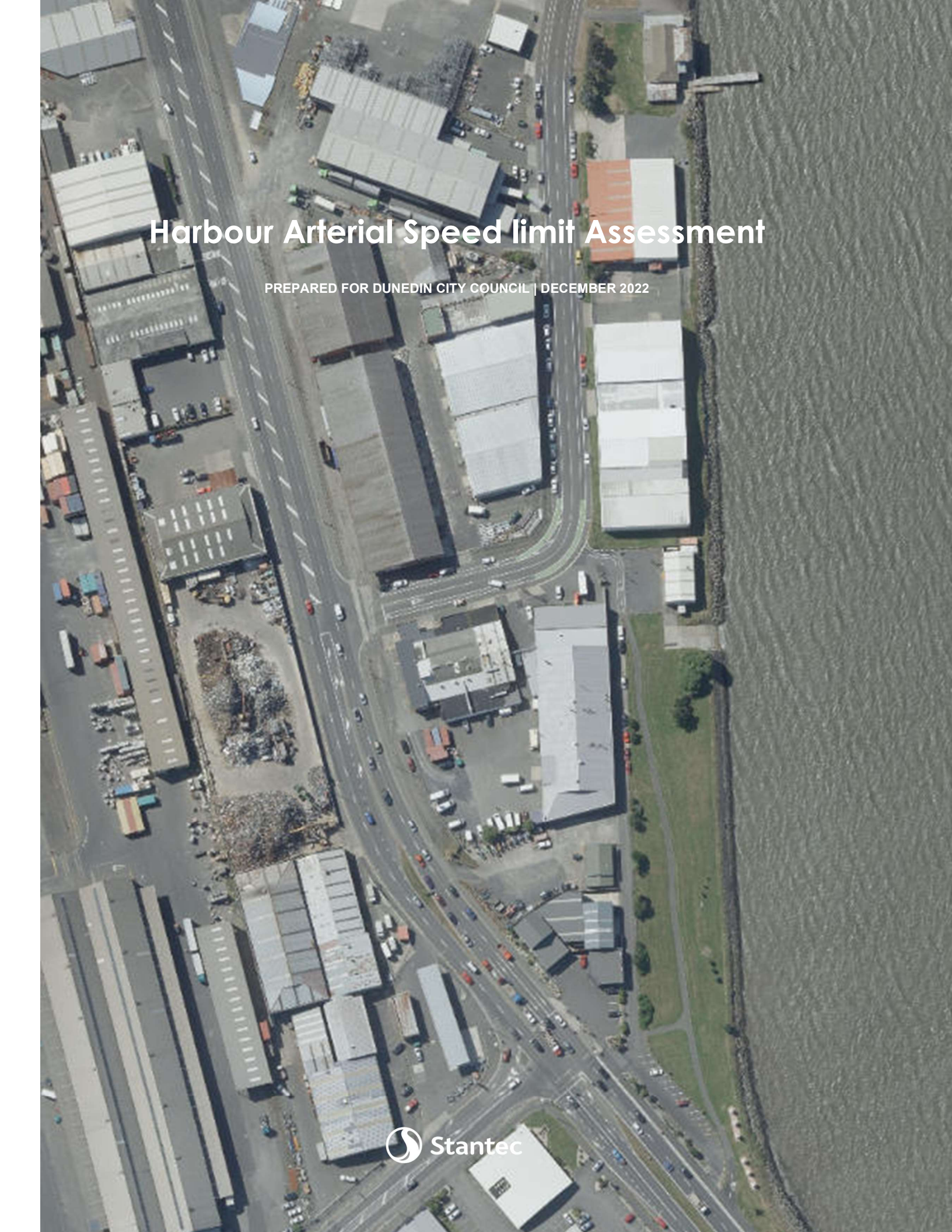




Harbour Arterial Speed limit Assessment

PREPARED FOR DUNEDIN CITY COUNCIL | DECEMBER 2022

Revision schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
a	16/12/2022	Final Draft for Client Comment	Jeremy Byfield	Hjarne Poulsen	Susan Lilley	Susan Lilley

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Quality statement

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1 Introduction

The Dunedin City Council (DCC) have asked Stantec to provide a technical assessment of speed limit on the Harbour Arterial. The area is to cover Portsmouth Drive from Portobello Road, Wharf Street, Thomas Burns Street and St Andrew Street through to the rail crossing.

2 Background Data

The corridor under review totals 2.7km in length. The various sections can be broken down and described as follows.

Portsmouth Drive is a median divided four lane road 1.1km in length between Portobello Road and the intersection with Strathallan Street. Portsmouth Drive runs alongside the harbour with a separated cycle lane/shared path. There are five T intersections along the route, three of which are signalised.

