



# THE EFFECT OF TRAFFIC ON COMMUNITY

A Case Study on Beckenham, New Zealand

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## Executive Summary

- Beckenham is a suburb located in Christchurch, New Zealand that has the potential for lower speed limits and/or traffic restrictions due to its geographical location and culture.
- Beckenham is a small suburb condensed within a loop of the Heathcote River, with low traffic volumes and wide streets.
- The suburb also has the highest percentage of cyclists in Christchurch, at 14%. Beckenham has also been recognised for its special character by the Christchurch City Council who have named it a special amenity area.
- Information about the suburb, coupled with secondary research, helped create the research question ‘What would the impacts be of a slower speed limit or traffic restrictions on the community in Beckenham and what would be the feasibility of implementing this?’
- Four different methods were used to gain information from the community. These methods were a questionnaire, focus groups, speed measurements and consultation with experts.
- The majority of the community members questioned believe that there is an issue with traffic speeds and safety in Beckenham.
- The results show that the community wishes the speed limit to be lowered within the whole Beckenham loop.
- Speed data collected over one hour within Beckenham showed that 35% of drivers were travelling faster than the speed limit.
- The biggest limitation of the research was the use of a snowball sampling method that may have led to some bias with the results. Although the sample size was not entirely representative of the whole community, the results found are statistically significant and give a good indication on how Beckenham feels about the traffic in their community.
- A suggestion for further research is an increase of the sample size. Interviewing each member of the community face to face would give a more accurate reading of how the community would respond to lower speed limits.
- Further speed measurements should be undertaken to allow for proof of speeding to be given to the Christchurch City Council.

## Introduction

This report highlights the effect traffic has on a community through analysing the case-study of Beckenham, Christchurch. Beckenham is a small suburban area with low traffic volumes, located within a loop of the Heathcote River, where the majority of traffic is created by residents of the neighbourhood. These conditions suggest that Beckenham may have the potential for slower traffic speeds or traffic restrictions to be put in place to enhance walkability and create a safer, stronger community. The research conducted was based around the question 'What would the impacts be of a slower speed limit or traffic restrictions on the community in Beckenham and what would be the feasibility of implementing this?' This study has been produced in association with the Beckenham Neighbourhood Association with the aim that these findings will start towards producing a safer community environment. This report starts with an evaluation of secondary literature surrounding the topic of traffic speeds and the process of creating liveable streets and communities. The next section is methodology which explains the research process and stages of this project, followed with results and discussion. The report concludes with suggestions for further research and the final findings of the project.

## Literature Review

The first stage of the research process was to read secondary literature to help narrow down the research question and find background information on traffic management restrictions. Overall, a wide range of information was gathered from a variety of scholarly sources. One of the main recurring points stated by multiple sources is the common idea that slower speed limits in residential neighbourhoods create a safer, stronger community. The article *Liveable streets and social inclusion* by Sauter & Huettenmoser (2008) states that residential areas with lower speed limits have higher levels of social inclusion and interaction, which creates a stronger community. The design of neighbourhoods is important for people deciding which mode of transport they will use, whether that be by car or walking. Handy and Clifton (2001) stress the importance of direct routes as a factor which will encourage more pedestrians to walk rather than drive. As Beckenham is a well-connected suburb located within a loop of the river reducing the speed limit is likely to encourage more people to walk.

When investigating the issue of speeding, Saibel et al. (1999) found that drivers commonly break the speed limit in residential neighbourhoods, even within school zones, which was an important aspect to consider when investigating the issues of speeding and congestion around Beckenham School and St Peter's School, the two primary schools in Beckenham. The article *Vehicle speeds in school zones* also suggests that lowering speed limits on the roads that lead up to school zones is an effective method of reducing traffic speeds (Saibel et al, 1999). Therefore, this suggests that lowering the speed

limit for the whole area of the Beckenham loop would be more effective than just lowering it on certain streets.

Giles-Corti et al (2010) discusses the walkability of different school zones showing that kids in high walkability zones were three times more likely to walk to school regularly. The article also states that for every kilometre away from the school that a child lived, they became 86% less likely to walk. This idea is backed up by Guliani et al. (2015) who state that lower speed limits increase the number of children using active transport to get to school rather than getting driven. Active modes of transport have been proven to be better for children, therefore lowering the speed limits will positively impact the lives of children in the Beckenham community.

