Abtract

Some of the best walking and cycling routes in the world have few conventional pedestrian and cycle facilities. Neighbourhood greenways (aka "bicycle boulevards") are a form of street treatment where simple measures such as lower speeds, traffic restraints, wayfinding and crossing treatments are used to create an environment that is friendly for walking and cycling. They are particularly useful for connecting people to community facilities such as schools, parks, shops and other key destinations in a neighbourhood and beyond. Neighbourhood greenways are a popular tool in North America (e.g. Portland and Vancouver) but have yet to catch on here in New Zealand, despite many similarities in street environment.

This paper outlines what kind of features typically make up neighbourhood greenways and how they combine to make walk/cycle-friendly streetscapes. Examples from North America will be shown, as well as a case study for how similar treatments could be applied in rebuilt Christchurch. Funding and implementation considerations for New Zealand will also be discussed.
Introduction

In New Zealand and many other parts of the world, physical provision for walking and cycling often focuses on specific pedestrian/cycle infrastructure, such as cycle lanes, pathways and zebra crossings. Yet some of the best walking and cycling routes I have encountered in the world have few conventional pedestrian and cycle facilities.

Neighbourhood greenways (aka "bicycle boulevards") are a form of street treatment where simple measures such as lower speeds, traffic restraints, wayfinding and crossing treatments are used to create an environment that is friendly for walking and cycling.

They are particularly useful for connecting people to community facilities such as schools, parks, shops and other key destinations in a neighbourhood and beyond. Neighbourhood greenways (NGs) are a popular tool in North America (especially on the west coast) but have yet to catch on here in New Zealand, despite many similarities in street environment.

This paper outlines what kind of features typically make up NGs and how they combine to make walk/cycle-friendly streetscapes. Examples from North America will be shown, as well as a case study for how similar treatments could be applied in rebuilt Christchurch. Funding and implementation considerations for New Zealand will also be discussed.

Note that, in this paper, the term “neighbourhood greenway” encompasses a range of treatments typically applied to a conventional local street. Other places have sometimes used the term “greenway” to denote active transport corridors away from streets and motor traffic, for example Auckland’s proposed Greenway Project (Greenways 2011). While there may be off-road components to a neighbourhood greenway route, this paper is generally not focused on these.

History of Neighbourhood Greenways (NGs)

NGs historically had their origins in proposals to make certain streets more cycle-friendly and less attractive to motor vehicles. Such “bicycle priority streets” were being developed in the Netherlands (MVW 2009), but the more common term “bicycle boulevard” appears to have had its origins on the west coast of North America. The grid nature of many North American cities lends itself to developing suitable quiet routes that are parallel to other busier routes. It is important to note too that many North American residential streets still feature four-way STOP controls (i.e. everyone must come to a halt) at every intersection.

Bicycle boulevards were first implemented in North America in Palo Alto, California (aka “Silicon Valley”) in 1981, on a 3km length of Bryant Street (City of Palo Alto 1982). Free flow of bicycle traffic was created by removing unwarranted STOP signs along the street; to discourage motor vehicles after the STOP signs had been removed, two street closures (see Figure 1) and a pedestrian/cycle-only bridge were installed. A further 2km treated section of the street was added in 1992.

(Source: Google StreetView)

Figure 1: A bicycle-only intersection entrance along Bryant St, Palo Alto CA
Other US cities followed suit with bike boulevards, including Berkeley (California), Albuquerque (New Mexico), Minneapolis (Minnesota), and Eugene (Oregon). In British Columbia, Canada, similar “greenway” projects were developed in Vancouver and Victoria.

In Portland OR, bicycle boulevards had been introduced over the past decade, with 50km to 2010 and 400km of further boulevard routes planned by 2030 (City of Portland 2010). In 2010, the programme was rebranded “neighbourhood greenways”, ostensibly a political move to broaden the support base and minimise any backlash associated with cycling-specific facilities. Given that these projects also tend to benefit pedestrians and local communities in general, this seems a smart choice. Other cities have also looked to use alternative terms, including “parkways”, “neighborways” and “quiet streets”.

It is instructive to note the goals of Portland’s NG programme (City of Portland 2011a):

- **Reduce automobile cut-through** - Speed bumps and traffic diverters keep cars trying to avoid main streets from cutting through on neighbourhood streets.
- **Provide safer bicycling and pedestrian connections** - Pavement markings alert people driving to expect people bicycling; improved crossings and curb ramps make pedestrian mobility easier and safer.
- **Reduce automobile speeds** - Speed bumps help slow automobile traffic on greenways.
- **Help people across our busier streets** - Improved crossings at main streets help people walking and bicycling cross more easily.
- **Guide people on the route and help get them where they are going** - Markings on the pavement and signage let you know where the Greenway goes and what’s nearby, like parks and business districts.
- **Provide more "eyes on the street"** - More people out on the street bicycling and walking leads to safer streets!

