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Research Report Prepared for
Auckland Transport

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2011 Auckland Region Manual Cycle Monitor

- Orakei Ward -

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1.1 Introduction

The Need For Reliable Cycle Trip Data

Monitoring cycle movements and cycle traffic is important to Auckland Transport, to identify where investment may be needed to improve infrastructure for cycling. Cycle traffic data will also help Auckland Transport 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 Auckland Transport to track progress against a quality baseline over the coming decade.

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.

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

[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.

As outlined in the Regional Cycle Monitoring Plan, a consistent methodology would ensure that:

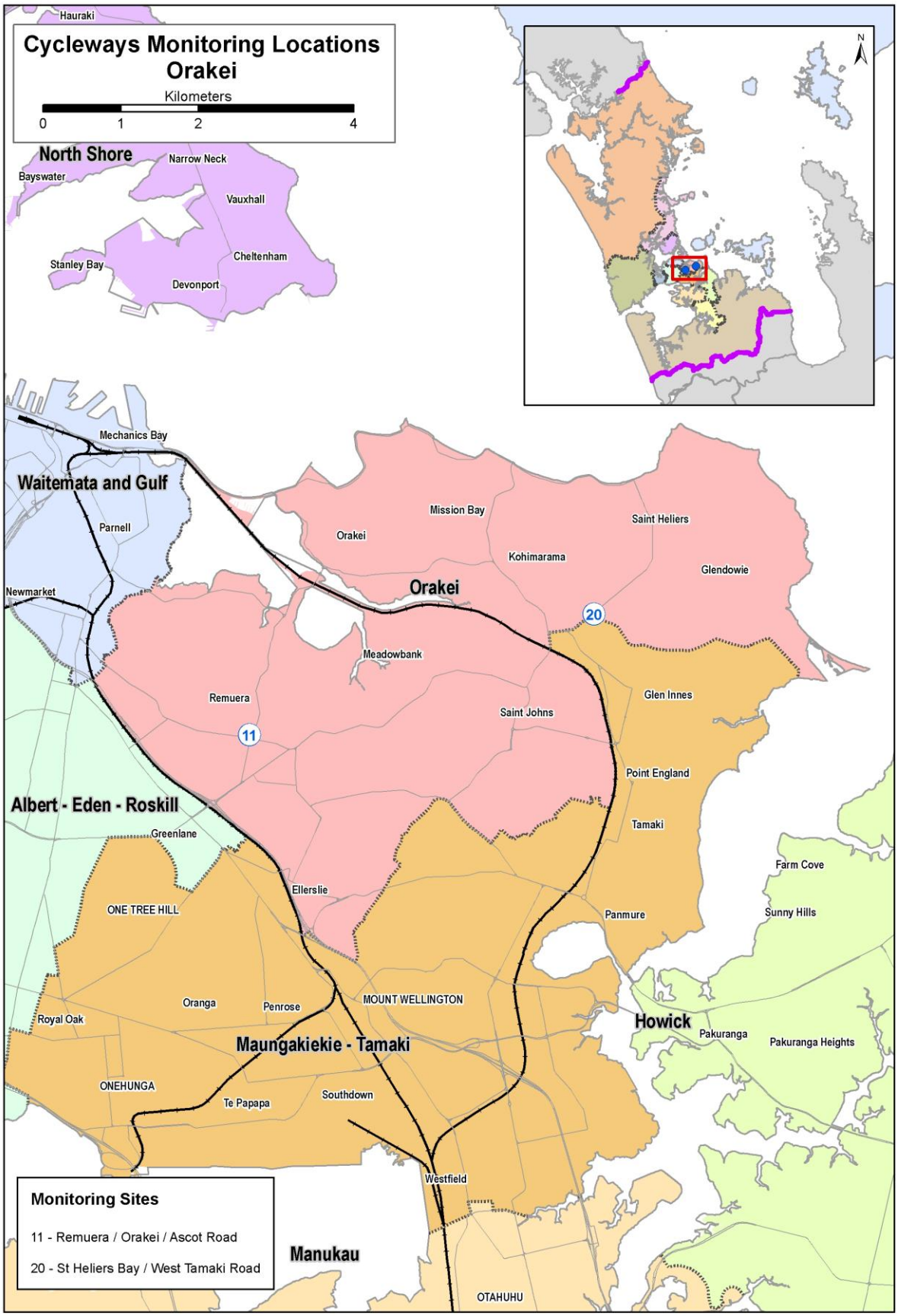
- standard monitoring days are used – that is, school and tertiary holidays, and statutory holidays are excluded and that monitoring preferably takes place at the same time each year to enable reliable year-on-year comparisons to be made. Decisions about whether cycle counts take place on weekdays and 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 in the Orakei ward following a standardised methodology. Results are presented site-by-site, as well as being aggregated to a ward and region level. For sites also monitored in 2007, 2008, 2009 and/or 2010, comparative results are provided.

Important Note: This report provides the results of manual cycle monitoring conducted at two pre-determined sites in the Orakei ward only. Site-by-site results and ward summaries for all other Auckland region wards 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.

Figure 1.1 shows the locations of the monitoring sites in the Orakei ward. Note that one site (St Heliers Bay/West Tamaki Road in Glen Innes (Site 20)) lies on the border with the Maungakiekie-Tamaki ward and consequently has been included in both ward reports.

Figure 1.1: 2011 Cycle Monitoring Locations in Orakei Ward



1.2 Methodology

Manual cycle counts have been conducted using a standardised methodology across all sites. This methodology is outlined below.

Choice of Sites

Decisions as to which sites were chosen for cycle counts were guided by the planned developments for the Regional Cycle Network.

Manual counts were undertaken at 82 different sites throughout the region. Sites were distributed by ward as follows:

- Albany 15 sites
- Albert-Eden–Roskill 10 sites
- Franklin 2 sites
- Howick 5 sites
- Manukau 10 sites
- Manurewa-Papakura 4 sites
- Maungakiekie-Tamaki 7 sites
- North Shore 8 sites
- Orakei 2 sites
- Waitakere 13 sites
- Waitemata and Gulf 9 sites
- Whau 4 sites

(Note: Seven sites lie on the border of two wards. These sites have been included in both ward reports).

Monitoring Times

Time Of Day

Manual counts in the morning peak were conducted between 6:30 and 9:00 am, with manual counts in the evening peak conducted between 4:00pm and 7:00pm.

Day Of Week

Previous experience conducting cycle and other traffic manual counts 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 Auckland Transport. 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 8th of March and be conducted on the first three fine days of the 8th, 9th, 10th, 15th, 16th, or 17th of March.

Counts were conducted on the following days:

• Tuesday 8th March	Albany, Manukau, Manurewa-Papakura, Franklin
• Wednesday 9th March	North Shore, Waitemata and Gulf, Whau, Albert-Eden-Roskill
• Thursday 10th March	Maungakiekie-Tamaki, Howick, Orakei, Waitakere

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. 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 2011 was as follows:

Tuesday 8th March

- Sunrise: 7:12am; Sunset: 7:51pm.
- Highest temperature: 20.1 degrees Celsius.
- Fine weather for all sites in both the morning and evening shifts.

Wednesday 9th March

- Sunrise: 7:13am; Sunset: 7:50pm.
- Highest temperature: 22.5 degrees Celsius.
- Fine weather for all sites in the morning shifts. In the evening shift, showers were observed at some sites from 6.00pm until the end of the monitoring period.

