

University of Southern Queensland

Faculty of Health, Engineering & Sciences

Brisbane City Council

Strategic Planning:

Delivery of

Sustainable Transport

Case Study: The Brisbane Bicycle Hire
Scheme 'CityCycle' as an attempt to
promote urban cycling

A dissertation submitted by

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Abstract

Sustainability reflects one of the most fundamental human desires supported by virtually all philosophies and religions: to create a better future world. Sustainable transport is an essential aspect of developing sustainable cities.

Cycling, as a commuter mode of active transportation, is getting increasing attention in cities worldwide due to its environmental and health benefits and its potential to integrate with public transportation. Brisbane City Council is attempting to promote urban cycling as a means of sustainable transport using a public bicycle sharing scheme called CityCycle, which is reputed to be underutilised and performing poorly.

Unobtrusive observation of cyclist behaviour in Brisbane's Central Business District was used to gather primary quantitative data in order to inform the research questions. This was complimented by gathering secondary qualitative data from media sources such as online blogs.

This mixed methods research project attempted to find answers to the question why CityCycle was performing poorly and in particular the influence of one way streets upon cyclists. The first stage of research was to measure the activity of CityCycle station 38 during the AM peak period, as station 38 was deemed to be of strategic importance to the CityCycle network due to its close proximity to Central Station. The second stage of research was to investigate the effects of one way streets as a deterrent to cyclist participation.

Nobody hired a CityCycle from station 38 during the AM peak period on Tuesday 20 August 2013. Also the findings did not back up claims in the planning literature that one way streets are cycling unfriendly. However, the findings did show the planning cycle is inefficient and the 'vision-mission-action-measurement' cycle breaks down at the point of 'measurement'. Subsequently all recommendations to improve the productivity of CityCycle are based on improvements to the planning framework.

It is suggested that there be an investigation into the necessity to maintain commercial sensitivity of the data held by CityCycle in relation to the activity levels of each individual station in the CityCycle network.

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A handwritten signature in black ink that reads "A Savage". The signature is written in a cursive style with a large initial 'A'.

Signature

21 October 2013

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Glossary of Terms

Bicycle lane – a portion of the roadway which has been designated by striping, signing and pavement marking for the preferential or exclusive use by bicyclists (Bicyclinginfo.org 2013)

Bicycle path – a length of path for the exclusive use of bicycle riders (Roads and Traffic Authority 2003, p. 7).

Bus lanes – are traffic lanes reserved solely for the use of buses, bicycles, taxis, limousines, emergency vehicles and any other vehicles turning within 100m of an intersection, regardless of occupancy (Queensland Transport 2006, p.1)

Conceptual framework – a framework showing the central concepts of a piece of research, and their conceptual status with respect to each other; often expressed as a diagram (Punch 2012, p.151)

Data – direct observable information from the world used to aid research into an empirical question (Punch 2012, p.3).

Egress Trip – a bicycle trip at the activity end of a multi-modal commute (Martens 2007).

Empiricism – the doctrine that all knowledge derives from experience (Collins 2005, p.91).

Potential conflict points – the number of points a cyclist could potentially receive contact from motorists (Schepers et al. 2013)

Qualitative data - : data not in the form of numbers – usually but not always in the form of words – can also be in the form of maps and photographs (Punch 2012, p.3).

Quantitative data - : data in the form of numbers (Punch 2012, p.3).

Shared paths – area open to the public that is designated for use by both bicycle riders and pedestrians (Roads and Traffic Authority 2003, p. 9).

Unobtrusive observation – a method of making observations without the knowledge of those being observed (About.com 2013).

1. Introduction

In the age of climate change and population increase, encouraging people to use public and active transport is seen as a way to achieve sustainable transport (Shaheen et al. 2010). Cycling, as an important commuter mode of active transportation, is getting increasing attention in cities worldwide due to its environmental and health benefits and its potential to integrate with public transportation (Nkurunziza et al. 2012). Public bicycle share schemes (PBSS) have existed for almost 50 years and produce benefits such as flexible mobility, emission reductions, physical activity benefits, reduced congestion and fuel use, individual financial savings and support for multimodal transport connections (Shaheen et al. 2010). A PBSS is a service in which bicycles are made available for shared use to individuals on a very short term basis. CityCycle is a PBSS located in Brisbane's central business district (CBD) and surrounding inner suburbs.

The CityCycle program is comprised of a network of 150 stations stretching from Newstead through the CBD to West End and Toowong, and a fleet of approximately 2,000 bicycles (see Appendix C). Once a bicycle is hired from a particular station, the rider has thirty minutes to return it to any station in the network (CityCycle 2012). CityCycle was launched in October 2010 but has not reached a level of performance its designers would have hoped for. Since its launch CityCycle has maintained a usage rate of approximately 0.3-0.4 trips per bicycle per day (Fishman et al. 2012). Effectively, each day approximately two thirds of the bicycle fleet is not utilised. Several initiatives, intended to improve the program, have been introduced since its launch. For example, fees have been reduced, free helmets have been provided, and access to the system has been linked to Brisbane's Go Card (Feeney 2012). Unfortunately, none of these measures effected any significant increase in patronage. The patronage of CityCycle needs to increase significantly to operate at a level with successful PBSS's, such as Dublinbikes in Dublin, which operates at 13 trips per bicycle per day (EPOMM 2012). This project aimed to investigate possible causes for CityCycle's poor performance, and then make recommendations to improve its productivity.

Sustainable transport is an increasingly important issue within the urban structure and this report enables an examination of one sector within the vision for a more sustainable Brisbane. The success of CityCycle can contribute to promoting urban cycling as a sustainable form of transport.

The structure of this report reflects the order of the research process. The literature review revealed the issues related to cycling as a mode of sustainable transport and how sustainable transport is delivered through the planning framework. The planning framework is a hierarchy of state and local government planning documents which inform planning decisions.

The nature of the research problem suggested a mixed-methods approach to this research project, resulting in the collection and analysis of quantitative and qualitative data. This data was analysed and provided a basis for making recommendations which will enhance the performance of the CityCycle program.

2. Literature Review

2.1 Introduction

The purpose of the literature review was to gain a background understanding of the subject matter relating to the *BCC Strategic Planning: Delivery of Sustainable Transport. Case Study: 'CityCycle' as an attempt to promote active urban cycling* project (CityCycle project). This literature review allowed the gap in the literature to be identified, which in turn informed the research questions and focused the research on the sub-topics. The three sub-topics considered in the literature review are all connected to sustainable transport – namely sustainable transport itself, active urban cycling, and the Queensland planning framework. The material reviewed included journal articles published within the last seven years, international planning documents, current Queensland state legislation, and Queensland state and local government planning documents. Due to time and resource constraints, the scope of the review was limited to defining sustainable transport and the links thereof to the state legislative framework. This literature reviewed also informed the compilation of a simple conceptual framework which shows the types of cycling interventions needed to create an active urban cycling culture, and delivery of sustainable transport through the state planning framework.

2.2 Sustainable Transport

There is no universally accepted definition of sustainable transport (Beatley 1995, p. 339). For the purposes of this project, one way of overcoming this obstacle was to find a definition of sustainable transport which agrees with the definition of sustainability stated in the *Sustainable Planning Act 2009* (SPA). The SPA is the foremost legislative document which underpins the definition of sustainable planning and informs the entire hierarchy of planning documentation in Queensland

The SPA replaced the *Integrated Planning Act 1997* (IPA) with the intention of providing a legal framework for planning in Queensland that emphasised the importance of ecological sustainability. Collins (2005, p. 88) defines the word 'ecological' as 'intended to protect the environment'. Section 8 of the SPA extends the scope of this definition by stating ecological sustainability encompasses not only environmental sustainability, but social and economic

sustainability. This inclusion of the other pillars of sustainability into the definition or scope of ecological sustainability is confusing, as the Collins dictionary makes no reference to economic or social issues in its definition of the word 'ecological'. Nonetheless, it was assumed that any subsequent reference to 'ecological sustainability' or 'sustainability' found in the Queensland state and local government planning documents implies consideration to social, economic and environmental sustainability with equal importance. Building on the scope of ecological sustainability as defined in the SPA, it followed that sustainable transport must be socially, economically and environmentally sustainable. This was found to be consistent with the European Union Council of Ministers of Transport (EUCMT) view of sustainable transport:

- allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations (social sustainability)
- is affordable, operates efficiently, offers choice of transport mode, and supports a competitive economy, and balanced regional development (economic sustainability)
- limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes and minimizes the use of land and the generation of noise (environmental sustainability).

(TDM Encyclopedia 2013, p.3)

The Organisation for Economic Co-operation and Development (OECD) (cited in Geurs & van Wee 2003, p. 33) stated quantitative targets to achieve environmentally sustainable transport by the year 2030:

Stabilisation of atmospheric concentrations of CO₂ emissions at or below their 1990 levels to prevent climate changes.

Accordingly, total world-wide CO₂ emissions are to be reduced by between 50percent and 80 percent for OECD countries. Total emissions from the transport sector should not exceed 20 percent of 1990 levels.

In summary, the attributes from both these two definitions of sustainable transport were used to define sustainable transport in a way which is consistent with the SPA. One purported form of sustainable transport is urban cycling. It is necessary to ascertain from the literature that the BCC urban cycling scheme is a form of sustainable transport, as the CityCycle scheme is being promoted in the interests of sustainability.

2.3 Urban Cycling

The attributes of urban cycling were analysed to see if they satisfy the definition of sustainable transport specified in the previous section:

Element	Proof
<p><u>Social sustainability</u>: allows the basic access needs and development of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between generations</p>	<p>Cycling promotes social inclusion. Nkurunziza et al (2012, p.249) state for individuals who do not have the option of driving, whether for financial or other reasons, cycling can be an important means to get to destinations, particularly for trips that are too long to walk or not served by transit</p>
<p><u>Economic sustainability</u>: is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy, and regional development</p>	<p>‘Once you have your bike and accessories, cycling is basically free. That means you do not have to pay for fuel, parking, registration or insurance. This saves thousands of dollars per year (Department of Transport and Main Roads 2011b, p. 6).’ The cost of constructing cycling infrastructure is cheaper than construction costs for rail, motorway/roads, busways, and tunnelling (Priest 2012).</p>
<p><u>Environmental sustainability</u>: Stabilisation of atmospheric concentrations of CO₂ emissions at or below their 1990 levels to prevent climate changes.</p>	<p>‘Increased use of cycling reduces car dependence. In turn this reduces congestion and CO₂ emissions. Relying on “pedal power” cycling produces no emissions, consumes no non-renewable fossil fuels, and has minimal impacts on the environment’ (Department of Transport and Main Roads 2011b, p. 6).</p>

Table 1: Proof urban cycling is a form of sustainable transport

Due to satisfying the criteria as set by the EUCMT and the OECD, urban cycling can be considered a sustainable form of transport. The following section will present a conceptual framework developed from the literature to show the

interventions that are necessary to create an, active urban cycling culture which meets the three elements of social, economic and environmental sustainability.

In a ground-breaking piece of work, Pucher et al (2009) performed an assessment of the existing research into the effects of various interventions to the levels of bicycling. Their approach was to review 139 studies on the effects of a single intervention, and 14 case study cities that adopted multiple interventions (Pucher et al. 2009, p.106). The main conclusion from their study was:

Individual interventions can increase bicycling to varying degrees, but the increases are not usually large. Substantial increases in bicycling require an integrated package of many different, complementary interventions, including infrastructure provision, pro-bicycling programs, and policies.

(Pucher et al. 2009, p.122)

From these findings the beginnings of a simple conceptual framework was created which shows an active cycling culture is the result of the synergies of cycling infrastructure, programs and policies:

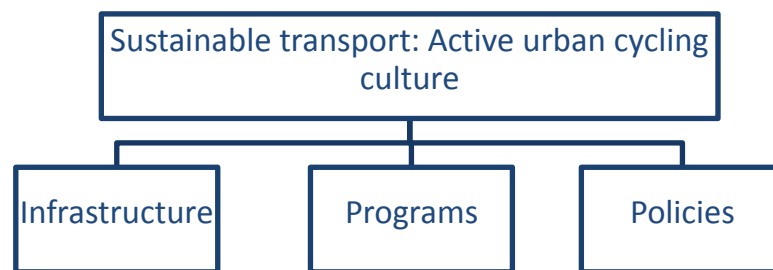


Figure 1: Conceptual framework of an active cycling culture.

It was subsequently possible to classify and assess any cycling intervention within this framework, and postulate whether that intervention is a barrier or facilitator towards creating an active cycling culture. For example, CityCycle is a public bicycle sharing scheme (PBSS), which was classified as a program within this conceptual framework, and was argued to be a facilitator towards creating an active cycling culture. From this vantage point it was appropriate to consider potential cycling interventions which could apply to the catchment area of the CityCycle network and create a postulated conceptual framework. A theoretical

view of the system could be readily used to direct investigation into areas which may be underperforming.