Due to the Beckenham school zone being one of the major areas prone to issues regarding speed and congestion, a review of literature was undertaken to see how children are affected by the speeds limits in their neighbourhood, along with how best to work with children when aiming to create a focus group. Appleyard's (2016) article *The meaning of livable streets to schoolchildren* discusses the affect that traffic has on children's cognitive development. His article states that children who walk or cycle to school, rather than being driven, have a far more advanced knowledge of their surrounding road networks. The article concludes that lowering speed limits and volumes of traffic within school zones will be beneficial to not only children's safety, but also their educational development.

Appleyard's methods of interviewing children in focus groups was useful to help understand effective ways to communicate with children. He suggests that visual images and hands on techniques are more effective than answering verbal questions. The children's focus group method created for this project was based on Appleyard's method of cognitive mapping. His method of asking the children to draw a map of their neighbourhood was adapted to suit this research aim by using printed out maps of Beckenham and allowing the children to place stickers on them. Further information on children's focus group techniques was gathered from the article *Conducting focus groups with child participants* (Kelly, 2013) which emphasises the importance of eye contact and open answer questions, as well as suggesting that the focus groups should be no longer than 20 minutes without a break.

The idea of liveable streets is a theme in a lot of literature regarding issues of speed and congestion in neighbourhood environments. The book *Street Design Guidelines for Healthy Neighbourhoods* by Dan Burden (2002) states several ways to create healthy neighbourhoods and liveable communities through traffic management methods such as lowering speed limits. The book suggests that if speed

limits are lowered more people would walk and bike rather than drive, which is proven to strengthen bonds in communities. The book suggests that neighbourhood streets should consider the safety of pedestrians by giving them priority on the streets. *Real Towns: Making Communities Work* by Bright Rue (2000) also considers healthy neighbourhoods and roads as the key ways to create a liveable community. Although changing the road design to implement traffic calming methods can seem expensive, Bright Rue states that it can save money in the long run. This book also states that streets are for the people, not just the cars.

Prioritising pedestrians was a theme in many of the readings, including *The Global Street Design Guide* (NACTO, 2016) which states that cities are built for people and that the roads should reflect this. *The Built Environment and Traffic Safety* (Ewing & Dumbaugh, 2009) states that wide, straight roads with clear visibility are safer in rural areas but not in urban areas due to pedestrians, cyclists, drivers, intersections, driveways and parking. This article also highlights that the built environment is important to traffic safety. Engwicht (2000) states in the book *Street Reclaiming* that it is possible to make liveable streets without taking space away from the roads, by instead encouraging the use of traffic restrictions, which make drivers instinctively slow down, rather than slowing down because of physical barriers.

*The U.S Traffic Calming Manual* (Ewing & Brown, 2009, p.2) states that, “traffic calming involves changes in street alignment, installation of barriers and other physical measures to reduce traffic speeds and or cut through the volumes, in the interest of street safety, liveability, and other public purposes”. Extensive research of literature was needed to evaluate the differences between the numerous traffic calming methods, by considering the cost and positive and negative aspects of each method. Bright Rue (2000) gives the positive and negative points of each traffic management option, such as speed bumps and medians. One conclusion made is that widening streets doesn't always improve mobility, instead it can increase issues such as speeding, which is evident in the Beckenham community. *The Global Street Design Guide* (NACTO, 2016) is another source that outlines the different methods of traffic management as well as defining street types and how they are used. *The Canadian Guide to Neighbourhood Traffic Calming* (TAC, 1998) and the *U.S Traffic Calming Manual* (Ewing and Brown, 2009) are also good resources that give the positive and negative impacts for each calming method allowing for comparison between each method to find the best possible options for the Beckenham community.

## Methods

### Questionnaire

The first method chosen to answer the research question was a questionnaire, designed to gather data from the residents of Beckenham on their broad opinions of traffic safety in their community. This is related to the feasibility section of the research question, if no residents deem there to be a need for traffic restrictions, their implementation is not feasible.

The questionnaire was devised using maptionnaire.com, a questionnaire-building website accessible through the university's subscription. There were several advantages of using this website. The first was the online format, making distribution of the survey quick and not labour intensive. The second was the use of maps in the questionnaire itself, for example a respondent could mark a point on a map where they frequently visited in Beckenham, giving a sense of which roads were most used. The questionnaire was tested on friends and family before being released, in order to ensure questions were concise and easy to understand.