Thursday 10th March

- Sunrise: 7:14am; Sunset: 7:48pm.
- Highest temperature: 21.7 degrees Celsius.
- Fine weather for all sites in both the morning and evening shifts.

Conducting The Manual Counts

Scoping Visit

Gravitas visited each of the 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; Maungakiekie-Tamaki/Albert-Eden-Roskill wards).
- Beach Road/Browns Bay Road, Mairangi Bay (Site 45; Albany ward).

Three surveyors were used at the ferry terminal site (Site 22; Waitemata and Gulf ward).

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].

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;
- Gender of the cyclist *(collected for the first time in 2011)*; and
- Whether cyclists are riding on the road, footpath or designated off- road cycleway[5].

[3] This letter also contained contact details for Auckland Transport 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 one or 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).

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

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 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].

[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.

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].

School Bike Shed Counts

As stated above, manual cycle counts were undertaken during the morning (6:30am to 9:00am) and evening (4:00pm to 7:00pm) 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).

Initially 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. Note however that, to ensure all children of intermediate school age cycling to school were captured, full primary schools (those catering for Years 1 to 8) were included in the school bike shed count from 2011.

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

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 full primary, 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 e.g. boarding schools, special needs schools). This sheet was designed in consultation with Auckland Transport to ensure all necessary information was collected.

2. This email was then sent to all eligible schools in Auckland region (n=295) 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 8th 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. In 2011, 201 responses were received, a response rate of 68 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

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
  - male/female
  - 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 ward 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 ward 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 four sites surveyed in the Orakei ward. 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 the Orakei ward, 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 and Three of this report.

Note: Surveying in the Orakei ward was undertaken on Thursday 10th of March, 2011. Sunrise was at 7:14am and sunset at 7:48pm. The highest temperature was 21.7 degrees Celsius.

1.4 Morning Peak Summary Results

Environmental Conditions

- All sites monitored in the Orakei ward had fine weather in the morning.
- No site had road works or accidents that would have affected cycle movement counts.

Key Points

- A total of 323 cyclist movements were recorded across the two sites in the morning peak period (between 6:30am and 9:00am) in 2011. Forty-six per cent of these movements (n=150) were made by cyclists riding in groups.
- The total volume of morning cyclist movements has increased - from 247 in 2010 to 323 in 2011 – a 31 per cent increase.
- The average volume of morning cyclists in the Orakei ward is 162 cycle movements, compared to 124 movements in 2010, a 31 per cent increase.
- The busiest site in the morning continues to be Remuera/Orakei Road (173 cycle movements, up from 149 movements in 2010).
- Both sites saw increases in cycle movement volumes this year when compared to 2010:
  - Remuera/Orakei Road – up 16 per cent
  - St. Heliers Bay/West Tamaki Road – up 53 per cent

Table 1.1: Summary Of Morning Cyclist Movements

2007-2011 (n)

Site No.	*Locations*	*2007*	*2008*	*2009*	*2010*	*2011*	Change 10-11	Change 07-11
11	Remuera/Orakei Road	86	100	107	149	**173**	16%	101%
20	St Heliers Bay/West Tamaki Road	139	107	61	98	**150**	53%	8%
	Average per site	**113**	**104**	**84**	**124**	**162**	**31%**	**43%**
	Total	**225**	**207**	**168**	**247**	**323**	**31%**	**44%**

- Morning cyclist characteristics this year are similar to those reported in 2010. In particular, 94 per cent of cyclists this year are adults (up slightly from 92 per cent in 2010).
- Almost all morning cyclists are wearing a helmet (99 per cent in 2011, stable from 2010).
- The majority of morning cyclists this year were male (70 per cent).
- The share of cyclists riding on the road (92 per cent) has remained stable over the last four years of monitoring.

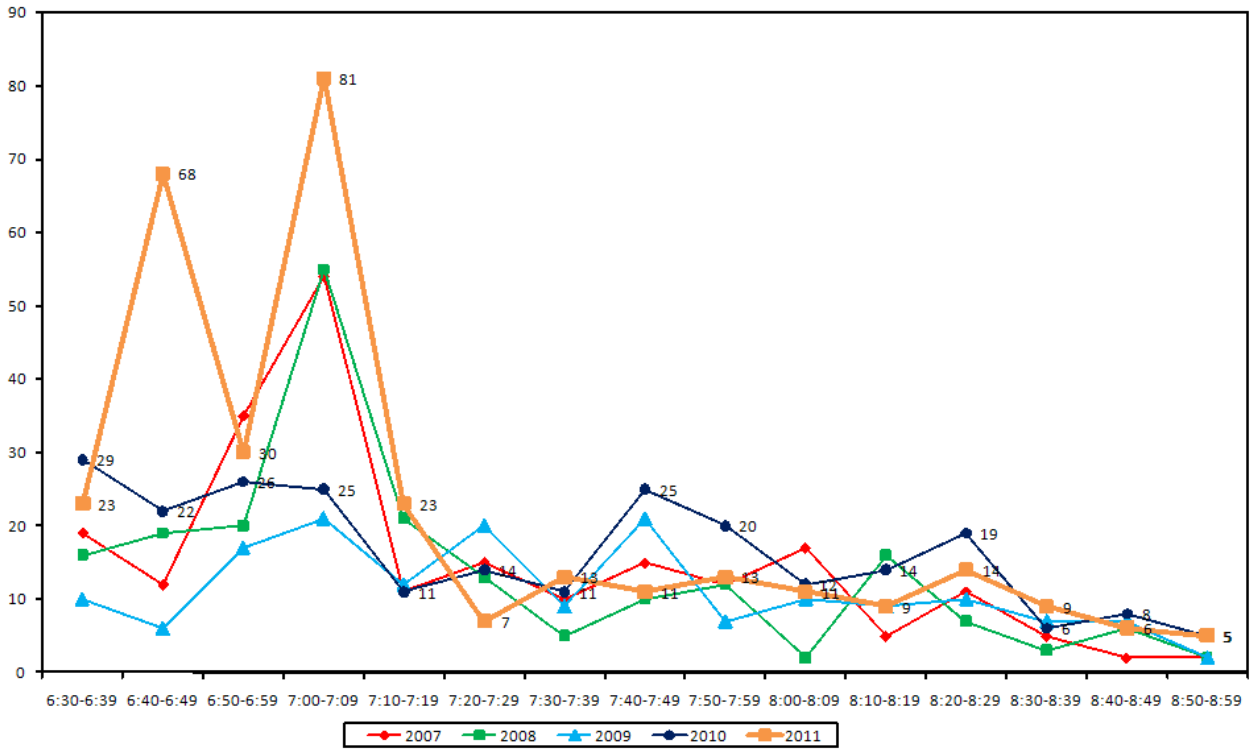
Table 1.2: Summary of Morning Cyclist Characteristics

2007 -2011 (%)

	2007	***2008***	***2009***	***2010***	***2011***	**Change 10-11**
Cyclist Type						
Adult	88	95	93	92	**94**	2
School child	12	5	7	8	**6**	-2
Helmet Wearing						
Helmet on head	99	98	98	98	**99**	1
No helmet	1	2	2	2	**1**	-1
Gender						
Male	-	-	-	-	**70**	-
Female	-	-	-	-	**16**	-
Can't tell	-	-	-	-	**14**	-
Where Riding*						
Road	88	92	94	92	**92**	-39
Footpath	12	8	6	8	**8**	39
Base:	***225***	***207***	***168***	***247***	***323***	

- Figure 1.2 illustrates the total number of morning cyclists by time of movement at the two sites in the Orakei ward. The graph shows two sharp peaks in cycle volumes: the first between 6:40am and 6:49am (68 movements) and the second between 7:00am and 7:09am (81 movements). Cyclist numbers then decrease and remain steady throughout the remainder of the morning monitoring period. No sharp peaks were recorded in 2010, with cycle volumes steady throughout the morning peak.

