MONITORING REPORT

Prepared For Regional Cycle Monitoring Working Group
(Co-ordinated by Auckland Regional Transport Authority)

MANUAL CYCLE MONITORING IN THE AUCKLAND REGION

March 2010

Papakura District

Prepared by Gravitas Research and Strategy Limited

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1.1 Introduction

The Need For Reliable Cycle Trip Data

Monitoring cycle movements and cycle traffic is important to the Auckland Regional Transport Authority (ARTA) and the local councils in the Auckland region, to identify where investment may be needed to improve infrastructure for cycling. Cycle traffic data will also help ARTA prioritise future funding through the Auckland Land Transport Programme[1].

Cycle traffic data will help inform a major programme of improvements for cycling in the Auckland region. In 2007, over $100 million was planned to be invested in building over 50% of the Regional Cycle Network by 2016. By mid 2009, 21% of the Regional Cycle Network had been built. Comprehensive cycle data assists with the development of the region's cycle network and prioritisation of projects.

This cycle monitoring gives precise cycle traffic information for a number of locations across the region, which can guide investment in infrastructure and other programmes. It also allows councils to track progress against a quality baseline over the coming decade.

[1] Auckland Regional Transport Authority (2006) *Regional Cycle Monitoring Plan (Provisional Guidelines)*

Manual Cycle Monitoring

Historically, manual cycle monitoring had been carried out in four of the seven Auckland region Territorial Authorities (TAs). However, each monitor had been undertaken using a different methodology[2]. This variability prevented the possibility of comparing the relative popularity of different sites across TA boundaries. In addition, each monitor programme took place at different times of the year, preventing comparability from location to location since factors such as weather, school/tertiary education holidays, seasonal variations and daylight savings each have an impact on the numbers of cyclists. Even within TAs, inconsistencies as to when counts took place from year to year prevented robust comparability over time.

Through the Regional Cycle Monitoring Plan, it was proposed that these manual counts be regionally aligned to ensure better regional consistency. Ideally, cycle count monitoring would be carried out at the same time each year across the region, applying a standard methodology. As outlined in the Regional Cycle Monitoring Plan, a consistent methodology would ensure that:

- standard monitoring days are used – that is, school and tertiary holidays, and statutory holidays are excluded and that monitoring preferably takes place at the same time each year to enable reliable year-on-year comparisons to be made. Decisions about whether cycle counts take place on weekdays and weekends would be made at the outset;
- a consistent set of times are used for monitoring, for the morning, evening and inter-peak periods; and
- a consistent method is used for monitoring direction and location of cyclists, including monitoring how many are on the footpath.

This report presents results from manual cycle counts conducted at two sites across the Papakura district following a standardised methodology. Results are presented site-by-site, as well as being aggregated to a TA and region level. For sites also monitored in 2007, 2008 and/or 2009, comparative results are provided.

Important Note: This report provides the results of manual cycle monitoring conducted at two pre-determined sites in Papakura district only. Site-by-site results and city/district summaries for all other Auckland region Territorial Authorities have been provided in separate documents. It is strongly recommended that this report be read in conjunction with the Regional Summary document, which provides aggregated data for the region, as well as a regional comparison of results.

[2] For example, Manukau and North Shore cities' monitors took place at the same morning and evening peak times, while Auckland city's differs by one hour for the evening peak, and Waitakere's differs for both peaks.

1.2 Methodology

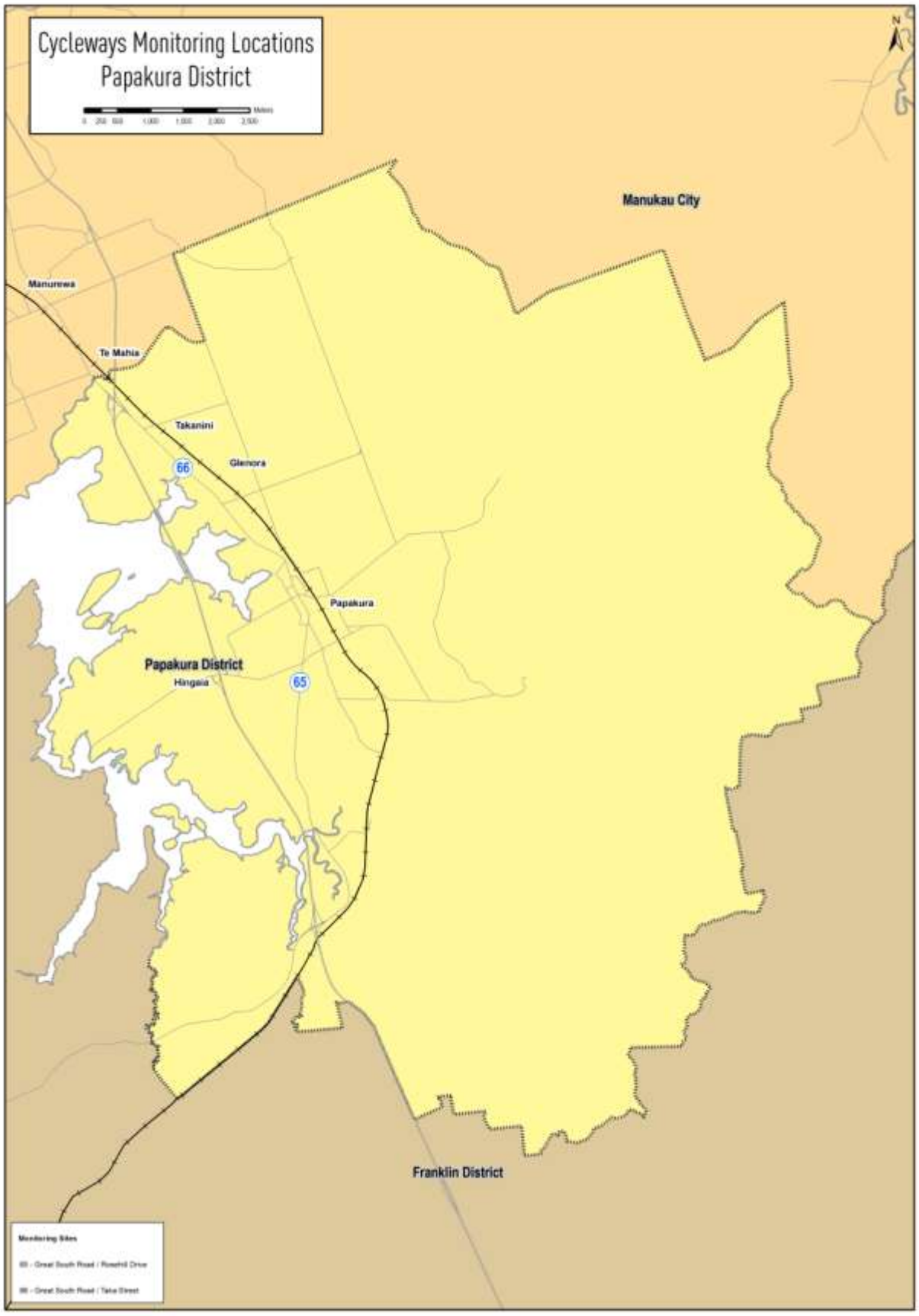
Manual cycle counts have been conducted using a standardised methodology across all sites. This methodology is outlined below. *Note: To ensure the longitudinal comparability of its cycle data, Gravitas have conducted the regional monitoring using a similar approach to that used to collect manual count data for Auckland City Council between 2001 and 2006.*

Choice Of Sites

Decisions as to which sites were chosen for cycle counts were guided by each respective TA, keeping in mind the planned developments for the Regional Cycle Network. In choosing their sites, TAs were strongly recommended to consider sites that could be retained over time as this will allow for the most accurate longitudinal assessment of change in cycle numbers.

Manual counts were undertaken at 84 different sites throughout the region. Sites were distributed throughout the region as follows:

- Auckland City — n=28 sites (12 sites monitored since 2001; 10 sites added in 2007; 5 sites added in 2008; 3 sites relocated, one site dropped and one site added in 2009, one site added in 2010)
- Waitakere City — n=15 sites (11 sites monitored since 2007; 2 sites added in 2008; 1 site added in 2009; one site relocated and one site added in 2010)
- Manukau City — n=14 sites (12 sites monitored since 2007; 1 site added in 2008; one site relocated, 2 sites dropped and 3 sites added in 2009)
- North Shore City — n=13 sites
- Rodney District — n=8 (5 sites monitored since 2007; 3 sites added in 2009)
- Franklin District — n=4 (3 sites monitored since 2007; 1 site added in 2009)
- Papakura District — n=2 sites (3 sites monitored since 2007; 1 site dropped in 2010)


Cycleways Monitoring Locations
Papakura District
Manukau City
Manurewa
Te Mahia
Takanini
Glenora
66
Papakura
Papakura District
Hingaia
65
Franklin District

Monitoring Times

Time Of Day

On the recommendation of the Regional Cycling Monitoring Working Group, manual counts in the morning peak were conducted between **6.30 and 9.00 am.** It should be noted that this is a slightly longer morning peak than was used for manual counts in Auckland city prior to 2007 – 7.00 to 9.00 am. However, to allow for longitudinal comparisons, results for Auckland city have been presented for both 7.00 to 9.00 am and 6.30 to 9.00 am.

Between 2001 and 2006, Gravitas monitored Auckland city evening cycle numbers between 4.00 and 6.00 pm. However, in 2005 and 2006, data collected at some sites had shown upwards trends and notable peaks later in the shift (particularly between 5.50 and 6.00pm) which suggested that cycle numbers after 6.00 pm may remain high or even increase. To capture this trend, Gravitas recommended extending the evening peak monitoring period to **4.00 to 7.00 pm**. Once again, to allow for longitudinal comparisons, results for Auckland city have been presented for 4.00 to 6.00 pm as well as 4.00 to 7.00 pm.

