Road Safety Commission

40km/h Review City of Vincent

12 Month Trial Evaluation

June 2020

Executive Summary

Background

In April 2019, the City of Vincent, Road Safety Commission, WA Police, and Main Roads WA commenced a trial of a 40 kilometres per hour (km/h) local speed limit area in the southern section of the City of Vincent. Various quantitative and qualitative data was collected by the City of Vincent before and during the trial to support a formal evaluation.

GHD has been engaged by the Road Safety Commission to provide advice and monitoring of the data collection and research design, to undertake data analysis, and to evaluate the outcomes of the trial. This evaluation aims to consider a broad set of the outcomes of the trial, including both direct traffic and transport observations, and community perception of the potential local amenity and wellbeing outcomes associated with reduced posted local traffic speeds.

This evaluation seeks to assess the outcomes of the trial based on the **triangulation** of several sources of data, rather than any one data set or single result. Conclusions are drawn where multiple sources of data indicate a similar overall result (refer section 2).

This report summarises the results of the first twelve months of the trial. GHD also delivered a separate six-month report in February 2020, which contains broadly similar findings. Seasonal effects appear to have impacted on the six-month report.

This twelve-month report is subject to, and must be read in conjunction with, the limitations set out in Section 1 and the assumptions and qualifications contained throughout the report.

COVID-19 Pandemic

The twelve-month evaluation milestone data has been impacted by the COVID-19 Pandemic.

The specific impacts of COVID-19 on the evaluation is specifically addressed in section 2.4, and throughout the data analysis. Overall, most data was collected before the pandemic caused major changes in travel behaviour. Accordingly, **GHD believes that these trial results are valid and meaningful**, provided that any possible effects are considered in the analysis.

Vehicle Speeds

Based on the full set of evidence evaluated after twelve months of the trial, it appears that **the trial has resulted in some speed reduction effects**. Mean (average) vehicle speeds have reduced by about 1 km/h, or about 2.4%. The 85th percentile speed on trial roads has dropped by just over 1 km/h, or about 2.5%.

The reduction in average vehicle speeds is of a similar magnitude to the reduction seen with the introduction of the default 50 km/h limit in 2001 (section 3.1). The reduction is not as large as overall results generally seen in research internationally.

The number of vehicles observed at twelve months was comparable to the baseline, and no significant change was observed on distributor roads which were not subject to any change in speed limit.

Crash Prevention

After twelve months, crash records provided by Main Roads WA indicate that there **has been some crash reduction effect** on the trial roads.

This reduction coincides with a long-term decline in overall crashes within the City of Vincent. There was also a less substantial crash reduction in overall crashes within the control set of local roads (the northern part of the City of Vincent) not subject to the new limit.

The reduction in total crashes matches (triangulates) with the reductions in observed vehicle travel speeds, and aligns with established road safety theory. Therefore**, it is very likely that the 40 km/h limit would have long-term crash reduction benefits**.

The reduction in Killed and Seriously Injured (KSI) crashes was less in the trial area than in the control area. However, this finding is based on only three crash events (two in the trial area, one in the control roads). Therefore, this result is not statistically meaningful.

Results for crashes of different severity and road user types have been variable. The small size of the trial area means that single crash events can skew this data. Some of the crash data used in this evaluation was yet to be reviewed by Main Roads WA, and is therefore preliminary. Accordingly, future evaluation would be needed to substantiate the nature of the crash reduction more confidently.

Local Street Walking and Cycling

Significant increases in walking and cycling were observed at the four observation sites within the City of Vincent. **A total of 14% more pedestrians and cyclists were observed in the twelve month surveys,** compared to the February 2019 baseline.

The total number of cyclists also increased at twelve months. The percentage of all cyclists who were observed cycling on the road surface (rather than on footpaths) also increased from 67% to 70%, suggesting **there may be a perceived safety benefit for cyclists**. There were some differences between the four sites. The timing of these surveys was largely before the most significant disruption effects of the COVID-19 lockdown.

School representatives and crossing wardens interviewed for this evaluation also spoke of **benefits for children's' safety travelling to school** (section 3.5). However, these interviews indicate that increased awareness-raising measures beyond the immediate school zone could be beneficial.

Resident Perceptions

Residents surveyed expressed mixed overall responses about the trial. Overall, responses at twelve months were varied among the 151 resident surveys completed.

When asked directly about the trial, there was a reasonably even distribution of responses for questions concerning the potential safety and amenity benefits. This finding triangulates with the generally modest improvements in observed vehicle speed and pedestrian/cyclist count data.

Support for the trial appears to be lukewarm (section 3.4.5). While a small majority are unhappy with the lower limit, **there is not substantial or persistent opposition to the 40 km/h trial area among local residents. A majority of respondents surveyed at this twelve month milestone thought a 40 km/h limit could be useful in other areas.**

Indirect survey results indicate that residents are generally less concerned with road safety and local street amenity issues at this twelve-month milestone – further indicating benefits.

Open-ended comments about the trial mainly concerned:

- The perceived inappropriateness of the 40 km/h speed limit along Bulwer Street

- The perceived lack of compliance with the 40 km/h speed limit
- A perceived lack of enforcement
- A lack of awareness about the trial
- Confusion around signage for the trial

Survey respondents indicated that additional street design measures, signage, enforcement, and other awareness measures may improve compliance.

Conclusions

In view of all the above data, considering the triangulation of results, **the 40 km/h trial within the City of Vincent has resulted in some speed reduction and crash benefits. This result is in line with what would be expected based on previous research in this field.**

The evidence also suggests that **local street amenity has somewhat improved**. The increase in the total number of pedestrian and cyclists observed triangulates with the slight improvement in perceived street safety and amenity reported by respondents.

It is not possible to completely exclude the impacts of COVID-19 on these results. However, the triangulation of multiple sources of data (collected mostly before the pandemic) generally supports these findings.

Complementary street design, road user awareness, and enforcement measures to reinforce the 40 km/h speed limit may result in the realisation of a greater level of total benefits. If left in place, it is possible that vehicle speeds within the trial area would continue to mediate below the new limit – particularly if supporting measures are introduced. Future evaluation would be useful in assessing the longer-term effects and potential effectiveness of supporting measures.

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Appendices

Appendix A – References

1. Introduction

The 40 km/h trial took effect on all local roads within the southern part of the City of Vincent (broadly south of Vincent Street) on 29 April 2019. Distributor roads retained their existing posted limits, at either 50 km/h or 60 km/h. The two year trial is proposed to run until April 2021.

The spatial scope of the trial is illustrated in Figure 1-1 below.

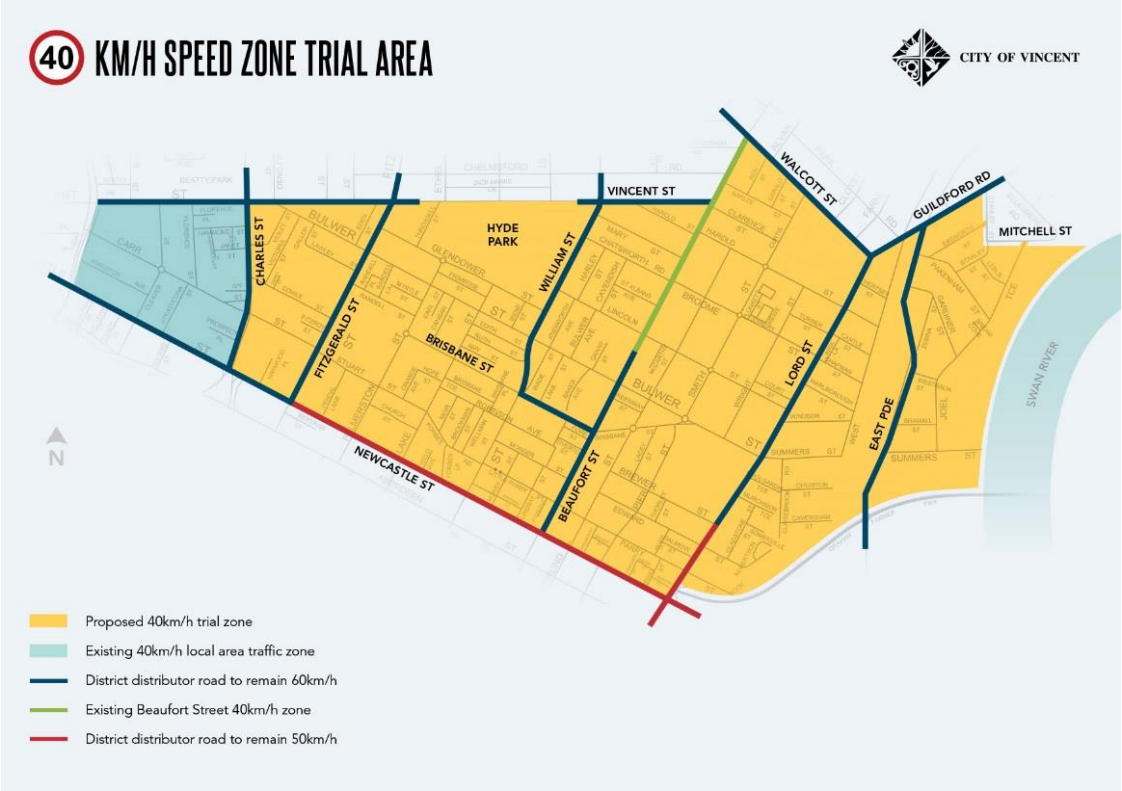

Figure 1-1: City of Vincent 40 km/h trial area

Other 40 km/h speed zone areas already exist within the City of Perth, the City of Fremantle, and some regional towns in Western Australia. The portion of the City of Vincent bounded by Newcastle Street, Loftus Street, Vincent Street, and Charles Street (the “Cleaver Precinct” – shown in blue at the left of Figure 1-1) also has an existing 40 km/h limit, instituted during the 2000s.

It should be noted that both William Street (between Newcastle Street and Brisbane Street) and Brisbane Street (between William Street and Beaufort Street) were converted to two-way operation on Sunday December 1, 2019.

1.1 Purpose, Scope, and Limitations of this Report

This report summarises the results of the study data provided to GHD for the baseline, six month, and twelve month trial milestones.

This report has been prepared by GHD for the Road Safety Commission and may only be used and relied on by the Road Safety Commission for the purpose agreed between GHD and the Road Safety Commission as set out in this report. The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report. GHD otherwise disclaims responsibility to any person other than the Road Safety Commission arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

This report is based upon data provided to GHD by the City of Vincent, Road Safety Commission, and third party contractors. GHD has prepared this report on the basis of information provided to GHD by the City of Vincent, the Road Safety Commission and others. GHD has not independently verified or checked this information beyond the agreed scope of work.

It should be noted that potential additional benefits arising from the trial (such as reduced traffic noise) for which data was not collected have not been evaluated. Accounting for these benefits could result in some variance in the overall efficacy of the trial.

GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.2 Acknowledgements

Data in this report has been collated and provided by the City of Vincent, Main Roads WA, and other agencies involved in the 40 km/h Trial Area Working Group. GHD would like to acknowledge all members of the Working Group for their assistance through the trial evaluation. GHD would like to thank Main Roads WA for providing the traffic trend and pre-release crash data that has been used in this report.

2. Research Approach

This research has been undertaken as a longitudinal (through time) study of the conditions which occurred before and during the trial.

This evaluation has employed a mixed-methods approach, gathering several different sources of information to investigate a broad range of possible effects resulting from the introduction of the trial 40 km/h area speed limit.

A mixed-methods case study research approach is based upon developing understanding through capturing and *triangulating* (matching findings and themes from) many different sources of data (Yin 2011, p. 14; MacCallum, Babb, and Curtis 2019, p. 46). In a mixed-methods research approach, conclusions are drawn based on patterns indicated across several sources of data, rather than from any single dataset. No definitive conclusion should be drawn from any single data point within this report; conclusions should only be drawn based on results which align from the analysis of several sources of data.

Where applicable, control datasets have been used to compare results within the trial area to results for similar locations which did not have a change in speed limit. The use of such controls helps to identify broader trends which may be occurring irrespective of the trial speed limit.

2.1 Research Context

This research has been informed by a review of similar evaluations and empirical assessments undertaken previously in Australia and internationally. Research strongly indicates that urban speed limits are an effective and cost-efficient mechanism to reduce fatalities and injuries occurring due to traffic crashes (Archer et al. 2008; Elvik et al. 2009a).

Evidence from other locations indicates that reductions in vehicle speeds on local roads may also result in reductions of traffic noise, and can promote walking and cycling, which have clear flow-on health, wellbeing, social, and economic benefits (Box and Bayliss 2012; James et al. 2014). The impacts of noise and air pollution resulting from traffic also reach minimal levels at a speed of 40 km/h (Elvik 2009b, p. 37). Reducing local speed limits typically has a negligible effect on journey times, particularly because small variations in trip time associated with travel on local roads at the start and end of journeys are not perceptible or significant when considered in the frame of whole trips (Haworth et al. 2001).

It is important to note that previous research suggests that, when speed limits are lowered, the actual travel speeds tend to decrease, but less than the full reduction in the speed limit. Evidence collected across countries generally indicates that a reduction of posted speed limit of 10 km/h results in travel speeds decreasing by less than 10 km/h – typically about 3-4 km/h (OECD/ECMT 2006, p. 100).

In addition to assessing quantitative transport activity data, qualitative data about resident perceptions is also a critical component of this study.

2.2 Research Design

Quantitative (traffic and road user activity data) and qualitative (attitudinal survey) data has been collected in regularly scheduled phases during the pre-trial (“ex ante”) and trial (“ex post”). The data collection in the pre-trial and trial periods has been consistent, and is explained below.

2.2.1 Quantitative – Crash Data

Crash data has been retrieved from the Main Roads WA crash database. Because the evaluation for the trial periods is occurring before the scheduled usual release of the data, specific extracts have been provided directly by Main Roads WA.

Crash data for a calendar year is reviewed and corrected during March and April of the following year. Therefore, **crash data released to GHD before these correction milestones may contain duplicates and other erroneous records which misrepresent crash risk**. Generally speaking, this dataset – often with uncorrected duplicate records, such as multiple reports made by multiple parties in a single crash – overstate recent crashes, making recent crash incidence appear worse than actual. GHD has not verified or filtered the crash data for these effects.

Crashes for a relatively small area across a short time frame may be impacted by "small number" effects. This means that the occurrence of a single crash (such as a non-frequent high severity crash) during the trial period may have an extreme weighting on the results, even though the underlying level of risk may have been reduced. Accordingly, analysis of crashes has been made by assessing the aggregate results for the baseline and trial periods.