Figure 1.2: Total Cyclist Frequency – Morning Peak
2007-2010 (n)



1.5 Evening Peak Summary Results

Environmental Conditions

- All sites monitored in the Orakei ward had fine weather in the evening.
- No site had road works or accidents that would have affected cycle movement counts

Key Points

- A total of 181 cyclist movements were recorded across the two sites in the evening peak period (between 4:00pm and 7:00pm) in 2011. Nine per cent (n=17) of the total cycle movements in the evening peak were made by those cycling in groups.
- The total volume of morning cyclist movements in the Orakei ward has increased from 167 in 2010 to 181 in 2011 – an 8 per cent increase.
- The average volume of morning cyclists in the Orakei ward has increased from 84 movements in 2010 to 91 in 2011, an 8 per cent increase.
- The busiest site in the morning is Remuera/Orakei Road (107 cycle movements, up from 95 movements in 2010).
- Both sites saw increases in cycle movement volumes this year when compared to 2010:
  - Remuera/Orakei Road – up 13 per cent
  - St. Heliers Bay/West Tamaki Road – up 3 per cent

Table 1.3: Summary Of Evening Cyclist Movements 2007-2011 (n)

Site No.	*Locations*	*2007*	*2008*	*2009*	*2010*	*2011*	Change 10-11	Change 07-11
11	Remuera/Orakei Road	109	89	80	95	**107**	13%	-2%
20	St Heliers Bay/West Tamaki Road	69	60	47	72	**74**	3%	7%
	Average per site	**89**	**75**	**64**	**84**	**91**	**8%**	**2%**
	Total	**178**	**149**	**127**	**167**	**181**	**8%**	**2%**

- Eighty-six per cent of evening cyclists this year are adults (down from 95 per cent in 2010).
- Most cyclists are wearing a helmet in the evening (95 per cent, unchanged from 2010).
- The majority of evening cyclists were male (83 per cent).
- The majority of evening cyclists are riding on the road (86 per cent, down from 91 per cent in 2010).

Table 1.4: Summary of Evening Cyclist Characteristics

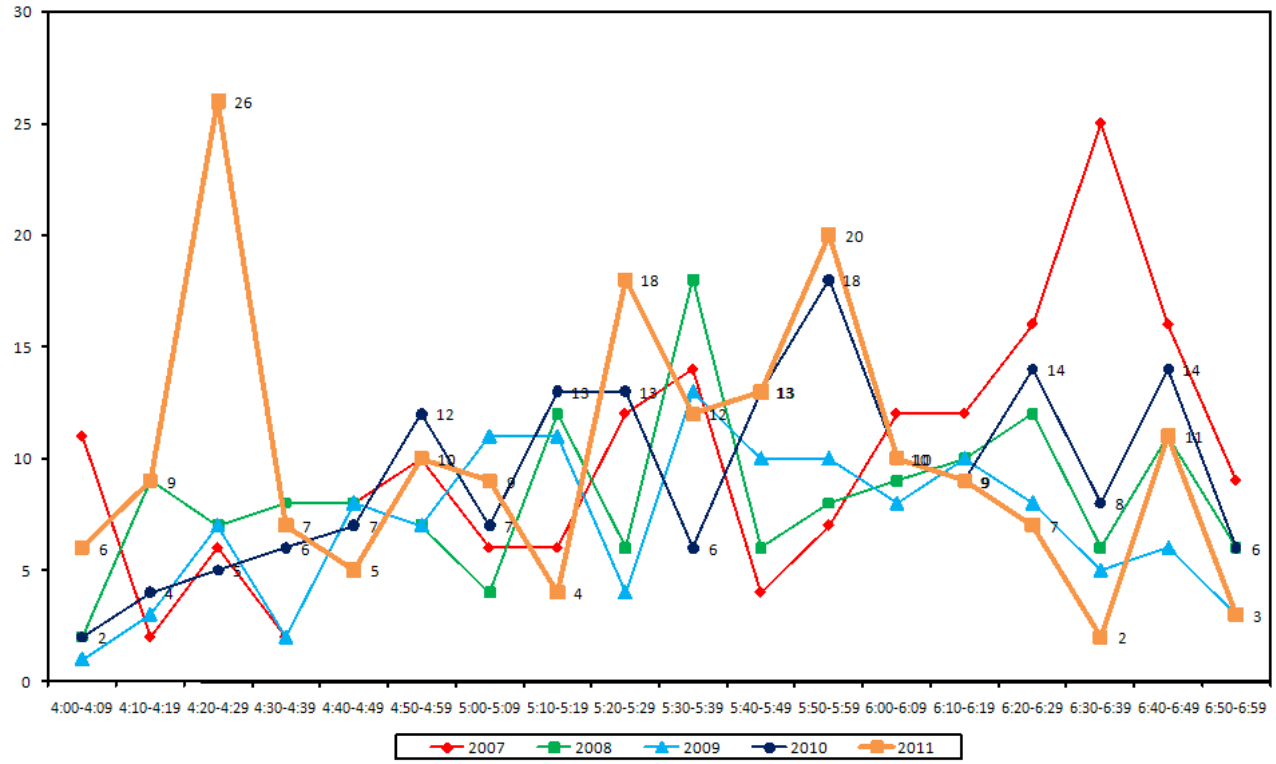
2007 -2011 (%)

	2007	*2008*	*2009*	*2010*	*2011*	Change 10-11
Cyclist Type						
Adult	94	89	95	95	**86**	-9
School child	6	11	5	5	**14**	9
Helmet Wearing						
Helmet on head	98	94	97	95	**95**	0
No helmet	2	6	3	5	**5**	0
Gender						
Male	-	-	-	-	**83**	-
Female	-	-	-	-	**10**	-
Can't tell	-	-	-	-	**7**	-
Where Riding*						
Road	90	88	89	91	**86**	-5
Footpath	10	12	11	9	**14**	5
Base:	***178***	***149***	***127***	***167***	***181***	

- Cyclist volumes fluctuate throughout the evening monitoring period, with a peak of 26 movements between 4:20pm and 4:29pm. This compares with a peak between 5:50pm and 5:59pm of 18 cyclist movements in 2010.

Figure 1.3: Total Cyclist Frequency – Evening Peak

2007-2011 (n)



1.6 Aggregated Total Summary Results

- Overall, a total of 504 cyclist movements were recorded across the two sites monitored in 2011 - 33 per cent of these cyclists (n=169) observed as cycling in groups.
- The average number of cycle movements per monitoring site is 252, an increase of 22 per cent from last year.
- Of the two sites in the Orakei ward, the busiest continues to be Remuera/Orakei Road with a total of 280 movements this year (up 15 per cent from 244 in 2010).

