THE CYCLE NETWORK PLANNING PROCESS
7 ASSESSING CYCLE DEMAND

### Assess Cycle Demand

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<td>Map cycling trip origins and destinations.</td>
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<td>Map land use using district planning data.</td>
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<td>Assess their importance as cycling trip generators.</td>
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<td>Map desire lines.</td>
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<td>Map existing cycle routes and the numbers of cyclists using them.</td>
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<td>Map cycle crashes.</td>
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<td>Map existing cycle facilities.</td>
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<td>Count and map cycle traffic and parked cycles.</td>
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<td>Consult and/or survey cycle users.</td>
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<td>Assess trip purposes and types of cyclists.</td>
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<td>Identify infrastructure barriers, using discrepancies between desired and actual use.</td>
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<td>Assess, map and quantify latent demand: what additional cycling could be expected with better conditions and promotion?</td>
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#### 7.1 Introduction

To know what to provide for cyclists, and where, it is important to have good information — such as how many people cycle or wish to cycle, where they wish to ride, for what purpose they ride, and how competent they are to handle a variety of conditions.

To help build this picture, this chapter describes cyclists’ trip origins and destinations, methods for identifying the routes cyclists take, and the types and numbers of cyclists who use them or who may use them in the future.

#### 7.2 Cyclists’ origins and destinations

Cyclists may wish to cycle everywhere. Particular origins and destinations include:
- residential areas
- tourist accommodation
- education establishments
- areas with large employment
- shopping areas
- leisure and entertainment facilities
- public facilities
- public transport interchanges
- historic and tourist sites.

By mapping these locations, trip desire lines can then be plotted, permitting a qualitative assessment of where cycle demand is likely to be significant. Methods for identifying origins and destinations are outlined below. They may be supplemented by questionnaires.

#### 7.2.1 City/district planning information

**Description**

District planning documents map the existing land use and the hierarchy of roads. They also contain information about land use zones and growth areas, major residential subdivisions or commercial or community developments. They are a most useful source of primary data about likely origins and destinations of cyclist trips. A higher concentration of cyclists can be expected near popular cycling destinations.

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<tr>
<th>Advantages</th>
<th>Disadvantage</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>This information is readily available and helps identify cyclists’ origins and destinations.</td>
<td>This method provides no information about numbers of cyclists or the routes they use.</td>
<td>Identify where cycle traffic could be expected by plotting cyclists’ significant trip origins and destinations on a map, alongside any existing cycle facilities and the road hierarchy.</td>
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7.2.2 Census data

**Description**
The five-yearly Census includes questions about the mode of travel to work on Census Day and the locations of the respondent's residence and workplace. This data can identify the number and distribution of residents and employees in various age brackets and those who cycled to work on Census Day.

**Advantages**
This data provides reliable numbers. It can be used to plot graphically the significance of areas as origins and destinations for cyclists' trips to work and by connecting them, the desire lines for commuting to work.

Plotting family size or population density in school-age or the 30 to 45 age bracket may allow a comparison of the likely uptake of cycling in different parts of cities. Larger families and these age groups are likely to yield more cyclists.

**Disadvantages**
There are disadvantages in time and cost. It duplicates some of the qualitative information available from land use which may sometimes be sufficient for the purpose.

Census data does not reveal cyclists' route choices.

The Census trip-to-work data is a snapshot of one day. It is affected by weather and any other factors peculiar to that day and provides no data about cycling trips that are not trips to work.

**Recommendation**
If using this method, be aware of its limitations.

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7.2.3 School cycle traffic

**Description**
School cycle traffic is localised and likely to be a significant proportion of the total cycling in many areas. If not, a poor cycling environment is likely to be suppressing use.

Questionnaires and counting parked cycles are commonly used to assess cycle demand at schools.

By obtaining the number of students attending school on a survey day, the percentage of students cycling to school can be calculated.