The questionnaire was promoted using the community Facebook page (3480 members), through the Beckenham Neighbourhood Association community newsletter, and through emailing the link to the questionnaire to known people living in Beckenham. A presentation was also given at the Beckenham Neighbourhood Association's Annual General Meeting in order to promote the questionnaire and focus groups further and educate those who attend on the project and its rationale.

### Vehicle Speed Measurements

Vehicle speeds were measured using a Pro Laser III speed gun by Kustom Signals in Beckenham, on a Sunday from 12:30pm-1:30pm. Measurements were taken from within a parked car in order to remain inconspicuous to drivers and get non-biased results.

Vehicle speeds were measured on this occasion in order to gain a general idea of how fast cars travel in Beckenham on average, and whether the results showed an issue with speeding. This data was compared with the questionnaire and focus group results to see whether there was a correlation between people's perceptions of traffic issues and actual collected data.

### Focus Groups

The final question on the questionnaire asked whether the respondent may be willing to participate in a focus group in the month of September, with food and beverages provided. Those who answered

yes to this were contacted with the details they provided. The volunteers from the questionnaire made up the three adults focus groups, along with some already known individuals living in Beckenham. This method of sampling could have led to some bias in the results, as those who volunteered to participate are likely those with strong opinions on the issue. There were four participants in each of the focus groups, held on a Thursday and Wednesday evening, and on a Thursday morning.

Four focus groups were run with primary school aged children from Beckenham School, during their school hours. There were five participants in three of these focus groups, and four participants in the fourth group. The objective of these groups was to gain an idea of how the children felt when using the roads in terms of their personal safety around vehicles. The focus groups were held on a Tuesday morning, shortly after the children had arrived at school. The information collected in the children's focus groups was particularly useful, as they are significantly less likely to have completed the online questionnaire than their parents. Emails were sent out to the children's parents prior to this, giving them the opportunity to opt their child out of the focus group if they did not wish them to participate. Efforts were also made to ask very specific questions, for ethical reasons, that ensured the children understood we were asking about traffic safety, rather than general safety or stranger danger.

A visual aid was used to maintain the attention of the children in the form of a printed map of Beckenham. The children were asked to mark on the map with stickers areas where they felt safe or unsafe, or had witnessed a crash or a near miss. An example of this is shown below.



Figure 1: An example of a printed map used as a visual aid in children's focus groups



Focus groups were used to get more in depth information about public perceptions of traffic issues, without having to extend the questionnaire and make it time consuming to complete.

### **Consultation with Experts and Review of Relevant Literature**

While all previously mentioned methods will answer the feasibility section of the chosen research question, the impacts section of the question must be answered through the collection of background research. This is why consultation with experts and reviewing of relevant literature is very important to this study.

Meetings have been held with two experts. Glen Koorey, a traffic engineer, and Mike Fisher, a place planner, both provided some specific knowledge about traffic management methods and personal experience with public response to traffic methods, as well as suggestions of relevant literature to review. The results of this literature review are in the section above.

## **Results**

### **Questionnaire**

The Maptionnaire survey received 107 responses. Females were far more likely to complete the survey with 74% of the responses being from women. This may have impacted the results of the study, as women may be more inclined to act in a more maternal manner towards children, or be more likely to collect children from school. The respondents were largely older than 40, accounting for 68% of respondents, and those older than 30 years accounted for 91%. 49% of respondents had at least one child currently in either primary and/or intermediate school, with 53% of these respondents having children currently attending Beckenham School.

It was found that 66% of respondents believed that Beckenham would benefit from traffic speed restrictions being implemented (Figure 2). 41% of people agreed that the traffic restrictions should be implemented in only parts of Beckenham. It was found that females were slightly more likely to agree with the statement, with 68% females agreeing. However this is only a slight increase on males, where 58% agreed. Respondents were equally likely to agree with the statement regardless of if they had children or not currently in primary or intermediate school.