At Strathallan Street the Harbour Arterial becomes Wharf Street through to Fryatt Street and is around 900m in length. Wharf Street has two lanes in each direction separated by a flush median until the Jetty Street overbridge is reached. Beyond here the road becomes single lane until a second northbound lane is added at Fryatt Street for traffic coming off the overbridge. The main intersections within this section are Roberts Street and Kitchener Street, the latter being signalised in 2022.

From Fryatt Street the Harbour Arterial becomes Thomas Burns Street for just over 500m and provides the link through to the four-leg roundabout at Ward Street. There is one southbound lane and two northbound lanes with three intersections along the length providing access into the harbour industrial area. The roundabout is provided with a left turn slip lane which is where Thomas Burns Street becomes the St Andrew Street extension.

The St Andrew Street extension simply links the roundabout to the city via the only at grade rail crossing in the city centre. The corridor is highlighted in Figure 1 below.



Figure 1: Study Corridor

2.1 Corridor Metrics

The Speed Management Guide: Road to Zero edition states that the safe and appropriate speed is based on several inputs including speed limit ranges for each of the One Network Framework street categories and the infrastructure risk rating for the road in question. The primary determinant of the safe and appropriate speed on a road is the One Network Framework (ONF) classification. The full length of the corridor has the ONF classification of Urban Connectors and thus the safe and appropriate speed is shown as 50km/h in MegaMaps.

The ONF is an evolution of the One Network Road Classification (ONRC) framework and “**has been designed to take a more human-centric approach to classifying the road and street network. It is part of a national response to ensure delivery of a safe transport system that protects and prioritises human life and is particularly needed in our urban areas where communities are striving to create great places to live, work and play.**”¹

MegaMaps is a geospatial tool that Waka Kotahi NZ Transport Agency (Waka Kotahi) provides for each road controlling authority which contains speed management information and guidance for the roading network. The MegaMaps: Road to Zero edition calculates the safe and appropriate speed by applying the criteria set out in the Speed Management Framework in the Speed Management Guide: Road to Zero edition.

Various datasets can be used to support the most appropriate speed limit on a road. Table 1 lists some of the basic metrics for the four separable parts of the Harbour Arterial.

Table 1: Corridor Metrics

	Portsmouth Drive	Wharf Street	Thomas Burns Street	St Andrew Street Ext
Length	1,100m	900m	500m	220m
Traffic volume (mobileroads)	11,300	16,500	15,500	5,610
Posted speed limit	60km/h	60km/h	60km/h	60km/h
Collective risk (MegaMaps)	NBD Medium SBD Low	NBD Low-medium SBD Medium	Medium	Low
Personal risk (MegaMaps)	NBD Medium SBD Low	NBD Low-medium SBD Medium	Medium	Low
Infrastructure Risk Rating	Medium	NBD Medium-high SBD Medium	Medium	NBD High SBD Medium-high
One Network Framework	Urban Connectors	Urban Connectors	Urban Connectors	Urban Connectors
Safe and appropriate speed	50km/h	50km/h	50km/h	50km/h

Portsmouth Drive, Wharf Street and the St Andrew Street extension are fully or partly median divided and therefore MegaMaps provides a rating for each direction. Collective and Personal Risk in MegaMaps are based on DSI equivalents for the 2016 to 2020 five-year period. It is noted that none of the sections are above a Medium risk rating.

The Infrastructure Risk Rating (IRR) is based on the actual roadside environment but derived from automated processes and it is always good practice to review the supplied data. The reason these ratings differ on either side appears debatable. On Wharf Street for example one side of the road is classed as curved with a narrow shoulder while the other side is straight with a wide shoulder when the reality is that the shoulder is much the same on both sides and the alignment is clearly the same in both directions. St Andrew Street also has a discrepancy between shoulder widths which is due to an assumption made based on lane widths on non state highways. It does recognise a higher volume of northbound traffic than southbound however does not appear to take into account that there are two lanes in one direction to accommodate this flow.

Within the IRR rating certain criteria such as roadside hazards are fixed based on surrounding land use and not rated on the actual roadside hazard present. These are rated as Severe/Moderate on all four roads based on the land use classification of Commercial Big Box/Industrial.

MegaMaps allows the nine items that make up the IRR to be amended however doing so on this corridor does not change the safe and appropriate speed which is 50km/h along the full route due primarily to the ONF Urban Connectors classification.