Day Of Week

Previous experience conducting cycle and other traffic manual counts on behalf of Auckland city has found that these counts are best undertaken on either a Tuesday, Wednesday or Thursday as travel patterns on Mondays and Fridays tend to be more variable.

Time Of Year

To ensure consistency throughout the region, standard monitoring days were selected and agreed upon by the Regional Cycle Monitoring Working Group. In selecting the days, consideration was given to:

- the timing of school and tertiary holidays/the commencement of term time for tertiary institutions;
- the timing of statutory holidays (particularly Easter);
- the timing of Bikewise Month; and
- daylight saving times.

It was agreed that manual counts would commence on Tuesday the 9th of March and be conducted on the first three fine days of the 9th, 10th, 11th, 16th, 17th, or 18th of March.

Counting at sites in **North Shore and Waitakere** cities was completed on **Tuesday the 9th of March**. Counting at sites in **Auckland city** was completed on **Wednesday the 10th of March**. Counts in **Manukau, Rodney, Papakura and Franklin** were completed on **Thursday the 11th of March**. Note: Counts in the morning and evening peaks took place on the same day for each site.

Weather and Daylight Conditions

Auckland city's 2006 cycle monitor provides a clear example of the impact of weather conditions on the validity of the data collected. During the (fine) morning peak, 1579 cyclists were recorded across the twelve monitoring sites. By comparison, in the (wet) evening peak on the same day, only 1050 cyclists were counted, demonstrating that only 66% of those who cycled during the morning peak were counted again in the evening. Such a significant drop in cycle numbers was not observed in previous years, when weather was comparable in the morning and evening peak.

To reduce the impact of weather conditions on cycle numbers, manual counts were conducted on predominantly fine days (although intermittent drizzle was observed at a small number of sites). In addition, if it rained during the morning peak, monitoring in the evening peak on that same day was also postponed, irrespective of the weather (as it can be assumed that cyclists' travel behaviour in the evening peak will have been influenced by decisions they made earlier in the day – for example, the decision to leave their bike at home and use public transport instead). Care was taken to ensure that all manual counts were conducted prior to the conclusion of daylight saving.

The weather on the three count days in 2010 was as follows:

Tuesday 9th March

(Waitakere and North Shore city sites monitored)

- Sunrise: 7:13am; Sunset: 7:49pm.
- Average temperature: 19 degrees Celsius.
- Fine weather for all sites in the morning period.
- Weather fine throughout the evening shift.

Wednesday 10th March

(Auckland city sites monitored)

- Sunrise: 7:14am; Sunset: 7:48pm.
- Average temperature: 14 degrees Celsius.
- Fine weather at most sites in the morning period.

Thursday 11th March

(Manukau city and Rodney, Papakura and Franklin district sites monitored)

- Sunrise: 7:15am; Sunset: 7:46pm.
- Average temperature: 20 degrees Celsius.
- Rodney district has fine weather throughout the morning shift. Most sites had overcast weather in the morning period apart from light drizzle at two Manukau city sites, one Franklin and one Papakura site.
- Weather in the evening period was overcast, with intermittent drizzle throughout the period.

Conducting The Manual Counts

Scoping Visit

Gravitas visited each of the selected sites prior to the first monitoring shift. This scoping visit was used to map the roading network and to identify and map the range of directions that cyclists could travel through the site. This visit was also used to identify any particular features (such as designated cycle ways) or potential hazards that surveyors needed to be aware of when monitoring at the site. As part of the scoping visit, a recommended observation point was identified and mapped (this point chosen on the basis of offering the best trade-off between visibility and safety). The maps prepared for each site have been included in this report – just prior to the count results for each site.

As part of the scoping visit, a small number of sites were identified as requiring two or more surveyors to accurately capture all cycle movements (due predominantly to the complexity of the roading/cycleway network at the site or poor visibility at the intersection). Two surveyors were used at:

- Great South Road/Campbell Road/Main Highway, Greenlane (Site 21; Auckland city);
- Beach Road/Browns Bay Road, Mairangi Bay (Site 45; North Shore city).

Three surveyors were used at the ferry terminal site (Site 22; Auckland city).

Briefing Session

Prior to their monitoring shift, all surveyors participated in a briefing session. The session covered:

- the overall aims of the Regional Cycle Monitoring Plan and how the manual monitoring fits with this Plan;
- the aims and purpose of the cycle monitoring and the process to be used;
- review of all materials supplied – how to interpret and use the maps, how to accurately record data on count sheets etc;
- health and safety issues; and
- general administration – shift times, collection and return of materials etc.

This session was interactive, with surveyors being encouraged to ask questions and seek further explanation on issues they were unsure about. Surveyors were also provided with a copy of the briefing notes for reference during their shifts. During the briefing session, all surveyors were also required to conduct a "practice count" for 20 minutes at the Ponsonby Road/Karangahape Road site.

Conducting The Manual Counts

Each site was assigned to a surveyor, who was issued with a map that showed the range of movements a cyclist could make through that site. In addition to the map, surveyors were issued with a clipboard, a safety vest and a letter identifying them as a member of a Gravitas research team[3].

For consistency with the Auckland city cycle data collected since 2001, during their shift the surveyor collected data on:

- The total number of cyclists[4] passing through the intersection;
- The direction in which cyclists are travelling (using the numbers on the map provided);
- The time at which cyclists pass through the intersection (to the nearest minute);
- Whether cyclists are school children or adults (determined by whether they are wearing a school uniform or clearly of school age);
- Whether cyclists are wearing a helmet; and
- Whether cyclists are riding on the road, footpath or designated off- road cycleway[5].

Since 2009, surveyors have been required to indicate those cyclists riding together in groups of three or more. To be consistent with previous year, each member of these 'pelatons' has been included in the site-level analysis as a separate cyclist movement. However, where pelatons were observed, the number of cyclists and the time they passed through the site have been given in the report, along with a percentage figure indicating what share of all cyclists of the site were riding as groups.

In addition, where cyclists were recognisable, surveyors were instructed to record each cyclist no more than three times during a single shift, irrespective of how many movements they actually made through the site. Surveyors noted where and when this occurred.

In addition, data was collected on the weather and daylight conditions at the site. Surveyors were also encouraged to record any information that may have affected cycle numbers or cycle

[3] This letter also contained contact details for the client organisation and Gravitas Research and Strategy for any member of the public or local business owners who had queries about the work being undertaken.
[4] To ensure consistency across all surveyors, a "cycle" was defined as being non-motorised, with two wheels and requiring pedalling to make it move. Note that this definition did not include scooters.
[5] Note: For the purpose of this project, an off-road cycleway is defined as designated off-road path for cycles. This includes exclusive cycle paths, separated paths (such as the footpath on Tamaki Drive) and shared-use paths (available to cyclists and pedestrians). It excludes on-road cycle lanes (that is, designated lanes marked on the road).

movements at the site – for example, construction or maintenance works being conducted on the cycle way or road works at the intersection.

A team of supervisors checked that surveyors were in the correct position and recording data accurately.

Data Analysis

Upon their return to Gravitas, all count sheets were checked for completeness. The raw data was then entered into Excel for logic checking, analysis and graphing.

Annual Average Daily Traffic (AADT) Analysis

It is acknowledged that the number of cyclists using a site varies by time of day, day of the week and week of the year, and therefore it is not valid to simply multiply manual count data collected over a certain (relatively brief) period out to represent a full day, week or year. However, according to Land Transport New Zealand[6], Annual Average Daily Traffic (AADT) analysis can be used to estimate the average annual daily flow of cyclists from manual and automated cycle counts conducted at one point in time. The procedure involves deriving scale factors, which account for the time of day, day of the week, and week of the year (which varies with school holidays and season) as well as weather conditions on the count day. These scale factors are then applied to the count data collected to give an AADT estimate.

Using the manual count figures for each site, it has been possible to provide the average annual daily traffic flow of cyclists (cycling AADT) estimate for each site. AADT scale factors (morning and afternoon) were provided by ViaStrada[7].

By applying the scale factor to the manual count data for each morning and afternoon peak, and averaging the two figures, an average annual daily cyclist flow figure has been obtained for each site. *A more comprehensive overview of the methodology used for this analysis is provided in Appendix One.*

Note: ViaStrada acknowledge that, as cycling volumes fluctuate from day to day depending on the weather, this method should be used with caution. They note that ideally an estimate should be achieved based on the average of the results of several counts, rather than counts from a single day, as in this study[8].

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[6] http://www.ltsa.govt.nz/road-user-safety/walking-and-cycling/cycle-network/appendix2.html

[7] ViaStrada is a traffic engineering and transport planning consultancy based in Christchurch, New Zealand.

[8] Appendix 2 of the Cycle Network and Route Planning Guide (CNRPG) (Land Transport New Zealand, 2004)

School Bike Shed Counts

As stated above, manual cycle counts were undertaken during the morning (6.30 am to 9 am) and evening (4 pm to 7 pm) peaks. However, it was noted in the design phase of the project that the timing of the evening peak monitoring would mean that the greatest share of students cycling home from school will be excluded from the counts. This was identified as a potential weakness of the monitoring proposed.

Therefore, it was suggested that information on numbers of students cycling to and from intermediate and secondary schools across the region could be collected by counting the number of bikes in school bike sheds on a pre-determined day. Rates of cycling among students could also be assessed by calculating the number of bikes counted as a share of the school's total roll (or share of the school's roll eligible to cycle).

It was decided that school bike shed monitoring would focus only on intermediate and secondary schools (and composite schools which included children of intermediate and secondary school age), since children travelling to primary schools are considered by many parents (and schools) as too young to cycle to school.

Methodology

The following process was used to collect the school bike shed count data.

