

Urban Cycleways Programme

National monitoring and data reporting requirements

Introduction

Background and Purpose

In July / August 2015, recipients of funding from the Urban Cycleways Programme (UCP) signed memorandums of understanding with the NZ Transport Agency which included that they would make all reasonable effort to:

Implement a monitoring system to track usage of the Council's new cycle facilities and its impact on the wider network, incorporating monitoring establishment costs into project budgets, and cooperate with the Agency to ensure this supports implementation of a national monitoring framework which will include the collection of baseline and usage data, and data on changes in attitudes and perceptions (Clause 3.1(m)).

The throughput of people on bikes is the key metric for determining whether investment to encourage more utility cycling is succeeding. This document focuses on throughput and associated qualitative information. Other measures, including the impact of the investment on attitudes and perceptions towards people on bikes, will be included in the Transport Agency's overall monitoring programme and are briefly referenced in this document.

This document covers the two components of the throughput monitoring requirements quoted above:

- Direct measurement of UCP investment through baseline and throughput monitoring
- Wider network monitoring.

Methodologies for gathering the necessary data to satisfy the above purposes are included in this document. For UCP projects, automatic cycle counting technology is mandated. While technology is not mandated for monitoring wider networks, it is recommended. The methodologies described in this document can also be used to guide the establishment of a wider automatic cycle counting programme.

The Transport Agency recognises that many authorities currently have a cycle counting programme in place, and many are already using automatic counting technology. The Transport Agency anticipates that monitoring requirements for the UCP will be integrated with these existing activities where possible.

Document Format

This document is divided into two overarching sections: Part A: Monitoring Requirements and Part B: Cycle Monitoring Guidance.

Part A mandates what must be included in monitoring plans and reported on for all Road Controlling Authorities (RCAs) that are receiving UCP investment. Part A consists of the following sections:

- **Monitoring Plans.** This section provides the requirements for cycle monitoring plans that must be submitted to the Transport Agency.
- **Additional Nationally-Led Monitoring.** An explanation of other monitoring that will be coordinated by the Transport Agency.
- **Reporting Requirements.** These are the Transport Agency's minimum reporting requirements for both performance of the UCP routes and wider network impact (generally measured by a cordon survey). This section is also accompanied by standard forms that should be completed and returned to the Transport Agency by 30 June each year, commencing in 2016. Monitoring plans must be designed to ensure that reliable values can be provided for all cells in the reporting forms.

Part B provides best practice guidance for achieving the requirements of the monitoring plans. Part B provides some minimum requirements for monitoring, however the Transport Agency is open to alternative

means of meeting the monitoring plan and reporting requirements where data robustness can be demonstrated. Part B includes the following sections:

- **Measuring the UCP Investment**
 - *UCP Project Throughput Measurement.* This section provides further detail on the requirement for automatic count stations on UCP projects and the wider network and provides guidance for locating these.
 - *Baseline Data Collection.* The Transport Agency requires the collection of baseline data before UCP routes are constructed. This section sets out baseline reporting requirements and makes recommendations for how this data could be collected.
- **Wider Network Monitoring.** In order to measure the network impact of investment the Transport Agency requires an annual network survey of cyclists, including throughput and qualitative data. Guidance on the design and reporting requirements for this survey is detailed in this section.

Part A: Monitoring Requirements

This section mandates what must be included in the monitoring plans and reported to the Transport Agency for all RCAs that are receiving UCP investment.

Monitoring Plans

A monitoring plan must be prepared and submitted to the Transport Agency prior to February 12, 2016 that meets the requirements of Part A. Requirements are summarised in Table 1. Note that the function of calibration stations and reporting count stations is explained in Part B.

Table 1: Monitoring Plan Requirements

Monitoring Category	Summary of Requirements	Monitoring Plan Information
<p>UCP Project Throughput and Growth Measurement</p>	<p>The monitoring plan must provide a methodology to measure reliable throughput (Average Daily Cyclists) and growth on all UCP projects. The methodology must be sufficient to complete all required values on the forms in the 'Reporting Requirements' section.</p> <p>All values reported to the Transport Agency must be reliable. It is recommended that this is achieved through the application of the Guidance in Part B. See Reporting Count Station and Calibration Station requirements below.</p> <p>The anticipated pedestrian volumes on shared facilities and methodologies for recording pedestrian data should also be included.</p>	<p>All monitoring/count station locations must be provided on a map with accompanying GIS compatible data or coordinates. Count station locations should be categorised by type and count duration.</p>
	<p>Calibration Stations</p> <p>A selection of count stations must have technology that continuously counts cyclists on all days of the year.</p> <p>Part B recommends all RCAs include 2-4 calibration stations in their UCP monitoring programme – see Figure 2. Calibration stations should be located in accordance with the principles in Table 2. It is unlikely that the Transport Agency will approve monitoring plans where the calibration station guidance is not applied.</p>	<p>A short commentary explaining how the proposed locations and durations will provide reliable data. This may be a comparison with the requirements for “Calibration Stations”.</p> <p>Proposed count technology/methodology.</p> <p>Survey design for the collection of pedestrian data, where facilities are shared paths.</p> <p>On the same map referred to above, calibration stations must be specified.</p> <p>Short commentary explaining how the selected calibration stations meet the principles in Table 2.</p>
	<p>Reporting Count Stations</p> <p>For reliable data, Part B requires RCAs include at least one reporting count station on each UCP route project and</p>	<p>Same as for calibration stations, and:</p> <p>A short commentary explaining how the proposed locations and durations will provide reliable data. This may be a comparison with</p>

	sufficient count stations to monitor UCP packages.	<p>the requirements of “Reporting Count Stations”.</p> <p>Annual counting schedule for each site, where count stations are not proposed to be permanent.</p> <p>Proposed automatic counter maintenance schedule, including counter validation checks.</p>
Baseline Data Collection	<p>The monitoring plan must include the collection of sufficient baseline data to allow growth in cyclist numbers and number of diverted cyclists to be measured. At a minimum this requires a single weekday and weekend survey for each UCP project.</p> <p>Part B recommends that baseline data is collected in the vicinity of proposed count stations for all UCP projects. Baseline data should also be collected on parallel routes where there are currently moderate–high levels of cycling.</p>	<p>Map showing baseline data monitoring locations, including identification of parallel routes to be surveyed.</p> <p>Proposed timeframe and method of data collection.</p>
Wider Network Monitoring	<p>The monitoring plan must include provision for annual monitoring of cycling on the wider network.</p> <p>Part B recommends that this is undertaken using a morning peak hour manual survey in March (commencing in 2016) that monitors cycling near key destinations on the network as a whole. For larger RCAs this should include a cordon count surrounding the CBD at a minimum. Smaller RCAs may monitor representative screen lines only.</p>	<p>Map(s) showing cordon/screen line and other monitoring locations. This information should be supplemented by the location of key cycle destinations on the network.</p> <p>Proposed method of data collection.</p> <p>Qualitative data to be collected. At a minimum this must include cyclist gender.</p> <p>Calibration stations to be used to scale wider network data.</p>

The Transport Agency is happy to assist authorities needing advice on counter locations and will seek expert review of monitoring plans. The finalisation of the monitoring plans may be an iterative process between the Transport Agency and RCAs.

Additional Nationally–Led Monitoring

In addition to the count data requirements in this document, the Transport Agency will be monitoring other aspects of cycling in UCP investment areas. While these will be nationally led, some input from RCAs may be requested. This additional monitoring will include:

- A national attitudes and perceptions survey, planned to be undertaken in March. The survey questions will be provided to local authorities so they can use them in their areas if they would like to get better local insight or adapt existing surveys
- Monitoring the impacts of the UCP on safety at a national level
- Mapping of existing cycle facilities and strategic cycle networks in the main urban areas nationally. This will require additional input from local authorities.

Further information about these requirements will be provided at a later date.

Reporting Requirements

UCP monitoring results must be reported annually and submitted to the Transport Agency by 30 June each year (commencing 2016) using the forms below. Wider network monitoring results must be collected during March each year using the provided form and submitted to the Transport Agency by 30 June.

Scaling of count data is required to complete the forms below. This should be undertaken by RCAs before forms are provided to the Transport Agency to ensure that data received from all RCAs is consistent and comparable. Ultimately the forms will be available through the Transport Agency's online reporting software and can be submitted electronically.

Appendix 2 of the Transport Agency's "Cycle Network and Route Planning Guide"¹ describes a methodology for scaling very short-term cycle counts (e.g. the wider network monitoring surveys). Calibration station data should be used to populate the columns in Table A2.1 Typical Daily Cycling Profile, Table A2.2 Weekday usage percentages and Table A2.3 Period adjustment factors on an annual basis. These tables are in Appendix 2 of the Cycle Network and Route Planning Guide (see link in footnote of this page).

For general count stations that count for two weeks or longer, counts should be scaled using the same time period in which the calibration station data was collected. This data should be analysed to determine the scaling factor required to scale it to mean flow during the period. Average daily cyclists can then be calculated. It is important that short term counts are scaled using the most recent year of calibration station data to account for differences in weather.

