University of Southern Queensland

Faculty of Health, Engineering and Sciences

School of Civil Engineering & Surveying

'The impact of a new light rail network upon walkability in a central business district'

A dissertation submitted by

Mrs Nadya Miller

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ABSTRACT

Traditionally, in Australia, development has occurred in a way that has encouraged car use rather than public or active transport. Recently, there has been an increasing amount of research into walkability and how it can best be encouraged when designing neighbourhoods, in order to reduce those problems associated with car dependency such as urban sprawl and increased obesity rates. The recent construction of a light rail system on the Gold Coast presents an opportunity to utilise and apply findings from existing research to existing pedestrian infrastructure, walkability levels and connectivity to some important destinations from a new light rail station. Therefore, this research paper aims to determine to what degree the walkability concepts have been considered during the design and construction of pathways from new light rail stations to important destinations, and to provide recommendations which will aid policy makers when designing the next stages of this network and future networks. The paper will have a specific focus on the factors that impact upon the attitudes and behaviours to walking.

The mixed methods research project revealed that the routes to the key facilities around the case study tram station were in fact very walkable and well connected, but identified some important factors which inhibit walkability. Suggestions and recommendations are provided to enhance the desirability of walking in a central business district. The key issue this research paper has identified is that the development of a light rail system and the upgrade to the walking facilities around it will not automatically increase the number of people walking in an area, and that policy makers should consider many other factors during the planning, design and implementation stages of new pedestrian networks.

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N. Miller

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CHAPTER 1

1.0 INTRODUCTION

> 'City officials want to encourage people to walk to make
> downtowns safe and popular destinations for residents, workers and
> shoppers; social equity advocates want to make walking possible
> and pleasant for elders, women, children, transit riders, poor people
> and people with disabilities; environmentalists want alternatives to
> more parking, roads, car emissions, and automobile dependency;
> and New Urbanists want to design diverse, pedestrian-friendly
> places that support resource efficiency and a sense of community'
> (Brown et al. 2007, p. 35).

With this in mind, the aim of this research project has been to analyse the walkability of an area, with specific focus upon new pedestrian accessibility opportunities arising from the new light rail stops in the central business district of the Gold Coast, Southport. The research will first determine what factors impact levels of walkability and connectivity, and magnets or high attraction facilities in the area will be identified. The aim of the researcher was then to provide recommendations which may improve the levels of walkability and connectivity in that area.

Chapter 1 will commence with providing some background information about the subject area of this research project. This will be followed by an explanation of the project objectives, and justification for this research will then be described. After which, a brief outline of this dissertation will be provided. The penultimate section is

a discussion of the consequential effects of this research, with particular regard to sustainability, safety and risk analyses, and ethical responsibility. Finally, the conclusion will summarise the chapter and discuss what is comprised in Chapter 2.

1.1   Background

The suburb of Southport on the Gold Coast in Queensland, has been the city's Central Business District (CBD) for many decades. In the last few decades, the area has declined in desirability for both commerce and recreation as a result of a number of factors, including the age and state of repair of facilities such as the building facades and street furniture in the area, as compared to other more recent and modernised, high density areas such as Broadbeach and Surfers Paradise (GCCC 2013).

The Gold Coast district, and in particular Southport, will be the host city of the 2018 Commonwealth Games (GCCC 2013). Many millions of dollars are currently being invested in preparing the city for this event. Recently, Southport was identified as a Priority Development Area under the *Economic Development Act 2012*. This assigned status could possibly, in part, be a result of the upcoming major international event (GCCC 2013). Now that the Gold Coast City Council has the support of the State Government, major redevelopment is proposed for Southport. A significant portion of this redevelopment has been designed around the new light rail system which has been constructed between Southport and Broadbeach and which commenced operation on the 20th July 2014 (GCCC 2013).

The first stage of the light rail network is 13 kilometres long, running from the Health and Knowledge Precinct in Southport, through Surfers Paradise and ending at Broadbeach, and will have 16 stations along the route (McConnell Dowell 2014). The 14 trams are Bombardier Flexity 2 Light Rail Vehicles which are 433.5 metres in length, 2.65 metres wide and 3.4 metres high and can transport up to 309 people (McConnell Dowell 2014). The light rail system will be linked to the whole Gold

Coast public transport network, including the bus service, and heavy trains (GoldLinQ 2013).