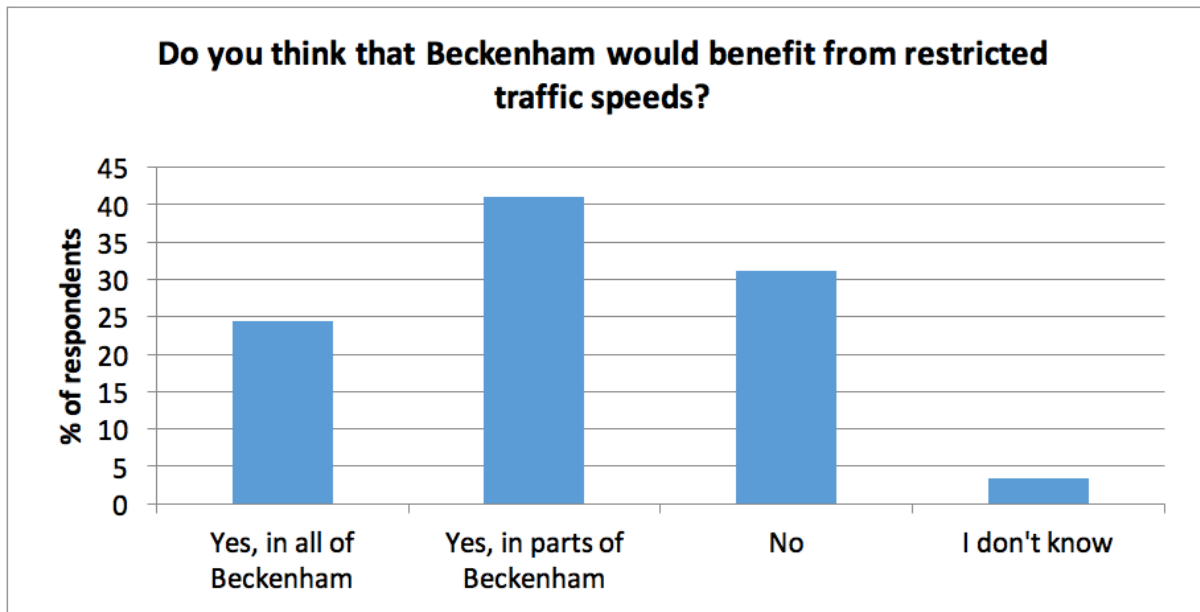


Figure 2: Showing the responses to the question “Do you think that Beckenham would benefit from restricted traffic speeds?”

62% of respondents believe there are issues with traffic congestion in the Beckenham loop during school drop off and pick up times, around 8:40am - 9am, and 2:50pm - 3:10pm (Figure 3). No one strongly disagreed with the statement, with only 8% disagreeing. Those with children are more likely to agree/strongly agree with this statement, at 71%. Only 50% of those without children agreed/strongly agreed, a 21% difference.

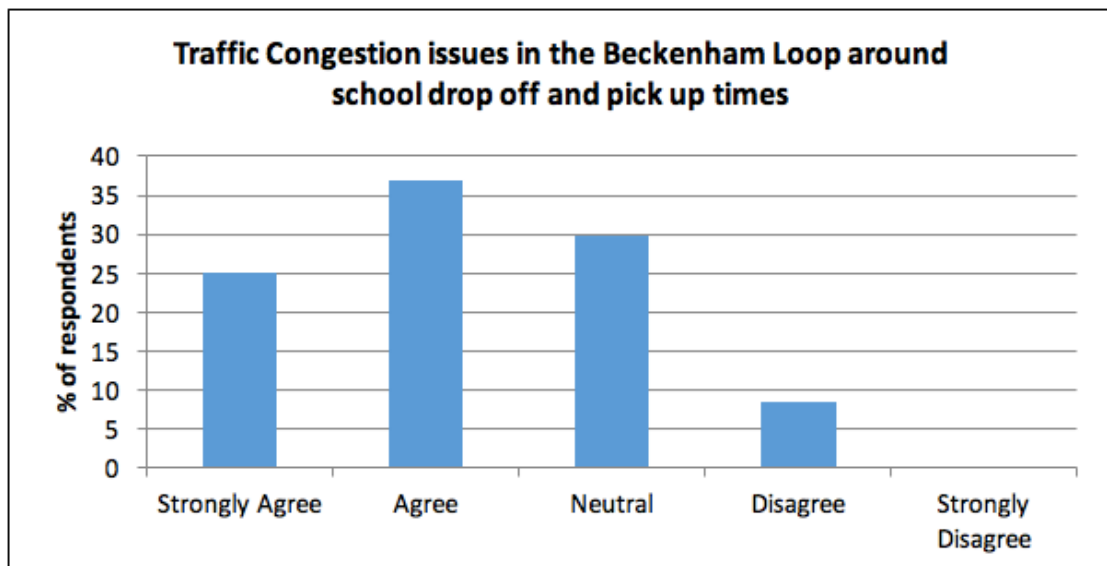


Figure 3: Showing the responses to the statement “There are issues with traffic congestion in the Beckenham Loop associated with school drop off and pickup”

75% of respondents have, at some point, feared for their own, or their family’s safety around traffic in Beckenham (Figure 4). Most of these responses however, fall into the “sometimes” and “not often” categories, showing that while there has been instances that they feel unsafe, they are not common. Of people with children currently in primary/intermediate school, 85% of respondents had feared for their own or their family’s safety, 20% higher than those without children.