In order to inform potential interventions within the conceptual framework the research of Fishman et al. was used. Fishman et al. (2012) used discussions with focus groups to gain an understanding of perceived barriers and facilitators to using CityCycle. Three group categories of cyclists were used – group one consisted of non- and infrequent riders, group two consisted of regular riders, and group three consisted of CityCycle members. Each group session contained six people. In addition, sessions with groups one and two were run twice, with new people in each session. Therefore a total of thirty people had input into the discussions. The themes which developed from these discussions relating to infrastructure interventions or policies are considered below.

Of the participants in the study, only one participant thought the cycling infrastructure was very good. This person rode exclusively along Brisbane's shared paths along the river on the Bicentennial Bikeway (Fishman et al 2012, p. 693).

However, the view that the streets in Brisbane's central business district (CBD) do not support bicycling was a consistent theme across and within the various focus groups, regardless of bicycling experience (Fishman et al 2012, p. 692-693).

This negative view was reflected by the following comments:

I would never, in peak hour ride on one of those roads

There has been a tendency to put in a bike lane as an afterthought. It has not been designed by people who are cyclists

It's that dangerous, you are taking your life in your hands every day

There are so many streets in the CBD that are bike no go zones

People have to realize that painting a bicycle on a road does not make it a cycle lane

(Fishman et al. 2012, p. 692-693).

It was deemed that high levels of traffic and a lack of cycling infrastructure in the CBD are barriers to urban cycling. This may explain why the Irish ‘Smartertravel’ program felt it was necessary to state the following policies in their National Cycle Policy Framework:

- Reducing volumes of through-traffic in city centres
- Calming traffic/ enforcing low traffic speeds
- Removing cyclist unfriendly multi-lane one-way systems
(Department of Transport 2009, p.7).

Department of Transport (2009, p.7) state that ‘cycling friendly routes are safe, direct, coherent, attractive and comfortable’. Although they identified one way streets as being ‘cyclist unfriendly’, no reasons were given for the statement. Further investigation of the literature showed there is a lack of research done on this subject. As previously mentioned, 56 percent of the road network servicing the CBD between Ann Street and the Brisbane River is comprised of one way streets as shown in figure 2, where the one way streets are highlighted with a purple arrow. This area, which from now on will be referred to as the study area of the CBD, also has the greatest CityCycle station density in the CityCycle network.

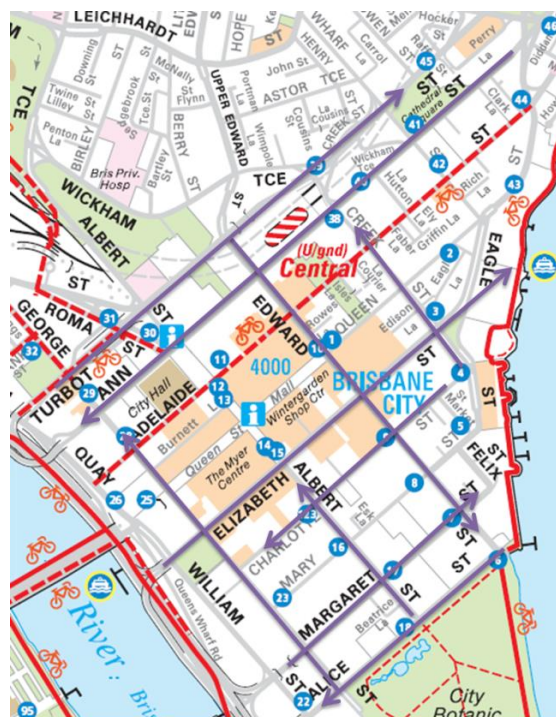


Figure 2: One way streets in Brisbane’s CBD

Schepers et al. (2013, p.6) state ‘...the risk of collisions depends on the number of potential conflict points and how well road users are able to handle conflicts’. For example, a cyclist riding on the left side of the left hand lane of a one way street with no cycle lane has one potential conflict point with traffic, whilst a cyclist riding in the middle of the road has two potential conflict points with traffic (see figure 3). It was argued that this situation would be made even more hazardous if the traffic is travelling significantly faster than the cyclist.



Figure 3: Multiple potential conflict points

The BCC have recently lowered the speed limit in the CBD to 40km/h in the interests of cyclist safety (Brisbane City Council 2011, p.10). Wegman et al. (2012, p.19) argue that in the event road users with large mass differences use the same traffic space, the speeds should be so low that the most vulnerable road users and transport modes come out of a crash without any severe injuries. Several studies have confirmed that there is a threshold around 30km/h, above which the probability of injury and fatality for cyclists colliding with motor vehicles strongly increases (Kim et al. 2007, p.238; Rosen et al. 2011, p.25). So it remains questionable whether BCC have lowered the speed limit in the CBD to a level which is safe for cyclists. The safety issues discussed so far include potential conflict points of cyclists with traffic, and traffic speed limits. The ‘attractiveness’ or pull-factors of the CBD road network to cyclists was then

considered, given that it is the most densely serviced region in the CityCycle network.

BCC claim that the compact nature of the CBD and inner city makes CityCycle a great choice for short trips (Brisbane City Council 2011, p.11). In other words, BCC believe CityCycle is an attractive active transport mode option in the CBD because travel distances are short. The study by Millward et al. (2012, p.105) on a small city in Novia Scotia showed the average distance walked by pedestrians in an active transport trip from the origin to the 'workplace or other place' is 0.5km, with very few exceeding 1.2km. Millward et al. (2012) further state that the assumption in the walkability literature that walking trips should be restricted to within 1km is justified. Given that the distance from Central Station to Alice Street at the southern end of the CBD is approximately 0.8km, it was argued that most destinations in the subject area of the CBD are within acceptable walking distance of Central Station. Therefore there is the potential for walking to be the preferred choice of active transport in the CBD if the postulated barriers to cycling in the CBD make cycling less attractive than walking. The barriers to cycling in the CBD considered thus far are the prevalence of one way streets in the road network, the lack of cycling infrastructure, large volumes of through traffic both entering and exiting the Pacific Motorway, and the limited traffic calming policy.

These issues were added to the conceptual framework with postulated barriers written in red and facilitators written in green:

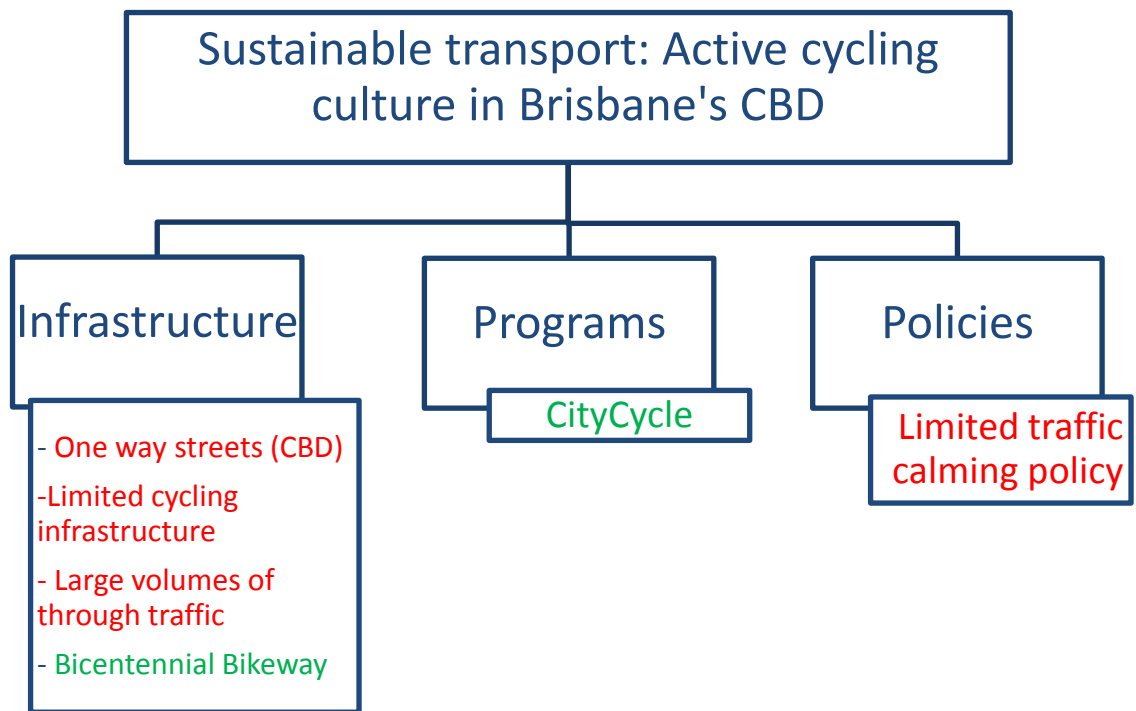


Figure 4: Conceptual framework for cycling in Brisbane’s CBD

There are numerous other issues which contribute to cycling culture which are outside the scope of this project due to time and cost constraints. For example, the statement by Pucher et al. (2012, p. 695) that mandatory helmet regulation acts to reduce the reported spontaneity with which participants could use CityCycle and therefore acts as a barrier to creating an active cycling culture. For the sake of simplicity, only the interventions listed in figure 4 were considered relevant to the CityCycle project. This completes the discussion on the objectives of creating an active cycling culture. Consideration must now be given to how these objectives will be achieved through the state and local government planning system. It follows that any flaws or deficiencies in the system may have detrimental effect on the realisations of these objectives

2.4 Strategic Planning Framework

The BCC is the local authority which is responsible for the strategic planning of the city of Brisbane. Brisbane City Council (2013) state their long term community plan ‘Brisbane Vision 2031’ is put in place to address the best environmental and infrastructure planning for the future. This is an example of a local government planning document. Various departments of the Queensland state government also produce planning documents, and so are called state planning documents. Planning documents are hierarchical. Those at the top of

the hierarchy are written by the state government, and are more general in nature as they provide direction to several jurisdictions. Those at the bottom are written by local governments and contain specific actions to achieve goals. Planning documents are the means by which an active cycling culture is changed from an idea into reality. The remainder of the literature review focusses on the particular state and local government planning documents which are argued to have the greatest influence on creating an urban cycling culture.

All planning documents have a function which can be linked to the ‘vision-action-mission-measure cycle’, as shown in the following diagram:

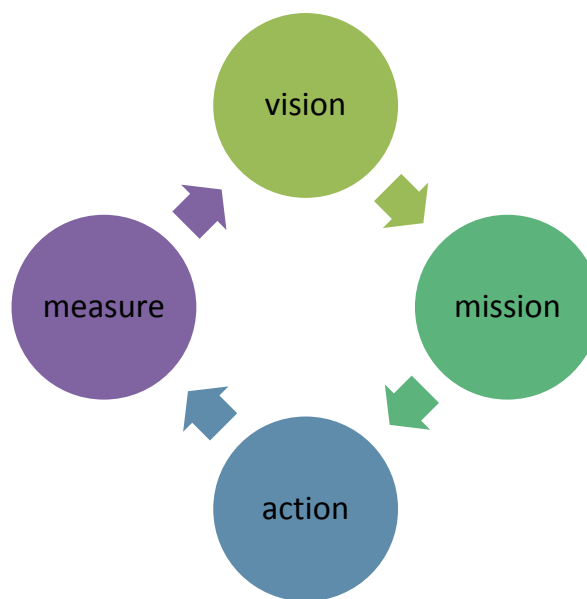


Figure 5: ‘Vision-mission-action-measure’ cycle

The aim of each document was identified and positioned in the ‘vision-mission-action’ cycle. This allowed the planning framework to be seen in diagrammatical form, so that any strengths and weaknesses could be more readily identified. The state planning documents were reviewed first given that they provide guidance for several different local governments, and so are more focussed on providing a vision of planning objectives.

2.4.1 State Planning Documents

The South East Queensland Regional Plan (SEQRP) was prepared by the Regional Planning Minister Stirling Hinchliffe in accordance with subdivision 2 and part 6 of the SPA (Hinchliffe 2009). It contains general planning objectives

which are specified as ‘desired regional outcomes’. For example, Hinchliffe (2009, p. 139) acknowledges the role of cycling as part of an integrated transport system in Desired Regional Outcome 12:

A connected and accessible region based on an integrated transport system that is planned and managed to support more compact urban growth and efficient travel; connect people, places, goods and services; and promote public transport use, walking and cycling.

Hinchliffe (2009, p. 39) further asserts ‘urgent action is necessary to stabilise greenhouse gas emissions at a level where the effects of extreme climate change can be avoided.’ This sentiment is why it was important for the definition of environmentally sustainable transport to have quantifiable attributes, as previously mentioned.

Hinchliffe (2009, p. 140) goes on to recognise the need for infrastructure in policy 12.2.2:

Support walking, cycling and public transport use with new infrastructure, improvised services and information.

So, the desired regional outcomes which are set in the SEQRP provide a vision for the future of South East Queensland. The SEQRP has statutory power to ensure that subsequent planning documents are in accordance with its directives. The second state planning document which was reviewed is ‘Connecting SEQ 2031, An Integrated Regional Transport Plan for SEQ’ (CSEQ), as it sets strategies for achieving sustainable transport which will fulfil the desired regional outcomes set out in the SEQRP.

