Glossary

Term	Description
Collective Risk	Collective Risk can be thought of as 'crash density' and is related to the crash history of the section of road. Collective Risk is a measure of the number of deaths and serious injuries (DSIs) per km that can be expected on a road segment over the next five years. There are five risk levels (High, Medium-High, Medium, Low-Medium, and Low), and the threshold levels for the overall collective risk level vary based on corridor length and urban versus rural.
High-risk road	A high-risk road (or road section) is a road that has either a 'High' or 'Medium-High' Collective Risk, Personal Risk, or Infrastructure Risk Rating.
Infrastructure Risk Rating (IRR)	IRR is based on nine variables that have a significant influence on determining road safety risk. It is determined independently of crash history (unlike Collective Risk and Personal Risk) and represents the underlying risk inherent to the road. The variables assessed are: • Road stereotype • Alignment • Carriageway width (lane and sealed shoulder) • Roadside hazards • Land use • Intersection density • Access density • Traffic volume There are five risk levels (High, Medium-High, Medium, Low-Medium, and Low). The threshold levels for the risk levels vary based on urban or rural adjacent land use.
One Network Road Classification (ONRC)	The ONRC is the New Zealand Transport Agency's classification system, which divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations or if they are the only route available. Primary collectors, secondary collectors and access roads are pertinent to this case. • **National**: These roads make the largest contribution to the social and economic wellbeing of New Zealand by connecting major population centres, major ports or international airports, and have high volumes of heavy commercial vehicles or general traffic. • **Arterial**: These roads make a significant contribution to social and economic wellbeing, linking regionally significant places, industries, ports or airports. They may be the only route available to important places in a region, performing a 'lifeline' function. • **Regional**: These roads make a major contribution to the social and economic wellbeing of a region and connect to regionally significant places, industries, ports and airports. They are major connectors between regions and, in urban areas, may have substantial passenger transport movements. • **Primary collector**: These are locally important roads that provide a primary distributor/collector function, linking significant local economic areas or population areas. o **Traffic volumes**: more than 3,000 vehicles per day (vpd) o in urban areas, and more than 1,000 vpd in rural areas. Greater than 150 heavy commercial vehicles (HCV) per day. o **Connectivity**: Links places with populations greater than 2,000 people. o **Speed**: Generally moderate speed environment in urban areas. Moderate to high speed in rural areas. o **Access:** Access primarily to adjoining property. • **Secondary collector**: These roads link local areas of population and economic sites. They may be the only route available to some places within this local area. o **Traffic volumes:** more than 1,000 vpd in urban areas, and more than 200 vpd in rural areas. Greater than 25 HCV per day. o **Connectivity:** Links places with populations greater than 250 people. o **Speed**: Generally moderate to low speed environment. o **Access:** Access primarily to adjoining property. • **Access**: This is often where your journey starts and ends. These roads provide access and connectivity to many of your daily journeys. o **Traffic volumes:** less than 1,000 vpd in urban areas, and less than 200 vpd in rural areas. Less than 25 HCV per day (if any). o **Connectivity:** Links places with populations less than 250 people. Collect and distribute traffic to/from local properties within an area. o **Speed:** Generally moderate to low speed environment. o **Access:** Significant access to adjoining properties.
Mean Operating Speed	The average free-flow speed based on TomTom data. The average speed that vehicles actually travel on that section of road.
Personal Risk	Personal Risk can be thought of as 'crash rate' and is related to the crash history of the section of road. Personal Risk is a measure of the risk of an individual dying or being seriously injured on a road corridor. It is calculated by dividing the Collective Risk by traffic volume exposure. There are five risk levels (High, Medium-High, Medium, Low-Medium, and Low).
Posted Speed Limit	The posted speed limit is the speed limit shown on speed limit signs.
Safe and Appropriate Speed (SAAS)	The SAAS is the travel speed that is determined to be safe and appropriate for a road segment based on the road function, design, safety and use.
Travel Speed	The average speed vehicles actually travel on that section of road.

AT Safe Speeds Tranche 2 Speed Limit Review Process

Quality Assurance Information

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Prepared by: Lewis Martin

Reviewed by: Paul Durdin

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		Name
8/04/2021	Draft report	Paul Durdin (Abley)
29/04/2021	Final Report	Paul Durdin (Abley)
27/10/2021	Amended for Tranche 2B	Betty Diao (AT)