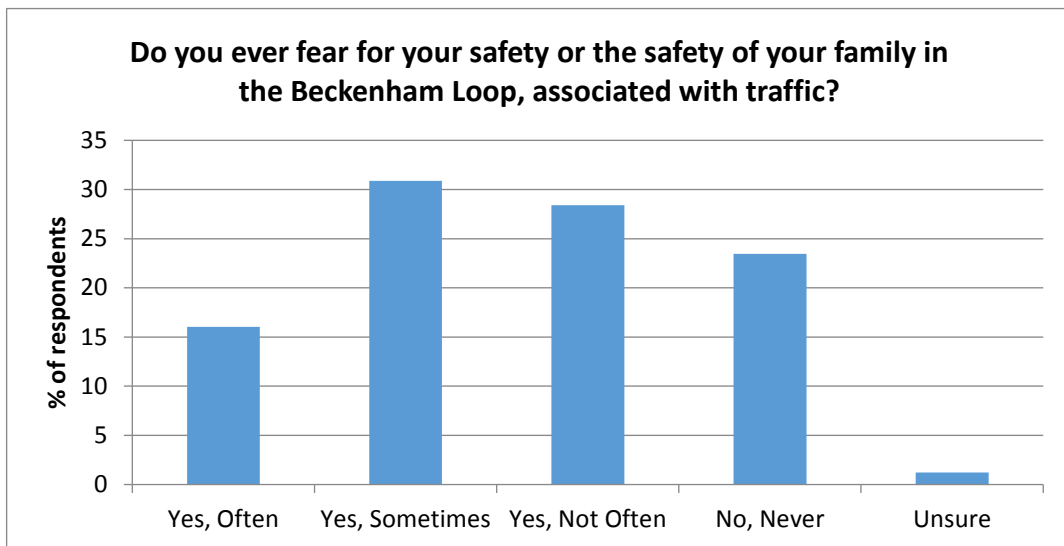


Figure 4: Showing the responses to the question “Do you ever fear for your safety or the safety of your family in the Beckenham Loop, associated with traffic?”

Respondents were asked about the places in Beckenham where they have witnessed any issues with traffic. This resulted in four major standout areas being highlighted: Tennyson Street, Norwood Street, Birdwood Avenue, and Sandwich Road, with emphasis at intersections between these roads. The exact points of contention can be seen in Figure 5, over the page. The most common complainants were that cars travel too fast for the conditions, being mentioned in 48% of comments, and streets being too hard to cross, especially for children, which was mentioned in 31% of comments.

### Focus Groups

The focus groups brought to light the community’s views on favoured traffic management methods. The preferred method with an almost unanimous agreement was a reduction of speed limits in Beckenham, with a suggested speed of 30km/hr. It was widely agreed that the most effective way to do this would be to implement it across the entirety of Beckenham, with signposts at each entrance into the suburb. The use of chicanes or road narrowing on the wider streets in Beckenham was also favoured, most notably on Birdwood Avenue and Norwood Street. The main issue that was identified

was that chicanes may be seen as obstacle courses by reckless drivers. Raised medians were also considered to be a viable option for Beckenham, and considered to be child friendly for busier roads, however many had issues with the ability to safely hold a bike within the median when crossing the road. The only disliked methods of traffic management were that of directional or full closure, as they believed that they would ruin the connectivity of a suburb, and speed bumps, which were considered to be noisy due to acceleration, and ineffective at reducing speeds on the entirety of a street.

