

## BLACK REGISTRATION PLATES REVIEW

<b>Date</b>	13/12/2023
<b>To</b>	Eric van der Plank, Senior Manager Commercial Services
<b>Prepared By</b>	Bruce Currie, Senior Advisor – Regulatory Implementation Kim Gaffaney, Contracts Officer Commercial Services
<b>From</b>	Brook Mitchell, Manager Regulatory Framework Optimisation
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### Purpose

This memo summarises a review of the testing, approval, and effectiveness of two recently approved reflective black background motor vehicle registration plate formats. Police have raised concern about the ability to read the plates (by eye and by camera) under certain conditions. This has implications for regulatory enforcement. Decisions need to be made about urgent further work required, whether to suspend issuing the plates, and future steps to improve plate testing and approval outcomes.

### Recommendations

It is recommended that the Senior Manager Commercial Services

1. **commission** urgent work (to be completed within a timeframe of three months) to understand why in New Zealand there is difficulty with automatic number plate recognition (ANPR) cameras reading new style black (reflective and non-reflective) backed registration plates (which have successfully been used in Australia for almost a decade); and determine whether in New Zealand ANPR cameras can be brought up to a condition to read these plates (and in particular **non-reflective** black backed plates) and what this will involve and cost. **Agree / Disagree**
2. **agree** the continuation of the approval of reflective black-backed plates (both white and silver characters) while the work in 1. is carried out and completed. **Agree / Disagree**
3. **commission** a review of the way registration plate testing is carried out in New Zealand with the aim of improving the robustness and reliability of future plate testing. **Agree / Disagree**

### Background

Registration plates (plates) are issued to motor vehicles as the final stage of their certification process to operate on the road. They are useful for the purposes of identifying vehicles and the person responsible for

their use to other road users, and for enforcement (e.g., by Police, parking wardens, safety cameras, ANPR, CCTV).

They are designed according to an ISO standard (ISO 7951) and their form is approved by the Registrar of Motor Vehicles (Registrar) after testing by the New Zealand Transport Agency/Waka Kotahi (NZ Transport Agency) and Police. The Director is the Registrar and delegates the approval role to NZ Transport Agency staff.

In 2021/2 reflectorised black-backed personalised plates were tested by Police and approved for use as an alternative form of personalised plates (under regulation 34(4)(b) of the *Land Transport (Motor Vehicle Registration and Licensing) Regulation 2011*).

The plates were launched for sale on 1 September 2022. The plates are personalised plates and vehicle owners pay a premium to have them. Kiwiplates sell the personalised plates and a share of the sale price is paid to NZ Transport Agency which is, in turn, paid to the Community Road Safety Fund to fund community initiatives.

The reflectorised black-backed personalised plates are available with a choice of either of two coloured characters: white or silver. Examples of these plates are shown below – centre and right. There are about <sup>(ii)</sup> ~~s 9(2)(b)~~ of these plates now in use. The plate on the left is a plate not yet approved or in use. It is a prototype plate with a non-reflective black background and reflective white characters.



## The issues

### New style black background personalised plates can't be read in certain situations

Sample reflectorised black-backed personalised plates (with white characters) were sent to New Zealand Police for testing in 2021 and those with silver characters in 2022. NZ Police conducted testing and approved both plates in March 2022. Prior to the reflectorised black-backed personalised plates being sent to the Police the NZ Transport Agency undertook testing of the plates with toll gantry ANPR cameras, with the Safety camera team, and also sought approval from the Weigh Right team. Once all parties had provided approval the reflectorised black-backed personalised plates (with both white and silver characters) were approved for sale.

Following ongoing feedback from NZ Police field staff over the last six months or so, NZ Police have recently officially advised NZ Transport Agency (refer Appendix 1) that the unique identifiers on the approved reflectorised black-backed personalised plates are, under certain conditions (both day and night), not clearly visible to the human eye.

In September of this year, NZ Police carried out further plate testing (refer Appendix 2). This recent testing has compared standard white reflectorised plates, reflectorised black-backed personalised plates (black reflectorised plates), and a prototype black non-reflectorised background plates. Images of the plates tested are provided on the following insert.



White reflectorised plates  
(standard issue)



Black reflectorised plates  
(Personalised plate issue)



Black non-reflectorised plates  
(Personalised plate prototype)

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NZ Police chose 31 existing ANPR sites across Auckland to test the plates, which represents a range of ANPR camera manufacturers. Police testing found:

- 100% of the ANPR cameras were able to read the standard white reflectorised plates in both daytime and night-time conditions.
- Performance of the currently issued reflectorised black-backed personalised plates (black reflectorised plates) was deemed poor, with only 73% of the ANPR cameras able to read these plates at night and 84% in the daytime.
- The prototype black non-reflectorised plates performance was even worse, with only 26% detection at night and 50% during daylight conditions.

Overall, NZ Police have concluded that the introduction of the new reflectorised black-backed personalised plates has impacted their ability to identify vehicles of interest. They summarise that these plates are significantly less readable than the standard issue white reflectorised standard and personalised plates.

After approval of the reflectorised black-backed personalised plates our toll camera team have advised they have issues reading these plates, especially those with silver characters, when the light reflects in a particular way. This issue is across both our Auckland and Tauranga equipment. The Auckland equipment was recently upgraded but this has not seen any improvement in the readability of these plates.

The circumstances above suggest that inadequate testing of the reflectorised black-backed personalised plates was conducted before these plates were approved.

### **Australia has been using reflectorised black-backed plates for 10 years with few problems**

In Australia, both NSW and WA have reflectorised black-backed and reflectorised character black-background plates in use. Like here, these are issued as a personalised alternative to “standard” plates. They have had both alternates of the black background plates for approximately a decade. There are accounts of readability difficulty issues shortly after their introduction, and plate issuing was suspended while the regulator conducted inquires. Ultimately, reflectorised black-backed plates were approved and are widely in use in Australia.

Australia operate extensive ANPR in their Police patrol vehicles. These units scan surrounding vehicle plates and give notification of vehicles of interest. It seems Australian Police are much less reliant than NZ Police on human eye detection of vehicle plates. Australian fixed site and camera van ANPR also appear to cope with reflectorised black-backed plates, both reflectorised background and reflectorised character, both day and night.

The high NZ Police reliance on reading plates by eye is possibly a significant factor in terms of the future viability of reflectorised black-backed plates. It seems that in NZ we will have to establish a non-reflective black background plate format that works for ANPR camera and human eye detection alike if a black background plate style is to continue.

NZ registration plate manufacturer, LicenSys, has provided data showing that in 2022, 55,000 sets of reflectorised black-backed plates were issued in NSW, and 15,000 sets in WA. However, given the preceding paragraph highlighting the human eye detection reliance issue in New Zealand, the more interesting data is that 285,000 sets of white reflective characters on **non-reflective** black backed plates were issued across Victoria, Queensland and South Australia in 2022 s 9(2)(b)(ii) Ultimately, the marked difference between ANPR black background plate detection rates between New Zealand and Australia requires investigation. It is likely additional programming of our ANPR cameras could improve readability of non-reflective black background plates, the NZ Police testing report suggests this, but we do not know to what extent hardware may also need to be upgraded or replaced. In Australia there is a considerably greater range

of personalised plates available. Some States have around 100 personalised plate design variations. The implication for New Zealand is that we should anticipate demand for a much greater variety of plates in the near future. We need a robust testing system to adequately assess such demand.

## Legal assessment

### Confidential and subject to legal privilege

s 9(2)(h)

[Redacted content]

## Reputational risk

There has been media coverage of the plate readability problem. The NZ Transport Agency has publicly confirmed that there is a problem with both human eye and camera readability of the plates (under certain conditions). This highlights that there will be some public interest in how reflectorised black-background plate approval happened. There is a public expectation that the reflectorised black-backed personalised plates would have gone through thorough testing before being approved.

Any decision to suspend the approval would stop the sale of reflectorised black-backed personalised plates in New Zealand. Personalised plates would only be available in the approved reflectorised white background styles from time of any such suspension. Reflectorised black-backed personalised plates have proven popular,

so there would be significant media attention drawn to a suspension and this would ultimately highlight the shortcomings in testing and approval. This presents a significant reputational risk to both the NZ Transport Agency and NZ Police.

Questions will also be raised about the reflectorised black-backed personalised plates in circulation – their effectiveness for regulatory purposes and the ability to on-sell them.

## Commercial impacts

### Contractual Liabilities


Kiwiplates are aware of the issues with the readability of the reflectorised black-backed personalised plates, and NZ Transport Agency have had ongoing discussions with them about next steps.

s 9(2)(b)(ii)



### Risk assessment

There appears to be a narrow scope where readability problems have manifested as a regulatory/enforcement problem (i.e., the specific lighting circumstance and/or reading fail and offending taking place). s 9(2)(g)(i)



Additionally, the work to understand the ANPR readability problem needs to occur regardless, so making it a priority to fully understand the readability issues and solution within a few additional months, if there is a technology fix (additional ANPR programming/upgrades/replacements), will only add modestly to the number of black plates already issued. At the conclusion of this prioritised work a clear picture about whether the plates

will be able to be read in the near future or not will have emerged. At this point a more confident decision could be made about whether indefinite suspension of approval is required or not.

## Options assessment

Four options were evaluated. These are summarised in the table below. The preferred option is enhanced status quo. A full assessment of the possible solution options is provided in Appendix 5.

Status quo: trust incremental improvements to ANPR, camera and tolling systems. Assumes our plates and our automated systems are same as NSW.
Enhanced status quo: develop and approve a new, readable plate (non-reflective) and once achieved replace existing approval and issue new plates from there leaving existing plates in circulation
Suspend and allow existing plates to be used: remove approval, leave existing plates in use. Restart black plates when readability issues are sorted.
Suspend and forced surrender of existing plates: remove approval and collect back and replace all current black plates with new readable ones, don't issue new plates until readability problems addressed

## Review conclusion

A significant number of plates have already been issued and cannot be recalled, s 9(2)(h)

The regulatory enforcement problem created by the plates is very small. Looking at reflectorised black-backed personalised plates in Australia, there is probably a technological fix to the ANPR camera readability problem in New Zealand. A clear picture on this can likely be formed within a few months. There is a human eye readability problem, but this is transient in nature and tolerable with Police workarounds. Suspending the approval of the plates now is not supported by the law and would create significant downstream reputational risks for NZ Transport Agency and NZ Police. Suspending the plates now also risks generating contractual liabilities and costs for NZ Transport Agency, Kiwiplates, and LicenSys for no appreciable return in terms of improved regulatory compliance.

The preferred way ahead is to immediately start work on understanding why NZ has difficulty with ANPR cameras reading black-backed (reflective and non-reflective) plates (which have successfully been used in Australia for almost a decade); and determine whether in New Zealand ANPR cameras can be brought up to a condition to read these plates and what this will involve and cost. In parallel, work should begin on a review of the way plate testing is carried out in New Zealand with the aim of improving the robustness and reliability of future plate testing outcomes. Plate testing should probably be a tri-party arrangement where the plate manufacturer, NZ Police and NZ Transport Agency work in close collaboration to test and approve plate formats.

## Communications approach

We will communicate the decision to continue sales of black background plates (as per the recommendation) to key stakeholders, Kiwiplates, LicenSys and Police. As this decision maintains the status quo, we will not make any public statement but will advise s 9(2)(a), as a courtesy.

If further testing results in the suspension of sales, we will proactively publicly communicate our decision. Key stakeholders, Kiwiplates, LicenSys and NZ Police will be informed first, and staff and government agencies will be advised before we issue a media release.

A decision to stop the sale of reflectorised black-backed personalised plates has implications for recipients of the Community Road Safety Fund. These stakeholders will be advised separately by Anna Williams to ensure that they hear the news (and understand the implications for them) from us first. As a courtesy, s 9(2)(a) and Fair Go will be advised of our decision shortly before a public statement is issued.

We will announce our decision via a media release at the same time or just after Kiwiplates and NZ Transport Agency websites are updated. The websites of both organisations and our Contact Centres will have information for existing plate holders.

**Signed:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**NAME:** Eric van der Plank, Senior Manager Commercial Services

## RAPID

Roles	Relevant party
Recommend: who is accountable for developing a proposal to recommend to decision-makers.	Brook Mitchell, Manager Regulatory Framework Optimisation with support from Bruce Currie, Senior Advisor Regulatory Implementation, Kim Gaffaney, Contracts Officer Regulatory Commercial Services
Agree: who is accountable for providing key expertise or assurance, to ensure any recommendations and decisions are within the relevant guidance, policies, or processes e.g., meet procurement, security, finance, governance, or delegation requirements. Their input MUST be considered when making a recommendation and decision.	Brett Aldridge, National Manager Road Safety Regulations, Katie Brownless, Manager Contracts, Commercial Services
Legal advice	Juliet Esposito, Senior Legal Counsel, (with support from Chapman Tripp)
Perform: who is accountable for executing or implementing the decision once it's been made.	Katie Brownless, Manager Contracts, Commercial Services
Input: who is consulted on the recommendation or provides information or advice in support. The recommender isn't obliged to act on this advice.	Bruce Currie, Snr Advisor Kim Gaffaney, Contracts Officer Helen Keyes – Regulatory Communications Manager, Communications and Engagement Chris Foley, Principal Advisor Regulatory Implementation NZ Police Any of the legal removed from above
Decide: who is accountable for making the decision and committing the organisation to action. This works best when there is a single individual – if a group or more than one person is selected as the Decider, it must be clear how the decision will be made, e.g., consensus, majority vote, etc.	Eric van der Plank, Senior Manager Commercial Services

## Appendices

Appendix 1. Letter from Police to Waka Kotahi dated 17 November 2024[sic]

Appendix 2. Police ANPR Plate testing:- Black backed number plates 19 September 2023

Appendix 3. Information from LicenSys on black plates issued in Australia 2022

Appendix 4. Land Transport (Motor Vehicle Registration and Licensing) Regulations 2011 Regs 39 and 40

Appendix 5. Options analysis summary

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Kia ora Chris,

Please see the below summary of our options for pausing/recalling black reflectorised background plates and the associated impacts.

### Regulatory action

#### Context

- The Registrar approved the black reflectorised background for personalised plates last year.
- The determination was made under regulation 34(4)(b) of the *Land Transport (Motor Vehicle Registration and Licensing) Regulation 2011*
- The internal processes set up to test the readability of any new personalised plate style were followed, including testing internally by Waka Kotahi as well as Police
- The testing did not pick up any visibility issues with the plates.
- It has since come to light that the new black reflectorised background creates some visibility issues with the plates.

#### Potential Action

- s 9(2)(h) [Redacted]
- s 9(2)(h) [Redacted]
- s 9(2)(h) [Redacted]

This leaves us with an immediate option to pause black reflectorised background plate sales with a view to review the long-term sale of black background plates based on the outcomes of the testing currently underway with NZ Police. Any recall would likely need to be on the basis of voluntary surrender by plate holders with replacement plates at the cost of Waka Kotahi.

### Contractual Liabilities

#### Context:

- Kiwiplates are aware of the issues with the readability of the black background plates, and Waka Kotahi have been in ongoing discussions with them regarding this and next steps.

- s 9(2)(b)(ii) [Redacted]

- Out of Scope [redacted]

### Liabilities Summary

- s 9(2)(b)(ii) [redacted]
- s 9(2)(h) [redacted]

### Safety Impact

The safety impact of the approximately s 9(2)(b)(ii) plates already in circulation is likely low but will become clearer once testing is completed. Any negative safety impact is driven by potential reduction of police enforcement capability and related increased non-compliance. Until testing is completed it is unclear to exactly what extent enforcement action is limited. s 9(2)(b)(ii) vehicles are approximately s 9(2)(b)(i) of the registered vehicle fleet which considerably limits any potential safety impact.

The sale of black plates over the review period is estimated to be between s 9(2)(b)(i). This will drive a proportional increase in any safety impact.

### Other Considerations

Reputational risk is likely to be increased if KiwiPlates continue to market and sell black background plates and they are subsequently removed from the market.

There is also reputational risk around the use of a voluntary recall if this option is taken. s 9(2)(g)(i)

Acceptance of the plates not being fit for purpose may also be limited among plate holders. A strong communications plan will need to be implemented with Waka Kotahi working jointly with both Kiwiplates and NZ Police.

## Recommendations

Recommendation	Agree
1. Pause the sale of black background plates until testing is completed and subsequent review is completed.	Yes/No
2. Continue working with Licensys and NZ Police to test the reflective black background plate.	Yes/No
3. Continue working with KiwiPlates Licensys and NZ Police to test the alternative non-reflective black background plate.	Yes/No

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17 November 2024

Eric van der Plank  
Senior Manager Commercial Services  
Waka Kotahi

Dear Eric,

The purpose of this letter is to provide formal advice of feedback previously given to Waka Kotahi regarding Police testing of vehicle number plates with a black background.

A set of number plates, of the style observed as being unreadable under certain circumstances, was received from Waka Kotahi to enable the Police Calibrations team to facilitate testing in early October of this year.

It was immediately apparent that this set of plates was difficult to read with the naked eye at different angles and lighting conditions. On 9 October Senior Sergeant Dave Martin sent an email to several Waka Kotahi personnel advising of the preliminary observations and the likelihood these plates would not pass testing, with that email accompanied by some photographs illustrating the issues.

On-road testing was conducted on 11 October, including both visual observations and static speed camera testing. The extent of readability issues for these plates through visual observations alone meant, very early on in the testing process, that they did not pass testing. Essentially, under certain conditions the background and the font appear as one colour, so the font cannot be distinguished from the background. A couple of photographs, as previously provided, have been inserted below to provide an illustration of the issues. Night-time visibility is markedly worse than these daylight views.

Given the early visual failure, conducting extensive camera testing with the plates would have been a wasted resource effort. Rudimentary camera testing was completed using just one static speed camera under limited conditions. Whilst the plates could be read in those camera photographs, again, it is important to note that the camera testing was extremely limited due to the absence of benefits in extensive camera testing for plates that had already failed.

In summary, these black-background number plates failed Police testing for the reason that they are not readable under certain conditions.

Yours sincerely,

**Peter McKennie**  
Inspector  
National Road Policing Centre

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**Police National Headquarters**

180 Molesworth Street. PO Box 3017, Wellington 6140, New Zealand.  
Telephone: 04 474 9499. Fax: 04 498 7400. [www.police.govt.nz](http://www.police.govt.nz)



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## ANPR Plate testing:

- *Black backed number plates*
- 



through  
partnership

## Police Districts with ANPR

\* Boundary lines indicative only



## Executive Summary

In September 2022 Kiwiplates commenced issuing a new style of personalised number plate within New Zealand. This new plate design consisted of a black reflectorised backing with either white or silver lettering. The appearance is effectively an inverted colour scheme of the current standard NZ number plate.

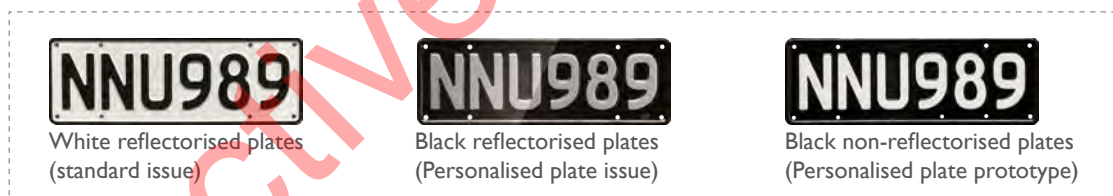
Subsequent to their issue, these plates have been the subject of a considerable number of Police complaints and public discussions. The two main points arising are:

- 1) These plates demonstrate an unusual reflective property that renders them unreadable at certain angles.
- 2) These plates are not recognised by numerous existing ANPR (Automatic Number Plate Recognition) cameras across New Zealand, rendering the new plates unreadable by these cameras.

As an immediate response to this feedback, an initial ANPR test program was conducted in November 2022 by the Visual Information Centre in Counties Manukau Police. This was carried out in order to quantify the extent of the issue. This test resulted in less than 50% of the 113 ANPR sites tested, being able to read these plates.

In June 2023, Road Policing (PNHQ) contacted Counties Manukau Police regarding the growing concern nationally from Police Staff unable to read the new plates due to the reflectivity issue. Discussions were then had with NZTA and it was agreed that further testing needed to be done on both issues. NZTA (via Licensys) provided to Police a further prototype plate for testing, which has non reflective black backing paint. This was in addition to the 2 styles already issued.

Police have undertaken testing all three number plates formats across a variety of existing ANPR cameras within the Auckland District.



Police chose existing ANPR partnership sites across Auckland, which represent a range of ANPR camera manufacturers. This report contains the results of this test.

Across 31 test sites:

- 100% of the ANPR cameras were able to read the standard NZ white backed plates in both daytime and nighttime conditions
- Performance of the currently issued black backed reflectorised plates was significantly worse with 73% of the ANPR cameras able to read these plates at night and 84% in the daytime.
- The proposed prototype alternative plate was detectable with 26% of the ANPR cameras at night and 50% during the daylight conditions.

The introduction of the new personalised black backed plates has impacted New Zealand Police's ability to detect vehicles involved in criminal activity. The plates have significant less readability than the standard issue New Zealand number plate.



# 1 - Background

Around September 2022 KiwiPlates NZ announced the release of a new black backed personalised number plate format in New Zealand. This new plate format was jointly approved by both Police and NZTA after a (reportedly) rigorous testing regime. These new number plates consist of a black reflectorised background paint, utilising the standard NZ plate font in either white or silver coloured lettering (as below).

Unfortunately, it has subsequently been discovered that these new plates were not robustly tested with ANPR (Automatic Number Plate Recognition) cameras. (Of note the recommendation from the Police Calibration Section who undertook the testing, was to decline the approval of these plates). Consequently in November 2022, an initial test of 113 ANPR sites in Auckland was conducted and confirmed a significant number of ANPR cameras were unable to read this new format. This included two national petrol station chains who currently hold the largest ANPR network in the country. NZTA and Police National Headquarters were immediately notified of these preliminary findings.

Within several months of the new plates being available to the public, a number of complaints were forthcoming from both within Police and externally. These complaints focused primarily around the significant reflectivity issues being observed by police staff and the public alike. At certain angles, the plates are rendered unreadable. These observations were clearly in conflict with the original intent regarding the introduction of the white reflectorised plates in 1986, which was 'to make NZ plates more clearly readable.'



Comments within Police include

*"...because we were driving along behind it and the whole license plate appeared silver in our headlights - unreadable. When we stopped the vehicle we started to be able to see that the license plate was in-fact black with silver lettering as per the new NZ plates. The driver had just received them and documentation was all legitimate. This is going to be a big problem for us and I presume traffic safety camera and ANPR."*  
(Papakura - Public Safety Team)

*"Some of the staff from central mentioned that the new plates have an unusual quality to them at night. When a cars headlights shine on the plate from a slight angle, they are hard to read. I was a bit suspect of this and thought maybe it was an exaggeration, however last night I was driving behind a car with a new plate and I noticed when my headlights went on it at a certain angle the background "Black" turns to silver and the numbers and letters go completely invisible to the eye."*  
(North Canterbury Highway Patrol)

External forums:

*"How are these new reflective license plates legally?[sic] I've been seeing these around at the moment. They have black and white bases with white letters and numbers. When a light shines on them, the letters and numbers disappear into the background. They're mostly on new Teslas and other new rich people cars."*

*"The reflections go almost an orange colour for a lot of the plates but from a distance and up close, you can barely make out anything on the plate..."*

*"I don't understand how that's supposed to work for ticketing, and also how that's supposed to work for telling cops when someone has hit n run or is driving like an ass on the road because the licence plate can't be easily recorded."*

*"Edit: I am not saying I'm angry at people getting the plates, I'm saying the plates themselves should not have been made legal due to the danger they pose regarding potential accidents, hit n runs, and dangerous driving calls."*  
<https://reddit.com/r/auckland/s/BHb9WpR4zn>

In June 2023 the Co-Director - NZ Road Safety at PNHQ contacted the Visual Information Centre in the Manukau Police, regarding the expanding email trial within Police highlighting the reflectivity issues with the 'new' black backed plates. As a result of further discussions between NZTA and Police it was agreed that further testing of these 'new' number plate was required, and the specific issues needed to be identified and documented.

It was determined that Road Policing (PNHO) would prepare a report regarding the reflectivity issues in relation to the mobile speed cameras platform and Counties Manukau Police would investigate the ANPR readability concerns and prepare a report on this.

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## 2 - ANPR Technology

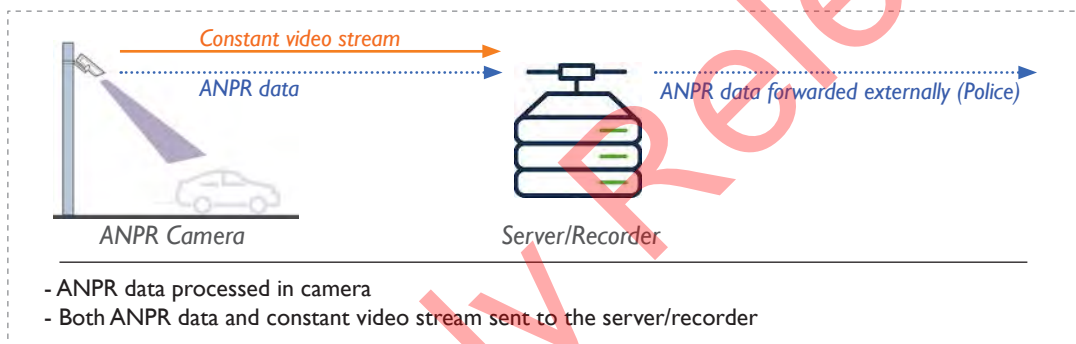
ANPR technology is deeply embedded across New Zealand. Business's who have adopted this technology include Petrol Stations (who use it for customer service/payments), shopping centres (for customer shopping patterns and crime prevention), parking facilities (for payments and enforcements), Business and Resident Associations (crime detection/prevention), along with a number local and central government agencies nationally, enabling traffic volume management and real-time analytics.

NZ Police have partnered with many of these groups, as we share a common goal of crime prevention/detection. As a result this has now become a major investigation tool for Police spanning all 12 Police districts. The choice and use of this technology (make, model and configuration) is made by each business, and is not determined by Police. Any change to the specifications of the standard New Zealand number plate has the potential to cause very significant impact on businesses, agencies and Police using this technology.

Information generated by ANPR technology is generally configured by one of 3 possible set ups. This is highlighted in this report, as it provides an understanding of how an ANPR image can (or cannot) be obtained from a system when a camera fails to detect a vehicle driving under it.

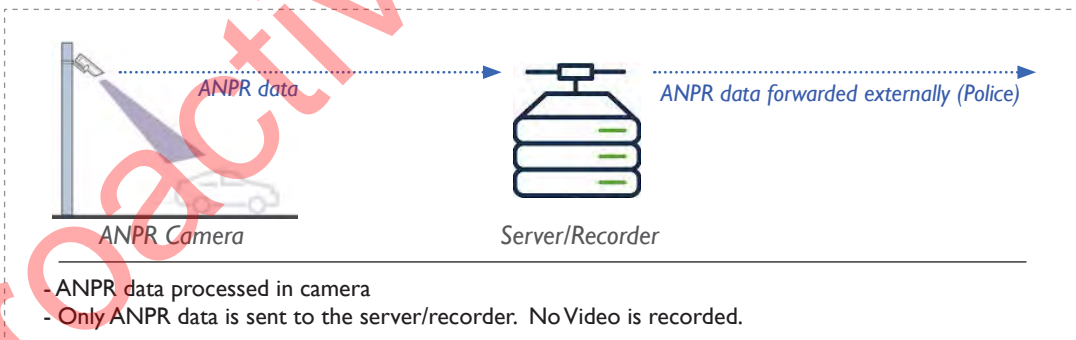
### Set up 1

ANPR data & video is sent from the camera



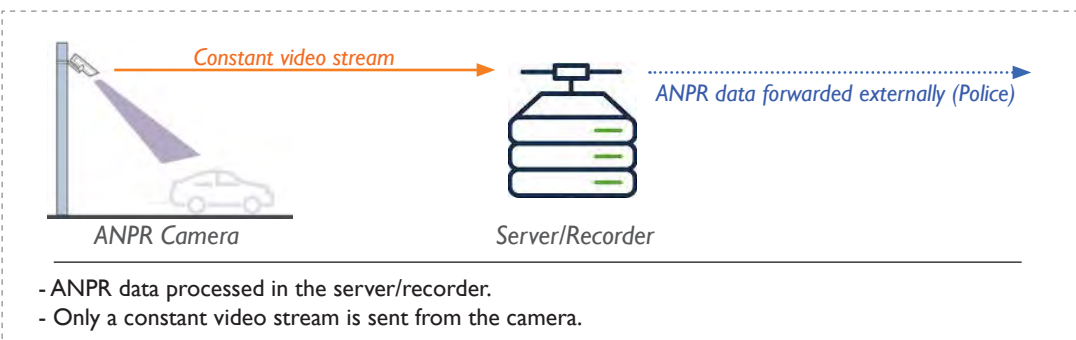
### Set up 2

Only ANPR data is sent from the camera



### Set up 3

Only a video stream is sent from the camera to the server. All ANPR processing is done at a server level.



### 3 - Investigation

#### 3.1 - Introduction:

As a result of the ongoing Police/NZTA discussions and in response to issues highlighted by both Police staff and the public alike, NZTA proactively sought potential alternate plate options. Licensys NZ, who manufacture number plates for NZ vehicles, began to explore an alternative plate option that might overcome these initial issues. A prototype black backed plate was subsequently provided to Police for this trial utilising non reflective background paint.

#### 3.2 - Test equipment:

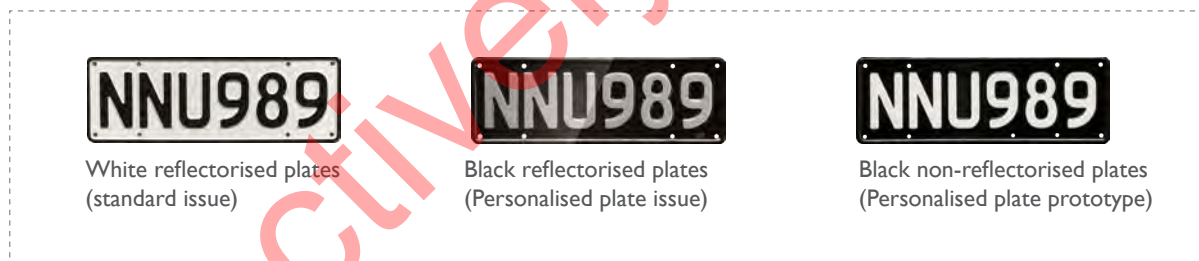
In developing a testing program, Police were locked into using existing ANPR cameras in our community, as they not only represented 'real world' testing, but also accounted for a number different makes, models and 'set-up's' not available for Police to reconstruct in a controlled environment.