In addition to the data required in the forms, bar charts must be provided showing hourly volumes across an average weekday and average daily volumes across an average week. For calibration stations and permanent general count sites, weekly flows across the year should also be provided in bar chart form. All bar charts must be accompanied by spreadsheet data to allow these to be reproduced in a Transport Agency format for national reporting.

¹ <https://www.nzta.govt.nz/resources/cycle-network-and-route-planning/>

Baseline Monitoring Form for UCP Projects

Complete one form for each UCP project. Counting must occur for the full duration of the periods specified below to ensure consistency across the national cycle counts database. During the weekend, a 4 hour peak period should be selected. The same peak period must be reported on after the implementation of the facilities, so the peak should be selected with likely future use in mind. Only one baseline count per project is mandated in these requirements. However additional baseline monitoring is advised where facilities will not be completed until 2017 or 2018.

UCP Project Name			Number of future count stations for project	
Project Type		<input type="checkbox"/> Route <input type="checkbox"/> Package		
Baseline Count Type		<input type="checkbox"/> Manual <input type="checkbox"/> Automatic		
Count Station 1	Location		Related Calibration Station	<i>Location of station that will be used for scaling future counts</i>
	Number of Parallel Routes		Count dates:	
		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)
	UCP Route Peak Count			
	Parallel Route 1 Count			
	Parallel Route 2 Count			
	Parallel Route 3 Count			
	Total Count (sum of UCP route and all parallel route counts)			
Pedestrian Counts <i>(for shared facilities)</i>				
Count Station 2	Location		Related Calibration Station	
	Number of Parallel Routes		Count dates:	
		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)
	UCP Route Peak Count			
	Parallel Route 1 Count			
	Parallel Route 2 Count			
	Parallel Route 3 Count			
	Total Count (sum of UCP route and all parallel route counts)			
Pedestrian Counts <i>(for shared facilities)</i>				
Count Station 3	Location		Related Calibration Station	
	Number of Parallel Routes		Count dates:	
		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)
	UCP Route Peak Count			
	Parallel Route 1 Count			
	Parallel Route 2 Count			
	Parallel Route 3 Count			

	Total Count (sum of UCP route and all parallel route counts)			
	Pedestrian Counts <i>(for shared facilities)</i>			
	Total UCP Count (sum of all UCP route counts)			
Comments				

UCP Reporting Forms – Post Implementation

Complete one form for each UCP project. **Where manual counts are undertaken on parallel routes, these should be undertaken at the same time of year as the baseline monitoring.** Average Daily Cyclist (ADC) 5-day (Monday – Friday) and ADC 7-day (Monday – Sunday) are scaled average daily cyclist counts. The AM, PM and Weekend peaks are scaled counts to get averages for these time periods and allow comparison to the baseline data. Local scaling factors must be applied to the counts for each time period. Scaling factors should be calculated using the related calibration stations and will retrospectively be applied to the baseline data to allow comparison.

Year 1 and 2 UCP project reporting form

UCP Project Name					Number of count stations for project		
Project Type		<input type="checkbox"/> Route <input type="checkbox"/> Package					
Parallel Route Count Type		<input type="checkbox"/> Manual <input type="checkbox"/> Automatic					
Count Station 1	Location		Related Calibration Station		Location of station used for scaling counts		
	Number of Parallel Routes		Count dates:		For manual surveys should be the same time of year as baseline counts		
		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)	ADC 5-day	ADC 7-day	
	Scaling Factor						
	Scaled UCP Route Count						
	Scaled Parallel Route 1 Count						
	Scaled Parallel Route 2 Count						
	Scaled Parallel Route 3 Count						
	Total Scaled Count (sum of UCP route and all parallel route counts)						
	Pedestrian Counts <i>(for shared facilities)</i>						
Count Station 2	Location		Related Calibration Station				
	Number of Parallel Routes		Count dates:				

		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)	ADC 5-day	ADC 7-day
	Scaling Factor					
	Scaled UCP Route Count					
	Scaled Parallel Route 1 Count					
	Scaled Parallel Route 2 Count					
	Scaled Parallel Route 3 Count					
	Total Scaled Count (sum of UCP route and all parallel route counts)					
	Pedestrian Counts <i>(for shared facilities)</i>					
Count Station 3	Location		Related Calibration Station			
	Number of Parallel Routes		Count dates:			
		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)	ADC 5-day	ADC 7-day
	Scaling Factor					
	Scaled UCP Route Count					
	Scaled Parallel Route 1 Count					
	Scaled Parallel Route 2 Count					
	Scaled Parallel Route 3 Count					
	Total Scaled Count (sum of UCP route and all parallel route counts)					
	Pedestrian Counts <i>(for shared facilities)</i>					
	Total scaled UCP Count (sum of all scaled UCP route counts)					
Comments						

Year 3 onwards UCP project reporting form

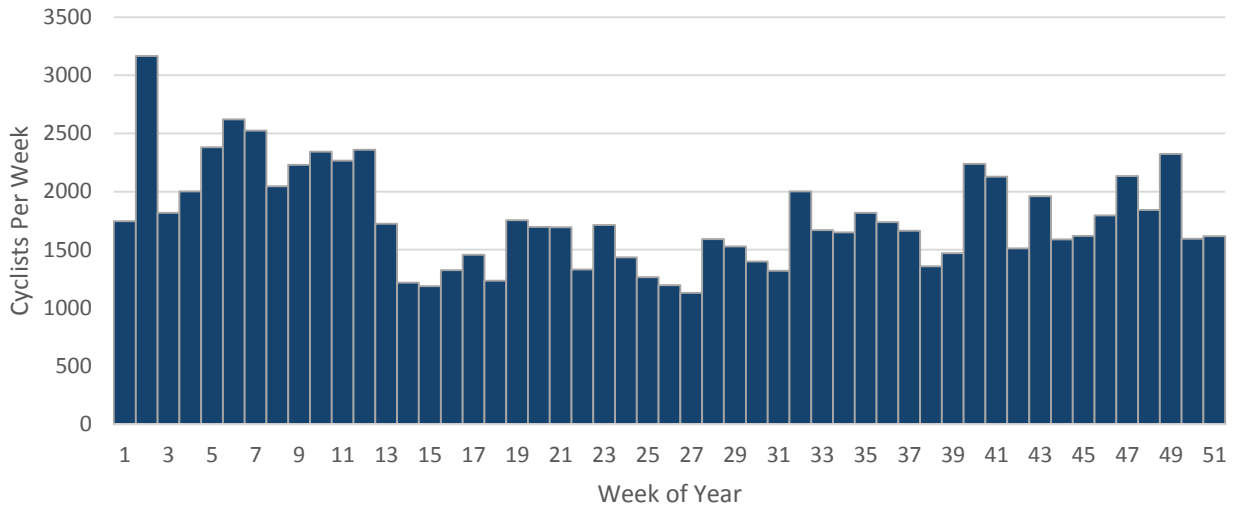
UCP Project Name			Number of count stations for project	
Project Type		<input type="checkbox"/> Route <input type="checkbox"/> Package		
Count Station 1	Location		Related Calibration Station	<i>Location of station used for scaling counts</i>

	Count dates:	<i>Only applicable where count station is not permanent</i>				
		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)	ADC 5-day	ADC 7-day
	Scaled UCP Counts					
	Pedestrian Counts <i>(for shared facilities)</i>					
Count Station 2	Location		Related Calibration Station			
	Count dates:					
		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)	ADC 5-day	ADC 7-day
	Scaled UCP Counts					
	Pedestrian Counts <i>(for shared facilities)</i>					
Count Station 3	Location		Related Calibration Station			
	Count dates:					
		AM (7-9am)	PM (3-6pm)	Weekend (4 hour peak)	ADC 5-day	ADC 7-day
	Scaled UCP Counts					
	Pedestrian Counts <i>(for shared facilities)</i>					
	Total scaled UCP count (sum of all scaled UCP Counts)					
Other Comments		<i>May also include comments from additional data collected during manual count station validation (annual maintenance) e.g. user types, gender, proportion of cyclists using facility etc</i>				

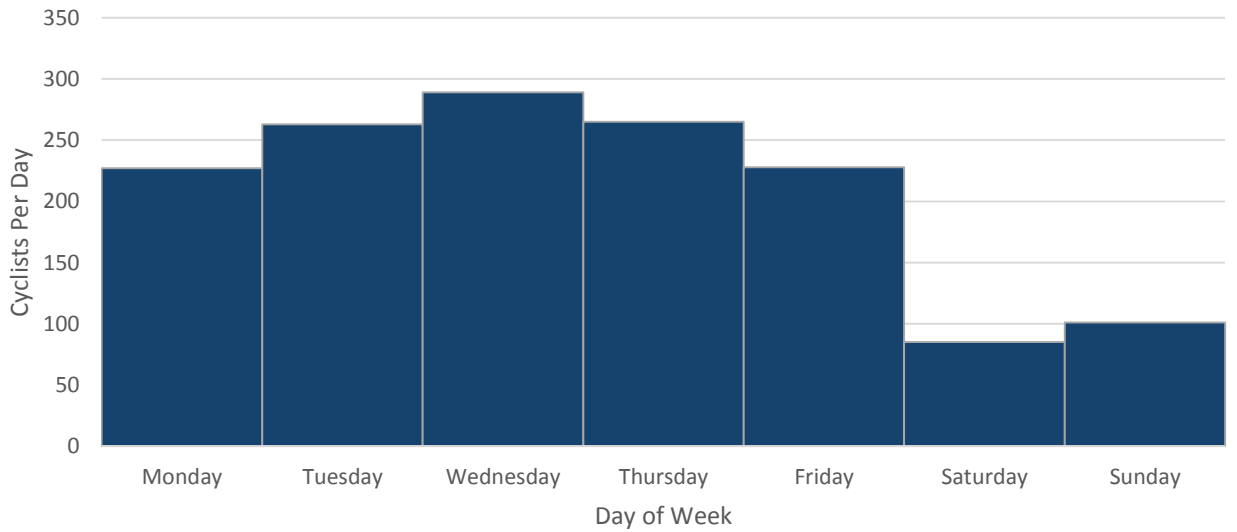
Required Bar Charts

In addition to the data required in the forms, bar charts must be provided showing hourly volumes across an average weekday and average daily volumes across an average week. For calibration stations and permanent general count sites, total monthly flows should also be provided in bar chart form. All bar charts should be accompanied by spreadsheet data to allow these to be reproduced in a Transport Agency format for national reporting. Examples of the required bar charts are shown below.