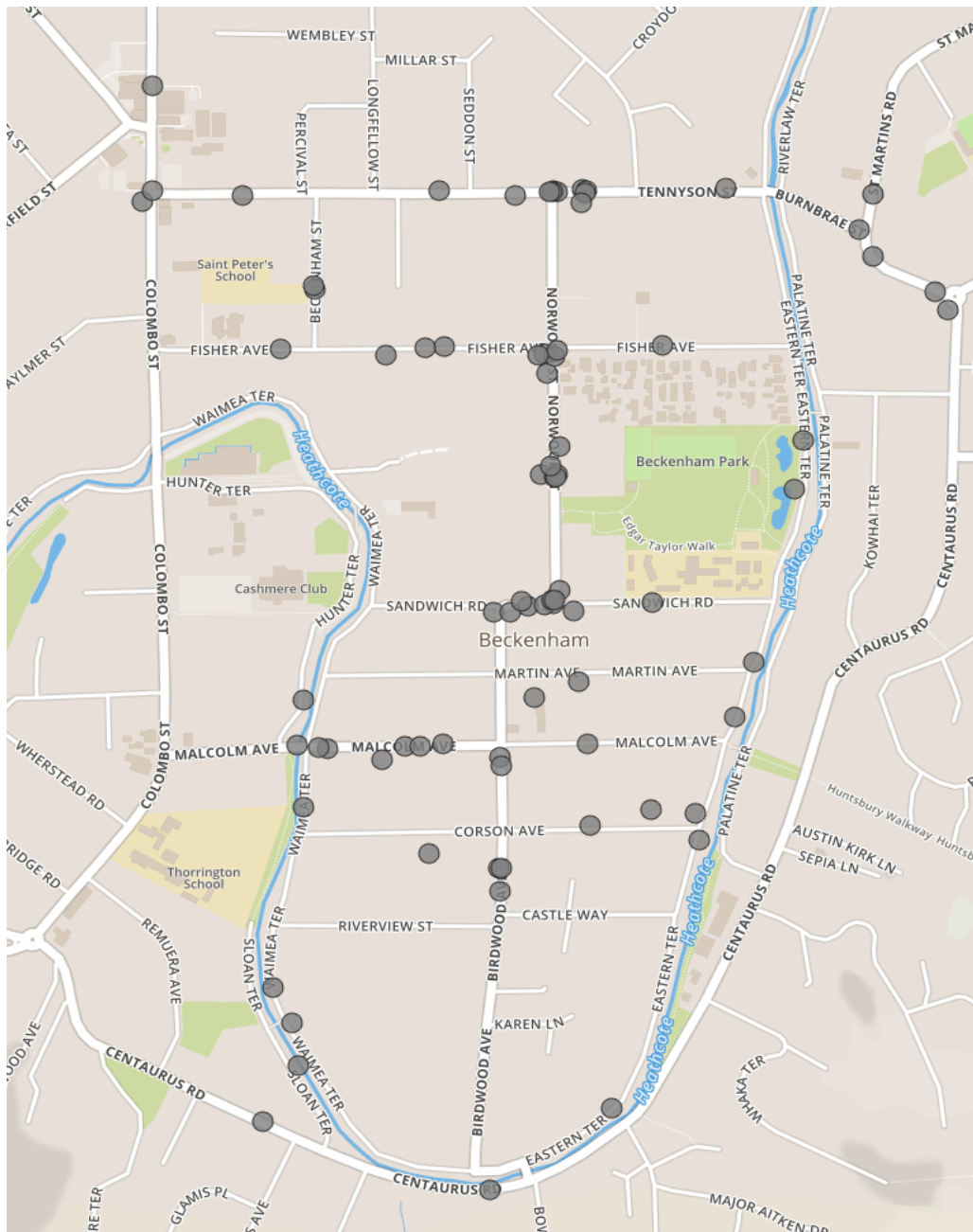


Figure 5: Map from Maptionnaire showing the locations that people reported having issues with traffic.

## School Survey

The school survey of 60 children in year 7 and 8 found that 62% of children surveyed had witnessed a car travelling at a speed that they deemed to be too fast in Beckenham. The survey did not specify what was to be considered as too fast, but rather let the student decide what was dangerous to them. The survey also found that 45% of children were driven to school by an adult, and that 50% of students used an active transport method to get to school (Figure 6). These children are more likely to be exposed to dangerous traffic behaviour in Beckenham, with 53% of those who used active transport also reporting that they had witnessed unsafe driving behaviour, compared to 45% of those who are driven to school.