Police dedicated a red unmarked SKODA - NNU989 as the test vehicle for the program.



Unmarked Police Skoda test vehicle.

#### 3.3 - Test plate formats.



#### 3.4 - ANPR Site Choice:

The New Zealand Police's ANPR strategy is predominantly (but not exclusively) designed around partnering with Businesses, Organisations, Associations and Agencies that have already installed ANPR at their respective locations. Police's policy permits access to ANPR data partnerships through 2 companies only. These companies are SaferCities and Auror.

In the initial November 2022 trial, the black backed plates testing focused primarily on Auror ANPR sites. However, in this report, the sites are exclusively related to SaferCities ANPR sites. The sole reason for this is, the Auror ANPR sites are all related to retail premises which are well lit at night. This negates the ability to test the plates in darkness. On the other hand, SaferCities sites are all on the roading corridor, which enables true nighttime testing.

Police partner with 3rd party entities with existing ANPR cameras, and therefore have no influence on the choice of ANPR camera or installation parameters adopted. A pre-test survey of the ANPR cameras install-base across Auckland indicated that the AXIS brand of ANPR camera was the most prevalent camera used. This higher market share is reflected in the portion of sites chosen.

### 3.5 - Methodology.

It was determined that a simple testing process was all that was needed to obtain the required ANPR data. The testing plan utilised existing ANPR camera installations across the Auckland Districts. Of note, no petrol stations were used in this trial as their forecourts are permanently lit with artificial lighting, thus negating our ability to test under nighttime conditions.

The testing process schedule:

- 1) Identify a sample set of 50 ANPR camera sites across Auckland reflecting a variety of makes, model and environments.
- 2) Drive under each camera with the 3 different format plates, incorporating both daylight and nighttime conditions (ie 6 images per site).
- 3) Download and collate imagery.
- 4) Eliminate sites with unrelated failed detections eg out of focus (see section 4.4).
- 5) Evaluate the results.

### 3.6 - Execution

The test vehicle was rigged with a mounting that enabled quick swap-ability of both the front and rear number plates. Before embarking on each test drive, the online status of each site was confirmed. Over a period of 5 driving days, all the sites were visited in both daytime and nighttime conditions, and all site drive through times recorded.

Upon completion of each day's testing, the ANPR images were downloaded from the various ANPR cameras involved in the test program.

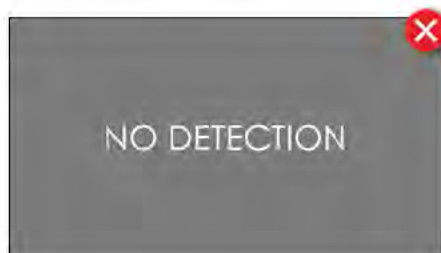
**3.6.1** - Positive reads/detections are displayed in the report with a green tick (or green background)



**3.6.2** - Failed reads/detections are displayed in the report with a red cross (or red background). In these situations (where possible) the constant CCTV recording was reviewed on the CCTV recorder and the image pulled from it.



**3.6.3** - When a failed detection/read occurred on a camera without constant CCTV recording, or one I did not have access to the CCTV recorder, the result is displayed as.



## 4 - Results

### 4.1 - Preliminary testing.

Each of the 50 sites were initially tested under nighttime conditions using all 3 plate formats. It soon became apparent that not all sites had been set up correctly for nighttime number plate detection at all. As a result these were immediately eliminated from the test program. Nineteen sites were removed due to this situation.

The 2 primary causes of failed nighttime detection related to:

- 1) The cameras were out of focus at night.
- 2) The 'distance to detection' length was in excess of the manufacturers specification, resulting in the area of plate detection having insufficient lighting from the cameras light source for nighttime detection.

### 4.2 - Plate Detection summary

Site No	Camera Make/OCR engine	WR Day	WR ni	BR Day	BR ni	Bnon day	Bnon ni
2	s 9(2)(k)	Det	Det	Det	Det	Det	Not Det
8	s 9(2)(k)	Det	Det	Det	Not Det	Not Det	Not Det
9	s 9(2)(k)	Det	Det	Det	Det	Det	Not Det
10	s 9(2)(k)	Det	Det	Det	Det	Det	Not Det
11	s 9(2)(k)	Det	Det	Det	Det	Det	Det
12	s 9(2)(k)	Det	Det	Det	Det	Det	Not Det
13	s 9(2)(k)	Det	Det	Det	Non Det	Det	Det
14	s 9(2)(k)	Det	Det	Not Det	Det	Not Det	Not Det
15	s 9(2)(k)	Det	Det	Det	Det	Not Det	Det
16	s 9(2)(k)	Det	Det	Not Det	Det	Not Det	Not Det
17	s 9(2)(k)	Det	Det	Det	Det	Not Det	Not Det
18	s 9(2)(k)	Det	Det	Not Det	Det	Not Det	Not Det
20	s 9(2)(k)	Det	Det	Det	Det	Det	Det
21	s 9(2)(k)	Det	Det	Det	Det	Det	Det
23	s 9(2)(k)	Det	Det	Det	Det	Det	Det
26	s 9(2)(k)	Det	Det		Det		Not Det
31	s 9(2)(k)	Det	Det	Det	Det	Not Det	Not Det
32	s 9(2)(k)	Det	Det	Det	Det	Not Det	Not Det
33	s 9(2)(k)	Det	Det	Det	Det	Not Det	Not Det
34	s 9(2)(k)	Det	Det	Not Det	Det	Not Det	Not Det
35	s 9(2)(k)	Det	Det	Not Det	Det	Not Det	Not Det
36	s 9(2)(k)	Det	Det	Det	Det	Det	Det
37	s 9(2)(k)	Det	Det	Det	Det	Not Det	Not Det
41	s 9(2)(k)	Det	Det	Det	Not Det	Det	Not Det
42	s 9(2)(k)	Det	Det	Det	Det	Not Det	Not Det
43	s 9(2)(k)	Det	Det	Det	Det	Not Det	Not Det
44	s 9(2)(k)	Det	Det	Det	Not Det	Det	Not Det
46	s 9(2)(k)	Det	Det	Not Det	Det	Not Det	Not Det
48	s 9(2)(k)	Det	Det	Det	Not Det	Det	Det
49	s 9(2)(k)	Det	Det	Not Det	Det	Det	Not Det
50	s 9(2)(k)	Det	Det	Not Det	Det	Det	Not Det

WR = White reflectorised plates    BR = Black reflectorised plates    Bnon = Black non-reflectorised trial plates

**Det** = Plate read Detected by ANPR camera

**Not Det** = Plate read Not Detected by ANPR camera

### 4.3 - Results Summary

The full imagery from the ANPR detection sites are included in Appendix 1. The summary results are tabled below.

Site Total	WR day (Det/Not Det)	WR night (Det/Not Det)	BR day (Det/Not Det)	BR night (Det/Not Det)	Bnon day (Det/Not Det)	Bnon night (Det/Not Det)
31	31/0	31/0	22/8	26/5	15/15	8/23
Detect %	100%	100%	73%	84%	50%	26%

WR = White reflectorised plates    BR = Black reflectorised plates    Bnon = Black non-reflectorised trial plates

### 4.4 - Failed detections??

The primary question arising from these results is - what is the cause of the failed detections of the black backed number plates?

It is clear from this investigation that there are many reasons that an ANPR camera may fail to detect a number plate in it's view. Primary causes (singular or a combination thereof) include.

- 1) ANPR Software is not programmed to read white letters on black backgrounds.
- 2) Not enough reflective light received by the ANPR camera from nighttime detections.
- 3) Contrast ratio between black and white not significant enough.
- 4) Harsh shadows over part of the plate.
- 5) Camera set up beyond their manufacturer'ss recommended distance/detection/lighting settings.
- 6) Site offline.
- 7) Camera out of focus.
- 8) Dirty lens.
- 8) Nighttime imagery subject to cob webs flaring, not visible during the daylight.
- 9) s 6(c)
- 10) s 6(c)

### 4.5 - Data interpretation:

Only site's where white back reflectorised number plates were detected 100% were included in the data. This decision eliminates most of the issues outlined above. The author of this report therefore concludes the cause of the failed Black reflectorised number plates can primarily be attributed to

- 1) ANPR Software not programmed to read white letters on black backgrounds.
- 2) Not enough reflective light received by the ANPR camera from nighttime detections.

## 5 - Conclusion

The ANPR testing regime adopted in this report used the standard NZ issue number plate (white reflectorised backing) as a bench mark for all ANPR sites tested. 31 trial sites successfully read these standard number plates 100% of the time. Under the same conditions, ANPR tests with both black backed plates returned significantly lower readability.

The 16-27% performance drop in readability of the black backed reflectorised plates is significant enough to impact both commercial installations relying on accurate data, along with Police's use of the technology for road safety and criminal investigation. This decrease is unacceptable, and also unnecessary, as the current white backed number plates show excellent performance in this regard. The proposed prototype alternative black backed number plate provided for this investigation, demonstrates a worse detectability rate of 50% or less. This rules it out as an acceptable alternative.

New Zealand commenced issuing white reflectorised plates in 1986 with a goal of 'making our plates more easily readable'. The issuing of a new style plate with a black backing, albeit reflectorised or not, is a step backward and is not in line with the current objectives of the New Zealand Police's focus of road safety and denying the criminals use of the roads. This report clearly shows the introduction of the black backed plates has negatively impacted New Zealand Police's objective with respect to Automatic Number Plate Recognition.

Proactively Released



## Appendix A

- Raw ANPR data with imagery.

Proactively Released

# Daytime plate summary

	White Reflectorised Plates	Black Reflectorised Plates	Black non Reflectorised Plates
Site 2 - s 9(2)(k)			
Site 3 - (NOT USED)			
Site 4 - (NOT USED)			
Site 8 - s 9(2)(k)			
Site 9 - s 9(2)(k)			
Site 10 - s 9(2)(k)			
Site 11 - s 9(2)(k)			
Site 12 - s 9(2)(k)			
Site 13 - s 9(2)(k)			
Site 14 - s 9(2)(k)			
Site 15 - s 9(2)(k)			
Site 16 - s 9(2)(k)			

# Daytime plate summary

	White Reflectorised Plates	Black Reflectorised Plates	Black non Reflectorised Plates
Site 17 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 18 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 20 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 21 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 23 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 26 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 31 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 32 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 33 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 34 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 35 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			
Site 36 - <span style="background-color: #cccccc; color: red;">§ 9(2)(k)</span>			

# Daytime plate summary

	White Reflectorised Plates	Black Reflectorised Plates	Black non Reflectorised Plates
Site 37 - s 9(2)(k)			
Site 41 - s 9(2)(k)			
Site 42 - s 9(2)(k)			
Site 43 - s 9(2)(k)			
Site 44 - s 9(2)(k)			
Site 45 - (NOT USED)			
Site 46 - s 9(2)(k)			
Site 48 - s 9(2)(k)			
Site 49 - s 9(2)(k)			
Site 50 - s 9(2)(k)			

# Nighttime plate summary

	White Reflectorised Plates	Black Reflectorised Plates	Black non Reflectorised Plates
Site 2 - § 9(2)(k)			
Site 3 - (NOT USED)			
Site 4 - (NOT USED)			
Site 8 - § 9(2)(k)			
Site 9 - § 9(2)(k)			
Site 10 - § 9(2)(k)			
Site 11 - § 9(2)(k)			
Site 12 - § 9(2)(k)			
Site 13 - § 9(2)(k)			
Site 14 - § 9(2)(k)			
Site 15 - § 9(2)(k)			
Site 16 - § 9(2)(k)			

# Nighttime plate summary

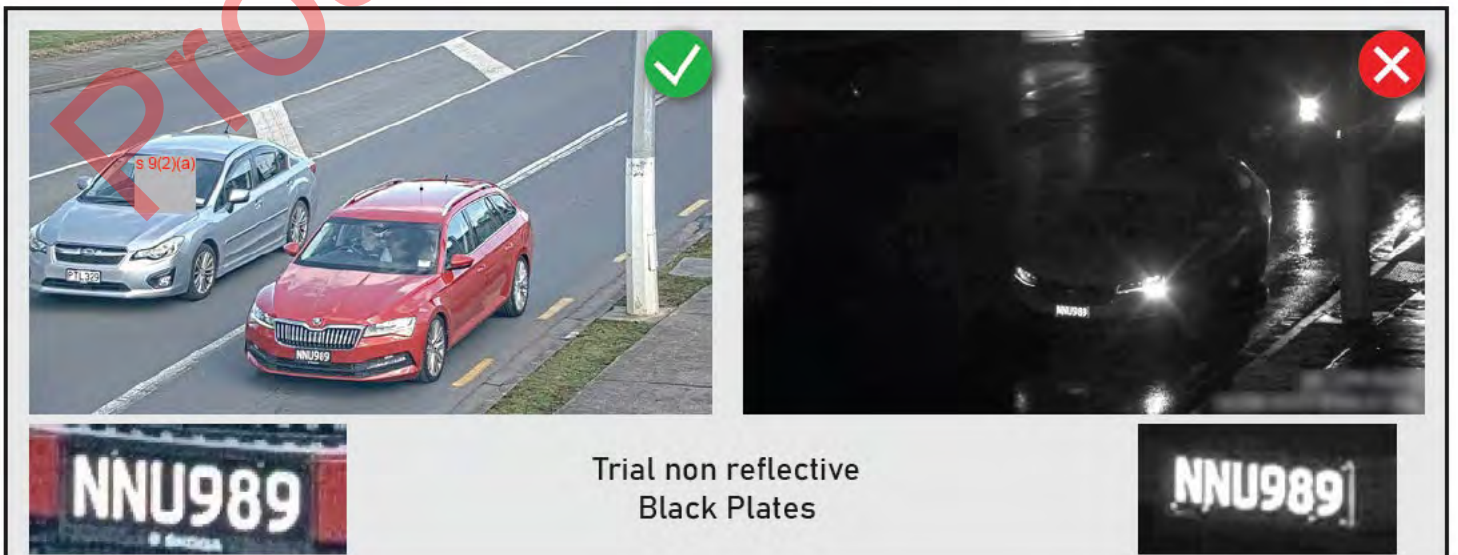
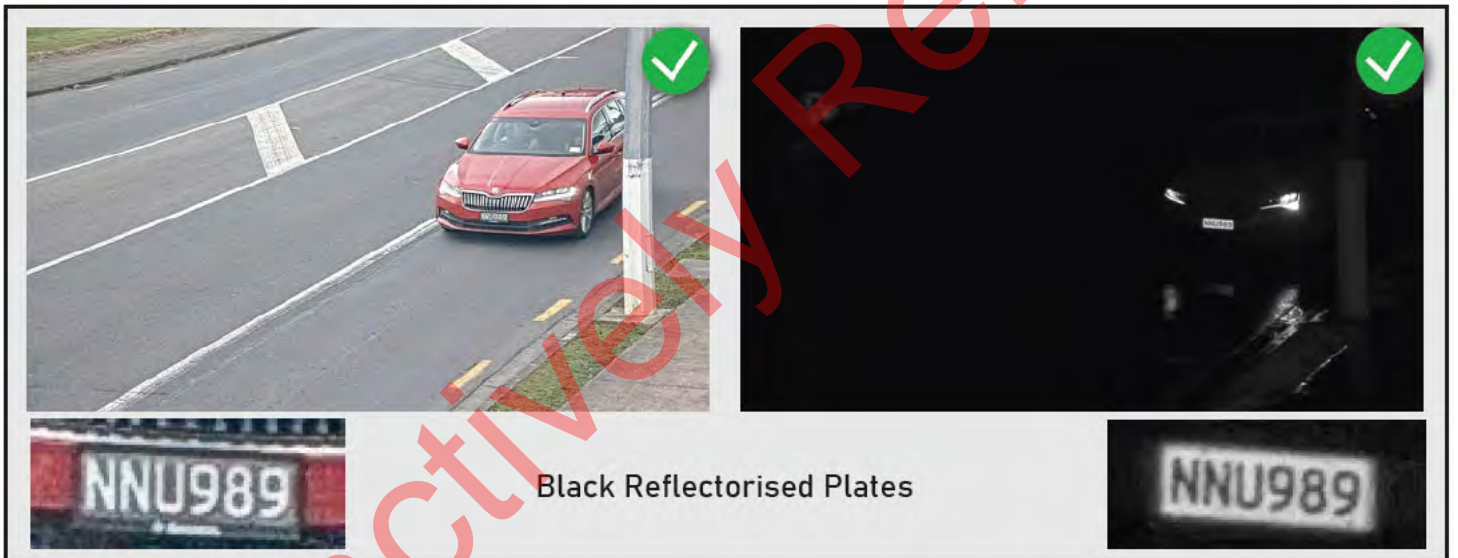
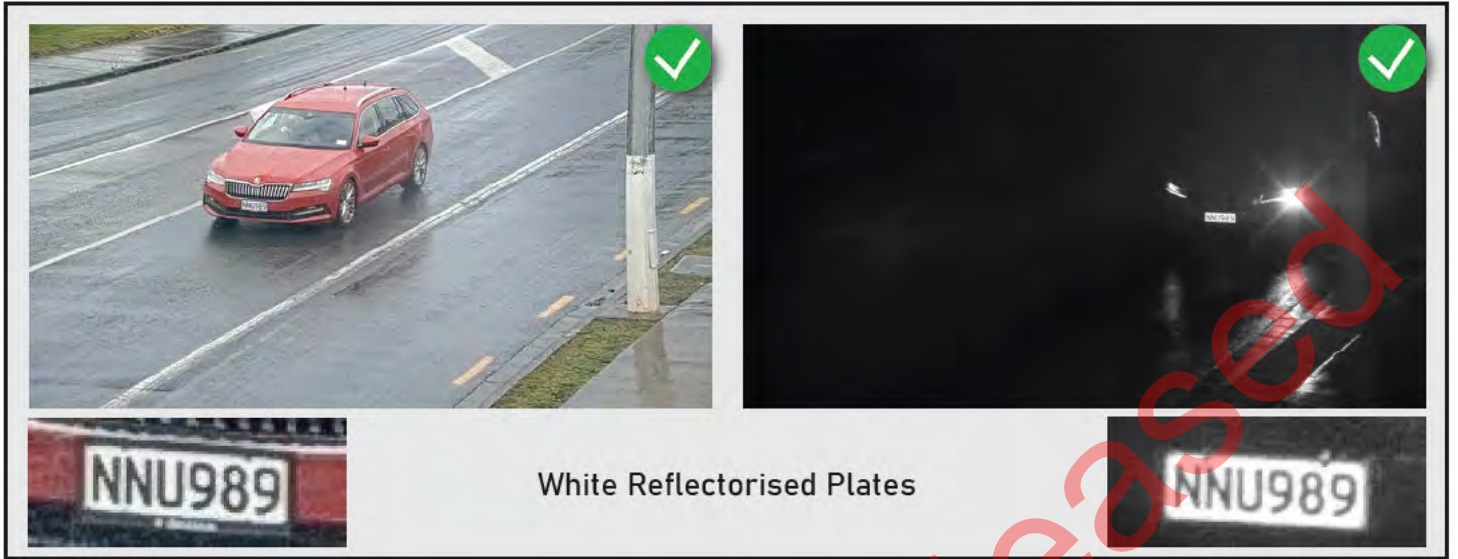
	White Reflectorised Plates	Black Reflectorised Plates	Black non Reflectorised Plates
Site 17 - s 9(2)(k)			
Site 18 - s 9(2)(k)			
Site 20 - s 9(2)(k)			
Site 21 - s 9(2)(k)			
Site 23 - s 9(2)(k)			
Site 26 - s 9(2)(k)			
Site 31 - s 9(2)(k)			
Site 32 - s 9(2)(k)			
Site 33 - s 9(2)(k)			
Site 34 - s 9(2)(k)			
Site 35 - s 9(2)(k)			
Site 36 - s 9(2)(k)			

# Nighttime plate summary

	White Reflectorised Plates	Black Reflectorised Plates	Black non Reflectorised Plates
Site 37 - s 9(2)(k)			
Site 41 - s 9(2)(k)			
Site 42 - s 9(2)(k)			
Site 43 - s 9(2)(k)			
Site 44 - s 9(2)(k)			
Site 45 - NOT USED			
Site 46 - s 9(2)(k)			
Site 48 - s 9(2)(k)			
Site 49 - s 9(2)(k)			
Site 50 - s 9(2)(k)			

Daytime

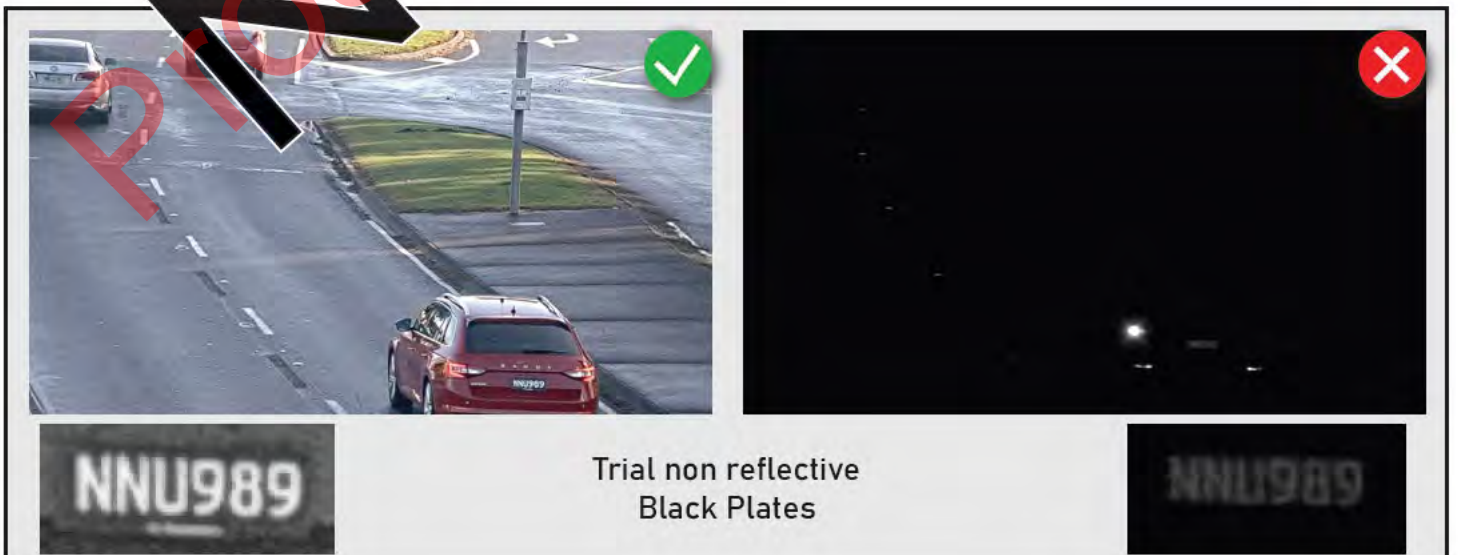
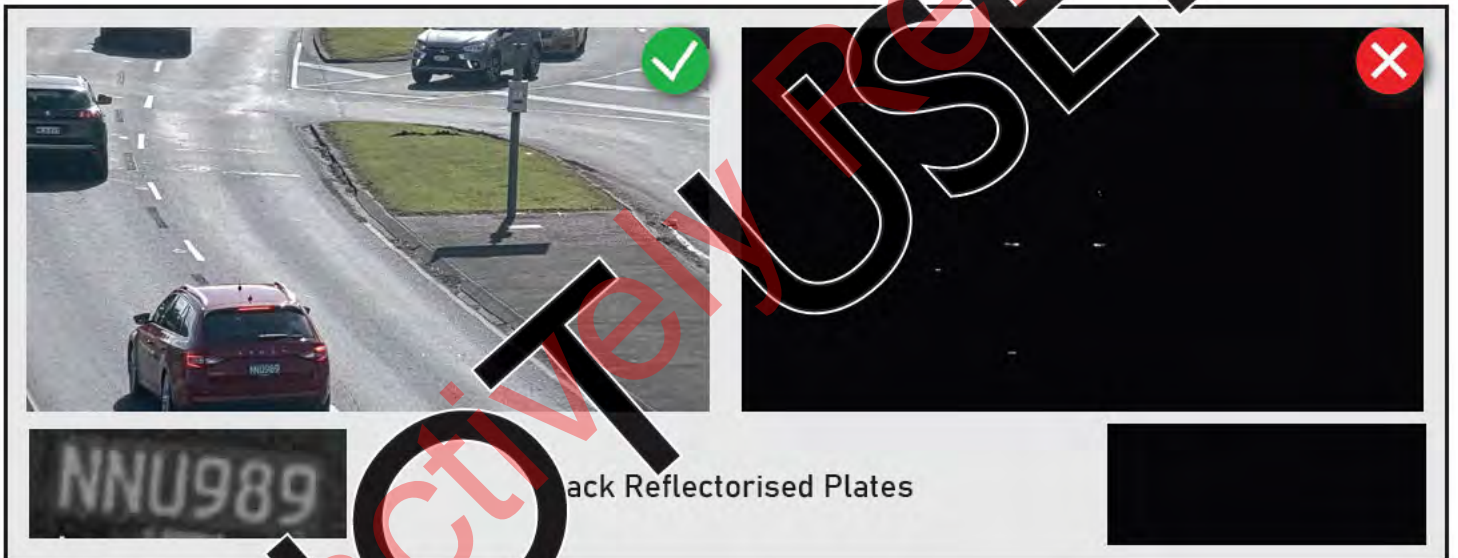
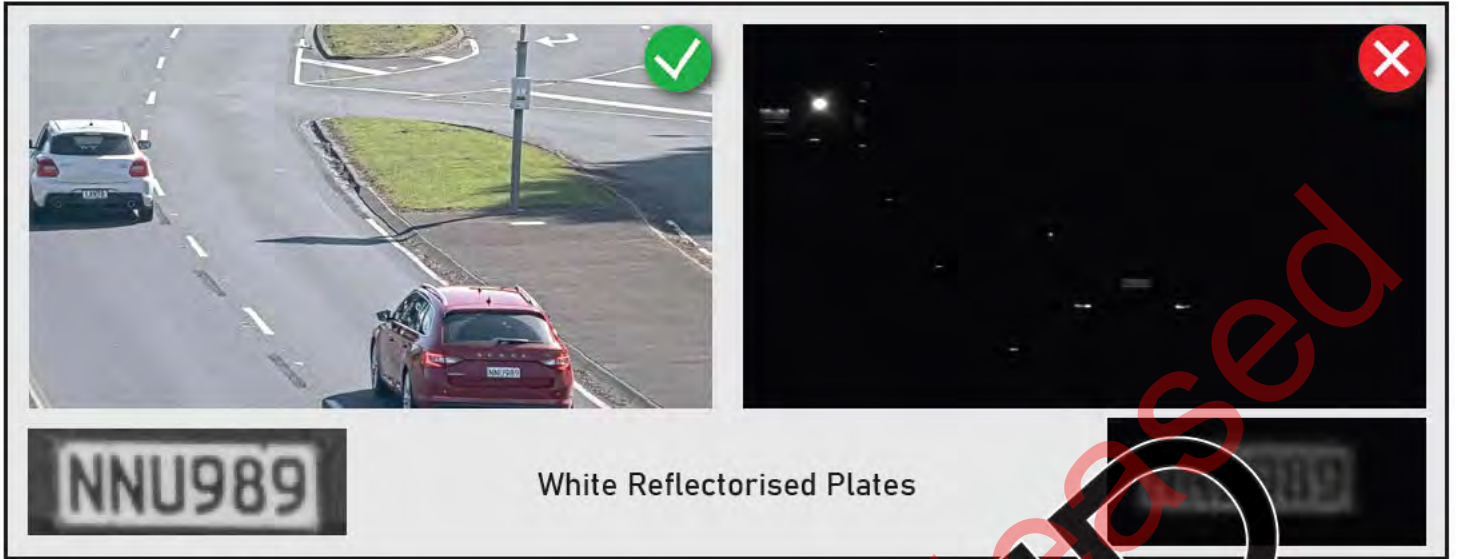
Nighttime





