

## Protecting Road Users against Wrong Way Drivers

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### Abstract

Wrong Way Driving (WWD) occurs when a driver either inadvertently or deliberately drives against the traffic flow. On a divided road, particularly motorways and expressways, WWD results in a serious safety risk due to the high speeds that tend to be involved when a collision occurs. Despite being a serious international phenomenon, it has typically been viewed as being in the too difficult basket to try and resolve and hence appears to have been largely left unaddressed. The Auckland Motorway Alliance (AMA) started from first principles to bring together a multi-Agency and multi-disciplinary team to develop tools and systems to target this issue.

### Background.

The need for protecting against WWD was clearly recognised through the number of deaths and serious injuries sustained on the Auckland Motorway network and the exposure that our road workers are placed in due to breaches of work sites.

WWD can typically be categorised into three broad groups:

- Unintentional - where the driver has been momentarily distracted or confused.
- Impaired - a driver with alcohol, drugs (including prescription), age or medical impairment.
- Deliberate - typically in an attempt to evade police.

The drivers in each of these three categories all display different driver behaviour, meaning each potentially requires a different treatment solution. This exacerbates the challenge of developing a treatment solution to prevent drivers making that initial mistake or deliberate choice and providing protection for all road users, including the wrong way driver.

We note a high risk group are those with age related impairments. Our experience has seen 50% of WWD fatalities caused by old age related impairments. This user group is also over represented in Japan with respect to WWD. With an increase in aged driving it is reasonable to assume that the risks of wrong way driving will increase over time. Hence a need to act now.

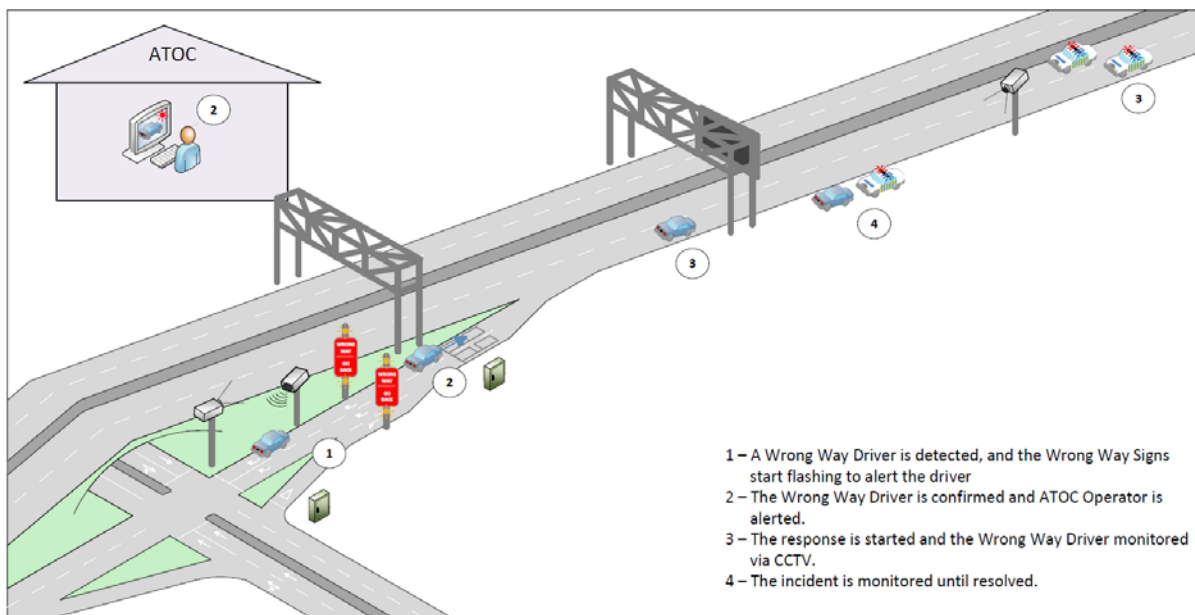
The AMA has developed and are implementing what we believe to be a complete safe system that:

- Firstly, reduces the likelihood of drivers making a mistake by modifying physical infrastructure at interchanges;
- Secondly, detects and provides an activated warning system to alert drivers, should they make a mistake allowing them to self-correct;
- Thirdly, provides early warning to the Auckland Traffic Operations Centre (ATOC) operators and response teams allowing faster resolution times and deployment of warning to other road users should the WWD proceed to the mainline, and;
- Finally, while it is only at conceptual stage, accommodates triggers for activating systems for the disabling of a vehicle should the above interventions be breached.

## Development of a System

During 2009/10, two low cost cameras that could detect and record wrong way driver movements were deployed. The cameras were used to test the concept and robustness of detection, while increasing the understanding of the frequency and cause of events.

Based on the trial, it was considered realistic to set a goal to build a robust and largely automated detection system that would activate warnings for the WWD and alert other motorists of pending danger and also provide ATOC with early warning of an arising situation.



**Figure 1. WWD Detection and Monitoring at Off Ramps**

To complement the detection, monitoring and warning systems, a range of physical works were also identified with the aim of preventing drivers making a mistake in the first place. Many of these are very simple, e.g. changing the solid green aspect on the traffic signals to a straight ahead arrow. This has resulted in 80-100% reduction WWD movements at the site we are presently monitoring. Other initiatives include changes to signage location and content to improve conspicuity and comprehension.

This project has also utilised military developed hardware in the form of the X-Net, in what is a world first application in terms of protecting road work sites against WWD.

This paper will provide an overview of this project, exploring the drivers, their behaviors, treatment options and development, the limitations and successes and system that is presently being deployed across the Auckland Motorway network.