Contents

Glossary of Terms

Term	Definition
Base Information	Information that is used in combinations to determine metrics or assist in making decisions.
Land Use	The human or economic functions that take place on the land adjacent to the road.
5- year crash history	The injury crashes recorded in Waka Kotahi's Crash Analysis System (CAS) during a period of 5 years.
Section length (km)	The length of a given road section.
Annual average daily traffic (AADT)	The average volume of vehicle traffic using a road for a day over a given year.
Road alignment	The horizontal alignment of a given road section.
Carriageway width	The width of a given road segment's carriageway.
Roadside hazards	The number of roadside hazards per km of road section, categories into a band.
Intersection density	The number of intersections per km of road section.
Access density	The number of accesses per km of road section.
Road Stereotype	The number of lanes and if the carriageway is divided.
One Network Road Classification (ONRC)	How the road is classified as part of the ONRC given its characteristics.
Freight priority	Identified as a freight priority route in a Network Operating Framework or similar strategic document.
Operating speed / travel speeds	The average free-flow speed for a given road segment.
Existing posted speed	The existed posted speed limit on a given section of road.
Network Legibility	Network legibility is the process of insuring that the network makes sense on a whole to road users rather than just individual road sections in isolation.
Safe and appropriate Speed (SaAS)	SaAS is a travel speed that reflect the function, design, safety and use of any given road.
Mega Maps suggested speed	The Mega Maps suggested speed is the default SaAS specified in the Mega Map tool.
Homogeneous road segments	Road segments where all of the base information remains the same over the length of the segment.
Vulnerable Road User (VRU)	Non-motorised road users, such as pedestrians and cyclists.

Supporting Documents and Tools

This process utilises the following documents and tool(s) in order to determine the proposed speed limit for a given road:

Land Transport Rule - Setting of Speed Limits 2017

The Setting of Speed Limits Rule set by the Ministry of Transport in 2017 allows for road controlling authorities to set speed limits for roads in their jurisdictions and outlines the requirements they must adhere to.

Speed Management Guide

Sets out the speed management framework for how road controlling authorities determine SaASs.

The Guide was published in November 2016[1] as part of the Safer Journeys Safer Speeds Programme and in advance of the Land Transport Rule: Setting of Speed Limits 2017 (Setting of Speed Limits Rule)[2]. The guidance is evidence based, nationally consistent, prioritises improvements to safety and economic productivity, achieves value for money and contributes to the credibility of the speed management programme.

Mega Maps

The Waka Kotahi geospatial speed management tool. This tool draws on a wide range of data sets to provide strategic road safety metrics to road controlling authorities.

Safer Journeys Risk Assessment Tool (Mega Maps) Edition II: Using and Interpreting the Tool

A document that outlines the process for using and interpreting the Mega Maps speed management tool.

Infrastructure Risk Rating (IRR) Manual

Sets out the methodology for calculating the IRR for any given road segment.

1 https://www.nzta.govt.nz/assets/Safety/docs/speed-management-resources/speed-management-guide-first-edition-201611.pdf
2 https://www.nzta.govt.nz/assets/resources/rules/docs/setting-speed-limits-2017.pdf

1. Introduction

As a nation, we need to see a reduction in deaths and serious injuries on our roads whilst also moving people and goods efficiently around our transport network in a way that is aligned to the Safe System approach. The Safe System approach underpins Vision Zero. It was pioneered in Sweden and acknowledges the physiological and psychological limitations of humans and puts ultimate responsibility on the designers and operators of the system to accommodate these human limitations. This approach is derived from an understanding that people make mistakes, and from an ethical standpoint no-one should be killed or seriously injured on roads. The focus is on adapting the road system to humans, rather than human behaviour to the roads.

The Safe System approach demands a holistic approach to the safety of the road system and the interactions among roads and roadsides, travel speeds, vehicles and road users. It is an inclusive approach that caters for all groups using the road system, including drivers, motorcyclists, passengers, pedestrians, cyclists, and commercial and heavy vehicle drivers. The Safe System approach operates on the following guiding principles:

- **People make mistakes**: Humans will continue to make mistakes, and the transport system must accommodate these. The transport system should not result in death or serious injury because of errors on the roads.
- **People are vulnerable and the system should be managed within human biomechanical injury limit**: Our bodies have a limited ability to withstand crash forces without being killed or seriously injured. A Safe System ensures that the forces in collisions do not exceed the limits of human tolerance. Speeds must be managed so that humans are not exposed to impact forces beyond their physical tolerance. System designers and operators need to consider the limits of the human body in designing and maintaining roads, vehicles and speeds.
- **Shared responsibility**: The burden of road safety responsibility no longer rests solely with the individual road user. System managers have a primary responsibility to provide a safe operating environment for road users and ensuring that the system is forgiving when people make mistakes.
- **Strengthening all parts of the system**: All pillars of the road system need to be strengthened so that if one part fails, other parts will protect the people involved from serious harm.

Central to the Safe System approach is human tolerance to crash impacts and the management of kinetic energy transfer so these are within survivable limits. Managing the transfer of kinetic energy in the road transport system is key to managing injury outcomes. Outside of vehicle design and primary road infrastructure treatments, speed management is the key method for managing kinetic energy transfer. Having travel speeds that are aligned to the Safe System approach are statistically proven to provide a significant reduction to both deaths and serious injuries and remain the most practical way for addressing safety of vulnerable road users, such as pedestrians, cyclists and motorcyclists.