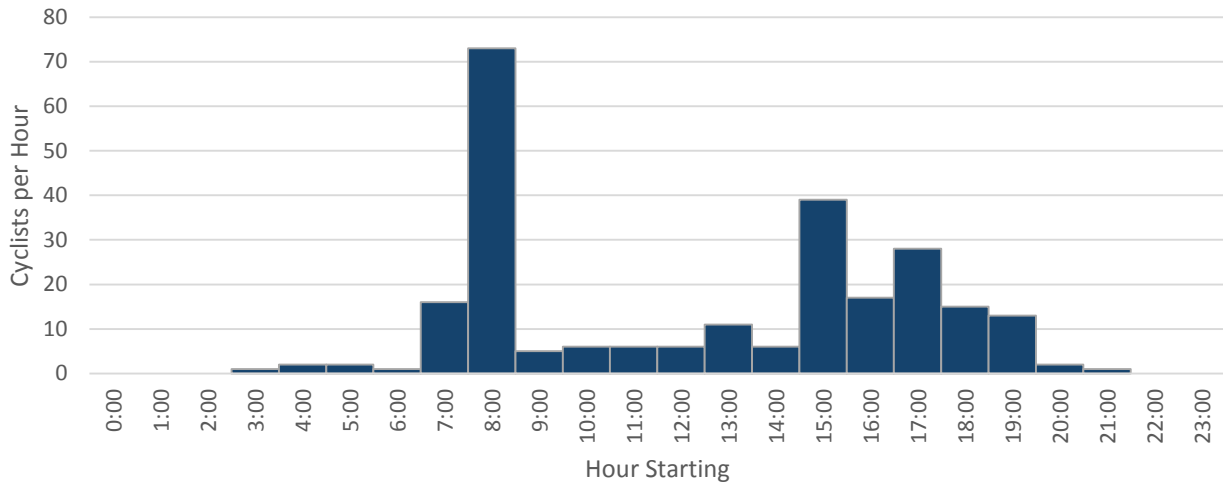
Weekly Cyclist Count Across Year - Required Annually for Calibration Stations



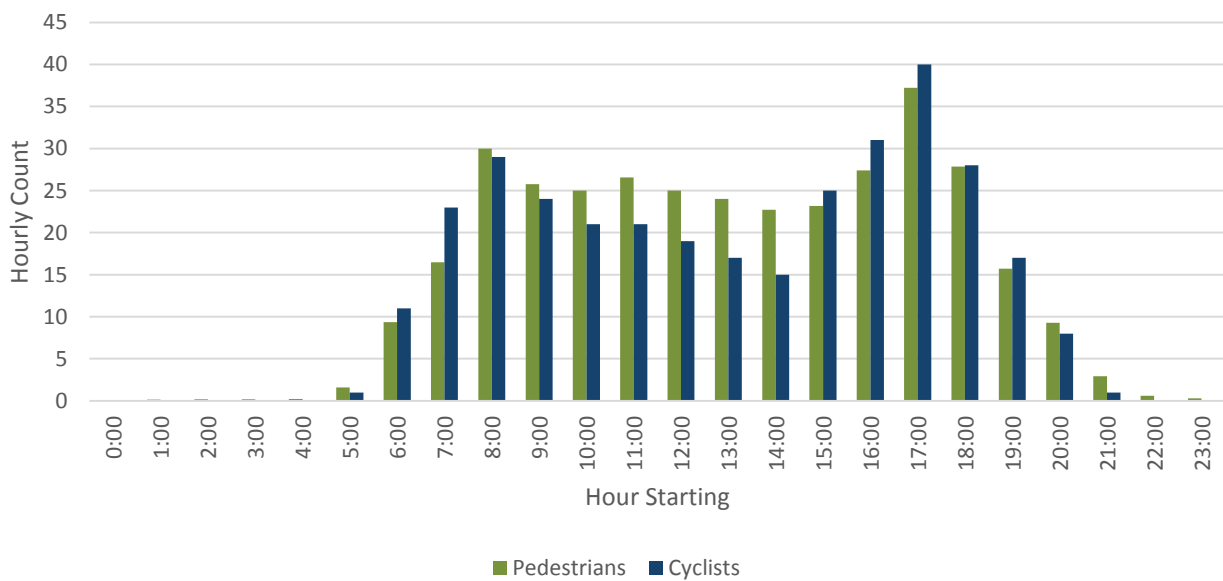
Average Daily Cyclist Count - Required for All Count Stations



Average Weekday Hourly Cyclist Count - Required for All Count Stations



Average Weekday Hourly Cyclist and Pedestrian Counts - Recommended where facility is a shared path



Wider Network Monitoring Form

Road Controlling Authority		Count	
		Date	
Weather			
Total Morning Peak Trips in to CBD (07:00 - 09:00)			
Total Morning Peak Trips out of CBD (07:00 - 09:00)			
Survey 2- Location: (general location e.g. destination, not individual count site)		Survey 2 Morning Peak Trips	
Survey 3- Location:		Survey 3 Morning Peak Trips	
Survey 4- Location:		Survey 4 Morning Peak Trips	
Total number of Morning Peak Trips Recorded (raw data) (07:00 - 09:00)			
Scaling Factor to get to 7-day ADC based on related calibration stations			
7-day ADC - calculated using scaling factor above			
Gender		% Female	% Male
Comments			

Part B: Cycle Monitoring Guidance

Measuring the UCP Investment

RCA's are required to install automatic count stations on all UCP projects. This section sets out recommendations for the quantity of count stations, count duration and count station location. Automatic count stations are separated into two types for the purposes of this guidance:

- Calibration Stations – permanent locations that will allow counts across the network to be calibrated to provide average daily volumes.
- General Count Stations – for the purposes of the Transport Agency's monitoring requirements, these have been divided into two types:
 - Reporting Stations – count sites that may not be permanent where the data is reported to the Transport Agency as part of the requirements in this document
 - General Count Stations – automatic count stations, in addition to calibration and reporting stations that may double count with calibration and reporting stations but provide additional data that is useful to the evaluation, design and communication of success of the UCP projects and wider cycle network. Data from these count stations will not be reported to the Transport Agency as part of these requirements.

It should be noted that the location of count stations is not an exact science and requires a pragmatic approach based on local knowledge. Individuals or groups that are familiar with cycling in the local area should be involved in the development of the monitoring programme. The guidance in this document focuses on the monitoring requirements mandated for the UCP projects. However RCA's are strongly encouraged to consider their cycle network as a whole when locating automatic count stations.

There are many ways to approach the location of automatic count stations on a network. The process in Figure 1 is recommended in this guidance. Ultimately this is an iterative process and can be approached in a different order, using similar principles, where appropriate for your network. This process can be applied to the network as a whole or the UCP projects only.