Because actual travel speeds and crash risk is very closely correlated (see Jurewicz and Turner 2011, and Elvik 2009b), the change in overall vehicle speeds should also indicate the relative change in overall crash risk, assuming that no other factors have changed.

2.2.2 Quantitative – Active Transport Video Survey Data

The City of Vincent has commissioned an experienced video surveying provider to undertake counts of pedestrians and cyclists ("active transport" users) at four sites within the trial area (Table 2-1). Three of these sites are located in close proximity to the City's usual traffic count sites (see section 2.2.3 below), such that the data can be compared for analysis.

Table 2-1: Pedestrian and cyclist count sites

Site	Location	Intersection Type and Context	Nearby Traffic Count Site	Other Notes
Site One	Palmerston Street and Randell Street	Local T-junction with speed cushions on both streets, corner of Robertson Park.	Palmerston Street between Myrtle and Randell Streets (<50 m)	-
Site Two	William Street and Lincoln Street	T-junction terminus of Lincoln Street. Bakery on corner. Hyde Park opposite William Street	William Street between Lincoln Street and Chatsworth Road (<200 m)	William Street at this location (north of Brisbane Street) remains 60 km/h
Site Three	Vincent Street and Throssell Street and Ethel Street	Two closely-spaced T-junctions on Vincent Street. Corner of Hyde Park. Nearby traffic cushions on Vincent Street.	Vincent Street between Ethel Street and Norfolk Street (<200 m)	60 km/h limit resumes approximately 100 m west of Throssel Street.
Site Four	Bulwer Street and Smith Street	Single lane roundabout with nearby T-junction approx. 30 m south on Brisbane Street. Corner of Perth Oval/nib Stadium. Protected bicycling lanes exist along Bulwer Street.	Bulwer Street between Lord and Wright Street (>150 m). Considered too far from this site to be representative.	

Each site has been video surveyed for twelve hours (0700 – 1900) on the Tuesday, Wednesday, Saturday and Sunday of a single week for each data collection round. Therefore, there are 16 days of twelve hour observations for each data collection round, which have been manually observed and tallied. There are approximately 24,000 observed active transport movements in the baseline data set.

These locations were selected by the City of Vincent, Main Roads WA and the Road Safety Commission prior to the appointment of GHD. The selected sample provides a useful snapshot of daytime pedestrian and cyclist activity within the trial area. No control sites were selected for this analysis.

No suitable other control group has been identified for this evaluation. While activity on the Principal Shared Path (PSP) network was considered as a potential control, it was assessed that PSP counts are likely to be too sensitive to other local factors. Unfortunately, there is not a comparable public data source for pedestrian and cyclist activity which is directly comparable to the video surveys commissioned by the City of Vincent.

Observations have been pooled to daily totals and averages for analysis, using Excel formulae to draw total values from the various original workbooks provided by the City.

Any effects of weather have not been controlled for, but reported conditions on each sampled day are reported with the results (section 3.2).

2.2.3 Quantitative – Traffic (Vehicle Count) Data

The City of Vincent routinely captures traffic data at sites listed in Table 2-2, which have been surveyed around the time of the data collection periods.

Table 2-2: Traffic count data sites

Sample	Road	Location (between/near these side streets)
Within 40 km/h trial area	Brisbane St	Dangan-Lake
	Brisbane St	Lane-Lindsay
	Bulwer St	Fitzgerald-Palmerston
	Bulwer St	Lord-Wright
	Carr St	Charles-Fitzgerald
	Harold St	Smith-Wright
	Joel Tce	Bream Cove-Gardiner
	Mary St	Beaufort-William
	Palmerston St	Myrtle-Randell
	Pier St	Brewer-Edward
	Smith St	Broome-Lincoln
	Summers St	Claisebrook-West
	Vincent St	Ethel-Norfolk
	William St	Monger-Robinson
Distributor Roads not subject to trial 40 km/h limit	Fitzgerald St	Cowle-Randell N Bound
	Fitzgerald St	Cowle-Randell S Bound
	Lord St	Court-Marlborough N Bound
	Lord St	Court-Marlborough S Bound
	William St	Chatsworth-Lincoln N Bound
	William St	Chatsworth-Lincoln S Bound

Data was collected for a calendar week at each site, and is reported in the results section. For each data collection period, the City has provided summary statistics and access to the raw count files for analysis. This evaluation is based on aggregate statistics. There were about 551,000 total weekday vehicle movements observed in the baseline dataset.

These counts are based on pneumatic tube traffic counting technologies. These black rubber tube systems *may* detect cyclists travelling on the road, but are not generally designed for counting bicycle movements. We have assumed that all values reflect detection of vehicles.

Due to the week-long sample period, and the different specific weeks recorded at each site, the effects of weather or other atypical circumstances are not considered in our analysis of traffic counts. The effects of these will be negligible when data is analysed as part of the overall sample. The key data points from each site that are evaluated in this report are:

- Average Weekday Traffic (AWT) – the number of vehicles passing the survey point on a weekday
- Average (Mean) Speed – the average speed counting all observed vehicles
- 85th Percentile Speed. This is the speed that is exceeded by 15% of observed vehicles.

2.2.4 Qualitative – Attitudinal/Perception Surveys

A series of attitudinal surveys have been undertaken during the pre-trial period, and at intervals during the trial. These were collected through a targeted online survey hosted by the City of Vincent.

Respondents were recruited through letterbox drops within specific parts of the trial area. These locations were selected due to the specific conditions of each area (for instance, an area near a primary school was selected to identify results of the trial relating to school zones).

The pre-trial survey was conducted in April 2019, and the six-month survey was conducted in mid-November 2019. The November 2019 letter box recruitment strategy was a repeat of the April survey. The November survey also recruited responses by an email sent to participants of the first survey who provided their address for this purpose.

A twelve month survey was conducted during May 2020. This was a repeat of the six month survey, with some additional questions to assess travel behaviour change associated with the ongoing COVID-19 pandemic. The number of properties to which a flyer was delivered was also expanded, as the final evaluation sought to obtain a broad view from across the trial area. Respondents who provided email address details in previous surveys were also invited to complete this final survey.

The questionnaire design for the twelve month evaluation was also modified to reduce the impact of COVID-19 on attitudinal questions. This is explained further in section 3.4.4.

Prior to this evaluation process, the City of Vincent also undertook earlier surveys (in October 2018) to support the establishment of the trial. These results have also been considered through the qualitative analysis, though direct comparison between results is not possible due to differences in sampling and question design.

No control group was selected for this analysis, as only perceptions within the trial area are of interest, and as the baseline survey effectively serves as the benchmark for comparison of trial results.

The survey design for this evaluation is detailed further in GHD Memorandum *6138251-MEM-C_Vincent 40 km Survey Design*.

2.2.5 Qualitative – School Zones

The safety and amenity for children travelling to school is an important public policy issue, especially for encouraging routine walking and cycling. The potential safety and amenity benefits for children's travel to school associated with the trial 40 km/h area was identified as a point of interest for the Road Safety Commission.

Reduced speed areas, such as around schools, have been widely demonstrated to have safety benefits, especially when street design measures and posted speed limits are coordinated (Elvik et al. 2009, p. 455).

The trial 40 km/h area speed limit effectively means that 40 km/h school zones effectively apply across the entire day, and across a broader part of the local street network surrounding schools. In theory, this can extend the protective effects of the 40 km/h to people travelling around the school outside typical school zone times (for example, students involved in after-school activity).

The effects on safety and amenity resulting from a change from conventional school zones (within default 50 km/h local road networks) to a 40 km/h local road area are challenging to directly observe and evaluate. Accordingly, a qualitative research approach to understand perceived effects of the trial among key school community representatives was adopted.

On behalf of the Road Safety Commission, GHD requested phone or email interviews with School Traffic Wardens and representatives of the two primary schools located within the trial area. The interviews follows a short, semi-structured format. The WA Police Force facilitated contact for the interviews with traffic wardens, while GHD contacted school administrations directly.

These interviews were only conducted at the twelve month milestone, and are reported in section 3.5.

2.3 Research Limitations

This research, at the twelve month milestone, is limited by:

- The relatively short time trial period frame, which only encompasses one year of data. There are unique features of this period (including the COVID-19 pandemic, and other more typical seasonal changes, influences, and trends).
- The scale and geographical nature of the network level trial area. The trial area is relatively small when considered against the wider metropolitan area. The trial area street network is much more constrained than typical suburban road networks.
- Potential effects associated with the transition and adjustments in driver familiarity and habits. The twelve month period may reflect effects associated with adjustment which would not exist if the 40 km/h area had been continually operating/permanent.

Accordingly, GHD suggests that this evaluation process is repeated at the 24 month milestone, which is the scheduled data for the trial to conclude. This evaluation could also consider in more detail how findings of the evaluations could inform speed zoning beyond this 24 month mark.

2.4 Effects Associated with the COVID-19 Pandemic

The twelve month evaluation data collection has occurred during the outbreak of SARS-CoV-2 coronavirus, which results in COVID-19 disease. This round of data collection has occurred while the effects of the pandemic have acutely impacted upon the lives of residents of the Perth Metropolitan Area. Government measures to mitigate the spread of the coronavirus through physical distancing have impacted the trial area to a similar degree to urban locations across Australia.

The COVID-19 pandemic has seen extreme reductions in vehicle traffic and public transport patronage in cities globally. Pedestrian and cycling activity has generally increased, as social distancing and increased time spent at home has incentivised active transport as a form of physical exercise and recreation.

The travel behaviour change effects of the pandemic has generally coincided with this twelve month evaluation. The complexity of these effects (such as more people initially driving to avoid public transport before large scale transition to travel avoidance) means that single measures may not fully capture the timing of the pandemic. However, Google Mobility Trends data[1] has been published by Google for an international set of cities, which represents overall activity changes coinciding with the twelve month milestone. GHD has used this data to illustrate the magnitude of possible travel behaviour change, which can be compared to other cities within the international dataset.

Generally, it appears that travel behaviour changes are very defined commencing from the middle of March 2020 (Figure 2-1), with a corresponding increase in home-based activity. The timing of the data collection methods, as presented in Table 2-3, indicates that there may be different impacts on each dataset. Importantly, the traffic count dataset appears to have been mostly collected ahead of the impacts of COVID-19, while the resident perception survey was able to specifically address COVID-19 in the questions asked to the respondents.

Ultimately, while COVID-19 represents an unprecedented disruption in travel patterns and behaviours, the results of the twelve month datasets do still have relevance for the evaluation of the trial.

[1] See https://www.google.com/covid19/mobility/

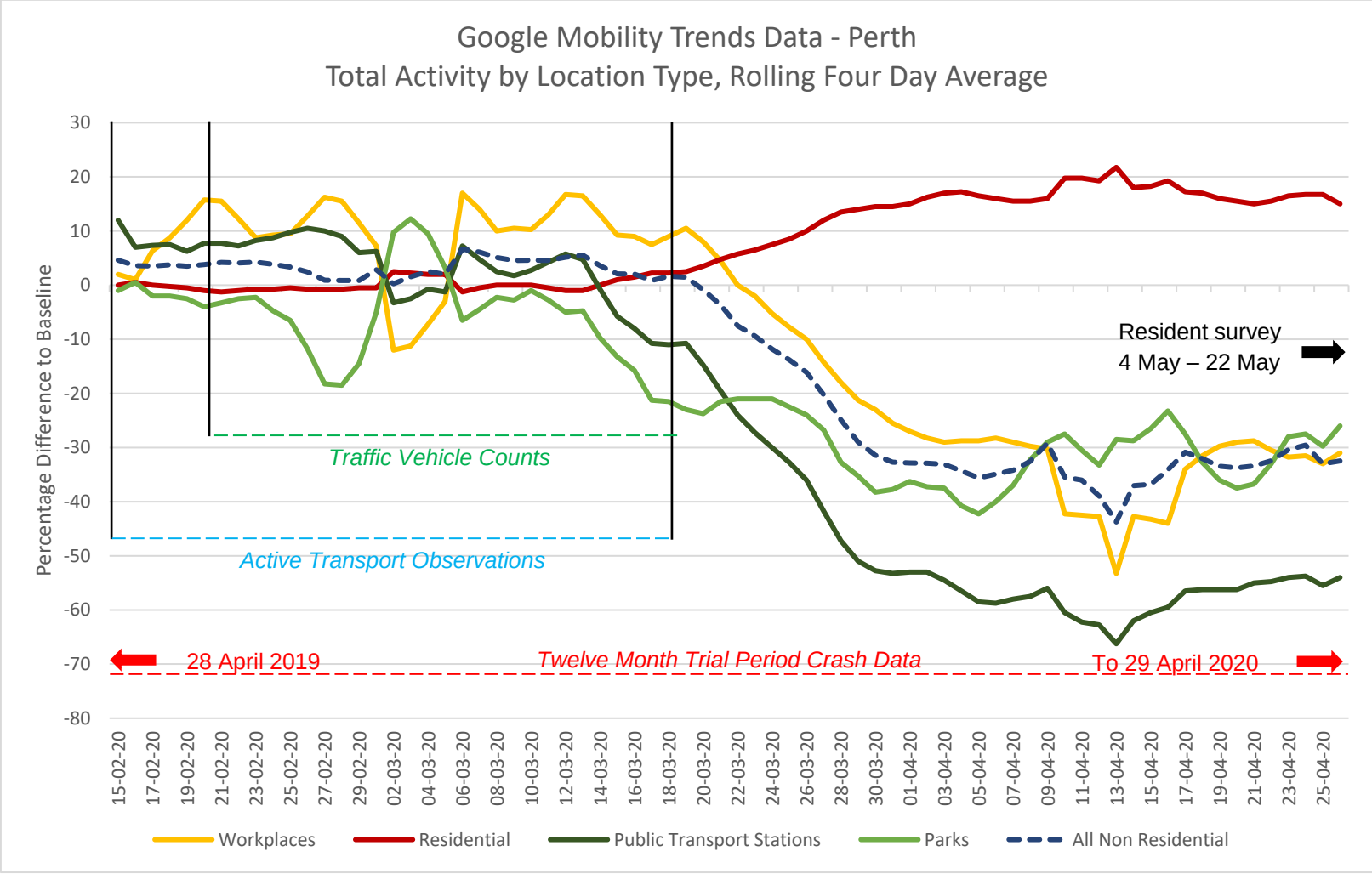

Figure 2-1: Google Mobility Trends Data - Perth Total Activity by Location Type, Rolling Four Day Average

Source: GHD Analysis of Google Data, original source: https://www.google.com/covid19/mobility/

Table 2-3: Effects associated with COVID-19 by twelve month evaluation dataset

Dataset	Date Collected	Changes to data Collection Process	Expected Magnitude of Effect
Crash Data (Section 3.1)	Requested 4 May – period is for 28 April 2019 to 29 April 2020.	No change in GHD evaluation process. Reporting and processing of crash statistics by crash involved parties, WA Police and Main Roads may be altered.	Changes in travel behaviour mainly occurred over the last six weeks of this evaluation period (Figure 2-1). However, reduced traffic volumes over these weeks may have complex impacts on crash risk and incidence. It should not be assumed that reduced traffic necessarily results in reduced risk. Crash incident occurrence rates during the pandemic have varied between cities globally.
Active Transport Observations (Section 3.2)	15 February – 18 March	No change in data collection process.	Later March traffic survey counts are more likely to be impacted more than February dates (refer section 3.2.2). However, it generally appears that these counts occurred just before the most substantial changes in travel patterns.
Traffic Vehicle Counts (Section 0)	20 February – 18 March	None – routine counting as conducted by the City of Vincent. Note that subsequent routine counts were cancelled.	Likely to be some impact, especially on counts during March, though these appear to be of small magnitude. The overall traffic volumes observed were comparable to the 2019 baseline.
Resident Perception Survey (Section 3.4)	4 May – 22 May	Revisions to survey working and questions to specifically define questions about travel over the past year *generally*. Addition of an open-ended question about specific impacts of COVID-19 to capture whatever respondents feel is notable about their travel in this period.	Likely to be some influence on results, even with revisions to questions to try to minimise these effects. Survey results should be evaluated with consideration of these possible impacts.