Table 1.5: Summary Of Total Cyclist Movements
2007-2011 (n)

Site No.	*Locations*	*2007*	*2008*	*2009*	*2010*	*2011*	Change 10-11	Change 07-11
11	Remuera/Orakei Road	195	189	187	244	**280**	15%	44%
20	St Heliers Bay/West Tamaki Road	208	167	108	170	**224**	32%	8%
	Average per site	**202**	**178**	**148**	**207**	**252**	**22%**	**25%**
	Total	**403**	**356**	**295**	**414**	**504**	**22%**	**25%**

- The majority of cyclists continue to be adults (91 per cent of all cyclists this year).
- Almost all cyclists are wearing a helmet (98 per cent, stable from 97 per cent in 2010).
- Three-quarters (75 per cent) of the total cyclist movements in Orakei ward were made by male cyclists.
- The majority of cyclists are riding on the road (90 per cent, stable from 92 per cent in 2010).

Table 1.6: Summary of Total Cyclist Characteristics

2007 -2011 (%)

	2007	*2008*	*2009*	*2010*	*2011*	Change 10-11
Cyclist Type						
Adult	91	92	94	93	**91**	-2
School child	9	8	6	7	**9**	2
Helmet Wearing						
Helmet on head	99	96	97	97	**98**	1
No helmet	1	4	3	3	**2**	-1
Gender						
Male	-	-	-	-	**75**	-
Female	-	-	-	-	**14**	-
Can't tell	-	-	-	-	**11**	-
Where Riding*						
Road	89	90	92	92	**90**	-2
Footpath	11	10	8	8	**10**	2
Base:	***403***	***356***	***295***	***414***	***504***	

1.7 Average Annual Daily Traffic (AADT) Estimate

Note: A discussion of Average Annual Daily Traffic Estimates is provided in Section 1.1. 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 1.7 provides the comparative AADT estimates for each site, based on the average of morning and evening peak AADT calculations.
- The highest AADT is at Remuera/Orakei Road (412 daily movements, up from 359 movements in 2010).
- Both sites have recorded increases in total AADT estimates this year compared with 2010:
  - Remuera/Orakei Road – up 15 per cent
  - St. Heliers Bay/West Tamaki Road – up 33 per cent

Table 1.7: AADT Estimates Based on Morning and Evening Cyclist Movements 2007-2011 (n)

Site Number	*Locations*	*2007 AADT*	*2008 AADT*	*2009 AADT*	*2010 AADT*	*2011 AADT*	10-11 Change	07-11 Change
11	Remuera/Orakei Road	282	276	274	359	**412**	15%	46%
20	St Heliers Bay/West Tamaki Road	308	246	158	249	**331**	33%	7%

1.8 School Bike Shed Count Summary

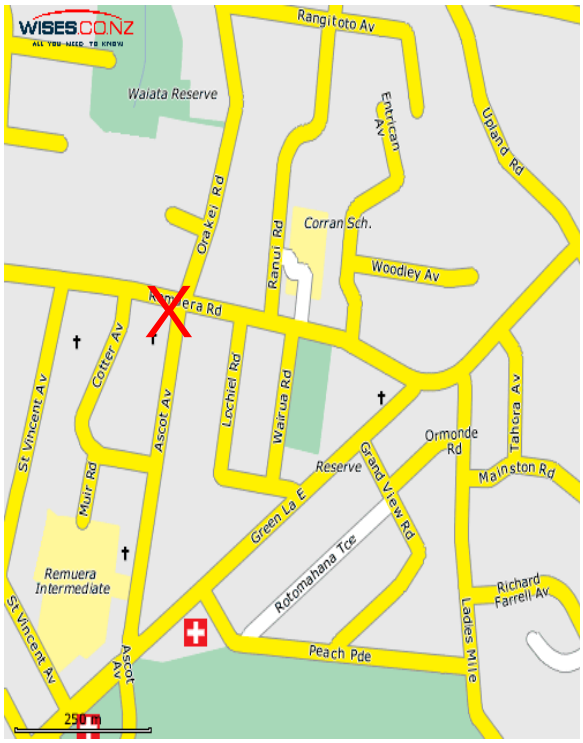
Key Points

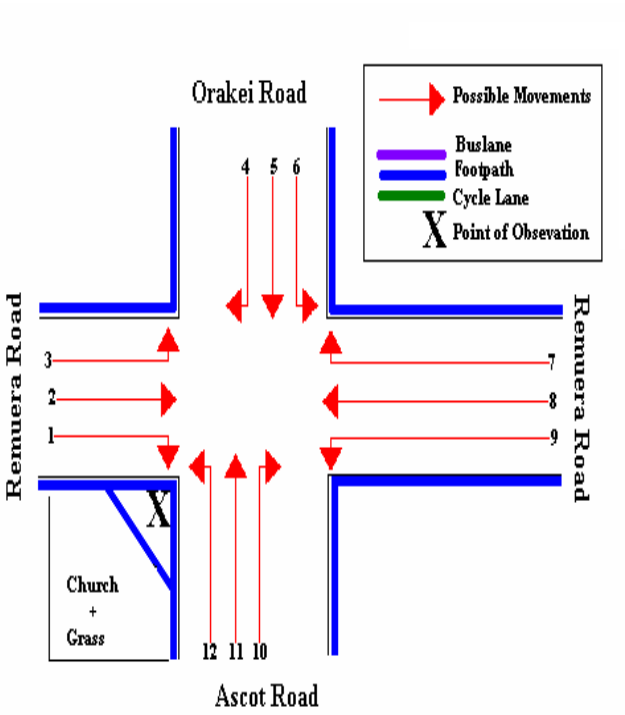
- Of those eligible to cycle at school, on average, two per cent of students are cycling to their schools in the Orakei ward.
- Across the 11 eligible schools that responded, n=138 students were reported to cycle to school.
- Remuera Intermediate reported the highest share of cyclists – 6 per cent of all eligible students currently cycling (up from 5 per cent last year).
- Of the 11 eligible schools that responded, 4 (36 per cent) had no students cycling to school.
- Rates of cycling to school are highest among intermediate schools (6 per cent, up from 5 per cent in 2010). The composite schools had the lowest rates of cycling (no cyclists).

2. REMUERA/ORAKEI/ASCOT ROAD, REMUERA (SITE 11)

Figure 2.1 shows the possible cyclist movements at this intersection.

Figure 2.1: Cycle Movements: Remuera/Orakei/Ascot





2.1 Site Summary

	Raw Counts			AADT
	Morning Peak	*Evening Peak*	*Total*	*Total*
2007	86	109	195	282
2008	100	89	189	276
2009	107	80	187	274
2010	149	95	244	359
2011	**173**	**107**	**280**	**412**

2.2 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

- Morning cyclist numbers recorded at the Remuera/Orakei/Ascot intersection in 2011 have increased since last year (173 movements, compared with 149 movements in 2010).
- This year, the most common movement at this site in 2011 is turning right from Orakei Road on to Remuera Road (Movement 4 = 70 cyclists).
- The most notable increase in cyclist volumes is Movement 4 (up 60 cyclists from 2010).