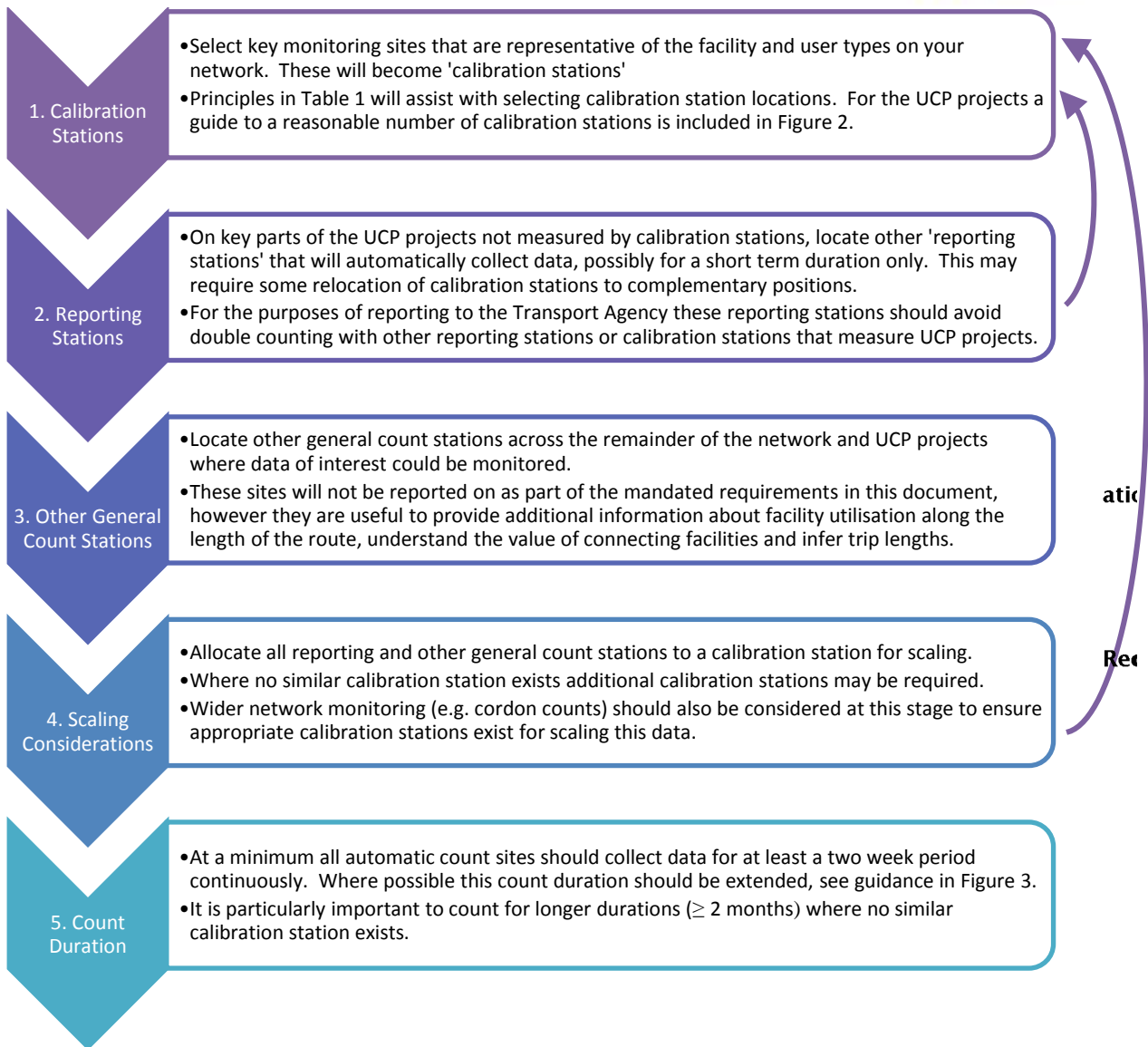


Figure 1: Overview of Count Station Location Guidance

Cyclist volumes vary, by days of week, during holidays, and due to inclement weather and special events. Deducing average annual counts from shorter counts requires information about whether those count days were busier or quieter than normal. A correction method for scaling small counts is found in Appendix 2 of the Cycle Network and Route Planning Guide. The best data for scaling shorter period counts comes from full time counting sites or calibration stations that are nearby and shown to vary in the same way as the short period count sites. Where there is no suitable calibration station the counting period will need to be about four times longer (two months compared to two weeks). Hence for an efficient counting programme there is balance between the number of full time counting sites and the number of shorter-term sites that a counter can be rotated around.

Calibration Stations (permanent counters)

A selection of the count stations must be permanent, continuous stations that count cyclists on all days of the year and are referred to as 'calibration stations' for the purposes of this document. Calibration stations will be used to calibrate and scale non-permanent cycle counts across the network to account for variations in flow caused by factors such as the weather, local events and seasonality.

An indication of the number of calibration stations required can be determined by taking the lesser of:

- The number of calibration stations required using 2; and
- The total number of UCP projects funded in your area over the 2014–18 period.

Please note that **Figure 2 provides an indicative minimum recommendation for monitoring UCP projects and should not be taken as a maximum for monitoring a cycle network as a whole.** Dependent on the variability of your network, you may require a greater number of calibration stations to accurately scale general count sites. There is considerable value in incorporating a greater number of permanent count stations into a monitoring programme, especially where facility and user types vary across the network.

Where a main urban area consists of several local authorities with separate UCP applications, the value used on the horizontal axis of Figure 22 should be the total urban population that the UCP projects connect to (e.g. for the Waimakariri this would be the combined population of Rangiora, Kaiapoi and Woodend).

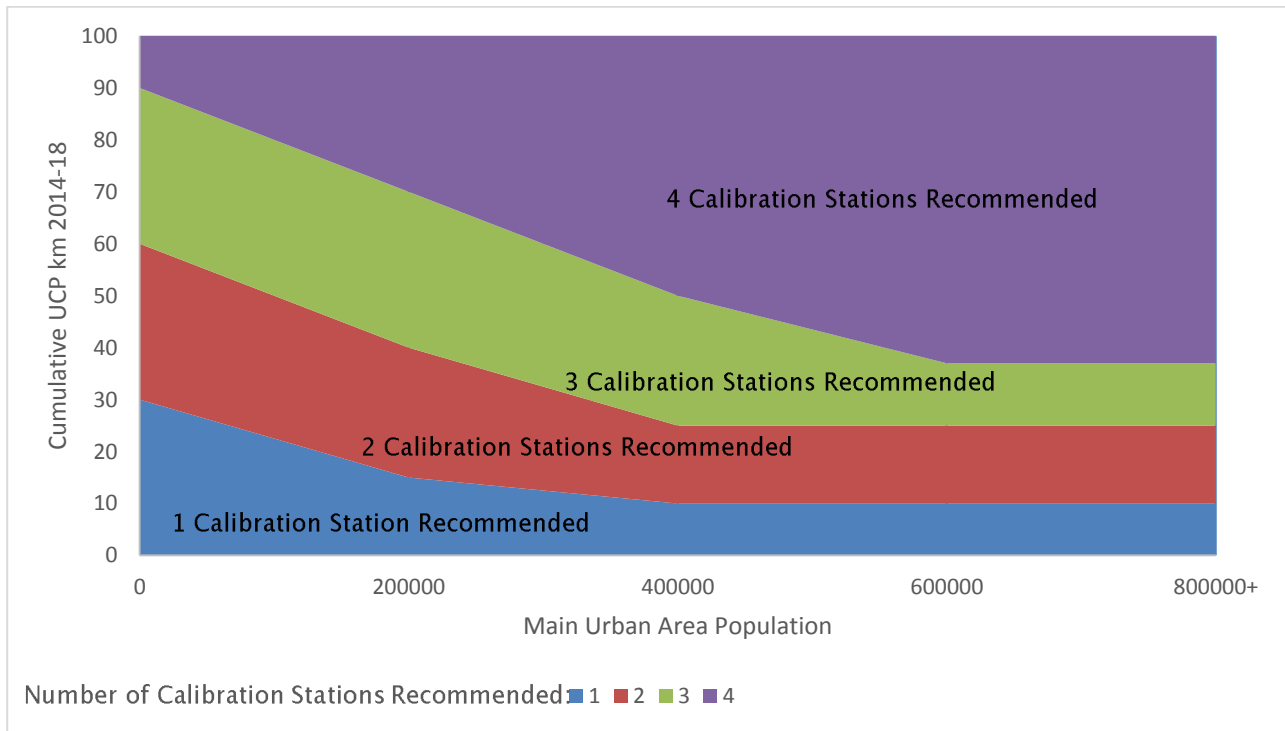


Figure 2: Minimum Number of Calibration Stations Recommended to Monitor UCP Projects

The location principles for calibration stations are listed in Table 2. Guidance for applying these principles is also included in the table.

It is recognised that RCAs with an existing cycle count programme may already have calibration stations on existing parts of the cycle network. These existing calibration stations may be sufficient for application to the UCP projects provided that facility and user types are similar. **NB. It is not appropriate to relocate an existing permanent count station** to a new UCP facility. Existing sites will provide important information about how the implementation of new facilities impacts on the uptake of cycling across the network.

RCAs may deem that a location of a new calibration station on an existing cycle facility would be most appropriate for their network. Provision of calibration stations on existing facilities is acceptable; however this is in addition to the requirement to provide general automatic count stations on all cycleway projects funded through the UCP. RCAs are encouraged to also consider their wider cycle network. Where the nature of cycle facilities and user types on the wider network differ from what is anticipated/proposed on the UCP facilities, it is recommended that additional calibration stations are incorporated. These will be useful for the wider network monitoring requirements. It would also be useful to regularly/continuously measure cyclists on key routes where no facilities are provided to ensure a full picture of cycling on the network as a whole.

In circumstances where the facility and user types are similar across the entire network it may be appropriate to provide fewer calibration stations than calculated using the guidance in this document. Where a RCA considers that fewer calibration stations are required, this should be justified against the principles in Table 2.