3. Results

This section presents a summary overview of the results of the trial.

All comparisons are between the data collected at the twelve month evaluation point and the pre-survey baseline, unless specifically stated.

Detailed interpretation and concluding analysis is provided in Section 4 of this report.

3.1 Crash Data

Crash data was provided by Main Roads WA. This data has been evaluated longitudinally, and compared between baseline and trial periods.

3.1.1 Reporting Effects and Limitations

As noted in section 2.2.1, crash data for a calendar year is reviewed and corrected during March and April of the following year. Therefore, **crash data released to GHD before these correction milestones may contain duplicates and other erroneous records which misrepresent crash risk**. Generally speaking, this dataset – often with uncorrected duplicate records, such as multiple reports made by multiple parties in a single crash – overstate recent crashes, making the trial period crash incidence appear **worse** than actual. GHD has not verified or filtered the crash data for these effects.

For the twelve month evaluation, crashes records for the period 1 January to 28 April 2020 are likely to have duplicates. These have not been adjusted by GHD.

Main Roads WA provided two sets of crash data:

1. A set of crash data for 1 January 2014 to 24 November 2019 was received in December 2019, and is reported in the Six Month Evaluation Report. The data for the trial period contained within this dataset has been superseded by the Twelve Month data detailed below. However, the baseline dataset of 27 April 2014 to 28 April 2019 has exclusively been taken from this dataset.
2. A set of crash data for 1 January 2015 to 30 April 2020 was received in May 2020. This data was used to develop 12 month trial period statistics.

It should be noted that some crashes reported for the six month trial period have been normalised in a way that changes the twelve month results. Example changes are noted below:

- Some duplicate crash records (i.e. for the same crash reported by multiple parties) have been removed, altering crash rates.
- The street name for some crashes changed, such that it transfers them from one subset to another. For instance, a crash reported for a minor local road, intersecting with a major road in the first dataset, was reclassified to be reported for the major road in the second issue of the data. Accordingly, the crash went from being included in the control group to an excluded distributor group, altering the control crash rate.

Owing to these differences, GHD recommends that a definitive re-analysis is completed after this one year data is reviewed and finalised by Main Roads WA in April 2021.

To allow for comparison of annualised rates, these crashes have been divided into time periods as per Table 3-1.

Table 3-1: Trial Time Periods

Time Period Subset					Notes
Pre_Baseline_Exclude	From	1-Jan-14	to	27-Apr-14	Before the baseline – discard, not reported
Baseline	From	27-Apr-14	to	28-Apr-19	Five year period – Baseline
Trial_0-6_Month	From	29-Apr-19	to	28-Oct-19	Six month period of the trial (reported in six month report and not in this document)
Trial_Year	From	29-Apr-19	to	29-Apr-20	Twelve month period of the trial, reported in this document.

All baseline crashes were converted to annualised crash rates. The crash rates were not adjusted per vehicle distance travelled, as no specific vehicle distance data is available.

To compare between the trial area and a suitable control group, roads within the City of Vincent were manually divided into categories relating to the trial as per Table 3-2. All crashes were assigned to only one subset.

Table 3-2: Trial Road Categories

Road Type Subset	Definition
Control	Local road outside trial area which retained existing limit (mostly default 50 km/h Built Up Area limit. This group provides a comparison to indicate broad changes which may have occurred irrespective of the trial.
Control Distributor	Distributor road outside trial area which retained existing limit (almost entirely 60 km/h posted arterial roads).
Excluded	Roads not appropriate for any other group, including Freeways, Freeway access ramps, Safe Active Streets, and Right Of Way roads (i.e. laneways and shared spaces). Brisbane Street was included in this group due to conversion to two way during the six month trial period. Crashes for these roads are still reported in “All Roads” categories.
Trial	Roads subject to the new 40 km/h speed limit, including sections of distributors where the limit was applied.
Trial Distributor	Distributor road within the trial area which retained an existing limit greater than 40 km/h (either 50 km/h or 60 km/h). Results for these roads have not been evaluated, but are included in the “All Roads” category.
All Roads	All of the above

Some “All Roads” totals presented in tables in the following section do not equal the sum of subset values, as not all subsets are presented.

Generally, crashes within the City of Vincent appear to have been slightly declining across the most recent five years of available data. This may reflect many factors, including changes in travel patterns and risk factors beyond speed limits and policy-specific road safety measures. For instance, if total vehicle distance travelled in Vincent has reduced, the rate of crashes would most likely decline, even if there had been no change in actual crash risk.

Analysis of seasonal (May to October) data, shown in Figure 3-1, illustrates what appears to be a general reduction in all crashes over the five year dataset.

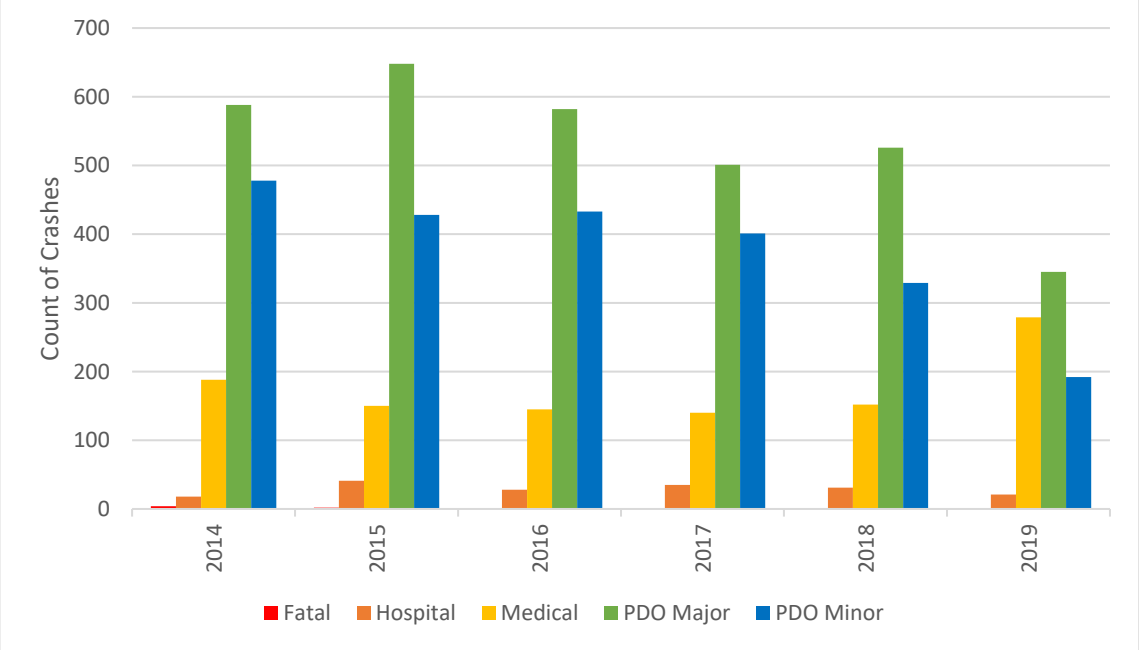

Figure 3-1: Seasonal Crashes in Vincent (Whole Local Government Area), by Severity, 2014 to 2019

The following sections present all data converted to annualised figures. Several limitations of this should be noted:

- As the trial year period is one year, and the baseline period is five years, the results for the trial period are more sensitive to individual crash events.
- The full year of the trial period also means that seasonal effects should be minimal. However, possible effect of the *introduction* of the trial (including changes in driver awareness or uncertainty about the applicable limit) may influence crash rates.

Where possible, results on the roads subject to the new 40 km/h limit have been compared with those on control local roads (roads in the City of Vincent which are subject to the default 50 km/h limit during both the baseline and trial periods.)

3.1.2 All Killed and Seriously Injured Crashes

A driving motivation for the trial is to prevent death and serious (permanent) injury resulting from crashes. Crashes in which any person is killed or seriously injured are referred to as KSI crashes. Based on Main Roads WA crash data, “Killed” crashes are those in which a person dies within 30 days of being involved in a crash. “Seriously Injured” crashes are generally those in which a person sustains injuries requiring hospitalisation. Medical crashes are generally those in which a person seeks treatment for injuries which are minor.

A total of 198 KSI crashes were reported during the baseline period (about 40 per year), and 26 during the first year of the trial period.

It should be noted that, as this data has been issued ahead of the usual review and publication process, crashes recorded for 2020 are subject to possible reclassification. Figures reported for 2019 in the six month evaluation have also been superseded by corrected data provided to GHD for this evaluation.

During the baseline time period, the trial and control roads had a similar annual rate of KSIs for all road users (Table 3-3). This is also true for the trial period, though total numbers are very small.

Table 3-3: Yearly Crash Rate - all KSI Crashes

Road Subset	Baseline	12 Month Trial Period	Change
Control Roads	5.6	1	-82%
Trial Roads	6	2	-67%
Distributor Roads (beyond trial area)	13.2	11	-17%
All Roads	39.6	26	-34%

During the twelve month trial period, the reported KSI crash rate for both trial roads and control roads has declined. However, the data for the trial period reflects only one to two crashes, which means that individual crash events have very significant impact on the calculated trend.

It appears that crashes on distributor roads have reduced less than crashes on local roads, suggesting that local roads (within and outside the trial area) have become safer during the trial period.

3.1.3 Vulnerable Road User KSI Crashes

Vulnerable Road Users (VRU) are those who are using travel modes which are most exposed to harm resulting from crashes. This category includes people walking and using wheelchairs, cyclists, motorcyclists, and people riding mopeds, small scooters, skateboards, etc. Reducing harm to VRUs is a key policy objective to support healthy active transport and recreation.

The annual KSI rate for VRUs was slightly higher for trial roads than control roads during the baseline period (total of 33 crashes), while it was higher for the trial roads during the trial period (two hospital severity crashes for the trial group and one for the control group). However, this difference is a single crash, which is not statistically indicative of a difference in risk.

This finding is inconclusive, but suggests that local roads across the City of Vincent were safer for VRUs during the first year of the 40 km/h trial. The effects of the trial for VRUs are not measurable with only one year of data. When figures for distributor roads beyond the trial area are analysed, a smaller improvement in VRU safety (23% crash reduction) is indicated by the data.

Table 3-4: Yearly Crash Rate - VRU KSI Crashes

Road Subset	Baseline	Twelve Month Trial Period	Change
Control Roads	3.4	1	-71%
Trial Roads	3.2	2	-38%
Distributor Roads (beyond trial area)	5.2	4	-23%
All Roads	14.2	12	-29%

3.1.4 All Medical Crashes

While prevention of KSI crashes is the main focus of road safety policy, medical crashes also represent a problem and cost for the public, and can indicate underlying risks which might result in KSI crashes.

Medical crashes (generally defined as those where a person seeks basic medical attention, such as with a General Practitioner) reported for all road users decreased for both trial and control roads between the baseline and twelve month period (Table 3-5). The trial roads only had one medical KSI reported for the twelve month period.

Table 3-5: Yearly Crash Rate - All Medical Crashes

Road Subset	Annual Baseline	Twelve Month Trial Period	Change
Control Roads	21.8	10	-54%
Trial Roads	12.8	1	-92%
Distributor Roads (beyond trial area)	66.6	59	-11%
All Roads	159.4	139	-25%
% on Trial Roads	37%	9.1%	N/A

3.1.5 All Crashes

Lastly, evaluating all crashes (for all road users and severity levels) provides the largest dataset to assess the potential impacts of the trial.

While Property Damage Only (PDO) crashes indicate road safety risks, it is important to acknowledge that road safety policy and practice now aims to reduce severe crashes, rather than Property Damage Only crashes. Crashes in which property is damaged but no persons are physically harmed are not the central focus of road safety measures. The prevention of harm to people is the primary aim of road safety policy.

The outcomes for all crashes, including KSI, Medical, and PDO crashes is shown in Table 3-6. The change for the trial roads and the control roads has been similar, with a slightly greater improvement among the trial area.

Table 3-6: All Crashes

Road Subset	Annual Baseline	Twelve Month Trial Period	Change
Control Roads	191	102	-47%
Trial Roads	157.4	71	-55%
Distributor Roads (beyond trial area)	449.4	265	-41%
All Roads	1365.4	837	-39%

3.1.6 Summary Finding

When viewed against the vehicle speed data, which indicates a slight reduction in vehicle speeds (see section 0), it appears that the trial limit has had some small protective effect in reducing road traffic crashes, with some possible reduction in severity. However, this has occurred over a period where crashes reported across the rest of the City of Vincent have also generally declined.

Based on this crash data, the evidence presented in the following subsections, and the broader evidence in the wider research literature, GHD concludes that the trial area has reduced crash

risk overall, in line with what would be expected based on the observed changed in observed vehicle speed behaviour.

Since the trial area speed limit has not involved any other speed management countermeasures (such as street design changes, changes in enforcement, etc.), it is likely that use of these other countermeasures in conjunction with the 40 km/h speed limit would probably result in a stronger crash reduction effect. It should be noted that WA Police performed very limited enforcement of the 40 km/h speed limit during the twelve month trial period.