**Advantage**
A school represents a concentration of cycle users who are relatively easy to survey.

**Disadvantages**
Surveying school cycle traffic:
- requires school approval
- has a time and cost factor, especially when questionnaires are used
- is limited as some areas have few children cycling to school.

**Recommendations**
During network planning, count parked cycles to quantify existing school cycle demand.

During route planning, use questionnaires to identify detailed information on route choice and problem areas. Where possible, incorporate this survey into a Safer Routes to School programme.

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Plot of locations where school children have had a cycle crash (black spots) or feel unsafe (green spots).
Source: Christchurch City Council, New Zealand.
7.2.4 Visitor numbers

**Description**
This method uses the total number of visitors to particular locations, attractions or facilities to indicate their likely significance as cyclist destinations.

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<tr>
<td>As long as the information is readily available, this is a quick method for prioritising sites for more detailed investigation, such as counting cycle traffic or parked cycles.</td>
<td>There are disadvantages in time and cost if the information is not readily available.</td>
<td>Use this method where the information is readily available.</td>
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</table>

7.2.5 Counting parked bicycles

Counting the number of bicycles parked at particular locations on a typical day can help determine the significance of those places as cyclist destinations.

**Advantage**
Counts of parked cycles are particularly useful for places with defined cycle parking places such as schools. They are quick and simple to perform.

**Recommendation**
Develop a program for counting parked bicycles at key destinations.

7.2.6 Travel surveys

**Description**
Information on cycle demand can be gleaned from surveys conducted for transport planning and modelling, or from LTSA travel surveys.

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<tr>
<td>The New Zealand Travel Survey 1997/98 (LTSA, 2000), available on the LTSA website (<a href="http://www.ltsa.govt.nz">www.ltsa.govt.nz</a>), identifies the general characteristics of cycle trips and the people who cycle.</td>
<td>The LTSA travel survey is a national survey, so the results do not necessarily reflect the characteristics of an individual study area. It does not identify routes.</td>
<td>Use any available information from local transport planning or modelling surveys; otherwise use the LTSA travel survey data.</td>
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7.3 Desire lines and barriers

The cycle demand information gathered should be reviewed and the major trip origins and destinations plotted on a map, followed by the major desire lines linking origins and destinations. Such maps permit barriers to cyclists travelling along these desire lines to be identified. Barriers could include waterways, motorways, railways, large industrial estates and sections of road that cyclists perceive as hazardous. The latter might include heavily trafficked roads that have to be crossed or travelled along, multi-lane roundabouts, or sections of busy roads with no dedicated space for cyclists.
7.4 Use of routes by cyclists

7.4.1 Road hierarchy method

Description
District plans usually include maps of the road hierarchy in their areas (typically arterial, collector and local roads).

A first assumption could be that the number of cyclists wishing to use a particular link in the road network will be in direct proportion to those using motor traffic on that link. So highly trafficked roads could be expected to carry relatively high volumes of cycle traffic, given appropriate cycling conditions.

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<td>This method gives the simplest and quickest indication of potential cycle demand across the whole area.</td>
<td>Cyclists may avoid sections of arterial roads that they perceive as hazardous or unpleasant for cycling, or may take a short cut not available to motor traffic. Cycling conditions may be perceived as so dangerous or unpleasant that people either cease cycling or don’t take it up in the first place. This suppressed or latent demand for cycling might be realised if cycling conditions were improved.</td>
<td>This method is a good way to begin assessing cycle demand. Other cycle demand assessment methods should be used to refine further the understanding of cycle travel patterns in an area.</td>
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7.4.2 Cycle crash data

Description
Cycle crash data for a long period of time can indicate those routes that cyclists have difficulty negotiating safely.

Useful crash data can be obtained from the LTSA, ambulance services and RCAs’ databases of locally reported crashes.