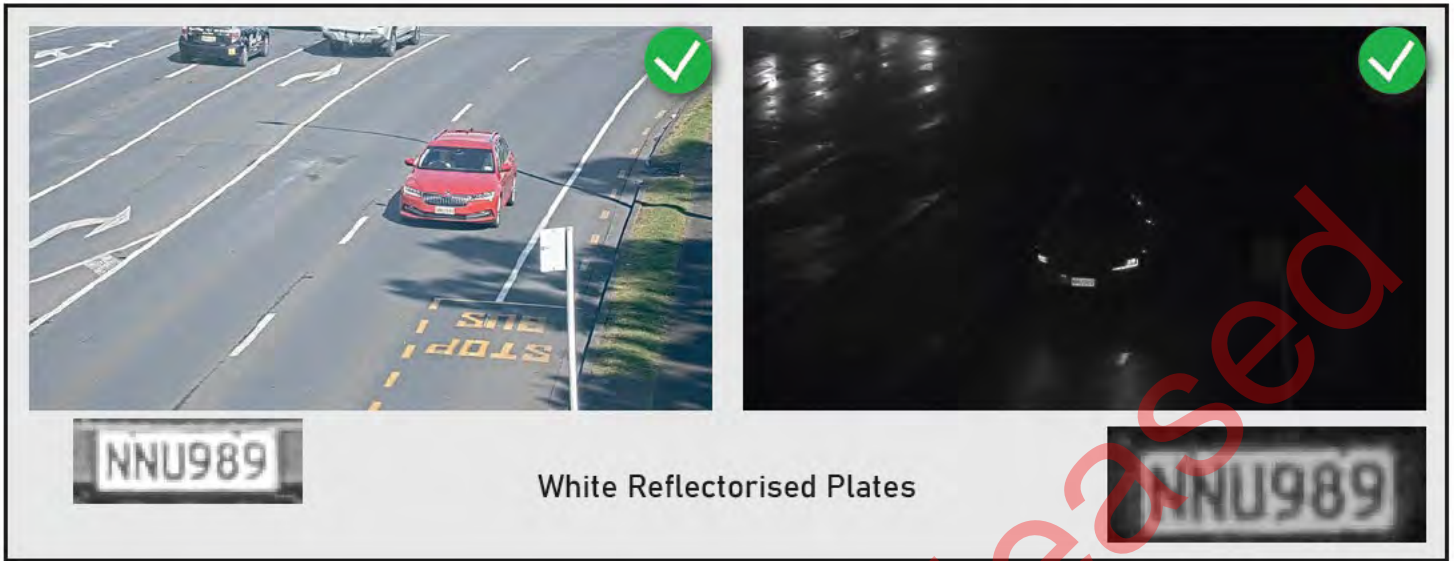
Daytime

Nighttime

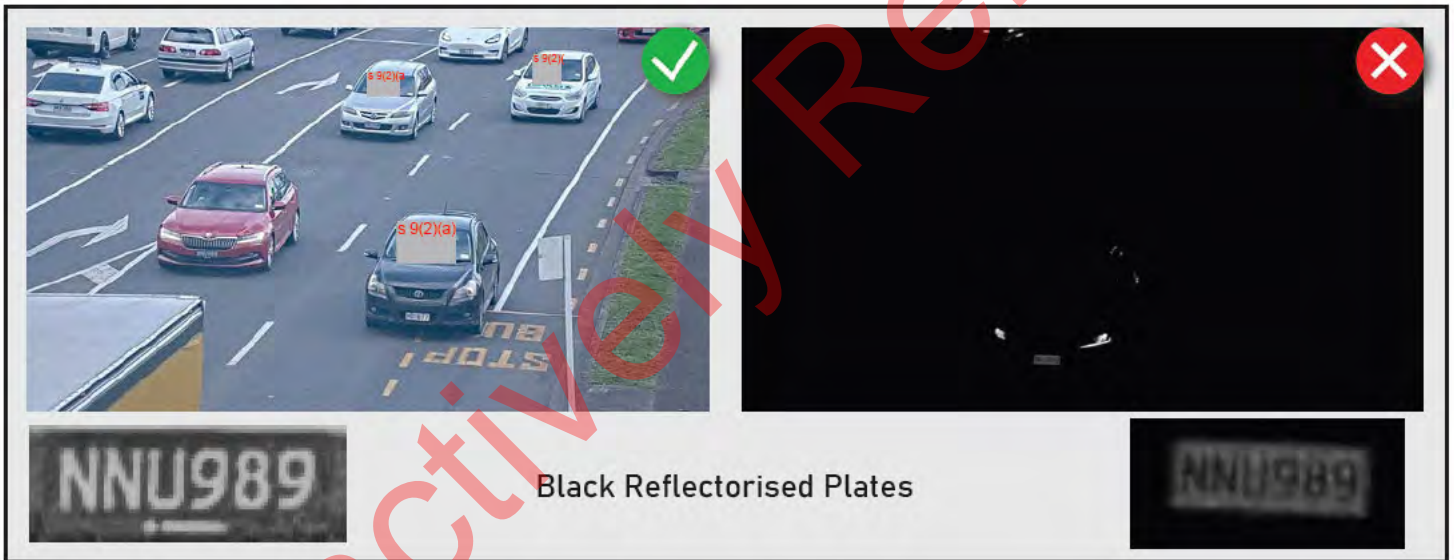


Daytime

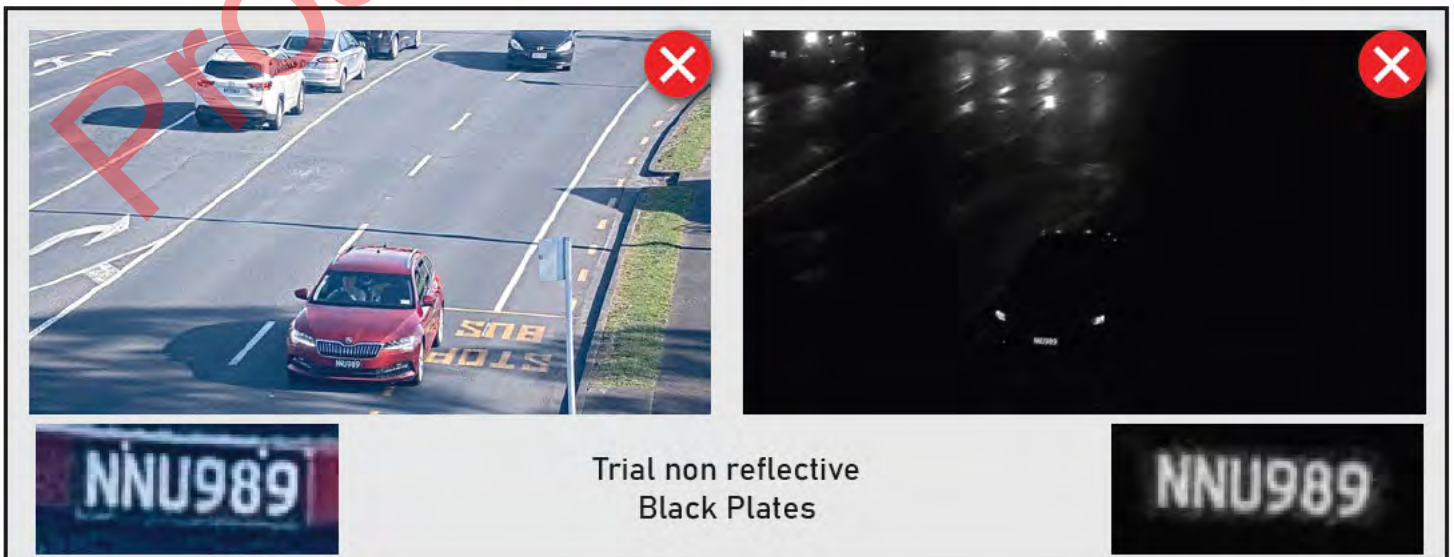
Nighttime



White Reflectorised Plates



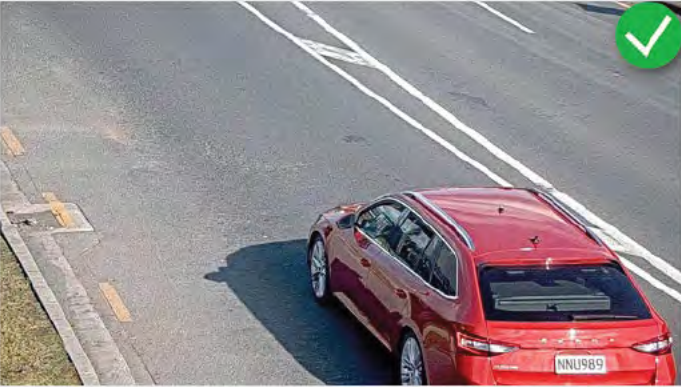

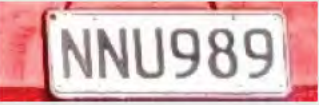

Black Reflectorised Plates



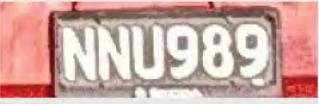



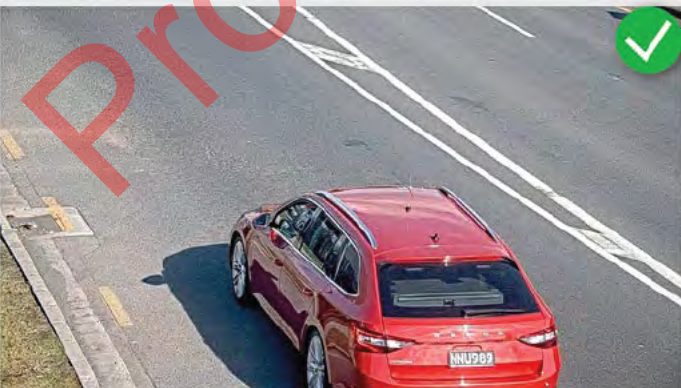



Trial non reflective  
Black Plates

Daytime

Nighttime

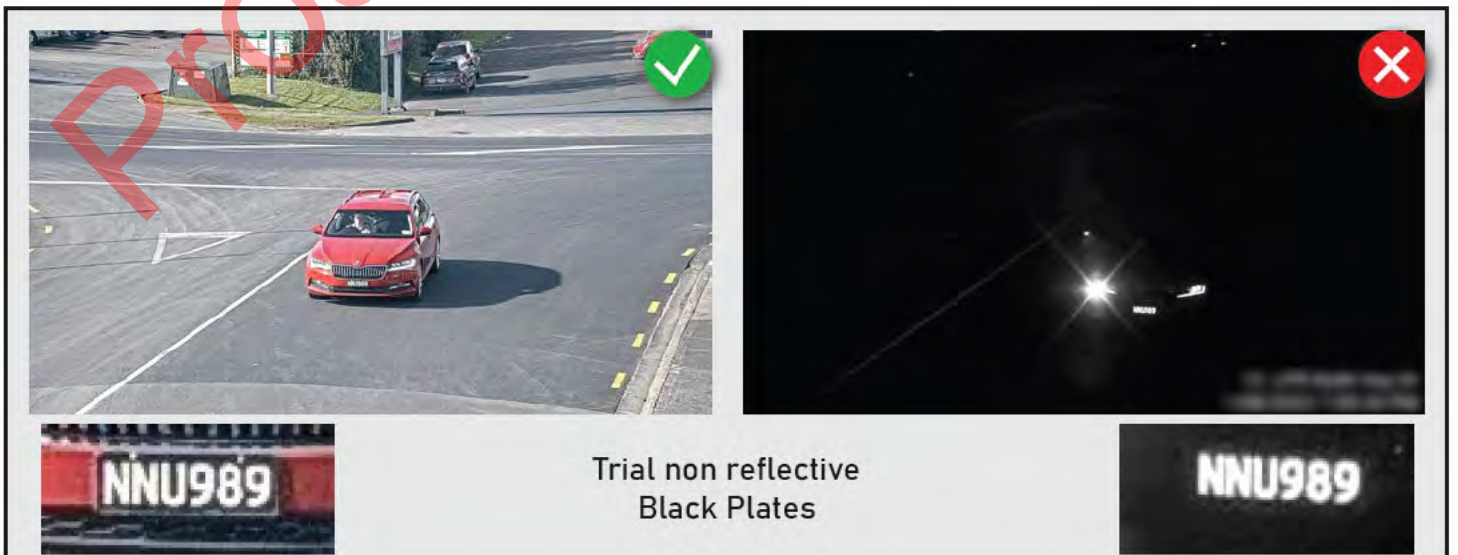
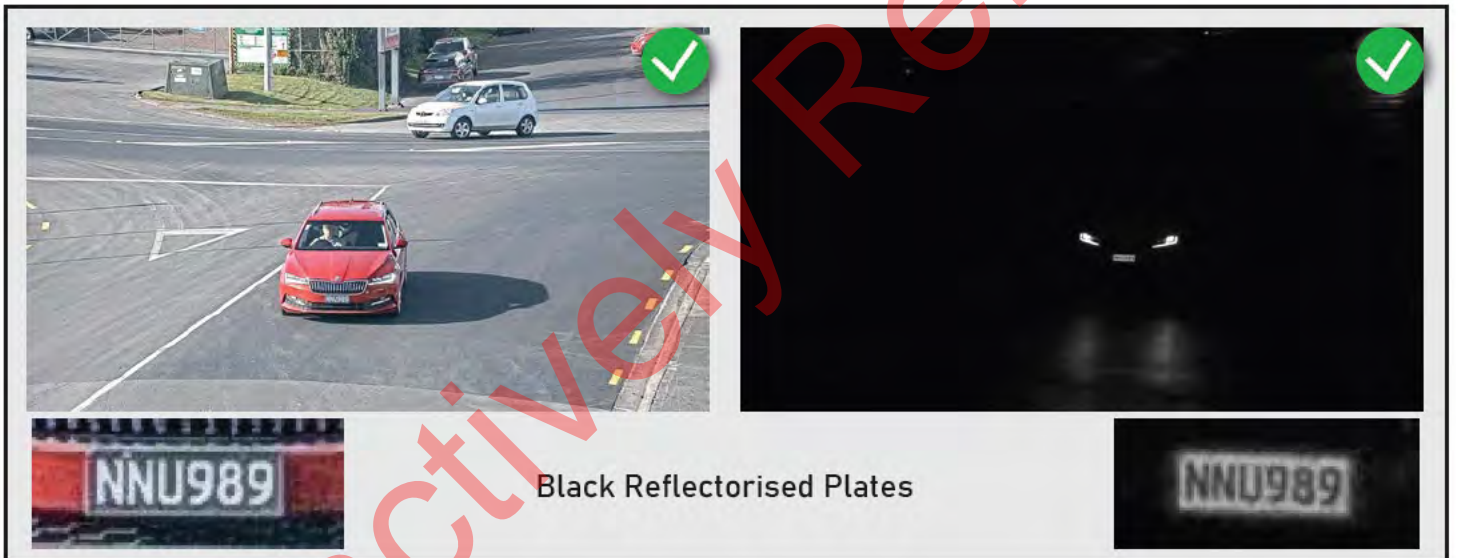
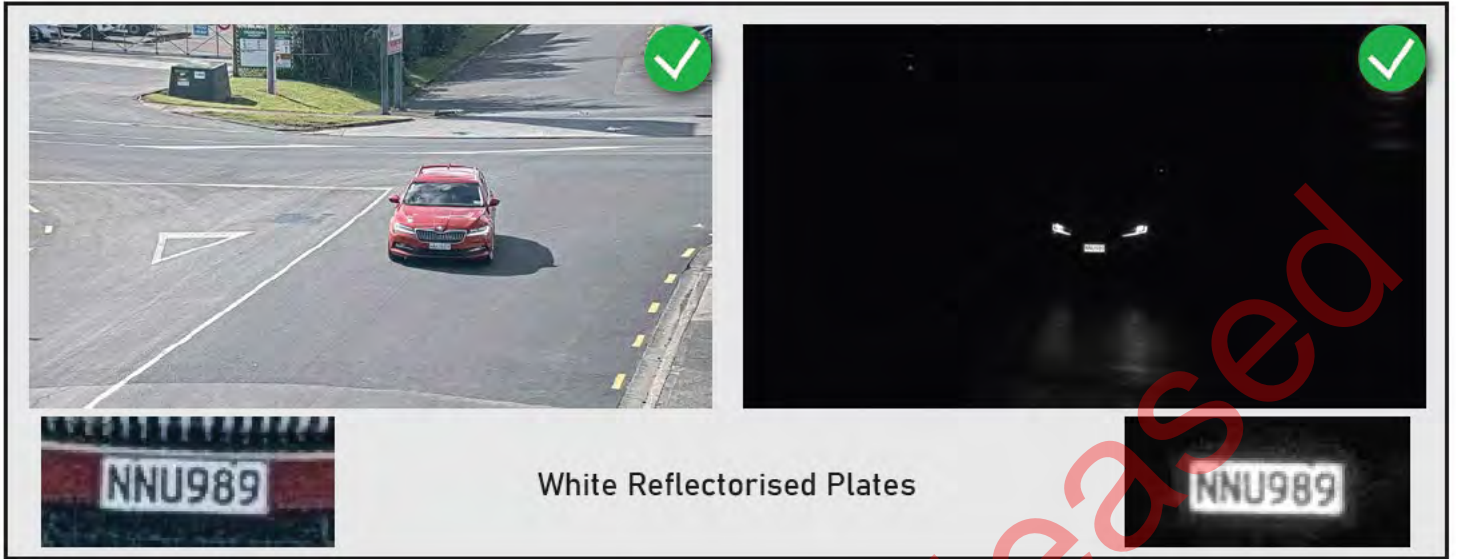
	
	
<p>White Reflectorised Plates</p>	

	
	
<p>Black Reflectorised Plates</p>	

	
	
<p>Trial non reflective Black Plates</p>	

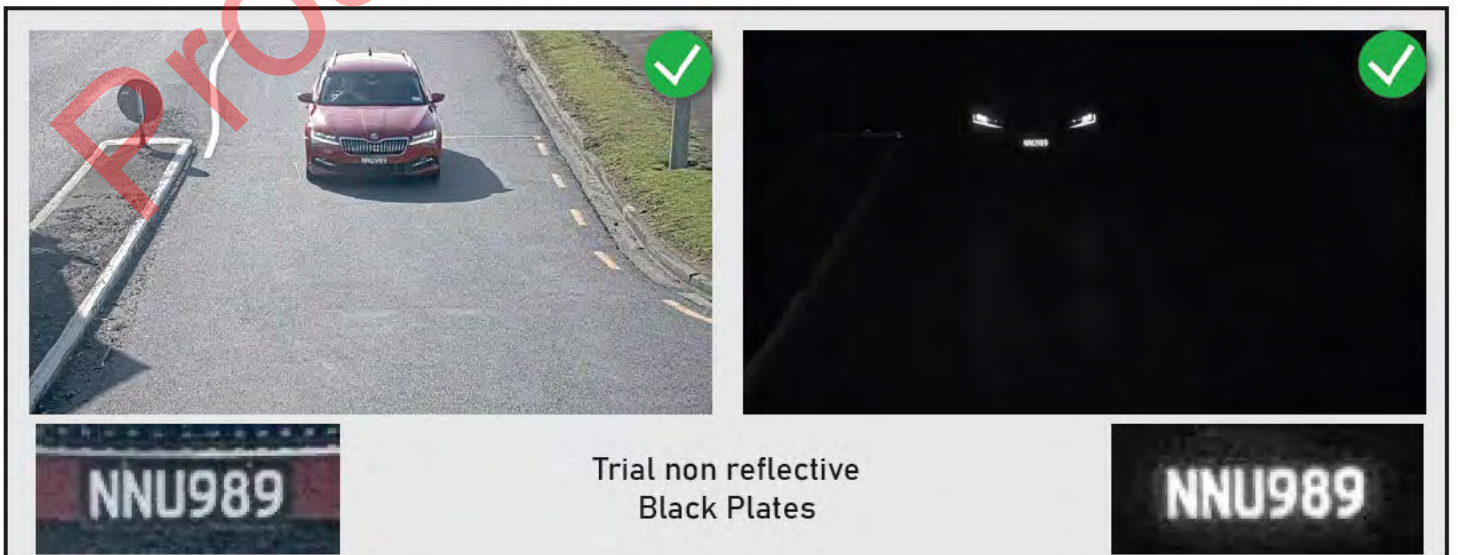
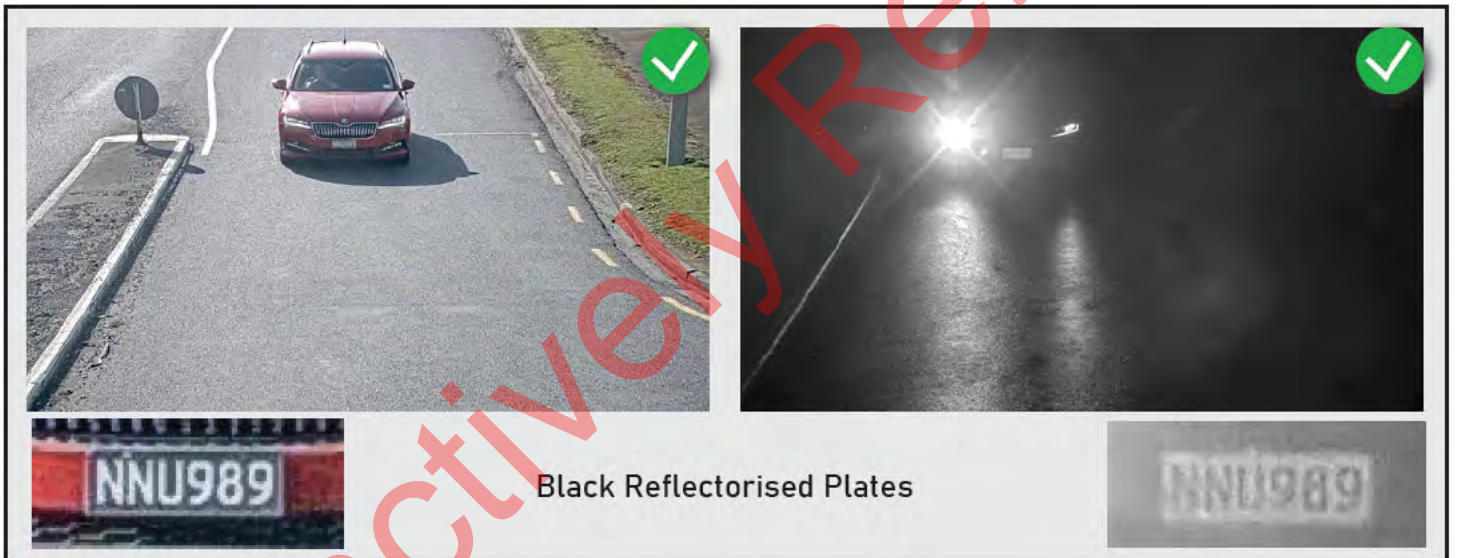
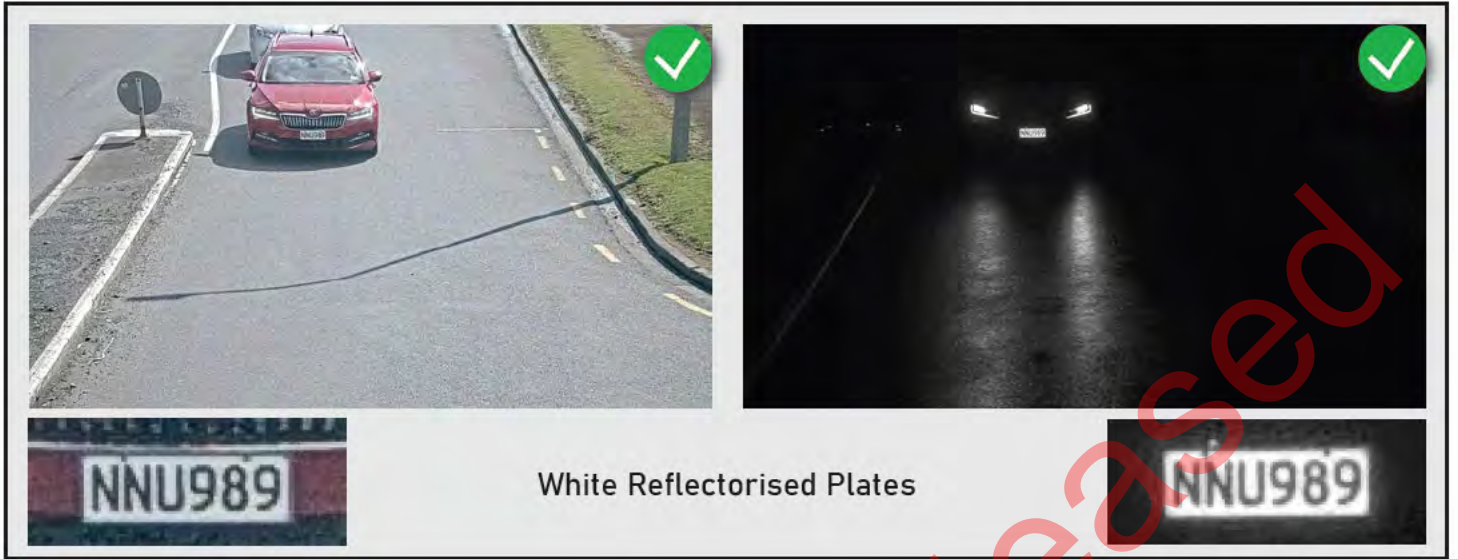
Daytime

Nighttime



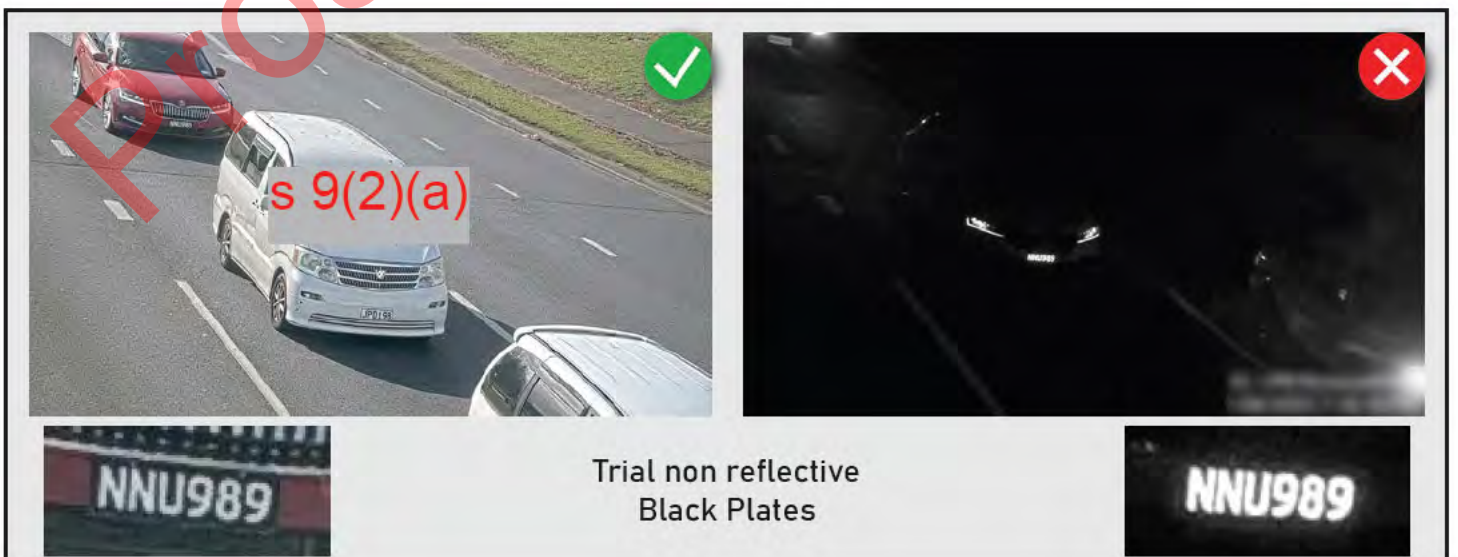
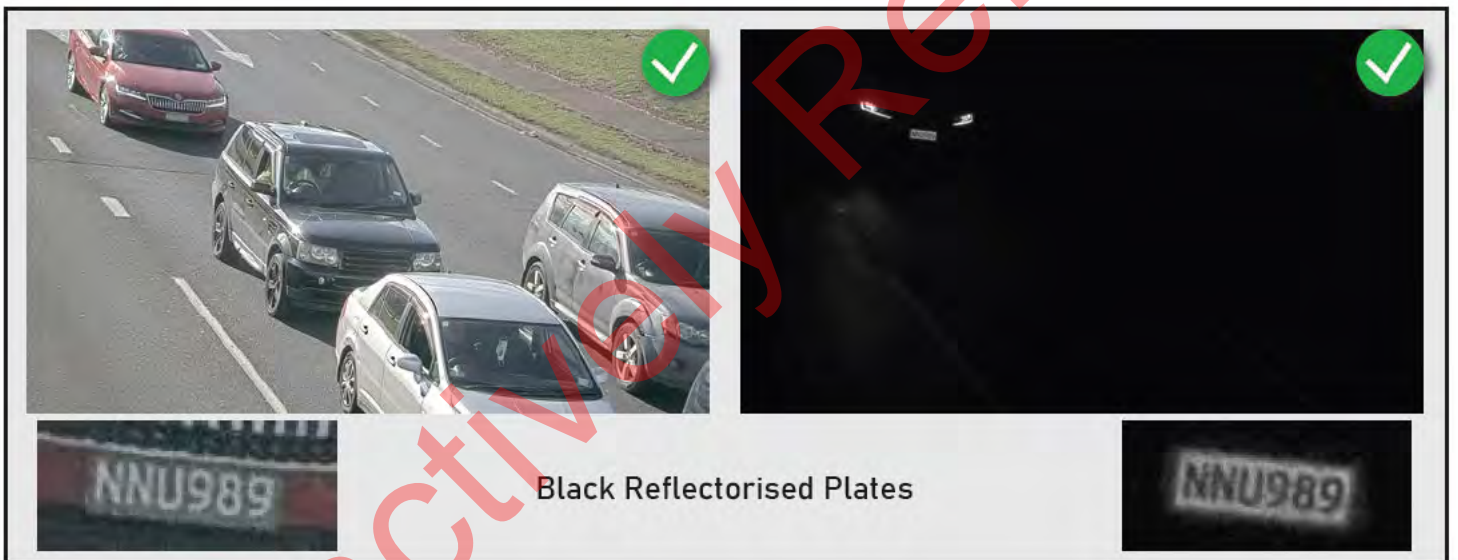
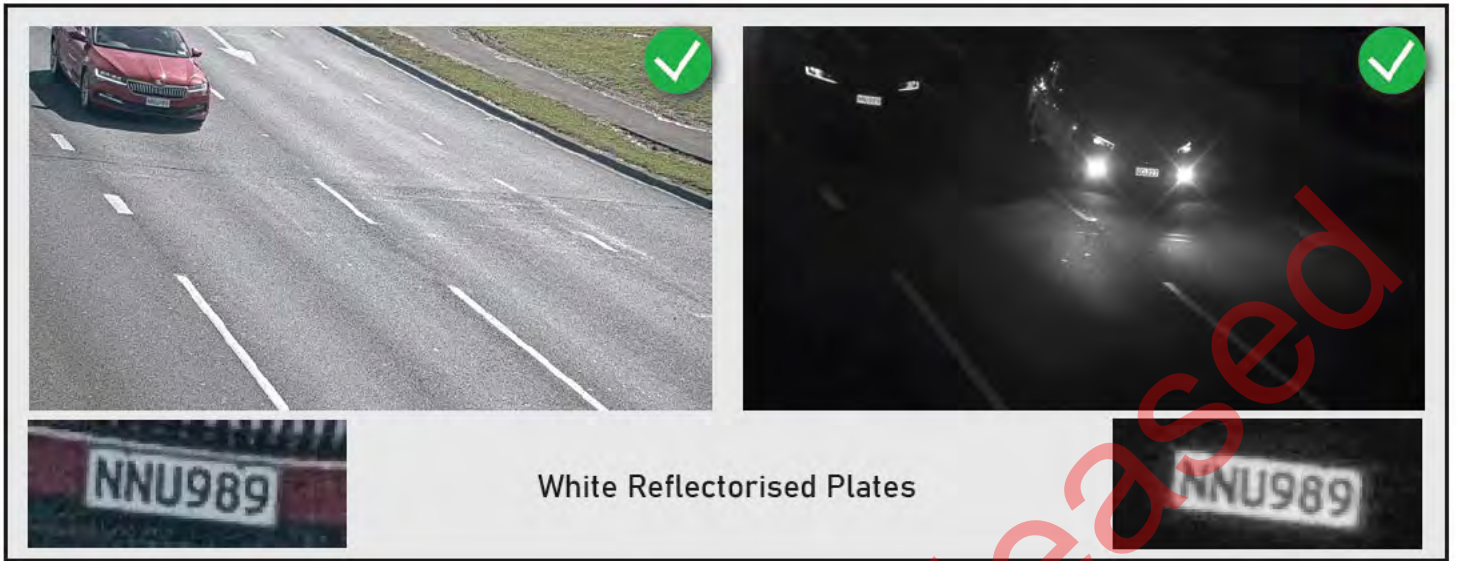
Daytime

