

BUDMT PAPER

Paper no:	24.2 2015 11 16
Meeting date:	16 November 2015
Prepared by:	Warwick Mason, Traffic Safety Engineer
Recommended by:	Nick Coxhill, Acting Safety & Network Performance Manager
Approval Sought:	Operational Safety
Subject:	AUCKLAND MOTORWAYS, STATE HIGHWAYS 16 & 20 WESTERN RING ROUTE ~ VARIABLE SPEED LIMITS

Attachment A



PURPOSE

1. To request that the State Highway Manager, Auckland and Northland, **endorse** the proposal to establish Variable Speed Limits (VSL's) on sections of Auckland's State Highway (SH)20 and SH16 urban motorways to facilitate the safe and efficient operation of the Waterview Connection twin road tunnels and Great North Road Interchange and approaches.



SUMMARY

2. As part of Auckland's Western Ring Route (WRR) Project, the New Zealand Transport Agency (the Transport Agency) are making significant alterations to the existing motorway network by upgrading the Great North Road Interchange at Waterview to a system interchange that will connect SH20 with SH16.

The northwards extension of SH20, to this enhanced interchange, will be through the Waterview Connection twin road tunnels.

To manage the flow of traffic leading to – and through – both the tunnels and the complex interchange, there will be a need to align traffic speed with the geometric constraints of each motorway and traffic conditions existing at the time.

To meet these operational needs the Intelligent Transport System (ITS) design for the WRR includes the provision of VSL's on sections of both SH20 and SH16.

3. To comply with the requirements of Land Transport Rule 54001 *Setting of Speed Limits 2003* (the Rule) the Transport Agency's Network Manager, Planning (Glenn Bunting), must, by Public Notice in the *New Zealand Gazette*, firstly approve the proposal to establish every VSL.

4. After the *proposal to create* a VSL has been approved – and that approval promulgated in the *NZ Gazette* - by Glenn Bunting, the Transport Agency must then set the VSL by making a bylaw in accordance with the requirements of the *Government Roading Powers Act 1989* and the Rule. This change to the Transport Agency's *Speed Limits on State Highways Bylaw* also requires promulgation by way of a further Public Notice in the *NZ Gazette*.

RECOMMENDATIONS

5. That the Highways BUDMT, Auckland, **endorse** the recommendations that:
 - a) An 80/30 km/h Variable Speed Limit (VSL) be established on SH20 through, and on the approaches to, the Waterview twin road tunnels; and
 - b) An 80/30 km/h VSL be established on SH16 on all the links, ramps and connections that will make up the Great North Road Interchange and approaches; and
 - c) On the residual 2 km long section of SH16, between Auckland's Central Motorway Junction (where the speed limit is 80 km/h) and the westbound approaches to the complex Great North Road Interchange (where the speed limit will be an 80/30 km/h VSL) the permanent speed limit in Newton Gully will be lowered from 100 km/h to 80 km/h. In day to day operations under normal circumstances one seamless 80 km/h speed restriction will then be in force along the SH16 North-western Motorway from the CMJ to the causeway.



OBJECTIVES

6. To action the *Safer Speeds Programme* to reduce deaths and serious injuries on our roads, while supporting the efficient operation of our high volume motorway corridors, by:
7. Establishing 80/30 km/h Variable Speed Limits (VSL's) on sections of Auckland's SH20 and SH16 urban motorways, as an integral part of the Intelligent Transport System (ITS) being installed to facilitate the safe and efficient operation of the Waterview Connection twin road tunnels and Great North Road System Interchange and approaches; and
8. Rationalizing the speed limit on Auckland's SH16 North-western Motorway for operational and safety reasons, from the Central Motorway Junction (CMJ) to the causeway west of the Great North Road System Interchange, by lowering the permanent speed limit along the motorway in Newton Gully from 100 km/h to 80 km/h to, under normal circumstances, effectively provide a uniform, continuous 80 km/h restriction along this section of motorway corridor.



BACKGROUND & CURRENT SITUATION

9. As part of Auckland's Western Ring Route (WRR) project, the Transport Agency is constructing two new motorway tunnels to link the current northern end of SH20 at Maioro Street with the SH16 North-western Motorway at the existing Great North Road interchange.
10. This new connection will create a large system interchange over the top of the existing service interchange at Great North Road, which will greatly change the character of the existing road alignment and introduce new decisions for motorists to process.

In addition to providing this new connection, the Transport Agency is also upgrading the SH16 motorway from St Lukes Road interchange through to the Lincoln Road interchange. These upgrades are to provide increased capacity for both the new movements introduced by the SH20 tunnels and future demand across the Auckland motorway network.