It should also be noted that corrections to the crash data for 2020, scheduled to be performed by Main Roads WA in April 2021, will probably alter the crash statistics for this period. If duplicates are removed or crashes reclassified to higher-order roads (refer 3.1.1), it is possible that the results for the trial period may indicate a stronger crash prevention benefit.

These preliminary findings are based on a single twelve month period. Ultimately, due to small number effects at twelve months, analysis over an extended time period is needed to more conclusively demonstrate the magnitude of the crash reduction benefits.

3.2 Active Transport Activity

This section reports on the pedestrian and cyclist observations undertaken for this study, both from the baseline and six month trial period.

3.2.1 Baseline

Baseline active transport activity surveys occurred in late March 2019. Weather conditions observed on these days is representative of typical March conditions, and is therefore not likely to have unduly influenced the survey results (Table 3-7).

Table 3-7: Baseline Active Transport Observation Survey Dates

Survey Day	Date	Weather Reported (BOM)[2]		
		Min. °C	Max. °C	Rain
1	Tuesday, 26th March 2019	14.8	34.0	None
2	Wednesday, 27th March 2019	16.3	29.6	None
3	Saturday, 30th March 2019	14.1	30.7	None
4	Sunday, 31st March 2019	16.7	35.2	None
Trial Started	Monday, 29th April 2019			

The total number of observed active transport users was 23,879. 19,381 pedestrians were observed – and 3,003 cyclists were counted riding on the road, with 1,495 riding not on the road (Table 3-8).

Saturday was less busy than the other days, mainly due to there being fewer pedestrians counted at sites two (William Street) and three (Vincent Street).

[2] Bureau of Meteorology, Perth WA Daily Weather Observations. http://www.bom.gov.au/climate/dwo/201903/html/IDCJDW6111.201903.shtml

Table 3-8: Baseline Survey Totals for Each Day (Sum of all sites)

Total of all Sites	Tue	Wed	Sat	Sun	Mean	Total
Total Pedestrians	4,975	5,266	3,764	5,376	4,845	19,381
Total Cyclists (On-Road)	1,043	643	515	802	751	3,003
Total Cyclists (Off-Road)	405	646	191	253	374	1,495
Total Active Transport Road Users	6,423	6,555	4,470	6,431	5,970	23,879
% Cyclists On Road	72%	50%	73%	76%	68%	67%

Of all sites, William Street has the highest daily pedestrian count (1,810 per day), while Bulwer Street had the most cyclists (~ 400 per day, mostly on road). These results are summarised in Table 3-9.

Table 3-9: Baseline Site Totals (Daily averages, all days)

Daily Average Counts by Site	Site One Palmerston Street	Site Two William Street	Site Three Vincent Street	Site Four Bulwer Street	Mean
Total Pedestrians	973	1,810	917	1,146	1,211
Total Cyclists (On-Road)	194	128	115	314	188
Total Cyclists (Off-Road)	104	114	70	86	93
Total Active Transport Road Users	1,271	2,052	1,101	1,546	1,492
% Cyclist On Road	65%	53%	62%	78%	65%

3.2.1 Six Month Results

Please refer to the Six Month Evaluation Report (*6138251-REP-C_Evaluation Report - 6 Month*) for detailed commentary on the results observed at the six month milestone.

3.2.2 Twelve Month Results

The twelve month data collection period occurred twelve months after the baseline data collection period. This was one week before the full twelve months of the trial period had elapsed.

Weather on these survey days is broadly representative of typical late February conditions in Perth, with negligible rain on Saturday 22 February (Table 3-10).

The weather was also broadly similar to the baseline (refer section 3.2.1). Therefore, the weather for these days is not expected to have had a substantial impact upon results.

Table 3-10: Twelve Month Active Transport Observation Survey Dates

Survey Day	Date	Sites Surveyed	Weather Reported (BOM)		
			Min. °C	Max. °C	Rain mm
1	Saturday, 15th February 2020	One, Four	22.3	25.6	None
2	Sunday, 16th February 2020	One, Four	18.0	26.3	None
3	Tuesday, 18th February 2020	One, Two, Four	16.9	33.5	None
4	Wednesday, 19th February 2020	One, Two, Four	22.1	36.2	None
5	Saturday, 22nd February 2020	Two	20.1	27.7	1.0
6	Sunday, 23rd February 2020	Two	19.6	33.5	None
7	Tuesday, 3rd March 2020	Three	15.0	32.6	None
8	Wednesday, 4th March 2020	Three	13.7	33.7	None
9	Saturday, 7th March 2020	Three	20.5	26.8	None
10	Sunday, 8th March 2020	Three	17.6	30.3	None
Twelve month milestone	Tuesday, 28th April 2020				

As discussed in section 2.4, the later survey dates coincide with the early effects of the COVID-19 pandemic, particularly for Site Three. However, these surveys were conducted ahead of the largest travel behaviour change effects (occurring from roughly 15 March onward), as shown in the Google Mobility Trends Data in Figure 2-1.

Data for Sites One, Two, and Four may be impacted by initial behaviour changes associated with the COVID-19 pandemic, before widespread social distancing arrangements had been implemented. Therefore, this data may be indicative (but not necessarily definitive) for how the trial may have impacted participation in walking and cycling.

For the purposes of analysis, data taken on the same days of the week on different individual dates (i.e. data collected on both Tuesday dates) have been aggregated.

Vehicle count sites near Sites One and Three have similar traffic volumes observed between baseline and the twelve month data collection, with observed reductions in mean and 85th percentile speeds for vehicles (Table 3-11).

Table 3-11: Measured Traffic Speeds near Active Transport Observation Survey Sites

Site	Nearby Traffic Count Site	Baseline			Six Months			Twelve Months			% Change (Baseline – 12 Month)		
		Average Weekday Traffic	Ave Speed	85% Speed	Average Weekday Traffic	Ave Speed	85% Speed	Average Weekday Traffic	Ave Speed	85% Speed	Average Weekday Traffic	Ave Speed	85% Speed
Site One	Palmerston Street between Myrtle and Randell Streets (<50 m)	2,786	29.1	36.5	2,617	29.6	36.7	2,659	28.7	36.0	-5%	-1%	-1%
Site Two	William Street between Lincoln Street and Chatsworth Road (<200 m)	Not subject to new limit (remains 60 km/h)											
Site Three	Vincent Street between Ethel Street and Norfolk Street (<200 m)	11,597	45.2	52	10,861	44.9	51.5	11,499	41.2	49.7	-1%	-9%	-4%
Site Four	Bulwer Street between Lord and Wright Street (>150 m)	Survey locations considered too far apart to be cross-referenced											

Pink shading indicates vehicle speed increases from baseline or above the applicable legal speed limit, green indicates a reduction.

The total number of observed active transport users was 27,418 (Table 3-12), an increase on both the March 2019 baseline (23,879) and October 2019 Six Month counts (23,181). The increase between the total number of pedestrians and cyclists between the baseline and twelve month surveys was 14.8% (an additional 3,539 observations). A total of 22,678 pedestrians were observed, while 3,340 cyclists were counted riding on the road, with 1,400 riding not on the road (Table 3-12).

Table 3-12: Twelve Month Survey Totals for Each Day (sum of all sites)

Total of all Sites	Tue	Wed	Sat	Sun	Mean	Total
Total Pedestrians	7,874	5,599	4,721	4,484	5,670	22,678
Total Cyclists (On-Road)	685	751	1,038	866	835	3,340
Total Cyclists (Off-Road)	356	272	385	387	350	1,400
Total Active Transport Road Users Observed	8,915	6,622	6,144	5,737	6,855	27,418
% Cyclists On Road	66%	73%	73%	69%	70%	70%

Of all sites, William Street again had the greatest daily pedestrian count (1,939 per day), while Bulwer Street again had the most cyclists (415 per day, mostly on road). These results are summarised in Table 3-13 below.

Table 3-13: Baseline Site Totals (Daily averages, all days)

Daily Average Counts by Site	Site 1 Palmerston Street	Site 2 William Street	Site 3 Vincent Street	Site 4 Bulwer Street	Mean
Total Pedestrians	1,147	1,939	889	1,695	1,417
Total Cyclists (On-Road)	260	138	142	295	209
Total Cyclists (Off-Road)	41	121	69	119	88
Total Active Transport Road Users	1,448	2,198	1,100	2,109	1,714
% Cyclist On Road	86%	53%	67%	71%	70%

When compared with the baseline, we see a significant increase (~15%) in overall active transport at the four sites. There is some reduction in cycling off the road, which is more than offset by increased on-road cycling. 17% more pedestrians were counted overall. Counts by days of the week appear to show an overall general increase, with some quite erratic variations (Table 3-14, overleaf).

Table 3-14: Site Totals Compared to Baseline

Total of all Sites	Tue		Wed		Sat		Sun		Total	
	n	%	n	%	n	%	n	%	n	%
Total Pedestrians	2899	58.3%	333	6.3%	957	25.4%	-892	-16.6%	3297	17.0%
Total Cyclists (On-Road)	-358	-34.3%	108	16.8%	523	101.6%	64	8.0%	337	11.2%
Total Cyclists (Off-Road)	-49	-12.1%	-374	-57.9%	194	101.6%	134	53.0%	-95	-6.4%
Total AT Road Users	2492	38.8%	67	1.0%	1,674	37.4%	-694	-10.8%	3539	14.8%

Pink shading indicates fewer pedestrians/cyclists from baseline; green indicates more.

When observing cyclists, we see overall increase in the proportion of cyclists riding on-road (Table 3-15). This might indicate that a subset of cyclists are more comfortable cycling on the road as a result of the trial speed limit. Overall, 4,498 total cyclists were counted in the baseline survey, and 4,740 at twelve months – an increase of just over 5%. Further work to directly interview cyclists (such as brief intercept surveys at the count site) about their comfort riding on the road within the trial area may be useful in further understanding this finding.

Table 3-15: Change in Proportion of Cyclists Riding On-road (Sum of all days)

Total of all Days	Site One	Site Two	Site Three	Site Four	Total (%)	Total on road (n)
Baseline Percentage on Road	65%	53%	62%	78%	67%	3,003
Twelve Month Percentage on Road	86%	53%	67%	71%	70%	3,340
Change in Percentage on Road	21%	0%	5%	-7%	4%	-
Change in Number on Road	-358	108	523	64		337

3.3 Traffic (Vehicle Counts)

This section presents traffic data detected by counts completed by the City of Vincent (refer 2.2.3).

3.3.1 Baseline

Baseline count results are summarized in Table 3-16.

Table 3-16: Baseline Total Observed Traffic Statistics

Sample Subset	AWT Five day			Ave Speed	85th% Speed
	Mean	Daily Total	Grand Weekday Total		
New 40 km/h Roads	4408.9	61,725	308,625	39.5	47.6
Excluded Distributor Roads	8076.3	48,458	242,290	51.3	58.1
Totals	-	110,183	550,915	-	-

The first series of traffic surveys undertaken for the baseline were conducted a few months in advance of the commencement of the trial during the months of February and March (Table 3-17). There was some degree of non-compliance of the 50 km/h default speed limit at the 85th percentile, indicated with red shading for streets listed in Table 3-17. For comparison, speed compliance on the distributor roads was consistently good.

Table 3-17: Baseline Traffic Dataset

Road	Location	Survey Date		AWT Five day	Ave Speed	85% Speed	% Heavy Veh.
40 km/h Trial Roads							
Brisbane St	Dangan-Lake	27-Feb-19	06-Mar-19	1410	38.1	46.1	2.6
Brisbane St	Lane-Lindsay	20-Feb-19	27-Feb-19	3208	41.2	50.9	4.9
Bulwer St	Fitzgerald-Palmerston	27-Feb-19	06-Mar-19	11,248	45.9	52.7	2.5
Bulwer St	Lord-Wright	20-Feb-19	27-Feb-19	7411	47.2	54.4	2.6
Carr St	Charles-Fitzgerald	06-Mar-19	13-Mar-19	4407	44.5	51.7	3.0
Harold St	Smith-Wright	20-Feb-19	27-Feb-19	2296	33.4	39.8	2.6
Joel Tce	Bream Cove-Gardiner	06-Mar-19	13-Mar-19	2386	45.0	53.1	3.1
Mary St	Beaufort-William	27-Feb-19	06-Mar-19	1055	31.8	39.4	2.4
Palmerston St	Myrtle-Randell	27-Feb-19	06-Mar-19	2786	29.1	36.5	2.9
Pier St	Brewer-Edward	20-Feb-19	27-Feb-19	2864	38.7	47.9	2.6
Smith St	Broome-Lincoln	20-Feb-19	27-Feb-19	2321	40.6	49.5	1.8
Summers St	Claisebrook-West	06-Mar-19	13-Mar-19	1513	38.4	46.6	4.7
Vincent St	Ethel-Norfolk	06-Mar-19	13-Mar-19	11,597	45.2	52.0	2.5
William St	Monger-Robinson	20-Feb-19	27-Feb-19	7223	34.4	46.1	3.8
Sample Averages				4,409	39.5	47.6	3.0
Daily Totals				61,725			
Excluded Distributor Roads							
Fitzgerald St	Cowle-Randell Northbound	13-Feb-19	20-Feb-19	8477	49.4	56.0	2.5
Fitzgerald St	Cowle-Randell Southbound	13-Feb-19	20-Feb-19	9463	49.4	57.1	5.7
Lord St	Court-Marlborough Northbound	13-Feb-19	20-Feb-19	10,167	52.5	58.9	4.7
Lord St	Court-Marlborough Southbound	13-Feb-19	20-Feb-19	9534	53.0	59.2	5.6
William St	Chatsworth-Lincoln Northbound	13-Feb-19	20-Feb-19	4175	52.0	59.2	3.6
William St	Chatsworth-Lincoln Southbound	13-Feb-19	20-Feb-19	6642	51.4	58.3	3.3
Sample Averages				8076	51.3	58.1	4.2
Daily Totals				48,458			

Pink shading indicates observed speed values being greater than the baseline default 50 km/h limit for roads subject to the trial only.

This data suggests most vehicles travelling on the local roads and vehicles travelling on surrounding distributor roads are generally in compliance with the legal speed limit.

3.3.2 Six Month

A slight decrease in average and 85th percentile speed on the trial streets was observed over the six month trial period (Table 3-18). However, this change is only a slight proportion of the 10 km/h reduction in the legal limit. Speeds on Distributor roads appear to be similar to baseline.