Nighttime



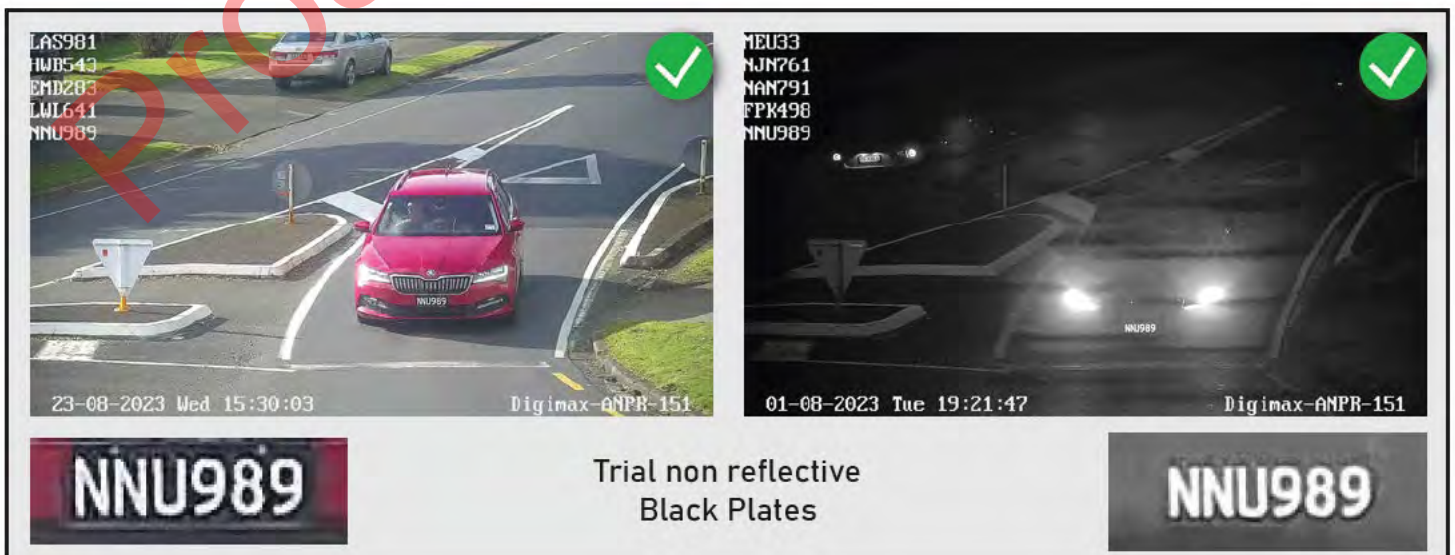
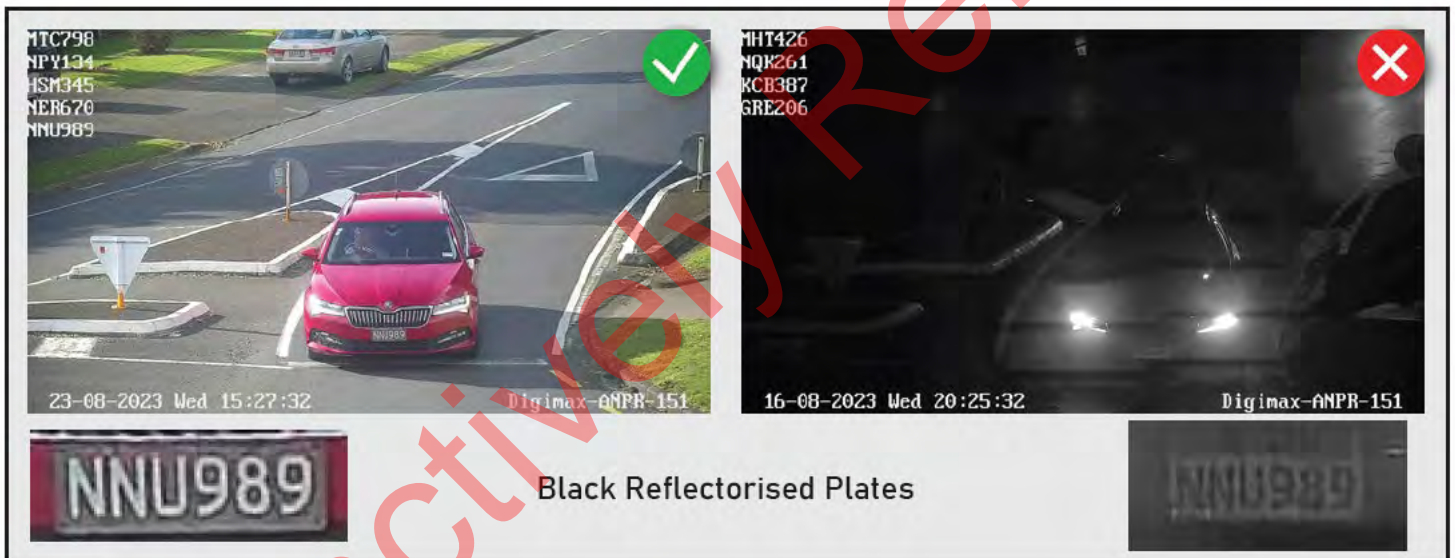
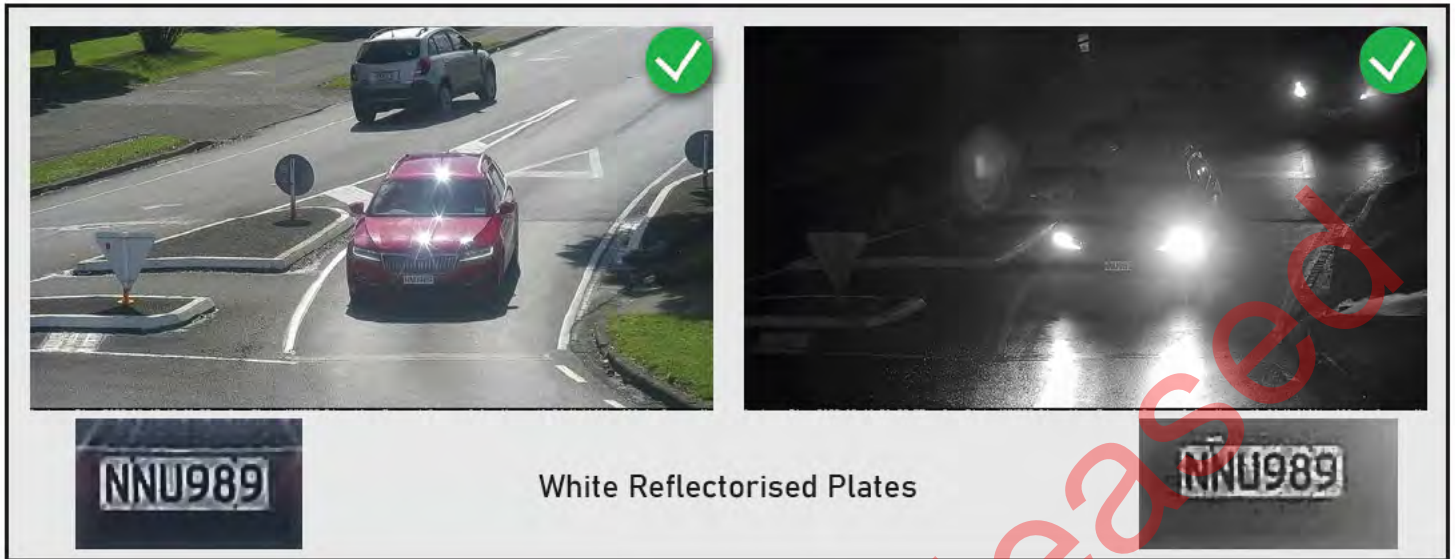
Daytime

Nighttime



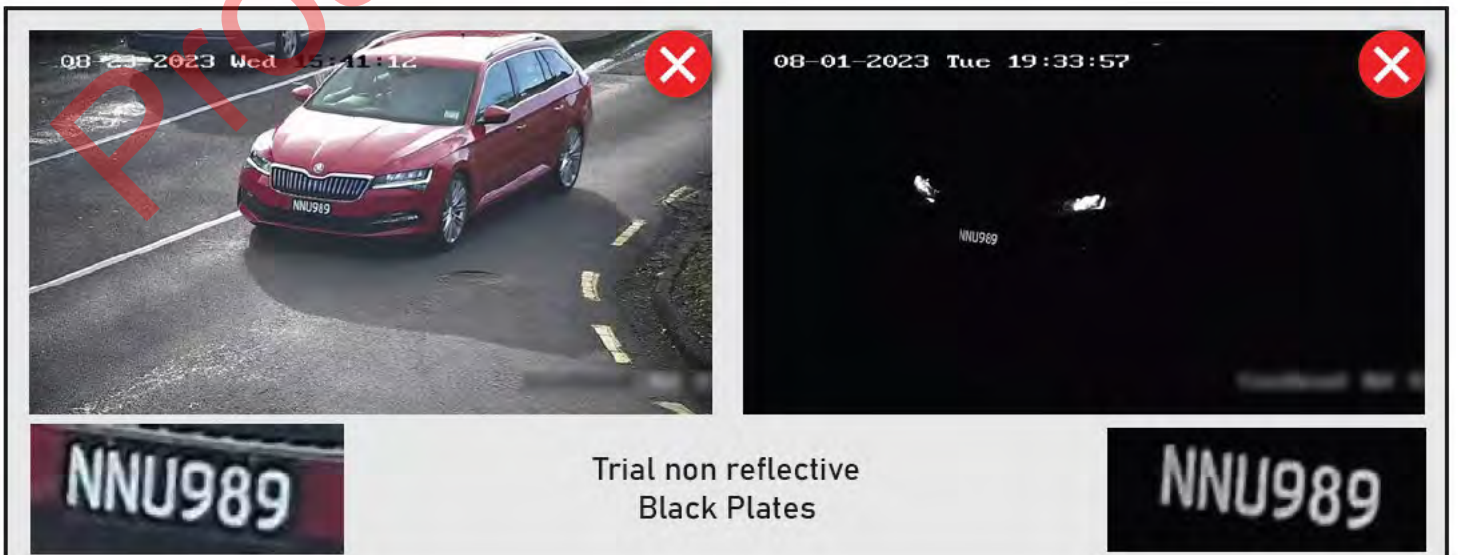
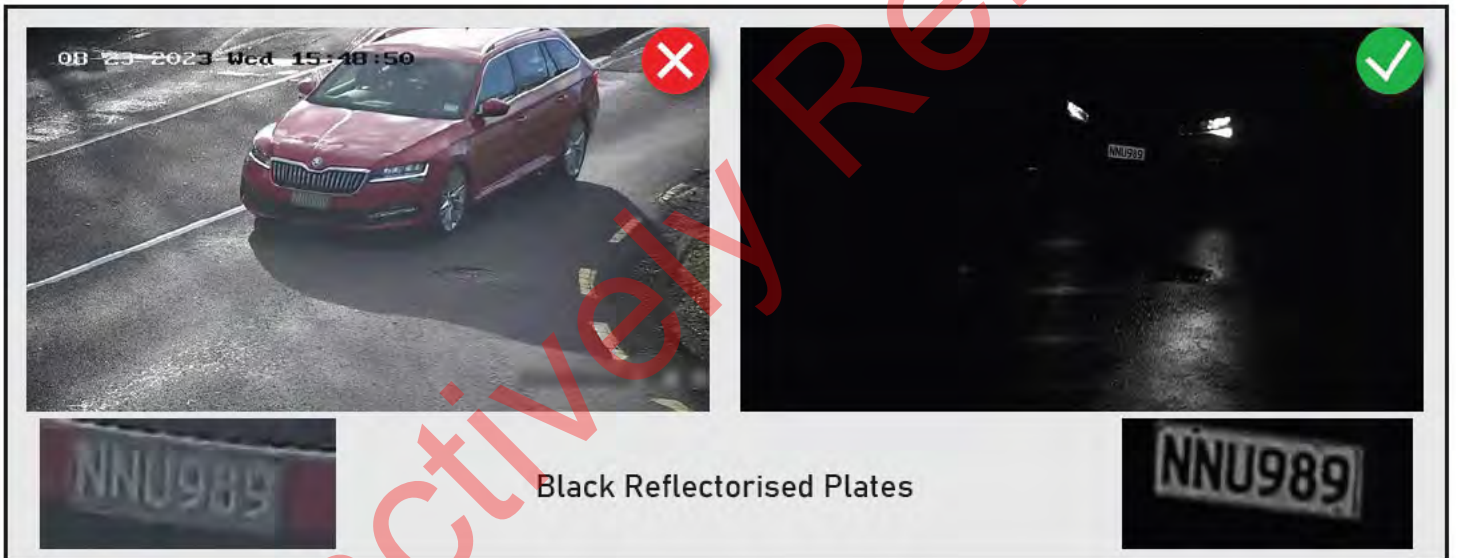
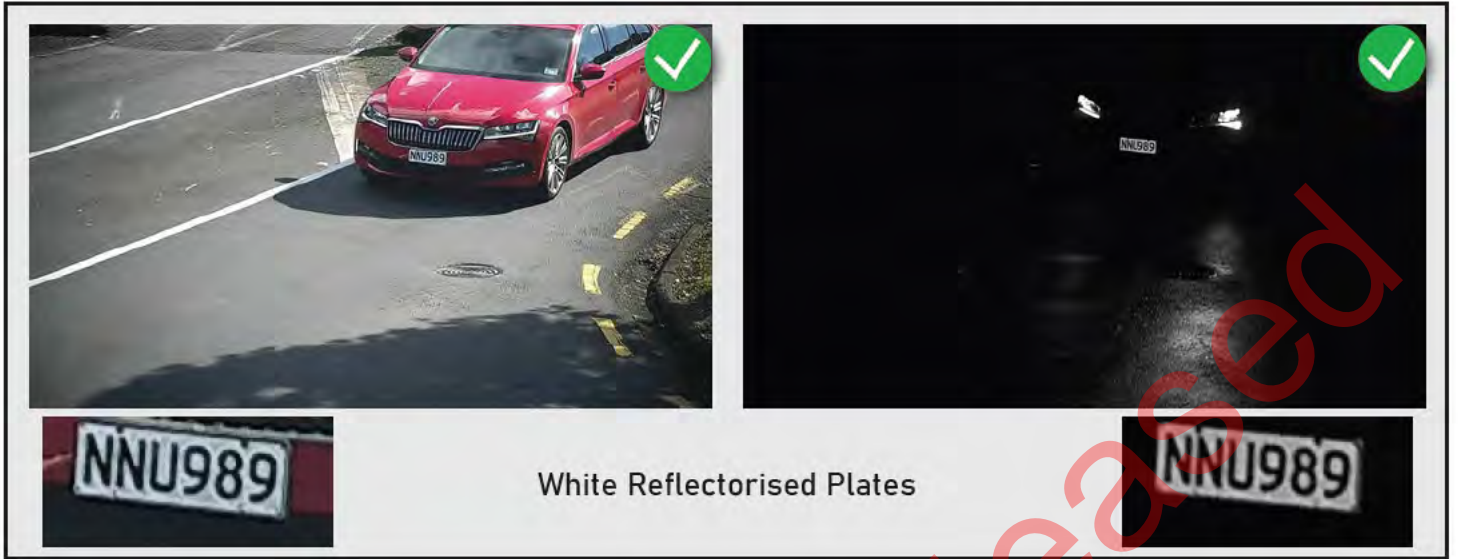
Daytime

Nighttime



Daytime

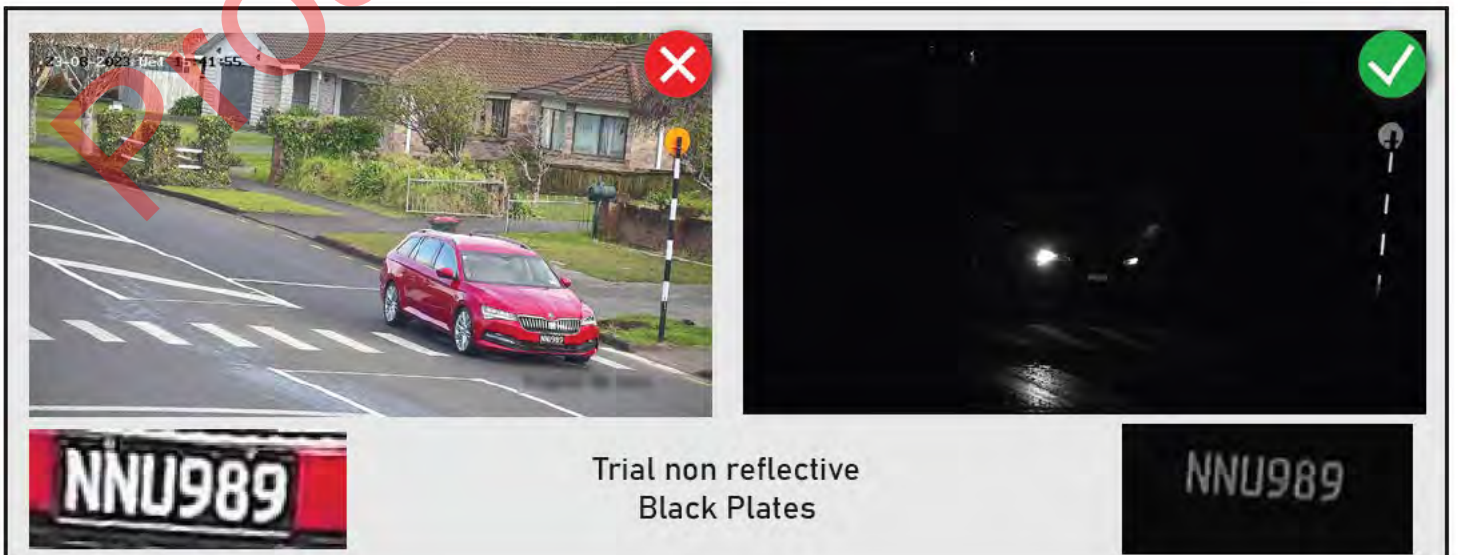
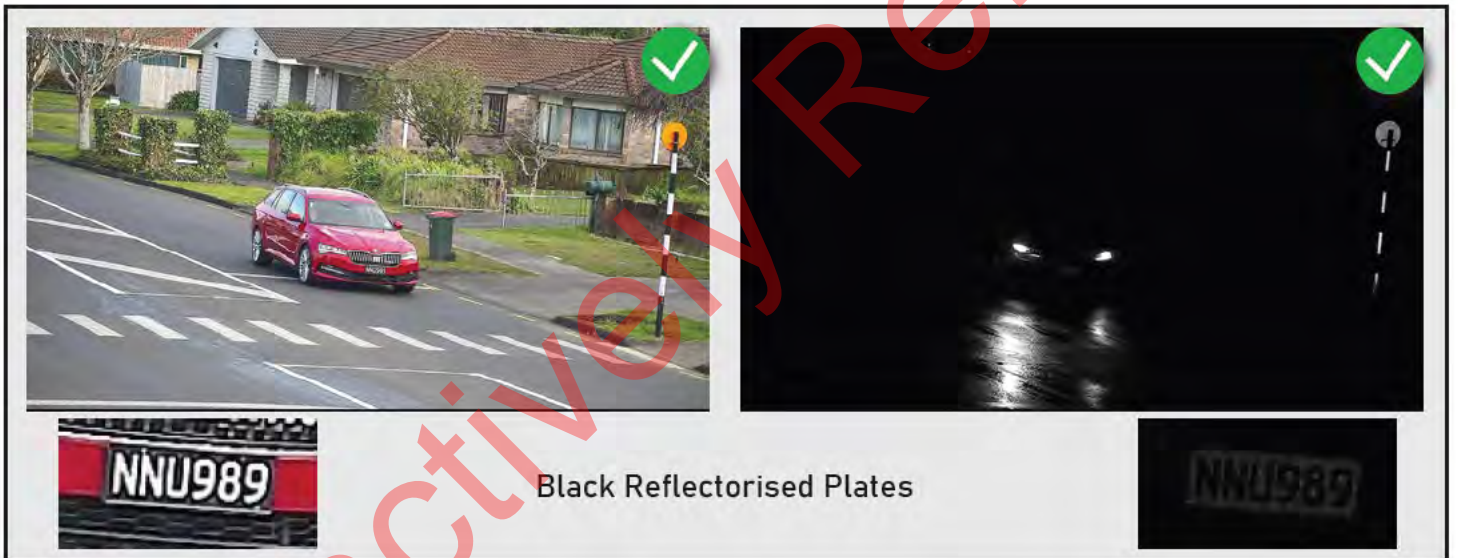
Nighttime





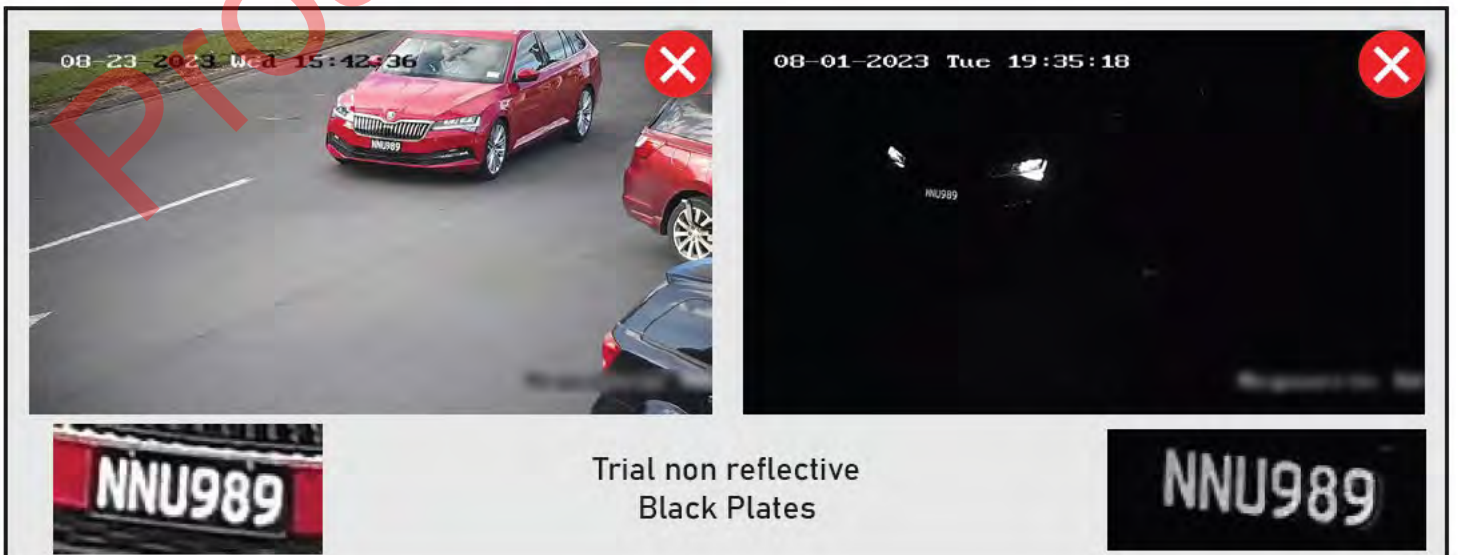
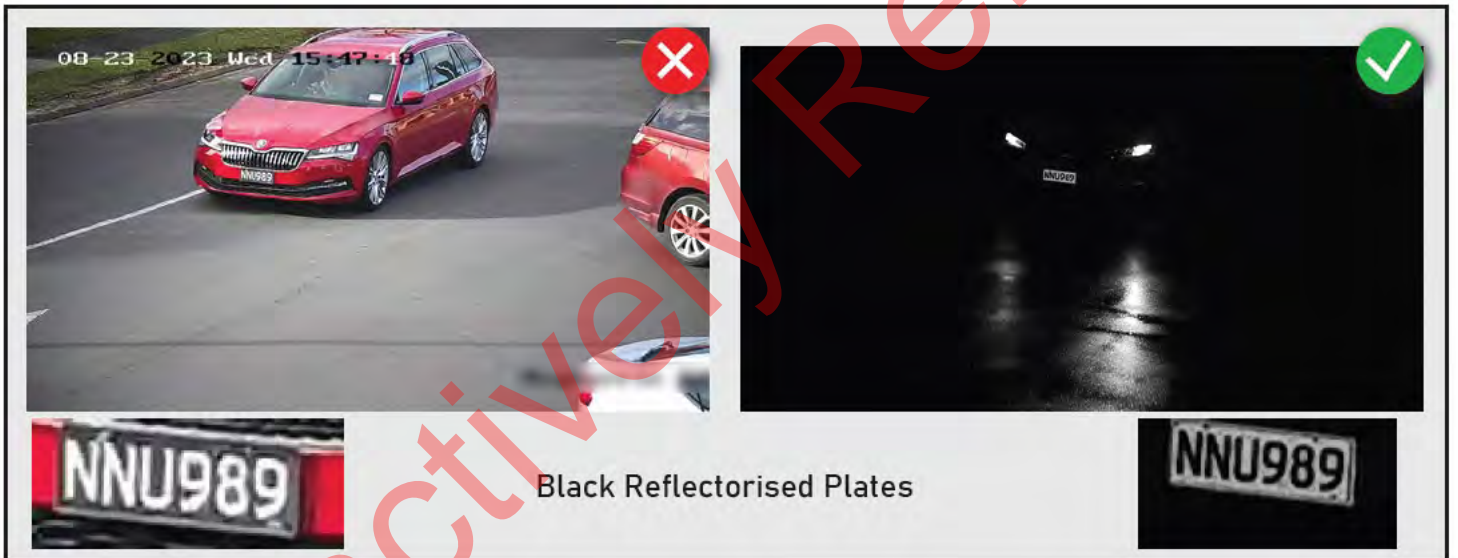
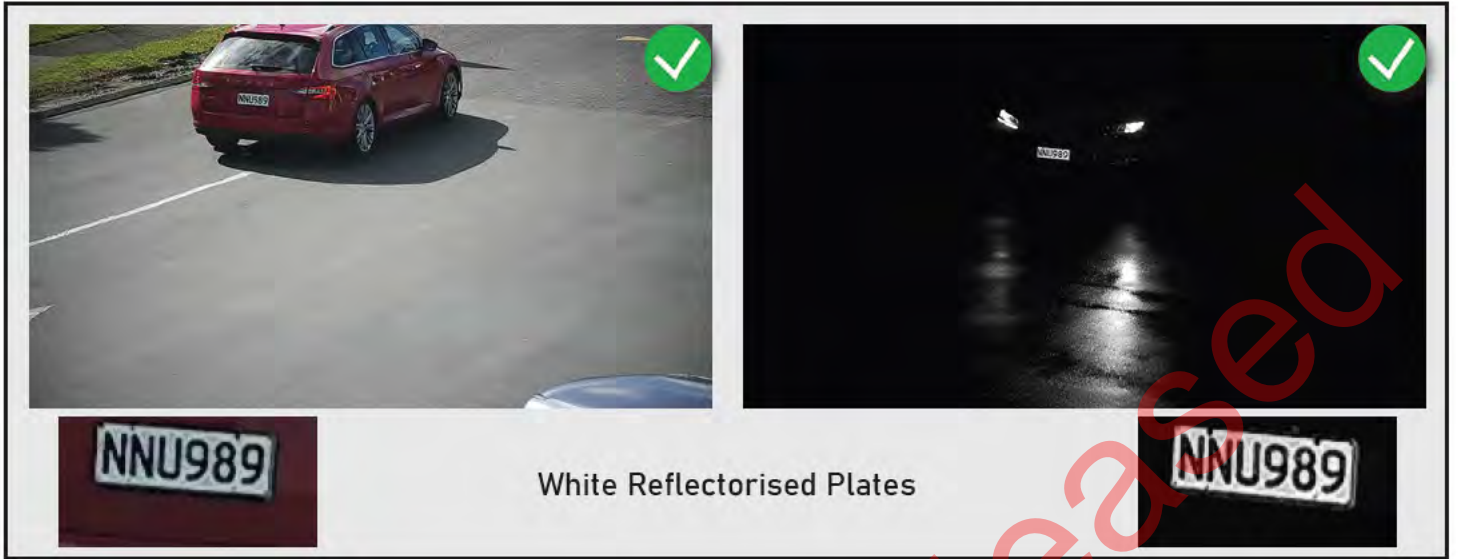
Daytime