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<td>This data is readily available and is also needed for evaluating cycle route options.</td>
<td>LTSA data generally excludes crashes that do not involve a motor vehicle, and off-road crashes. Ambulance data has good location information but is biased towards the more serious injuries. This method will be poor at identifying: • sections of the road network that carry significant numbers of cyclists and are relatively safe for cyclists • off-road routes (ambulance data is useful here). Also, cyclists may avoid hazardous sections of an otherwise desirable cycle route.</td>
<td>Use this method, but be aware of its limitations. Start with LTSA data. For a more complete picture, supplement this with ambulance and RCA data, but remove any duplicate data from the combined database to avoid double counting.</td>
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7.4.3 Existing cycle facilities

**Description**
This method involves plotting on a map the location of any existing cycle facilities. This may indicate where cycle demand is, or has been considered, significant.

**Advantage**
This information has more than one use, as it is part of the base inventory required before cycle route options are evaluated.

**Disadvantage**
The existence of cycle facilities does not always indicate significant cycle traffic, as they may be poorly sited or isolated.

**Recommendation**
Use this method as it provides information needed for other purposes, including cycling promotion.

7.4.4 Cycle counts

**Manual cycle counts**
In this method, people at cycling sites record the numbers of cyclists, their travel direction, and possibly whether each cyclist is a primary school pupil, secondary school student or adult.

At busy sites cyclists should be counted separately rather than as part of a general traffic count, as they are easily overlooked. Counting is usually done during the morning or afternoon peak, but counts undertaken at other times can also be scaled up (see Appendix 2).

The methods already mentioned will indicate where to start counting.

**Automated cycle counts**
Automatic mechanical counters can be used to count bicycles, even in conjunction with counting other traffic (Transfund, 2002).

Installing continuous automated counters on key routes provides control data for monitoring cycle use on the network. This can also be used for scaling short-term, seasonally affected or weather-affected counts and for calculating modal split.

Bicycle detectors at traffic signals can also be used to regularly monitor the number and time pattern of cycle use. Beware of false counting of cars driving in adjacent lanes or straying into the cycle lane.

**Advantage**
Cycle traffic counts provide hard, conclusive evidence of existing cycle demand.

**Disadvantage**
The method only has time and cost disadvantages.

**Recommendation**
Each local authority should carry out an annual programme of cycle counts to monitor cycle use trends and provide data to support funding applications.

In addition to counting cycles using sections of routes soon to be investigated or designed in detail, it is recommended that some strategic counts be repeated annually. This could include counting cycles crossing a cordon around the central business district and or other key cyclist destinations, as well as on some outlying arterial routes.
7.4.5 Consultation with cycle users

**Description**
This method involves consulting local bicycle users on popular cycle routes with which they are familiar in the areas where they cycle.

**Advantages**
Bicycle users usually have excellent local knowledge of the routes they use and their associated problems. This can also be an excellent way of identifying leisure cycle routes.

**Disadvantages**
Individual cyclists, unless they cycle many different routes, can talk accurately only about the number of routes with which they are familiar. It is necessary to speak to a representative group of cyclists covering all areas. Experienced cyclists may not be able to represent less confident, new cyclists' needs and desires.

**Recommendation**
Use this method. If there is no bicycle users' group, convene one for the purpose of ongoing liaison during cycle planning and implementation.

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7.5 Questionnaires

**Description**
Questionnaires help to identify:
- the types of cyclist
- origins and destinations
- routes travelled
- hazard locations
- crash or incident locations
- alternative routes cyclists would use if hazards or barriers were removed
- reasons why people do not cycle, the infrastructure or other measures that would induce them to cycle, and the routes they would take.

**Questionnaire distribution methods include:**
- newspapers
- cycle shops, libraries or places that cyclists visit often
- the internet: survey forms can be copied from the internet and posted to the surveyor, or the survey could be completed and submitted online
- placing questionnaires on parked bicycles
- roadside interviews
- handing out questionnaires to cyclists on popular cycle routes
- in classrooms for school surveys, and at tertiary institutions and workplaces.