Table 3-18: Six Month Total Traffic Statistics with Comparison to Baseline

Sample Subset	AWT Five day				Average Speed			85% Speed		
	Daily Mean	Daily Total	Grand Total	Change from Baseline	Mean of sites km/h	Change km/h	Change %	Mean of sites km/h	Change km/h	%
New 40 km/h Roads	4298	60,169	300,845	-2.5%	39.35	-0.19	-0.47%	47.26	-0.36	-0.76%
Excluded Distributor Roads	7510	45,059	225,295	-7.0%	51.13	-0.15	-0.29%	58.30	0.18	0.32%
Totals	-	105,228	526,140	-4.5%	-		-			

Pink shading indicates observed speed values being greater than the baseline, with green shading indicating a downward change.

The first series of traffic surveys undertaken during the trial occurred in advance of the six month milestone passing (Table 3-19). While average and 85th percentile speeds dropped, most average and 85th percentile speeds were in excess of the legal limit within the area. Speed limit compliance on distributor roads remained excellent.

Table 3-19: Six Month Traffic Dataset

Road	Location	Survey Date		AWT Five day	Ave Speed	85% Speed	% Heavy Veh.
40 km/h Trial Streets							
Brisbane St	Dangan-Lake	21-Aug-19	28-Aug-19	1421	38.1	46.1	2.8
Brisbane St	Lane-Lindsay	07-Aug-19	14-Aug-19	3131	40.5	50.4	4.5
Bulwer St	Fitzgerald-Palmerston	14-Aug-19	21-Aug-19	10,256	45.2	51.7	3.0
Bulwer St	Lord-Wright	07-Aug-19	14-Aug-19	8416	46.5	54.0	3.4
Carr St	Charles-Fitzgerald	14-Aug-19	21-Aug-19	4129	46.3	53.6	5.0
Harold St	Smith-Wright	07-Aug-19	14-Aug-19	2209	32.9	39.4	2.8
Joel Tce	Bream Cove-Gardiner	21-Aug-19	28-Aug-19	2143	43.1	50.9	3.0
Mary St	Beaufort-William	21-Aug-19	21-Aug-19	990	33.6	40.3	3.1
Palmerston St	Myrtle-Randell	14-Aug-19	21-Aug-19	2617	29.6	36.7	3.2
Pier St	Brewer-Edward	07-Aug-19	14-Aug-19	2958	38.3	47.7	3.2
Smith St	Broome-Lincoln	07-Aug-19	14-Aug-19	2306	41.0	49.1	2.0
Summers St	Claisebrook-West	21-Aug-19	28-Aug-19	1515	37.4	45.9	4.7
Vincent St	Ethel-Norfolk	14-Aug-19	21-Aug-19	10,861	44.9	51.5	2.5
William St	Monger-Robinson	07-Aug-19	14-Aug-19	7217	33.5	44.3	5.0
Sample Averages				4297.8	39.4	47.3	3.4
Daily Totals				60,169			
Excluded Roads							
Fitzgerald St	Cowle-Randell NB	31-Jul-19	07-Aug-19	7364	48.5	56.5	5.4
Fitzgerald St	Cowle-Randell SB	31-Jul-19	07-Aug-19	8691	48.2	57.2	6.2
Lord St	Court-Marlborough NB	31-Jul-19	07-Aug-19	9854	52.6	59.0	4.5
Lord St	Court-Marlborough SB	31-Jul-19	07-Aug-19	9198	53.5	59.6	5.6
William St	Chatsworth-Lincoln NB	31-Jul-19	07-Aug-19	4031	52.3	59.0	3.5
William St	Chatsworth-Lincoln SB	31-Jul-19	07-Aug-19	5921	51.7	58.5	3.7
Sample Averages	Sample Averages			7509.8	51.1	58.3	4.8
Daily Totals	Daily Totals			45,059			

Pink shading indicates observed speed values being greater than the trial legal limit of 40 km/h (shown for roads subject to the trial only).

Vehicles travelling on distributor roads appear to be travelling generally to the limit, similar to the results observed in the baseline surveys.

3.3.3 Twelve Month

The results for the Twelve Month evaluation indicates that there has been a further reduction in overall average (mean) and 85th percentile speeds for the 40 km/h trial roads. Importantly, while the six month trial saw less overall traffic (down 4.5% from baseline), the twelve month surveys saw a slight increase in the total volume of traffic compared to the baseline, with an increase of 1.7% overall (Table 3-20).

Table 3-20: Twelve Month Total Traffic Statistics with Comparison to Baseline

Sample Subset	AWT Five day				Average Speed			85% Speed		
	Daily Mean	Daily Total	Grand Total	Change from Baseline	Mean of sites km/h	Change km/h	Change %	Mean of sites km/h	Change km/h	%
New 40 km/h Roads	4579	64,104	320,520	3.9%	38.59	-0.94	-2.38%	46.43	-1.19	-2.50%
Excluded Distributor Roads	8001	48,006	240,030	-0.9%	51.28	0.00	0.00%	58.28	0.17	0.29%
Totals	-	112,110	560,550	1.7%	-		-			

Pink shading indicates observed speed values being greater than the baseline, with green shading indicating a downward change.

The decrease in average (-0.94 km/h) and 85th percentile (-1.19 km/h) observed speeds on the trial streets was again a small proportion of the 10 km/h reduction in the legal limit. This is generally in line with similar evidence in the international research literature, but is less than the 3-4 km/h decrease that could be expected based on meta-analysis of studies (OECD/ECMT 2006, p. 100). The unexpectedly low change in observed vehicle speeds is probably because the trial has primarily involved signage, with limited use of other engineering and enforcement measures.

The magnitude in speed reduction in the trial area is also comparable to the mean and 85th percentile speed reductions observed in metropolitan Perth during the two years immediately after the 2001 introduction of the 50 km/h default built up area speed limit in Western Australia (Hoareau and Newstead 2004, p. 38). It appears that area-wide speed reductions in Western Australia have yielded actual travel speed reductions in a gradual way, over several years following implementation. This reflects gradual adjustment in driver behaviours.

Speeds on Distributor roads were once again very similar to the baseline. Remarkably, there has been no change in overall observed mean speed at the excluded distributor sites, and a very slight increase in observed 85th percentile speeds, with only slight variation between individual sites. Overall, the resulting reduction in average and 85th percentile speed on trial roads is indicative of a modest potential effect resulting from the trial area limit (Table 3-21).

Table 3-21: Overall trial road speed compliance

	Baseline	Six Month	Twelve Month
Legal Limit (km/h)	**Default 50**	**Area 40**	**Area 40**
Mean Speeds (km/h)	39.54	39.35	38.59
85th Percentile Speeds (km/h)	47.62	47.26	46.43

Pink shading indicates observed speed values being greater than the trial legal limit of 40 km/h.

Observations at individual count sites, shown in Table 3-22, show reasonable compliance by the average vehicle, though the 85th percentile speeds (the speed that 15% of vehicles exceeded) remained generally well above 40 km/h. This suggests that other measures (such as physical road modification or increased enforcement) may be needed to reduce the incidence of vehicles travelling in excess of 40 km/h. Regulatory signage alone does not appear to combat this moderate (~10 km/h) speeding.

Table 3-22: Twelve Month Traffic Dataset

Road	Location	Survey Date		AWT Five day	Ave Speed	85% Speed	% Heavy Veh.
40 km/h Trial Streets							
Brisbane St	Dangan-Lake	04-Mar-20	11-Apr-20	1596	37.1	45.2	2.5
Brisbane St	Lane-Lindsay	19-Feb-20	26-Feb-20	2941	40.2	49.5	4.8
Bulwer St	Fitzgerald-Palmerston	26-Feb-20	04-Mar-20	11,154	44.7	51.3	2.8
Bulwer St	Lord-Wright	19-Feb-20	26-Feb-20	9603	46.1	53.5	3.2
Carr St	Charles-Fitzgerald	26-Feb-20	04-Mar-20	4071	43.5	50.7	2.5
Harold St	Smith-Wright	19-Feb-20	26-Feb-20	2398	32.9	39.4	1.9
Joel Tce	Bream Cove-Gardiner	04-Mar-20	11-Mar-20	2146	43.2	50.1	2.5
Mary St	Beaufort-William	04-Mar-20	11-Mar-20	971	33.0	40.0	3.3
Palmerston St	Myrtle-Randell	26-Feb-20	04-Mar-20	2659	28.7	36.0	2.9
Pier St	Brewer-Edward	19-Feb-20	26-Feb-20	2982	38.3	47.2	2.9
Smith St	Broome-Lincoln	19-Feb-20	26-Feb-20	2395	40.5	48.6	1.8
Summers St	Claisebrook-West	04-Mar-20	11-Mar-20	1553	38.0	46.1	5.2
Vincent St	Ethel-Norfolk	26-Feb-20	04-Mar-20	11,499	41.2	49.7	3.0
William St	Monger-Robinson	19-Feb-20	26-Feb-20	8136	32.9	42.7	3.3
Sample Averages				4579	38.6	46.4	3.0
Daily Totals				64,104			
Excluded Roads							
Fitzgerald St	Cowle-Randell NB	12-Feb-20	19-Feb-20	8990	49.3	57.2	5.9
Fitzgerald St	Cowle-Randell SB	12-Feb-20	19-Feb-20	7188	49.8	57.4	5.8
Lord St	Court-Marlborough NB	12-Feb-20	19-Feb-20	10,225	52.3	59.0	5.1
Lord St	Court-Marlborough SB	12-Feb-20	19-Feb-20	10,043	53.4	59.6	6.1
William St	Chatsworth-Lincoln NB	12-Feb-20	19-Feb-20	6482	51.4	58.0	3.4
William St	Chatsworth-Lincoln SB	12-Feb-20	19-Feb-20	5078	51.5	58.5	3.3
Sample Averages	Sample Averages			8001	51.28	58.3	4.9
Daily Totals	Daily Totals			48,006			

Pink shading indicates observed speed values being greater than the trial legal limit of 40 km/h (shown for roads subject to the trial only).

Vehicles travelling on distributor roads appear to be travelling generally to the speed limit, similar to the results observed in the baseline and six month surveys.

The results for each site indicate that 85th percentile speed compliance has generally decreased slightly at all sites. No site has seen a dramatic change in 85th percentile speeds (Table 3-23). Again, this suggests that street design changes and enforcement may be a stronger mechanism for speed compliance.

Table 3-23: Longitudinal Comparison of 85th Percentile Speeds

Road	Location	85th Percentile Speed		
Evaluation Milestone		Baseline	Six Month	Twelve Month
Speed Limit		Default 50	Area 40	Area 40
Brisbane St	Dangan-Lake	46.1	46.1	45.2
Brisbane St	Lane-Lindsay	50.9	50.4	49.5
Bulwer St	Fitzgerald-Palmerston	52.7	51.7	51.3
Bulwer St	Lord-Wright	54.4	54.0	53.5
Carr St	Charles-Fitzgerald	51.7	53.6	50.7
Harold St	Smith-Wright	39.8	39.4	39.4
Joel Tce	Bream Cove-Gardiner	53.1	50.9	50.1
Mary St	Beaufort-William	39.4	40.3	40.0
Palmerston St	Myrtle-Randell	36.5	36.7	36.0
Pier St	Brewer-Edward	47.9	47.7	47.2
Smith St	Broome-Lincoln	49.5	49.1	48.6
Summers St	Claisebrook-West	46.6	45.9	46.1
Vincent St	Ethel-Norfolk	52.0	51.5	49.7
William St	Monger-Robinson	46.1	44.3	42.7
Sample Averages		47.6	47.3	46.4
Excluded Roads				
Fitzgerald St	Cowle-Randell NB	56.0	56.5	57.2
Fitzgerald St	Cowle-Randell SB	57.1	57.2	57.4
Lord St	Court-Marlborough NB	58.9	59.0	59.0
Lord St	Court-Marlborough SB	59.2	59.6	59.6
William St	Chatsworth-Lincoln NB	59.2	59.0	58.0
William St	Chatsworth-Lincoln SB	58.3	58.5	58.5
Sample Average	Sample Average	58.1	58.3	58.3

Pink shading indicates observed speed values being greater than the applicable legal limit (shown for roads subject to the trial only).

3.4 Qualitative Resident Perceptions Survey

The April 2019 baseline survey received 63 responses, while the November 2019 survey received 73 responses. The twelve month evaluation survey received 151 responses. This reflects the increased letter box distribution, and respondents re-recruited by email from the earlier surveys.

The survey also included demographic information to test similarity of the sample to the broader community. The demographic profile for the twelve month results appears to be a reasonable representation of the residential population within the trial area.

Like all voluntary surveys, there is potential that the results reflect selection bias – that is, people who have stronger or particular views might be more likely to respond to the survey, resulting in a snapshot that does not entirely reflect the whole community. In this evaluation, this is not considered to be a significant problem, especially because the views of people who are especially motivated are of interest to the trial evaluation.

3.4.1 Baseline Attitudes

At the baseline survey, respondents generally indicated agreement with the potential benefits of the trial (Figure 3-2). Interestingly, and consistent with past surveys, respondents indicated that speeding above the new limit was morally unacceptable.