Table 2: Calibration Station Location Principles and Guidance

ID	Principle	Application Guidance
1	<p>Cover the range of broad facility types included in the UCP projects. Different facilities are likely to be used differently and may have different rates of uptake. It is important that this information is captured to demonstrate the attractiveness of implemented facilities. This information will also be useful to guide future investment, planning and design. Also consider the wider network facility types where these differ from the UCP projects.</p>	<p>Identify and categorise broad facility types across your network and UCP projects e.g.</p> <ul style="list-style-type: none"> • Shared paths • Exclusive cycle paths and separated cycle facilities • On-road provisions such as cycle lanes. <p>Allocate a calibration station to each facility type from the most to the least predominant type. E.g. if you are required to provide two calibration stations based on 2 and the two most predominant facility types are shared paths and exclusive cycle facilities then allocate one station to each of these types.</p>
2	<p>Cover the range of user types and trip purposes likely to use the UCP projects. Peak periods for different user types occur at different times, seasons and on different days. Therefore it is important that all user types are captured to allow appropriate scaling of non-permanent count sites.</p> <p>Also consider the wider network user types where these differ from the UCP projects.</p>	<p>Consider and map the location of:</p> <ul style="list-style-type: none"> • Schools • Tertiary institutions • Dense employment areas (e.g. using workplace address information from census data) • Public transport interchanges • Other utility trip destinations e.g. shops, and • Key recreational routes and facilities e.g. mountain bike tracks. <p>These locations will inform the placement of counters along the routes in conjunction with Principle 3. Where a small number of calibration stations are proposed, these should be located to capture all user types because different usage peaks happen at different locations.</p>
3	<p>Locate calibration stations where cycle flows are highest. This increases the robustness of recorded data. Fluctuations in flows at busy locations allow more detail in terms of percentage change to be extracted from the data.</p>	<p>In the first instance identify the preferred route(s) for application of calibration stations based on Principles 1 and 2 and:</p> <ul style="list-style-type: none"> • Demand estimates for each route • Population densities, and • Number of key destinations along the route. <p>Once preferred routes are identified, consider locations along the route where flows are likely to be highest. These locations may include:</p> <ul style="list-style-type: none"> • Where limited route choice is available and cyclists are channelled to use a single route e.g. underpasses, bridges and across railway lines • Where two facilities converge into one (see Figure 4) • Near key route destinations e.g. central cities and outside schools but before routes diverge • Where cyclist position can be reliably predicted i.e. away from intersections and on dedicated facilities. <p>Specific locations should be chosen in conjunction with technology suppliers as these may be impacted by e.g. facility widths and topography. Approximate locations (+/- 500m) where flows are highest should be identified for the purposes of the monitoring plan.</p>
4	<p>Ensure that there is some spatial separation between calibration stations. E.g, these should not be located on parallel routes.</p>	<p>Following the application of Principles 1–3 above ensure that there is some spatial separation between calibration stations.</p>

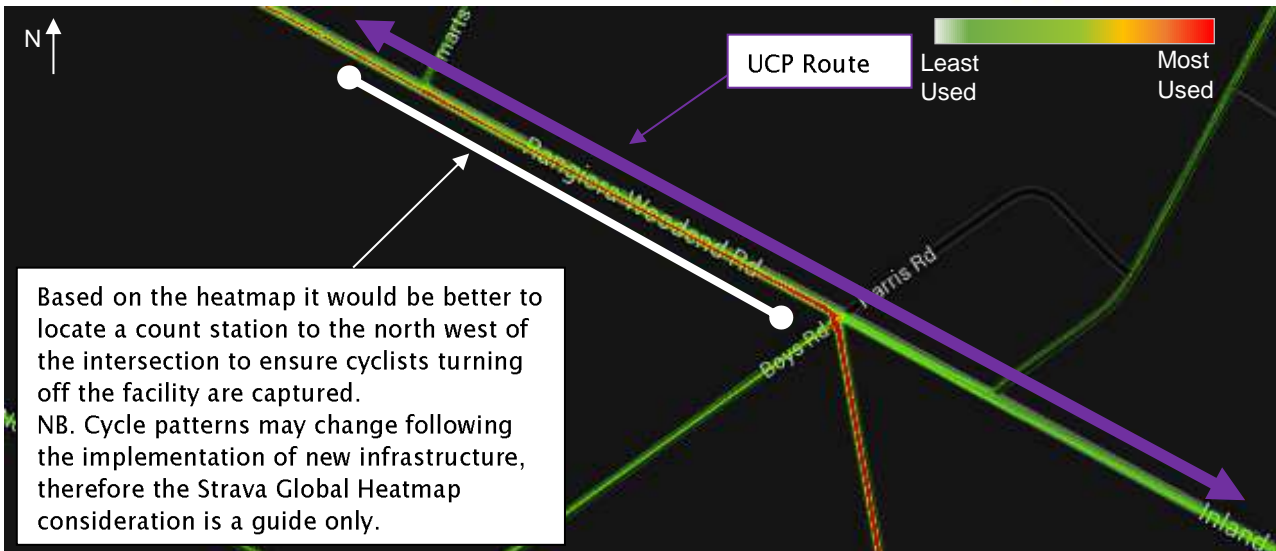


Figure 3: Example of using Strava Global Heatmap to inform count station location (Waimakariri)

Strava is a cycling and running GPS tracking application (app). It records routes travelled by app users and publishes them on a freely available global heatmap². Strava provides data for a sample of cyclists only and therefore cannot be used to determine absolute cyclist numbers. However the key routes utilised in Strava are considered to be representative of the parts of the network most used by people on bikes. It should also be noted that a large proportion of Strava users are recreational cyclists. Further information is available at: www.strava.com

Reporting Stations

The number of reporting stations required can be determined based on the nature and number of UCP projects in your district and the location of calibration stations. These stations aim to capture throughput and growth on each project for the purposes of reporting to the Transport Agency, so double counting on individual projects should be avoided.

For the purposes of the UCP requirements, count station location guidance in this section is separated for UCP ‘route projects’ and ‘packages’ (see Appendix A and the following sub sections for definitions). New automatic count stations may not be necessary where automatic counters already exist in places that can effectively measure cyclist throughput on a new UCP facility. **Where reporting stations are not permanent they should be paired with/allocated to a calibration station. Select the calibration station that is on the route most similar to the reporting station in terms of facility and anticipated user type.** Where no similar calibration station exists, RCAs should consider extending the count duration of the reporting station to a minimum of two months per year for scaling purposes.

Count Station Guidance for UCP Route Projects

Route projects are UCP projects that run along a single corridor. Route projects may also include short sections of connecting facilities. Projects that address standalone severance issues e.g. underpasses and bridges are also considered route projects for the purposes of these requirements. A list of all route projects included in the 2015–18 UCP is provided as Appendix A. Please note that this list has been adjusted for the purposes of these requirements and does not exactly replicate how the projects have been funded.

For the purposes of monitoring the UCP investment the Transport Agency recommends a single automatic count station on each route project (i.e. a calibration station or a reporting station).

Reporting stations on route projects should be located with reference to the following principles:

- Principle 3 of Table 1 – where flows are anticipated to be highest. Where cycle models have been developed, these should be used to understand where flows are anticipated to be highest and inform count station location.
- They should be in the vicinity of destinations that the route is intended to provide access to. See principle 2 of Table 1

- To capture where recreational flows are anticipated to be high (although the focus of UCP is not on recreational trips, it is noted that many facilities will also be used for this purpose)
- Preferably where average flows are at least 100 cyclists per day, and greater than 250 cyclists per day where possible³.

Count Station Guidance for UCP Package Projects

NB: Guidance in this section also applies to the placement of counters for wider network monitoring. While the Transport Agency is not mandating the placement of other general count stations for wider network monitoring, the Agency does recommend moving towards this approach.

Packages are UCP projects where facilities are dispersed across an area rather than along a single corridor. A list of all packages included in the 2015–18 UCP is provided in Appendix A.

The number of count stations required to reliably measure the performance of a package is relative to the package size and spatial spread. **The quantity of package count stations required is determined based on the nature of the package.**

Initially RCA's should use the following principles to propose count station quantity and location:

- Where the package consists of facilities located in close proximity it could be monitored using a screen line or cordon approach. A screen line approach involves choosing a location to draw a line through and monitoring all facilities that cross that line. An example of a screen line and possible count station locations is shown in Figure 4. The location of the screen line should be determined based on the principles in the 'Route Project Guidance' section
- Where the majority of flows on the package facilities are anticipated to converge at a single point a convergence point count station could be used, see Figure 56
- Where the package consists of separate sections of facilities with a wide spatial spread, all areas should be captured in the count stations
- All count stations developed as part of these requirements should count unique cyclists, i.e. double counting of the same cyclists should be avoided as much as possible in the numbers reported to the Transport Agency. Additional general count stations that include double counting are useful for other local purposes such as understanding utilisation along a length of facility and providing a basis for trip length approximations.

³ Strong, M (2006) *Practical Monitoring of Cycling* Transport Practitioners' Meeting 2006 www.transport-initiatives.com
[Accessed 7 August 2015]



Figure 4: Screenline Example (Auckland)



Figure 5: Convergence Point Example (Auckland)

General Count Stations

The guidance for locating reporting stations can be applied to the wider network. As a general guide the number of automatic count stations that may be appropriate for your network as a whole can be determined using 7. It is likely that other general count stations will include double counting and this should be adjusted for when reporting cycling throughput to stakeholders and investors. Sites that are located along the same route can provide very rich data in terms of understanding how usage varies along the facility, the value and usage of connecting facilities and to infer trip lengths.