Many of Portland’s NG routes also tend to include kerb extension treatments that allow for raingarden-style stormwater management, thus enhancing the “greenway” component of the name.

**Common Design Features**

NGs can feature a range of different street treatments, including:

- Street entrance or exit restrictions, allowing only one-way access to motor vehicles whilst still providing two-way cyclist (and pedestrian) access (see Figure 2).

![Figure 2: Bike-only street entrance along Alder St, Eugene OR](image)

- Median islands at intersections with cycle/pedestrian gaps, preventing motor vehicles from continuing along the neighbourhood greenway, whilst assisting cyclists and pedestrians to cross (see Figure 3).

NB: all photos by the author
- Mid-block or street-end closures for motor vehicles, with path bypasses for walking/cycling through (see Figure 4).

- Diagonal diverters at intersections to prevent through traffic, but with gaps for bikes (see Figure 5).

- Contra-flow bike lanes, to allow cyclists to travel against the flow of an otherwise one-way street (see Figure 6).
• Small roundabouts at intersections and central mid-block islands to slow motor traffic along a route (see Figure 7).

• Other traffic calming treatments, such as raised platforms, narrowings, chicanes and speed humps (see Figure 8), sometimes with bypasses for cycling.
• Introduction of lower posted speed limits, typically 30-40 km/h (see Figure 9).

Figure 9: 25mph (40 km/h) Speed Limit, SE Ladd Ave, Portland OR

• Signage to indicate destinations along the route or in the vicinity (see Figure 10), often with some “branding” of the NG route.

Figure 10: Cycle route signage, SW River Parkway & SW Moody Ave intersection, Portland OR

• Crossing facilities such as central median islands and signalised crossings, to assist across and along the route and also provide some traffic calming (see Figure 11).

Figure 11: Cycle crossing bay in median, SE Clay & SE Ladd intersection, Portland OR
• Where applicable, connections through neighbouring parks and other off-street corridors to extend the range of routes (see Figure 12).

![Figure 12: Street block closure on Bute St, Vancouver BC](image)

• Special cycle symbols on street to indicate general cycling use of the traffic lanes (see Figure 13).

![Figure 13: Cycle route “Sharrows” (Shared route arrows), SE 42nd Ave, Portland OR](image)

• Changing the priority of STOP or GIVE-WAY controlled intersections, so that the NG route has priority (note that this generally requires additional measures along the route to discourage motor traffic from also using the route).

In certain circumstances, short sections of cycle lane or pathway may be used to provide a designated connection along a NG route (perhaps where a short length of busier road is joined, or at an offset intersection).

NGs are usually aimed at streets with low traffic volumes and speeds, generally less than 3000 vehicles/day (and preferably closer to 1000 vehs/day) and with mean speeds of 30-40 km/h. Where these are not currently the case (or they change), further street treatments may be necessary to achieve the desired result. Other considerations when determining potential NG routes include the location of public transport routes, proximity to key community facilities (schools, shops, parks, etc), connections to other walking/cycling routes, and availability of alternative routes for motor traffic.
The list of treatments above is not exhaustive. A number of guidelines are now appearing to provide planning and design guidance for developing NGs. These include Wilbur Smith Associates et al (2000), Walker et al (2009), and City of Minneapolis (2011). In time it may be useful to develop a New Zealand-specific version for implementation here. General guidance on particular walking, cycling and street treatments along the route can also be found in many other useful publications, such as DfT (2007) and DfT (2008).

Benefits of Neighbourhood Greenways

Many readers will be familiar with the “hierarchy of treatments” (DfT 2008), which is commonly cited when trying to provide for cycling. This proposes that practitioners should consider (in order) the following types of treatment:

1. **Traffic volume reduction**, e.g. Local area traffic management schemes (particularly where cyclists can bypass the restrictions) and off-road shortcuts are some ways of achieving this.

2. **Traffic speed reduction**, e.g. 30-km/h speed zones, traffic calming measures, narrowing of very wide streets, and deflection at roundabouts.

3. **Intersection treatment and traffic management**, e.g. providing space at intersections, fixing narrow bridges and other pinch-points, adding crossing facilities.

4. **Reallocation of carriageway/corridor space**, e.g. removing or narrowing traffic/parking lanes, providing shared footpaths.