According to the Bureau of Statistics, in 2011, 22,834 people worked in Southport. Census data reveals that of those people, 6,916 people drove a car, 579 took a bus and 1,043 people walked to work (Profile id). The following visual representations indicate the difference in commute modes during that time on the Gold Coast; see Figure 1.1(a) and Figure 1.1(b)
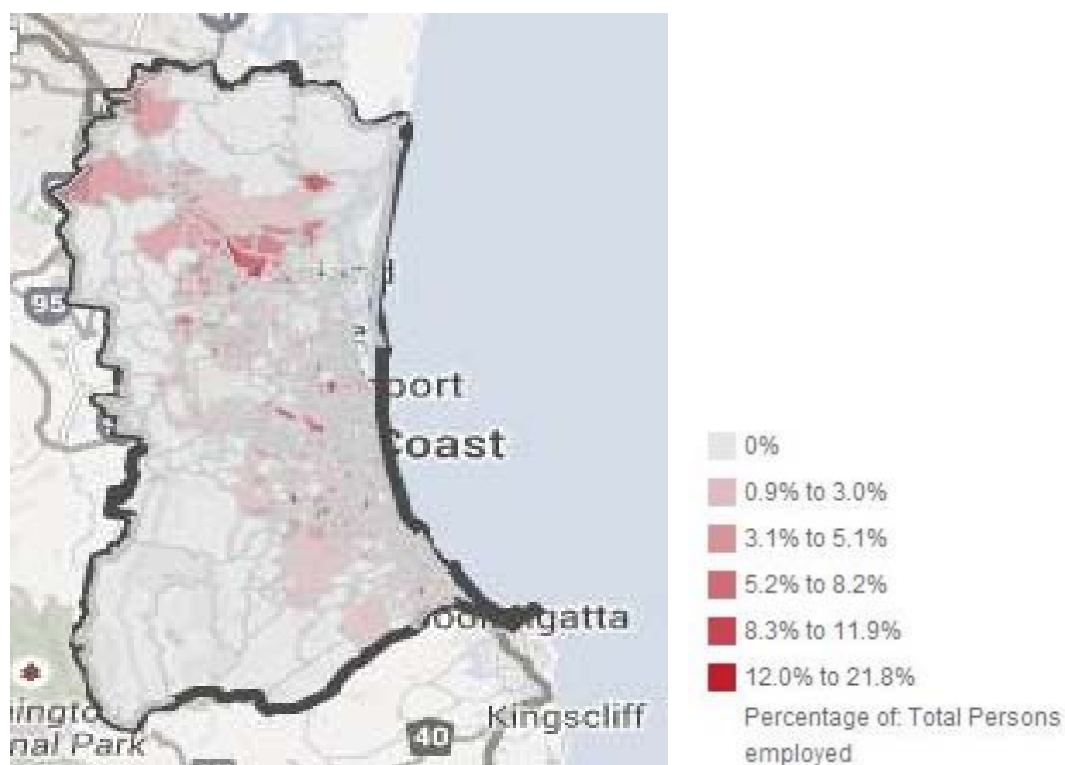
Gold Coast City, People who travelled to work on public transport, 2011, Enumerated, Persons

Figure 1.1(a) - Percentage of total people who travelled to work on public transport in 2011   <http://atlas.id.com.au/gold-coast#MapNo=10053&SexKey=3&datatype=1&themtype=1&topicAlias=travelled-to-work-on-public-transport&year=2011>
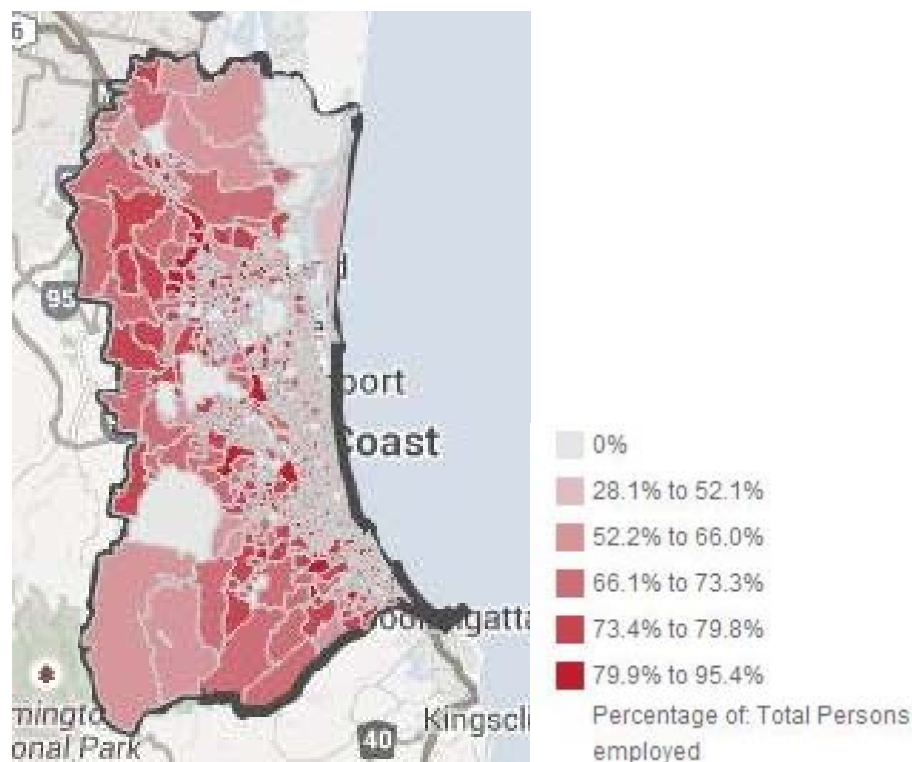
Gold Coast City, People who travelled to work by car, 2011, Enumerated, Persons