1. Gravitas designed an information sheet that was distributed to most intermediate, secondary and composite (Years 1 to 13) schools in the Auckland region via email (note a small number of schools were omitted due to the special nature of the students eg special needs schools). This sheet was designed in consultation with the Regional Cycle Monitoring Working Group to ensure all necessary information was collected.

2. This email was then sent to all intermediate, secondary and composite schools in Auckland region (n=160) to notify them of the bike shed count and to let them know what they would be required to do. Included in this email was a link to an online count form.

3. To enhance the comparability of the school bike shed data with that of the regional cycle monitor, Tuesday 9th March was designated as the bike shed count day. (Most schools reported that they undertook the count on this day).

4. Once the school bike shed count had been completed, schools completed the online count form and submitted it electronically to Gravitas. Gravitas contacted all participating schools who had not returned their sheets after five working days, first by email (two rounds) and then by telephone. All count forms were checked for completeness before

being data-entered into Excel. One hundred and twenty-five response were received, a response rate of 78 per cent.

Reporting

The data from the manual counts has been presented at a site-by-site, TA and regional level.

Manual Counts - Site Level Reporting

For consistency with Auckland city's cycle monitor, the following results have been reported for each site:

- Total number of movements through the intersection during each peak;
- Total number of movements through the intersection during each ten-minute interval during each peak;
- Number of cyclists making each directional movement through the intersection during each peak; and
- Share of cyclists through the intersection during each peak who are:
  - adults/school children
  - wearing a helmet/not wearing a helmet
  - riding on the road/riding on the footpath/riding on an off-road path

Manual Counts - Aggregated Reporting

Results have also been reported at an aggregate level (that is, summing up all sites) – by city/district and across the region – to show the total number of cycle movements recorded (both overall and by ten-minute intervals) and the characteristics of the cyclists.

Bike Shed Counts

Results have been provided by school (along with notes explaining why counts for some schools may not be representative), as well as at a TA and regional level. Raw cycle numbers and a "cyclists as a share of total school roll" figure have both been provided.

1.3 Summary Of Results

This summary contains the aggregated results of the three sites surveyed in Papakura district. It is split into four sections – a summary of results for the morning peak period (6:30am to 9:00am), a summary for the evening peak period (4:00pm to 7:00pm), a summary of aggregated results (morning and evening combined) and a summary of the results from the school bike shed counts.

While the summaries in this section are useful in giving an overall picture of cycling behaviour in Papakura district, they hide much of the specific details of cycling behaviour at individual sites. The site-specific data varies significantly from site to site, and can be found in Sections Two to Four of this report.

Note: Surveying in Papakura district was undertaken on Thursday 11th March, 2010. Sunrise was at 7:15am and sunset was at 7:46pm. The average temperature was 20 degrees Celsius.

Note: To enable comparisons of sites within Papakura district, cyclist volumes at each Papakura district site are considered as:

- "high/heavy" when 30 or more cycle movements are reported;
- "moderate" when between 16 and 29 cycle movements are reported;
- "low/light" when between 0 and 15 cycle movements are reported;
- having "notably" increased/decreased if the change is more than 15% of the data being compared with;
- having "slightly" increased/decreased if the change is less than 5% of the data being compared with.
- being "stable" since last year if the change is less or equal to 3 cycle movements/percentages.

1.4 Morning Peak

Environmental Conditions

- The intersection of Great South Road and Rosehill Drive experienced overcast weather conditions with patches of drizzle. The Great South Road/Taka Street intersection had fine weather conditions.
- There were no road works or accidents that may affect cycle counts.

Key Points

- A total of 44 cyclist movements were recorded across the two sites in the morning peak period (between 6:30am and 9:00am) in 2010. This represents a 29 per cent increase on the result for 2009 (34 movements), but a decrease from 2007 and 2008 (47 and 61 movements respectively movements). However, this increase is not statistically significant – that is, the decrease falls within the margin of error at the 95% confidence interval.
- The busiest site in the morning peak is the intersection of Great South Road and Rosehill Drive (29 cycle movements, up from 22 movements in 2009), whereas the Great South Road/Taka Street intersection has a lower level of morning cyclist traffic (15 cycle movements).
- The average volume of morning cyclist movements across the two sites monitored in Papakura district is 22. This compares with 17 movements in 2009.

Table 1.1: Summary Of Morning Cyclist Movements 2007-2010 (n)

Site Number	*Locations*	*2007*	*2008*	*2009*	*2010*	Change 09-10	Change 07-10
65	Great South Road/Rosehill Drive, Rosehill	29	42	22	**29**	**32%**	0%
66	Great South Road/Taka Street, Conifer Grove	18	19	12	**15**	**25%**	-17%
	Average	**24**	**31**	**17**	**22**	**29%**	**-8%**
	Total	**47**	**61**	**34**	**44**	**29%**	**-6%**

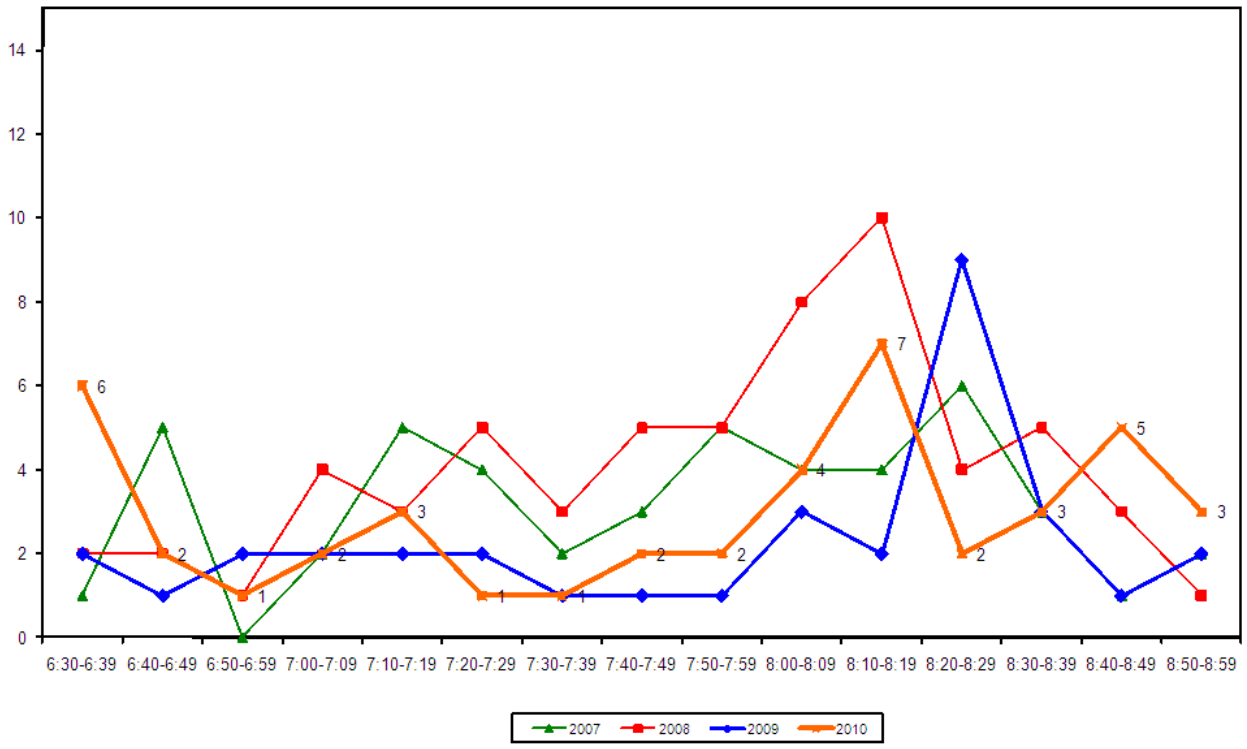
- Morning cyclist characteristics are shown in Table 1.2 below. Overall, 61 per cent of cyclists are adults (up from 56 per cent last year).
- The majority of cyclists across the Papakura district sites are wearing a helmet (84 per cent, stable from 83 per cent in 2009).
- Just over half of cyclists are riding on the road (55 per cent, compared with 47 per cent in 2009).
- Of the two sites monitored in Papakura district, Great South Road/Rosehill Drive has the highest proportion of cyclists who are school children (55 per cent), riding on the footpath (62 per cent), and the greatest share of cyclists not wearing helmets (17 per cent).

Table 1.2: Summary of Morning Cyclist Characteristics 2007-2010 (%)

	2007	***2008***	***2009***	***2010***	**Change 09-10**
Cyclist Type					
Adult	67%	58%	56%	61%	5%
School child	33%	42%	44%	39%	-5%
Helmet Wearing					
Helmet on head	79%	88%	83%	84%	1%
No helmet	21%	12%	17%	16%	-1%
Where Riding					
Road	51%	55%	47%	55%	8%
Footpath	49%	45%	53%	45%	-8%
Base:	***47***	***61***	***34***	***44***	

- Figure 1.1 illustrates the total number of cyclists in the morning peak by time of movement. The volume of morning cycle movements peaks at the start of the monitoring period between 6:30am and 6:39am (6 movements), and again between 8:10am and 8:19am (7 movements) – ten minutes earlier than last year.

Figure 1.1: Total Cyclist Frequency – Morning Peak



1.5 Evening Peak

Environmental Conditions

- Both sites had overcast weather throughout the evening shift, with periods of intermittent showers experienced at the Great South Road/Taka Street intersection.
- There were no road works or accidents that may affect cycle counts.

Key Points

- A total of 61 cyclist movements were recorded across the two sites in the evening peak period (between 4:00pm and 7:00pm) in 2010 (unchanged from 2009).
- Consistent with the morning peak, the intersection of Great South Road and Rosehill Drive is the busiest in terms of the evening cyclists' activity, with 33 cycle movements recorded (down slightly from 37 movements in 2009). Nine per cent (n=3) of total cyclists were identified at cycling in groups. The level of cyclist traffic at the Great South Road/Taka Street intersection is the lower of the two sites in the evening shift (28 cycle movements, up slightly from 24 movements last year).
- The average volume of evening cyclists across the two sites monitored in Papakura district is 31 cycle movements. This is stable from 2009 monitoring.