Table 2.1: Morning Cyclist Movements

Remuera/Orakei/Ascot 2007-2011 (n)

Movement	*2007*	*2008*	*2009*	*2010*	*2011*	Change 10-11
1	0	0	0	0	2	**2**
2	19	25	24	56	30	**-26**
3	4	1	3	5	3	**-2**
4	3	9	12	10	70	**60**
5	2	4	3	7	4	**-3**
6	3	9	1	4	5	**1**
7	0	0	4	2	3	**1**
8	52	45	56	63	55	**-8**
9	0	0	0	2	0	**-2**
10	0	1	0	0	0	**0**
11	1	2	1	0	1	**1**
12	2	4	3	0	0	**0**
Total	**86**	**100**	**107**	**149**	**173**	**24**

- Ninety-four per cent of cyclists in the morning at this site are adults (up slightly from 91 per cent last year).
- Helmet wearing continues to be widespread (99 per cent, up slightly from last year).
- Over half of the cyclists are male (58 per cent, comparable to 16 per cent being female).
- The share of cyclists riding on the road has remained stable (92 per cent, up 2 percentage points since the 2010 measure).

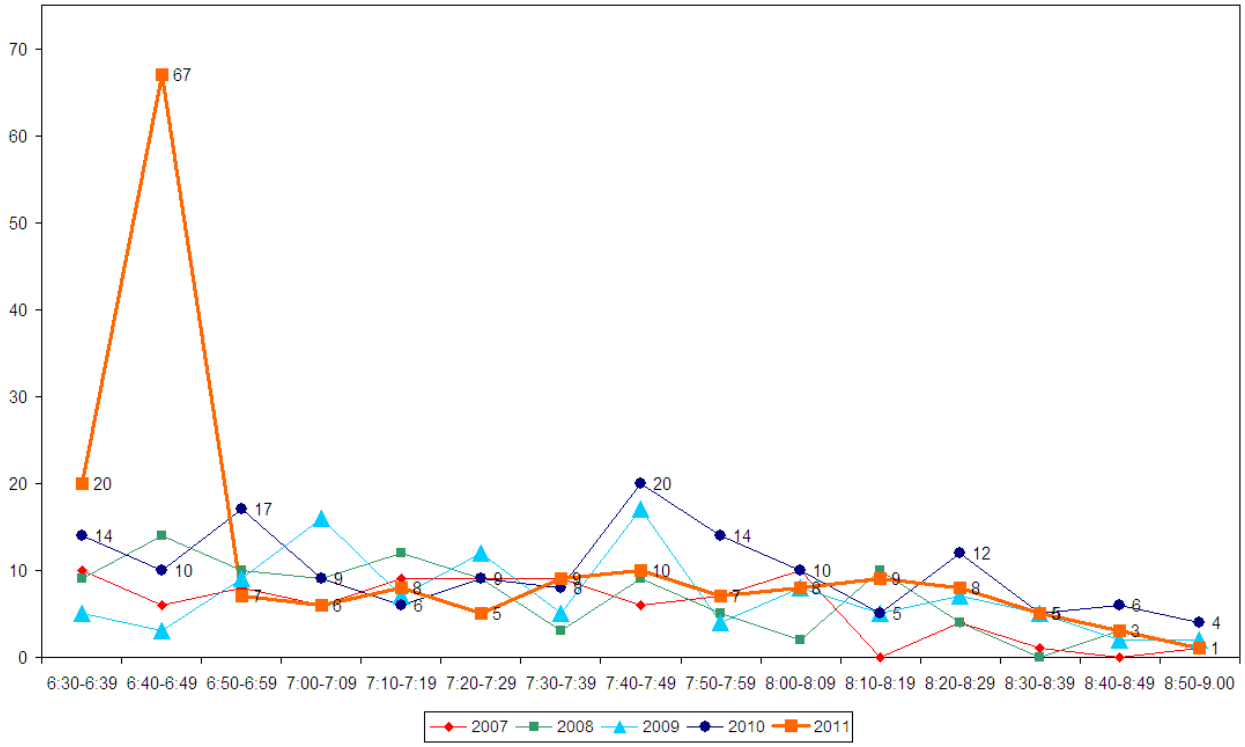
Table 2.2: Morning Cyclist Characteristics

Remuera/Orakei/Ascot 2004-2011(%)

	2004	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	Change 10-11
Cyclist Type									
Adult	89	85	89	91	97	94	91	94	**3**
School child	11	15	11	9	3	6	9	6	**-3**
Helmet Wearing									
Helmet on head	98	97	99	98	98	98	97	99	**2**
No helmet	2	3	1	2	2	2	3	1	**-2**
Gender									
Male	-	-	-	-	-	-	-	58	**-**
Female	-	-	-	-	-	-	-	16	**-**
Can't tell	-	-	-	-	-	-	-	27	**-**
Where Riding									
Road	83	79	86	90	92	94	90	92	**2**
Footpath	17	21	14	10	8	6	10	8	**-2**
Base:	***46***	***78***	***73***	***86***	***100***	***107***	***149***	***173***	

- This year, morning cyclist volumes start relatively high with 20 cyclists between 6:30am and 6:39am. There is a very sharp peak between 6:40am and 6:49am (67 cyclist movements). From 6:50am onwards, morning cyclist volumes at this site remain stable with no more than ten cyclists recorded over any ten minute interval, gradually decreasing from 8:10am till the end of the monitoring period.

Figure 2.2: Morning Peak Cyclist Frequency
Remuera/Orakei/Ascot (n)



Note: In 2011, 33 per cent of the total cycle movements in the morning peak were identified as cycling in groups. Three or more cyclists were observed travelling in groups at this site at the following times:

- *Three cyclists at 6:38am*
- *Nine cyclists at 6:39am*
- *Sixteen cyclists at 6:45am*
- *Ten cyclists at 6:46am*
- *Four cyclists at 6:47am*
- *Twelve cyclists at 6:48am*
- *Three cyclists at 6:59am*

2.3 Evening Peak

Environmental Conditions

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

Key Points

- The volume of cyclists recorded between 4:00pm and 6:00pm at this site in 2011 (107 movements) is an increase from that recorded last year (95 movements).
- The key movement in the evening at this site is east along Remuera Road (Movement 2 = 78 cyclists).
- The most notable increase in cyclist volumes recorded is at Movement 2 (up 18 cyclists).

Table 2.3: Evening Cyclist Movements

Remuera/Orakei/Ascot 2007-2011 (n)

Movement	*2007*	*2008*	*2009*	*2010*	*2011*	Change 10-11
1	3	3	2	0	1	**1**
2	60	49	41	60	78	**18**
3	6	4	6	8	2	**-6**
4	4	0	2	2	1	**-1**
5	4	0	1	0	1	**1**
6	1	5	2	3	2	**-1**
7	2	5	1	0	2	**2**
8	22	16	19	17	17	**0**
9	0	0	1	0	1	**1**
10	1	1	0	1	0	**-1**
11	5	6	5	3	2	**-1**
12	1	0	0	1	0	**-1**
Total	**109**	**89**	**80**	**95**	**107**	**12**

- The majority of cyclists in the evening are adults (84 per cent, down from 94 per cent last year).
- All cyclists are wearing a helmet (up from 95 per cent in 2010).
- Most cyclists are male (79 per cent).
- Compared with last year, the incidence of riding on the road has increased to 93 per cent (up from 87 per cent).