Nighttime



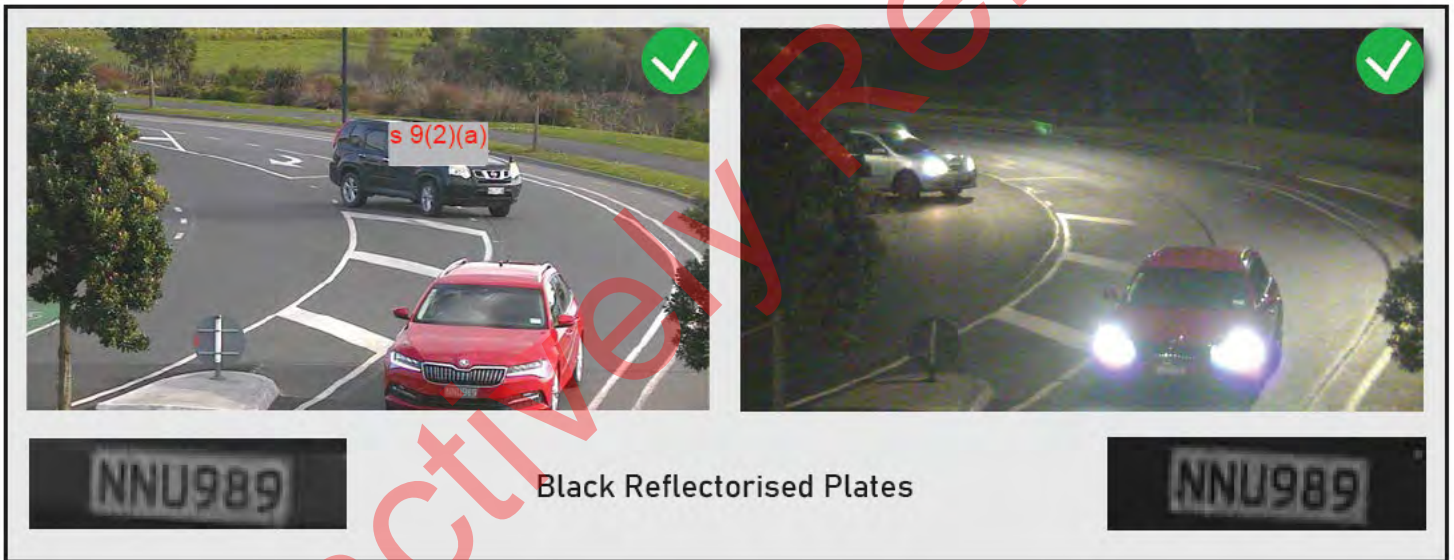
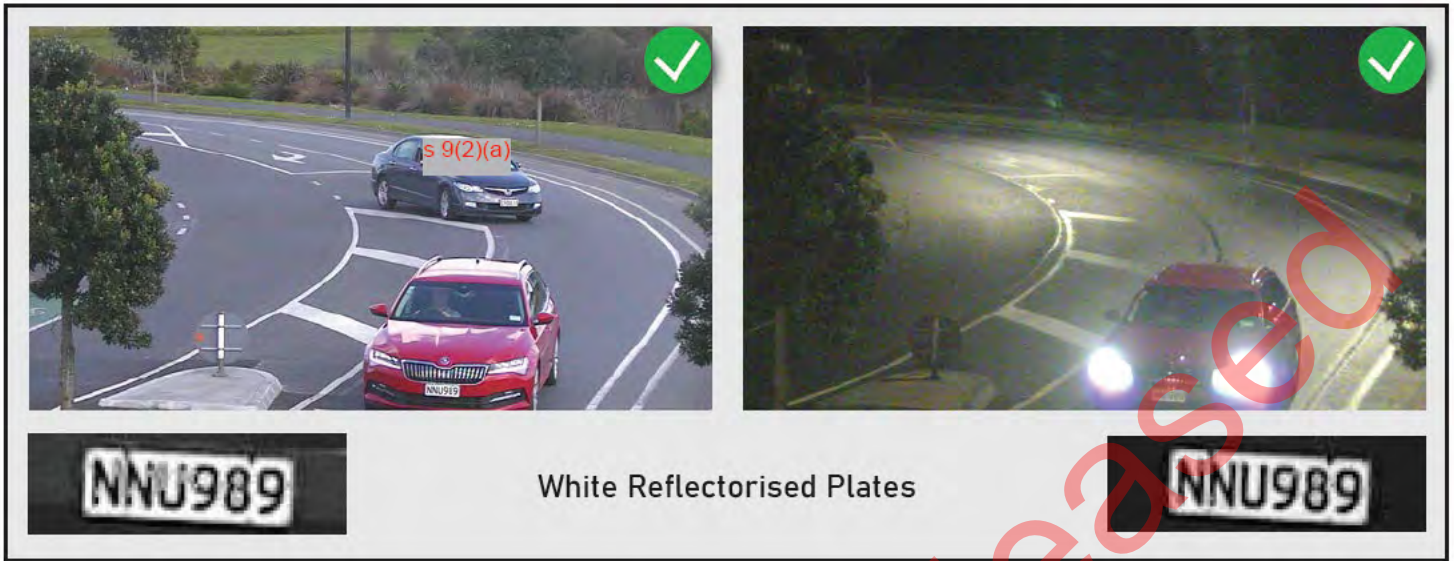
Daytime

Nighttime



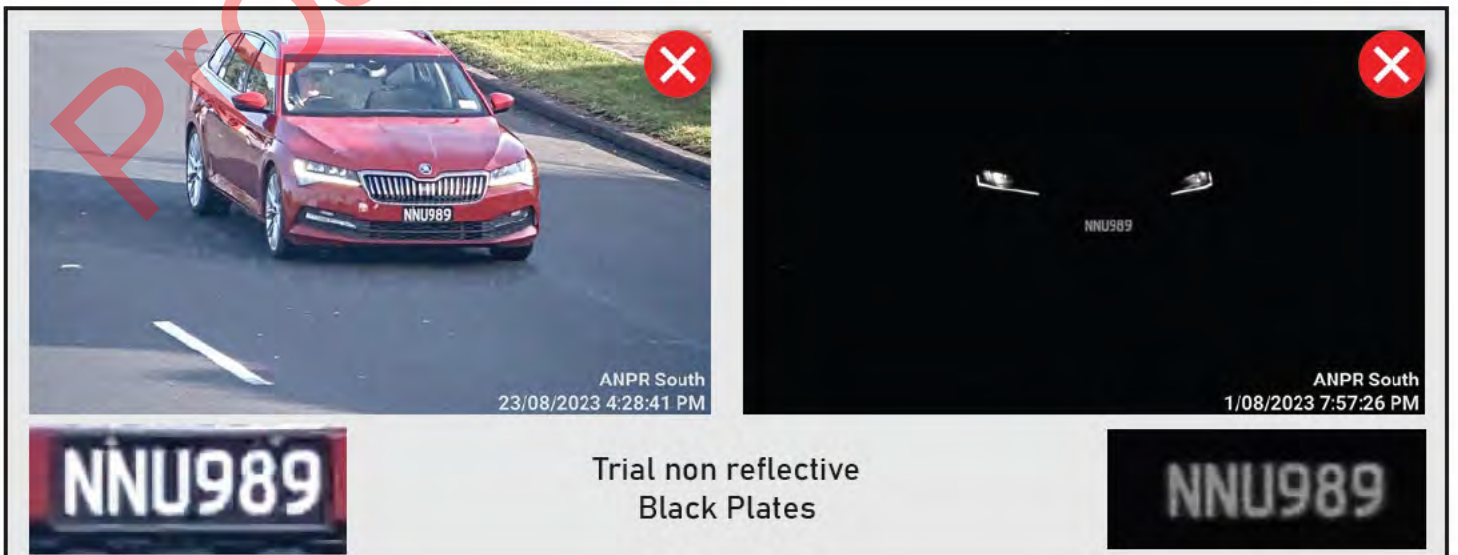
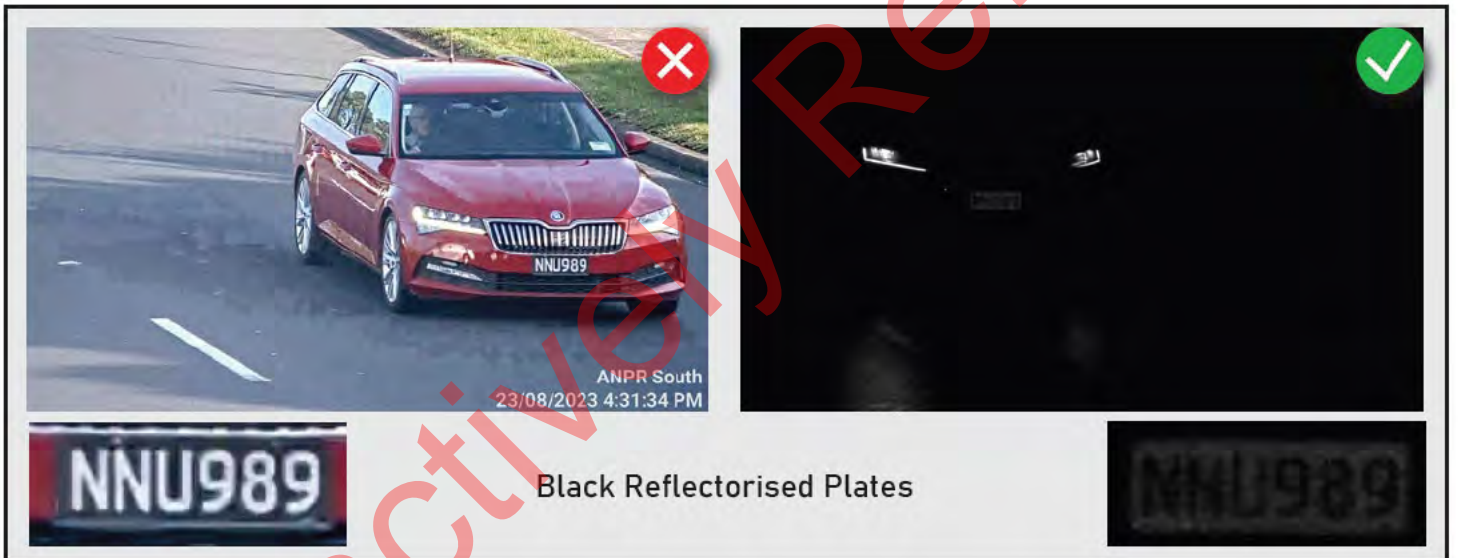
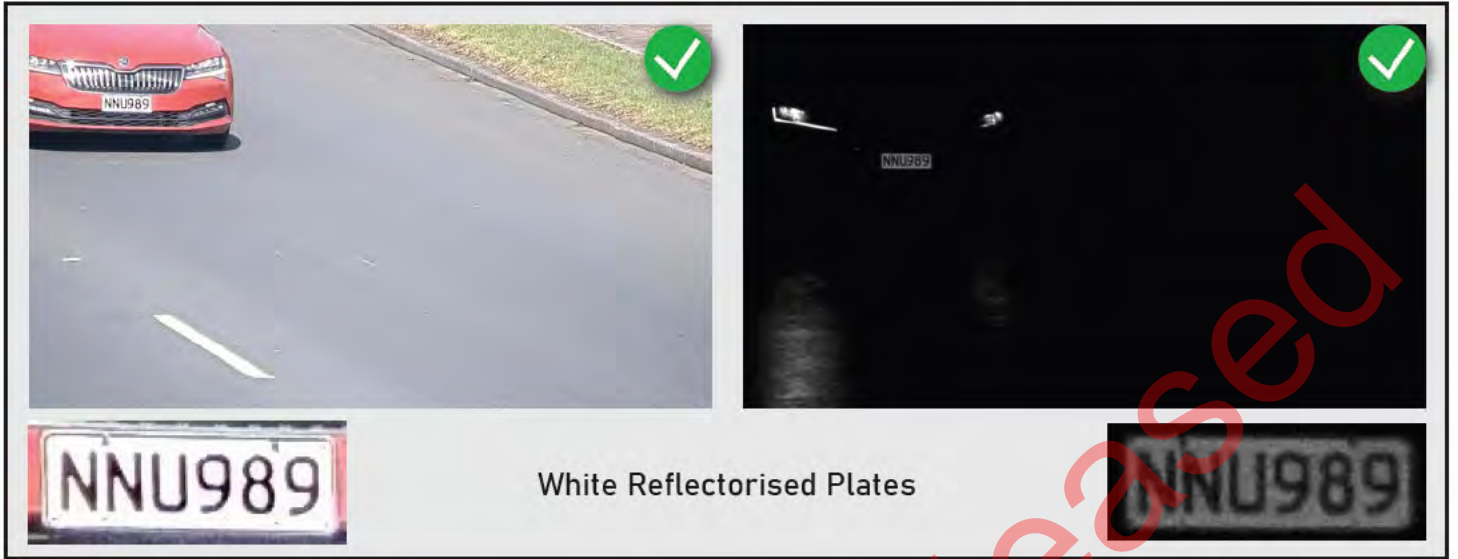
Daytime

Nighttime



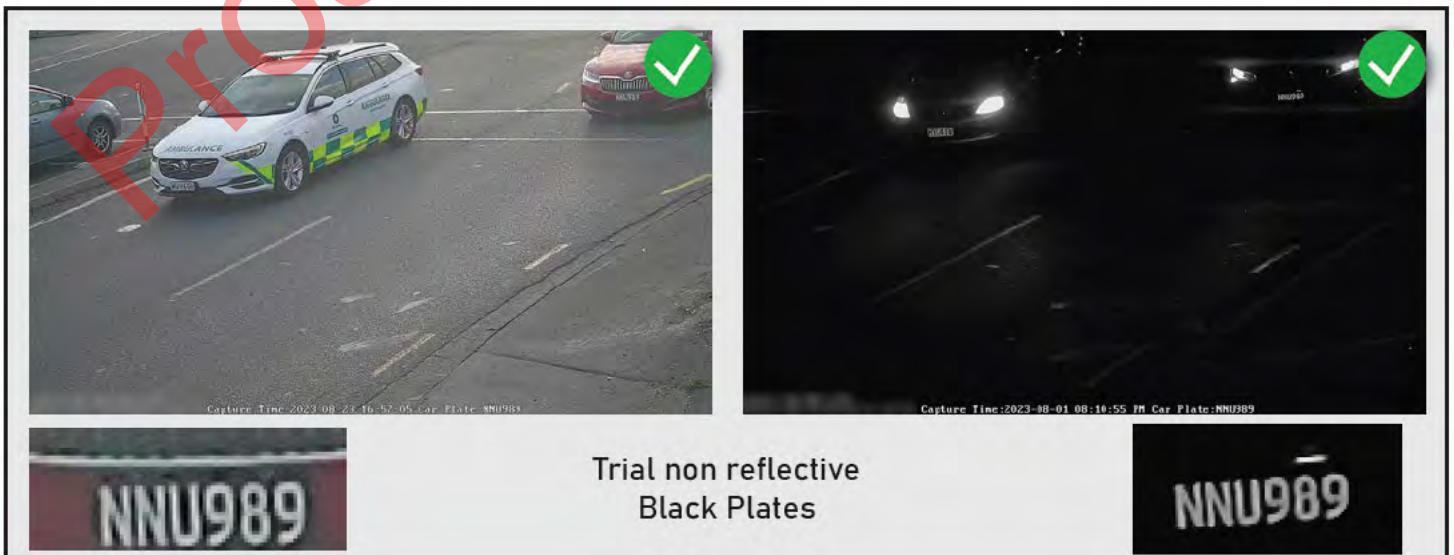
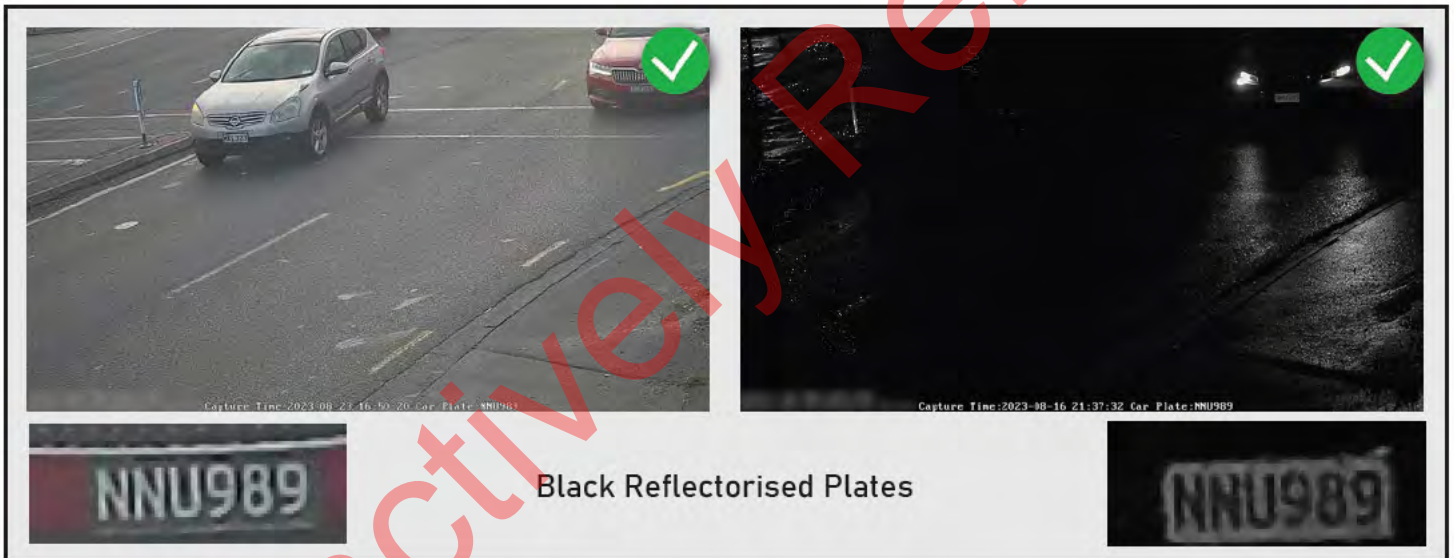
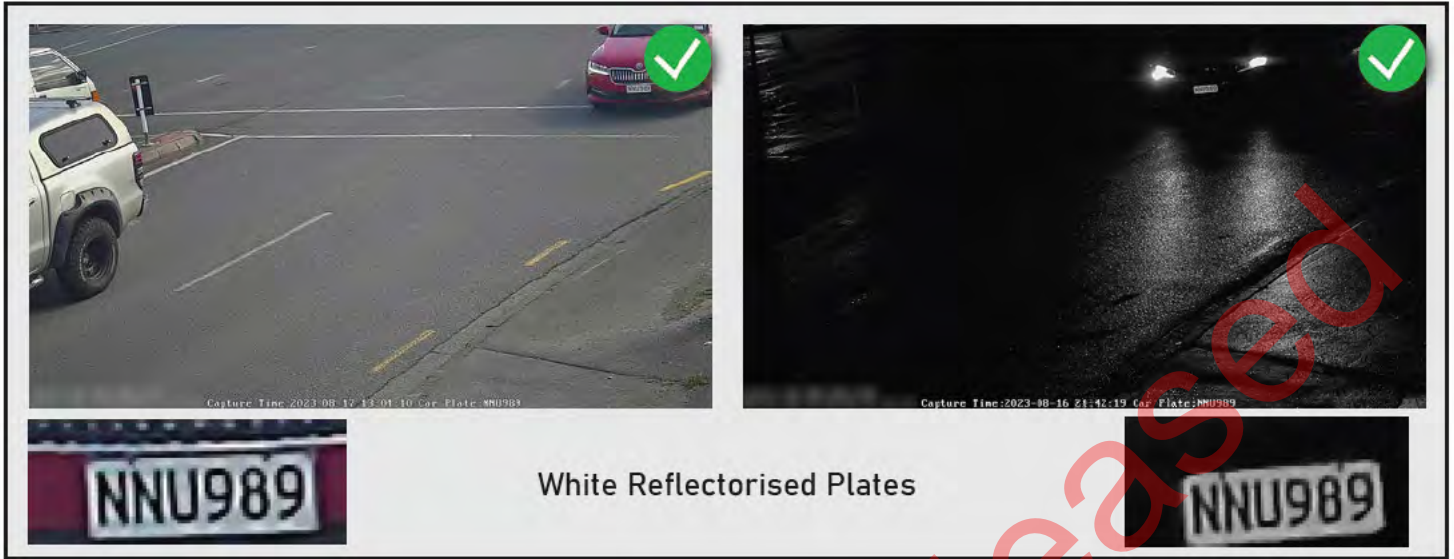
Daytime

Nighttime



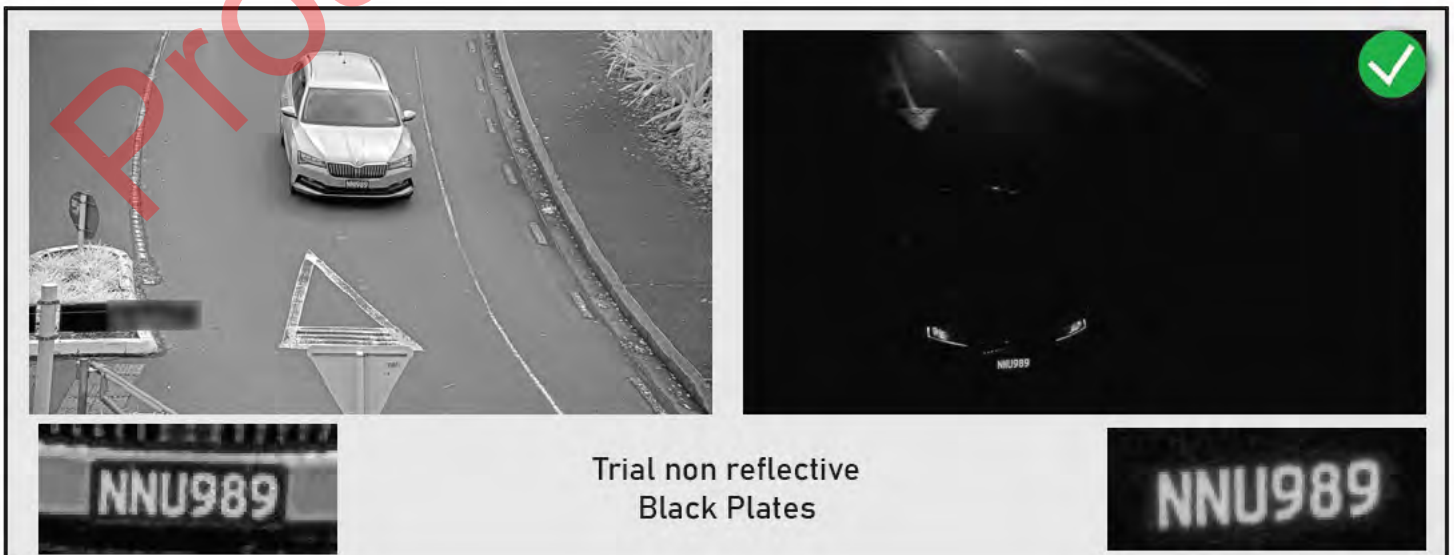
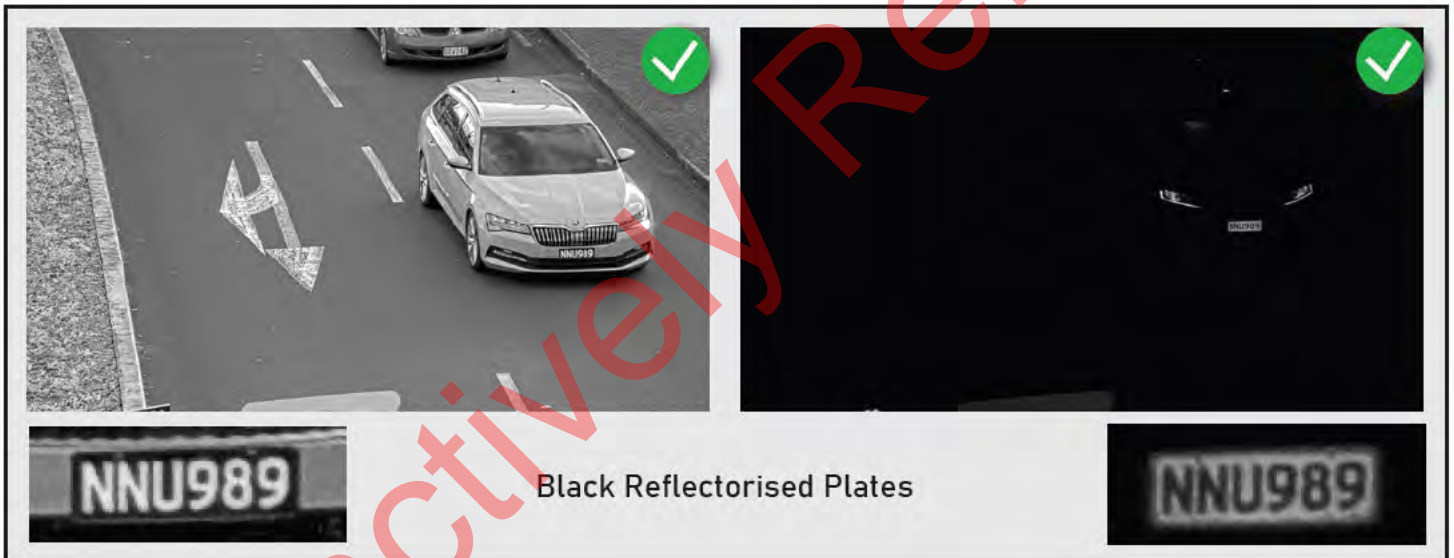
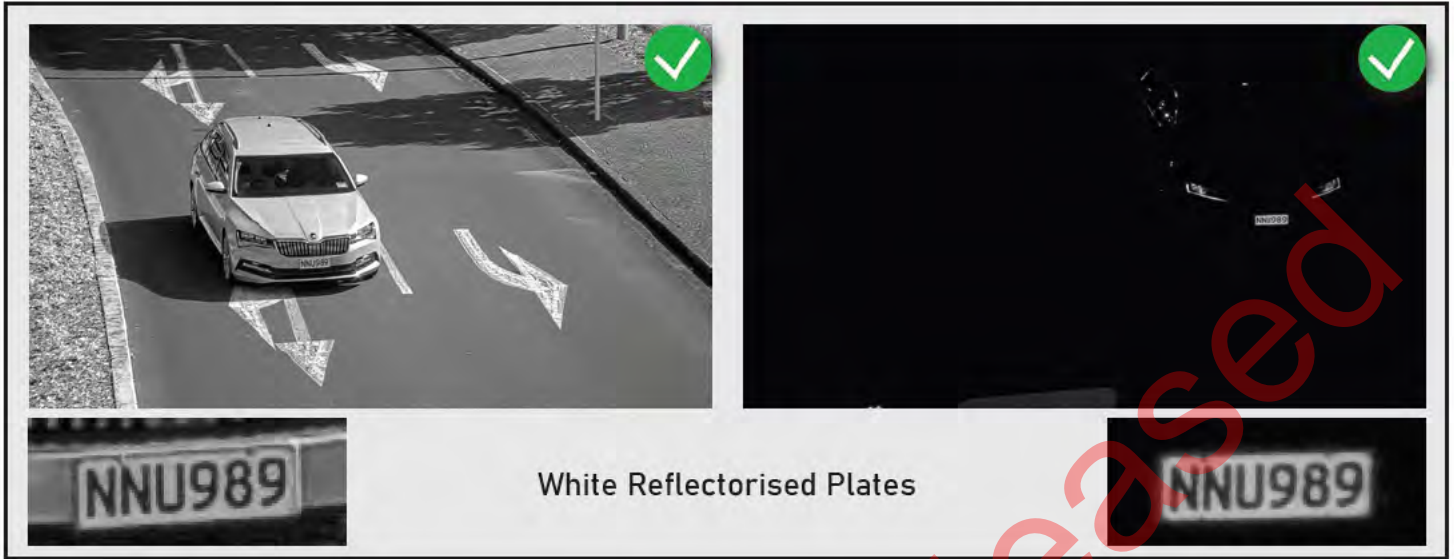
Daytime