Table 1.3: Summary Of Evening Cyclist Movements 2007-2010 (n)

Site Number	*Locations*	*2007*	*2008*	*2009*	*2010*	**Change 09-10**	**Change 07-10**
65	Great South Road/Rosehill Drive, Rosehill	24	30	37	**33**	**-11%**	38%
66	Great South Road/Taka Street, Conifer Grove	40	39	24	**28**	**17%**	-30%
	Average per site	**32**	**35**	**31**	**31**	**0%**	**-3%**
	Total	**64**	**69**	**61**	**61**	**0%**	**-5%**

Table 1.4 shows the percentage change in cyclist movements from morning to evening at each site monitored in Papakura district.

Note that there are three hours for the evening monitoring period compared with 2.5 hours in the morning. To enable the morning and evening cyclist volumes to be fairly compared, a scale factor has been applied so that the count numbers for both periods are based on the same length of time (2.5 hours). However, the limitation of this approach is that it does not take into account the variation in cycle movement numbers that exist over the course of a shift (as illustrated in Figures 1.1 and 1.2); rather, the number of cycle movements is assumed to be consistent throughout the monitoring period. Consequently, the results presented in Table 1.4 should be considered indicative only.

- Overall, the number of evening cycle movements across the two sites is greater than the number recorded in the morning shift (up 16 per cent).
- This increase is due to the increase at the Great South Road/Taka Street intersection (up 53 per cent from 15 in the morning to 23 movements in the evening).

Table 1.4: Summary Of Change in Cyclist Movements from Morning to Evening 2010 (%)

Site Number	*Locations*	*AM*	*PM*[9]	Change
65	Great South Road/Rosehill Drive, Rosehill	29	28	-3%
66	Great South Road/Taka Street, Conifer Grove	15	23	53%
	Total	**44**	**51**	**16%**

[9] A scale factor of 5/6 has been applied to reduce the evening cyclist volumes to a 2.5 hour interval, consistent with the morning monitoring period.

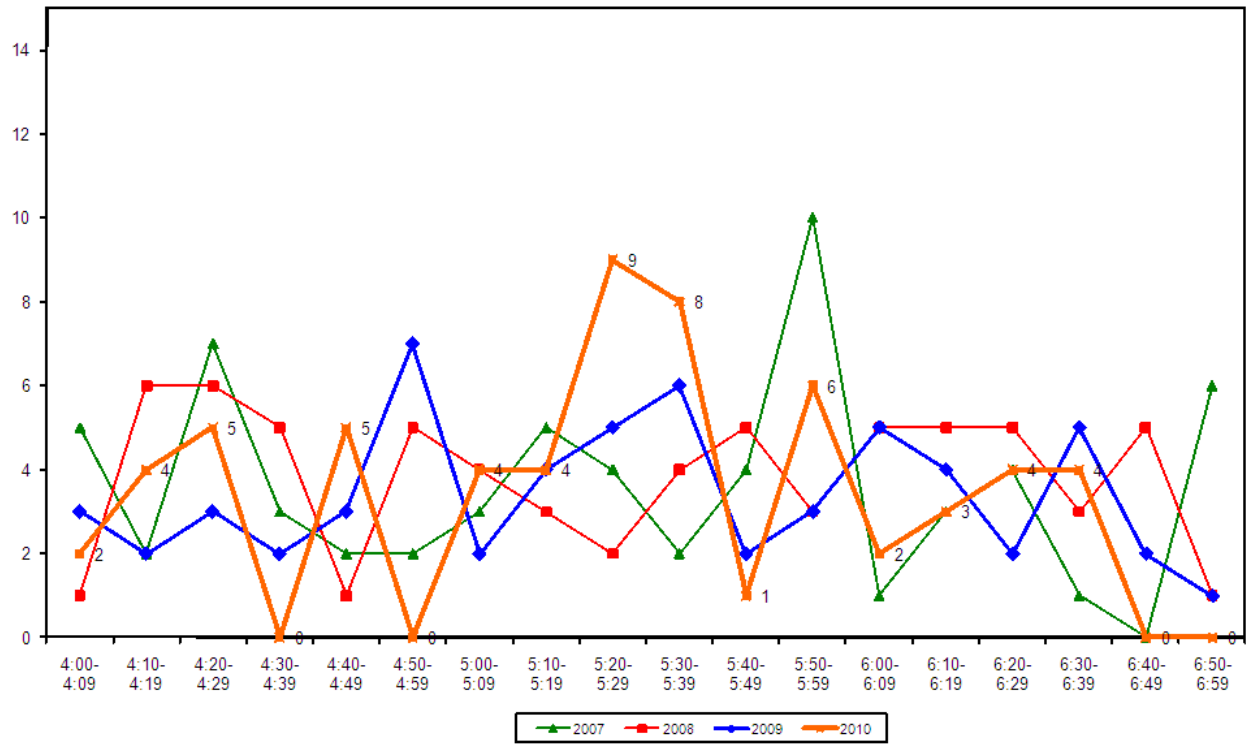
- Just over three-quarters of evening cyclists are adults (77 per cent, up slightly from 73 per cent in 2009).
- Approximately three-quarters of evening cyclists are wearing a helmet (74 per cent, stable from 72 per cent last year).
- Just over three in five cyclists are riding on the road in the evening (61 per cent, up slightly from 56 per cent last year).
- Great South Road/Rosehill Drive has the greatest share of cyclists who are school children (30 per cent), not wearing helmets (27 per cent) and riding on the footpath (48 per cent).

Table 1.5: Summary of Evening Cyclist Characteristics 2007-2010 (%)

	2007	***2008***	***2009***	***2010***	**Change 09-10**
Cyclist Type					
Adult	71%	58%	73%	77%	4%
School child	30%	42%	27%	23%	-4%
Helmet Wearing					
Helmet on head	65%	75%	72%	74%	2%
No helmet	35%	25%	28%	26%	-2%
Where Riding					
Road	53%	45%	56%	61%	5%
Footpath	47%	55%	44%	39%	-5%
Base:	***64***	***69***	***61***	***61***	

- The overall pattern of cyclist volumes by time of movement in the evening is illustrated in Figure 1.2. Evening cyclist volumes fluctuate over the monitoring period, with a peak evident between 5:20pm and 5:39pm (9 and 8 movements per ten minute interval respectively). This compares to slight peaks evident between 4:50pm and 4:59pm, 5:10pm and 5:19pm and again between 5:30pm and 5:39pm (8 cyclists over each ten minute interval) in 2009.

Figure 1.2: Total Cyclist Frequency – Evening Peak



1.6 Aggregated Total

- A total of 105 cyclist movements were recorded across the two sites in 2010. This represents an 11 per cent increase when compared with 2009 (95 movements) – not statistically significant at the 95% confidence interval.
- The intersection of Great South Road and Rosehill Drive has the greatest number of cyclists (62 movements, stable from 59 movements last year), while the Great South Road/Taka Street intersection has the lowest level of cyclist traffic (43 movements, up from 36 movements in 2009).

Table 1.6: Summary Of Total Cyclist Movements 2007-2010 (n)

Site Number	***Locations***	***2007***	***2008***	***2009***	***2010***	**Change 09-10**	**Change 07-10**
65	Great South Road/Rosehill Drive, Rosehill	53	72	59	**62**	**5%**	17%
66	Great South Road/Taka Street, Conifer Grove	58	58	36	**43**	**19%**	-26%
	Total	**111**	**130**	**95**	**105**	**11%**	**-5%**

- Overall cyclist characteristics are illustrated in Table 1.7. In total, 70 per cent of cyclists are adults (stable from 67 per cent in 2009).
- On average, four in five are wearing a helmet (78 per cent, stable from 75 per cent last year).
- Just over half of cyclists are riding on the road (58 per cent, up from 53 per cent last year).

Table 1.7: Summary of Total Cyclist Characteristics
2007-2010 (%)

	2007	*2008*	*2009*	*2010*	**Change 09-10**
Cyclist Type					
Adult	69%	58%	67%	70%	3%
School child	31%	42%	33%	30%	-3%
Helmet Wearing					
Helmet on head	72%	81%	75%	78%	3%
No helmet	28%	19%	25%	22%	-3%
Where Riding					
Road	52%	50%	53%	58%	5%
Footpath	48%	50%	47%	42%	-5%
Base:	***111***	***130***	***95***	***105***	

1.7 Average Annual Daily Traffic (AADT) Estimate

Note: A discussion of Average Annual Daily Traffic Estimates is provided in Section 1.2. A full description of the tool, the calculation used, and the limitations of the estimates are provided in Appendix One. Readers are encouraged to review these sections in conjunction with the data presented here.

- Table 1.8 provides the comparative AADT estimates for each site, based on the average of morning and evening peak AADT calculations.
- Based on the dry weather factor, the highest AADT is at Great South Road/Rosehill Drive (90 daily movements, up slightly from 85 movements in 2009) and lower at Great South Road/Taka Street (62 daily movements, up from 51 movements last year).