Table 2.4: Evening Cyclist Characteristics

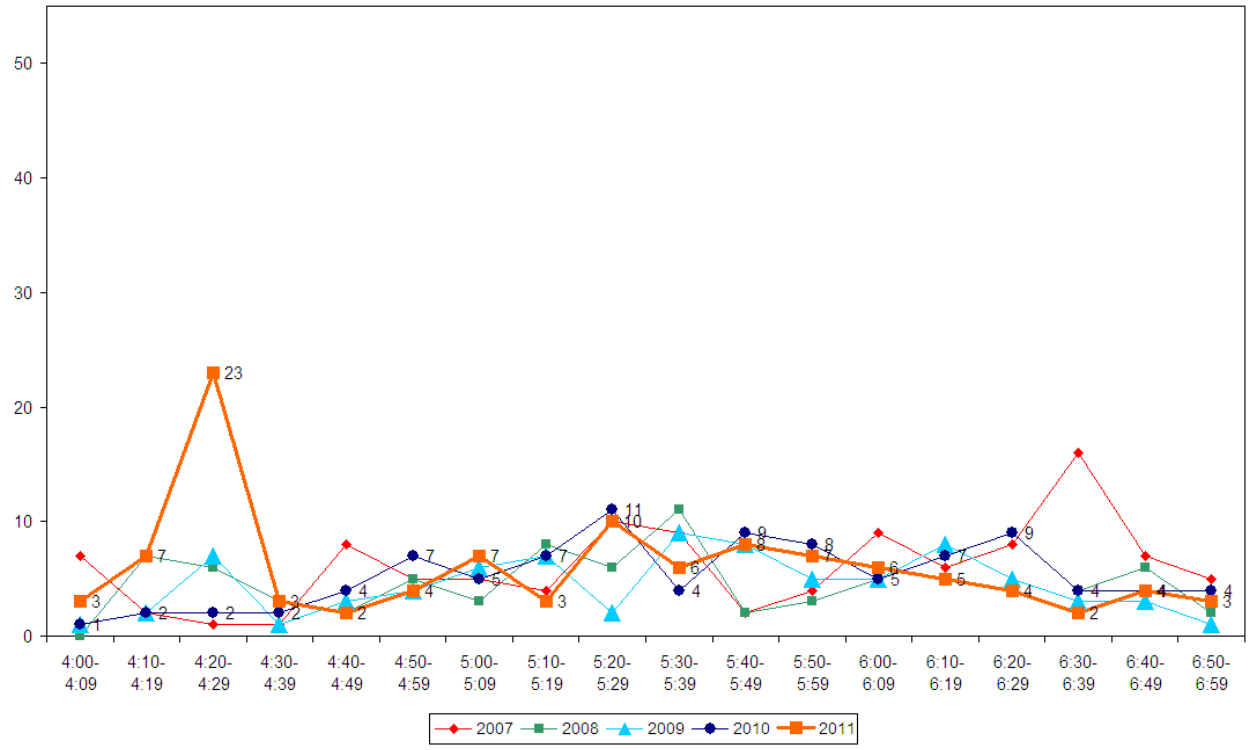
Remuera/Orakei/Ascot 2004-2011(%)

	2004	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	**Change 10-11**
Cyclist Type									
Adult	73	99	97	94	89	98	94	84	**-10**
School child	27	1	3	6	11	2	6	16	**10**
Helmet Wearing									
Helmet on head	94	100	100	98	96	98	95	100	**5**
No helmet	6	0	0	2	4	2	5	0	**-5**
Gender									
Male	-	-	-	-	-	-	-	79	**-**
Female	-	-	-	-	-	-	-	10	**-**
Can't tell	-	-	-	-	-	-	-	11	**-**
Where Riding									
Road	86	75	84	92	89	90	87	93	**6**
Footpath	14	25	16	8	11	10	13	7	**-6**
Base:	***49***	***73***	***32***	***109***	***89***	***80***	***95***	***107***	

- This year, evening cyclist volumes peak between 4:20pm and 4:29pm (23 cyclists) – earlier than the slight peak between 5:20pm and 5:29pm (11 cyclists) in 2010.

Figure 2.3: Evening Peak Cyclist Frequency

Remuera/Orakei/Ascot (n)



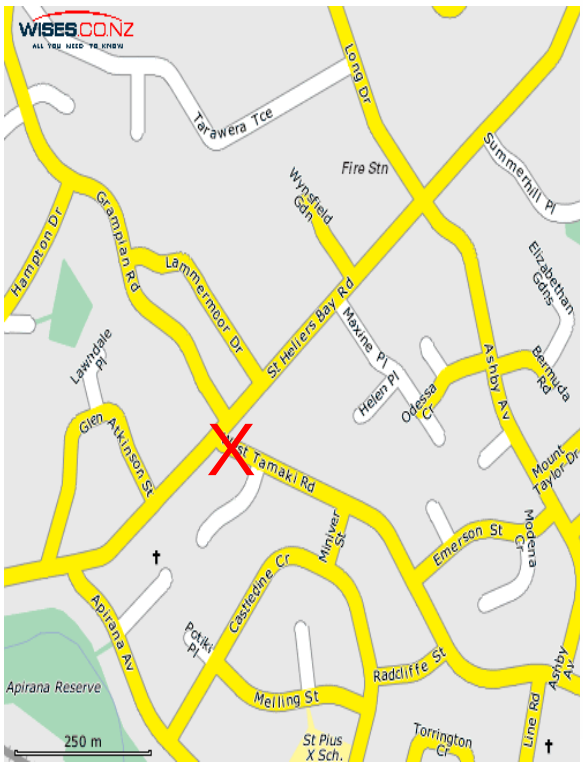
Note: In 2011, 13 per cent of the total cycle movements in the evening peak were identified as cycling in groups. Three or more cyclists were observed travelling in groups at this site at the following times:

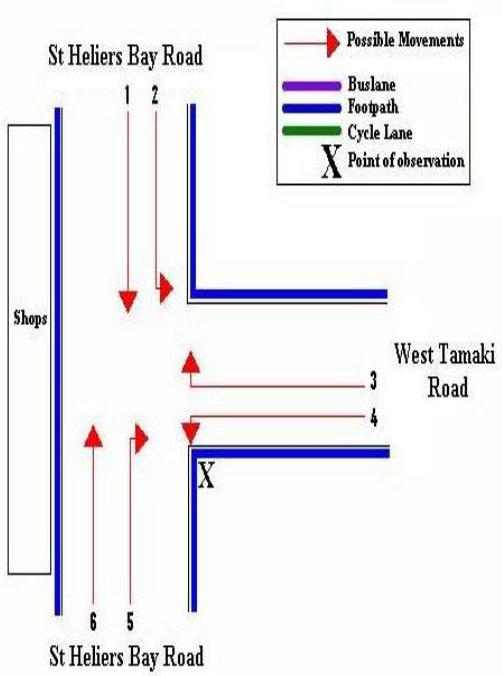
- *Eleven cyclists at 4:20pm*
- *Three cyclists at 4:21pm*

3. ST HELIERS BAY ROAD/WEST TAMAKI ROAD, GLEN INNES (SITE 20)

Figure 3.1 shows the possible cyclist movements at this intersection.

Figure 3.1: Cycle Movements: St Heliers Bay/West Tamaki Road





3.1 Site Summary

	Raw Counts			AADT
	Morning Peak	*Evening Peak*	*Total*	*Total*
2007	139	69	208	308
2008	107	60	167	246
2009	61	47	108	158
2010	98	72	170	249
2011	**150**	**74**	**224**	**331**

3.2 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

- The volume of morning peak cyclists at the St Heliers Bay/West Tamaki Road intersection has increased notably from last year – up from 98 to 150 movements this year.
- The key morning movement is riding along St Heliers Bay Road in a north-easterly direction and turning right on to West Tamaki Road (Movement 5 = 61 cyclists).
- The most notable increase is at Movement 5 - up 40 cyclists from 21 in 2010.