Nighttime



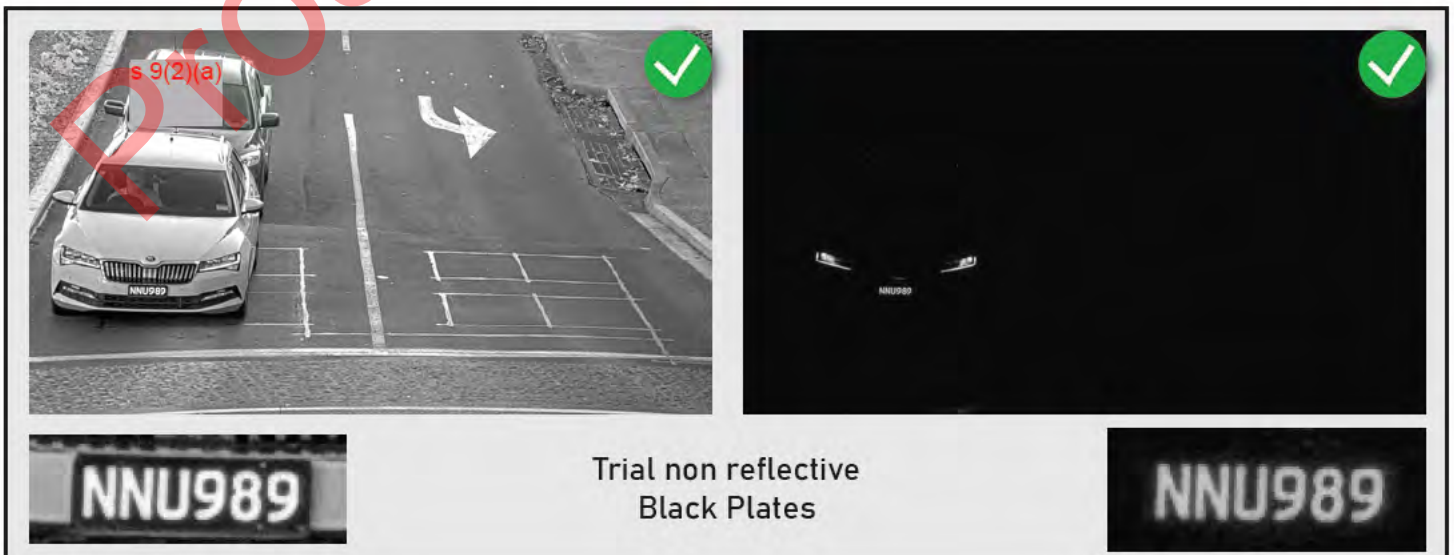
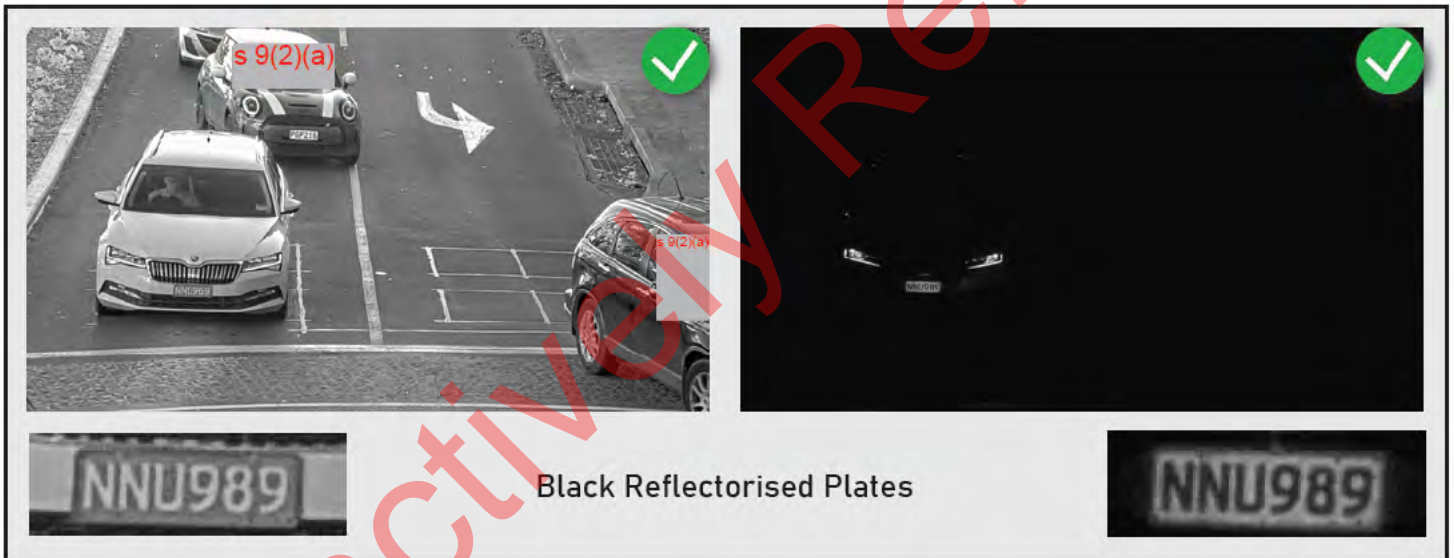
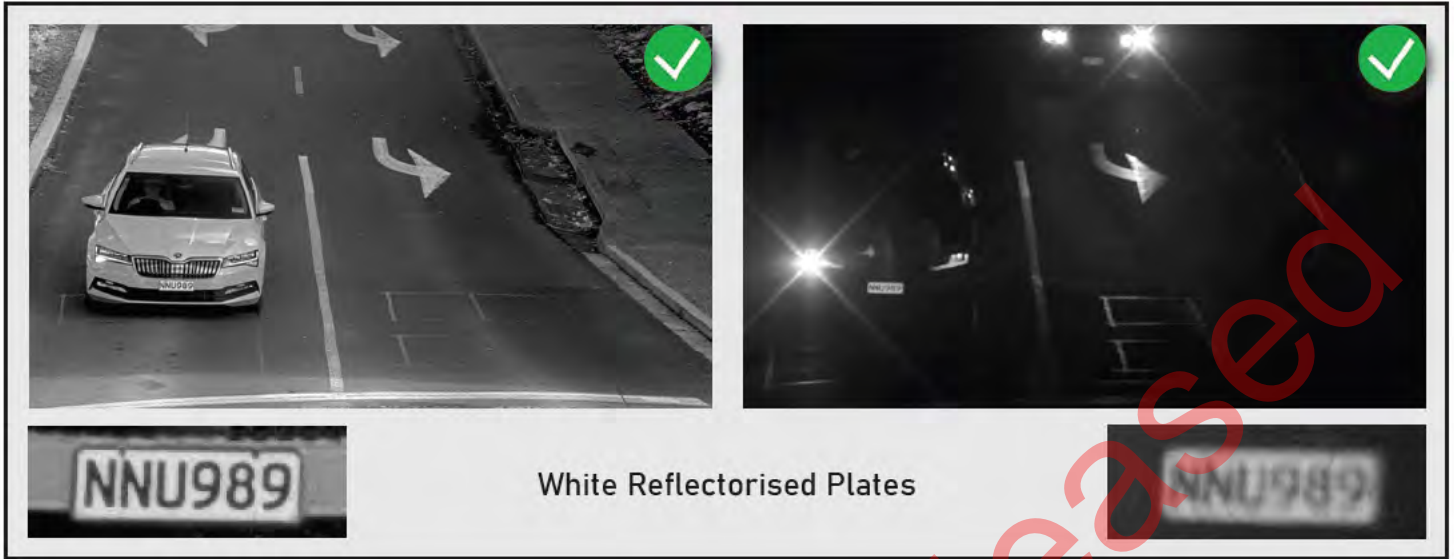
Daytime

Nighttime



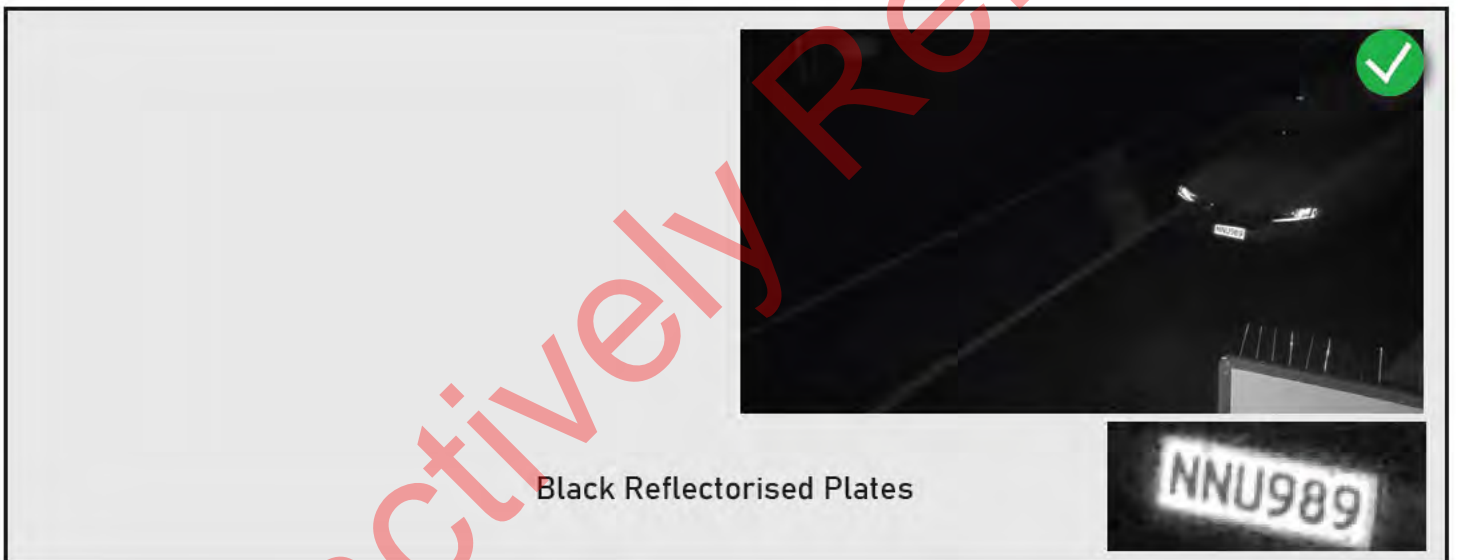
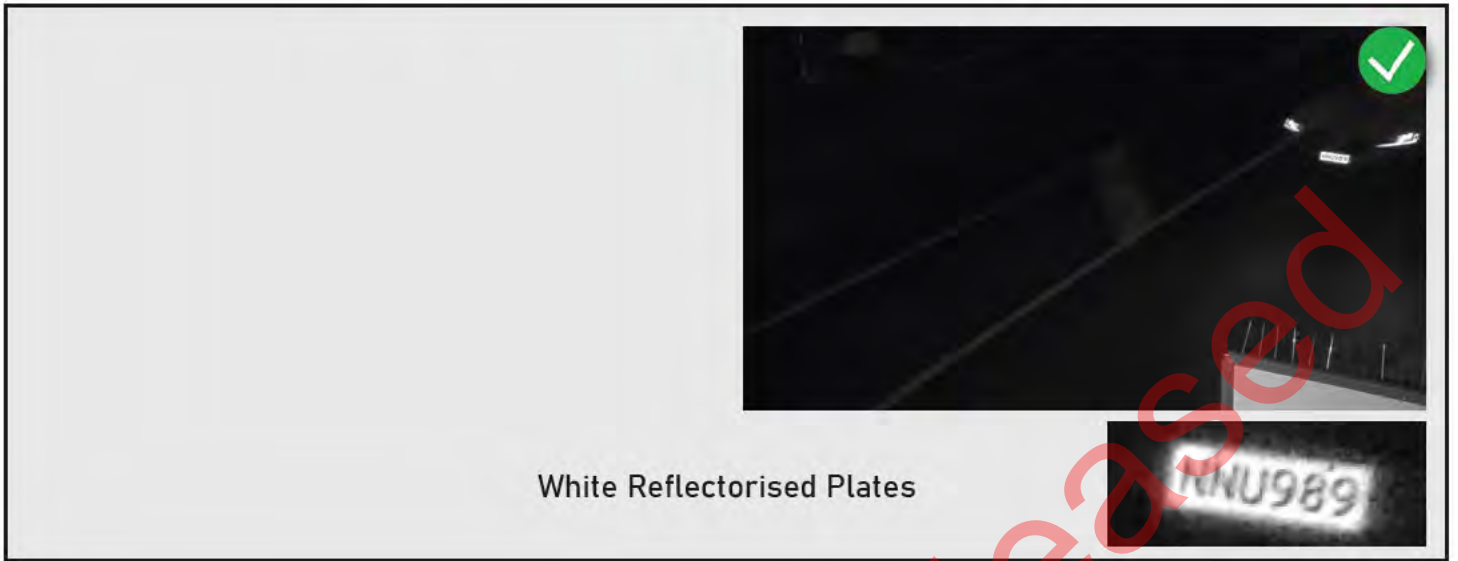
Daytime

Nighttime



Daytime

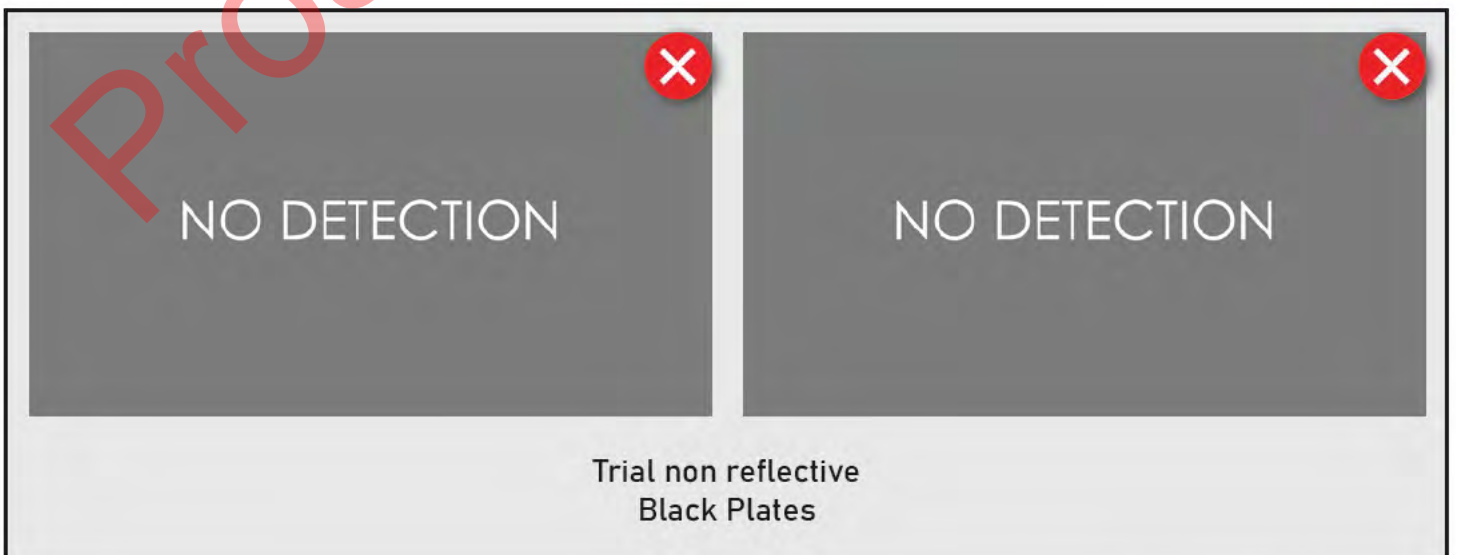
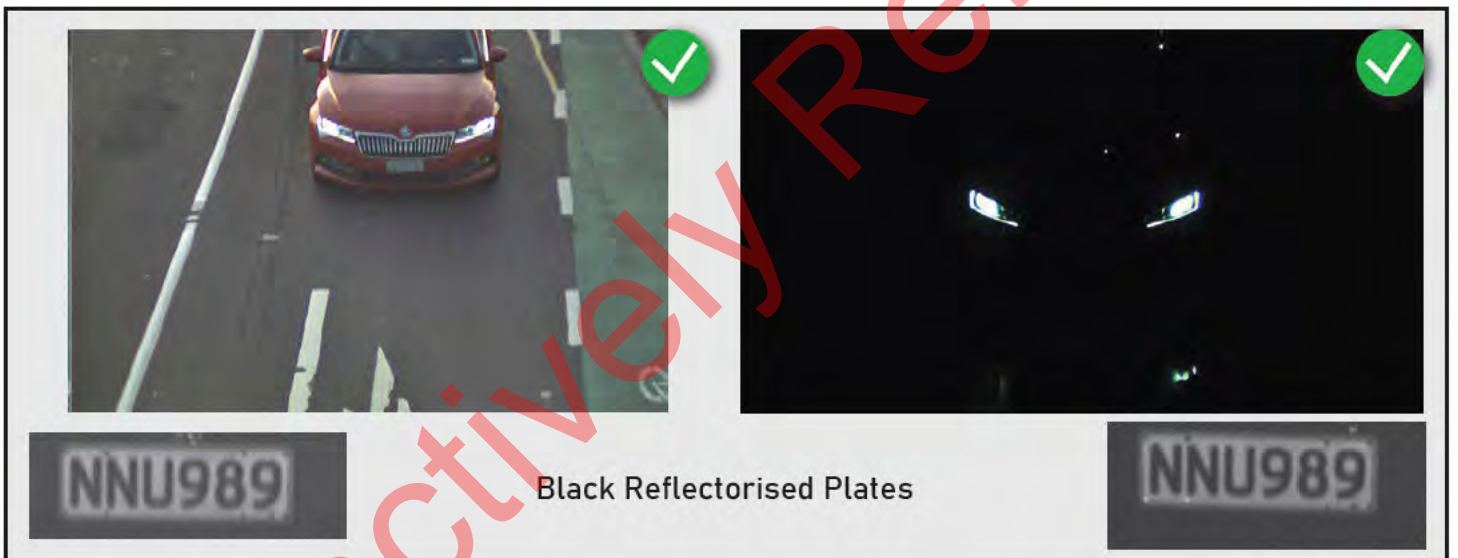
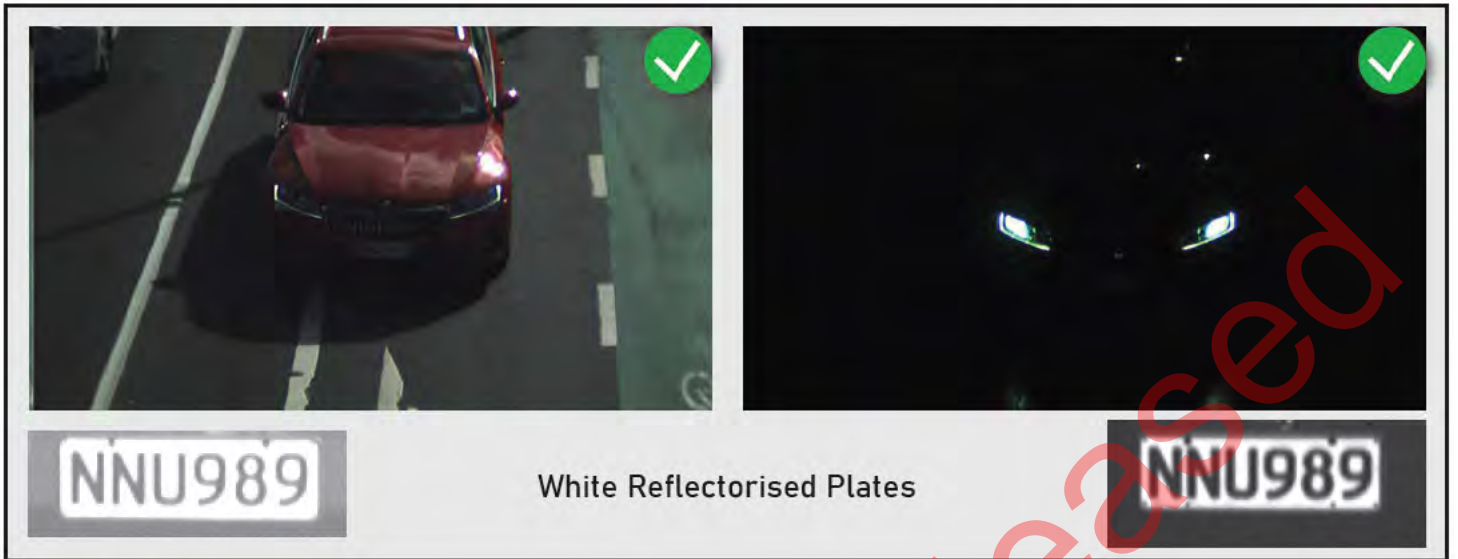
Nighttime







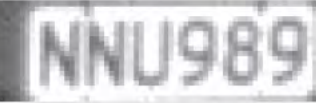

Daytime

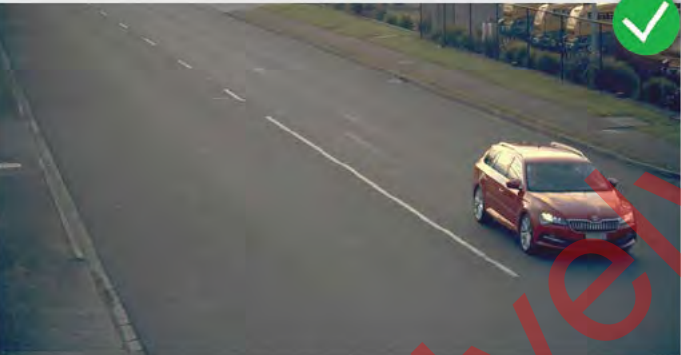

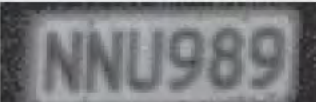
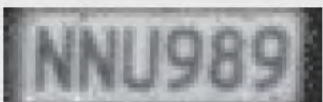
Nighttime

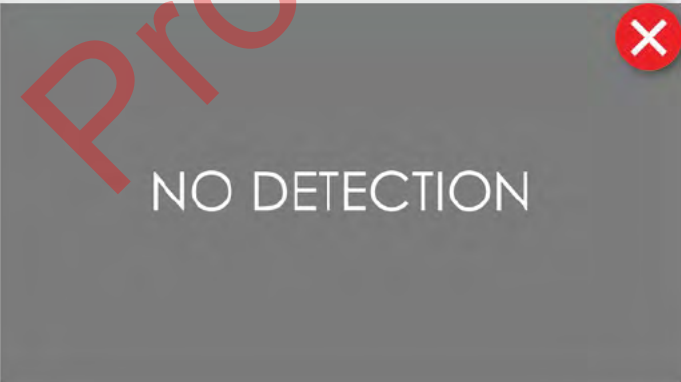


Daytime

Nighttime





		
	White Reflectorised Plates	

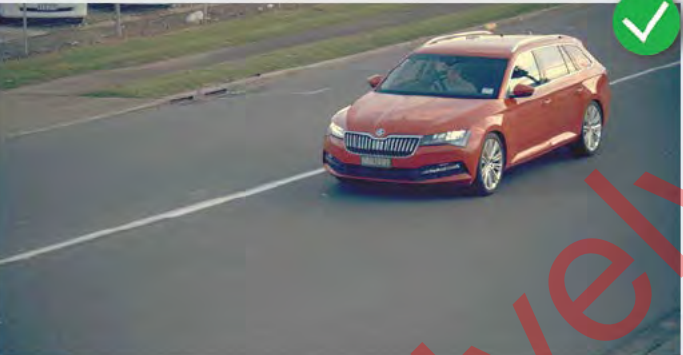

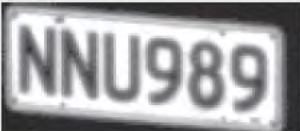
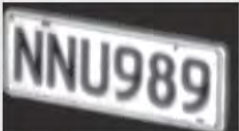
		
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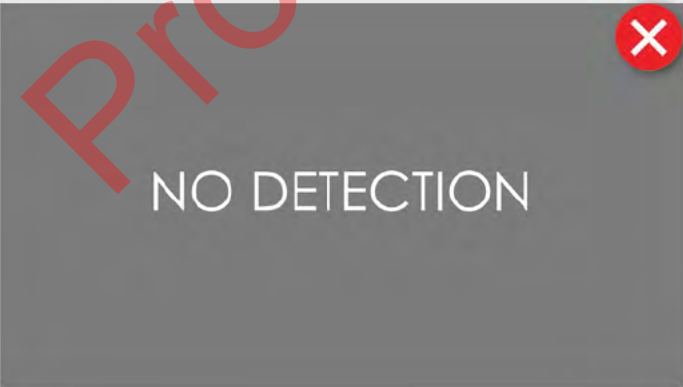
		
Trial non reflective Black Plates		

Daytime

Nighttime



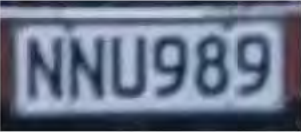

	
	
<p>White Reflectorised Plates</p>	



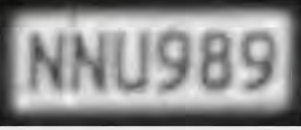
	
	
<p>Black Reflectorised Plates</p>	

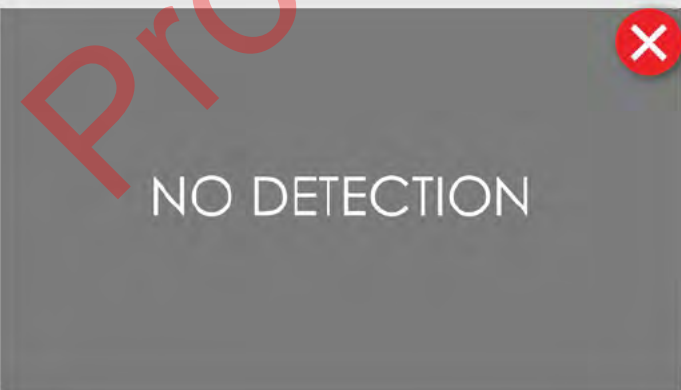

	
<p>Trial non reflective Black Plates</p>	

Daytime

Nighttime

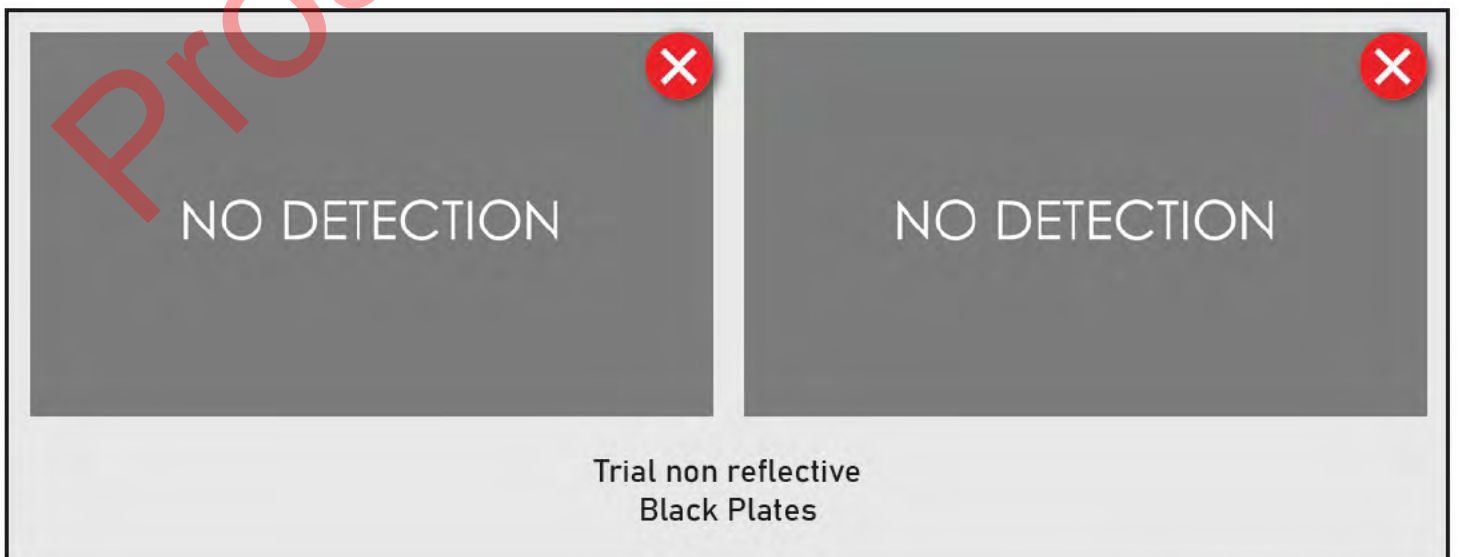
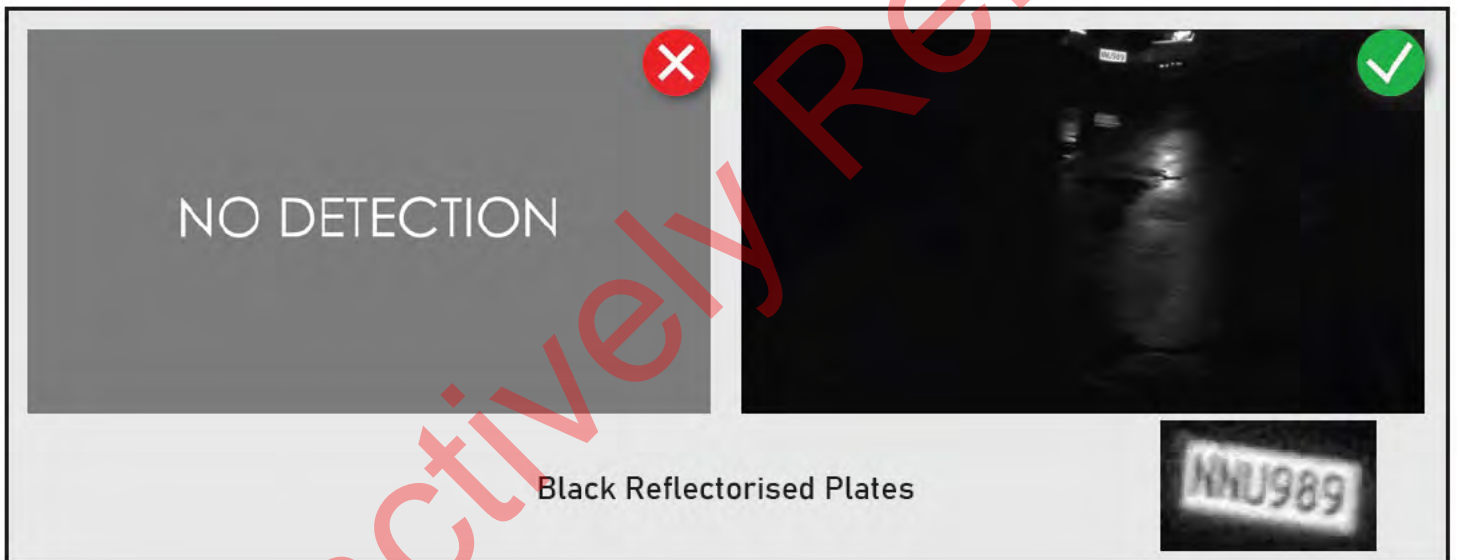
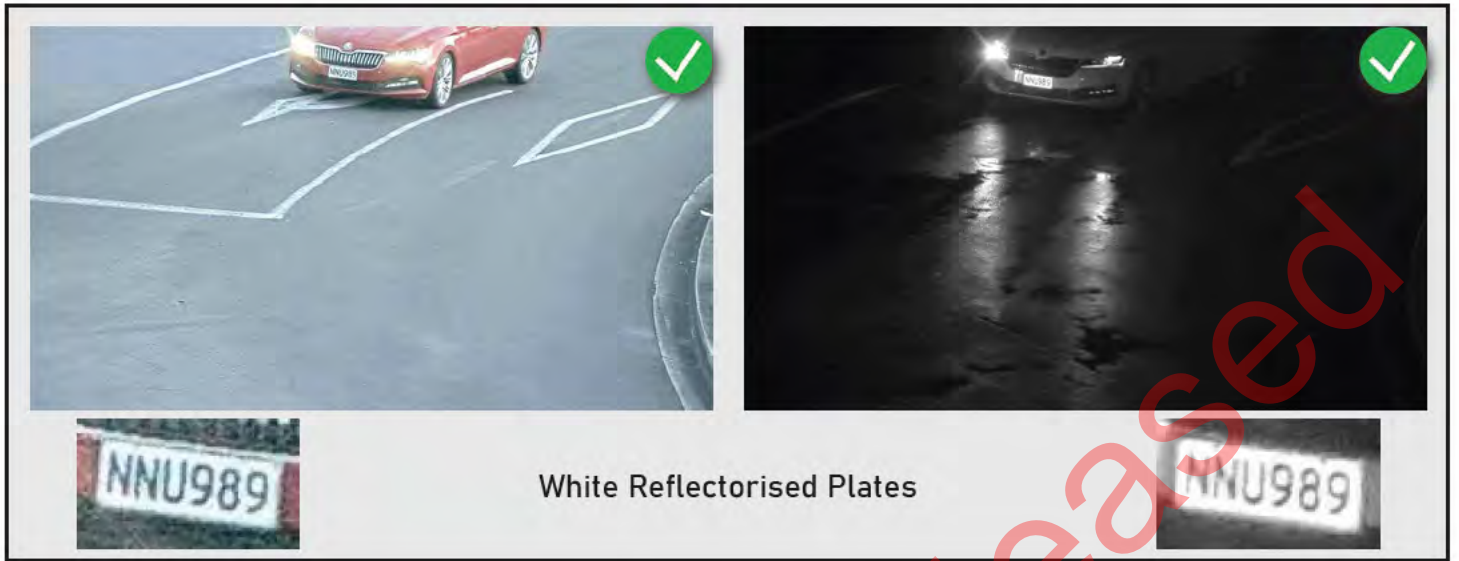
	