2.2 Crash Data

The latest five-year period for crash data is 2017 to 2021. There are 51 crashes recorded in CAS for that period made up of four serious injury crashes, 18 minor injury crashes and 29 damage only.

More than half of the crashes occurred at intersections with eight at Strathallan Street, seven at Teviot Street and another seven spread between the traffic signals at Orari Street and at Midland Street. Of these four sites only the unsignalised intersection of Teviot Street is showing an increasing crash trend with two crashes in 2020 and three in

¹ MegaMaps Road to Zero Edition 1 User and Interpretation Guide

2021. This is suggestive of the need for the installation of traffic signals at this intersection to control conflicting movements.

Two of the 51 crashes involved cyclists, one non-injury crash at Teviot Street where the cyclist was crossing Portsmouth Drive and was possibly hit by a turning vehicle (details are vague) and one minor injury where a car that was turning left from Kitchener Street was hit by a cyclist riding north on the shared path. There were no crashes reported involving pedestrians.

The sole crash involving a motorcyclist was one of the four serious injury crashes to occur along the route. In this crash an alcohol affected driver pulled out of the Sims Pacific access to turn right onto Wharf Street and was hit by a northbound motorcycle. Two of the other serious injury crashes also occurred on Wharf Street and both were as a result of rear end crashes due to driver inattention in heavy traffic, both crashes involving southbound traffic. The final serious injury crash occurred when a truck turned right from Portsmouth Drive into Orari Street and was hit by an oncoming car that failed to stop at a red traffic signal.

Of the 51 crashes only one has speed recorded as a factor. In this minor injury crash a driver was turning right into Kitchener Street at between 30 and 40km/h when they lost control during a heavy rain event.

Table 2: 2017 to 2021 crash data summary

	Portsmouth Drive	Wharf Street	Thomas Burns Street	St Andrew Street Ext
Serious injury crashes	1	3	0	0
Minor injury crashes	11	5	2	0
Non-injury crashes	16	10	2	1
Total crashes	28	18	4	1
Vulnerable user crashes	1	2	0	0
Intersection crashes	22	5	1	1
Speed recorded as a factor	0	1	0	0
Crashes at night	3	4	1	0
Crashes in the wet	4	4	0	1
Weekday crashes	24	12	4	0

2.3 Existing Travel Speeds

MegaMaps provides the mean operating speed on the road network based on a TomTom dataset however Council carries out speed surveys across the network therefore both sets of data are recorded here. Table 3 lists the mean operating speed recorded in MegaMaps and then the mean speeds from actual surveys that have been undertaken.

Table 3: Existing mean travel speeds

	Portsmouth Drive	Wharf Street	Thomas Burns Street	St Andrew Street Ext
From MegaMaps	NBD 51km/h SBD 54km/h	NBD 51km/h SBD 50km/h	51km/h	NBD 39m/h SBD 36km/h
Portsmouth Drive - Midland to Teviot May 2022	58.2km/h			
Portsmouth Drive - Midland to Teviot June 2022	53.3km/h			
Portsmouth Drive - Orari to Midland July 2021	53.8km/h			
Wharf Street - Strathallan to Kitchener August 2021		51.2km/h		
Wharf Street – Roberts to overbridge June 2022		53.2km/h		

	Portsmouth Drive	Wharf Street	Thomas Burns Street	St Andrew Street Ext
Wharf Street – Roberts to overbridge August 2022		51.9km/h		
Thomas Burns – Cresswell to Bombay July 2017			50.8km/h	
Average mean travel speed across all surveys	54.06km/h	51.46km/h	50.9km/h	37.5km/h

Other than one survey on Portsmouth Drive the results are remarkably similar between the MegaMaps data and that which was surveyed.

2.4 Travel Time Changes

MegaMaps provides guidance on what changes may be seen in mean operating speeds if the posted speed limit is reduced. Figure 2 below is an extract from MegaMaps. This chart shows that where the mean free flow speed is 50km/h a 10km/h reduction in the posted speed limit will result in a 2km/h reduction in mean operating speeds. Where the mean free flow speed is 60km/h a 10km/h reduction in the posted speed limit will result in a 3km/h reduction.