Table 3.1: Morning Cyclist Movements

St Heliers Bay/West Tamaki Road 2007-2011 (n)

Movement	*2007*	*2008*	*2009*	*2010*	*2011*	Change 10-11
1	17	14	16	20	**19**	-1
2	4	4	1	5	**4**	-1
3	21	7	5	7	**6**	-1
4	5	14	12	12	**33**	21
5	69	53	7	21	**61**	40
6	23	15	20	33	**27**	**-6**
Total	**139**	**107**	**61**	**98**	**150**	**52**

- Over the morning peak, adults comprise the greatest share of cycle movements (95 per cent, stable from the previous year).
- Nearly all cyclists are wearing a helmet (99 per cent, compared with 100 per cent last year).
- Eighty-four per cent of cyclists are male, compared to 16 per cent being female.
- Consistent with last year, the majority of cyclists are riding on the road (93 per cent, compared with 95 per cent at the last measure).

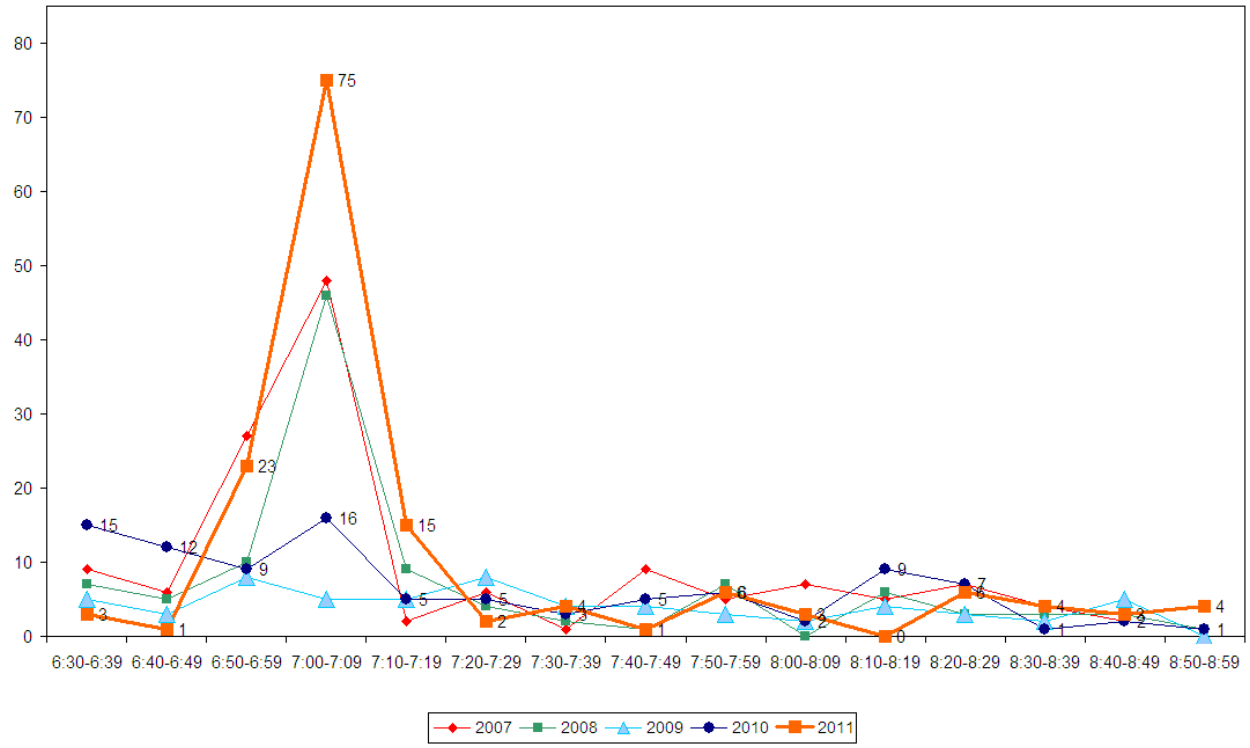
Table 3.2: Morning Cyclist Characteristics

St Heliers Bay/West Tamaki Road 2007-2011 (%)

	2007	*2008*	*2009*	*2010*	*2011*	Change 10-11
Cyclist Type						
Adult	87	93	92	93	**95**	2
School child	13	7	8	7	**5**	-2
Helmet Wearing						
Helmet on head	100	97	98	100	**99**	-1
No helmet	0	3	2	0	**1**	1
Gender						
Male	-	-	-	-	**84**	-
Female	-	-	-	-	**16**	-
Can't tell	-	-	-	-	**0**	-
Where Riding						
Road	87	92	93	95	**93**	-2
Footpath	13	8	7	5	**7**	2
Base:	***139***	***107***	***61***	***98***	***150***	

- There is a sharp peak between 7:00am and 7:09am (75 cyclist movements) which then falls to become a stable volume of movements for the remainder of the monitoring period. This compares to three slight peaks between 6:30am and 6:39am (15 cyclists), and 7:00am and 7:09am (16 cyclists), and between 8:10am and 8:19am (9 cyclists) in 2010. This trend is consistent with previous years.

Figure 3.2: Morning Peak Cyclist Frequency
St Heliers Bay/West Tamaki Road (n)



Note: In 2011, 62 per cent of the total cycle movements in the morning peak were identified as cycling in groups. Three or more cyclists were observed travelling in groups at this site at the following times:

- *Nine cyclists at 6:54am*
- *Four cyclists at 6:58am*
- *Fourteen cyclists at 7:00am*
- *Thirteen cyclists at 7:03am*
- *Twenty-four cyclists at 7:05am*
- *Twenty-two cyclists at 7:06am*
- *Seven cyclists at 7:18am*

3.3 Evening Peak

Environmental Conditions

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

Key Points

- The total number of evening cycle movements recorded at the St Heliers Bay/West Tamaki Road intersection has increased slightly, from 72 last year to 74 movements in 2011.
- The key movement at this site in the evening is straight along St Heliers Bay Road heading north (Movement 6 = 28 cyclists).
- The most notable decrease is at Movement 1 (down 6 cyclists).

Table 3.3: Evening Cyclist Movements

St Heliers Bay/West Tamaki Road 2007-2011 (n)

Movement	*2007*	*2008*	*2009*	*2010*	*2011*	Change 10-11
1	22	19	15	23	17	**-6**
2	6	6	7	6	6	**0**
3	4	8	6	2	4	**2**
4	5	5	5	6	8	**2**
5	3	12	7	9	11	**2**
6	29	10	7	26	28	**2**
Total	**69**	**60**	**47**	**72**	**74**	**2**

- Consistent with the morning peak, the greatest share of cyclists using this intersection are adults (89 per cent, down from 96 per cent in 2010).
- Most cyclists at this site are wearing a helmet (88 per cent, down from 96 per cent last year).
- Ninety-one per cent of cyclists are male.
- The majority of cyclists are riding on the road (76 per cent, down from 96 per cent last year).