11. The geometric design standards and changing character of these motorways necessitated a reassessment of the posted speed limits to determine the most appropriate limits for the safe and efficient operation of the tunnels and all approaches to the new system interchange at Great North Road.

SH16 & SH20 ~ CURRENT SPEED LIMITS

12. The current speed limit on all links, ramps and connections of SH1 and SH16, throughout Auckland's Central Motorway Junction (CMJ), is 80 km/h.
13. On SH16, the existing interface between the 80 km/h restriction within the CMJ, and the 100 km/h motorway default speed limit west of the CMJ, is at the Waima-Haslett Footbridge in Newton Gully.
14. On SH20, the motorway default speed limit of 100 km/h applies along much of Auckland's South-Western Motorway to the current northern terminus of SH20 at Maoro Street Underpass.



WATERVIEW CONNECTION TUNNELS

15. The northwards extension of SH20 through the two 2.4 km long 3-lane tunnels of the Waterview Connection project will provide an extra 6-lane motorway through and beneath Auckland's western suburbs, linking State Highways 20 and 16, to complete a motorway ring route around the city.
16. The horizontal and vertical alignment of both tunnels is curvilinear.
17. The design speed of the tunnels is 80 km/h, which means that any travel in excess of this speed represents a significant risk. Accordingly, the maximum speed limit through the tunnels must be limited to 80 km/h.
18. The implications of a planned or unplanned incident in the tunnels, or congestion across the network, may mean that the optimal strategy would be to reduce traffic speed in order to cope with the situation or deliver an improved traffic throughput. There is a need, therefore, to establish an 80/30 km/h Variable Speed Limit (VSL) through and on the approaches to the tunnels. This VSL will fit in well with the 80/30 km/h VSL that must also be established throughout the adjoining Great North Road system interchange.
19. Traffic management for the tunnels will be integrated into the wider Auckland motorway network, and the conditions required to maintain a safe and efficient travelling environment within the tunnels will drive key traffic management strategies and operational decisions.
20. Essentially, Variable Speed Limits and lane controls are fundamentally important to ensure safe driving behaviours by facilitating active management of congestion levels through, and on the approaches to, the twin Waterview Connection road tunnels.

GREAT NORTH ROAD INTERCHANGE

21. As part of Auckland's Western Ring Route (WRR) Project, the Transport Agency are making significant alterations to the existing motorway network by upgrading the Great North Road service interchange to a system interchange, which will connect SH20 with SH16. The WRR will provide an alternative route to SH1. The opening of this alternative route will significantly modify travel behaviour patterns in Auckland for short, medium and long distance trips in and around the region.
22. Whereas much of the adjacent, upgraded sections of SH16 are suited to a 100 km/h speed limit, some elements of the Great North Road Interchange have a design speed of only 70-80 km/h, resulting in an '*out of context*' driving environment compared with the adjacent sections of motorway.
23. The geometric design constraints and added complexity of this system interchange dictate that, for operational safety reasons, a speed limit lower than the normal 100 km/h motorway default speed limit should be imposed throughout the interchange. For these reasons, the interchange and approaches - some elements of which form the southbound approaches to the tunnels - should be restricted to an 80/30 km/h VSL so that the speed restrictions through the interchange merge seamlessly with the speed limit through both tunnels.

STATE HIGHWAY 16 MOTORWAY

24. In addition to the construction of the Waterview Connection tunnels, and the creation of the relatively complex Great North Road system interchange, a significant amount of upgrading

work is being implemented along SH16, from St Lukes Road in the east, to Lincoln Road in the west. Much of this section of SH16 is suited to a 100 km/h speed limit.

However, the new infrastructure will add complexity to the driving environment and also increase traffic volumes and weaving movements on this section of the network.

During both peak and inter-peak periods heavy demand for the Great North Road off-ramp results in lane saturation in the left-most lane of the motorway.

25. To mitigate known geometric and operational deficiencies along this section of SH16, it is recommended that a VSL be imposed between St Lukes Interchange and the causeway, effectively extending the VSL required at the Great North Road Interchange to encompass the approaches to this new system interchange. The benefits of a VSL along this section of SH16 will be:

- Mitigation of the negative effects caused by some elements within this route having a design speed of only 85 km/h;
- Mitigation of the negative effects of traffic flow turbulence caused by closely spaced on and off ramps;
- Reduced weaving;
- A reduction in (predominantly rear-end and side-swipe type) crashes;
- Reduced negative effects resulting from substandard sight distances and shy lines;
- Increased capacity through ability to optimise traffic flow;
- Better network management response to incidents;
- Improved journey time reliability on the network; and
- CO2 emission savings/benefits.