This document outlines the methodology for reviewing existing speed limits and proposing any speed limit changes within the Auckland Transport (AT) road network for Tranche 2A of the speed management programme. It is important to understand that the final speed limit for any given road will be determined following consultation with the public and key stakeholders.

Safe Speed Programme - Tranche 2

The Safe Speed Programme Tranche 2 includes speed limit reviews in several different settings. As slightly different approaches have been applied for reviewing speed limits in these different road

environments, Workstream categories have been created for carrying out the speed management process. The workstream categories for Tranche 2 include:

- Rural roads/Rural Maraes – Roads that exist in a rural environment where there is little to no pedestrian demand;
- Town centres – Roads located within a town centre;
- Residential areas – Roads that exist in a residential area;
- Schools – Roads that are directly next to a school or function with a high number of school-based movement;
- Urban roads – Roads in an urban context that are not in a residential area or town centre; and
- Complementary speeds – Roads that have been selected because they either:
    - Function at a SaAS due to new infrastructure that has been developed and now require a speed limit to complement that lower operating speed
    - Requested to be assessed by the public
    - Address a non-intentional problem that has been created through the first tranche of the Safe Speeds programme.

In complementary speeds, rather than having their own unique process, all road segments are reallocated to a different workstream based on their road environments. The given road segment will then have a proposed speed limit determined according to the process of the specified workstream it has been reassigned to.

2. Process Flowchart

The general information flow and workstream specific information flow in the Tranche 2 speed limit review and proposal process are captured as process flowcharts in Figures 1 and 2 respectively. The general information flow process is summarised below whilst the specific process steps are described in detail in the sections after the flowchart figures.

General Information Flow Overview

The general information flow process can be summarised as:

1. **Segmentation** of the network in homogeneous road segments.
2. Calculation of **road safety metrics**, including the Collective Risk, Personal Risk and Infrastructure Risk Rating (IRR) for each road segment.
3. Determination of the **SaAS** using the Speed Management Framework specified in the Speed Management Guide.
4. Identify the **speed management intervention** approach that is most likely to be appropriate.
5. Apply **engineering judgement** to ensure the technical assessment provides network legibility and aligns with Auckland Transport's Vision Zero Strategy.

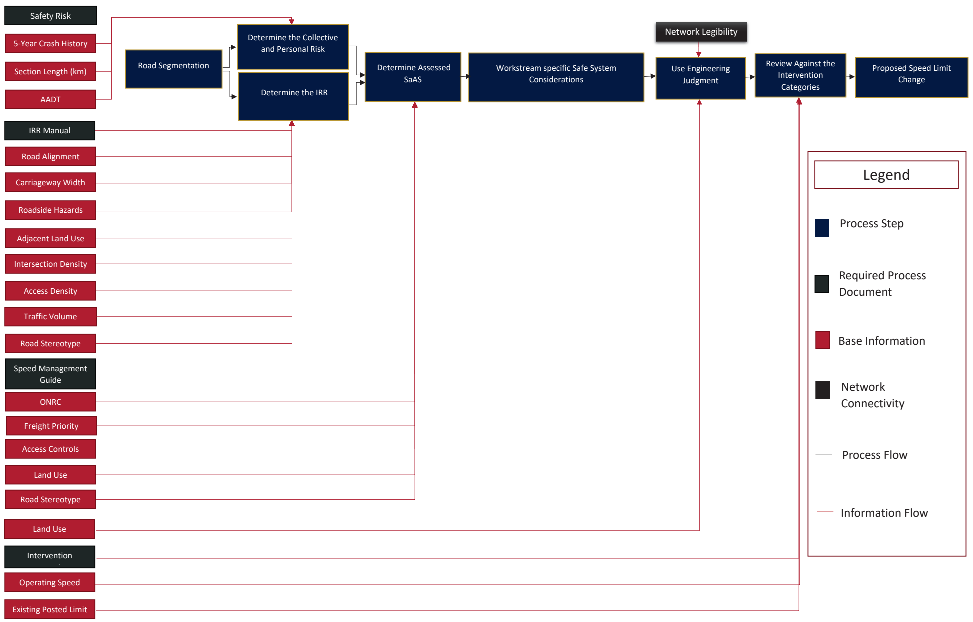

Figure 1 General information flow in the Tranche 2A speed limit review and proposal process