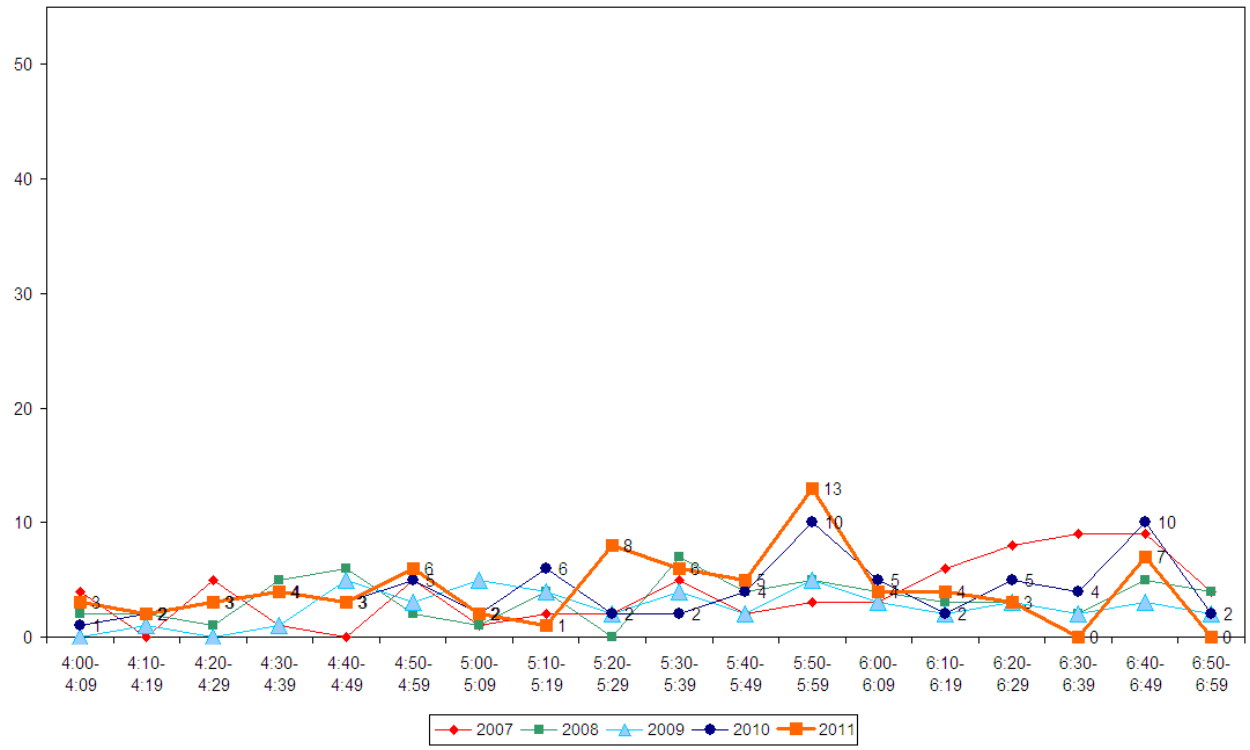
Table 3.4: Evening Cyclist Characteristics

St Heliers Bay/West Tamaki Road 2007-2011 (%)

	2007	*2008*	*2009*	*2010*	*2011*	Change 10-11
Cyclist Type						
Adult	93	88	89	96	**89**	-7
School child	7	12	11	4	**11**	7
Helmet Wearing						
Helmet on head	99	92	94	96	**88**	-8
No helmet	1	8	6	4	**12**	8
Gender						
Male	-	-	-	-	**91**	-
Female	-	-	-	-	**9**	-
Can't tell	-	-	-	-	**0**	-
Where Riding						
Road	88	87	87	96	**76**	-20
Footpath	12	13	13	4	**24**	20
Base:	***69***	***60***	***47***	***72***	***74***	

- The volume of evening cycle movements is relatively stable with three slight peaks occurring between 5:20pm and 5:29pm (8 cyclists), 5:50pm and 5:59pm (13 cyclists), and between 6:40pm and 6:49pm (7 cyclists). The two latter peaks are similar to the two slight peaks that occurred last year.

Figure 3.3: Evening Peak Cyclist Frequency
St Heliers Bay/West Tamaki Road (n)



Note: In 2011, three cyclists were observed riding as a group at 6:46pm. This comprises four per cent of the total cycle movements at this site in the evening peak.

4. SCHOOL BIKE SHED COUNT

Note: Full primary schools (those taking children through to Year 8) were included in the count for the first time in 2011.

Background Information

- A total of 11 schools in the Orakei ward participated in the school bike shed count.
- Of the schools that responded to the survey, most did not have policies that restrict students cycling to school[9].
- Churchill Park School noted that some Year 7 and 8 students were away at a sports tournament on count day. Consequently, actual cycle numbers for this school may be higher than those reported here.
- The designated count day was Tuesday 8th of March[10].

Key Points

- Of those eligible to cycle, on average, two per cent of students are cycling to their schools.
- Across the 11 eligible schools that responded, n=138 students were reported to cycle to school.
- Remuera Intermediate reported the highest share of cyclists – 6 per cent of all eligible students currently cycling (up from 5 per cent last year).
- Of the 11 eligible schools that responded, 4 (36 per cent) had no students cycling to school.

[9] Churchill Park School permits students 10 years or older to cycle to school. Saint Kentigern School only permits Year 7 and 8 students to cycle to school.

[10] The following schools undertook counts on alternative days:

- Saint Kentigern School for Girls – Corran – Friday 4th March
- Selwyn College – 14th March
- Saint Kentigern School – Thursday 31st March

Table 4.1 shows the results of the 11 schools surveyed in the Orakei ward.

Table 4.1: Summary Table Of School Bike Count

2007-2011 (n)

School Name	*School Type*	*School Roll Eligible To Cycle*	*No. of Cycles Counted*	*Cyclists as share of those eligible*[11]				
				2011	*2010*	*2009*	*2008*	*2007*
Remuera Intermediate	Intermediate	946	61	**6%**	5%	7%	5%	9%
Glendowie Primary	Full primary	621	24	**4%**	-	-	-	-
Selwyn College	Secondary	850	19	**2%**	2%	2%	1%	-
Churchill Park School	Full primary	143	3	**2%**	-	-	-	-
Glendowie College	Secondary	1040	14	**1%**	1%	1%	-	-
Sacred Heart College	Intermediate/secondary	1150	14	**1%**	-	1%	1%	-
St Thomas's School	Full primary	605	3	**<1%**	-	-	-	-
Baradene College	Intermediate/secondary	1024	0	**0%**	0%	0%	<1%	0%
St Kentigern School	Full primary	180	0	**0%**	-	-	-	-
Saint Kentigern School for Girls - Corran	Composite	115	0	**0%**	0%	-	-	-
The Bridge Academy	Composite	5	0	**0%**	0%	-	-	-
Total		**6679**	**138**	**2%**				

[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.

Table 4.2 illustrates the rates of cycling to school at different school levels. Rates of cycling to school are highest among intermediate schools (6 per cent, up from 5 per cent in 2010). The composite schools had the lowest rates of cycling (no cyclists).

Table 4.2: Summary Table Of School Bike Count by School Type

2007-2011 (%)

School Type	*Number of Schools Responded in 2011*	*Cyclists as share of those eligible*					
		2007	*2008*	*2009*	*2010*	*2011*	**Change 10-11**
Intermediate	1	9%	5%	7%	5%	**6%**	+1
Full primary	4	-	-	-	-	**2%**	-
Secondary	2	-	1%	1%	1%	**2%**	+1
Intermediate/Secondary	2	0%	<1%	<1%	0%	**1%**	+1
Composite	2	-	-	-	0%	**0%**	0

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APPENDICES

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[12] 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)[13], 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.

[12] Annual average daily traffic

[13] 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%