	
<p>White Reflectorised Plates</p>	

	
<p>Black Reflectorised Plates</p>	
	

	
<p>Trial non reflective Black Plates</p>	

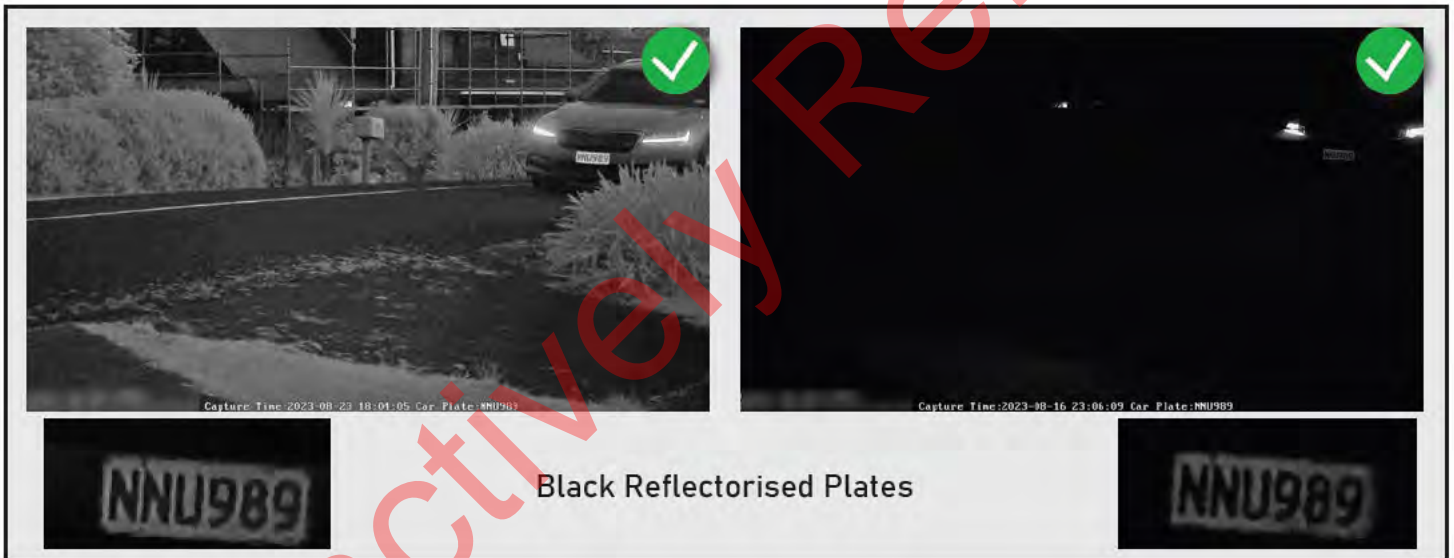
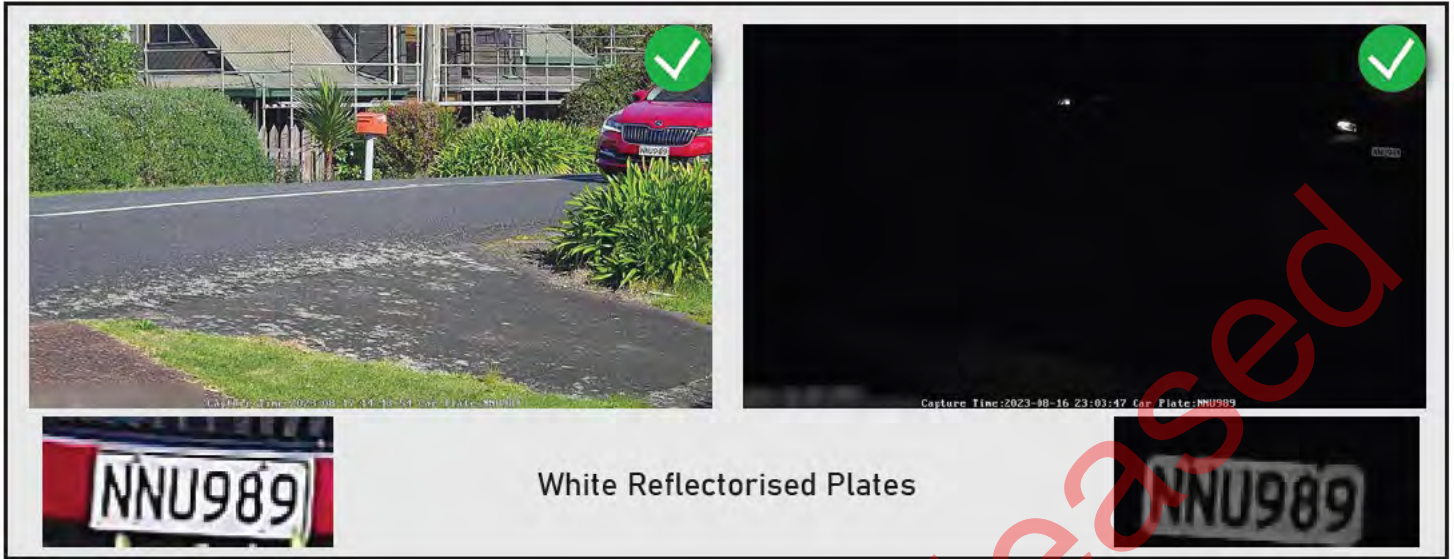
Daytime

Nighttime







Daytime

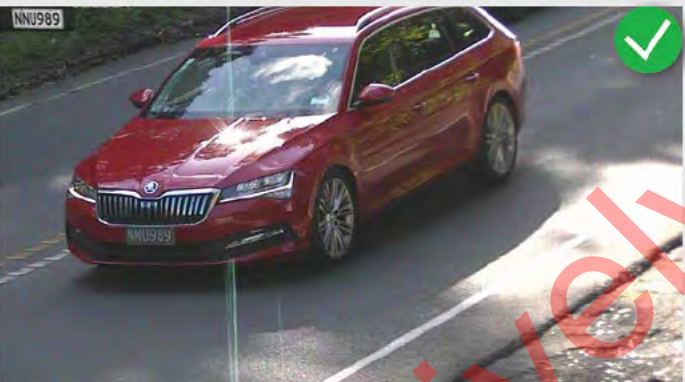
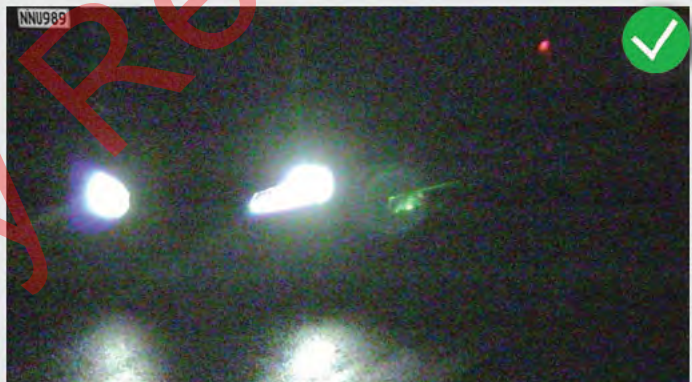
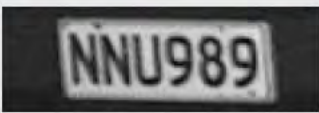
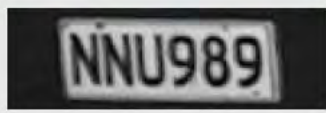
Nighttime

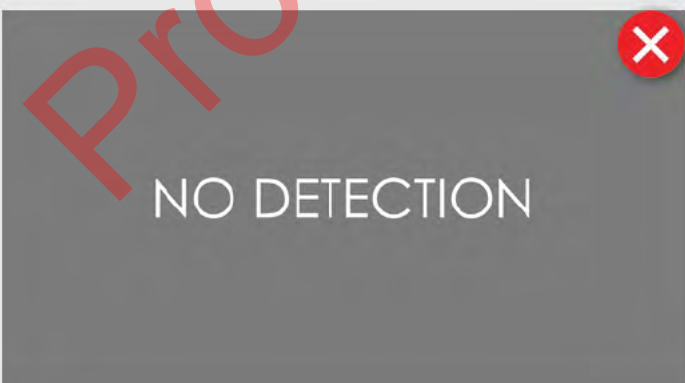



Daytime

Nighttime


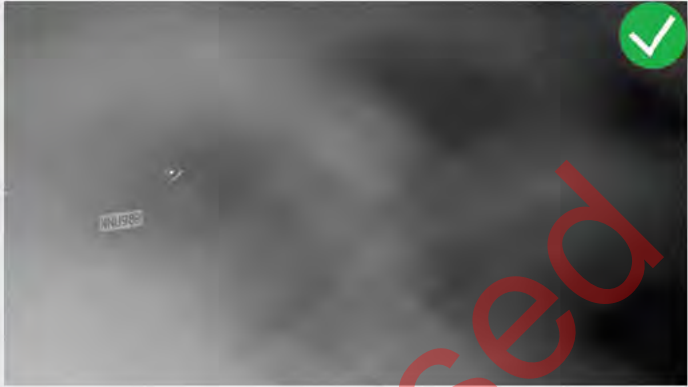
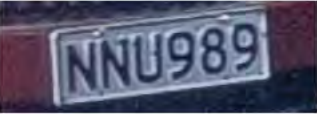
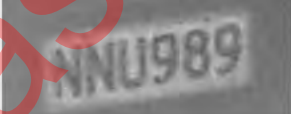
	
	
<p>White Reflectorised Plates</p>	


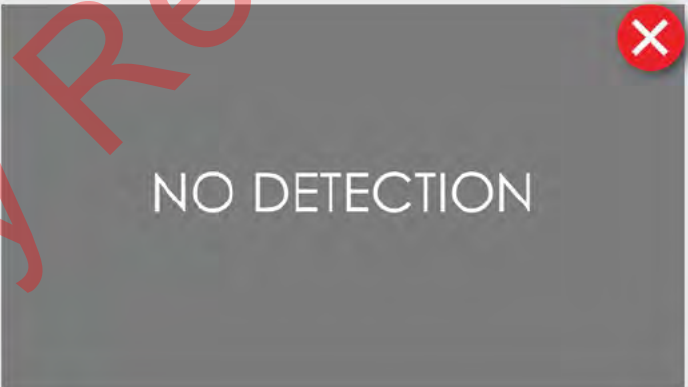

	
	
<p>Black Reflectorised Plates</p>	

	
<p>Trial non reflective Black Plates</p>	

Daytime

Nighttime

	
	
<p>White Reflectorised Plates</p>	

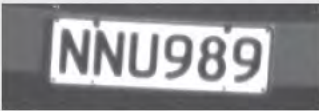
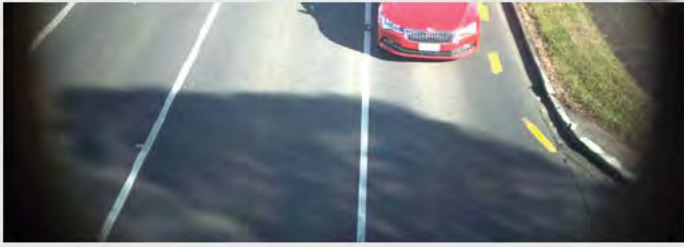
	
	
<p>Black Reflectorised Plates</p>	

	
	
<p>Trial non reflective Black Plates</p>	

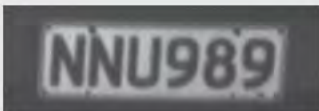


Daytime

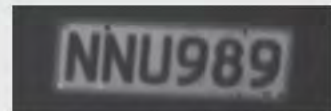
Nighttime



White Reflectorised Plates



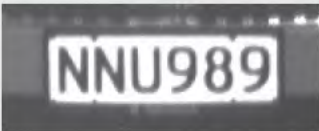
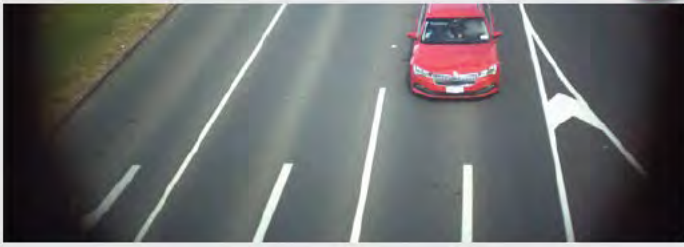
Black Reflectorised Plates



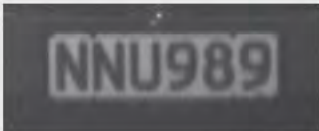
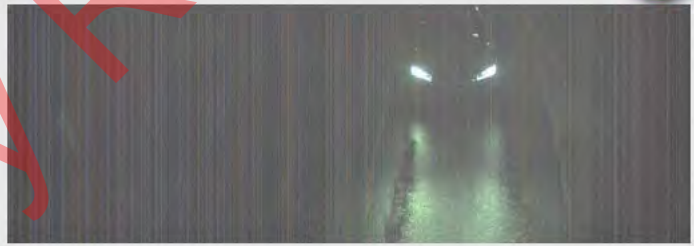
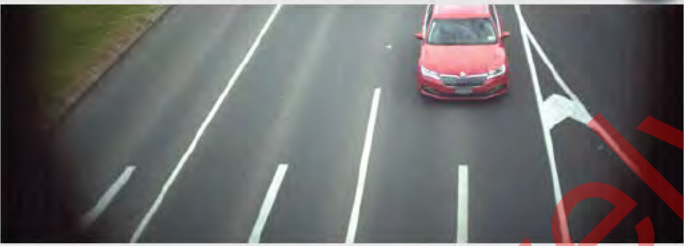
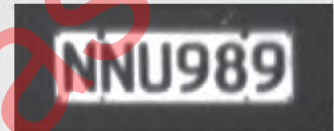
Trial non reflective  
Black Plates

Daytime

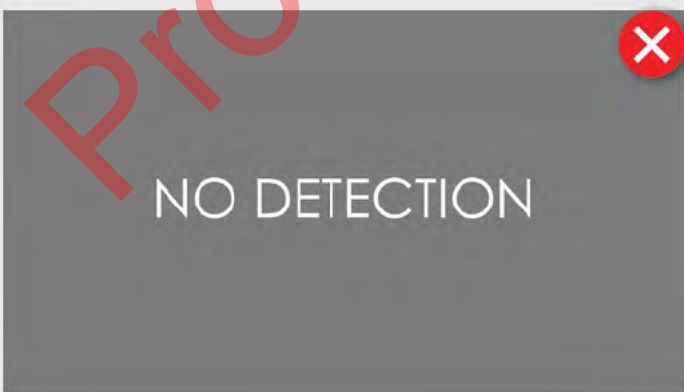
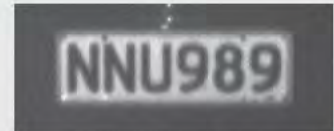
Nighttime



White Reflectorised Plates



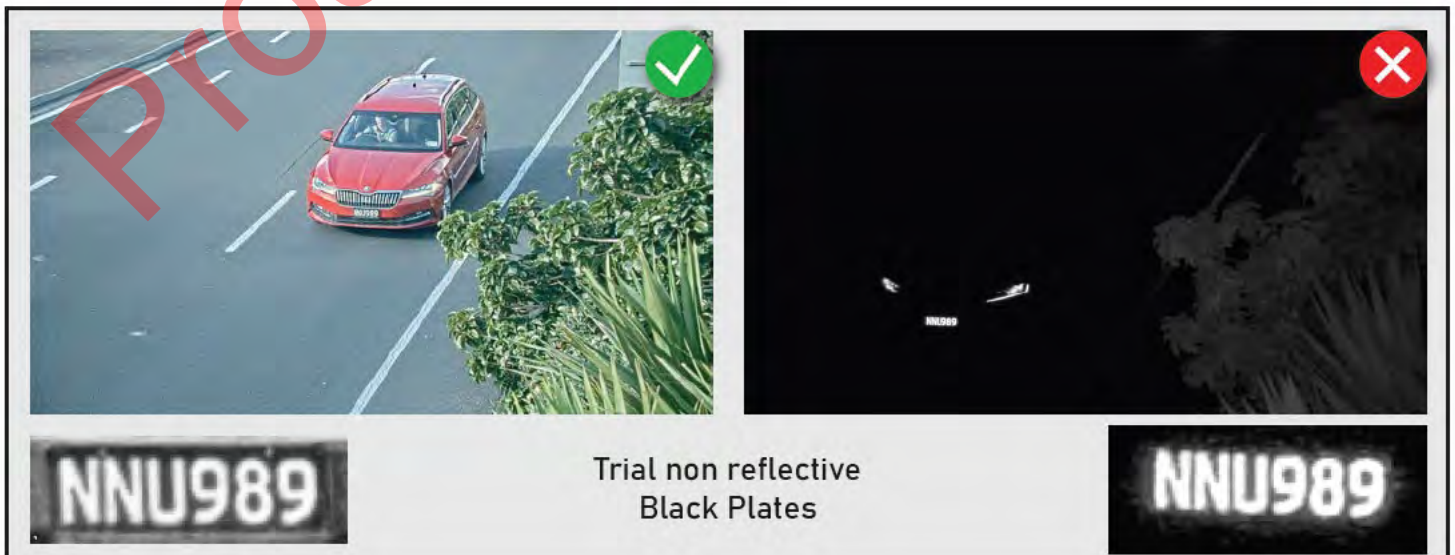
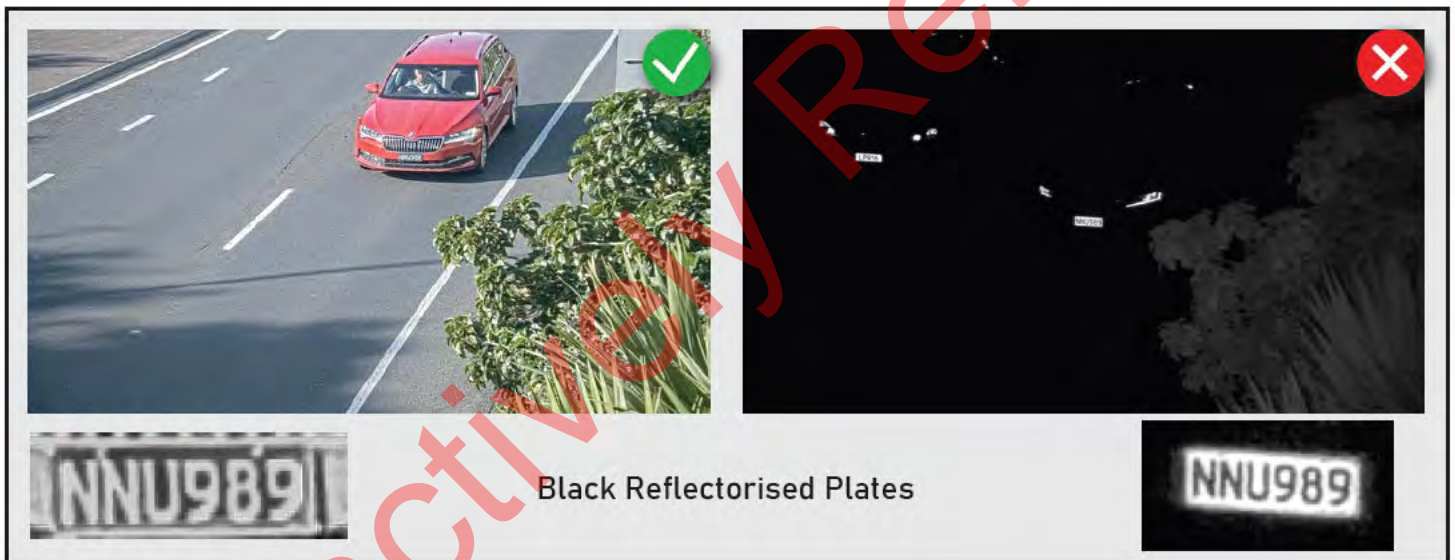
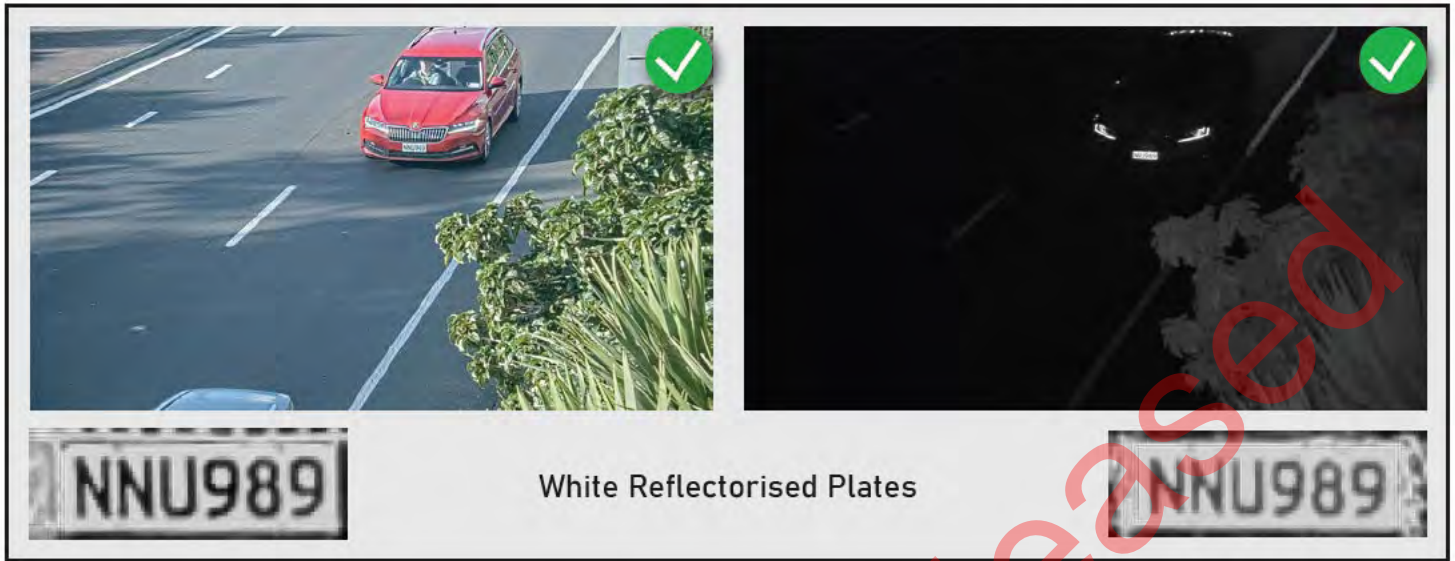
Black Reflectorised Plates



Trial non reflective  
Black Plates

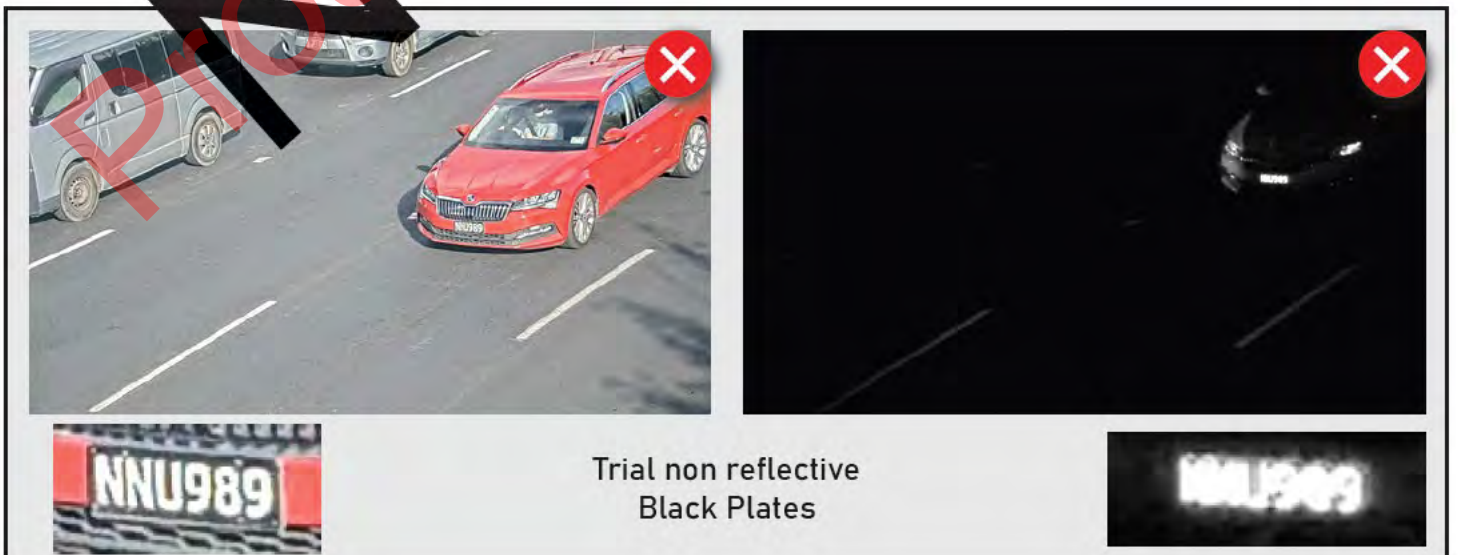
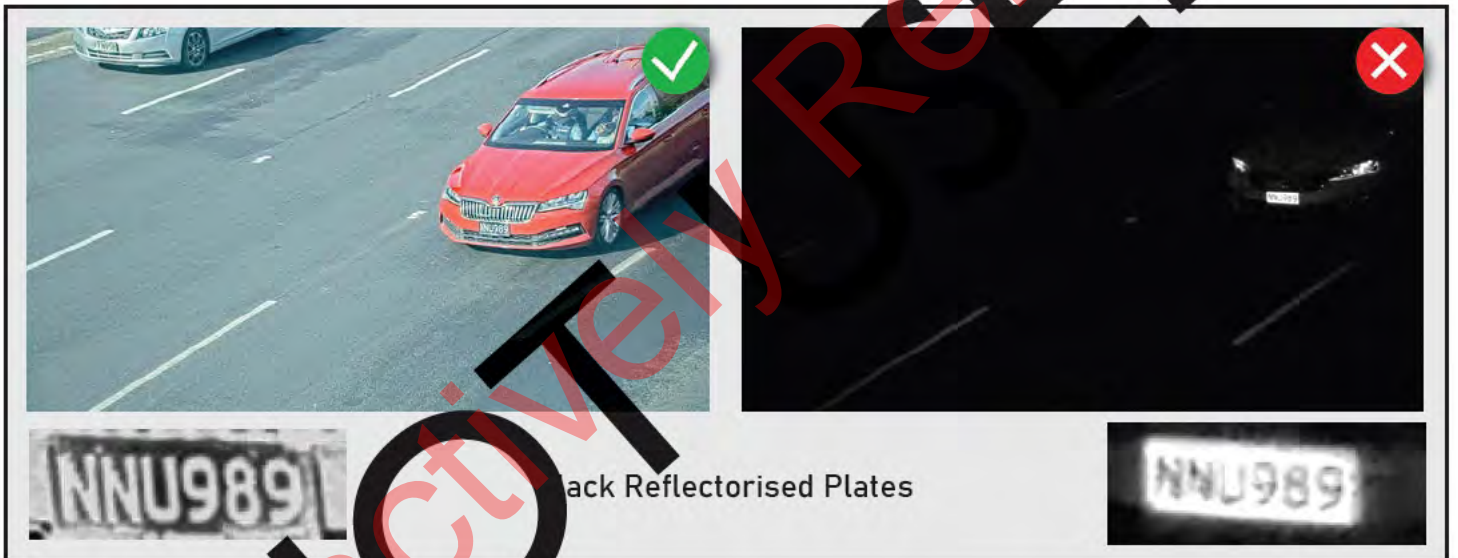
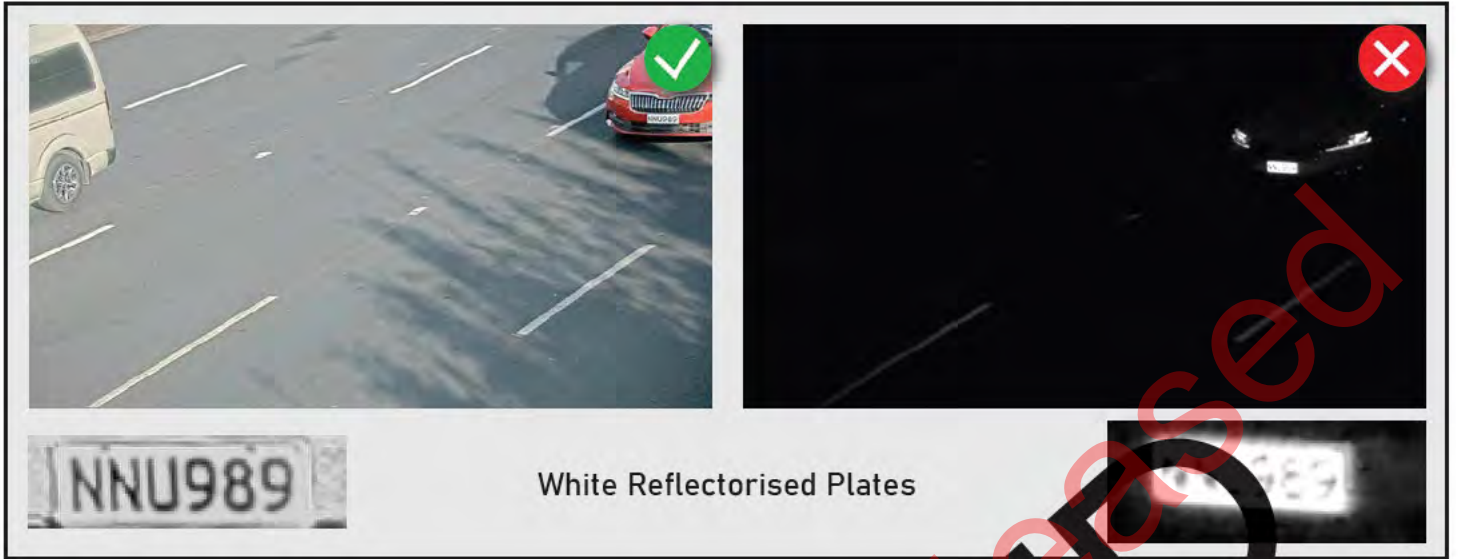
Daytime