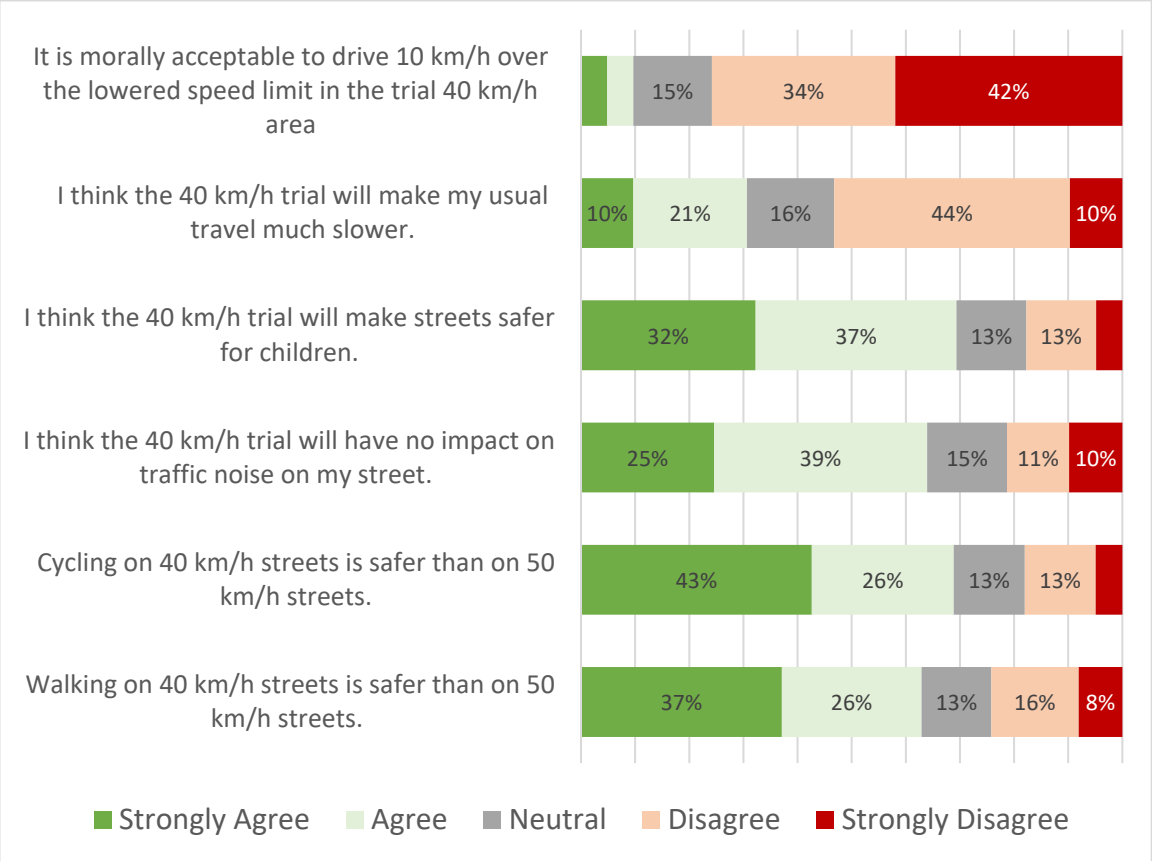

Figure 3-2: Pre-trial Speed Limit Attitudes

3.4.2 Baseline Travel Behaviours

Respondents reported frequently driving on their local street, with generally high participation in recreational and utility local walking. Cycling participation was quite limited, with more than 60% of respondents not usually cycling for recreation or local neighbourhood utility transport.

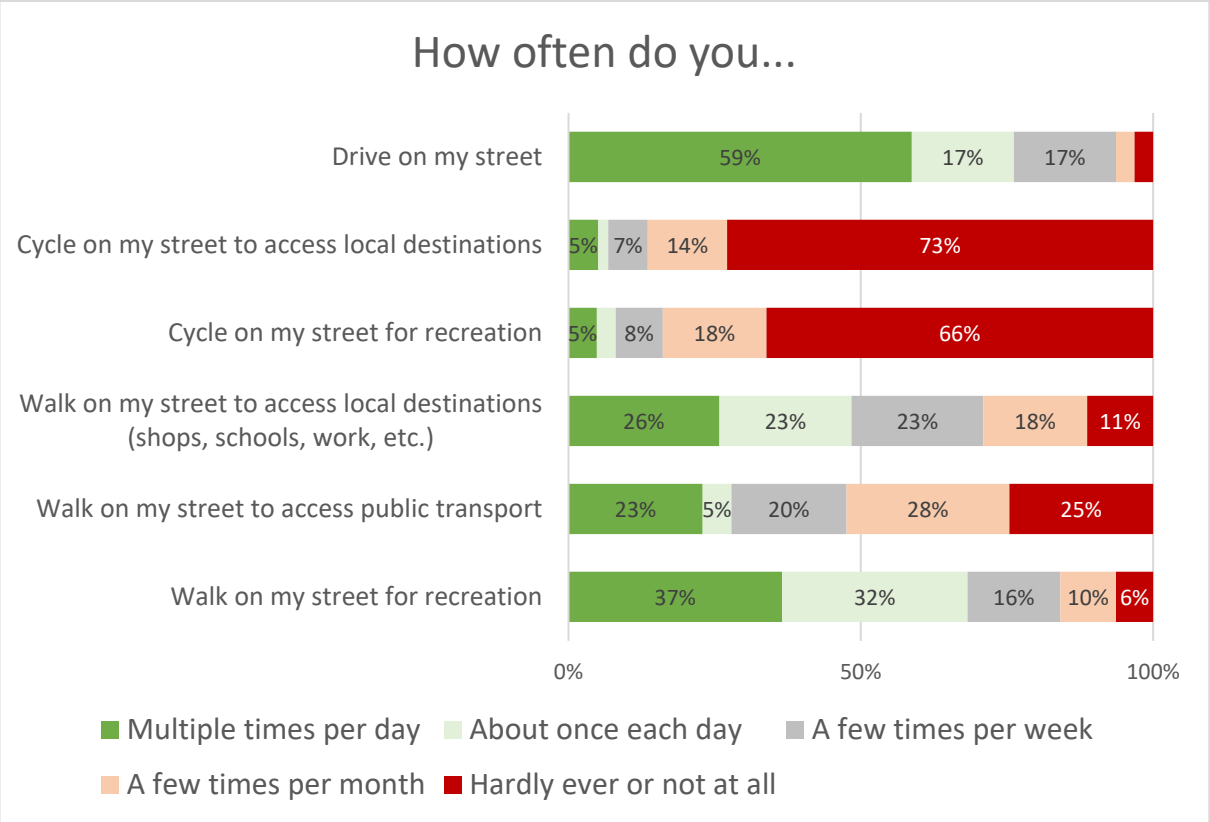

Figure 3-3: Pre-trial Reported Local Travel Behaviours

3.4.3 Six Month Milestone Attitudes

Please refer to the Six Month Evaluation Report (*6138251-REP-C_Evaluation Report - 6 Month*) for detailed commentary on the results observed at the six month milestone. Some six month reports are also profiled for comparison in the next section.

It should be noted that seasonal effects are likely to weigh upon travel behaviour reported in this dataset.

3.4.4 Twelve Month Milestone – Travel Behaviours

Effects of COVID-19

As the resident survey was conducted over a period of significant disruption (refer section 2.4), it was anticipated that the new routine habits adopted during physical distancing measures would skew questions relating to travel behaviour and potentially attitudes relating to the trial.

Since this evaluation is based on a before and after comparison study, the difference between the results for the same question in the baseline and trial datasets forms critical evidence, especially for quantitatively-measured attitudinal questions.

Accordingly, GHD and the City of Vincent sought to maintain, as far as practicable, the similarity of attitudinal questions. The questionnaire design was altered as follows:

- The survey recruitment materials and questionnaire introductory text was edited to include “We understand that the current COVID-19 pandemic is changing activity and travel patterns, and we are taking this into account in our evaluation of the trial. Your feedback is an important part of our evaluation and we would love to hear how you have experienced the trial over the past 12 months.”
- The travel behaviour questions was re-phrased to: “How often would you usually do the following, not considering the current COVID-19 pandemic?” The revision to this question should make the results between this dataset and the baseline dataset more comparable, though some residual reported effects (e.g. recency bias) associated with disrupted activity patterns may still exist in the dataset.
- A new open ended question was added: “Has the COVID-19 pandemic changed your usual walking, cycling or driving patterns? If so, how?” This is reported below.

Change in Specific Transport Patterns due to COVID-19 Self-Reported by Respondents

When asked to describe how COVID-19 had altered usual walking, cycling or driving patterns, respondents described a range of changes to their travel behaviour. The open-ended comments received for this question were reviewed and assigned into groups, if respondents mentioned a specific thematic response to their travel behaviour. These below figures are the percentage of respondents who *mentioned* a type change, which does not necessarily represent the number of people who have actually changed their travel patterns in this way.

41 respondents (27%) reported no changed to their usual travel behaviour. 18 respondents (12%) specifically reported working from home[3]. 35 respondents (23%) mentioned driving less, while 15 (10%) reported less use of public transport. For active transport (walking and cycling), 39 respondents (26%) mentioned some overall increase in walking or cycling, while 20 respondents (13%) reported less participation in walking or cycling. 31 respondents (20%) offered no specific comment, while 16 respondents (11%) made comments which could not be assigned to any of the above themes.

[3] The working from home rate for Greater Perth reported for the 2016 census was 3.4%, though this includes certain agricultural workers, mobile tradespeople, and some other occupations. See page 3 of the Babb et al. (2017) Unlocking the Potential for Working Closer to Home report.

Change in Usual Transport Patterns (aside from the COVID-19 Pandemic) Reported by Respondents

Routine use of local streets for different modes of transport was evaluated with equivalent questions to the baseline, phrased to exclude (or at least minimise) the results of COVID-19 on the responses.

Results for this question at twelve months are presented below in Figure 3-4. The same results from the baseline are included as Figure 3-3 in section 3.4.2.

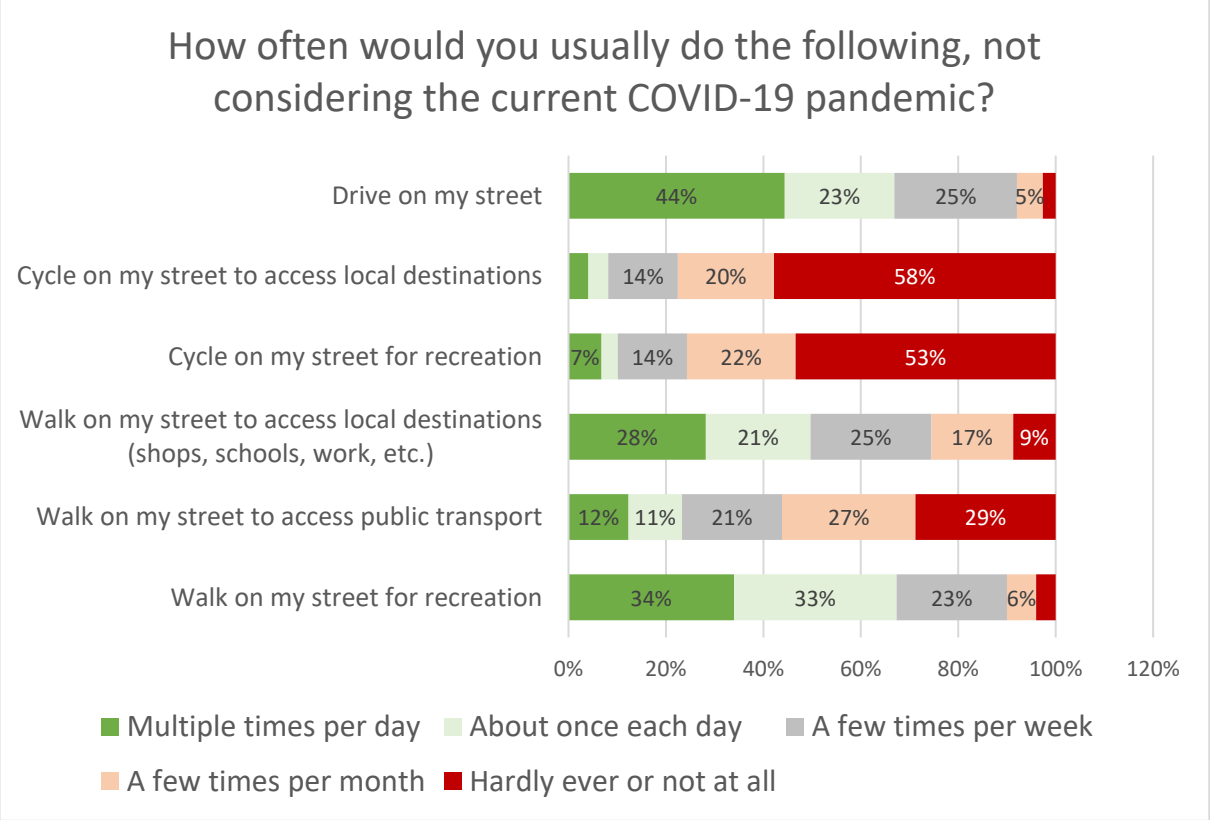

Figure 3-4: Twelve Month Reported Local Travel Behaviours

When the percentage of respondents falling into each category are compared (see Table 3-24), it appears that changes in local travel have been mixed, with a greater share of respondents reporting very frequent or very infrequent travel by different modes. There is also a substantial reduction in reported walking to access public transport.

These general findings align with the responses in the open-ended travel behaviour question reported on the previous page, and suggests that some people have engaged in much more walking and cycling (for instance, due to more time at home), while others have reported less walking and cycling (such as for people who may have previously walked or cycled to work).

Whether this is due to the trial conditions or COVID-19 remains to be seen. Although these results should ideally not reflect the effects of COVID-19 pandemic, it is not possible to conclusively determine that they have not been at least partially impacted.

Table 3-24: Changes in Reported Local Travel Behaviours

Statement	Change in Response Percentages (Baseline to 12 Month)					Inference based on change in response
	Multiple times per day	About once each day	A few times per week	A few times per month	Hardly ever or not at all	
Walk on my street for recreation	2%	2%	6%	-8%	-2%	Walking patterns appear disrupted. No clear trend. Less routine use of public transport. Responses seem slightly more weighted toward more extreme categories.
Walk on my street to access public transport	-7%	1%	1%	-10%	15%	
Walk on my street to access local destinations (shops, schools, work, etc.)	8%	1%	1%	-5%	-4%	
Cycle on my street for recreation	-2%	0%	2%	-2%	3%	No clear trend
Cycle on my street to access local destinations	6%	1%	-2%	-1%	-4%	
Drive on my street	-9%	1%	8%	1%	0%	Slightly less frequent driving trips.

Pink shading indicates that a lower percentage of respondents provided this response in the twelve month survey, compared with baseline. Green indicates an increase.

3.4.5 Twelve Month Milestone – Attitudinal Questions

At this twelve month milestone, perceptions towards the trial appear to be mixed, with many questions receiving fairly even splits of responses into each attitude category.

Attributional responses have been measured through direct questions about the trial, through general perception questions, and in open-ended questions.

Attitudinal Responses – Direct Questions

Directly-stated perceptions about the trial, shown overleaf as Figure 3-5, assess respondents' immediate response to the trial itself. These questions are most direct, and are most likely to responses weighted by overall opinions of the trial area speed limit.

The even spread of many of the results appears to indicate that both perceived benefits and perceived disbenefits of the trial have been fairly minor. For instance, less than 30% of respondents agreed that the trial "has made it more difficult to get around". Questions about the overall effects of the trial on pedestrian/cyclists safety, and local amenity impacts, received very evenly split responses.

Some results seem to indicate a weak or ambivalent overall attitude towards the trial. For example, 58% of respondents agreed or strongly agreed that a 40 km/h area limit might be useful in other areas, though 71% of the same cohort of respondents disagreed that the trail had been "worth doing" (Figure 3-5).