Table 1.8: Dry Weather Factor AADT Estimates Based on Morning and Evening Cyclist Movements 2007-2010 (n)

Site Number	***Locations***	***2007 AADT***	***2008 AADT***	***2009 AADT***	***2010 AADT***	**Change 09-10**	**Change 07-10**
65	Great South Road/Rosehill Drive, Rosehill	77	106	85	**90**	**6%**	17%
66	Great South Road/Taka Street, Conifer Grove	83	83	51	**62**	**22%**	-25%

1.8 School Bike Shed Count Summary

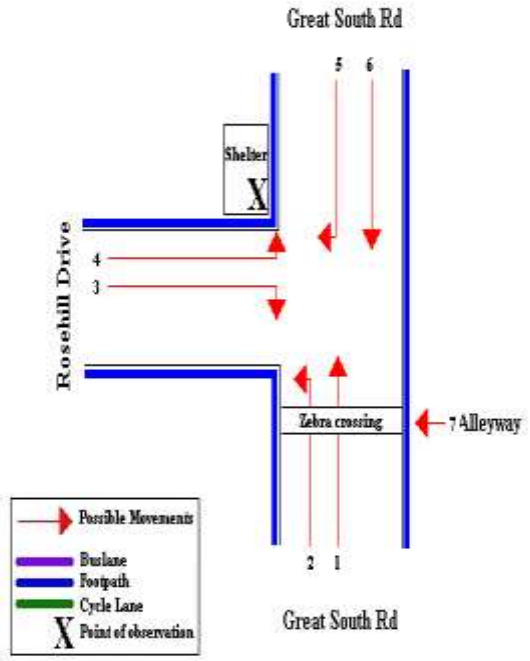
Key Points

- Of those students eligible to cycle, on average, one per cent of students are currently cycling to their schools (unchanged from last year).
- In total, n=64 students from the five responding schools were reported as cycling to school.
- Rosehill Intermediate reported the highest share of cyclists – 6 per cent of all eligible students currently cycling to school.
- Of the five schools that responded, one (20 per cent) had no students cycling to school. This compares with all schools having cyclists last year.
- Rates of cycling to school are the highest at the intermediate school (4 per cent) and lowest at the composite and secondary school (1 per cent).

2. GREAT SOUTH ROAD/ROSEHILL DRIVE, ROSEHILL (SITE 65)

Figure 3.1 shows the possible cyclist movements at this intersection.

Figure 2.1: Cycle Movements: Great South Road/Rosehill Drive



AADT Estimate

- The AADT for this site is 90. This compares with:
  - 85 in 2009
  - 106 in 2008
  - 77 in 2007.

	AM	*PM*	*TOTAL*
Raw Cycle Movement Counts 2010	**29**	**33**	**62**

2.1 Morning Peak

Environmental Conditions

- The weather was overcast, with patches of drizzle and rain between 6:50am and 7:10am and 8:03am and 8:17am.
- There were no road works or accidents that may affect cycle counts.

Key Points

- Of the two sites monitored in Papakura district, the intersection of Great South Road and Rosehill Drive is the busiest in terms of morning cyclist activity, with 29 movements recorded (up from 22 movements last year).
- The key morning movement is the right turn out of Great South Road into Rosehill Drive (Movement 5 = 11 cyclists).
- The most notable changes since 2009 are at Movements 1 and 6 (up 4 cyclists).

Table 2.1: Morning Cyclist Movements

Great South Road/Rosehill Drive 2007-2010 (n)

Movement	*2007*	*2008*	*2009*	*2010*	Change 09-10
1	8	13	5	9	4
2	2	6	2	2	0
3	1	1	0	2	2
4	5	4	1	1	0
5	7	10	14	11	-3
6	6	5	0	4	4
7	-	3	0	0	0
Total	**29**	**42**	**22**	**29**	**7**

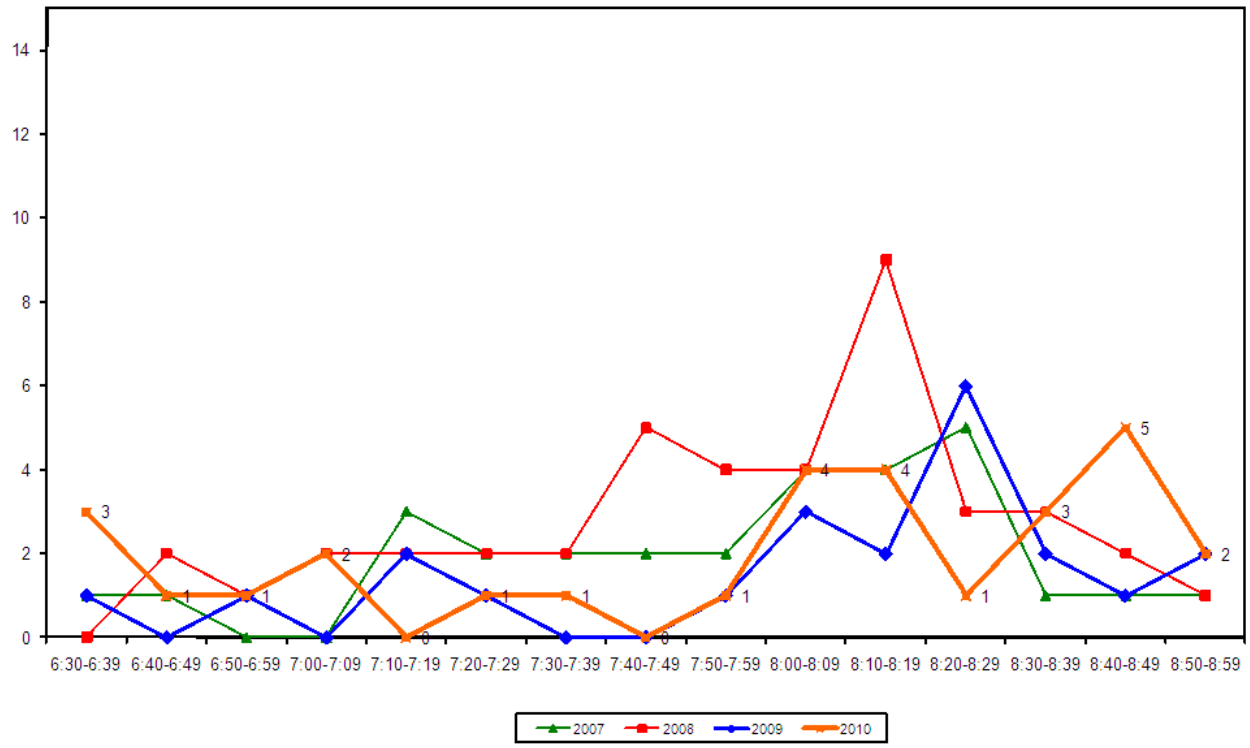
- Just over half of the cyclists over the morning peak are school children (55 per cent, down from 68 per cent at the last measure).
- Most cyclists are wearing a helmet (83 per cent, down from 91 per cent in 2009).
- More cyclists are riding on the footpath (62 per cent, stable from 64 per cent last year).

Table 2.2: Morning Cyclist Characteristics
Great South Road/Rosehill Drive 2007-2010 (%)

	2007	***2008***	***2009***	***2010***	**Change 09-10**
Cyclist Type					
Adult	55	40	32	45	13
School child	45	60	68	55	-13
Helmet Wearing					
Helmet on head	72	95	91	83	-8
No helmet	28	5	9	17	8
Where Riding					
Road	45	43	36	38	2
Footpath	55	57	64	62	-2
Base:	***29***	***42***	***22***	***29***	

- Morning cyclist volumes in 2010 are variable throughout the monitoring period, peaking slightly between 8:40am and 8:49am (5 cyclists). This compares to a peak between 8:20am and 8:29am (6 cyclists) in 2009.

Figure 2.2: Great South Road/Rosehill Drive Cyclist Frequency – Morning Peak



2.2 Evening Peak

Environmental Conditions

- The weather was overcast throughout the evening shift.
- There were no road works or accidents that may affect cycle counts.

Key Points

- Evening cyclist volumes at the Great South Road/Rosehill Drive intersection have decreased, from 37 in 2009 to 33 this year – the busiest of the two monitored sites in Papakura district.
- In contrast to the morning shift, the most common movement in the evening is south along Great South Road (Movement 6 = 15 cyclists).
- Evening cyclist volumes at this intersection have changed most notably at Movement 1 (down 6 cyclists).

Table 2.3: Evening Cyclist Movements

Great South Road/Rosehill Drive 2007-2010 (n)

Movement	*2007*	*2008*	*2009*	*2010*	Change 09-10
1	7	10	14	8	-6
2	2	6	1	6	5
3	2	0	0	2	2
4	2	4	3	1	-2
5	3	1	1	1	0
6	8	6	18	15	-3
7	-	3	0	0	0
Total	**24**	**30**	**37**	**33**	**-4**

- Seven in ten cyclists using this intersection are adults (70 per cent, stable from 68 per cent in 2009).
- Just less than three-quarters of cyclists at this site are wearing a helmet (73 per cent, up from 65 per cent last year).
- Just over half of the cyclists at this site are riding on the road (52 per cent, up from 43 per cent at the previous measure).