26. While, with the traffic volumes involved, flow break down will be inevitable at times, a reduced speed limit would delay the onset. Additionally, the difference in vehicle speed between weaving vehicles and straight-through traffic would be reduced, resulting in greater safety margins.
27. Essentially, the establishment of an 80/30 km/h VSL on SH16, between St Lukes Interchange and the causeway to the west of the Great North Road Interchange, will fit well with the 80/30 km/h VSL required through the Waterview Connection tunnels. A VSL along this section of SH16 will significantly improve the operational performance of this section of the motorway network by enabling traffic flow to be managed dynamically, resulting in more reliable journey times and vehicle throughput during peak periods. By adjusting speed limits to suit traffic demand, weather conditions and in response to unplanned incidents on the network, traffic flow breakdown is avoided, or minimised, and network performance can be managed effectively.
28. For operational and safety reasons, it will be desirable to lower the residual 2km length of 100 km/h limit currently in force in Newton Gully to 80 km/h so that one seamless 80 km/h restriction will be in force from the CMJ to the causeway under normal operating conditions.



ELECTRONIC SIGNS & EQUIPMENT

29. The electronic signs and equipment, necessary to manage and control the VSL's, will be installed by the Well Connected Alliance prior to the opening of the tunnels and enhanced Great North Road Interchange and approaches late in 2016 or early in 2017.



REGIONAL ENGAGEMENT

30. Confirmation that the value and extent of the proposed sections of 80/30 km/h Variable Speed Limit on SH16 and SH20 is consistent with the expectations of the Western Ring Route project teams has been provided by:
- Peter Norfolk, Design Manager, Well-Connected Alliance;
 - Martyn Francis, Aurecon; and
 - Andrew Musgrave, NZ Transport Agency, Waterview Connection.



NATIONAL OFFICE & OTHER ENGAGEMENT

31. Glenn Bunting, the Transport Agency's Network Manager, Planning, must, in the *first instance* (and subsequent to the Highway Manager's endorsement), approve the proposal to establish a VSL and promulgate his approval by way of Public Notice in the *NZ Gazette*.
32. Following publication of Glenn's approval, normal, mandatory external consultation with the Transport Agency's key road safety partners must be entered into, prior to seeking ratification of the proposal by the Agency's National Safety Engineer.
33. Final "sign off" of the speed limit proposal by Dave Bates, the Agency's Chief Advisor, Network Outcomes, must be obtained prior to formal publication of the changes to the Agency's Speed Limits Bylaw, by way of a second Public Notice, in the *NZ Gazette*.

34. Prior to the opening of the tunnels, or full utilization of the upgraded Great North Road Interchange, the Agency should, by way of media releases, advise the general motoring public of the imminent commissioning of the sections of VSL on sections of SH16 and SH20.

TIMING

35. The publication of Glenn's preliminary approval of the VSL's in the *NZ Gazette* is scheduled to occur in December 2015.