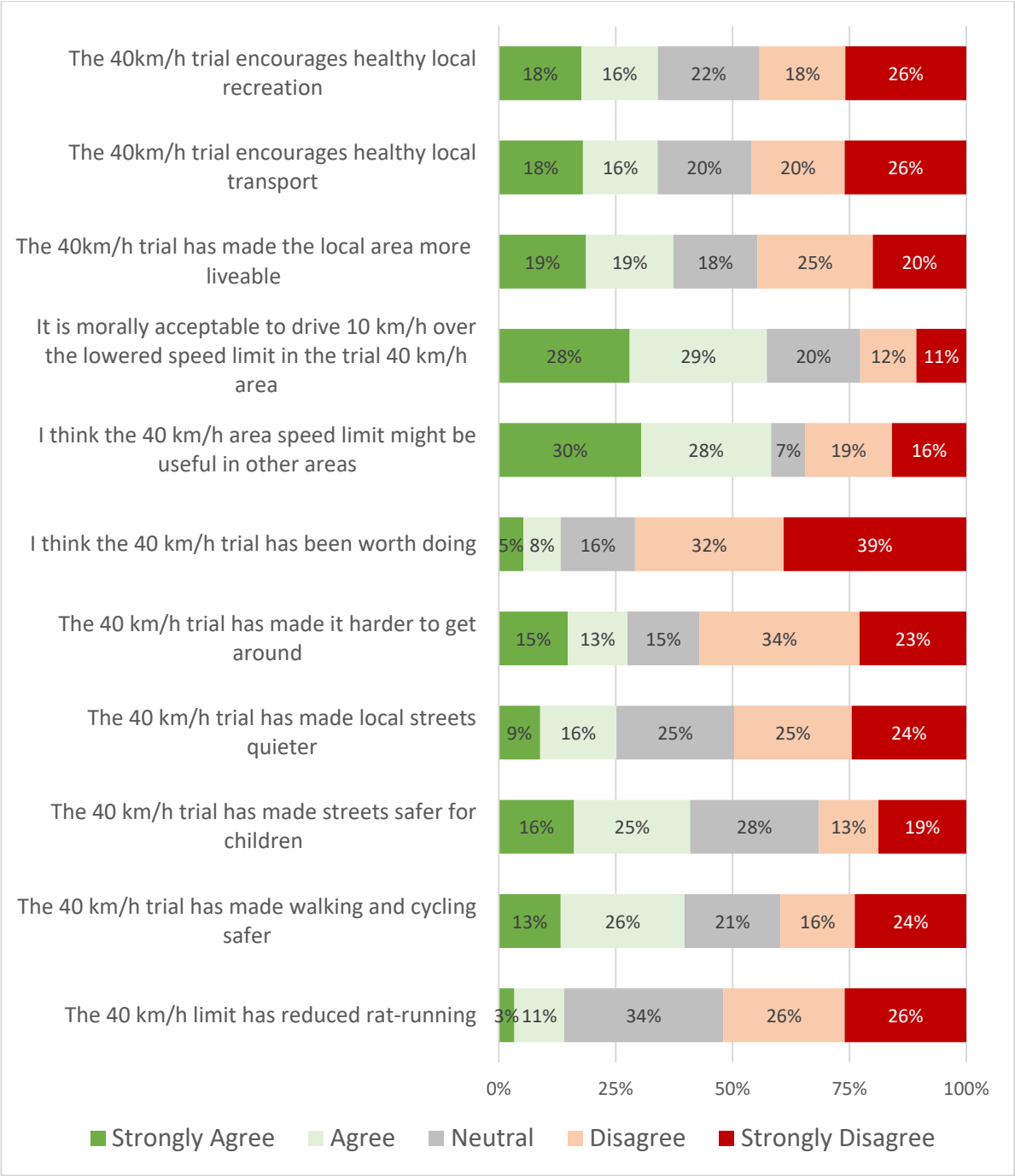

Figure 3-5: Twelve Month Attitudinal Survey Results about the Trial

Attitudinal Responses – Indirect Questions

While response to direct responses varied, measuring the difference for questions regarding general attitudinal questions about local transport and amenity before and after the trial implementation provides further evidence of trial outcomes.

Comparing how results for the same question changed between the baseline and twelve month surveys provides an indication of whether there is an implied change in perceptions. These results, presented in Table 3-25, indicate a general tendency for respondents to be less concerned about local transport issues than in the baseline survey. This result is similar to the result observed at six months, and may indicate that some intended benefits of the trial may be materialising.

Table 3-25: Change in Response Percentages for Local Transport Perceptions

Statement	Change in Response Percentages (Baseline to Twelve Month)					Inference based on change in response
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
It is generally safe for me to walk around my local area	1%	13%	-10%	-4%	0%	Overall improvement in perceived pedestrian safety (for adult respondents)
It is generally safe for children to walk around my local area	11%	7%	-4%	-12%	-2%	Overall improvement in perceived safety for children/vulnerable pedestrian groups
"Rat-running" (traffic taking short cuts on local streets) in my local area is a problem	-1%	-5%	-5%	13%	-2%	Slight reduction in concerns about rat-running.
Traffic noise in my local area is a problem	-5%	-4%	-2%	7%	3%	Reduced concern about traffic noise.
Vehicles speeding on local streets is a problem	-13%	3%	3%	8%	-1%	Reduced strong concern about vehicles speeding on local streets.
Cycling within the City of Vincent is generally safe	-4%	11%	-6%	0%	-1%	Potential slight improvement in perceived risks for cyclists.
I would cycle more if it was safer	-5%	0%	-3%	2%	5%	Slight decrease in number of people for whom safety concerns may impede cycling.
I would walk more if it was easier to cross roads	0%	-18%	-8%	14%	11%	Decrease in respondents for whom crossing roads is a barrier to walking
I would like to drive less	3%	-19%	11%	2%	3%	No substantial implication.

Pink shading indicates that a lower percentage of respondents provided this response in the twelve month survey, compared with baseline. Green indicates an increase.

When asked about the relative safety of walking and cycling on 40 km/h streets (compared to 50 km/h streets), more than half of all respondents agreed that safety had improved (Figure 3-6).

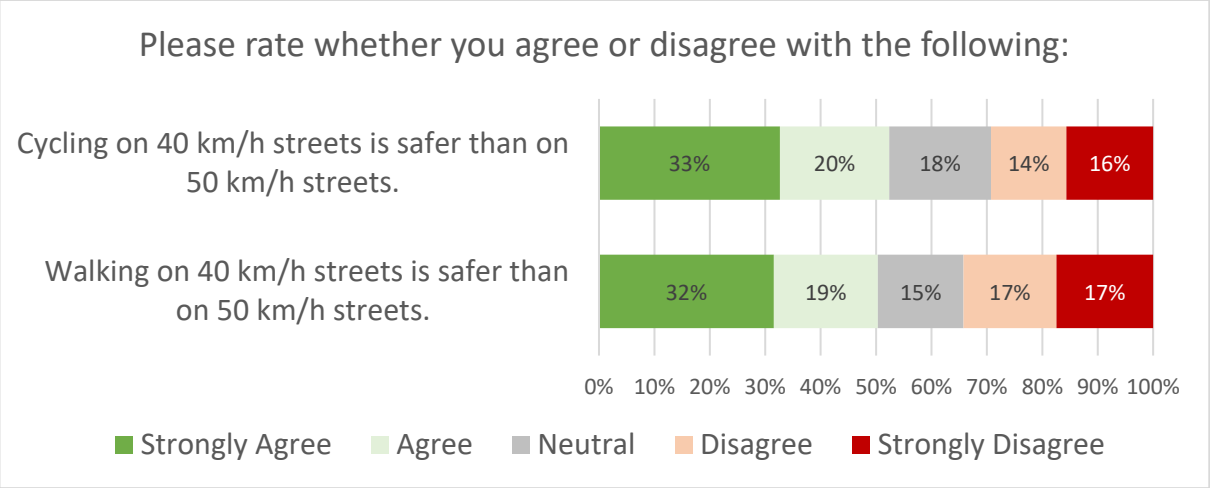

Figure 3-6: Twelve Month Perceptions about Pedestrian and Cyclist Safety

When compared with baseline results, a greater share of respondents agree that the lower speed limit improves pedestrian and cyclist safety at this twelve month mark (Table 3-26). This triangulates with observed increases in active transport activity (refer section 3.2.2), further substantiating the safety benefits of the lower speed limit.

Table 3-26: Change in Response Percentages for Pedestrian and Cyclists Safety

Statement	Change in Response Percentages (Baseline to 12 Month)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Walking on 40 km/h streets is safer than on 50 km/h streets.	9%	-4%	-4%	0%	-1%
Cycling on 40 km/h streets is safer than on 50 km/h streets.	26%	7%	-8%	-9%	-16%

Pink shading indicates that a lower percentage of respondents provided this response in the twelve month survey, compared with baseline. Green indicates an increase.

Attitudinal Responses – Moral Acceptability of Exceeding the Speed Limit

Perceptions of safe and acceptable speeds vary among populations (Box and Bayliss 2012). A question relating to the "moral acceptability" of speeding (i.e. driving at the previously existing limit) was included in the survey. This question was used previously in an evaluation of the introduction of the lower 50 km/h default built up area speed limit in December 2001 (developed by Battini and Evans, cited in Hoareau and Newstead 2004, p. 42).

One concerning finding of this trial evaluation is that respondents appear more accepting of speeding (to the previous 50 km/h limit) than they were at baseline. This trend appears to continue from the six month results (Figure 3-7, overleaf).

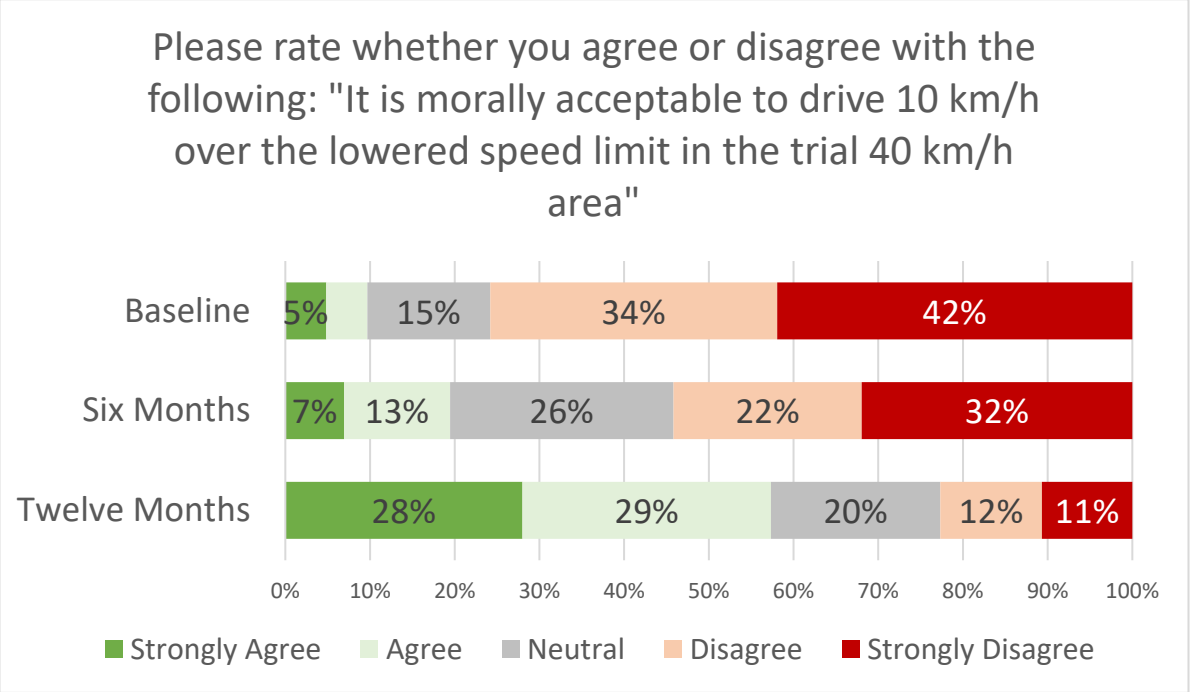

Figure 3-7: Morality of Exceeding Trial Area Limit – Result between Surveys

The baseline 40 km/h trial area morality question result (total 76% of respondents morally opposed to speeding) mirrors the initial result found in the 2001 surveys (Table 3-27). However, while moral opposition to speeding within the default 50 km/h limit increased after the introduction of the new limit (to 80% of respondents), the same does not appear to have occurred in this area trial (Figure 3-7). This may reflect limited awareness of the new limit, or effects associated with limited overt enforcement.

Table 3-27: Morality of Exceeding the lower 50 km/h Built-Up Area Limit

	Dec 2001-May 2002	Jun 2002-Nov 2002	Dec 2002-May 2003	Jun 2003-Nov 2003
Agree	22%	21%	18%	18%
Disagree	76%	76%	80%	80%
No opinion	3%	2%	1%	2%

Source: Batini and Evans, presented in Hoareau and Newstead 2004, p. 42.

Open Ended-Responses – General Support or Opposition

The twelve month evaluation survey contained the following 'free-text' questions: "Do you have any other general comments about traffic and transport in Vincent?" and "Do you have any other comments about the 40 km/h speed limit trial?"

About a third of respondents (55 out of a total of 151 respondents) expressed a written comment about the trial. Of these, 24 were opposed, while 23 provided comments in favour of the trial limit. Qualified support was provided by eight respondents.

In most cases, these opinions where either very positive or very negative as shown by the representative responses below.

Supportive comments included:

> *"I think it has been a great initiative."*
>
> *"The new 40 zones are great, it has slowed drivers down especially on Beaufort Street and near the schools I have noticed. With more families living inner city living it's a very good idea to have the 40 klm speed limit."*
>
> *"I love this new speed limit!"*
>
> *"I would like to see this trial extended across other densely populated residential areas and enforced more noticeably and regularly."*
>
> *"The trial is clearly a good idea, and hopefully the 40km/h speed limit will be permanent. Well done to the Council on the initiative."*

Non-supportive comments generally indicated scepticism for the purpose of the trial:

> *"It's unnecessary and would do little to deter speeders"*
>
> *"The trial, in my view was/is of little value."*
>
> *"Very strongly disagree with 40 km speed"*
>
> *"I don't understand why 50 km/h is suitable for all other built up areas/suburbs but we should be punished with 40 km/h."*
>
> *"It is nonsense and it achieves absolutely nothing."*

Responses expressing qualified support generally raised specific conditions for how they felt the 40 km/h may be more appropriate:

> *"I would agree more with questions above in relation to the 40 kmh limit if it was enforced."*
>
> *"I accept some streets should be 40"*
>
> *"I believe 40 km is good on smaller, local streets"*
>
> *"I agree with the 40 kph speed limit. However, I would make Bulwer St 50 kph,"*

Two of the respondents noted that they had changed their mind since implementation of the trial:

> *"Initially I thought the idea was ridiculous however I am now in favour for all of the reasons above but ask that it is implemented properly"*
>
> *"Although I was not initially a supporter of the 40 km speed limit, I've revised that thought and am supportive as I believe that it can only help to increase safety for everyone living in the area"*

Open Ended-Responses – Thematic Findings from Comments

Further analysis of the responses revealed a number of themes relating to aspects of the trial.