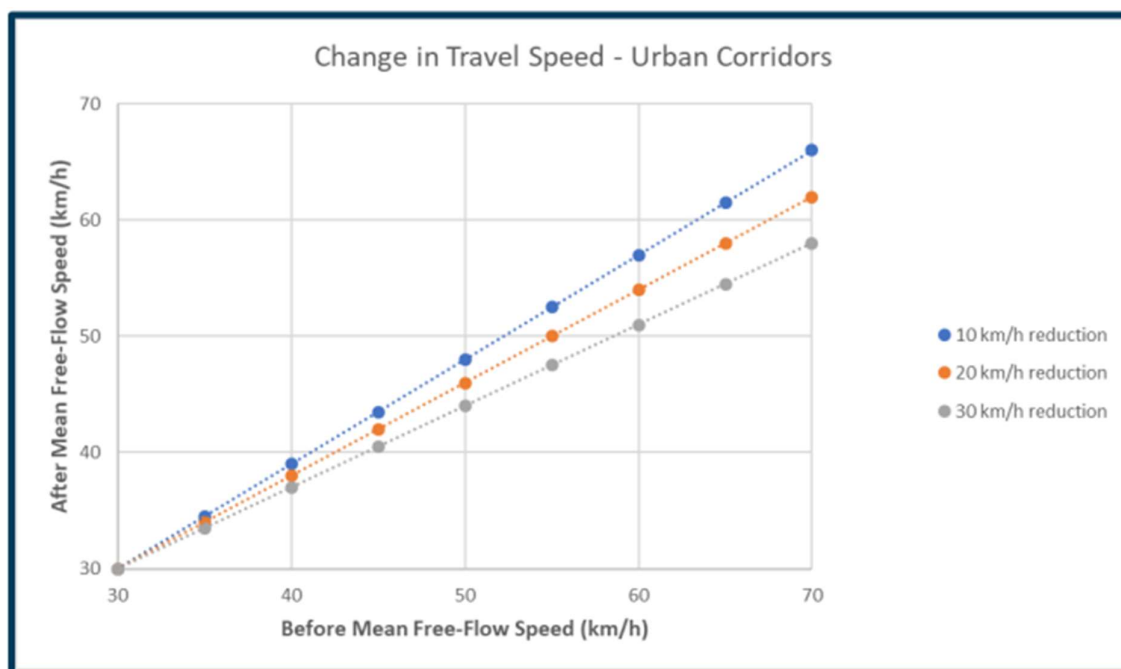


Figure 2: Expected change to mean operating speeds (from MegaMaps user and interpretation guide)

As shown in Table 3, the highest mean speed of five results on Portsmouth Drive is 58km/h, with an average of 54km/h. The lowest mean speeds were recorded on St Andrew Street which is the shortest link where speeds are naturally constrained by the roundabout at one end and a sharp turn at the rail crossing end.

Previous guidance on setting speed limits (Speed Limits New Zealand) stated that the mean operating speed should be around the same as the speed limit while the 85th percentile speeds should be around 10km/h higher. The mean operating speeds are closer to what would be expected for a 50km/h speed limit than a 60km/h speed limit. While this may mean little reduction in vehicle speeds will be noticed if the speed limit is lowered it also means that any losses due to increases in travel times will be minimal.

Travel time changes are derived from the following calculation and listed in Table 4 below:

$$(length/before\ speed - length/after\ speed) \times 3600$$

Table 4: Corridor Metrics

	Portsmouth Drive	Wharf Street	Thomas Burns Street	St Andrew Street Ext	Total travel time change
Length	1,100m	900m	500m	220m	
Mean operating speed before (average of all data)	54.06km/h	51.46km/h	50.9km/h	37.5km/h	
Mean operating speed after speed limit reduction	51.65km/h	49.54km/h	48.81km/h	37km/h	
Travel time changes	+3.4s	+2.4s	+1.5s	+0.3s	+7.7s

Based on the data contained in MegaMaps if the 60km/h speed limit along the full length of the route was reduced to 50km/h a free-flowing vehicle would take an additional eight seconds to travel from Portobello Road to the St Andrew Street rail crossing. In reality that is longer than the actual delay if any of the four sets of traffic signals were on red.

2.5 Side Road Speed Limits

A number of side roads intersect with the corridor, at present all of these side roads have a 50km/h speed limit, the only 60km/h limit being on the Jetty Street overbridge. If the corridor speed limit is reduced, then consideration will need to be given to the speed limit on the overbridge and how it interacts with the southbound one way which at present is 60km/h.