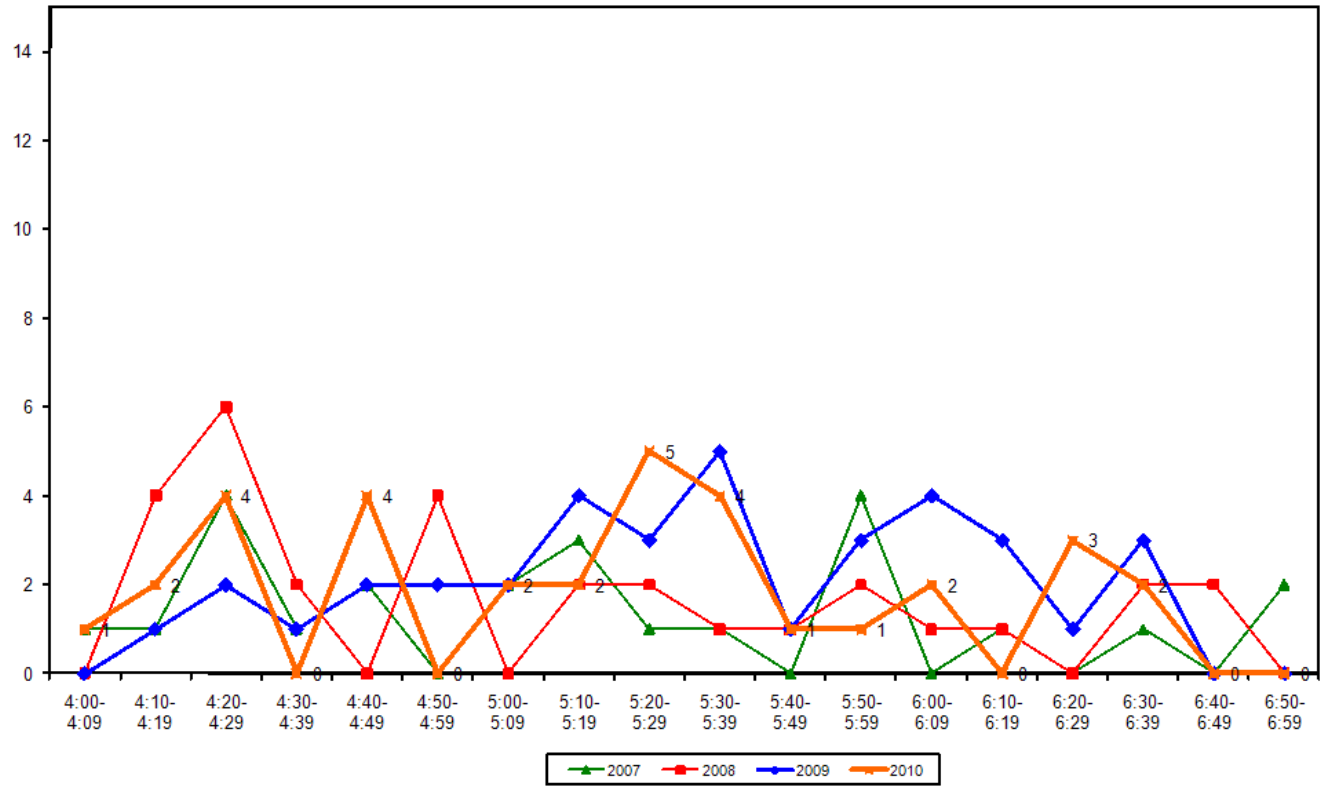
Table 2.4: Evening Cyclist Characteristics

Great South Road/Rosehill Drive 2007-2010 (%)

	2007	*2008*	*2009*	*2010*	**Change 09-10**
Cyclist Type					
Adult	58	33	68	70	2
School child	42	67	32	30	-2
Helmet Wearing					
Helmet on head	67	77	65	73	8
No helmet	33	23	35	27	-8
Where Riding					
Road	42	27	43	52	9
Footpath	58	73	57	48	-9
Base:	***24***	***30***	***37***	***33***	

- Evening cyclist numbers are very variable throughout the evening shift and peak slightly between 5:20pm and 5:29pm (5 cyclists), ten minutes earlier than the slight peak observed last year.

Figure 2.3: Great South Road/Rosehill Drive Cyclist Frequency – Evening Peak

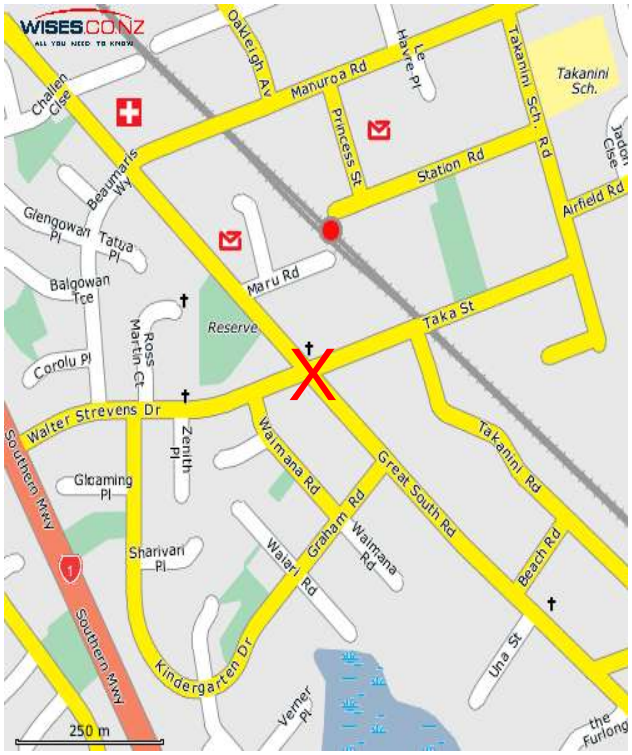


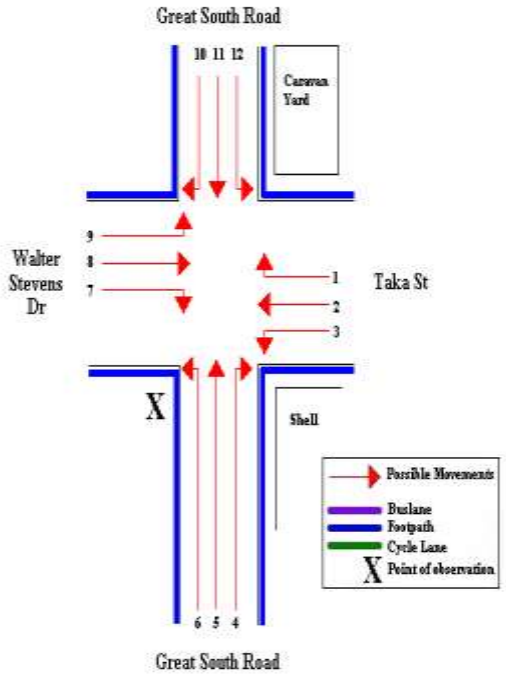
Note: In 2010, three cyclists were observed riding as a group at 5.59pm. This comprises nine per cent of the total cycle movements in the evening peak in 2010.

3. GREAT SOUTH ROAD/TAKA STREET, CONIFER GROVE (SITE 66)

Figure 4.1 shows the possible cyclist movements at this intersection.

Figure 3.1: Cycle Movements: Great South Road/Taka Street





AADT Estimate

- The AADT for this site is 62. This compares with:
  - 51 in 2009
  - 83 in 2008
  - 83 in 2007.

	AM	PM	TOTAL
Raw Cycle Movement Counts 2010	**15**	**28**	**43**

3.1 Morning Peak

Environmental Conditions

- The weather was fine throughout the morning shift.
- There were no road works or accidents that may affect cycle counts.

Key Points

- Consistent with last year, the volume of morning cyclists at the Great South Road/Taka Street intersection is the lightest of the two sites in Papakura district (15 movements, up slightly from 12 movements last year).
- The key morning movement is straight along Great South Road heading northwest (Movement 5 = 11 cyclists).
- Morning cyclist volumes at most movements are stable since last year, with change most notable at Movement 5 (up 6 cyclists).

Table 3.1: Morning Cyclist Movements

Great South Road/Taka Street 2007-2010 (n)

Movement	*2007*	*2008*	*2009*	*2010*	Change 09-10
1	0	0	0	1	1
2	1	2	1	0	-1
3	0	0	0	0	0
4	0	0	1	1	0
5	6	6	5	11	6
6	0	0	0	0	0
7	2	0	0	0	0
8	1	4	0	1	1
9	0	0	1	0	-1
10	0	0	0	0	0
11	8	7	4	1	-3
12	0	0	0	0	0
Total	**18**	**19**	**12**	**15**	**3**

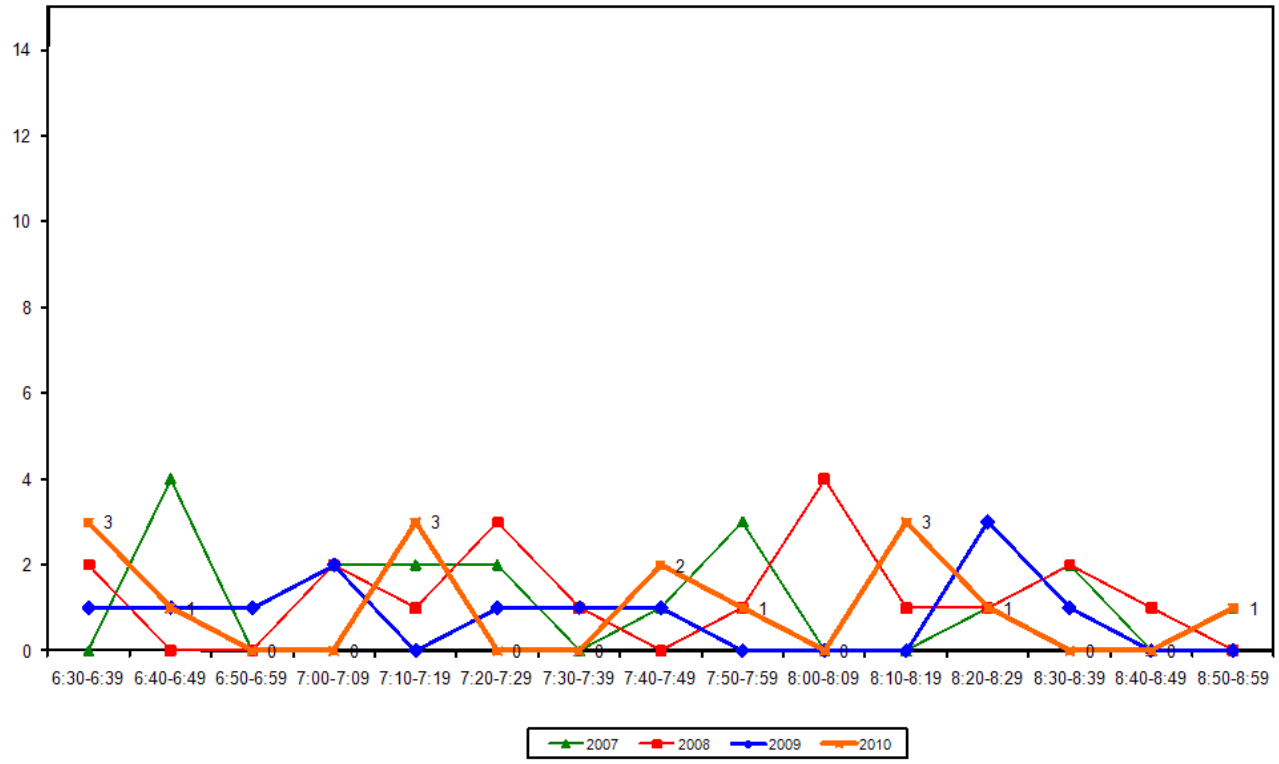
- Over the morning peak, most cyclists are adults (93 per cent, down slightly from 100 per cent last year).
- Most cyclists are wearing a helmet (87 per cent, up notably from 67 per cent in 2009).
- Incidence of riding on the footpath in the morning has decreased notably at this intersection (13 per cent, down notably from 33 per cent last year).