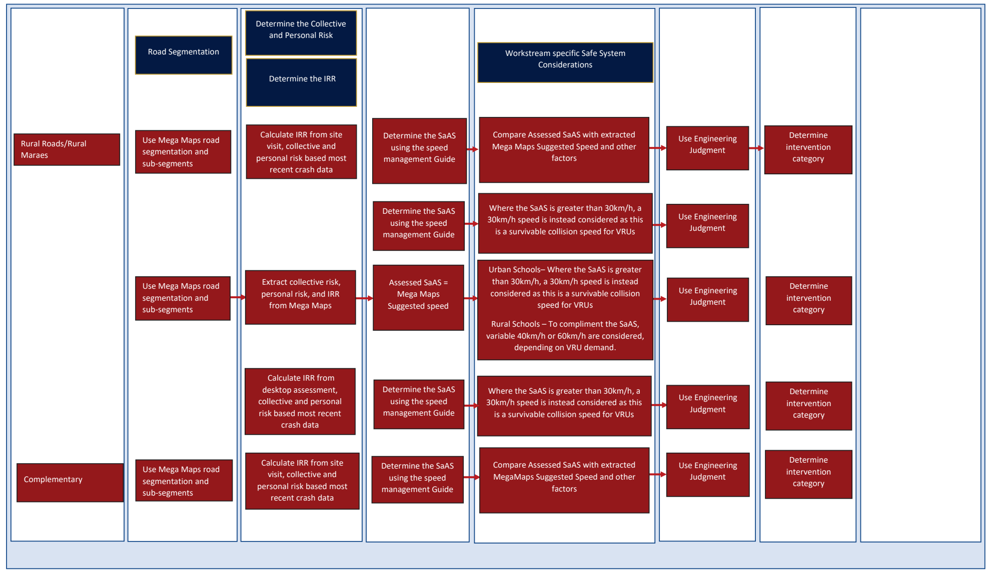

Table 1 outlines where this information generally sourced. Where variables are determined differently within specific workstreams, this is discussed separately.

Table 1 Information sources

Base information	Source	Original source
Land Use	Mega Maps	Land use classification is modelled using urban and rural boundaries and the density of residential and commercial developments sourced from planning zones, Open Street Map (OSM) and Land Information New Zealand (LINZ) datasets.
5-Year Crash History	Crash Analysis System (CAS)	Extracted from a Waka Kotahi CAS system (crashes 2016-2020)
	Mega Maps	Mega Maps uses crashes extracted from the Waka Kotahi CAS System (crashes 2015-2019).
Section Length (km)	Mega Maps	The section length is determined using geospatial measuring tools.
Annual Average Daily Traffic (AADT)	Mega Maps	The Average Annual Daily Traffic (AADT) is determined based on information contained in a Waka Kotahi centreline dataset that is maintained by CoreLogic.
Road Alignment	Mega Maps	Horizontal alignment is determined using a geospatial process that calculates degrees of curvature per km. Alignment classification follows the banding specified in the Waka Kotahi Economic Evaluation Manual (EEM).
Carriageway Width	Mega Maps	Lane width is determined based on information contained in a Waka Kotahi centreline dataset that is maintained by CoreLogic. Separate lane and shoulder width information is not available within the dataset, so assumptions are made based on the carriageway width. These assumptions are: • Local roads have a maximum lane width of 3.3m with the shoulder forming the balance of the carriageway. • State Highways have a lane width of 3.6m with the shoulder forming the balance of the carriageway.

Base information	Source	Original source
Roadside Hazards	Mega Maps	Roadside hazards can be estimated from a combination of land use classification and road alignment.
Intersection Density	Mega Maps	Intersection density is calculated using a geospatial process that calculates intersection density along a road segment based on the underlying road centreline.
Access Density	Mega Maps	Access density is estimated from adjacent land parcels, where it is assumed that each land parcel has one access point to the frontage road.
Road Stereotype	Mega Maps	Road stereotype is determined based on information contained in a Waka Kotahi centreline dataset that is maintained by CoreLogic.
One Network Road Classification (ONRC)	Mega Maps	The ONRC is sourced from a Waka Kotahi centreline dataset that is maintained by CoreLogic.
Freight Priority	Auckland Transport	Identified as a freight priority route in a Network Operating Framework or similar strategic document
Operating Speed	Mega Maps	Real time traffic information over specific sections provided by TomTom.
Existing Posted Speed	Mega Maps	The existing posted speed is sourced from Waka Kotahi centreline dataset that is maintained by CoreLogic.

3. Road Segmentation

The segmentation process aims to achieve homogeneous road segments i.e. road segments with consistent attributes. However, in practice, a balance is typically struck between consistent attributes and segment length to ensure that road segments are of a length that may be appropriate for a different speed limit to an adjacent segment.

The speed limit review and proposal process starts by using Mega Maps segments, which are derived using an automated geospatial process that is laid out in the IRR manual and reproduced as Figure 3.