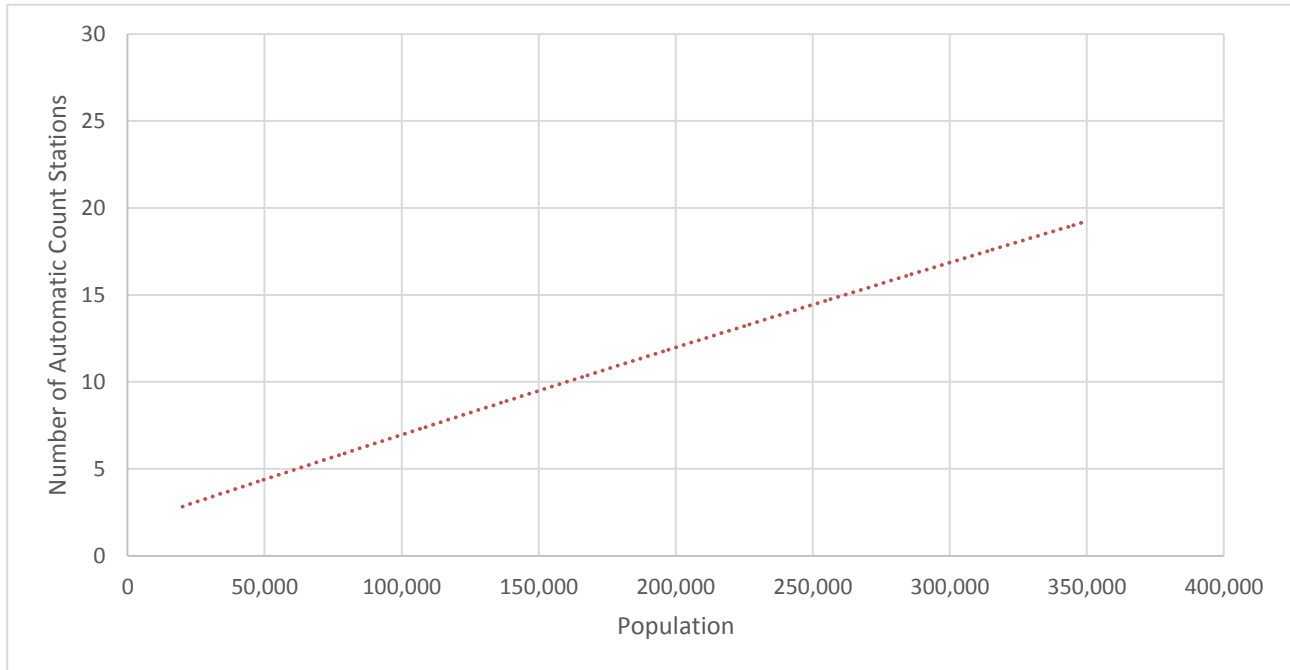


Figure 7: Indication of Appropriate Number of Automatic Count Stations Across Cycle Network as a Whole³

Count Duration

General count stations are not required to count continuously over the entire year. **Where a similar calibration station is available, general count stations should count for a minimum of two weeks per annum.** Where no similar calibration station is available, additional calibration stations should be considered. Alternatively general count stations should count for a minimum of two months cumulatively across the year. In general, longer count durations and higher count frequencies result in more robust data and are preferred by the Transport Agency.

Where RCAs want to ensure more robust data, the recommended minimum count durations relative to daily cycle flows shown in 8 can be applied. 8 assumes 24 hour count periods. In lieu of other data, daily cyclist flows for use in 8 can be based on existing cycle volumes + 50%. 8 is based on the assumption of measuring an annual change of 15% in cyclist volumes⁴. Where annual changes are lower, the measured change may only be statistically robust over a longer period e.g. three to five years, depending on variation in flows.

It is noted that the initial uptake in cycling is likely to be much higher than 15%. The initial uptake is measured from the baseline data to the first year of automatic count data. This is different to measuring changes over time once the new facilities are already established.

Where count stations are not permanent, counts should be undertaken during a period that reflects high use for the key trip purposes on the facility. For example, where a facility provides for trips to school, school

³ Strong, M (2006) *Practical Monitoring of Cycling* Transport Practitioners' Meeting 2006 www.transport-initiatives.com [Accessed 7 August 2015]

⁴ Count durations based generally on Figure 3 of Guidance on Monitoring Local Cycle Use, TRL Report 395 (1999), Davies D.G., Emmerson, P and Pedler, A.

holiday periods should be avoided. Short term counts should preferably be undertaken during a busy period on the facility.

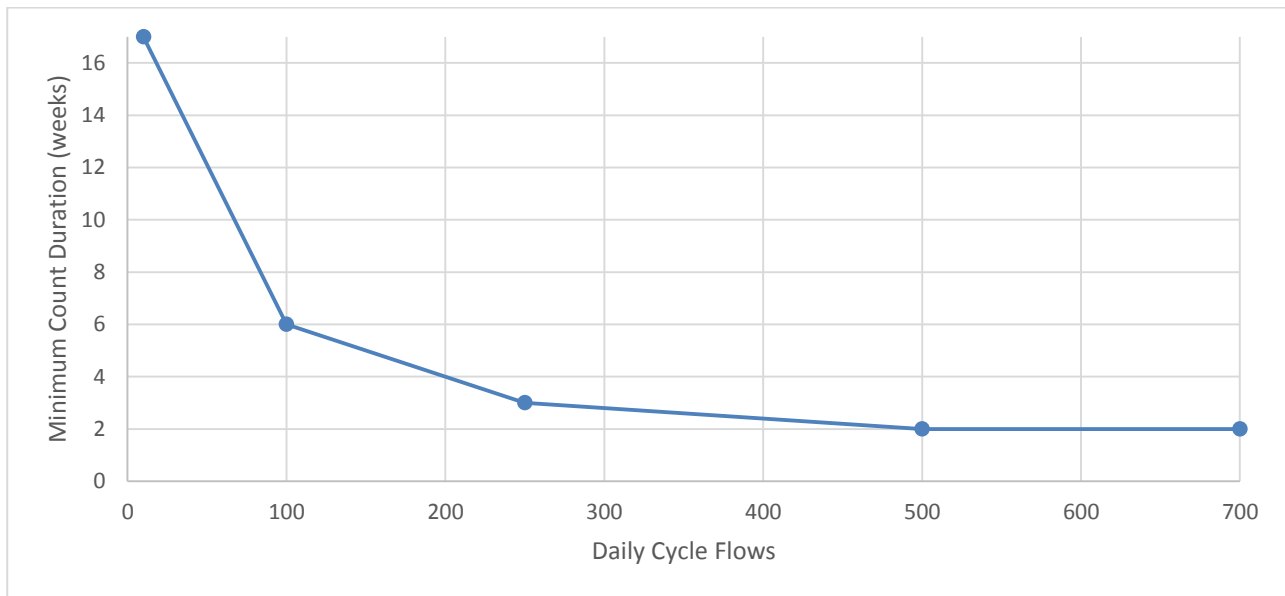


Figure 8: Minimum Count Duration Recommendations

NB. All count stations must be validated manually once per annum using a peak hour count to ensure data accuracy and to identify a need to make changes to the count station. These manual validation checks are also an opportunity to collect additional qualitative data about the type of use of the facility.

Baseline Data Collection

New UCP facilities are expected to attract cyclists from parallel routes as well as new users. The collection of baseline cycle volumes is key to allowing the response to new infrastructure to be measured and to better quantify targets for cycle numbers going forward. Baseline data is also a useful input for the design process where facility design is not yet in the advanced stages. Baseline data must be collected before construction of a UCP project commences and must be reported to the Transport Agency by 30 June, 2016.

The number and location of baseline monitoring points should be determined through the following steps:

1. Use future count station locations as a starting point. Where possible baseline data should be collected in the vicinity of each future count site.
2. Use Strava Global Heatmap⁵ to identify parallel routes currently used for cycling, see Figure 9 and Figure 10.
 - Baseline data should be collected on these parallel routes to allow differentiation between diverted and new trips following the completion of the facility. Parallel routes must be surveyed for the first two years following implementation of the new facilities.
3. Where the UCP project is an extension of an existing off road facility, base cycling numbers on the existing facility should also be recorded.
4. Determine if any existing count stations already collect data for any of the baseline monitoring locations. Use of existing count data and stations is acceptable provided that there is confidence that it accurately reflects flows in the baseline locations.

While the monitoring of parallel routes is recommended as part of the baseline data collection there is value in continuously monitoring these as part of your wider network monitoring plan.