Table 3.2: Morning Cyclist Characteristics
Great South Road/Taka Street 2007-2010 (%)

	2007	*2008*	*2009*	*2010*	**Change 09-10**
Cyclist Type					
Adult	89	95	100	93	-7
School child	11	5	0	7	7
Helmet Wearing					
Helmet on head	89	74	67	87	20
No helmet	11	26	33	13	-20
Where Riding					
Road	61	79	67	87	20
Footpath	39	21	33	13	-20
Base:	***18***	***19***	***12***	***15***	

- As in 2009, the volume of cycle movements is relatively low over the entire morning shift, with no more than three cyclist recorded passing over during all ten minute intervals. Slight peaks (of three cyclist movements) occurred between 6:30am and 6:39am, 7:10am and 7:19am and 8:10am and 8:19am. This compares to a slight peak between 8:20pm and 8:29pm (3 movements) in 2009.

Figure 3.2: Great South Road/Taka Street Cyclist Frequency – Morning Peak



3.2 Evening Peak

Environmental Conditions

- The weather was overcast with intermittent showers throughout the evening shift.
- There were no road works or accidents that may affect cycle counts.

Key Points

- Consistent with the morning shift, the intersection of Great South Road and Taka Street has the lowest volume of evening cyclist traffic, with 28 movements recorded (up slightly from 24 movements in 2009).
- The most common movement in the evening is straight along Great South Road heading south (Movement 11 = 13 cyclists).
- The most notable changes in cyclist volumes since 2009 have been at Movement 1 (down 3 cyclists) and Movement 10 (up 3 cyclists).

Table 3.3: Evening Cyclist Movements
Great South Road/Taka Street 2007-2010 (n)

Movement	*2007*	*2008*	*2009*	*2010*	Change 09-10
1	5	0	4	1	-3
2	3	4	0	1	1
3	3	4	2	1	-1
4	4	4	1	0	-1
5	11	6	2	3	1
6	1	2	2	0	-2
7	0	1	1	0	-1
8	2	4	0	1	1
9	0	1	0	2	2
10	10	0	1	4	3
11	1	10	11	13	2
12	0	3	0	2	2
Total	**40**	**39**	**24**	**28**	**4**

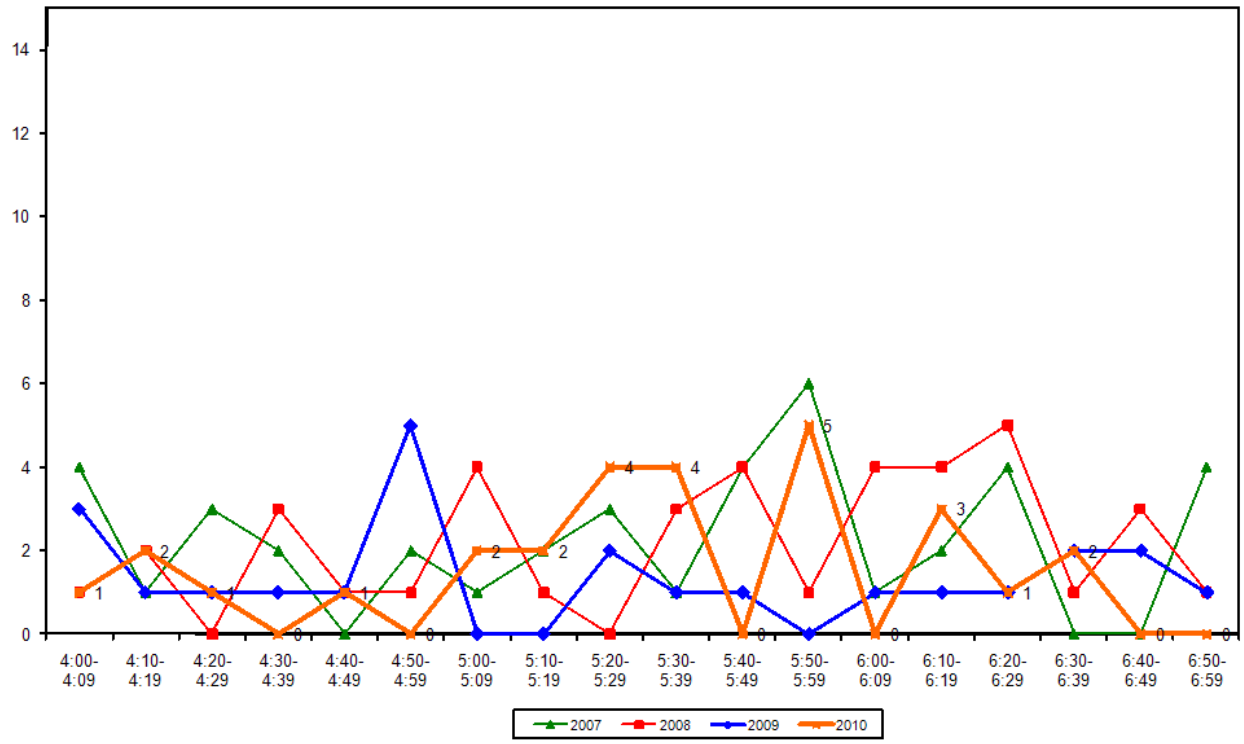
- Consistent with last year, most cyclists using this intersection are adults (86 per cent, stable from 83 per cent in 2009).
- Three-quarters of cyclists at this site are wearing a helmet (75 per cent, down from 83 per cent last year).
- Seventy-one per cent of cyclists are riding on the road (down slightly from 75 per cent in 2009).

Table 3.4: Evening Cyclist Characteristics
Great South Road/Taka Street 2007-2010 (%)

	2007	***2008***	***2009***	***2010***	**Change 09-10**
Cyclist Type					
Adult	77	77	83	86	3
School child	23	23	17	14	-3
Helmet Wearing					
Helmet on head	65	74	83	75	-8
No helmet	35	26	17	25	8
Where Riding					
Road	60	59	75	71	-4
Footpath	40	41	25	29	4
Base:	***40***	***39***	***24***	***28***	

- Evening cyclist volumes peak between 5:50pm and 5:59pm (5 movements) – 60 minutes later than the peak recorded last year.

Figure 3.3: Great South Road/Taka Street Cyclist Frequency – Evening Peak



4. SCHOOL BIKE SHED COUNT – PAPAKURA DISTRICT

Background Information

- A total of six schools were contacted in Papakura district. Of the five schools (83 per cent) that responded to the survey, none have policies that restrict students cycling to school.
- No school surveyed reported events or issues that may affect the cycle counts.
- The designated count day was Tuesday 9th of March[10].

Key Points

- Of those students eligible to cycle, on average, one per cent of students are currently cycling to their schools (unchanged from last year).
- In total, n=64 students from the five responding schools were reported as cycling to school.
- Rosehill Intermediate reported the highest share of cyclists – 6 per cent of all eligible students currently cycling to school.
- Of the five schools that responded, one (20 per cent) had no students cycling to school. This compares with all schools having cyclists last year.

[10] Rosehill Intermediate conducted their count on Friday 12th March.
ACG Strathallan and Mansell Senior School conducted their count on Friday 19th March.

Table 5.1 shows the results of the five schools surveyed in Papakura district.