The Department of Transport and Main Roads (DTMR) present their long term transport plan to achieve sustainable transport in the form of a bar graph which represents actual transport levels in 2006, and forecast transport levels in 2031 (see figure 6):

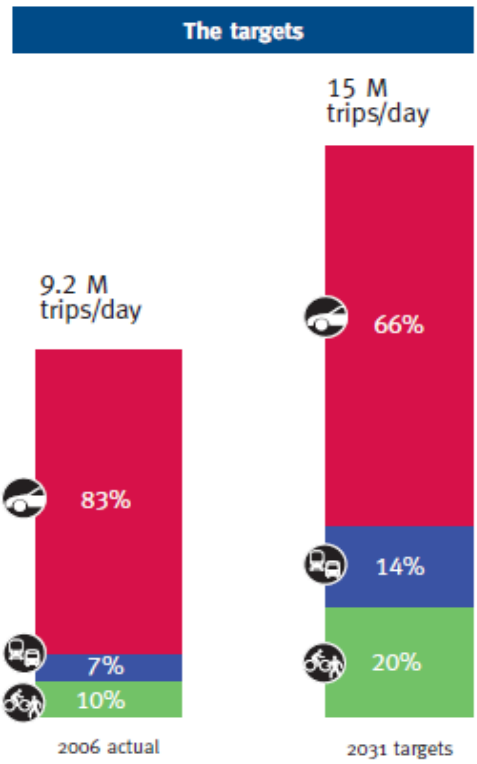


Figure 6: South East Queensland transportation targets to 2031

(Department of Transport and Main Roads 2011a, p. 4)

Table 2 converted these figures from percentages into quantities:

	2006 Actual	2031 Targets
Total trips/day	9.2 million	15 million
Motor vehicle trips/day	83%	66%
Motor vehicle trips/day	7.64 million	9.9 million

Table 2: Actual and forecasted motor vehicle trips

From table 2 it can be seen that although the proportion of motor vehicle use is predicted to reduce by 17 percent, due to the increase in population the increase in motor car use will be over 2 million car trips per day.

The DTMR (2011a, p.4) claim sustainable transport mode share volumes can be achieved in 2031 if ‘the average South-East Queenslander changes just three of

their seventeen weekday trips per week from car to public transport, cycling or walking.’ Therefore the strategy for achieving the mode share targets in CSEQ is based on a desired minor behaviour change of the average South-East Queensland, as opposed to implementing paradigm changes to transport behaviour. This strategy to change the transport habits of the average South East Queensland provides a mission to be achieved by planners in subsequent planning documents. State planning documents which seem to be focusing on this strategy are the ‘Queensland Cycle Strategy’ (QCS) and ‘The SEQ Principal Cycle Network Plan’ (PCNP), as these documents are concerned solely with encouraging active transport.

DTMR (2011b, p.6) state their vision for cycling in Queensland is: ‘more cycling, more often, on safe, direct, and connected routes.’ This would indicate they think the main intervention needed to promote cycling is cycling infrastructure. This statement is corroborated by the statistic that only 17 percent of cyclists feel safe cycling on a road with no bicycle lane (Department of Transport and Main Roads 2011b, p.19). The vision stated in the QCS has a direct link to the PCNP, which was written to provide a framework for future cycle network planning in South East Queensland (Queensland Transport 2007). The PCNP further asserts that:

- principal routes are the spine from which to build local cycle networks
- information regarding the location and the level of principal cycle networks should be accessed from the relevant local government
- Individual SEQ local governments are responsible for delivering principal cycle routes on local roads and land (Queensland Transport 2007, pp. 3-10).

From this information was concluded that the BCC is responsible for the planning and delivery of the principal cycle networks in Brisbane which are safe, direct, and connected. This was therefore seen as a mission set by state planners that BCC must attempt to achieve. It was argued that in order to make informed decisions on where best to build cycling infrastructure, the needs of the different types of cycle trips must be understood.

Queensland Transport (2007) state the main cycle trips are for education, work, shopping and recreation. DTMR (2011b) claim there is no state-wide data available that tracks how often people cycle for all types of trips. They therefore refined their strategy to focus on people who cycle to work. Commuting to work has been identified as the main reason South East Queensland residents choose to cycle. Also, DTMR have set a target that by 2021, 2.8 percent of all work commutes will be by bicycle (Department of Transport and Main Roads 2011b). As this mission has been set in the state planning documents, it is argued that for the integrity of the planning system to be maintained it must be the primary goal of any local government cycling interventions. Therefore it was deemed relevant to revisit the functionality of the CityCycle network to isolate the possible types of CityCycle trips which have most relevance to the CityCycle project whilst complementing the states cycling strategy.

United Nations (2001, p 16) define 'multi-modal transport' as 'the carriage of goods by two or more modes of transport'. For example, a person's daily commute to work is deemed to be multi-modal if they firstly cycle to a public transport hub and then catch a train or bus to their destination. Martens (2006) describes the use of a bicycle at the home end of a multi-modal trip as an 'access' trip. Alternatively a person may firstly travel by bus or train to a transport hub, and then use a bicycle to travel the remainder of their journey to their destination. Martens (2006) describes the use of a bicycle at the activity end of a multi-modal trip as an 'egress' trip. In Brisbane, Central Station is the number one ranking destination in all of Brisbane during the morning peak period (Service Planning 2013b). Central Station is also located in the study area of the CBD.

To this point the state planning documents provided visions and missions for planning in South East Queensland. Local government planning documents were subsequently examined to see if they contain action statements to fulfil the missions set in the state planning documents.

2.4.2 Local Government Planning Documents

The most recent planning document produced by BCC relating to active transport is the 'Brisbane Active Transport Strategy 2012 – 2026' (BATS). Brisbane City Council (2011, p 3) state their vision is to create a high quality, connected, accessible pathway network which will attract people of all ages to

walk and cycle. Their aim is that by 2026, one in five transport trips will be by walking or cycling. This is consistent with the state planning mode share targets which were presented in CSEQ, except that BCC hope to achieve this result five years earlier, in 2026. There are references to further local government planning documents for essential information regarding active transport planning.

For example, Brisbane City Council (2011) state cycling requirements will be incorporated into a reviewed City Plan. The City Plan has extensive planning controls on land development. This reflects the realisation that in order to influence more participation in active transport, land use planning and transport planning must be integrated (Puntambekar 2011). Also the Brisbane Bicycle Infrastructure Plan will be written to outline the infrastructure requirements of the bikeway network (Brisbane City Council 2011, p10). In fact, most of the strategies presented in this document are based on the provision of infrastructure. This is reflected in the following comment:

The key to encouraging walking and cycling is [walking and cycling routes which provide] access, safety, security and comfort (Brisbane City Council 2011, p.8).

Or to put it more succinctly, provision of good cycling infrastructure is a key intervention to creating an active cycling culture. This sentiment is shared by Pucher et al. who argue 'probably the most visible commitment of a city to cycling is a comprehensive system of separated bicycle paths and lanes, providing a reserved right of way to cyclists and sending a clear signal that bicycles belong' (2010, p. 332). Furthermore, Thomas and DeRobertis (2012) note that a key characteristic of developed countries with a high cycling mode share is their provision of cycle tracks. For example, The Netherlands and Denmark enjoy high bicycling mode shares (26 percent and 19 percent respectively) and are also characterized by the provision of cycle tracks as the predominant form of cycling infrastructure on major streets. Therefore, BCC's intention to construct quality cycling infrastructure to promote urban cycling is an action which is consistent with the findings in the literature. Finally, there is no mention in the BATS of a strategy to achieve the target of 2.8 percent of all work commutes being by bicycle by 2021, as specified in the state planning documents.

2.4.3 Planning framework summary

The overall planning framework was summarised in the following table:

Document	Aim	Function
SEQRP	Set 'Desired Regional Outcomes'	Vision
CSEQ	Provide a strategy for sustainable transport	Mission
QCS	'more cycling, more often, on safe, direct and connected routes'. Doubling the percentage of cycling's share of commutes to work by 2021.	Vision, Mission, Measure
PCNP	Defer responsibility for design and construction of principal cycle networks to local government	Delegation of responsibility
BATS	Implement infrastructure projects and cycling programs to encourage cycling (reasons for commute unspecified)	Vision, Action

Table 3: Planning document functions

These documents were then placed in the 'vision-mission-action-measure' diagram:

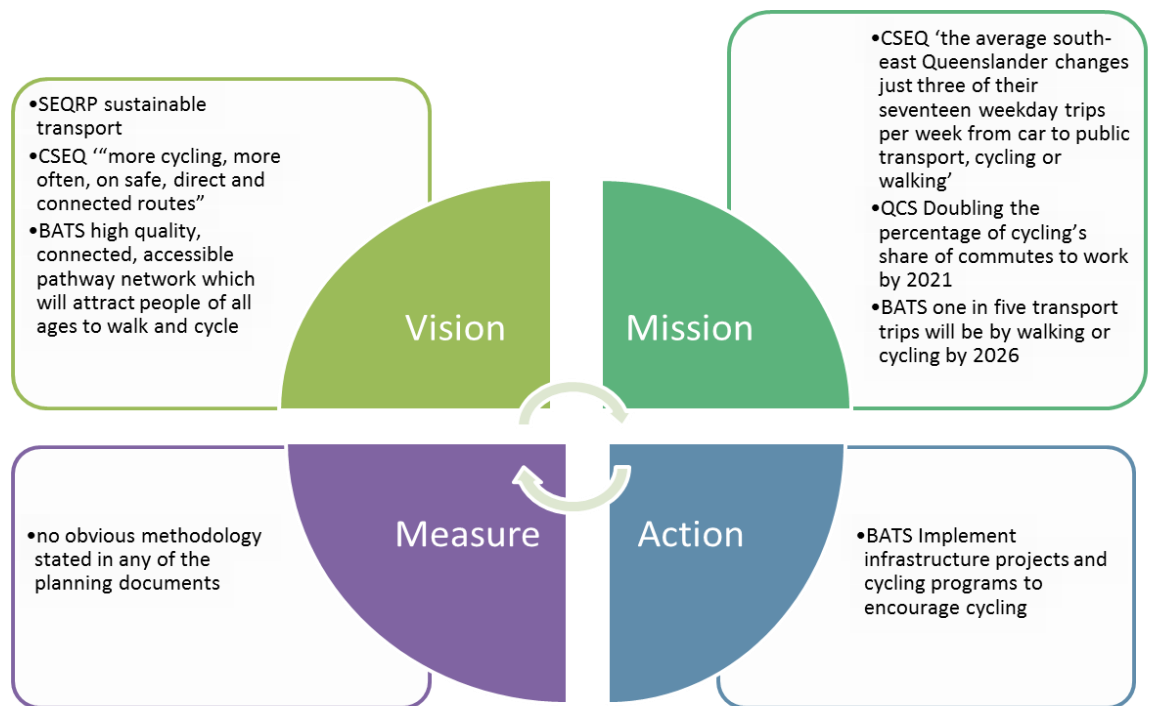


Figure 7: Populated ‘vision-mission-action-measure’ diagram

2.4.3.1 Visions

The visions identified in CSEQ and BATS focus on infrastructure provision as a means of increasing cycling participation. These visions are compliant with policy 12.2 in SEQRP, which states cycling is to be supported with new infrastructure.

2.4.3.2 Missions

There is a lack of cohesiveness between the missions stated in CSEQ, QCS and BATS, because the target group specified in each mission statement changes between subsequent planning documents. For example, the target group in CSEQ is the ‘average South East Queenslander’, which is changed to ‘work commuters’ in QCS, and finally reverts back to anonymity in BATS, which simply states one in five trips will be active transport by 2026.

It is argued that by maintaining focus on a specific target group, for example work commuters in the QCS statement, local governments are influenced to prioritise infrastructure projects, cycling programs, and cycling policies in favour of work commuters. QCS contains the only mission statement which sets

a quantitative target for a specific type of cycle trip – QCS desires that by 2021, 2.8 percent of commutes to work will be by bicycle. BCC does not acknowledge this target in its mission statement.

2.4.3.3 Actions

Currently there are three main principal bikeways in Brisbane which connect cyclists in the outer suburbs to the CBD – the Western Freeway bikeway, the Southeast Freeway bikeway, and the Bicentennial Bikeway (Brisycle 2013). BCC launched the CityCycle scheme in October 2010, and built stations which service the Bicentennial Bikeway from Toowong to Newstead (CityCycle 2012). The Western Freeway bikeway and the Southeast Freeway bikeway are currently not serviced with CityCycle stations. The subject area of the CBD is the most densely serviced zone of the CityCycle network with 35 stations in this zone alone. Subsequently it is argued that CityCycle designers believe there is a large demand for egress trips in the CBD. However, the CBD has no significant cycling infrastructure and cyclists are forced to cycle in a road network which is predominantly one way streets, amongst traffic which flows onto and off the Pacific Motorway.