Survey results may also be available from workplace and school travel plan projects.

Surveys of non-cyclists are better incorporated in a survey on a wider range of issues, such as an annual citizens' satisfaction survey, because non-cyclists may have little or no interest in responding to a survey solely about cycling.

Appendix 3 has an example of a typical questionnaire.

**Advantages**
The route and hazard information is usually plotted on a map of the study area and can be used to identify route, or site-specific, improvements.

Information about the type of cyclist is needed to identify the most appropriate type of facility for any route in the network.

**Disadvantages**
Issues associated with questionnaires are:
- margins of error with various sample sizes
- questionnaire distribution
- encouraging responses, for example by providing prizes
- obtaining responses from a cross-section of cyclists or the general population
- processing the gathered information efficiently
- response bias
- cost and time.

The questionnaire has to be developed, distributed, collected, collated and interpreted. A Christchurch City Council questionnaire asking for current routes, routes avoided and other information about cyclists resulted in about 800 responses; each took about an hour to map and collate (Transfund, 2003, p.20).

**Recommendation**
This method is recommended where the above methods do not provide sufficient information. If questionnaires have not been used for network planning, they should still be considered for route planning.

Developing and using a questionnaire are not simple exercises; it may be wise to seek specialist advice to ensure cost-effective and useful results.
7.6 Which methods to use?

7.6.1 Existing cycle use
Start identifying existing cycle demand with a focus on the arterial road network. The following methods (described in detail above) can then be used in combination to form a clearer picture of the popularity of routes cyclists are likely to take:

- LTSA cycle crash data
- city/district planning and Census information
- existing cycle facilities
- consultation with cycle users
- visitor numbers at important cyclist destinations
- counting cycles parked at schools.

Then undertake a programme of cycle counts at strategic locations to confirm the actual cycle travel patterns.

It may be difficult to identify accurately an adult’s cycling skill level simply by observing them. It may be necessary to either conduct a brief, kerb-side interview or use a questionnaire.

7.6.2 Identify users and trip purpose
Methods for identifying user type and trip purpose include:

- consultation
- travel surveys
- manual counts
- counting parked cycles at key destinations
- census data
- questionnaires.

7.7 Estimating latent demand
Latent demand describes potential new cycle trips that are currently suppressed, but that would be made if cycling conditions were improved.

Latent demand can be assessed in relation to specific route improvements or to the whole network, assuming it is fully developed and that complementary cycle promotion activities are undertaken.

A wide range of methods have been proposed for forecasting cyclist travel demand. These methods have not been assessed for use in New Zealand. Some are quite complex. They are described in:

- Traffic flow models allowing for pedestrians and cyclists (Taylor and Damen, 2001)
- Guidebook on methods to estimate non-motorized travel (FHWA, 1999)
- Forecasting demand for bicycle facilities (Katz, 2001).

**Advantage**
Taylor and Damen concluded that there are a number of useful tools for assessing the demand for proposed bicycle facilities.

**Disadvantages**
There are time and cost disadvantages.

**Recommendation**
While these methods require further research for application in New Zealand, the simpler methods may be useful until this research can be done.

7.8 Data presentation
Geographical information systems (GIS) are well suited to data presentation. By presenting collected data as layers on common maps, many aspects can be considered together and a complete picture of cycle demand and obstacles developed. Sufficient work should be done to obtain a clear picture of where people wish to cycle, where they currently cycle and where the key network barriers to more cycling exist. The aim is to have usage information that is useful for project evaluation and prioritising improvements in cycle provision.
Figure 7.1: Cycle crash data assessment

Note: Each spot represents a bicycle collision. Thickness of buffered line varies in proportion to the number of bicyclists surveyed.

ADELAIDE CITY STRATEGIC BIKE PLAN
CITY OF ADELAIDE

COMPARISON OF BICYCLE ROUTES & BICYCLE COLLISION DATA

FIGURE 8.3