Table 4.1: Summary Table Of School Bike Count 2007-2010 (n)

School Name	*Year Levels*	*School Roll Eligible To Cycle*	*No. of Cycles Counted*	*Cyclists as share of those eligible[11] (2010)*	*Cyclists as share of those eligible[12] (2009)*	*Cyclists as share of those eligible (2008)*	*Cyclists as share of those eligible (2007)*
Rosehill Intermediate	Intermediate	352	20	**6%**	6%	-	-
Rosehill College	Secondary	1869	25	**1%**	1%	1%	<1%
Papakura High School	Secondary	1059	7	**1%**	0%	<1%	<1%
ACG Strathallan	Composite	1200	12	**1%**	0%	1%	-
Mansell Senior School	Intermediate	205	0	**0%**	-	-	-
Total		**4685**	**64**	**1%**	**1%**	**1%**	**1%**

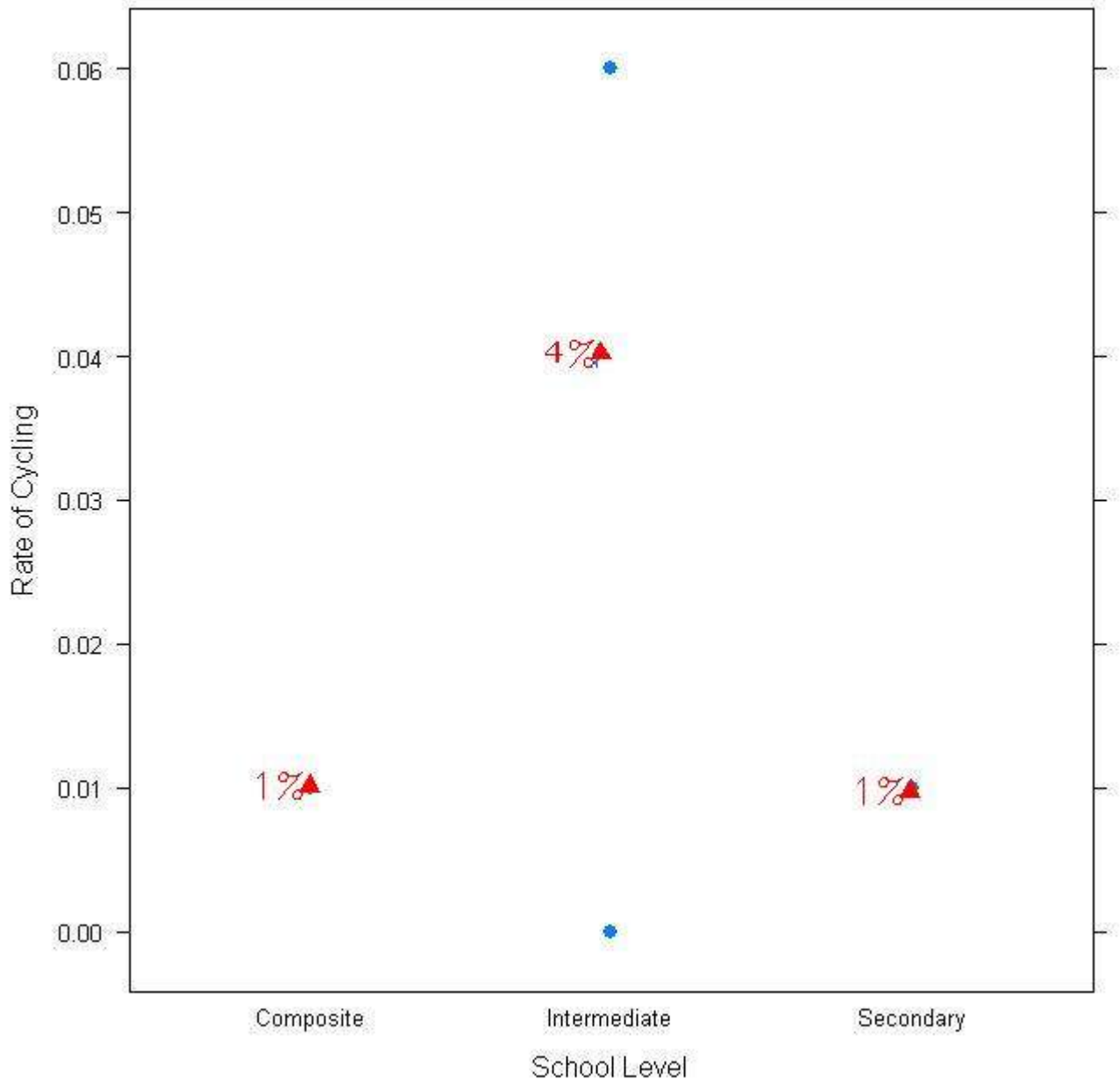
[11] This share is calculated by averaging the number of cycles counted over the total number of students eligible to cycle. The figure obtained is rounded to zero decimal places.
[12] This share is calculated by averaging the number of cycles counted over the total number of students eligible to cycle. The figure obtained is rounded to zero decimal places.

- Table 4.2 and Figure 4.1 illustrate the rates of cycling to school at different school levels. Rates of cycling to school are the highest at the intermediate school (4 per cent) and lowest at the composite and secondary school (1 per cent).

Table 4.2: Summary Table Of School Bike Count by Year Levels 2007-2010 (%)

Year Levels	*Number of Schools Responded in 2010*	*Cyclists as share of those eligible - 2007*	*Cyclists as share of those eligible - 2008*	*Cyclists as share of those eligible - 2009*	*Cyclists as share of those eligible - 2010*	**Change 09-10**
Intermediate	2	-	-	6	**4**	-2
Composite	1	-	1	<1	**1**	0
Secondary	2	1	1	1	**1**	0
Total	**5**	**1**	**1**	**1**	**1**	**0**

Figure 4.1: Cycling Rates by School Level
2010 (%)



APPENDIX

Appendix One: Annual Average Daily Traffic (AADT) Calculation

APPENDIX ONE: ANNUAL AVERAGE DAILY TRAFFIC (AADT) CALCULATION

Note: This description of the calculation of the Annual Average Daily Traffic Flow of Cyclists has been provided by ViaStrada based on their May 2007 report for ARTA entitled "Development of a Cycle Traffic AADT Tool".

Purpose

The purpose of this appendix is to document the recommended procedure for estimating a cycling AADT[13] in the Auckland region from any Gravitas manual count.

Method for Estimating AADT

The methodology is based on that published in Appendix 2 of the Cycle Network and Route Planning Guide (CNRPG)[14], adjusted for Auckland conditions based on data collected during March 2007. The aim was to use the published methodology as much as possible, with any necessary departure from it documented below. The following equation yields the best estimate of a cycling AADT:

$$AADT_{Cyc} = Count \times \frac{1}{\sum H} \times \frac{1}{D} \times \frac{W}{7} \times \frac{1}{R}$$

where *Count = result of count period*
H = scale factor for time of day
D = scale factor for day of week
W = scale factor for week of year
R = scale factor for weather conditions on the count day

If more than one set of count data is available (for example, both a morning count and afternoon count), then **the calculation should be carried out for each set of data, and the estimates derived from each averaged**.

The values for the scale factors (*H, D*, *W* and *R*) have been deduced in the ViaStrada report and are included in this report in Figure 1.

[13] Annual average daily traffic

[14] LTSA, 2004

For the Gravitas counts, the following factors apply:

$\sum H_{AM} = 30$; $\sum H_{PM} = 33.3$; (AM and PM refer to morning and afternoon respectively)

D = 14

W = 0.9

$R_{DRY} = 100$; $R_{WET} = 64$ (DRY and WET refer to fine and rainy conditions respectively)

These can be combined as a single multiplier to convert the manual count to an AADT estimate as follows:

	Morning	**Afternoon**
Dry weather	**3.06**	**2.78**
Wet weather	**4.78**	**4.35**

Worked Example

If morning and afternoon manual traffic counts are available at a site, the AADT can be calculated using the count summaries for each period. For example, a morning survey of 102 and an afternoon survey of 130 are suggested. It is assumed for this example that the weather was fine in both surveys.

- Thus the AADT from the morning survey is estimated as 3.06 x 102 = 312.
- The AADT from the afternoon survey is estimated as 2.78 x 130 = 359.
- The average of these two estimates is 335; this is the estimate of AADT for this site, based on the two surveys.

Figure 1: Scale Factors for Auckland Region

Period Starting	Period Ending	Interval (hours)	$H_{Weekday}$ Mon to Fri	$H_{Weekend}$ Sat & Sun
0:00	6:30	6.50	5.5%	1.8%
6:30	6:45	0.25	2.3%	0.8%
6:45	7:00	0.25	2.6%	1.5%
7:00	7:15	0.25	3.2%	1.4%
7:15	7:30	0.25	3.7%	2.1%
7:30	7:45	0.25	3.8%	2.8%
7:45	8:00	0.25	4.0%	3.3%
8:00	8:15	0.25	3.9%	3.2%
8:15	8:30	0.25	3.1%	3.8%
8:30	8:45	0.25	2.3%	3.5%
8:45	9:00	0.25	1.3%	3.5%
9:00	10:00	1.00	4.2%	13.6%
10:00	11:00	1.00	3.4%	11.6%
11:00	12:00	1.00	2.6%	9.1%
12:00	13:00	1.00	2.7%	6.6%
13:00	14:00	1.00	2.7%	5.0%
14:00	14:15	0.25	0.7%	1.9%
14:15	14:30	0.25	0.7%	1.3%
14:30	14:45	0.25	0.6%	1.3%
14:45	15:00	0.25	0.6%	1.2%
15:00	15:15	0.25	0.8%	1.1%
15:15	15:30	0.25	1.0%	0.9%
15:30	15:45	0.25	1.3%	1.4%
15:45	16:00	0.25	1.2%	1.3%
16:00	16:15	0.25	2.1%	1.0%
16:15	16:30	0.25	2.3%	1.7%
16:30	16:45	0.25	2.1%	1.0%
16:45	17:00	0.25	2.5%	1.2%
17:00	17:15	0.25	3.3%	1.2%
17:15	17:30	0.25	3.7%	1.2%
17:30	17:45	0.25	4.0%	1.1%
17:45	18:00	0.25	3.2%	1.1%
18:00	18:15	0.25	3.0%	0.9%
18:15	18:30	0.25	2.7%	0.7%
18:30	18:45	0.25	2.4%	0.8%
18:45	19:00	0.25	2.1%	0.6%
19:00	20:00	1.00	5.6%	2.0%
20:00	0:00	4.00	3.0%	1.5%
		24.00	100.0%	100.0%

Day	D
Monday	14%
Tuesday	14%
Wednesday	14%
Thursday	14%
Friday	14%
Saturday	14%
Sunday	16%

Period	W
Summer holidays	1.0
Term 1	0.9
April holidays	1.0
Term 2	1.0
July holidays	1.2
Term 3	1.1
Sep/Oct holidays	1.2
Term 4	1.0

Weather	R
Fine	100%
Rain	64%