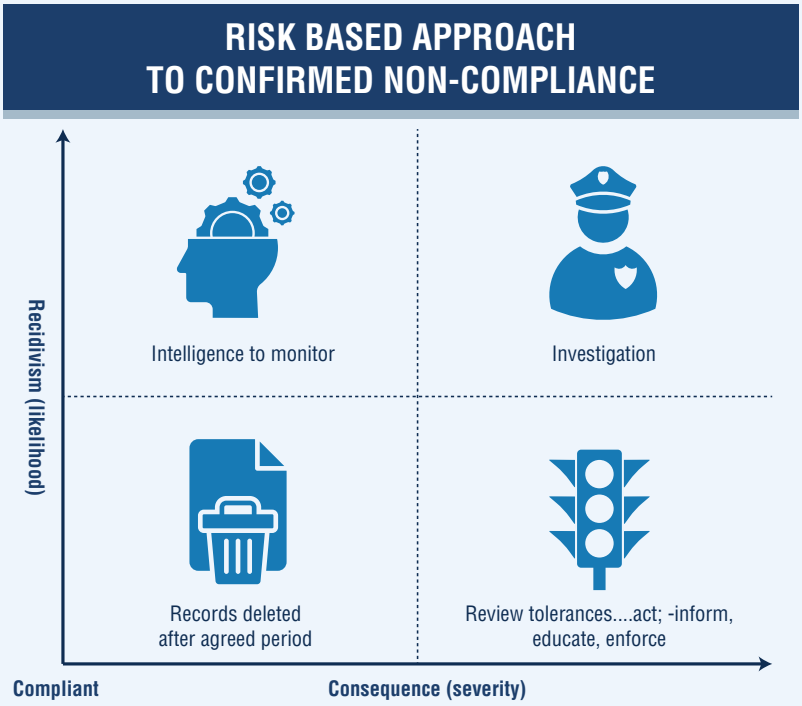


Figure 3 - Regulatory action on confirmed non-compliance using a risk-based approach

Areas of enforcement action able to be identified through camera enforcement are:

- Mass, dimension, loading
- Fatigue
- Failure to follow a direction (enforcement avoidance)
- Unregistered vehicles
- Off route
- Mechanical*
- Permit conditions.

*Requires subsequent on road intercept or scheduled inspection.

Authorised officers will use an initial camera detection to form a reasonable belief an offence has occurred. Secondary verification will occur to through additional data available to the NHVR including those outlined in Appendix 1.

A backing office setting affords the authorised officer the opportunity to access and review detailed information regarding the non-compliance and undertake secondary verification in order to make the most appropriate determination of risk and intervention.

Benefits for industry

The Camera Compliance Enforcement Framework is beneficial for industry. By implementing this framework and bringing camera based enforcement in line with the NHVR's risk-based approach, there will be enhanced productivity for compliant operators through a reduced likelihood of being identified as a priority vehicle for interception and administrative burden through Notice to Produce processes.

This framework also ensures that operators receive a consistent level of compliance monitoring and regulatory experience regardless of their state of operation.

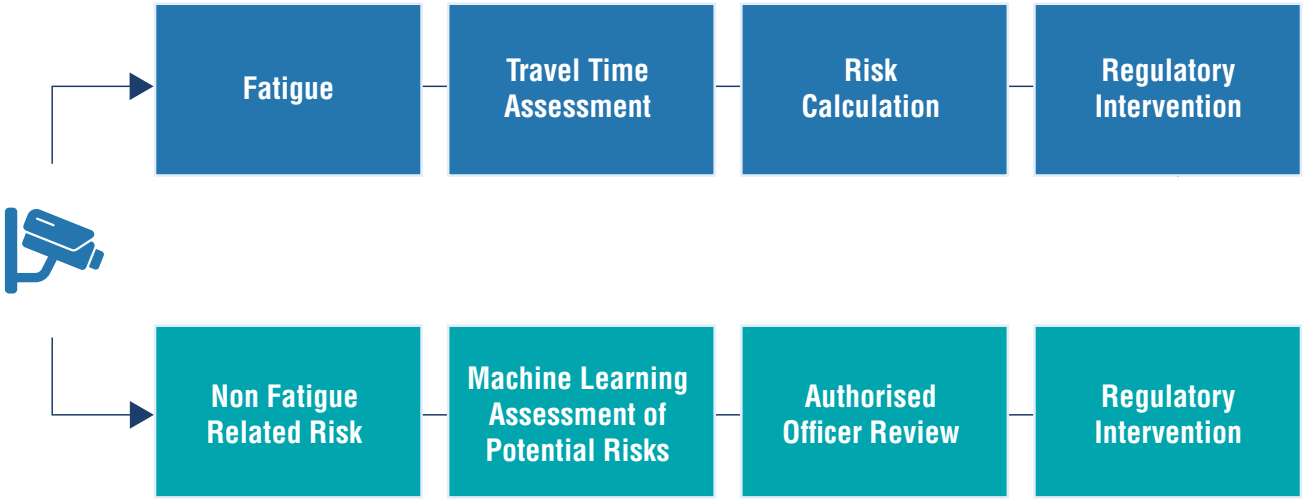
APPENDIX 1: COMPLIANCE MONITORING INFORMATION SOURCES

Table 1: Attributes captured by each vehicle data source

Information disclosed to the NHVR								
	ANPR[1]	TIRTL[2]	TMA	TMA+OBM	IAP	RCMS[3]	Traffic logger	WIM[4]
Image of vehicle	✓							
Driver						✓		
VIN			✓	✓	✓	✓		
Registration number	✓		✓	✓	✓	✓		
Date-time	✓	✓	✓	✓	✓	✓	✓	✓
Location	✓	✓	✓	✓	✓	✓	✓	✓
Direction of travel	✓	✓	✓	✓	✓		✓	✓
Derived speed			✓	✓	✓			
Certified speed		✓			✓ optional			
Compliance flag					✓			
Self-declared weight			✓ optional		✓ optional			
WIM total							✓	
WIM groups							✓	
Total mass				✓				✓
WIM groups						✓		✓
Axle group masses				✓		✓		
Axle configuration	✓					✓		✓
Axle count	✓	✓		✓				
Axle spacing	✓	✓					✓	✓
Load	✓							

1 Automatic Number Plate Recognition Cameras.
2 The Infra-red Traffic Logger.
3 Road Compliance Monitoring System.
4 Weigh in Motion Scales.

APPENDIX 2:


Fatigue
Travel Time Assessment
Risk Calculation
Regulatory Intervention
Non Fatigue Related Risk
Machine Learning Assessment of Potential Risks
Authorised Officer Review
Regulatory Intervention

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