2.4.3.4 Measurement

There are several missions identified in the hierarchy of planning documents, so it is not clear which mission should be the yardstick to compare measurements against to form an evaluation. Also, there is no obvious evaluation methodology stated in any of the planning documents, on both a state and local level, to collect data in order to provide a basis for measuring the effectiveness of the actions. It is argued that with no measurement systems in place, there is no feedback which may highlight any deficiencies at the level of ‘action’. This knowledge gap was deemed a valid research topic for the CityCycle project, given that it is currently deemed to be underperforming.

In summary, the various ‘visions’ are consistent, the ‘missions’ are inconsistent, the ‘actions’ at local level do not acknowledge the mission stated in QCS, and there is no obvious evidence that any ‘measurements’ exist.

2.5 Conclusion

The literature review began with establishing what constitutes sustainability as defined in the SPA. This allowed a definition of sustainable transport to be proposed, and was subsequently found to be consistent with definitions of sustainable transport given by the EUCMT, and also the OECD. Urban cycling was proven to be a form of sustainable transport and a simple conceptual framework relating cycling interventions to an active cycling culture was formed in terms of the literature. Fifty six percent of the road network servicing the subject area of Brisbane's CBD was found to be one way streets with no cycling infrastructure, and one way streets are believed to be 'cyclist unfriendly' by the Irish Department of Transport. Further investigation showed little research into why this is so. It was deemed that this issue would impact the usage of CityCycle significantly given the subject area of the CBD contains 23 percent of the CityCycle stations. Subsequently the 'cycle friendliness' of one way streets in Brisbane's CBD became a relevant research topic for the CityCycle project.

The overall planning framework, which is the means by which an active cycling culture is to be created, was found to be fragmented with no obvious means to measure the effectiveness of local government cycling interventions. Due to the lack of literature on 'measurement', this issue also became a relevant research topic for the CityCycle project given that it is currently reputed to be underperforming.

3. Methodology

3.1 Introduction

Leedy & Ormrod (2001) state a research methodology specifies the methods used to collect and analyse the data which is specific to a particular academic discipline.

A research methodology has two primary functions. Firstly, it specifies the type of data that is to be collected; it controls and dictates the manner of acquisition of data, the optimal site of data collections as well as the actual sources of the data. Secondly, it corrals the data after its acquisition and allows the researcher to extract meaning from it through different data analysis processes such as tabulation for qualitative data, and descriptive statistical methods for quantitative data. Thereupon conclusions can be made which assist in answering the research question. This in turn builds knowledge in the gap previously identified by the literature review (Leedy & Ormrod 2001).

This chapter is subdivided into the stages which construct the methodology. Firstly, the ethics of primary data collection are discussed, which in turn create constraints on the means that primary data can be collected. Secondly, the research elements are specified. Next the optimal site for the primary data collection is discussed, and the specific research questions are tabulated. Finally, sources of secondary data are discussed which have the potential to add further meaning and perspective to the research questions.

3.2 Ethical statement

Due to time constraints, obtaining the permission of the USQ Ethics Committee for Human Ethics clearance to actively involve participants or respondents in the research project was not an option. The primary data was thus collected by means of unobtrusive observation; no attempt was made to gain the informed consent of the cyclists whose behaviour was recorded. However, according to Leedy and Ormond (2001, p.108) unobtrusive measures are appropriate in an instance such as this for the following reasons:

- Cyclists behaviour was recorded during their normal daily activities
- Cyclists were not asked to do anything they would not ordinarily do

- Cyclists were not scrutinized in a way which might potentially be embarrassing or invasive
- Cyclist's identities remained anonymous.

3.3 Design of the Methodology

3.3.1 Research Elements

One main objective of the CityCycle project was to be able to make recommendations which improve the productivity of the CityCycle program. Therefore it was necessary to identify an area of the CityCycle network which is underperforming, and then discover reasons why it is underperforming. Subsequently the CityCycle project has two research elements – the actual performance of a zone of the CityCycle network, and the factors which affect its performance. These elements will now be discussed in further depth.

3.3.1.1 Measurement of CityCycle performance

It was argued that the easiest way to identify an underperforming zone of the CityCycle network is simply to examine the data which shows the activity levels at the individual docking stations. Any clusters of stations with low activity levels will represent an underperforming zone in the network. However, CityCycle refused to divulge this data deeming it to be commercially sensitive (CityCycle Customer Support Team, 2013, pers. comm., 9 Sept). Measuring the performance of several docking stations was deemed to be impractical due to time and resource constraints. Therefore, it was decided to measure the performance of a single docking station within the CBD which was deemed to be strategically important for the following reasons:

- According to online blogs, the CBD is a neglected and underutilised zone of the CityCycle network (Feeney 2013)
- the CBD has the greatest density of CityCycle stations, and so it was argued that any improvement to the productivity of the CBD will have the most leverage towards improving the productivity of CityCycle as a whole
- it was argued the activity level of a strategically important station is indicative of the activity of the zone which surrounds it

3.3.1.2 Cycle friendliness

If the performance of the strategically important station in the CBD was found to be poor, it could be postulated that the CBD is a cycling unfriendly zone. The road network which services the CBD is predominantly one way streets, which are cyclist unfriendly according to Irish planning literature. Therefore it was argued there are enough one way streets to influence the usage of CityCycle in the CBD if one way streets are indeed found to be cyclist unfriendly.

As previously mentioned, cycle friendly routes are 'direct, coherent, attractive, comfortable and safe' (Department of Transport 2009, p.7). Research questions were formulated only for the attributes which could be measured by unobtrusive observation.

When a road network has no exclusive cycling infrastructure, such as in Brisbane's CBD, a cyclist is forced to ride on the road amongst traffic. It is argued that the directness and coherence of any cycle route is dependent on the journey of the individual cyclist. Also the attractiveness and comfort of a person's cycle route is a subjective opinion of the person involved. Qualitative primary data sourced from questioning cyclists in the CBD would be needed to address any research questions related to these attributes. Subsequently, researching the directness, coherence, attractiveness and comfort of one way streets in Brisbane's CBD was deemed outside the scope of this project.

Data relating to any research questions on safety can be gained by unobtrusive observation and also secondary data sources. Therefore the only component of cycle friendliness that can be objectively assessed within the constraints of this research project and the topic is safety. Subsequently investigating the safety of cycling on one way streets in Brisbane's CBD is an avenue of research for the CityCycle project.

3.3.2 Optimal Site for primary data collection

In order to maximise the use of available time, it was necessary to find a single site in the CBD where primary data could be gathered which would be relevant to both research elements. The proposed site would therefore need to be on a section of a one way street which has two main attributes. Firstly, it would need to be on a common route for a large number of cyclists to optimise the potential number of observations of cyclist's behaviour on a one way street in the CBD.

This would enable primary data to be collected which pertains to research questions on the safety of cycling on one way streets. Secondly, it would need to be in the vicinity of a CityCycle hub station with potential to be the origin of egress trips that would be useful to a large number of people. This would make the station strategically important, and so its activity would be indicative of the activity of the zone which surrounds it.

‘Cycle 2 City’ is a facility located in King George Square which provides bicycle storage, lockers and showers for people who wish to cycle into the CBD (Cycle 2 City 2013). Ann Street, which is highlighted yellow in figure 8, is a one way street in the CBD which provides direct access to King George Square for cyclists commuting south from Fortitude Valley. Cycle 2 City (2013) claim their facility has been designed to support people who want to ride to work but suffer inadequate workplace facilities. Subsequently it was hypothesised that Ann Street would be a common route for cyclists commuting to work in the CBD during the morning peak period, and would therefore be an optimum road on which to observe cyclist behaviour on a one way street.



Figure 8: CityCycle stations in the CBD

There are nine CityCycle stations on Ann Street. In order to choose which station which would be popular with CityCycle members, it was necessary to envisage a type of egress trip which could theoretically be useful to a large portion of the public, and decide which of the nine stations would most likely be the origin of such an egress trip. The following excerpts from local and state planning documents were used as a basis for a proposition:

- According to the Brisbane City Council (2011, p.11) ‘the compact nature of the CBD and inner city makes CityCycle a great choice for short trips.’
- People who cycle to work, school or education facilities ride more often than the majority of people who only cycle for recreation and exercise (Department of Transport and Main Roads 2011)
- The Queensland Government will focus on integrating cycling with public transport (Department of Transport and Main Roads 2011)

Based on these points, it is argued state and local government planners would expect people to use CityCycle in the CBD for egress trips as part of their daily commute to work. For example, a person who commutes by train to work in the CBD may choose to ride a CityCycle bicycle from Central Station to a CityCycle station closest to their place of work.

Service Planning (2013b) defines the ‘AM peak period’ as inbound services arriving at Central Station between 6am and 9am, and claim the maximum demand occurs from Tuesday to Thursday. The results from the most recent Queensland Rail load surveys were sourced to get an indication of the number of people expected to alight from Central Station during the AM peak period each day, and who could then possibly use a CityCycle as part of a multi-modal commute:

Load survey report	Inbound Alightings (daily 6-9am)	Time period of survey	Reference
2011 Q3	31,484	23rd Aug - 22 nd Sep 2011	Service Planning 2013a, p.39
2012 Q1	32,753	6th Mar - 23 rd Mar 2012	Service Planning 2013b, p.43
Average	32,119		

Table 4: Inbound alightings from Central Station during AM peak period

It was decided to measure the activity of CityCycle station 38 for the following reasons:

- Station 38 is located directly across the road from Central Station, and so is positioned for the convenience of rail commuters to the CBD. It is therefore a strategically important station in the CBD
- 32,000 people are expected to alight from Central Station during the AM peak period, whilst there are 23 stands in station 38 (CityCycle 2012). Therefore there is a huge potential market for station 38.
- The activity of station 38 would give a clear indication of the extent that workers in the CBD utilise CityCycles for egress trips.

CityCycle hub stations open at 5.00am (CityCycle 2012), making them available for use before the AM peak period begins. It was therefore decided to make the observations on Tuesday 20 August 2013 between 6am and 9am to coincide with the AM peak period on a day when public transport is used the most.

3.3.3 Research Questions

A series of hypotheses related to the research elements were made which in turn informed the research questions. Once the research questions were articulated, the rest of the methodology was formulated:

Research Element	Hypothesis	Research Question	Measurement	Data Type	Analysis
Measurement of CityCycle performance	Approximately 32,000 people alight from Central Station during the AM peak period. They could hire a bicycle from station 38 to complete their commute. The activity of station 38 is therefore an indication of the performance of CityCycle in the CBD.	How many people hire a CityCycle from station 38 during the AM peak period to use for an egress trip in the CBD?	Count the number of people who hire a CityCycle during AM peak period.	Quantitative	Bar graph of available CityCycle s and number of trips taken at station 38 during AM peak period.
Cycle friendliness of one way streets	Cycling infrastructure increases safety by separating cyclists from traffic and reducing potential conflict points.	What cycling infrastructure is available on Ann Street?	Measure lane widths, taxi zones, loading zones, bus stops. Record signage.	Qualitative: photographs and scale diagrams	tabulation
Cycle friendliness of one way streets	Traffic speed on roads with no cycle lanes should be 30km/h or less so cyclists are more likely to endure a crash without severe injuries. (Kim et al. 2007, p.238)	Do people adhere to the speed limit of 40km/h on Ann Street throughout the AM peak period?	Time traffic flow over 100m. At 40km/h, time must be less than 9s.	Quantitative	Line graph
Cycle friendliness of one way streets	Cyclists may feel unsafe riding amongst traffic and choose to ride on the footpath instead.	Do cyclists cycle on the footpath?	Count cyclists who ride on the footpath.	Quantitative	Pie graph
Cycle friendliness of one way streets	Cyclists may feel unsafe changing lanes in traffic, and instead choose to cross the road on foot at the pedestrian crossing	Do cyclists change lanes on Ann Street?	Count cyclists who change lanes	Quantitative	Pie graph

Table 5: Primary data methodology

3.3.4 Primary data collection

Saneinejad et al. (2012) state a person's tendency to cycle is negatively affected by temperatures below 15°C, rain, or strong winds. Weather conditions on the morning of 20th August 2013 were initially overcast, with no wind. By 8am the cloud cover had cleared, blue skies prevailed, and temperatures were mild to warm. Therefore it was deemed that conditions were ideal for cycling. It was also assumed that approximately thirty two thousand people alighted from Central Station during the period, as indicated by the load surveys in table 4, with sixteen bicycles available for hire at station 38. So for every bicycle available for hire, there were two thousand potential customers. Therefore the activity of station 38 could not be influenced by a lack of potential customers. For these reasons it was deemed sufficient to make observations of cyclist's behaviour and the activity of station 38 during one period only.

3.3.5 Secondary data

Qualitative and quantitative data was gathered from secondary sources in an attempt to discover further insights into the research questions.

3.3.5.1 Online blogs

Qualitative data in the form of blogs was gathered from online newspaper articles related to CityCycle. Repeating themes were identified in these responses and were subsequently codified so that their frequency could be recorded. This was used to determine which safety issues related to CityCycle are prominent to Brisbane residents.