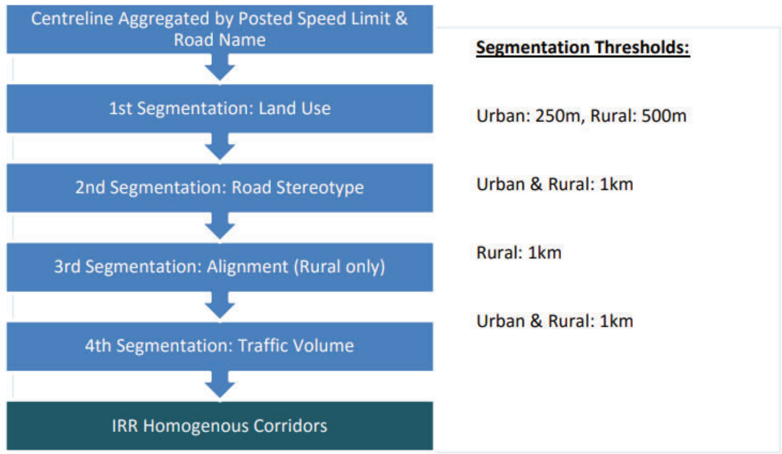

Figure 3 Road Segmentation Process

In some instances, particularly town centres and schools, there are circumstances where the extent further segmentation is completed to reflect local features that are not captured in the automated segmentation process. In these cases, consideration is given to whether the segment is sufficiently uniform to take the Mega Maps values for the entire segment and apply them to the partial segment.

4. Calculate the Collective and Personal Risk

Once the roads have been segmented, the Collective and Personal risk are determined for each road segment.

These road safety metrics are calculated using the estimated death and serious injuries (DSi) casualty equivalents approach, as used in the High-Risk Intersections Guide and Urban KiwiRAP analysis.

Estimated DSi casualty equivalents represent the likelihood of an injury crash resulting in a death or serious injury. Severity indices used in the calculation of estimated DSi casualty equivalents are based on the speed environment, crash movement type, midblock or intersection form and road user involved. Estimated DSi casualty equivalents are calculated by multiplying each injury crash (extracted from the Waka Kotahi Crash Analysis System (CAS)) on a road segment by the corresponding severity index. The estimated DSi casualty equivalents approach is the Waka Kotahi preferred approach to measuring risk based on historic crash data, as it reduces emphasis on locations with a high number of low severity crash types, such as rear-end) and also ensures sites where a fatality has occurred do not receive heightened bias.

- The **Collective Risk** is a measure of the total estimated DSi casualty equivalents per km for a road segment. It is effectively a measure of the number of deaths and serious injuries per km that can be expected on a road segment over the next five years if historic crash patterns continue.

- The **Personal Risk** is a measure of the risk of an individual dying or being seriously injured on a road corridor. It is calculated by dividing Collective Risk by traffic volume exposure.

Collective and Personal risks scores are converted to risk bands and the risk bands are used in the Speed Management Framework to determine the SaAS. Personal Risk plays an integral part in moderating the SaAS for a road segment, particularly where the observed crash history is worse than expected. Collective Risk plays a more significant role in determining the speed management intervention that is most likely to be appropriate.

The five risk bands are low risk, low-medium risk, medium risk, medium-high risk and high risk.

Schools

For Schools, Collective and Personal risks are extracted from Mega Maps, they use the 5-year crash data determined within Mega Maps rather than the 5-year crash data from CAS.

Other workstreams

For Rural roads, Rural Maraes, Urban Roads, Residential and Town Centres, Collective and Personal risks are calculated manually using most recent 5-year crash data from CAS.

5. Calculate the IRR

Along with the collective and personal risk, the third road safety metric that is considered is the Infrastructure Risk Rating.

Infrastructure Risk Rating (IRR) is a road assessment methodology designed to assess road safety risk based on the road environment and infrastructure present. IRR is important in determining the SaAS for a road segment because, while the collective and personal risk focus on historic crashes, IRR doesn’t consider historical crashes. IRR is a proactive measure of risk that aligns with personal risk and therefore is used to provide an approximation of underlying levels of risk for a road segment even when no crashes have been observed. This is especially useful for lower volume parts of the network.

For most workstreams, the IRR is extracted from Mega Maps, with any deviation from the IRR manual outlined in the Safer Journeys Risk Assessment Tool (Mega Maps) Edition II document.

IRR is constructed from a composition of the following Base information:

- Road stereotype
- Alignment
- Carriageway width
- Roadside hazards
- Land use
- Intersection density
- Access density
- Traffic volume

Where sufficient data is not available, Mega Maps approximates certain elements. While this can cause instances where a manually calculated IRR differs from the approximated Mega Maps IRR, the

IRR manual recognises a geospatial approximation as a suitable alternative when calculating IRR in certain situations[3].