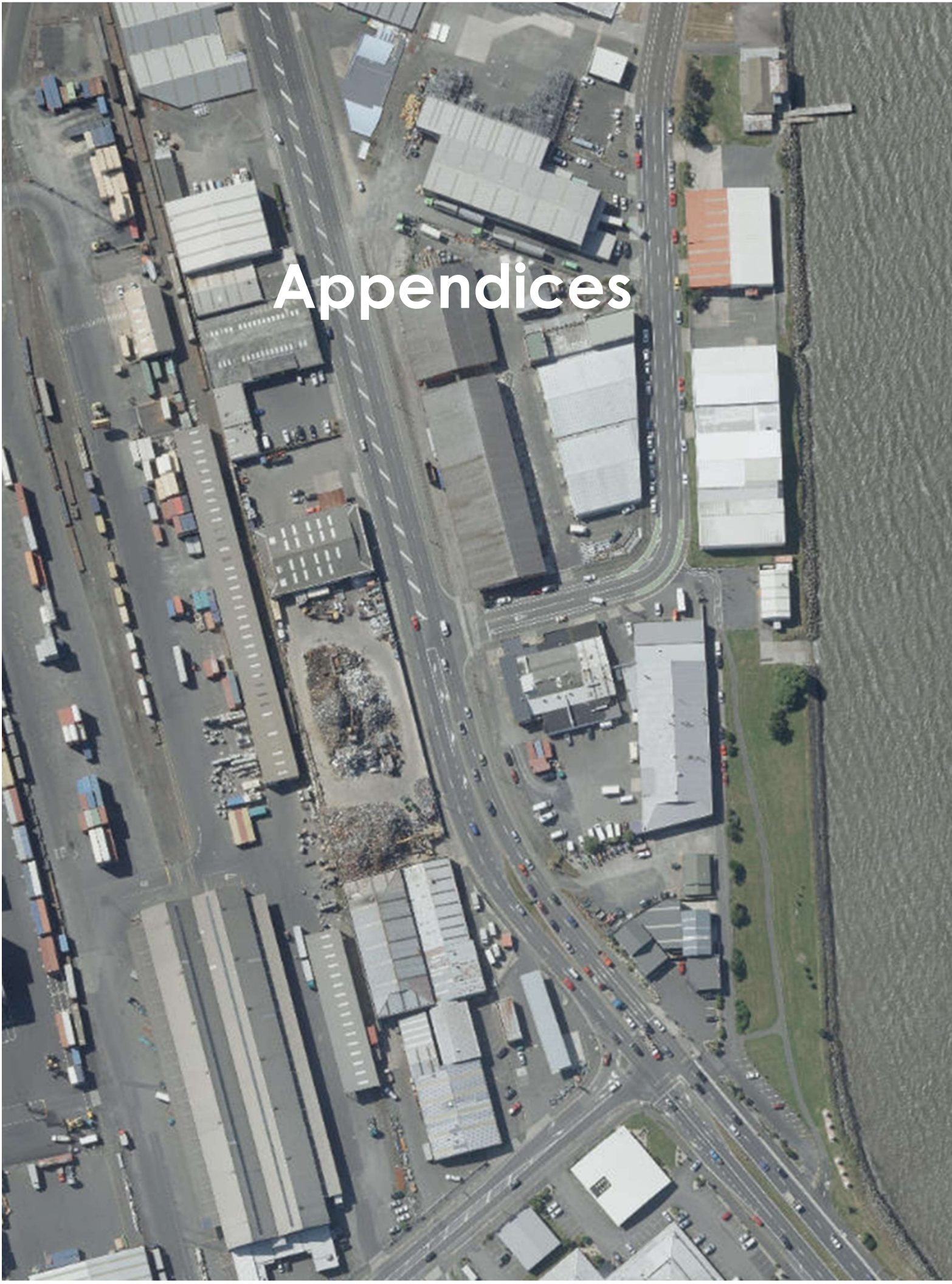
It should be noted however that none of the intersecting roads have a safe and appropriate speed of 50km/h. The majority are 30km/h with three roads having a SAAS of 40km/h; Midland Street, Strathallan Street and the Jetty Street overbridge. A decision needs to be made whether to concentrate solely on the Harbour Arterial and ignore the side roads for now or widen the area where speed limit changes may be made.

3 Conclusion and Recommendation

According to metrics derived by Waka Kotahi the safe and appropriate speed along the whole length of the corridor is 50km/h while it is currently signed as 60km/h. Speed survey data from MegaMaps and DCC surveys suggests that current travel speeds are in line with what one would expect for a 50km/h speed limit.

Research has shown that reducing the speed limit from 60km/h to 50km/h will result in slower vehicle speeds. Our analysis of current travel speeds indicates that in free-flowing conditions this reduction in the posted speed limit would add less than eight seconds to the time it takes a vehicle to travel the full length of the corridor. It is therefore recommended that the existing 60km/h speed limit between Portobello Road and St Andrew Street is reduced to 50km/h.

Appendices



Appendix A MegaMaps Outputs





Safe and Appropriate Speed (SAAS)



One Network Framework classification (ONF)



Infrastructure Risk Rating (IRR)

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