3.3.5.2 Statistics of Cycling Accidents

Bicycle statistics are mainly sourced from hospital and police data. Hospital data is separated into injuries that require treatment, and injuries that require hospitalisation. In both instances it is the cause and type of injury that is recorded, with factors such as the accident location, road type, and traffic speed being overlooked. Therefore hospital data would not indicate any connection to one way streets. Police data contains information related to the site of the accident, however in order to be included in the database a crash must meet the following criteria:

- The accident occurred on a public road; and
- A person was killed or injured; or

- At least one vehicle was towed away; or
- The value of damage to property other than vehicles was at least \$2,500 (CARRS-Q 2010, p.25)

Studies have shown that reporting rates of bicycle crashes in Australia are very low, with analysis of Western Australia data suggesting that only 3.5 percent are reported, and most injuries are self-treated. Subsequently the statistics derived from police and hospital data are skewed towards serious injury crashes and those that involved motor vehicles, and do not give a true indication of the true extent of cyclist crashes (CARRS-Q 2010). Therefore any conclusions drawn from statistics will have to be well substantiated.

3.4 Conclusion

Due to ethical reasons, the primary data collection is constrained to collection by unobtrusive observation. The site of the data collection was in the vicinity of CityCycle station 38 for two reasons. This station is located in the immediate vicinity of Central Station, which is the most popular rail destination in Brisbane during the AM peak period. Subsequently station 38 is strategically important to the CityCycle network based on its advantageous position for multi-modal commuting. Measurement of the activity of station 38 will give an indication of the extent to which people who commute by rail to work in the CBD have embraced the CityCycle program to use a part of a multi-modal commute. Secondly station 38 is located on Ann Street, which is a one way street which provides access to the 'Cycle 2 City' facility in King George Square. For this reason, Ann Street is deemed to be an optimum location to observe cyclist behaviour on a one way street. Five research questions pertaining to the research elements were formulated, one to the activity of station 38, and four to the safety of cycling on a one way street. Secondary data sources were identified which provided further insight into the research questions.

4. Results and data analysis

4.1 Introduction

This chapter will present results of the research questions in the same order they were presented in figure X in the methodology section.

4.2 Measurement of CityCycle performance

4.2.1 How many people hire a CityCycle from station 38 during the AM peak period to use for an egress trip in the CBD?

At 6am on Tuesday 20 August 2013 there were ten CityCycle bicycles available at station 38. At approximately 6.40am, six more bikes were added to the station by the CityCycle redistribution team, and so were not included as a 'trip'. Between 8-9am two bicycles were parked at station 38 as the destination of their trip.

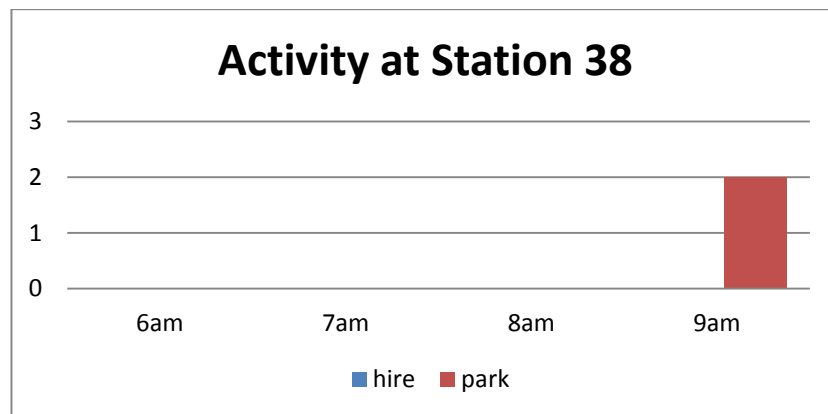


Figure 9: Activity at station 38 during AM peak period

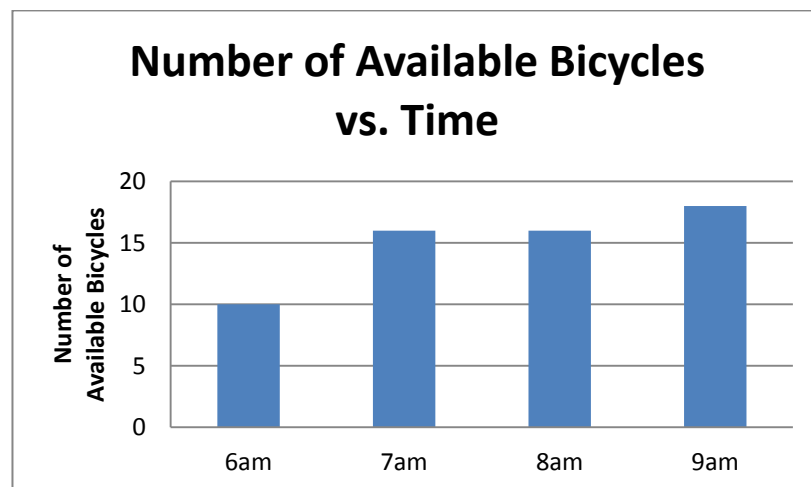


Figure 10: Available bicycles at station 38 during AM peak period

The following table summarises the number of trips to or from station 38 during the observation period:

Origin of trip	Destination of trip
0	2

Table 6: Summary of activity at station 38 during AM peak period

Nobody hired a CityCycle from station 38 during the AM peak period on Tuesday 20 August 2013. Clearly people who commute by rail to work in the CBD have not embraced the CityCycle program to use a part of a multi-modal commute.

4.3 Cycle friendliness of one way streets

4.3.1 What cycling infrastructure is available on Ann Street?

Figure 11 shows the road layout of Ann Street between Creek and Edward Streets:

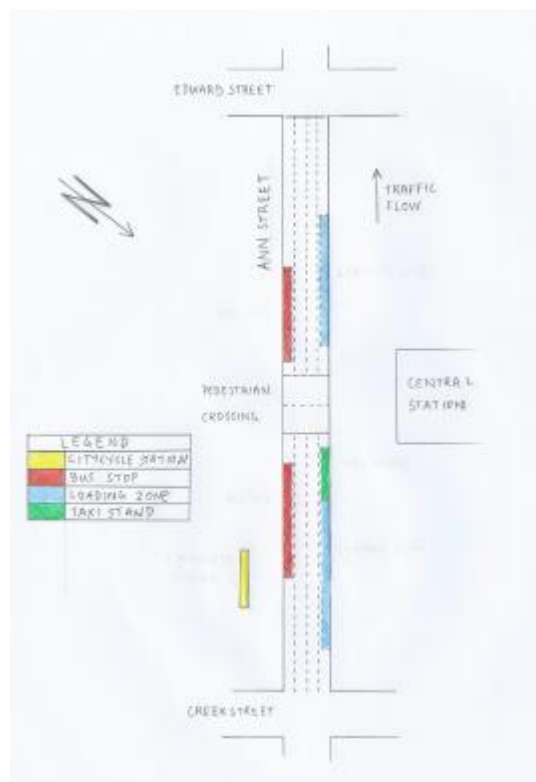


Figure 11: Diagram of street layout



Figure 12: Traffic speed limit sign for road works

The sign depicted in figure 12 is concreted into the pavement adjacent to the pedestrian crossing, and states the speed limit for traffic is 40km/h due to roadwork. However a visual inspection confirmed there were no road works in the vicinity of the sign.

The following table summarises the cycling infrastructure in the section of Ann Street:

Infrastructure element	Existence
Road	✓
Bus lane	✓
Bicycle path	✗
Shared path	✗
Bicycle lane	✗
Footpath	✓
Cyclist Signs	✗
Roadwork Signs	✓

Table 7: Available cycling infrastructure on Ann Street

In summary, cyclists have a legal right to cycle on the road, bus lane and footpath (Bicycle Road Rules 2013). Whilst legal access to infrastructure has been provided to cyclists, there are no infrastructure elements which have the appearance of catering specifically for cyclists. Furthermore, the speed limit sign erected by BCC makes no reference to cyclists, and so according to Pucher et al. (2010, p.332) there is no ‘clear signal that cyclists belong’.

4.3.2 Do people adhere to the speed limit of 40km/h on Ann Street throughout the AM peak period?

The distance between a lamp-post on the intersection of Creek Street and Ann Street and the 40km/h sign outside Central Station was measured to be 100m. If vehicular traffic respects the speed limit, they must not travel between these two marks in less than 9 seconds. The time a car took to travel between these two marks was recorded at regular periods throughout the morning with the results shown in figure 13:

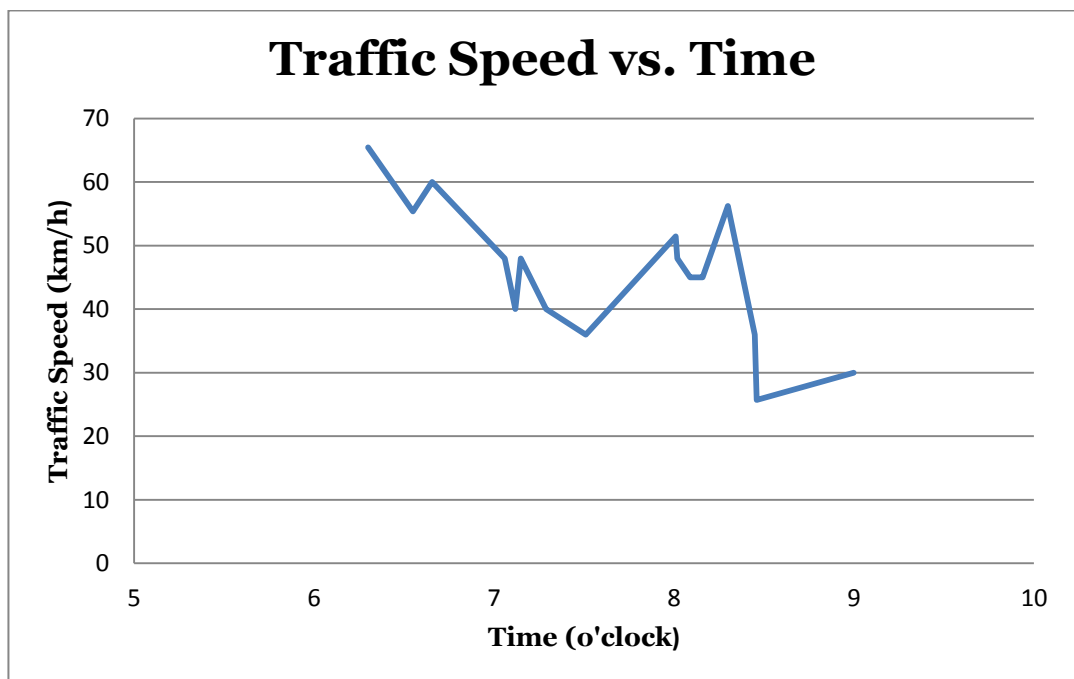


Figure 13: Vehicular traffic speed during AM peak period

It was noticed that traffic volumes and congestion increased with time. Typically when congestion was light earlier in the morning, motorists exceeded the speed limit significantly. Later in the morning, the speed limit could not be exceeded due to the congestion of the traffic. The following table summarises the observations:

Speed	Km/h
Maximum	65
Minimum	25
Average	46
Median	47

(n=16)

Table 8: Vehicular traffic speed statistics

Overall it was observed that motorists did not adhere to the speed limit of 40 km/h, and only drove within it when forced to by the traffic congestion.

4.3.3 Do cyclists cycle on the footpath?

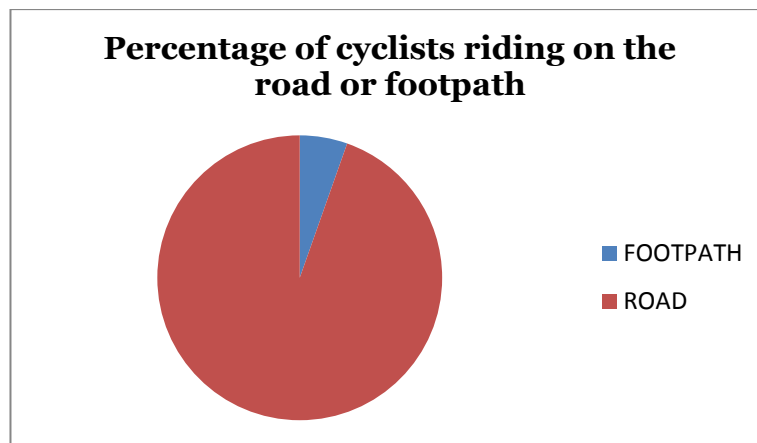


Figure 14: Position of cyclists on the road

Thirty seven cyclists rode on Ann Street during the observation period. Of these cyclists, only two rode on the footpath. This would seem to support the claim that people are not afraid of riding on a busy one way street with no exclusive cycling infrastructure. However it could be argued that only people with high tolerance to risk chose to cycle in the first place, and more risk adverse people would not venture to ride on Ann Street during the AM peak period.