Bulwer Street - Twenty-one of the respondents indicated that they felt that the 40 km/h speed limit on Bulwer Street was too low. The finding for this specific road may be over-represented because of the geographic sampling strategy.

> *"Bulwer Street does not need 40 km hour limit"*
>
> *"Bulwer St used to be 60 and is very much a main road, since it's dropped to 40, the time 20 km difference seems completely unnecessary and extreme"*
>
> *"40 km/hr on Bulwer St, a main thoroughfare is ridiculous"*
>
> *"I think the 40km speed limit is too slow on Bulwer Street"*

Compliance and Awareness - Fifteen of the respondents felt that compliance with the 40 km/h speed limit had been limited or non-existent.

> *"It seems to be ignored at times, which I think may be due to lack of awareness of the new limit amongst those who are not local residents".*
>
> *"40 km/hr on Joel Terrace totally ineffective"*
>
> *"I don't believe the majority of motorists take any notice of 40 km limits"*

Nine of the respondents felt that the trial had no impact on traffic speeds.

> *"I do not think it has been effective, as in my experience most drivers remain at 50 km/h or more"*
>
> *"In my particular case, I have seen little change from the 40 km/h speed limit trial"*
>
> *"The normal traffic around my area has not changed in trial period"*

This is unsurprising, in view of the modest overall average vehicle speed reductions (section 3.3.3).

Enforcement - Sixteen of the respondents believed that the trial would have benefited from greater enforcement.

> *"The lack of any enforcement of speed limits is a serious drawback"*
>
> *"Little or no enforcement of speed limits"*
>
> *"I would like to see this trial extended across other densely populated residential areas and enforced more noticeably and regularly"*

Signage - Eleven of the respondents indicated that the signage for the trial could be improved.

> *"There are far too many street signs (40 kmh Limit, End of 40 kmh Limit) along Bulwer St that add confusion"*
>
> *"It's not signposted enough/clear"*
>
> *"The speed signs are so unclear as it will say end of 40 km/h but it hasn't ended"*
>
> *"Far better signage required for 40 kmh zones - some were hidden behind trees and not as clear as normal speed limit signage"*

Improvements - A small number of the respondents suggested improvements, such as traffic calming and electronic speed limit signs should be implemented.

> *"Speed limit should be enforced, especially by physical means i.e. speed humps, etc."*
>
> *"I feel it would be much better and more acceptable generally if there was a solar powered adjustable speed limit"*
>
> *"There need to be flashing 40 signs as there are on Beaufort Street in order to remind drivers who don't live in the area"*
>
> *"Need better speed humps on Harold St"*

Rat running - Fourteen of the respondents were concerned about rat running, either through the trial or as a result of the trial (the quantitative results indicate that concern about rat-running has reduced over the trial period, refer to Table 3-25 in section 3.4.5).

> *"Rat run traffic still speed and ignore the limit"*
>
> *"I have regularly had annoyed rat runners overtake and speed away down my street"*
>
> *"Lots of rat running on Barlee Street since the no right turn on Beaufort/Walcott intersection causes much more unsafe traffic than the 40 km speed limit"*
>
> *"Specific action to address rat running would be more beneficial"*

3.5 School safety

There are two primary schools, and two school crossings controlled by WA Police Traffic Wardens (crossing guards), within the trial area.

Prior to the trial, each school had a conventional 40 km/h School Zone on fronting local roads. Existing school zone signage located at the entry to the local road area (i.e. on the entry from district distributor roads) was simply replaced to area 40 km/h signage for the trial period. Variable speed limit signage has been in place on nearby district distributor roads well before the commencement of the 40 km/h area trial.

To evaluate the potential effects of the 40 km/h trial on school access and safety, GHD requested phone or email interviews with school traffic wardens and representatives of the two primary schools located within the trial area. The interviews followed a short, semi-structured format. Both traffic wardens participated in a phone interview, while written comments were received from one school.

Traffic Wardens ("Crossing Guards")

Both traffic wardens had more than four years of experience at their location. Neither warden reported a significant difference in driver behaviour at their location during the first twelve month of the trial, which is broadly consistent with the traffic count data (refer section 2.2.3).

Both wardens commented that, since their crossings are located on distributor roads (which retained their speed limits and 40 km/h school zone timings), the trial itself had not substantially altered driver behaver. Aside from the recent effects of the COVID-19 pandemic, the wardens reported no substantial change in traffic during the trial year, or occurring around the start of the trial.

Each of the wardens noted instances of poor driver behaviour, mainly around instances of highly reckless speeding, and inattentive driving behaviours. One warden noted:

> *"People tend to forget the* [school zone 40 km/h] *limit – it is not obvious… Even when the* [40 km/h LED speed] *signs on people do not comply with the limit…"*

One warden emphasised the effectiveness of on-road 40 patches[4], and suggest they could be painted on more local roads, perhaps on area wide basis, as an additional reminder to drivers. The warden also commented that repeater signage along their relatively long school frontage may also improve driver compliance and safety.

The traffic wardens each commented that overt and covert police enforcement can result in detection of a substantial number of vehicle travelling at excessive speeds. One warden recalled a police operation near to their crossing, prior to the trial:

> *"One enforcement round there was one unmarked police car – the police issued something like 29 infringements in just in a short period of time – perhaps 45-60 minutes"*

Both wardens commented that they had not noticed targeted enforcement over the past year.

The final question put to the traffic wardens concerned their preference between a conventional school zone, and the 40 km/h trial area covering a wider area of local roads around the school.

> *"My preference is for 40 km* [speed limit] *across day – so when school happens, people are more used to it… there's no reason why there shouldn't be a permanent 40 km/h limit."*

[4] Refer Main Roads WA Standard Drawing 20063-0522-1

The other warden provided a similar response, but noted the importance of enforcement:

> *I think* [a 40 km/h area limit provides] *enhanced safety for children and parents walking to school - pupils getting off buses etc. - they would benefit. There's not too much* [of a benefit] *for my crossing, because it already has a 40 km/h limit… I think local roads being 40 km/h is a good idea – but we don't have the police presence to enforce 27/4"*

Schools

There are two primary schools in the trial area. A response was sought from a representative of each.

One response was received from a school principal, who estimated that up to 50-60% of the school's students may walk or cycle on a school day with fine weather. The principle had noticed any specific difference in traffic behaviour (aside from pandemic-related effects) over the trial year.

The principal noted that, while there would be limited impacts for roads around the school that were already 40 km/h during school zones, there are some benefits beyond the immediate school side streets:

> *"I like the fact that motorists are travelling slower around our students."*

No response was received from the other school.

4. Evaluation and Conclusions

The 40 km/h area speed limit within the City of Vincent has been assessed incorporating all the above results. This evaluation and conclusion has been made based on these twelve month results, and considering the preliminary results reviewed after the first six months of the trial.

4.1 Overall Findings

Based on the full set of evidence evaluated after twelve months of the trial, it appears that the trial has resulted in some speed and crash reduction effects. There also appears to be an associated minor local amenity and perceived safety benefit, especially for pedestrians and cyclists.

These findings are made based on a reasonable set of one year of data. While the precise magnitude of these benefits is challenging to ascertain with only one year of data, these evaluation results are evidence of a modest overall benefit.

The triangulation (matching) of evidence across the data collection methods used in this evaluation is the basis for this finding. While further data would be valuable (especially to evaluate specific KSI crash reduction effects, and to further reduce the potential impacts of COVID-19 on the results), the triangulation between results at this evaluation point provides a reasonable degree of certainty around the results.

While the effects of the COVID-19 pandemic (section 2.4), and the preliminary nature of the crash data (section 3.1.1) may have some impact on specific results, findings based on triangulation are much less susceptible to variation than single measured results. When the evidence is considered in totality, these potential effects do not appear to substantially alter the overall evaluation results.

The similarity of these results against the default 50 km/h built up area research (Hoareau and Newstead 2004) and international research more broadly (Box and Bayliss 2012; OECD/ECMT 2006, p. 100) also further support these evaluation findings.

From these results, we infer that there is potential for further improvement if additional speed management measures are implemented. The *Local Area Speed Management Blueprint* developed by the Road Safety Commission outlines a range of potential speed management measures.

4.2 Vehicle Speeds, Crashes, and Road Safety Implications

Vehicle crash risks are closely associated with vehicle speeds. A decrease in vehicle speeds is commonly associated with a more substantial reduction in the occurrence of crash rates (Elvik 2009b). Both a reduction in observed (mean and 85th percentile) and total crashes has been observed in the trial area.

Mean (average) vehicle speeds have reduced by about 1 km/h, or about 2.4%. The 85th percentile speed on trial roads has dropped by just over 1 km/h, or about 2.5%. The reduction in vehicle speed has been of a similar magnitude to the reduction seen with the introduction of the default 50 km/h limit in 2001. The reduction is not as large as overall results generally seen in research internationally, which suggests that complementary measures may further improve the results of area speed limit treatments. This is also supported by the available research evidence (see Elvik 2009a).

After twelve months, crash records provided by Main Roads WA indicate that there has been some crash reduction effect on the trial roads. This reduction has also occurred during a long-term decline in overall crashes within the City of Vincent. There was also a less substantial

crash reduction in overall crashes within the control set of local roads (the northern part of the City of Vincent) not subject to the new limit.

The reduction in KSI crashes was statistically less in the trial area than in the control area, but these findings are based on only three crash events (two in the trial area, one in the control roads) - which are therefore not statistically meaningful.

Results for crashes of different severity and road user types have been variable. The small size of the trial area means that single crash events can skew this data. Some crash data used in this evaluation was yet to be reviewed by Main Roads WA, and is therefore preliminary. Accordingly, future evaluation would be needed to substantiate the nature of the crash reduction more confidently. We suggest that long term evaluation (perhaps at two and five year milestones) would be highly informative, especially if the 40 km/h area limit was retained.

4.3 Findings for Travel Behaviours and Active Transport

Unfortunately, due to the timing of the resident survey during the COVID-19 pandemic, specific findings about the effect of the trial on reported travel behaviour cannot conclusively be drawn from the 151 survey responses (section 3.4.4). As would be expected, the resident survey findings do confirm highly variable results in changes in usual travel behaviour resulting from the pandemic.

However, video survey observations do indicate some increase in participation in walking and cycling (section 3.2.2). Significant increases in walking and cycling were observed at the four observation sites within the City of Vincent. A total of 14% more pedestrians and cyclists were observed in the twelve month surveys, compared to the February 2019 baseline. Vehicular traffic volumes observed just before the pandemic were relatively stable (1.7% increase from baseline, section 3.3.3).

The total number of cyclists also increased at twelve months. The percentage of all cyclists who were observed cycling on the road surface (rather than on footpaths) also increased from 67% to 70%, suggesting there may be a perceived safety benefit for cyclists. The total number of cyclists riding on the road grew by approximately 5% (242 total cyclists) from the early 2019 baseline. There were some differences between the four sites. The timing of these surveys was largely before the most significant disrupted effects of the COVID-19 lockdown.

School representatives and crossing wardens interviewed for this evaluation also spoke of benefits for children's safety travelling to school (section 3.5). However, these interviews indicate that additional awareness measures beyond the immediate school zone could be valuable.

4.4 Resident Perceptions

Residents surveyed expressed mixed overall responses about the trial. Overall, responses at twelve months were widely spread among the 151 resident surveys completed.

When asked directly about the trial, there was a relatively even distribution of responses for questions concerning the potential safety and amenity benefits. This finding triangulates with the generally modest improvements in observed vehicle speed and pedestrian/cyclist count data.

Support for the trial appears to be lukewarm (section 3.4.5). While a small majority are unhappy with the lower limit, there is not substantial or persistent opposition to the 40 km/h trial area among local residents. A majority of respondents surveyed at this twelve month milestone thought a 40 km/h limit could be useful in other areas.

Indirect survey results indicate that residents are generally less concerned with road safety and local street amenity issues at this twelve month milestone – further indicating benefits.

A finding of reduced concern about the moral implications of low-level speeding within the trial area among residents surveyed is of concern. This may suggest the need for enforcement, or at least further integration of measures to reinforce the suitability of a 40 km/h limit.

Open-ended comments about the trial mainly concerned:

- The perceived inappropriateness of the 40 km/h speed limit along Bulwer Street
- The perceived lack of compliance with the 40 km/h speed limit
- A perceived lack of enforcement
- A lack of awareness about the trial
- Confusion around signage for the trial

Survey respondents indicated that additional street design measures, signage, enforcement, and other awareness measures may improve compliance. Open ended-survey comments broadly triangulated with other findings.

4.5 Conclusions

In view of all the above data, and the triangulated results, the 40 km/h trial within the City of Vincent has resulted in some speed reduction and crash benefits. The result is in line with what would be expected based on previous research.

The evidence also suggests that local street amenity has somewhat improved. The increase in the total number of pedestrian and cyclists observed triangulates with the slight improvement in perceived street safety and amenity reported by respondents. There is good triangulation of findings between results from different methods, which supports confidence in these conclusions.

Complementary street design, road user awareness, and enforcement measures to reinforce the 40 km/h speed limit may result in the realisation of a greater level of total benefits. If left in place, it is possible that vehicle speeds within the trial area would continue to mediate below the new limit – particularly if supporting measures are introduced. Future evaluation would be useful in assessing the effectiveness of supporting measures.

Appendices

Appendix A – References

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Six Month Evaluation Report						
A (template only)	S McLeod	R Gorell	On file	A Wilmot	On file	17/05/2019
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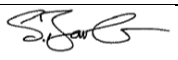
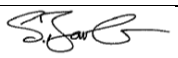
Twelve Month Evaluation Report						
A (Draft issue twelve month evaluation)	S McLeod R Gorell D Mulcahy	S Barlow		A Wilmot	On file	29/05/2020
0 (Final Twelve Month Evaluation)	S McLeod	S Barlow		A Wilmot	On file	09/06/2020

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