⁵ <http://labs.strava.com/heatmap/#6/172.65610/-40.14136/yellow/bike>

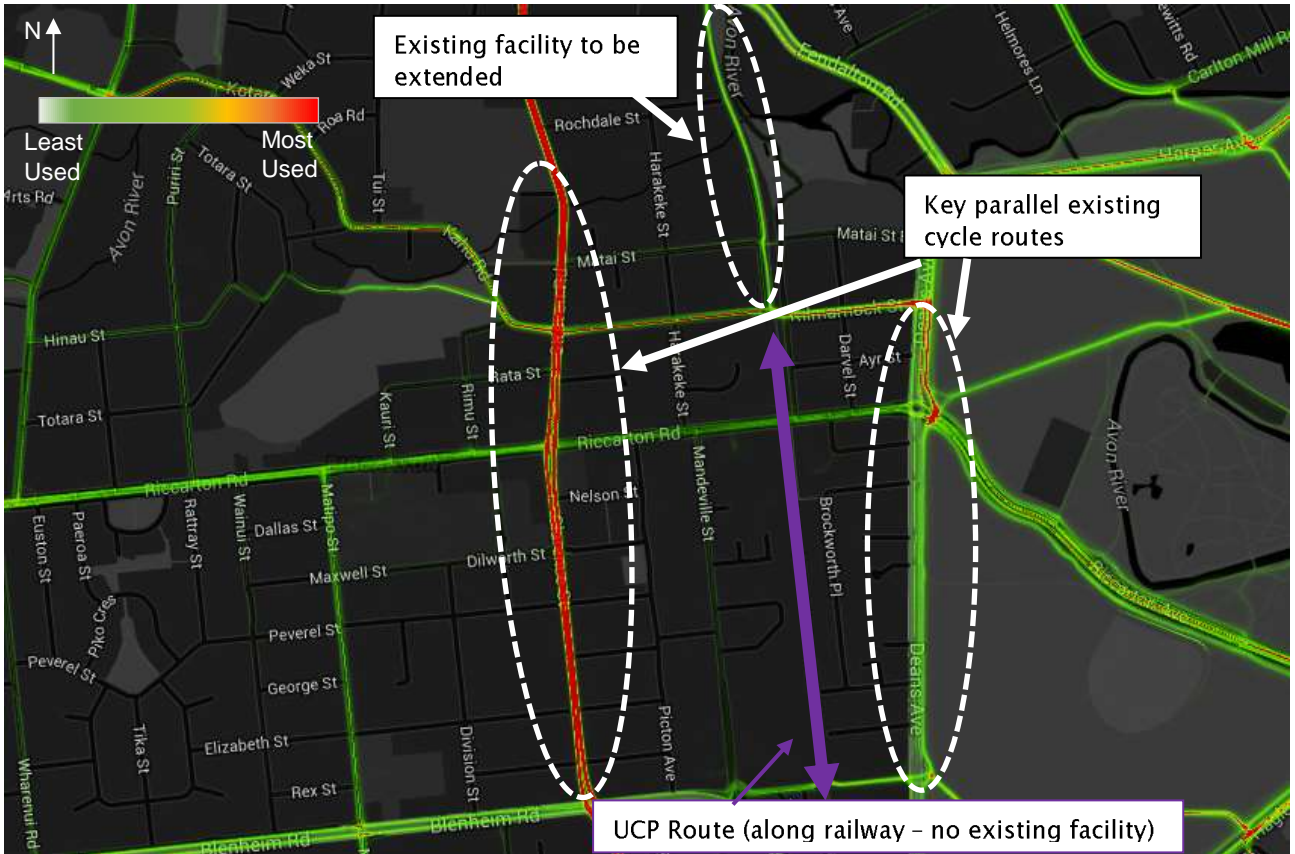


Figure 9: Baseline Count Locations for New/Extended Off Road Facilities (Christchurch)



Figure 10: Baseline Count Locations for New Facilities Where Routes Exist (Christchurch)

Generally a large uptake in cycling is anticipated following the implementation of the facilities. Therefore baseline data can be collected using manual count methodologies and relatively accurate comparisons made. However, where automatic counting is possible this will provide a more reliable measure and allow off peak periods to be captured.

Manual baseline counts must be collected during peak periods (**7–9 am and 3–6pm**) on a **weekday and a four hour peak weekend period**. Manual counts should be undertaken during fine weather. All parallel routes should be surveyed at the same time. Where the baseline count is undertaken on an existing facility or cyclist position on the road can be accurately predicted, automatic count data for a period of one to two weeks is preferable. Baseline data collection should be undertaken during normal network operating times (for example, not during school holiday periods or special events).

Where facilities are likely to be shared paths, baseline pedestrian data is also recommended. This will be useful in informing the design. Pedestrian baseline flows are not required to be reported for the purposes of the UCP investment.

Following the completion of the baseline data collection, the form titled 'Baseline Monitoring Form' should be completed and submitted to the Transport Agency by 30 June, 2016.

Wider Network Monitoring

The Transport Agency is coordinating an annual survey of people on bikes in each of the main urban areas that have received UCP investment. The core component of this wider network monitoring is a cordon or screen line count(s) that measure the number of cycle trips to key cycle trip attractors on your network. It is anticipated that for many local authorities this will consist of a cordon surrounding the CBD, however this will need to be determined based on local context. The wider network monitoring will be undertaken during the morning peak (7:00am – 9:00am) on a single weekday during March each year. During census years, the cordon count should be undertaken during the census week. **Cordon counts will commence in March 2016. Cordon count results should be reported to the Transport Agency using the applicable form in Part A by 30 June each year.**

The proposed wider network monitoring aims to provide a reproducible, nearly absolute, count of the number of cyclists crossing cordons or screen lines to key destinations on the network. This survey could be made up of a number of survey types including: cordon counts, screenline counts and destination-specific surveys e.g. school bike shed counts or counts at public transport hubs. Cordon counts generally encompass an area (e.g. the CBD) while screenline counts are used to record the number of trips across a line and generally follow boundaries where there are a limited number of crossing points, e.g. railway lines or rivers.

The aim to quantify the number of cyclists accessing key destinations means that surveys should be designed to minimise double counting of cyclists who cross the cordon more than once. It is noted that it is impossible to capture all cyclists using the network, therefore this number is more useful as a tool to understand the relative number of cyclists in each district. The wider network monitoring requirements also include reporting of gender. It is also advised that additional qualitative information is captured, including: travel direction; whether cyclists are travelling in groups; cyclist type (i.e. for recreational or utility trips); age; and whether cyclists are using the cycle facility if one is provided. Where a cordon or screen line is already monitored with automatic cycle counts, the Transport Agency requires that only 30% of cordon sites are surveyed manually to capture qualitative data. This does not apply to part time count stations that are not being monitored during the survey.

A cordon count of the CBD should cover all cycle routes into the CBD including on road and off road routes. The cordon should be located to encompass the majority of destinations within the CBD but not be so large that a significant proportion of cyclists will not cross the cordon as part of their trip. An example of a possible CBD cordon location for Gisborne is shown in 1.

Where there are major cycle trip attractors outside of the CBD (for example, schools or public transport), additional cordon or screenline counts are recommended, but other survey types may be appropriate instead, such as school bike shelter/stand counts. These types of surveys could be undertaken by the schools themselves and reported to form part of the dataset. It is important that areas where cycle networks will be implemented in the future are also considered in the survey methodology so that numbers of cyclists are comparable across years. NZ census data can be used to assist with identifying key cycle commuting

destinations within the district. The Statistics New Zealand⁶ website provides data on the main means of travel to work by area unit.

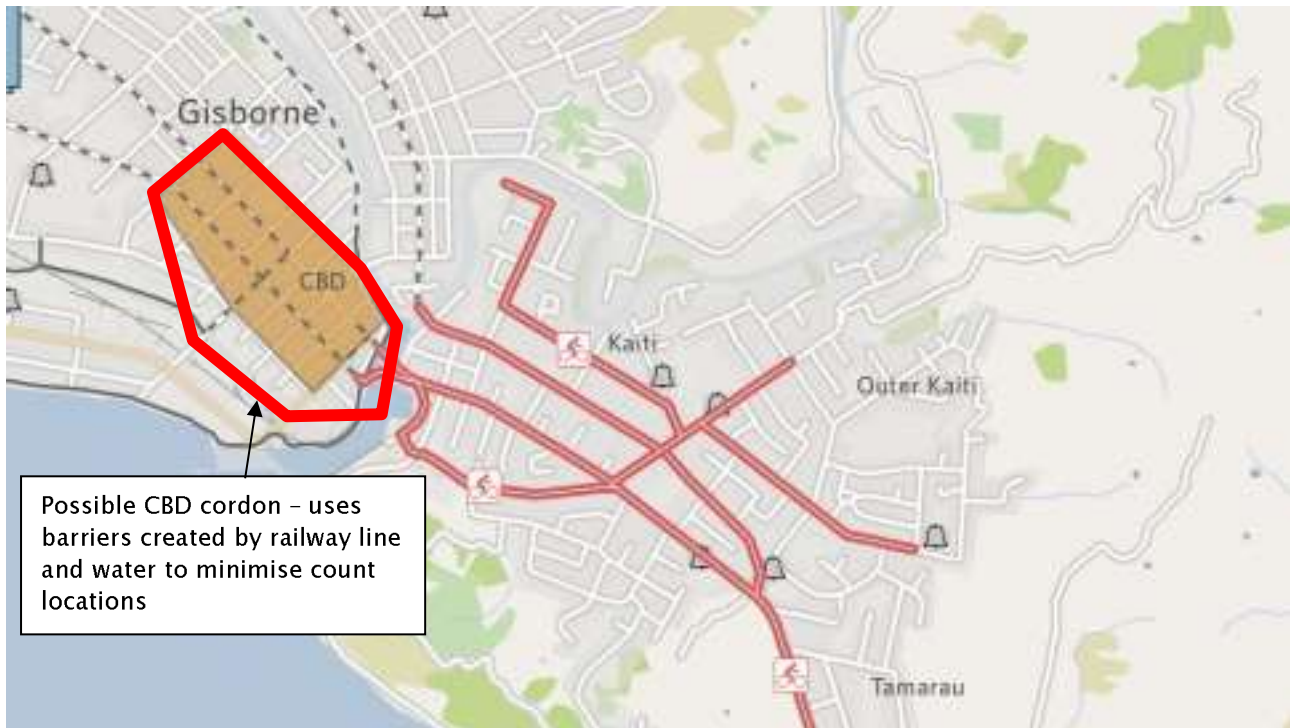


Figure 11: Possible CBD Cordon Design (Gisborne)