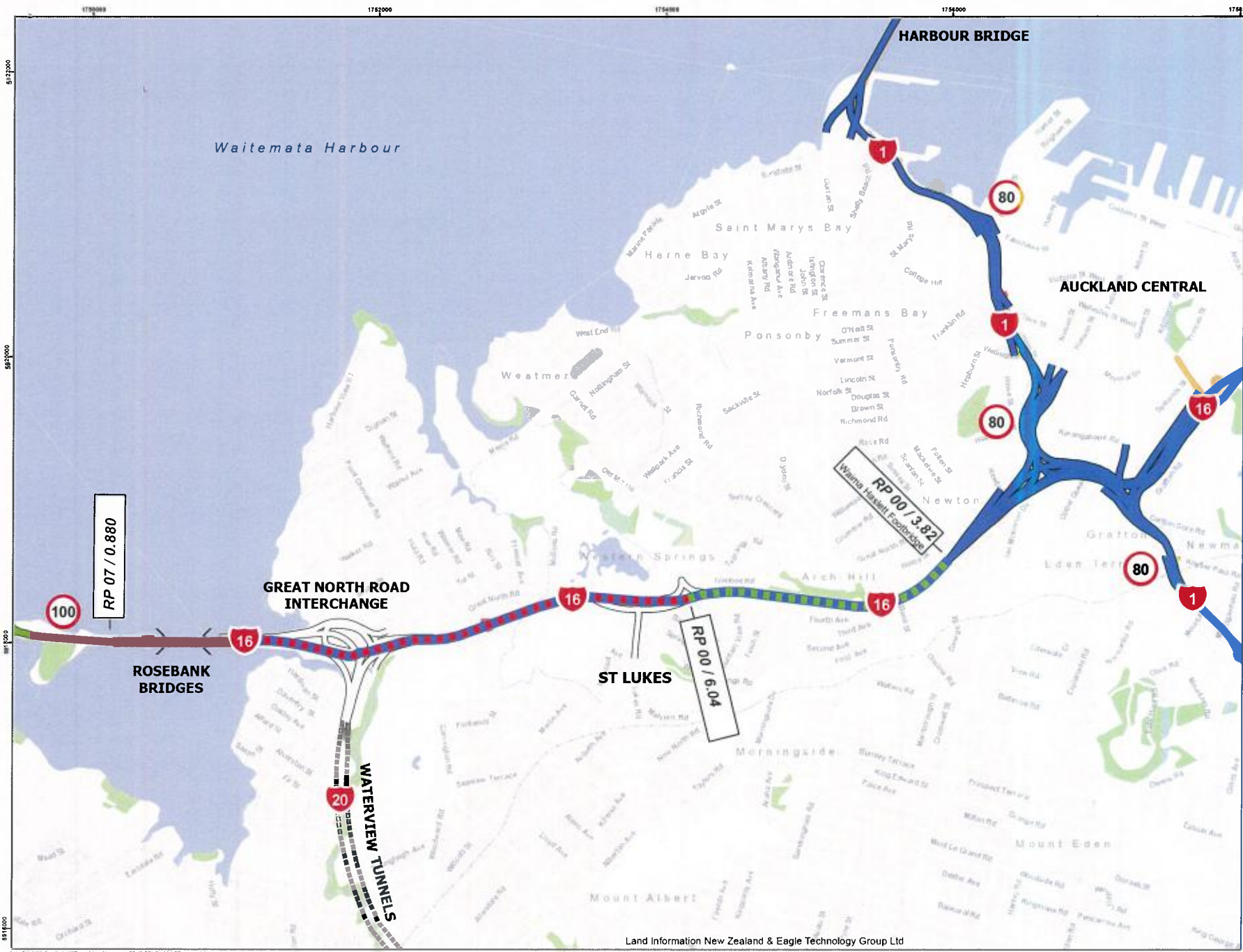
📎 ATTACHMENTS

36. Two plans, which illustrate the location and extent of the existing and proposed speed limits on SH20 and SH16, in the vicinity of the Waterview Connection tunnels and adjacent section of Auckland's North-western motorway, are attached herewith.

🎯 KEY CONSIDERATIONS FOR BUDMT

- The northwards extension of SH20 through the Waterview Connection twin road tunnels, towards the end of 2016, will connect SH20 with SH16 at the significantly enhanced Great North Road system interchange.

- The opening of the Western Ring Route (WRR) will, without doubt, modify travel behaviour patterns in Auckland for short, medium and long distance trips in and around the region.
- The geometric design constraints accepted for the Waterview Tunnels and Great North Road Interchange necessitate the imposition of a lower than normal speed limit on these sections of the motorway network.
- The implications of a planned or unplanned incident in the tunnels, or congestion across the network, indicate that the optimal strategy would be to reduce traffic speed in order to cope with the situation, or deliver an improved traffic throughput.
- To meet these operational safety needs the Intelligent Transport System (ITS) design for the WRR includes the provision of Variable Speed Limits (VSL's) through, and on the approaches to, the Waterview Connection tunnels and Great North Road Interchange.
- There is a need, therefore, to establish an 80/30 km/h VSL through and on the approaches to both the Waterview Connection tunnels and adjoining Great North Road Interchange.
- For operational and safety reasons it would be desirable to provide one seamless 80 km/h restriction from Auckland's CMJ to the causeway, by lowering the existing 100 km/h in Newton Gully to 80 km/h.