Rural roads, Rural Maraes, Urban Roads, Residential and Town Centres

For the Rural roads, Rural Maraes, Urban Roads, Residential and Town Centres workstreams, the IRR is determined in two different ways. Firstly, the IRR is extracted from Mega Maps as discussed above. Secondly, the base information that makes up the IRR, listed above, is verified and updated where necessary during the site drive over or desktop assessment. The Mega Maps IRR score is then compared to the manually assessed IRR score. If there is a difference between the Mega Maps IRR and the assessed IRR, the assessed IRR will be used, provided that the manual assessment is deemed satisfactory. Table 2 shows how the manually assessed IRR elements are determined.

IRR banding categories are determined based on the IRR score. As with Collective and Personal Risk, the five risk bands are low risk, low-medium risk, medium risk, medium-high risk and high risk.

[3] https://www.nzta.govt.nz/assets/Safety/docs/speed-management-resources/irr-manual-201607.pdf

Table 2 Assessed IRR element source

IRR element	Source	How base information is determined within the source
Road Stereotype	Desktop study and drive over	Engineer's interpretation from site visit or desktop assessment.
Alignment	Desktop study and drive over	Engineer's interpretation from site visit or desktop assessment.
Carriageway Width	Desktop study and drive over	Derived from asset data base measured on site or measured from aerial photo.
Roadside Hazards	Desktop study and drive over	Engineer's interpretation from site visit or desktop assessment.
Land Use	Desktop study and drive over	Engineer's interpretation from site visit or desktop assessment.
Intersection Density	Desktop study and drive over	Determined from site visit or desktop assessment.
Access Density	Desktop study and drive over	Determined from site visit or desktop assessment.
Traffic Volume	Desktop study and drive over	Derived from asset data base.

6. Determine Assessed SaAS

The Waka Kotahi Speed Management Guide provides a framework to assist Road Controlling Authorities (RCAs) such as AT, to determine the SaAS for individual road segments across their local network.

As indicated by the name, there are two aspects to SaAS: (1) safety and (2) appropriateness. The safety aspect ensures that the travel speed is such that, if a driver were to make a mistake, then the consequence should not result in death or serious injury. The appropriateness of the speed is to ensure readability, consistency and road efficiency, particularly around corridors of high economic importance.

Setting a SaAS is about aligning both the posted speed limit and travel speeds to reflect the road function, design, safety and use.

Figure 3 and Figure 4, taken from the speed management guide, represent the speed management framework for setting SaAS. This framework is used within the Mega Maps tool to determine the SaAS. In all workstreams other than schools, the Mega Maps suggested speed is used before additional considerations are made.

Table 2.1: Proposed Safe and Appropriate Speeds classification method – Urban Roads

Function / Feature	Road safety metric	Infrastructure Risk Rating	Safe and Appropriate Speed (km/h)
• **ONRC** is Class 1 or 2 • Identified as a Freight Priority Route in a Network Operating Framework • Limited Access Road controls • Median Divided	• Personal Risk ≤ Low–Medium;	• **'Low' or 'Low Medium'**	• **80**
• **ONRC** is Class 1 or 2 • Non-commercial[2] adjacent land use	• Personal Risk ≤ Medium;	• **'Low' or 'Low–Medium'**	• **60**
• **ONRC** is Class 1 or 2 • Non-commercial[2] adjacent land use	No road safety metric used in the assessment	• **Any IRR**	• **50**
• **ONRC** is Primary Collector • Residential adjacent land use	• Personal Risk ≤ Medium–High	• **Low to Medium**	• **50**
• **Any ONRC** • Non-commercial and non-residential adjacent land use	• Personal Risk ≤ Medium–High	• **'Low' to 'Medium'**	• **50**
• **Any ONRC** • CBD/town centre • Residential neighbourhoods	No road safety metric used in the assessment	• **'low' to 'Medium–High'**	• **40**
• **Any ONRC** • CBDs or town centres with high place function and concentration of active road users	No road safety metric used in the assessment	• **'High'**	• **30**
• **Parks**	No road safety metric used in the assessment	• **Any rating**	• **20**
• **Shared spaces** with high place function and concentration of active road users • **Car parks**	No road safety metric used in the assessment	• **Any rating**	• **10**

Note 1: HRIC – NZ Transport Agency High-Risk Intersection Guide, 2013
Note 2: Commercial land use excludes Industrial land use activities.
Note 3: No road safety metrics are used in the assessment of roads with a safe and appropriate speed of 40km/h or less, but the corridor's look and feel should be conducive to achieving the safe and appropriate speeds.