4.3.4 Did cyclists change lanes on Ann Street?

None of the thirty seven cyclists attempted to change lanes:

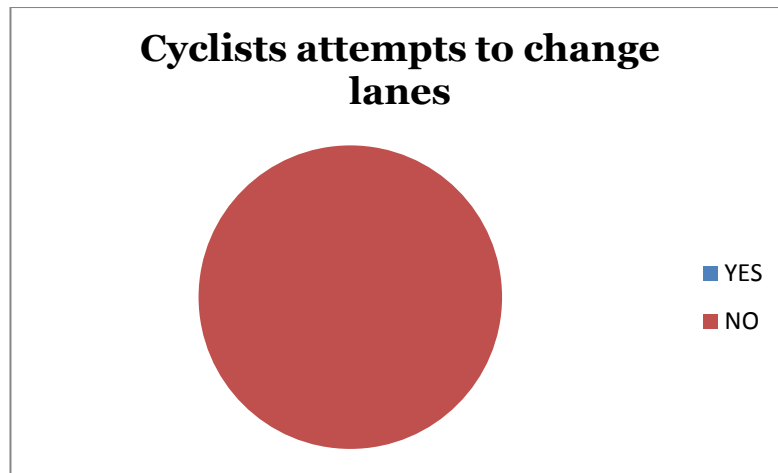


Figure 15: Lane changes by cyclists

This result does not mean the cyclists were afraid of changing lanes. For example it is possible most of the cyclists were on their daily commute and were familiar with the lanes, and had therefore positioned themselves so lane changes were minimised or unnecessary.

4.3.5 Secondary Data

The following table summarises the findings of the content analysis of the blogs which were sourced from the online newspaper articles:

ISSUE	ONLINE NEWSPAPER ARTICLE						TOTAL	PROPORTION
	70 per cent of CityCycle helmets go missing	Is Brisbane CityCycle 'designed' to fail?	Why is Brisbane CityCycle an unmitigated flop	CityCycle use rises after Go Card link	Lord Mayor defends CityCycle amid profit fall	Is cycling more dangerous than driving?		
helmets	15	9	10	14	10	1	59	29%
CityCycle costs	7	2	0	2	17	0	28	14%
infrastructure	4	4	3	1	8	5	25	12%
perceived usage	6	1	0	5	12	0	24	12%
spontaneity	0	9	1	7	3	0	20	10%
traffic/ drivers attitudes/speed limits	2	5	2	2	2	3	16	8%
stations	2	1	0	5	1	0	9	4%
advertising	0	2	0	1	4	0	7	3%
cycling in the CBD	2	1	1	0	1	0	5	2%
state of repair	1	3	0	0	1	0	5	2%
work commuting	2	0	0	0	1	0	3	1%
demand	0	0	2	0	0	0	2	1%
dangers of one way streets	0	0	0	0	0	0	0	0%
TOTAL	41	37	19	37	60	9	<u>203</u>	

Table 9: Content analysis of blogs from online newspaper articles

As can be seen the helmet debate is the most discussed issue, whilst the cost of running the PBSS, infrastructure provision, perceived use, lack of spontaneous access and traffic are discussed at similar levels. The issue of one way streets is

not mentioned at any time. This content analysis does not back up the statement in the planning literature that one way streets are cycling unfriendly.

4.3.6 Evaluation

4.3.6.1 Actual Safety

In order to evaluate the actual safety of cycling on Ann Street, links must be made between identified hazards and incidents that could occur due to the hazards, the risk of the incident occurring, and the level of safety due to the risk. These links will be made with references to the literature and the findings of the data analysis. In order to take a conservative approach, the worst case scenarios will be considered.

A hazard facing a cyclist who chooses to ride on the road is exposure to traffic. In the worst case scenario, a collision could occur between a cyclist and a motor vehicle which causes a fatality. As previously mentioned, studies have confirmed that there is a threshold around 30km/h, above which the probability of injury and fatality for cyclists colliding with motor vehicles strongly increases (Kim et al. 2007, Rosen et al. 2011). This finding is supported by Queensland crash data which shows the number and severity of cyclist injury against the signed speed limit at the crash locations:

Speed limit (km/h)	Total	Fatality	Hospitalised	Medically treated	Minor Injury
<40	60	1	14	19	26
40	377	7	106	147	117
50	1795	12	603	748	432
60	10,307	73	3,039	4,619	2,576
70	512	10	192	190	120
80	462	15	194	162	91
90	13	0	8	4	1
100	367	30	175	121	41
110	6	1	2	3	0

Table 10: Signed speed limit at bicycle crash locations by injury severity (CARRS-Q 2010, p.27)

The trend in this data shows an increase in frequency of all accident types from 40km/h to an eventual peak at 60km/h. The injury data has been plotted

against the signed speed limit at the location of the accident as a best approximation of the traffic speed. This is because it is not possible to record the actual speed of a vehicle at the precise moment of impact with a cyclist (CARRS-Q 2010, p.26). Therefore this data is not completely accurate, however the trends do reinforce the findings in the literature (see figures 16 & 17):

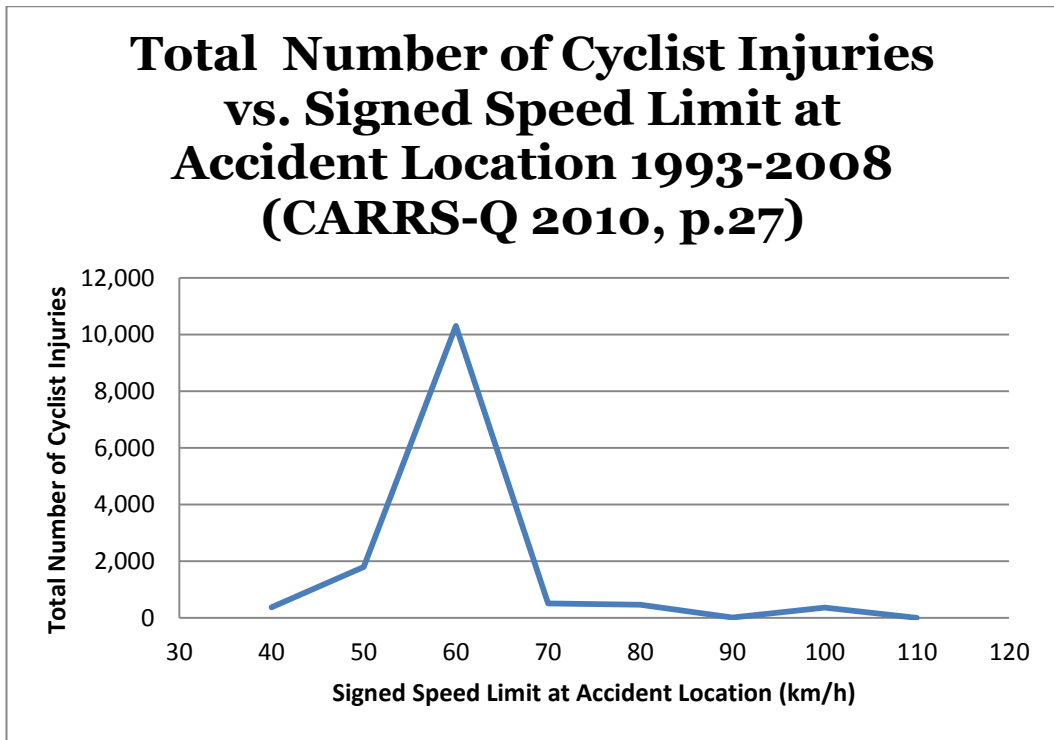


Figure 16: Cyclist injuries against signed speed limit

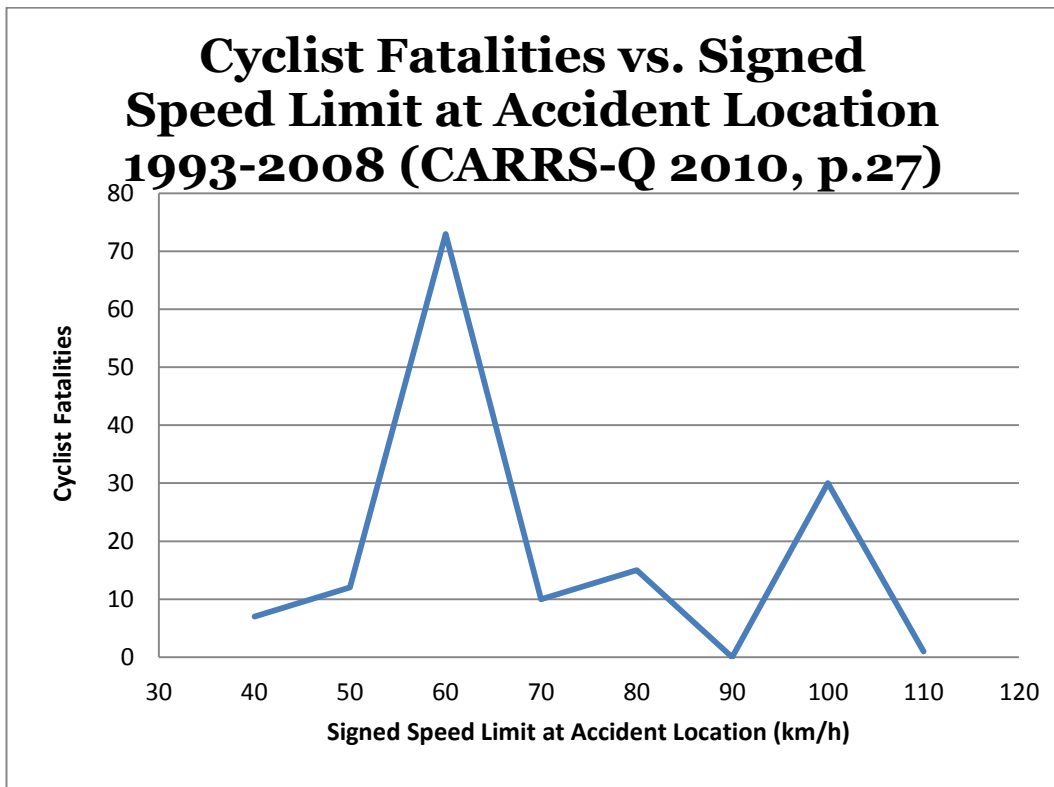


Figure 17: Cyclist fatalities against signed speed limit

The average traffic speed in the period of observation was 46 km/h, and the sign posted speed was 40km/h. At 40km/h the numbers of fatalities over a fifteen year period are low. However it is argued that whenever a cyclist shares a road

with traffic there is always the potential for a fatality, and statistics show that they do indeed occur at 40 km/h albeit at a rate of 0.5 fatalities per year. For these reasons it was deemed that the likelihood of a fatality occurring on Ann Street is rare. In the event of a fatality, that being the worst case scenario, the consequence is a loss of life. By reference to table 11, the consequence is therefore critical:

Consequence	Description of Consequence
Insignificant	No treatment required
Minor	Minor injury requiring First Aid treatment
Moderate	Injury requiring medical treatment or lost time
Major	Serious injury requiring specialist medical treatment or hospitalisation
Critical	Loss of life, permanent disability or multiple serious injuries

(Education Queensland 2013. p.2)

Table 11: Consequences of incident

It is now possible to assess the risk of cycling on Ann Street by means of the risk assessment matrix supplied by the Queensland Government Department of Education (Education Queensland 2013, p.2):

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Critical
Almost Certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	High	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Low	Medium

Table 12: Risk assessment matrix

The likelihood of a fatality on Ann Street is statistically rare and the consequence would be critical, therefore Ann Street is a medium risk cycling environment (see table 12). The final step is to link the level of risk to safety.

Reynolds et al. (2009) claim comparisons of the safety performance of different types of infrastructure may be confounded by different levels of skill or risk taking behaviour. Schepers et al. (2013, p.6) state ‘...the risk of collisions depends on ... how well road users are able to handle conflicts’. The common theme between these two findings is the chances of an incident occurring are dependent on the skill of the cyclist in managing risk, and in the risk taking behaviour shown by the cyclist. In other words, the actual safety of cycling on Ann Street depends on the skill levels of the cyclist and motorist and the behaviour they display. It is argued that as Ann Street is a medium risk environment, it is only safe for cyclists of average to above average ability who ride sensibly amongst traffic.

4.3.6.2 Perceived Safety

A survey performed by Queensland Transport found that only 17 percent of cyclists feel safe on a road with no cycle lanes (Department of Transport and Main Roads 2011b). In other words, 83 percent of cyclists would not feel safe cycling on Ann Street.

4.4 Conclusion

Nobody chose to hire a CityCycle from station 38 during the AM peak period of Tuesday 20 August 2013, and so workers in the CBD have not embraced the CityCycle program as a means of transport within the CBD.