Site Location



Legend

- Speed Limits**
- Existing 100km/h
 - Existing 80km/h
 - Existing 100km/h, Proposed 80km/h
 - Existing 100km/h, Proposed 80 - 30km/h

Notes

- 1. Data Source
 - LINZ web GIS service for re-use under the Creative Commons Attribution 3.0 New Zealand licence (<http://services.arcgisonline.com/arcgis/services/IGene/en/newzealand>)
 - LINZ
- Revision: A



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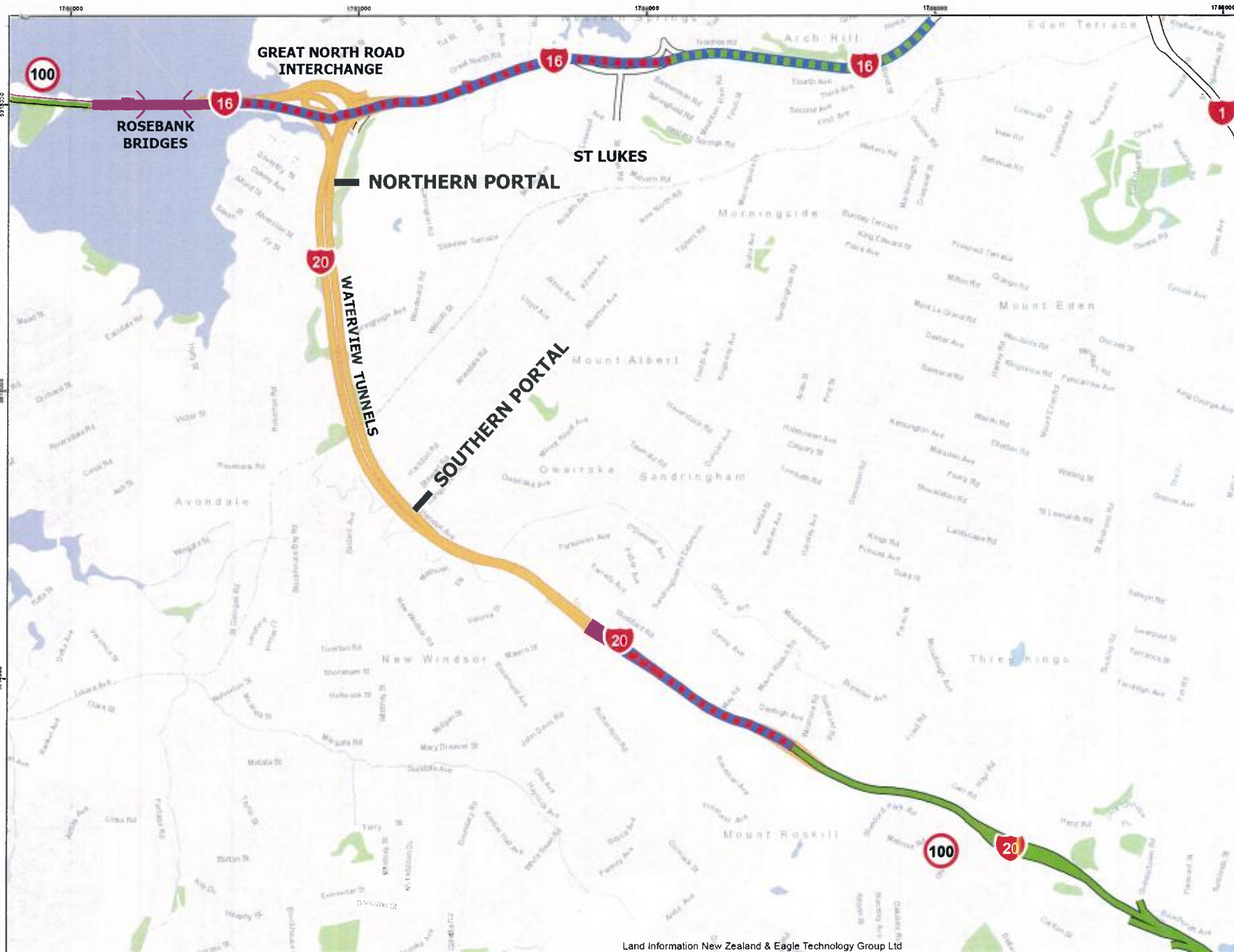
Unit: 2 / 10/13 5 Path: N:\Transport\Auckland\TEMP\TEMP_JOB\STRANSPORT\APPLS\AUCKLAND speed limits\GIS\MAPS\XXXXX\0000.FIG.CC-0001.mxd



Project Number: 230930
Projection: NZTM

NZTA State Highway 16, Auckland City

FIGURE CC-0001: Speed Limits



Site Location



Legend

Speed Limits

- Proposed 80km/h - 30km/h V.S.L
- Existing 100km/h
- Existing 100km/h, Proposed 80km/h
- Existing 100km/h, Proposed 80 - 30km/h

Notes

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- LINZ

Revision: A



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Project Number: 239030
 Projection: NZTM