Figure 4: Table 2.1 – Proposed SaASs Classification Method for Urban Roads (as taken from the Speed Management Guide)

Table 2.2 Proposed Safe and Appropriate Speeds classification method – Rural Roads (incl rural towns)

Function / Feature	Road Safety Metric	Infrastructure Risk Rating	Safe and Appropriate Speed (km/h)
• **ONRC** is Class 1 • Median Divided and at least 2 lanes in each direction • No direct property access • Grade separated intersections	• Personal Risk ≤ Low–Medium; • Collective Risk ≤ Medium–High;	• **'Low'**	• **110**[7]
• **ONRC** is Class 1 – 3 • Sealed road	• Personal Risk ≤ Medium; • Collective Risk ≤ Medium–High;	• **'Low' or 'Low–Medium'**	• **100**
• **Any ONRC**	• Personal Risk ≤ Medium–High;	• **'Low' to 'Medium'**	• **80**
• **Any ONRC** • **Not in a rural town**[2] • **Sealed road**	No road safety metric used in the assessment	• **'Low' to 'High'**	• **<80**
• **Any ONRC** • **Not in a rural town**[2] • **Unsealed road**	No road safety metric used in the assessment	• **'Low' to 'High'**	• **<80**
• **ONRC** is Class 1 – 2 • **Rural town**[2]	• Personal Risk ≤ Low–Medium • Collective Risk ≤ Medium–High	• **'Low' or 'Low–Medium'**	• **80**
• **ONRC** is Class 1 – 3 • **Rural town**[2]	• Personal Risk ≤ Medium	• **'Low' to 'Medium'**	• **60**
• **Any ONRC rural town**[2]	• Personal Risk ≤ Medium–High,	• **'Low' to 'Medium'**	• **50**
• **Rural town**[2] • High place function and concentration of active road users	No road safety metric used in the assessment	• **'Low' to 'Medium–High'** • **Or 'High'**	• **<50**

Note 1: HRIC – NZ Transport Agency High-Risk Intersection Guide, 2013
Note 2: Not classified as Urban according to Statistics New Zealand definition.

[7] Several sections of the Roads of National Significance would safely support travel speeds of up to 110km/h. Setting limits higher than 100km/h is currently not permitted, but a change to the law (Land Transport Rule: Setting of Speed Limits,2003) is under consideration.

Figure 5: Table 2.2 – Proposed SaASs Classification Method for Rural Roads (as taken from the Speed Management Guide)

When the SaAS is determined, any variation from the Speed Management Framework is documented for each road segment under consideration, along with an explanation of why this difference exists.

School

In the School workstream, the Assessed SaAS is equal to the Mega Maps suggested speed. In these cases, the process above is carried out by Mega Maps.

Other workstreams

In all other workstreams, the assessed IRR is used alongside the Speed Management Guide to determine the Assessed SaAS.

Due to the function of the Speed Management Guide tables, there is some flexibility around the setting of SaASs for rural roads. For example, the table recommends a SaAS less than 80 km/h for both sealed and unsealed roads that do not fall into any of the other categories. Further analysis and interpretation is required to determine whether the SaAS is 40 km/h or 60 km/h. A speed of 50 km/h is not considered, apart from in urban areas and rural townships. The Speed Management Guide explains that this is because at higher operating speed, road users have difficulty differentiating speed limit differences of just 10 km/h[4]. The advantage of using 20 km/h speed increments is that fewer, more recognisable speed categories are easier for people to understand and recall.

When determining whether the appropriate speed is 40 km/h or 60 km/h, engineering experts review the land use, network connectivity and consistency, existing nature of the road and current travel speed to determine which speed is SaAS. This analysis is conducted on a case-by-case basis. Generally, the road stereotype (sealed versus unsealed) and existing travel speeds have the greatest impact on this decision. However, it is important to remember that this is not always the case, and a holistic assessment of the road and all related features is required before the SaAS can be determined.

7. Safe System Considerations

In some cases, to align with Auckland Transport's Vision Zero strategy and provide survival impact speeds in high pedestrian areas, Auckland Transport may progress with lower speed limits than the Assessed SaAS.

Town Centres and Residential

For the Town Centre and Residential workstreams, the available speed limits in the Speed Management Guide range from 10km/h to 50km/h. However, it is Auckland Transport's preference for speed limits in these areas to be no higher than 30km/h, as this considered to be a survivable collision speed for VRUs. Accordingly, where the Assessed SaAS is greater than 30km/h, a 30km/h speed is adopted. In many instances, physical speed calming measures and enforcement may be necessary to achieve compliance with this speed limit.

A workstream specific process is undertaken for Schools, which differs between schools in urban and rural settings.

For Urban Schools, a permanent 30km/h speed limit is adopted. In these instances, the extent of the speed limit reduction may expand from the school frontage to include a larger area beyond the school.

Currently, due to legislation and funding issues, only urban schools where the operating speed is already close to 30km/h, will be considered for a speed limit change to 30km/h.