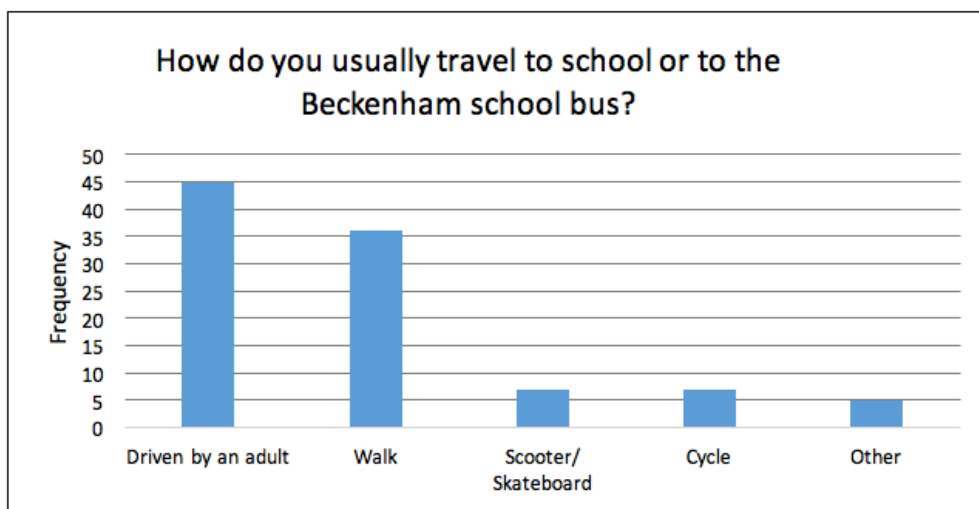


Figure 6: Showing the responses to the question “How do you usually travel to school or to the Beckenham School bus?”

## School Focus Groups

Beckenham schoolchildren largely identified two roads as having issues. These were Tennyson Street and Sandwich Road. Tennyson Street was thought to have cars speeding too often, as well as being hard to cross. This was due to there not being enough crossings, and the cars not letting people cross when they are waiting at a median. Sandwich Road is the road on which Beckenham school is located, and is thought that the parents who drop off and pick up their children do not treat it like a real road, often not indicating and pulling out from parks without looking properly, making it dangerous for cycling children. The streets in Beckenham that children do like were many of the horizontal and river roads, as there was less traffic along them and therefore they were easier to cross.

## Speed Measurements

The speed measurements taken in Beckenham showed some evidence of speeding. 35% of the cars measured were found to be traveling at above the 50km/hr speed limit. This means that while the majority of the cars measured were travelling within the speed limit, there was still a significant proportion of cars travelling at speeds that could be considered dangerous within the loop.

## Discussion

Our research has shown that the majority of both adults and children who were surveyed believe that there is an issue with traffic in Beckenham. With more than three quarters of survey respondents fearing for the safety of their families around traffic in their neighbourhood, it is important that traffic is managed, to make the community feel safer whilst travelling. Research by Sauter & Huettenmoser (2008) has shown that areas with lower speed restrictions have a much stronger sense of community. When the area is seen as being less hazardous, people are more likely to interact with their neighbours rather than being in their homes or backyards away from the traffic. The general consensus of our research was that residents preferred to slow traffic speed within the whole loop in conjunction with raised medians, road narrowing or chicanes.

Although many people believe entering and exiting the loop is the biggest problem, slowing the traffic within the whole loop is favoured as it would make drivers feel like they are entering into a different space, enhancing the already strong, community feel. Beckenham is regarded as a special amenity area so incorporating traffic calming methods would help with the characteristic nature of the suburb.

There has been precedent internationally for lower speeds in suburbs with movements overseas such as '20 is plenty,' calling for 20 mile per hour speeds in areas across the United Kingdom (King, 2017). Slower speed suburbs are not common throughout New Zealand, but the special characteristics and the strong community of the Beckenham Loop may allow this to become a reality. As the community is not a thoroughfare, has many preschools and primary schools, and the highest rate of cyclists in the whole Christchurch city, at 14% (Statistics New Zealand, 2013), Beckenham is the perfect example of a community that is likely to benefit from reduced speeds. If speed restrictions were implemented it is likely to add only a few seconds to the travel time within the loop.

Although we don't have sufficient evidence to say that drivers speed, the community still feels that 50km is too fast for their neighbourhood. As many children in primary school haven't yet developed the ability to correctly judge traffic speeds, the chance of accidents involving children would be reduced by slower speeds. This would make the whole area safer for children to walk to school,

meaning children who were previously driven to school may now be allowed to walk. Children who walk to school are also much more aware of their surroundings and know their neighbourhood layout better than children who are driven (Saibel et al., 1999).