5. **Specific cycle facilities**, e.g. cycle lanes, cycle paths, underpasses and overbridges.

Similar treatment hierarchies have been proposed for pedestrian networks (e.g. NZTA 2009). NGs tend to use the first three steps of the hierarchy to provide routes with reduced and/or slower motor traffic and greater assistance crossing busy roads.

In this respect, they have often been termed “invisible infrastructure” for walking and cycling (e.g. Cycling England 2008), as specific walking and cycling facilities are often not very evident. Politically this can sometimes be very useful, as decision-makers may be more supportive of initiatives they perceive as being beneficial to the wider community rather than targeted treatments like cycle lanes. Similarly, to the general public, a NG may seem little different to a conventional local street.

NGs should be expected to attract more pedestrian and cycle traffic; it is likely that some of this will be diverted from nearby parallel routes and some will be new trips. A review of the first Palo Alto bicycle boulevard found that cycle volumes increased by 85-100% along the treated street, with 35-55% reductions in volumes along parallel routes (City of Palo Alto 1982). Near the two street closures, motor traffic declined by 50-65%.

This preference for NG-style routes over similar alternative routes has also been observed in Portland, Oregon. Broach et al (2011) used bicycle-mounted GPS units to observe the behaviour of 164 cyclists in Portland for several days each. Trip purpose and other trip-level variables were recorded by the cyclists, and the resulting trips were coded to a detailed bicycle network. In terms of route preferences, the study found that cyclists appear to place relatively high value on off-street bike paths, neighbourhood greenways, and bridge facilities. This is reflected in the fact that, on average, actual trip lengths were 11-12% longer than the shortest possible route (which may include a less pleasant link). When converting the data to a route prediction model, travel on NGs for non-commute trips was considered equally preferable to a conventional route that was almost 18% shorter. The authors speculate that features such as traffic speeds, perceived safety in numbers, or simplified navigation may contribute to the preferences for NGs.

Introduction of lower traffic speeds and volumes, coupled with crossing improvements, should provide safety improvements for pedestrians and cyclists using the NG routes. Minikel (2011) investigated crashes on seven bicycle boulevards and six (busier) parallel routes in Berkeley, California. The cycle crash rates on bicycle boulevards were significantly less (statistically speaking) than the equivalent parallel routes (by 13-55%), although interestingly the proportions of severe injuries were not different. This suggests that the lower traffic volumes at least may have provided a safer cycling environment.

NG routes may also have benefits for the adjacent communities. A survey of residents living along a NG in Portland (VanZerr 2010) found that a strong majority of respondents felt that the NG had

- a positive impact on Home values, Quality of life, Sense of community, Noise, Air quality, and Convenience for cyclists;
• a negative impact on Convenience for drivers; and
• (surprisingly) no impact on Safety for children, Convenience for pedestrians, and the Amount of traffic collisions.

Of those who had moved in after the street had become a NG, 27% said it was a positive factor in their decision to move; none said it was a negative factor. Additionally, 42% of respondents said living on the NG had made them more likely to bike. In only a few questions (Quality of life, Driver convenience, Traffic collisions) were there statistically significant differences between the responses of those who didn’t regularly bike and those who did.

Because of the history of bicycle boulevards, most of the research on NG benefits has largely focused on cycling impacts. It is clear however that similar benefits (and disbenefits such as effects on motor traffic convenience) are likely to be found when considering the impacts on walking near NG routes.

**Application of Neighbourhood Greenways to New Zealand**

By their nature, NGs are often best located on routes with strong origin-destination demands but away from busier parallel routes (although it is important to appreciate that they may not reduce the need for suitable walking/cycling facilities on these busier routes too). In that respect, grid networks are particularly well suited to implementing NGs. Therefore many parts of most New Zealand cities have the potential to have such routes installed.

Christchurch has been investigated as a test case for this paper; the current rebuilding phase following the recent earthquakes also provides a timely opportunity to consider such treatments. Most of the suburbs immediately surrounding central Christchurch have grid patterns that lend themselves well to providing NG routes into the central city. A number of suitable routes have already been identified as “quiet streets” for cycling, albeit without any special treatments to assist cycling (CCC 2011). Figure 14 illustrates some potential NG routes radiating out from the central city (NB: routes through central city not identified).

![Figure 14: Some Potential Neighbourhood Greenway Routes in Christchurch](image-url)
For example, Worcester Street is a designated local street that extends from the central city east through Linwood and then veers north towards the Avon River (where a possible future river greenway is being mooted). Because there are a number of parallel routes far better suited for motor vehicle traffic, it is ideally placed to be a NG connecting many eastern residents with the central city, as well as with their own amenities. This includes close proximity to at least three schools, three local shopping centres, and two parks, with a number of other facilities also relatively close by (especially by bike).