For Rural Schools, if the SaAS for the surrounding area is greater than 60km/h, generally, variable 60km/h SaAS are considered. A 40km/h variable SaAS may instead be considered where there is high Vulnerable Road User (VRU) demand around the school.

Rural Roads, Rural Maraes and Urban Roads

Mega Maps has been determined by Waka Kotahi to be suitable for informing speed management decisions at a network level. However, due to the assumptions made when conducting a network

[4] https://www.nzta.govt.nz/assets/Safety/docs/speed-management-resources/speed-management-guide-first-edition-201611.pdf

wide geospatial analysis, it cannot reach the same level of accuracy as assessment conducted with video data. Because of this, where the Mega Maps suggested speed and Assessed SaAS are not aligned, the Assessed SaAS is used in preference to the Mega Maps suggested speed in most instances. This comparison is mainly conducted as a sense check of the Assessed SaAS.

8. Engineering Judgement

After the intervention approach has been identified, engineering judgment is applied before choosing the final speed that will be taken forward as the proposed speed limit. Engineering judgement is important because, while the speed management framework goes a long way in determining a speed that is both safe and appropriate for the road environment, there are certain aspects that it is not able to consider.

An example of where engineering judgement is required is the consideration of proposed speed limits for each road in the context of the surrounding road network. This can be in terms of providing consistent speed limits along adjoining segments on a road that may have different Assessed SaAS from the technical assessment but may not appear to change sufficiently from a road user perspective to warrant a different speed limit. Equally, this can be in terms of having speed limits that reinforce the road hierarchy so traffic is not encouraged to re-route along lower order roads that may have a higher Assessed SaAS than a higher order road.

9. Intervention Categories

Once the SaAS is identified and the Safe System considerations have been made, the travel/operating speed for that section of road is compared to the SaAS. Along with this, future or planned modifications, additional local knowledge and network legibility are considered at this stage to determine an appropriate intervention.

There are four potential intervention options that can be undertaken to align the posted speed limit with the SaAS. These are:

1. Engineer up
2. Challenging conversations
3. Self-explaining
4. Engineering Down

Engineer Up

Engineer up interventions are typically only justifiable on economically important roads where the safety performance is poor and there is a strong case for investment to bring the corridor up to the required standard to support existing or higher travel speeds. On these roads, travel speeds tend to be close to or above the existing speed limit. Therefore, decreasing the posted speed limit to match the SaAS may be inappropriate and possibly have poor levels of compliance and therefore not reducing risk on the road segment to desired levels.

As these roads tend to have a poor safety performance (i.e. high crash rate), leaving the existing speed limit as it stands with no changes is not acceptable nor consistent with Vision Zero for Tāmaki Makaurau. If the investment is justified for these roads, engineering design is required to improve the road safety performance. These are defined as 'engineering up' because substantial engineering design measures are required to bring the road safety performance of the road up to a standard that reflects the existing posted speed limit. Consequently, these changes would increase the SaAS to then be aligned with the current posted speed limit.

Challenging Conversations

These are corridors where current travel speeds and the speed limit are above the calculated SaAS. However, unlike roads that might be suitable for engineering up, these roads are typically lower order roads or do not have an established crash problem that justifies engineering intervention.

These are defined as 'challenging conversations' because discussions around lowering limits can often be challenging in areas where the travel speeds are not consistent with the SaAS. In these situations, traffic calming measures may be required to complement the reduced posted speed limit to increase compliance.

Self-Explaining

These are corridors where the posted speed limit is higher than the SaAS, but where road users are already travelling at (or even below) the SaAS. These are high benefit opportunities, because lowering the speed limit will tend to reflect how people are currently using the road and therefore be self-explanatory and credible

This helps to improve community understanding of SaAS and improves the credibility of speed limit setting and assists in explaining roads better to visiting drivers.

Engineering Down

These are roads where safety performance is poor, the SaAS is lower than both the 85th percentile speed and posted speed limit and there is a strong case for investment to modify the corridor into a formation which supports lower than existing speed limits.

On these roads, engineering measures are required to encourage users to travel at a lower posted speed limit.

Limitations

It is important to note that the current travel speeds are often determined from Mega Maps. In Mega Maps travel speeds are determined using Global Positioning System (GPS) information gathered from user devices. However, this information can have several limitations.

These operating speeds are often aggregated along corridors. As such, they are affected by the acceleration, deceleration and stopping of vehicles at intersections, loading zones and driveways. While this data is certainly beneficial at a network-wide level, there are instances where the travel speeds at specific locations along corridors will differ to that reported in the Mega Maps system.

10. Proposed Speed Limit Change

Once a SaAS has been determined and changing the speed limit to the SaAS is considered the most appropriate option, consultation with the public and local communities is undertaken to identify the views of interested persons or groups, consultation feedback is assessed and the proposed speed limit is adjusted, where appropriate.