Most people surveyed agreed that there are issues with congestion around the school during pick up and drop off times. With more children using a form of active transport to get to school, congestion around the school would be eased. Many children involved in our focus groups expressed feeling unsafe along Sandwich Road, where their school is located, due to speeding and the unpredictability of drivers not using indicators. Slower speeds would lessen the chance of accidents with parents and children both having more time to react.

Reducing the speed limit within the Beckenham loop is low cost, as it only requires signs to be installed and residents to be informed of the newly reduced speed limit. Solar powered signs that show your speed as you approach were also favoured, as it reminds drivers of the new lower speed limit and make them more aware of their surroundings in general. Flashing signs have also been proven to be the most effective way of slowing traffic in areas surrounding schools (Saibel et al., 1999).

Almost all streets in Beckenham are very wide, so narrowing the roads either through use of chicanes or reducing the road width would make the streets appear relative to the lowered speed limit. These methods were favoured by focus group participants due to the way they break up the long, uninterrupted field of view which can often cause people to increase their speed without realising. The visual appeal of nicely landscaped chicanes would add value to the area. Traffic calming methods on wider streets such as Norwood St and Birdwood Ave would also help people stick to a lower speed limit in smaller side streets.

Although chicanes are popular, the loss of on street parking may become an issue for some residents as up to 5 metres can be lost either side (TAC, 1998). The cost of chicanes can vary from \$16,000 to \$160,000 depending on the width of the road and the extent of landscaping. Bike lanes can also be incorporated between the chicane and the footpath which would be well suited in Beckenham due to the high density of cyclists (TAC, 1998). The majority of drivers would drive to suitable conditions in the chicaned area, although some more aggressive drivers may view it as an obstacle course putting themselves and others at risk (TAC, 1998).

In a community with many pedestrians and cyclists, raised medians allow for a safe place to cross busy roads. They could be installed on busy streets such as Tennyson St and Norwood St. This would be beneficial as children would only need to look one way at a time, leaving less room for error when judging speeds of oncoming traffic. Due to the large number of cyclists in Beckenham it would be essential for the median to be wide enough to safely fit a bicycle. A raised median could also be put in place on Sandwich Rd near the school as many children mentioned feeling unsafe and struggling to get across the road to school. The cost of raised medians can range from \$8000 to \$16,000 depending on the median width and location of utilities (TAC, 1998). Although they can just be painted onto the road, they are much more effective when in the form of a raised island and also provide a safer place acting as a pedestrian refuge. Residents liked the idea of raised medians, even though they restrict access to driveways (TAC, 1998).

The community does not favour speed bumps or road closures due to the annoyance of drivers decelerating and accelerating quickly, noise, and regarding issues of accessibility for emergency services. Although these methods have their benefits it is important to acknowledge why the community does not favour them for their suburb.

One limitation of our research was the small sample size we obtained from only distributing the questionnaire in the Beckenham Facebook group and the BNA newsletter, potentially excluding a whole group of Beckenham residents. This meant we did not have an accurate representation of the demographic in Beckenham, the majority of survey respondents were female and over 40 years of age. The focus groups also may have been skewed as most participants were of a similar demographic due to the snowball sampling method used, however we received a range of views from these participants.

This limitation could be improved in future research. Sampling a greater proportion of the community, and a wider variety of demographics could lead to more reliable results. This could be achieved through door knocking or through personally visiting places such as retirement villages to get the opinions of the elderly, a demographic that was likely missed in this study due to a lower rate of computer use.

Another limitation is the small amount of speed measurement data gathered. Measurements were only taken over the course of an hour and 72 different cars were measured, which is not a high enough number to be considered an accurate representation of speeds in Beckenham. This is something that



could be improved upon in future research. More speed data could be gathered, so that it could be relied upon in the analysis.

Some members of the community have expressed wishes to take this project further with the Christchurch City Council and in doing this we recommend that the community would benefit from a reduced speed across the entire Beckenham Loop, in conjunction with other traffic calming methods such as chicanes, road narrowing and raised medians.

## Conclusion

In conclusion, the residents of Beckenham consider there to be an issue with traffic in their community. The most favoured methods of traffic restriction is a reduction of speed limit for the whole Beckenham suburb, coupled with the installation of chicanes, road narrowing or raised medians in order to make the roads feel like a low speed zone as well as changing the legal speed.

Future research could use a different method of sampling for a questionnaire or focus groups and ensure that data was gathered from more demographics, as well as taking a larger amount of speed measurements to produce reliable results.

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