To improve this “Linwood Greenway” route for walking and cycling, a number of treatments could be considered, including:

- A lower speed limit for the route (30 or 40 km/h)
- Facilities to assist pedestrians/cyclists crossing major roads such as Barbadoes St, Fitzgerald Ave, Stanmore Rd, Linwood Ave and Woodham Rd, whilst restricting motor vehicles.
- Diagonal diverters at some local street X-intersections, with cycle bypasses, to prevent motorists from being able to drive down the entire route.
- Traffic calming features (central islands, raised platforms, kerb extensions, mini-roundabouts, etc) along the route to slow down motor traffic and also assist crossings.
- Destination signage at intersections to indicate proximity to nearby facilities. It is suggested that these indicate travel times by foot or bike (rather than traditional distances), as many people may not appreciate just how close they are to many amenities. Figure 15 gives an example of how this signage might look.

A relatively modest investment in street treatments (compared with a conventional street reconstruction or pathways) would enable a 4km route to be developed as a NG, providing thousands of nearby residents with safe and convenient walking and cycling access to a number of key destinations.

Because of the more general nature of the proposed street treatments, such a project could potentially be funded with assistance from NZTA’s “new/improved local road infrastructure” activity class, rather than the more limited “walking & cycling facilities” allocation. This would require a suitable benefit-cost ratio (BCR), which could be largely based on the walking and cycling health and safety benefits expected. Although it is likely there would be some increase in travel time costs for motor vehicles, this would be offset by (a) travel time reductions for pedestrians and cyclists crossing busy roads, and (b) safety benefits for motorists due to the lower speed environment. Further work is needed to quantify these for a typical neighbourhood greenway project in New Zealand. Alternatively, projects of this nature could be funded via the “minor improvements” work category, which doesn’t require as rigorous an assessment.

As has been the case elsewhere, probably the biggest potential hurdle (other than funding) would be with the introduction of significant traffic restriction features as part of the route. VanZerr (2010) noted that 40% of additional comments about bike boulevards in Portland from survey respondents were negative towards the concept, particularly by those who drove regularly and did not identify with cycling. Therefore it will be important to strongly “sell” to local residents (and businesses) the benefits they are achieving in return for a slight inconvenience in motor vehicle access:

- Reduced through traffic (but probably not less “foot traffic”).
- Safer, quieter, and more pleasant environment.
- Possible reduction in crime, based on more active street life.
- Improved ability to cross major roads while walking or cycling.
- Potential to enhance neighbourhood appearance and to increase green space through expanded or new kerb extensions, medians, and traffic islands.

![Figure 15: Example Destination Signage](image-url)
• Improved neighbourhood identity and coherence.
• Potential to increase property values through improved safety and liveability.
• More confidence in allowing themselves and their family to safely and conveniently walk and cycle in their neighbourhood.

It may be that some of the less “extreme” NG features need to be introduced first and then, having seen some of the benefits, additional features can be subsequently looked at. Another technique that could be considered is to introduce traffic restrictions initially through the use of moveable kerbing that can be adjusted or moved if necessary. This allows residents to “trial” the effects of a proposed treatment, without fear that they are permanently stuck with it if they don’t like it.

Another way to introduce residents to the concept of more walking/cycling and less motor traffic on their street is to hold a “ciclovia” or traffic-free day along the planned route. First introduced to Bogota, Colombia, these events are growing in popularity around the world and allow an opportunity for people to see the opportunities that would avail themselves if they were able to easily walk or cycle to various local destinations. In Portland these events are branded “Sunday Parkways” (City of Portland 2011b) and are typically held for five hours on a Sunday each month during summer, based around some of the city’s NG routes (or prospective routes). Community events such as fairs and markets are held in conjunction with the day, and many residents also get into the swing of things by holding stalls at the front of their house or providing water for passers-by (see Figure 16).

Figure 16: Portland Residents take advantage of the Southeast Sunday Parkway, August 2010

Conclusions and Recommendations

Neighbourhood greenways are an exciting addition to the walking and cycling “toolbox” for New Zealand towns and cities. They also serve to remind us that the best walking and cycling environments do not necessarily have to feature overt walking and cycling facilities; rather the key is often simply to control motor traffic and assist with tricky intersections and crossings. Their success, both for the walking/cycling users and the surrounding community, have been well documented in many other locations, particularly in North America. It is time that many districts here in New Zealand attempted to emulate that success.
References


