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Dear Mr Hale

8 July 2016

David Hale

Committee Manager

Macquarie Street

Sydney NSW 2000

Parliament of New South Wales

Staysafe (Joint Standing Committee on Road Safety)

RE: Inquiry into Driverless Vehicles and Road Safety in NSW (ref D16/20760)

Thank you for the opportunity to appear before the Joint Standing Committee on Road Safety (Staysafe).

I have no corrections to the transcript. Please find below responses to the Committee's additional questions taken on notice and in response to our submission.

Questions taken on notice

1. Will it be an expensive exercise to upgrade or to change the existing furniture on motorways so that it meets the standards required by autonomous vehicles? Will it require a great deal of reworking, or does the existing network need only minor adjustments to meet those standards?

We understand that car makers are following different approaches to automated driving, with varying emphasis on GPS, imaging, high-precision 3D maps and following the car in front. It is difficult to estimate what changes will be needed to roadside furniture until we have a clearer picture of the changes being developed. We anticipate that the changes will only be minor (e.g. line markings), but our understanding of this will be improved through participation in on-road trials involving a range of vehicles using different approaches to automation.

Some examples of changes or upgrades to roadside furniture could involve equipment that communicates with automated vehicles driving on motorways (i.e. infrastructure-to-vehicle communications) to provide alerts about variable speed limits, roadworks and stopped vehicles.

Ultimately, once a large proportion of vehicles are automated, more significant changes could be made to roadside furniture and also to physical road structures themselves. These include narrower lanes catering to more accurate lane-keeping, physical signage for human drivers replaced by electronic communications directly with vehicles, changed road configurations with less need to

address visibility and line-of-sight around curves and structures and pavements to cater to different loading from platoons of heavy vehicles.

Where changes or upgrades are required, the case for implementing these on motorways will likely be more compelling as these roads carry high volumes of vehicles in an environment more conducive to safe and early adoption of automation.

2. Are you aware of any issues that have arisen as a result of perhaps a different approach to lane marking or the provision of street furniture in the United States?

We are not aware of any such issues, but note that our involvement so far has only been in the one State. Others undertaking trials on public roads across multiple jurisdictions (e.g. Google) would likely have further insights into these differences.

Questions on Submission 13 – Transurban

- 1. The Transition Period: Your submission states that rules and regulations must consider the transition phase when both manual and automated cars are on the road to ensure safe sharing (p 8).
- Have you identified any rules or regulations that should be reviewed or amended as a priority prior to the transition phase?

We are in the process of preparing a submission in response to the NTC discussion paper on Regulatory options for automated vehicles. This submission will detail our thoughts on this topic, and should be published by the NTC once complete.

Additionally, we believe it is important that automated vehicles are not contemplated in isolation but that connected vehicles are also taken into account in considering communications with other vehicles and infrastructure. More specifically, we recommend that ACMA should allocate the 5.9 GHz spectrum (currently embargoed) with the European channel allocations, to enable the Co-operative ITS (vehicle-to-vehicle and vehicle-to-infrastructure) communications that would allow the full safety and productivity benefits of automated vehicles to be realised.

• In your view, what is the best way for the transition phase to take place?

Transition should take place progressively, in the environments where it will be safest for automated vehicles to operate. We reiterate that motorway environments lend themselves to early adoption due to fewer complicating factors such as pedestrians and traffic signals, and roads being maintained to a high standard.

Initial testing should take place in controlled environments, such as during road or lane closures or times with only light traffic, and then progressively expanded to mixed traffic once the technology proves safe and capable.

As these motorways progressively implement active traffic management (i.e. managed motorways), conditions can be better managed to control traffic flow and minimise tailbacks and stop-start traffic that could create risks for both manually-driven, connected and automated vehicles.

On tollways with multiple lanes and existing enforcement technology, initial approaches could involve designated lanes where automated vehicles are allowed to share the lane with other vehicles whilst in specific modes (and perhaps at specific times), where compliance with these conditions can be enforced.

One longer-term possibility, if penetration of automated vehicles increases sufficiently, could contemplate dedicated lanes on motorways, where only automated vehicles use those lanes and remain separated from manually driven vehicles in other motorway lanes. This would not be

necessary for transition, but could help to maximise motorway efficiency and reduce congestion both in dedicated lanes and in the other lanes.

• What do you see as the biggest risks during this transition?

There are a broad range of risks that need to be carefully considered and managed in the introduction and transition of automated vehicles, including safety, security, privacy, data ownership, liability, and other areas.

One of the biggest and perhaps most unpredictable risks specific to the transition involves human behaviour around automated vehicles. In particular, there is a risk of motorists placing excessive trust in automated vehicles before it is warranted. For example, where current 'autopilot' features on some vehicles still require motorists to keep their hands on the wheel and eyes on the road, there have been several high-profile examples of drivers posting videos of themselves ignoring or circumventing these requirements.

• Are you aware of any incidents that have taken place with both manual and automated vehicles sharing the road that need to be taken into consideration?

We are aware of incidents that have been publicised through the media.

For example, we understand that there was a fatality recently on a motorway in the US involving a truck and a Tesla in 'Autopilot' mode, but we note that this incident is currently being investigated and it is not yet clear exactly what happened.

Also, we are aware that Google's self-driving car program has experienced a number of accidents whilst vehicles were driving in autonomous mode in mixed traffic. In one of these accidents, Google acknowledged that their car bore some responsibility, whilst other accidents were attributed to errors made by drivers in other vehicles sharing the roads.

- 2. <u>Vulnerable Road Users</u>: One of the submissions recommended separate lanes for bicycles and automated vehicles, as a measure to protect vulnerable road users.
- What is your view on this suggestion?

Cyclists are currently permitted on motorways in Sydney such as Hills M2 and M5 South West. Obviously the safest option for cyclists and motorists is the complete separation of bicycles and cars – be they manual or automated.

However, more generally we suggest an approach involving conditional automation where vehicles are only allowed to drive in automated modes at locations where it is safe to do so. In principle, this could involve allowing vehicles to drive in an automated mode in lanes next to or with cyclists only once this is proven to be at least as safe as for manually driven vehicles. On motorways, this issue could be deferred by introducing automated vehicles on designated/dedicated lanes which would likely be the right-most lane, whereas cyclists would only be allowed on the left shoulder.

Thank you again for the opportunity to contribute. Please let us know if you have any further questions or clarifications.

Yours sincerely



Michele Huey

Group General Manager Strategy