There is no infrastructure in the study area specifically for cyclists, and so there is no message to motorists that cyclists belong. This is compounded by a speed limit sign that warns motorists to reduce their speed due to road works that do not exist. Cyclists can choose to cycle on the footpath amongst pedestrians, or on the road amongst the traffic which does not observe the speed limit. Neither observations of cyclist’s behaviour nor content analysis of online blogs gave any indication that one-way streets are cyclist unfriendly.

Ann Street was deemed to be safe for cyclists of average to above average ability who ride sensibly in traffic; however it is perceived as being unsafe by an overwhelming 83 percent of cyclists due to the lack of exclusive cycling infrastructure.

5. Discussion

5.1 Introduction

This discussion will begin with considering the performance of station 38 and how that relates to the performance of CityCycle within the CBD. It will then attempt to explain the inactivity of station 38 based on the findings within this project. Finally, the planning cycle and planning framework will be revisited as it is argued that if these components function efficiently, the problems with CityCycle will be identified and rectified.

5.2 CityCycle

It is assumed that people who commute to Central Station to work in the CBD do so on average five times each week. Therefore they represent a significant target market for CityCycle which could provide consistent revenue for the program if they embraced CityCycle as part of a multi-modal commute. This is backed up by the following points taken from the Draft Brisbane Active Transport Strategy:

- The compact nature of the CBD makes CityCycle a great choice for short trips
- The Brisbane CBD is one of Council's primary targets for increasing cycling trips
- Target markets include workers (Brisbane City Council 2011, pp.10-11).

To put it succinctly, workers in the CBD are a primary target market for CityCycle. It is argued that if a person does intend to hire a CityCycle after they alight from Central Station, then they will probably do so as quickly as possible to reduce the walking distance in their commute. If they ignore station 38 and walk a few blocks before they hire a CityCycle from another station, then the advantage of hiring a CityCycle wanes as they have become closer to their final destination. So it is assumed that as no one hired a CityCycle from station 38 during the AM peak period, it is unlikely that anyone who commuted by train to work in the CBD used a CityCycle to complete their journey. Therefore CBD workers have not embraced CityCycle and the program has failed to attract one of its primary target markets, as deduced from the Draft Brisbane Active

Transport Strategy. It follows the activity of station 38 during the AM peak period is unacceptable.

The inactivity of station 38 could not be attributed to the predominance of one way streets in the CBD based on the research in this project. There was no mention of any problems associated with cycling on one-way streets in a content analysis of the online blogs. Furthermore, the conclusions drawn from the analysis of the primary data regarding the safety of Ann Street are independent of the type of traffic flow, and do not give any insight to the safety of one way streets. For example, the fact that traffic congestion hinders cyclist's ability to change lanes is a problem not limited to one way streets. Similarly traffic speed, a lack of cycle lanes or cycle paths, and multiple potential points of contact are issues that are not specific to one way streets. These issues affect safety on two way streets as well.

According to the Queensland Government cyclist survey (Department of Transport and Main Roads 2011b, p.19), 17 percent of cyclists would feel safe cycling on Ann Street (see figure 18):

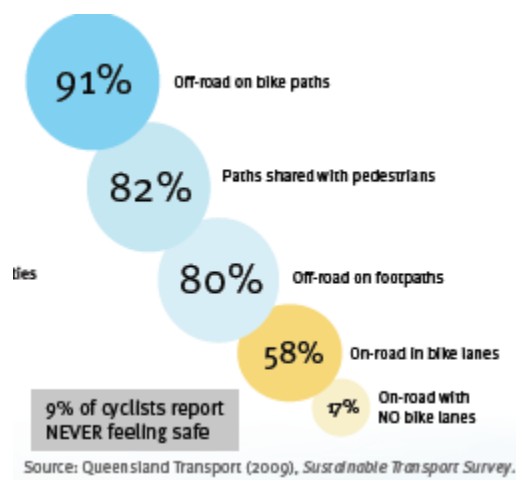


Figure 18: Situations where cyclists report feeling safe

In a study analysing transport mode choice decisions for disabled people, Schmöcker et al. (2007) found that in most cases public transport modes are not preferred, in particular rail modes. Therefore it is assumed that the majority of the 32,000 people who alighted from Central Station could walk unassisted. It will be further assumed that this majority all have the ability to ride a bicycle to varying degrees of proficiency, and can be classified as potential cyclists. It would only take 0.5 percent of this sample to hire a CityCycle for all 16 available

CityCycles at station 38 to be used at least once, which is well inside the 17 percent threshold who feel safe cycling on-road with no bicycle lanes. Subsequently the lack of perceived safety of cycling on Ann Street was not deemed to be a factor to the lack of activity of station 38, and there must be other reasons which influence the public's decision to shun the idea of hiring a CityCycle from station 38.

As highlighted in the literature review, DTMR have set a target that by 2021, 2.8 percent of all work commutes will be by bicycle (Department of Transport and Main Roads 2011b). As this goal has been stated in a state planning document, it follows that CityCycle should cater for work commuters to the best of its ability. Clearly the most densely populated work environment within the CityCycle network is the CBD. Therefore CityCycle can contribute to the state governments' goal by locating stations such that access to and within the CBD is provided, and by ensuring that the public embrace the scheme.

The people who commute by train to Central Station to work in the CBD have clearly not embraced the scheme. Therefore this portion of the CityCycle network is making no contribution to the state governments goal for active transport. It is argued that the productivity of the CityCycle network could be improved in a manner which complements the state government's active transport goals by relocating any poorly performing stations within the CBD to locations which would enable people to commute to the CBD. The obvious places are the two main principal bikeways in Brisbane which connect cyclists in the outer suburbs to the CBD and are currently not serviced with CityCycle stations – the Western Freeway bikeway and the Southeast Freeway bikeway.

The performance of station 38 was measured for the AM peak period only, and not for the entire seventeen hours which the station was open. Until the activity of station 38 is observed for the full seventeen opening hours, there is no evidence to objectively determine that it is an underperforming station. As CityCycle refused to divulge the data on the stations, there is no comprehensive reliable evidence to comment on the performance station 38 or any other station in the CityCycle network. As such, there is no reliable evidence to decide the strengths and weakness of the CityCycle network. This is deemed to be a major problem, as initiatives to improve the productivity of CityCycle cannot be

made until the shortcomings of the network are identified, and the program will continue to underperform.

One way to determine any shortcomings of the program is to ask its users; or to put it more simply, use public consultation. CityCycles are not available to non-members, and the email addresses of all members are known to CityCycle. A unique opportunity therefore exists to question every CityCycle user. A questionnaire could be sent to all members via email which could generate qualitative data that would provide insight into issues facing CityCycle. For example,

- Why do you use CityCycle?
- Do you use CityCycle in the CBD?
- If not, why not?
- How regularly do you use CityCycle?
- Are there places in Brisbane where you would like to use CityCycle but are not serviced by CityCycle stations?
- Do you think it is worth servicing the Western Freeway bikeway and the Southeast Freeway bikeway with CityCycle stations?

CityCycle's refusal to divulge information or cooperate with external parties on the grounds of commercial sensitivity is therefore a barrier to evaluating the performance of the CityCycle program.

5.3 Planning Cycle

It is argued that in a functional planning framework, the visions and missions expressed in the various state planning documents will be consistent with each other, and be implemented through the actions of local government. The effectiveness of the actions will be ascertained by monitoring and measurements, which feedback into the original vision in a helical process. Comparing a measurement of an action to the original vision is a vital step in maintaining the integrity of the planning cycle. In other words, if the intervention is underperforming, or indeed if it does not contribute in any way to the original vision, it will be identified in the 'measurement' phase of the cycle.

There are numerous state planning documents which influence the decision making of BCC regarding active transport. Examples include the South East Queensland Regional Plan, Connecting South East Queensland 2031, Queensland Cycle Strategy, and the Principal Cycle Network Plan. It is argued that if there is no coherency and consistency between the missions outlined in these documents, any influence on local government at the point of action becomes less authoritative. As such, the missions detailed in SEQRP, CSEQ and QCS will be revisited in order to appraise their quality, and also the consistency with each other.

Firstly, in the SEQRP, Hinchliffe (2009, p. 39) asserts ‘urgent action is necessary to stabilise greenhouse gas emissions at a level where the effects of extreme climate change can be avoided.’ Working on the assumption that sustainable transport will help prevent climate change, this can be taken to mean urgent action must be taken to achieve sustainable transport. This mission can be taken as a benchmark for evaluation purposes, as it is set in the SEQRP and has statutory power.

Secondly, as previously mentioned in the literature review, the DTMR present a long term transport plan to achieve sustainable transport in the CSEQ state planning document. The long term transport plan is presented in the form of a bar graph which represents actual transport levels in 2006, and forecast transport levels in 2031 (see figure 19). DTMR (2011a, p.4) state these goals can be achieved if ‘the average South-East Queenslander changes just three of their seventeen weekday trips per week from car to public transport, cycling or walking.’ The quality of this plan can be determined by examining the assumptions on which it is based.

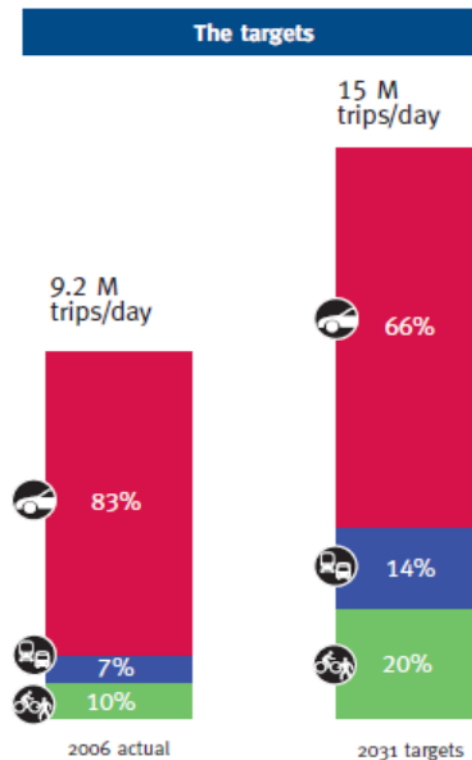


Figure 19: South East Queensland transportation targets to 2031

(Department of Transport and Main Roads 2011a, p. 4)

Firstly, the targets are presented under a heading entitled ‘A vision for sustainable transport’. However, there is no reference to any quantitative measurements which can prove environmental sustainability in terms of a recognized model. For example, they do not state these projected transportation mode share targets will keep CO₂ emissions at or below their 1990 levels to prevent climate changes, in accordance with the targets stipulated by the OECD (cited in Geurs & van Wee 2003, p. 33). Nor is there mention of a specific threshold on daily vehicle trips in South East Queensland which will ensure environmental sustainability. With no benchmark to use as a comparison, it is actually not possible to see whether the forecasted motor car use is in fact environmentally sustainable. Also, there is no mention of the impact on economic and social sustainability of an increase of 2.2 million car trips per day from 2006 to 2031.

Secondly, DTMR (2011a) assume that every ‘average South-East Queenslander’ has read page 4 of the state planning document ‘Connecting SEQ 2031 – An Integrated Regional Transport Plan for South East Queensland 2011’, and

realise they need to change three of their weekly trips to public or active transport on an ongoing basis for the sake of environmental sustainability. It is argued that the average South East Queenslander would be unaware of the existence of this document and therefore will not adopt the suggested sustainability strategy.

Thirdly, DTMR (2011a) have assumed a behaviour modification strategy can be based on the average mode share use of transport. It is argued there are scenarios where it would be unlikely for people to adopt their strategy, yet the same people in these situations contribute to the averages of mode share trips. For example, people who always use public or active transport will not be able to increase their use of it. Goudie (2002) argues no public transport system within affordable political budgets is ever likely to provide a level of service of sufficient appeal to attract large numbers of car users to switch to public transport across the many travel markets. So it is argued people who reside in dormitory suburbs on the urban fringe with poor access to public or active transport will be likely to use a car for all of their weekly trips. Therefore it is argued that state planners cannot realistically apply their mitigation strategy to the average person, and they will have more effectiveness at the level of action if they set quantitative targets for specific target markets.

Fourth, the forecasted motor vehicle use assumes the average person will definitely change three of their weekly trips to public or active transport on an ongoing basis. In other words, there will be a 100 percent compliance with the strategy. Steg (2010) claims cars are perceived as a way of expressing a person's identity and confirming their societal position, while driving is more about being a pleasurable and stimulating activity rather than just a mode of transport. Steg further argues making cars less attractive and alternative transport modes more attractive is the key to achieving sustainable transport. Therefore it is argued that whilst a person's responsibility to change three of their weekly trips to public or active transport is seen as an obligation rather than a desirable option, it is unrealistic to assume there will indeed be 100 percent compliance with the strategy.

In summary, the planning issues pertaining to sustainable transport have not been addressed in the CSEQ sustainable transport strategy. This reflects poorly on the quality of the planning document as critical issues are not addressed,

while unfounded assumptions form the basis of the sustainable transport strategy.