Technology Summary

This section presents an overview of cycle counting technologies currently available in New Zealand that count all cyclists. It should be noted, however, that new products are constantly being developed, so suppliers should be contacted and the local context of the count programme discussed before making decisions on the appropriate count station technology for your network. Bluetooth and Wi-Fi detection technologies are available and under development, however these do not reliably identify cyclists or currently collect data for all cyclists and miss some entire groups, e.g. school children without smart phones. Further information on cycle counting technologies is available in the Transport Agency’s Cycle Counting in NZ report⁷ (2007).

The following base requirements have been set to assist with choosing cycle counting technology for your UCP projects:

- Required UCP count stations must be capable of distinguishing pedestrians from cyclists
- Where required UCP count stations are located on shared paths, pedestrian numbers must also be recorded. The count duration for pedestrian data should be determined based on the volume of pedestrians expected on the facility. Where pedestrian flows are high, longer count durations (e.g. two-week automatic counts) should be considered.

⁶ <http://nzdotstat.stats.govt.nz/wbos/Index.aspx#> on panel on left select: 2013 Census> Work and Unpaid Activities> Workplace address and main means of travel to work, 2001, 2006, 2013 and click on arrows to select mode and area units.

⁷ <https://www.nzta.govt.nz/assets/resources/sustainable-transport/cycle-counting-in-nz/doc/cycle-counting-in-nz.pdf> ViaStrada. (2007). NB some of the technologies described in this report are now more commonly used across the country. Trial results for selected technologies are available here: <https://www.nzta.govt.nz/assets/resources/continuous-cycle-counting-trial/docs/continuous-cycle-counting-trial.pdf> It should also be noted that many technologies have been further developed since these trials were conducted.

- Required UCP count stations must use appropriate technology (with an appropriate maintenance schedule) to allow cyclist counts to be recorded to a high level of accuracy for the entire count duration specified in 8.
- All automatic count stations must record cyclist numbers in 15 minute time bands for every hour in every 24 hour period in which counting occurs.
- Calibration stations must also record directional data.
 - There is no requirement to provide directional data for general count stations, however this is likely to be very useful for future design and funding applications.
- All count stations must be calibrated and validated during installation. This service is often provided by the technology supplier.
- All count stations must be calibrated annually through a manual peak hour count. This may form part of your maintenance programme.

Calibration stations and general count stations are subject to different requirements and may have different technology needs. Table 3 summarises available count technology and is intended as an initial guide to understand what may be appropriate for your network. The most appropriate cycle counting technology for a specific location is very dependent on local factors and individual data needs of RCAs, so Table 3 is intended as a general guide only. Grey ticks in Table 3 indicate where a technology may be appropriate but only in specific circumstances and this should be discussed with the supplier.

In addition to the individual count technologies, some suppliers also offer a remote data collection option that allows count data to be accessed without visiting the site. This can be very useful and allows early notification of issues with the counter.

Generally cycle counting technologies fall into two categories:

- Permanent count technology
- Temporary count technology.

Permanent count technologies utilise hardware that is permanently installed that communicates with a count unit to record cyclist numbers. Generally the permanent hardware (e.g. induction loops/in-ground pressure sensors) is not relocatable, however the count unit (often the most expensive component of the count station) can be rotated between sites where permanent hardware has been installed. This means that permanent count technologies can be used for continuous count stations (e.g. calibration stations) and longer term (semi-permanent) count stations.

NB. Allocation of a single count unit to multiple count stations should be done with advice from the supplier. Site-specific conditions may mean that the type of count unit required for each station is different and therefore the unit cannot be shared.

Temporary count technologies are best suited to short term (~2 week) counts. Pneumatic tubes are a common form of temporary count technology. Where these are used for periods of longer than two weeks, they must be maintained fortnightly to ensure data accuracy. Note that specialised tube counters have been developed specifically for counting cyclists. These are more sensitive than the tube counters used for monitoring general traffic. Some radar and infrared technologies are relocatable and can also be used for temporary cyclist and/or pedestrian counts, although some do not distinguish between pedestrians and cyclists.

Specific count station location should be determined with assistance from the technology supplier. Factors that may influence specific location include, but are not limited to:

- Cyclist speeds – counts are generally more accurate at lower/average speeds, i.e. not on steep downhill slopes
- Predictability of cyclist position on path/roadway
- Width of facility (narrower widths may reduce the cost of the technology required)
- Location of cycle facility relative to general traffic and heavy vehicle numbers.

Table 3: Technology Summary

Technology Type	Product Name <i>(NB may not be an exhaustive list, focuses on known technology used currently or trialled in New Zealand)</i>	Duration			Facility Type						
		Temporary (<1 month)	Semi-Permanent	Permanent (Year Round)	On road cycle lane	Segregated cycle lanes / cycleway	Off road shared path	On road mix use with no cycle lane	Shared Bicycle/Bus Lane	Off road Cycle Path / Track	Pedestrians
Radar Detector	RadioBeam Bicycle Counter(Chambers Electronics)		✓	✓			✓			✓	✓
	SDR Bike (datacollect)	✓	✓	✓			✓				✓
In-ground Pressure Detector	MC5720 (MetroCount)		✓	✓	✓	✓	✓	✓	✓	✓	
Inductive Loop Detector	Bicycle Recorder (Counters and Accessories)		✓	✓			✓			✓	
	ZELT (Eco-Counter)		✓	✓	✓	✓	✓	✓	✓	✓	
Passive Infrared Detector ⁸	PYRO (Eco-Counter)	✓	✓	✓							✓
Pneumatic Tube Detector ⁹	MC5620 ¹ (MetroCount)	✓	✓		✓	✓	✓	✓	✓	✓	
	TUBE (Eco-Counter)	✓	✓		✓	✓	✓	✓	✓	✓	
Above Ground Pressure Detector	eTube bike (datacollect)	✓	✓		✓	✓	✓			✓	
Video Image Processing ¹⁰	Mio-Vision ¹¹	✓			✓	✓		✓			
	Signal Cameras in local Transport Operations Centre – may require special technology.	✓ ¹²	✓	✓	✓	✓		✓			

⁸ Does not differentiate between cyclists and pedestrians therefore must be used in conjunction with other cycle count technology e.g. ZELT Loops can be integrated.

⁹ Likely to have very high maintenance costs where used for greater than 2–4weeks, therefore not recommended for semi-permanent sites.

¹⁰ Generally at intersections only.

¹¹ 12–72 hours only (e.g. instead of manual counts). Also has high data processing costs unless used as part of a wider count programme.

¹² May also be able to use signals cameras for manual/cordon counts where they are located appropriately instead of having a surveyor on site.

Appendix A: 2014–2018 UCP Route and Package Projects

Main Urban Area		Route Projects	Packages
Whangarei		Kamo Route	
Auckland		Airport to CBD Central Park Drive Don Buck Road Glenn Innes to Meadowbank Nelson Street	City Centre Eastern Connections Western Connections Links to public transport
Hamilton		Western Rail Trail Te Awa	
Rotorua			Rotorua Cy-Way
Tauranga and Western Bay of Plenty		Omokoroa to Tauranga	Tauranga Urban Cycle Network Connections
Gisborne		Wainui to CBD	Wainui Local Connections
New Plymouth		Coronation Ave Mangati Pathway	
Napier and Hastings			Napier Urban Cycle Package Hastings Urban Cycle Package
Whanaganui		Te Tuaiwi City to North Mole	
Palmerston North		Manawatu River Bridge and Shared Path Mangaone Underpasses Longburn	
Wellington	Wellington City	Ngauranga to Bunny St	Wellington CBD Package Wellington Eastern Route Package
	Lower Hutt	Beltway Eastern Bays Melling to Petone	
	Upper Hutt	Rail Corridor Route Hutt River Trail	
	Porirua	Onepoto–Wi Neera Drive	
	Kapiti Coast		Stride n' Ride
Nelson		Nelson Coastal Route	
Blenheim		Spring Creek Taylor River Path Eltham/Beaver Road	
Christchurch	Christchurch City	Papanui Parallel Northern Line Uni–Cycle Little River Quarryman's Trail Heathcote Expressway Rapanui–Shag Rock	
	Waimakariri	Rangiora–Woodend Rangiora–Kaiapoi	
	Selwyn	Rolleston to Lincoln	
Dunedin			Central City Package South Dunedin Cycleway Enhancements