Nighttime



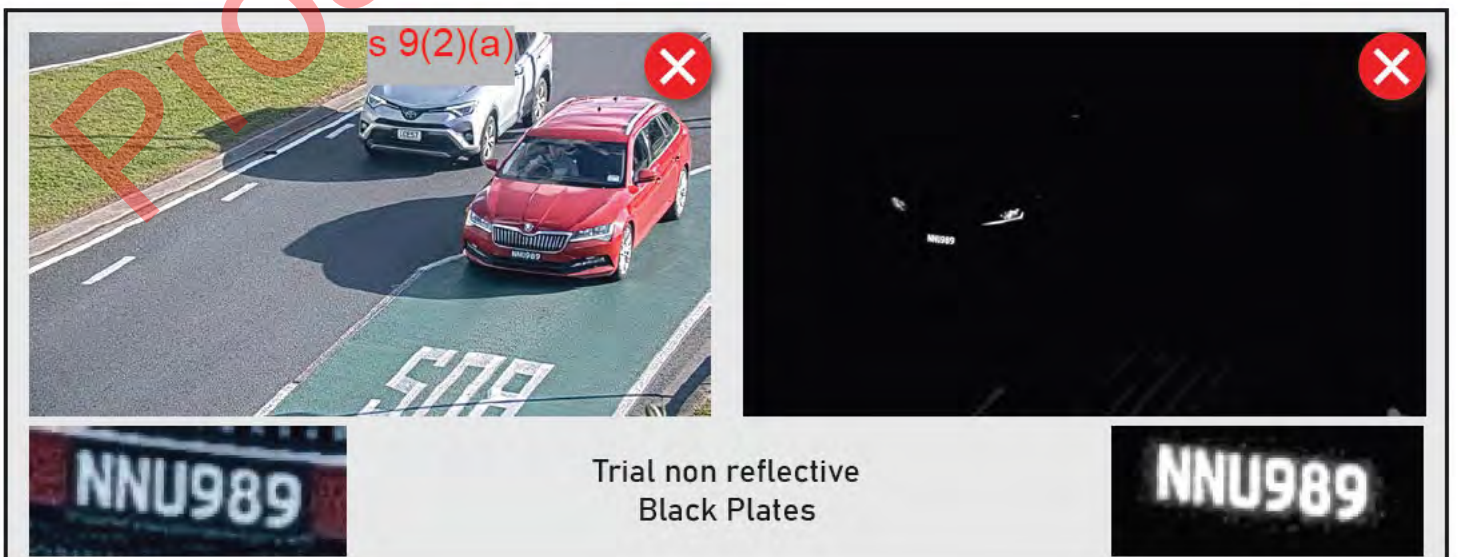
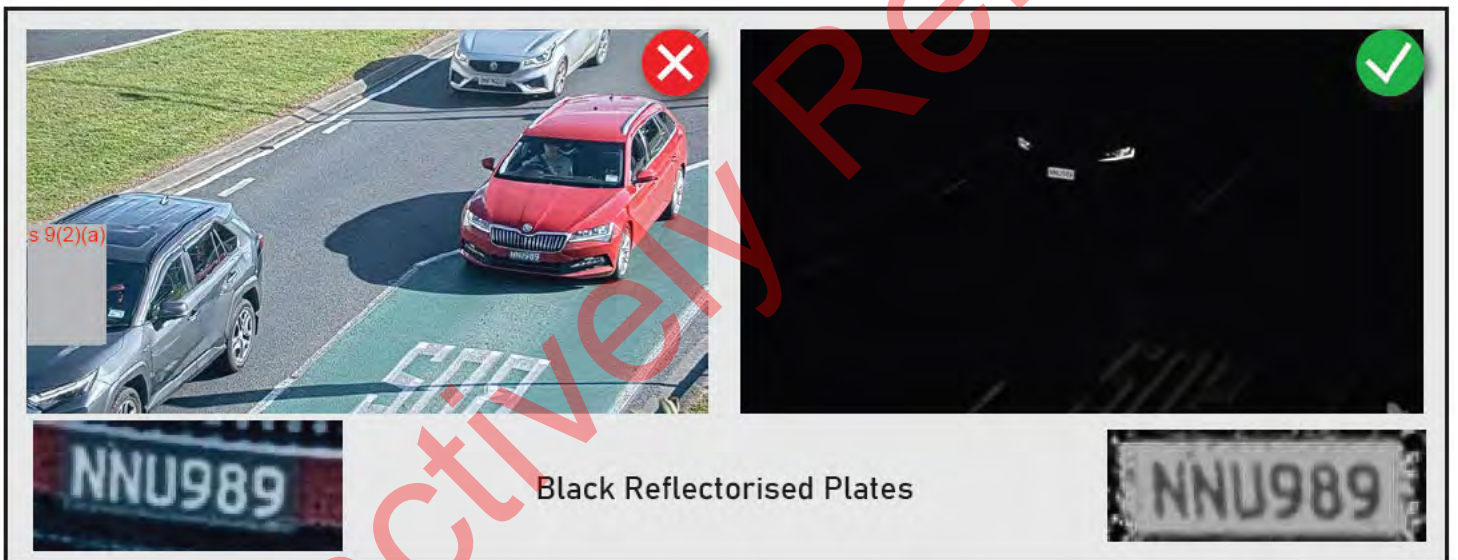
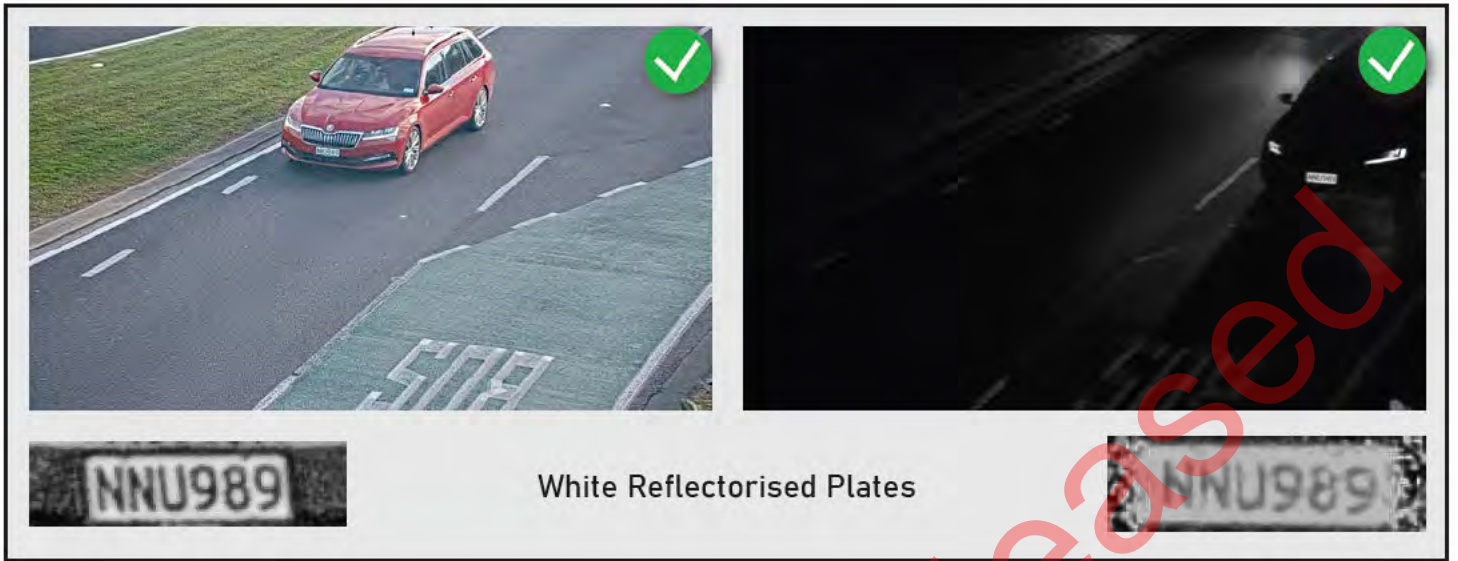
Daytime

Nighttime



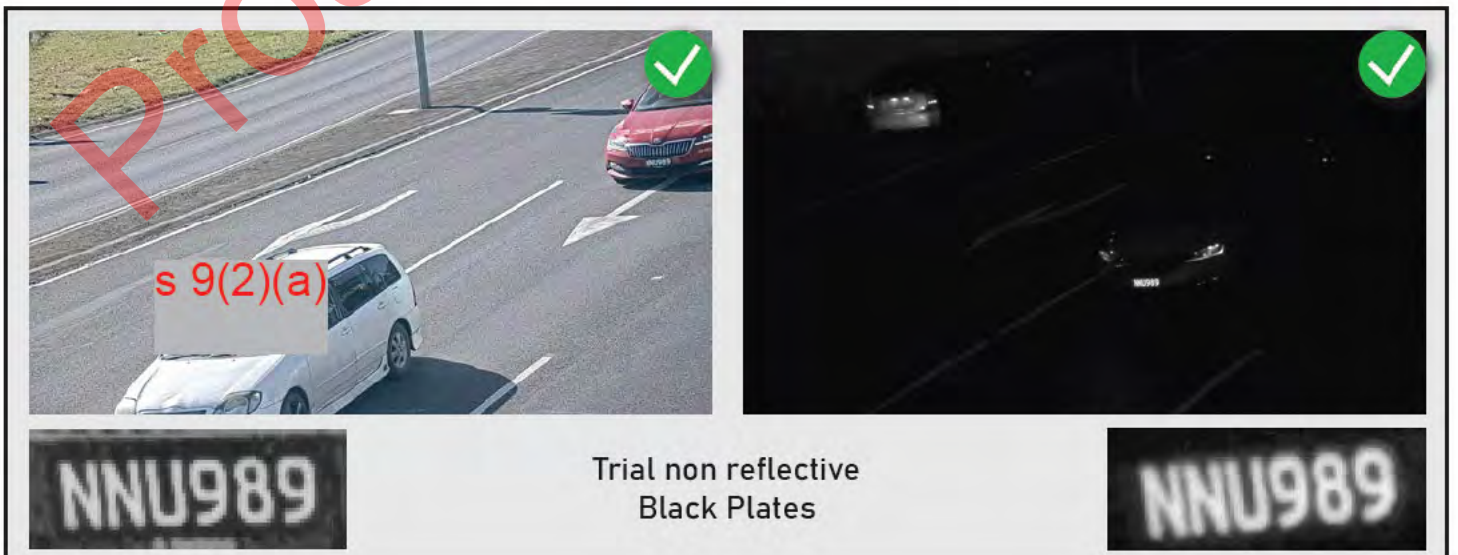
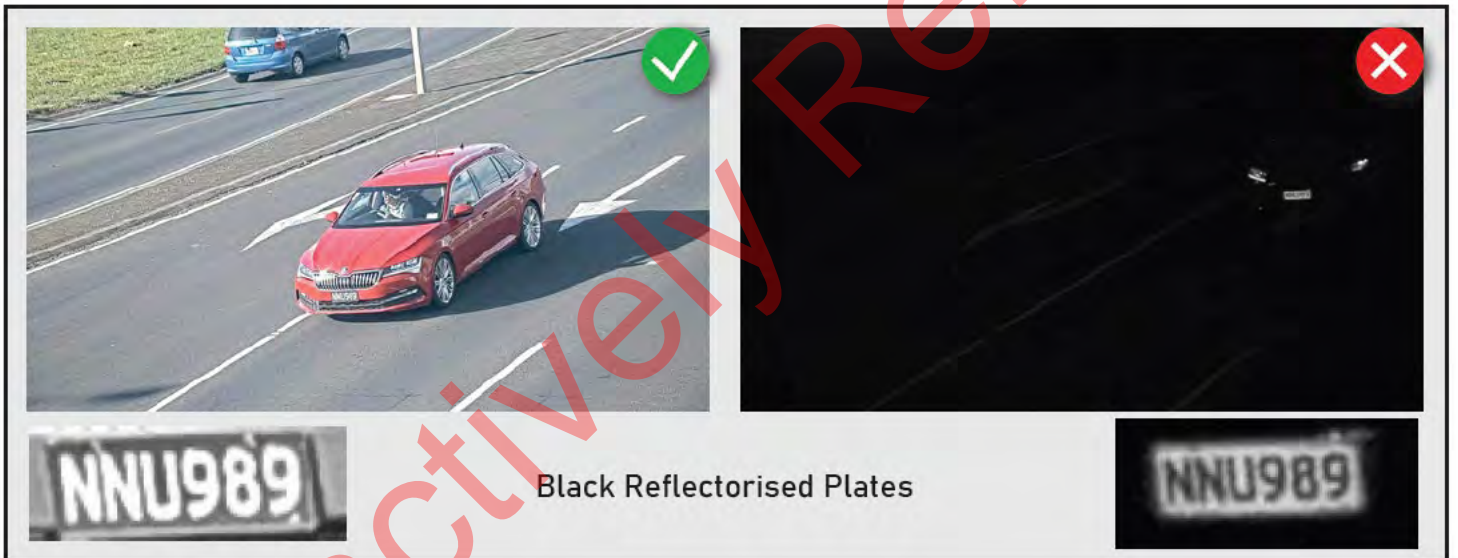
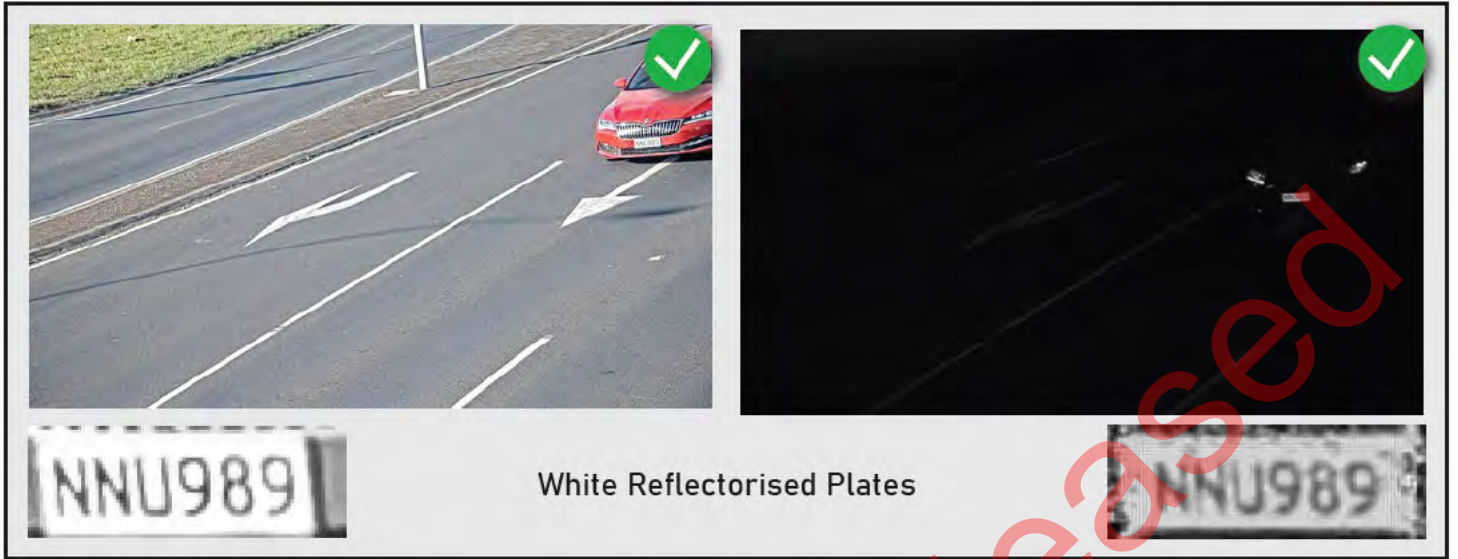
Daytime

Nighttime



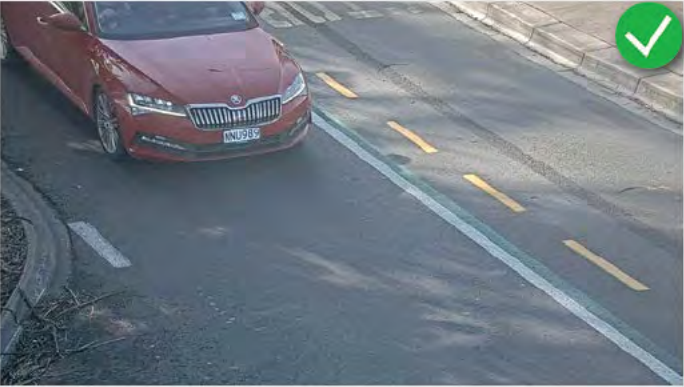



Daytime

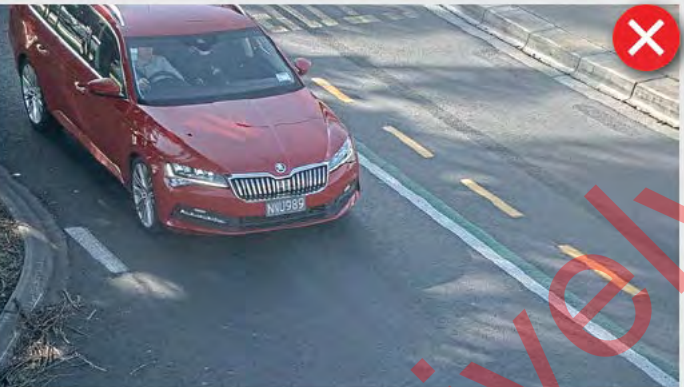


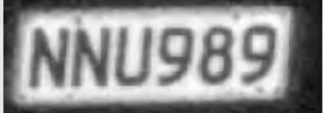
Nighttime


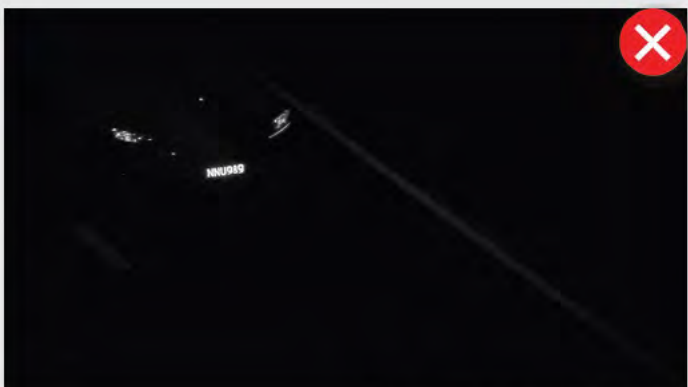
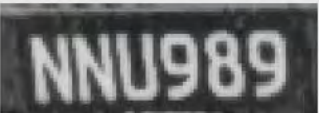



Daytime

Nighttime

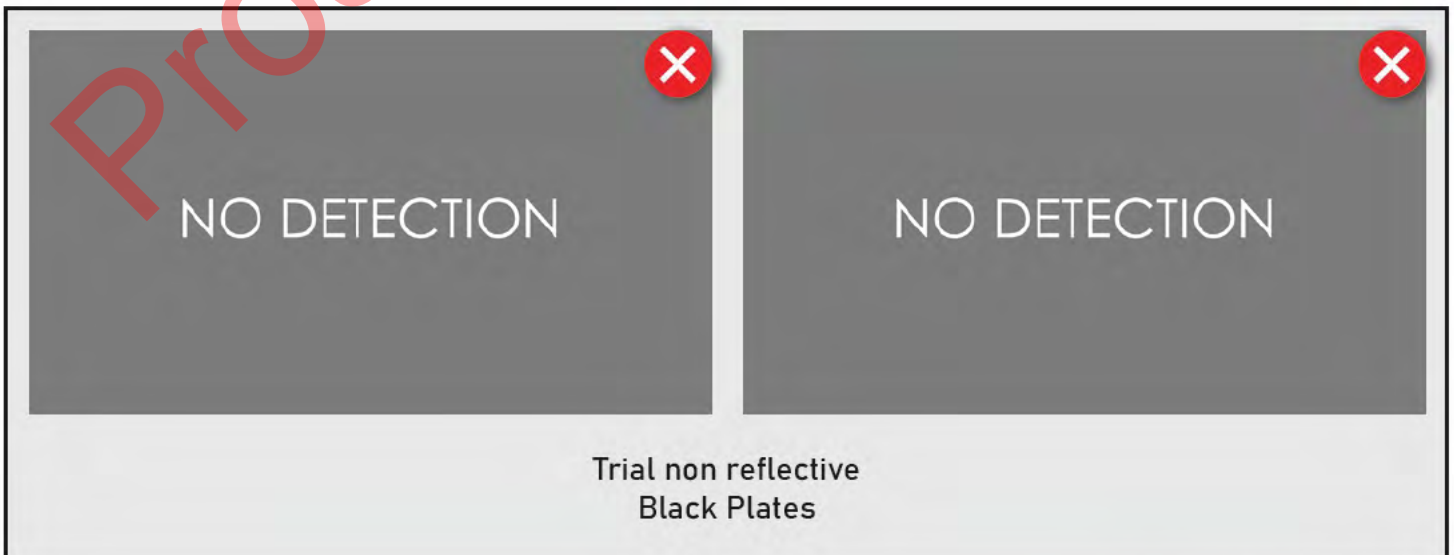
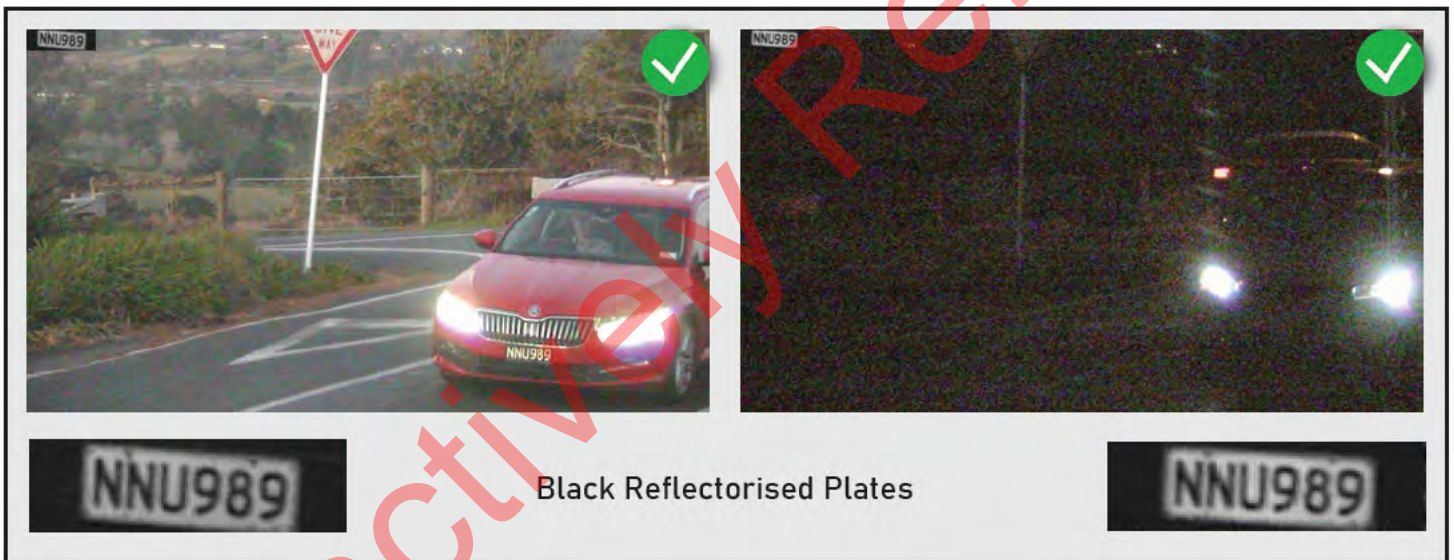
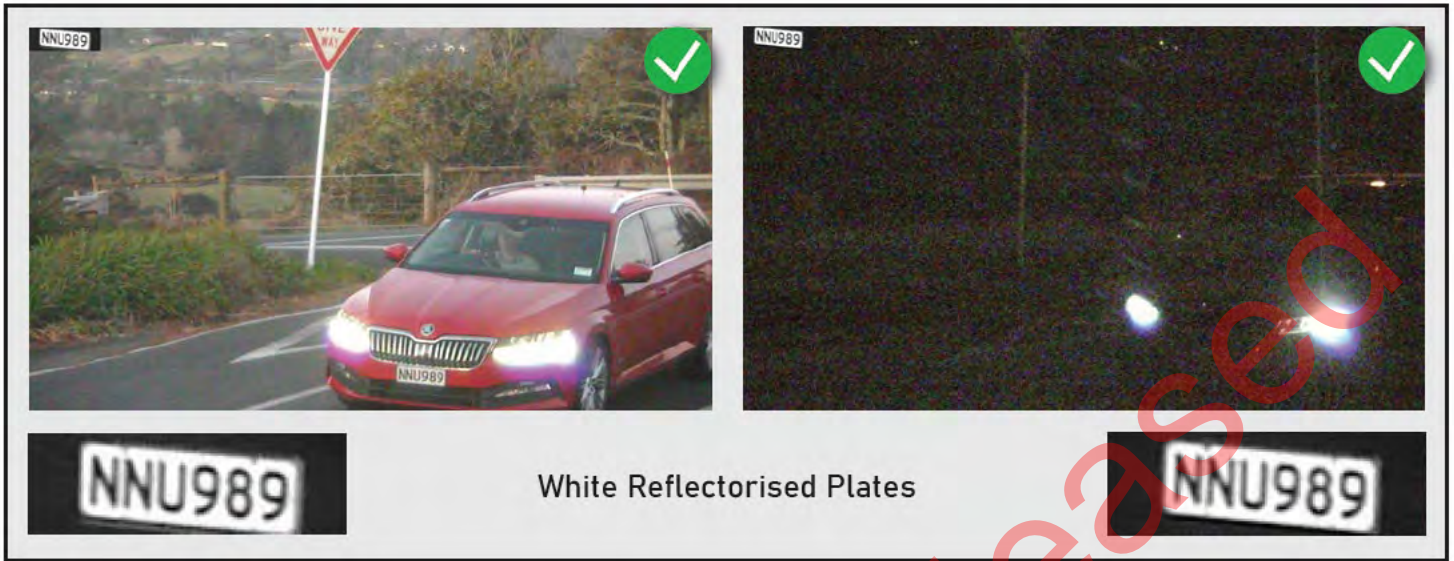
	
	
<p>White Reflectorised Plates</p>	

	
	
<p>Black Reflectorised Plates</p>	

	
	
<p>Trial non reflective Black Plates</p>	

Daytime

Nighttime





s 9(2)(b)(ii)

Proactively Released

# Land Transport (Motor Vehicle Registration and Licensing) Regulations 2011

## *Display of registration plates*

### **39 Display of ordinary plates**

- (1) Ordinary plates must be displayed as set out in this regulation.
- (2) In the case of a motorcycle, moped, tractor, or trailer, 1 plate must be securely affixed in an upright position on the rear of the motorcycle, moped, tractor, or trailer and displayed so that the unique identifier on the plate is easily visible at all times from the rear of the motorcycle, moped, tractor, or trailer.
- (3) In the case of any other kind of motor vehicle, 1 plate must be displayed on the front of the motor vehicle and 1 plate must be displayed on the rear of the motor vehicle, and both plates must be securely affixed in an upright position and displayed so that the unique identifier on the plate is easily visible at all times,—
  - (a) in the case of the front plate, from the front of the motor vehicle;
  - (b) in the case of the rear plate, from the rear of the motor vehicle.
- (4) Despite anything in subclause (2), the Registrar may impose any other requirements in respect of the position and manner of display of registration plates.
- (5) An instrument imposing requirements is secondary legislation (*see Part 3* of the Legislation Act 2019 for publication requirements), unless it relates only to 1 or more individually identified motor vehicles or named persons.

Compare: SR 1995/136 [cl 6](#)

### **40 Display of personalised plates**

Personalised plates must be displayed in the same manner as ordinary plates.

Compare: SR 1995/136 [cl 6](#)

## Black Plates – Options Table (5 Dec 2023)

Option	Description	Legal basis	Assessment				Financial implications	Nett effect
			Safety impacts	Our reputation	Stakeholders	unaddressed Risks		
1	Status quo: trust incremental improvements to ANPR, camera and tolling systems. Assumes our plates and our automated systems are same as NSW.	No change required. Develop and redeploy using current requirements.	✗ action against a small number of vehicles will not proceed	✓ low impact	✗✗ Police will be disappointed, but Kiwiplates satisfied	Will not address recognition by eye.  Still leaves a mess re: r40/39	✗ development of camera/ANPR enhancements and roll out.	✗✗ ✗
2 (Preferred option)	Enhanced status quo: develop and approve a new, readable plate (non-reflective) and once achieved replace existing approval and issue new plates from there leaving existing plates in circulation	Use existing approval powers in regulations on new plates and apply common law principals to revoke existing approval in due course. As we are not forcing surrender of existing plates in use no legal issues arise.	✗ as above but number of potential vehicles larger than in 1	✓✓ impact minimal.	✗✗ Police will be disappointed at delay, but Kiwiplates (and its customers) will be satisfied due to low disruption	Will not address recognition by eye.  Still leaves a mess re: r40/39 but assuming we get a new plate this will be lesser than 1.  We need to develop a robust testing process (tri-party approach)	✓ development and application of new testing regime but offset by little likelihood of compensation claims nor legal challenges	-----
3	Suspend and allow existing plates to be used: remove approval, leave existing plates in use. Restart black plates when readability issues are sorted.	Use existing approval powers in regulations for new plates and apply common law principals to revoke existing approval in due course	✗ as above	✓✓ some risk if there is a delay in approving new plate	✗✗ Police will be less disappointed, but Kiwiplates will be unsatisfied if there is a delay between	Will not address recognition by eye. Still leaves a mess re: r40/39. Also if there is a sizable delay between suspending existing approval and new approval Kiwiplates	✓ assuming time delay between approvals is minimal so little or no disruption to Kiwiplates business.	-----

				×	suspension of existing approval and new approval	may seek compensation	××	
4	Suspend and forced surrender of existing plates: remove approval and collect back and replace all current black plates with new readable ones, don't issue new plates until readability problems addressed	Use existing approval powers in regulations for new plates and apply common law principals to revoke existing approval in due course. Claim existing plates back on basis they are non-compliant with r.39/40 (note this could only be a voluntary act on the plate holders part hence the need to offer compliant plates in substitute)	✓✓ reduce likelihood of unreadable plates in use. Principled approach	× this will generate	✓ Police should support, will be very disruptive to Kiwi plates and plate holders	As above. If delay between approvals then as well as likely Kiwi plates compensation claims may be legal challenges from plate holders forced to surrender plates.	× likely compensation claims and replacement costs alone could be in vicinity of \$10-\$12M.	×

Symbol	meaning	Symbol	meaning
✓	Minor positive impact	×	Minor negative impact
✓✓	Medium positive impact	××	Medium negative impact
✓✓✓	Major positive impact	×××	Major negative impact