The third state planning document to be revisited is QCS, where the DTMR set a target that by 2021, 2.8 percent of all work commutes will be by bicycle (Department of Transport and Main Roads 2011b, p.6). This is deemed to be a better formulated quality mission, as it specifies a target market and gives a quantifiable goal to achieve. This will inform decision making at the level of action, and can be considered to be consistent with the SEQRP.

CSEQ and QCSA have different mission statements; therefore it is unclear which mission BCC is expected to follow. BCC could aim for 2.8percent of all work commutes to be by active transport by 2021, or rely on individuals to make the necessary changes as directed in the 'Connecting SEQ 2031' document. In fact, BCC created a new mission; one in five trips to be by active transport by 2026 (Brisbane City Council, 2011). It is argued that if CSQ had set the same quantitative active transport targets for work commutes as QCS, then as a unifying force they would create greater direction to BCC to reiterate this mission in their local government planning documents, and then to achieve it. This could have the potential of affecting the design of the CityCycle stations, as it might be deemed necessary to service all the principal bikeways into the CBD to help achieve the work commute target.

The final stage in the planning cycle, which has proven to be problematic, is the level of measurement. CityCycle have the data which shows the performance of the individual docking stations, and would be aware of the strengths and weaknesses of the network. However, this information remains confidential due to commercial sensitivity, and so is inaccessible to external evaluators. From an external research perspective the 'vision-mission-action-measurement' cycle breaks down at this point.

5.4 Recommendations to improve CityCycle performance

It is argued that problems within the planning framework and the CityCycle program be addressed so that the 'vision-mission-action-measurement' functions effectively.

It is imperative that continuity is maintained within the planning framework. It is the recommendation that all policy pertaining to cycling be contained within a

single state planning document. This document will set quantitative targets for specific target markets and policies which provide a structure for achieving these targets. This document will require statutory power to ensure compliance from local governments. This eradicates the current problem of having different mission statements from fragmented sources.

It is also recommended that the primary target market is work commuters as the majority of active transport trips are for the purpose of commuting to and from places of employment (Department of Transport and Main Roads 2011b). Therefore, if work commuters embrace active transport they will be making the largest contribution towards sustainable transport.

Finally, it is important CityCycle divulges the information regarding station activity so that a diagnostic of the CityCycle network can be made. It is argued CityCycle has an obligation to do so as it has cost ratepayers \$14 million over the last four years (Feeney, 2013), and so rate payers are entitled to transparency. Also, having an understanding of the strengths and weaknesses of the network would help eradicate unjustified negative speculation on the program from people who assume the entire CityCycle network is neglected:

Last time I saw anyone near one of those bikes it was a maintenance person wiping the dust and cobwebs off them.

Peter Stanton, June 17 21013 (Feeney, 2013)

5.5 Suggestions for further research

It is suggested that there be an investigation into the necessity to maintain commercial sensitivity of the data held by CityCycle in relation to the activity levels of each individual station in the CityCyle network.

The following is a list of postulations of possible causes for the lack of activity at station 38 during the AM peak period:

- People do not wish to carry a cycle helmet around with them, and they do not wish to share a communal helmet
- Female clothing, such as dresses, is not suitable for cycling
- People's final destination from Central Station is within acceptable walking distance anyway

- Cycling is more physically demanding than walking and may cause users to become sweaty prior to sitting in an office for eight hours
- Either exclusive cycling infrastructure or an enforced speed limit of 30km/h must be implemented in the CBD to make it a low risk cycling environment, and therefore have appeal to cyclists to all ages and levels of ability

5.6 Conclusion

The findings from the research within this project could not explain the inactivity of station 38. It was postulated the productivity of the CityCycle network could be improved in a manner which complements the state government's active transport goals by relocating any poorly performing stations within the CBD to locations which would enable people to commute to the CBD, such as along the Western Freeway bikeway and the Southeast Freeway bikeway. It was argued that the planning framework and the planning cycle must operate efficiently to ensure improvement to CityCycle. This begins with eradicating all spurious planning policy related to active transport within the state planning documents, followed by streamlining the documentation such that all policy at state level related to cycling is contained within a single planning document. Finally, CityCycle is the entity in the most advantageous position at the stage of 'measurement' within the 'vision-mission-action-measurement' cycle, as it has the data which shows the activity of each station within the CityCycle network. Its refusal to divulge the data on the grounds of commercial sensitivity is deemed to be contrary to the integrity of the planning cycle, and so the main recommendation for further research is to investigate why this information is commercially sensitive.

6. Conclusion

The CityCycle program was launched by BCC to provide an active and sustainable public transport option aimed at reducing traffic congestion and parking pressures in Brisbane's inner city. This dissertation established that urban cycling is indeed a form of sustainable transport. It also established that the CityCycle program has been rejected as a means of transport for egress trips in the CBD by workers who commute by rail to work in Brisbane's CBD. This is in spite of the fact the CBD is the most densely serviced zone of the entire CityCycle network, and the CBD has been identified by BCC planners as a primary area for increasing cycling activity.

Studies have shown that several kinds of interventions are necessary to create an active cycling culture. That is to say, it is not enough to simply launch a cycling program such as CityCycle as a sole intervention and expect it to succeed. Any cycling program needs to be complimented with cycling infrastructure and policies which promote cycling. To put it succinctly, an active cycling culture is the result of the synergies between the provision of cycling infrastructure, cycling programs, and cycling policies.

Whilst certain cycling interventions may be intended to act as a facilitator to creating an active cycling culture, they may in reality act as a barrier. For example, compulsory helmet law in Australia is a cycling policy intended to ensure safety to cyclists in the event they fall off their bicycle, however it is considered by many to be an inconvenience that reduces the attractiveness of cycling in the first place. This project chose to focus on cycling infrastructure within the CBD in an attempt to gain insight as to why workers within the CBD have not embraced the CityCycle program. The specific focus was the cycle friendliness of one way streets, for two reasons. Firstly, international planners regard one way streets as being cyclist unfriendly. Secondly, the road network within Brisbane's CBD is predominantly one way streets.

Due to time restrictions it was not possible to achieve the required ethics clearance to engage in qualitative research involving focus groups or questionnaires. Therefore any primary data could only be collected by unobtrusive observation. Observations of both cyclists and motorists' behaviour on Ann Street in the vicinity of Central Station were made in an attempt to gain insight

into the research questions, which were related to the safety of cycling on one way streets.

There is no infrastructure exclusively for cyclists on Ann Street in the vicinity of Central Station. Also, the vehicular speed limit of 40km/h is too high to be safe for cyclists in the event they have a collision with a motorist. This is compounded by the fact that motorists do not adhere to the speed limit anyway. Whilst these factors combined to determine that Ann Street is a medium risk environment for cyclists they gave no insight to the safety of one way streets, as a lack of exclusive cycling infrastructure and excessive vehicular speeds are issues which also apply to two-way traffic flows.

Observations of cyclists behaviour also gave no indication that one-way streets are unsafe. All the cyclists positioned themselves on the road such that lane changes were unnecessary; they looked confident cycling amongst heavy traffic and did not feel intimidated to the point they would prefer to cycle on the footpath. Furthermore the issue of cycling on one-way streets did not arise in a content analysis of online blogs related to several articles on CityCycle. Overall the evidence did not support the claim in the literature that one-way streets are unsafe for cyclists. The research therefore gave no insight as to why CityCycles are not used for egress trips by workers who commute to the CBD by rail.

The only aspect of cycle friendliness of one way streets which was researched in this project was safety. The other aspects of cycle friendliness, being the attractiveness, comfort, coherence and directness of cycle routes within the CBD, remain unknown. The data collection method of unobtrusive observation determined that the CBD is a problem area for CityCycle, but it proved to be a poor research method for investigating the cycle friendliness of one way streets. A more effective way to discover why CityCycle is underutilised in the CBD is to ask its users and the public; or to put it more simply, use public consultation. CityCycle is in the most advantageous position to do so for two main reasons. Firstly, it has the data which shows the activity levels of all the stations and so will be aware of all of the problem zones within the CityCycle network, including the CBD. Secondly, it has the email addresses of all the members of CityCycle. CityCycle is therefore in a position where it can email a questionnaire to its members asking specific questions about the problem areas in the CityCycle

network. The qualitative data generated by a questionnaire will better inform the causes for CityCycles underperformance in the CBD.

While the research gave little insight into the reasons for CityCycle's poor performance in the CBD, it did highlight deficiencies within the planning cycle and planning framework in South East Queensland. For example, the mission statements related to cycling contained within the state government planning documents 'Connecting SEQ 2031' and 'Queensland Cycle Strategy 2011 – 2021' are different. The mission statement related to cycling contained within the local government planning document 'Brisbane Active Transport Strategy 2012 – 2026' is different than the two mission statements contained in the state government planning documents. CityCycle uses ratepayers' money to bridge its shortfall in profits, yet there is little evidence of transparency regarding its operations. For example, CityCycle refuses to share information with external sources on the activity levels of the stations within the CityCycle network, as this information is deemed to be commercially sensitive. There is also little evidence that CityCycle uses public consultation as a means of gathering information to use as a basis to improve the CityCycle program. In summary, policies related to cycling within the state government planning framework were found to be inconsistent and at times spurious. This is compounded by the fragmented sources of cycling policy across several state planning documents, which places little onus on local government to comply with state government planning policy. Finally, from an external perspective, the planning cycle breaks down completely when appraising the performance of the CityCycle program due to CityCycle's refusal to share information on the activity levels of the stations within the CityCycle network.

This dissertation argues that improvements to the production of the CityCycle program will be instigated in the process of remedying the weaknesses within the planning framework and planning cycle. Firstly, it is recommended that all policy related to cycling at state level be contained within a single planning document, as seen in the Irish planning literature. Secondly, it is recommended that state government cycling policy contains quantifiable targets for specific target markets. The intention is to set a clear mission for local governments to achieve, and also provide a framework for evaluation at the 'measurement' stage of the 'vision-mission-action-measurement' planning cycle. Thirdly, it is

recommended that CityCycle releases information on the activity levels of the stations within the CityCycle network to external sources. This level of transparency is considered a courtesy to ratepayers, as it is ratepayers' money which is currently subsidising the CityCycle program. Fourth, it is recommended that CityCycle gathers feedback on the CityCycle program by emailing its members a questionnaire regarding the problem areas of the CityCycle network. This feedback can be used as a basis for making improvements to the CityCycle program. If it should be decided that it is not practical to service Brisbane's CBD with a PBSS, the productivity of CityCycle could be improved in a manner which complements the state government's active transport goals by relocating any poorly performing stations within the CBD to locations which would enable people to commute to the CBD, such as along the Western Freeway bikeway and the Southeast Freeway bikeway.

In the event that none of the recommendations from this dissertation are actioned, it is suggested that the justification of CityCycle's position to withhold commercially sensitive data be investigated.

In closing, this dissertation has made one important finding – workers who commute by rail to the CBD during the AM peak period do not utilise CityCycles for egress trips within the CBD. Research into the cycle friendliness of one way streets was ineffective, and therefore all recommendations to improve the CityCycle program were based on remedying problems within the planning framework and planning cycle. Ultimately, the aim is for CityCycle to operate as a going concern based only on the funds it receives from its members who pay to use CityCycles.

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Appendix A: Project Specification

University of Southern Queensland

Faculty of Health, Engineering & Sciences

ENG 4111/4112 Research Project

PROJECT SPECIFICATION

FOR: Andrew SAVAGE

TOPIC: The Brisbane Bicycle Hire Scheme as an attempt to promote urban cycling.


SUPERVISOR: Marita Basson

ENROLMENT: ENG 4111 – S1, 2013
ENG 4112 – S2, 2013

PROJECT AIM: This project seeks to investigate the outcomes of the Brisbane Bicycle Hire Scheme ‘Citycycle’

PROGRAM: **Revision F, 1st June 2013**

1. Research the international and national literature regarding bicycle sharing schemes, and cities which create an active cycling culture.
2. Research the planning legislation and government planning documents which provide the framework on which local governments base their planning strategies for urban cycling.
3. Develop a conceptual framework based on the literature which connects the essential aspects of an active cycling culture, and identity the position of a generic bicycle sharing scheme within that framework.
4. Methodology: Conduct a mixed method case study to gather both quantitative and qualitative data, which will be used to inform the research questions. Quantitative data will be gathered using unobtrusive observation of cyclist’s behaviour. Qualitative data will be gathered from secondary sources such as blogs from online newspaper articles on CityCycle.
5. Evaluate the success of CityCycle within a specific zone of the CityCycle network.
6. Make recommendations which could improve CityCycle.
7. Prepare and submit the final dissertation

AGREED:  (Student) APPROVED (Supervisor)

Appendix B: Risk Assessment

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Critical
Almost Certain					
Likely			1, 2		
Possible					
Unlikely					
Rare					

Risk Legend:

Risk Legend	
	Low
	Medium
	High
	Extreme

Item number	Activity	Hazard	Risk control
1	Working on computer	Back problems	Stretching every 30 minutes to change position
2	Working on project	High workload, stress	Good diet, exercise, USQ support at Stanthorpe.