Figure 1.1(b) - Percentage of total people who travelled to work by car in 2011 <http://atlas.id.com.au/gold-coast#MapNo=10052&SexKey=3&datatype=1&themtype=1&topicAlias=travelled-to-work-by-car&year=2011>

Gold Coast is a large city in area spread approximately 57 kilometres in length along the eastern Australia coastline (GCCC 2014). In the illustrations above census figures show that in the western areas of the city, almost no people used public transport for their daily commute. According to GCCC (2012), 88 percent of travel is made in personal automobiles, and this low usage of public transport is in part a result of the lack of availability and general inconvenience (such as limited numbers of stations and geographic dispersal of residential locations) of the existing public transport network. The resulting effect is an increased use of personal cars resulting

in significant traffic congestion during peak hours in and around the central business district.

A successful light rail network can invoke more excitement and be an attractor to an area such as a central business district (Brown et al. 2007). Gold Coast City Council (2012) hopes that the introduction of the new light rail system, which is linked to the greater public transport network, will entice travellers to further utilise the public transport network, and the flow-on effect of the increase in public transport use is expected to encourage walking between the transport stops and their destinations. It is, however, important to ensure that the areas in which people are walking are encouraging of that activity, thus further enticing people to use these sustainable modes of travel. Research has found that residents desire 'attractive and diverse destinations' and suggests that governments should aim to provide more green spaces, and associated amenities such as bike and walking paths (Brown & Werner 2011).

Werner et al. (2009) found that simply building a light rail stop will not necessarily increase walking to the stop and ridership, but that there must be consideration of the access to the stop. Their research found that people are more likely to walk to a rail stop if the start of the route is more walkable (Werner et al. 2009). Therefore, the areas around a light rail service must be highly walkable in order to entice people to walk to and from the service.

The aim of this project is, therefore, to analyse the walkability of the Central Business District in Southport, with specific focus upon new pedestrian accessibility opportunities arising from the new light rail stops. Accordingly the project is titled:

'The impact of a new light rail network upon walkability in a central business district'

The literature review has revealed that if the area around a light rail stop is highly walkable, people will be more inclined to walk. Drawing from existing academic literature, the researcher has identified the factors which affect the publics' inclination to walk. Key attractors in the area have been selected and the walkability of the routes has been analysed. It is hoped that the findings of this project will result in recommendations for identifying and improving the connectivity and pedestrian accessibility around a light rail stop, which will be utilised by planners and policy makers, when designing and implementing the next stages of this light rail network, and future networks around the State and the Nation.

1.2   Objectives

The intention of this project was to carry out a walkability audit at Southport Station Number 5, as shown on Figure 1.2. The findings of that audit were analysed with the potential to provide recommendations to improve the levels of walkability and connectivity in that area. It is considered important that lessons be learnt from this design and construction process and be applied to future developments, specifically regarding pedestrian habits, infrastructure provision and the built environment.

High attraction facilities in the area have been identified, coupled with factors impacting on behaviours and attitudes to walking of individuals, and an assessment was made as to the levels of connectivity between the Station and those facilities. The facilities selected include Australia Fair Shopping Centre, Gold Coast Institute of TAFE, Southport Library, Southport Courthouse and the Broadwater Parklands.

The recommendations are prepared for planners in both the governmental and private sectors, with an aim to improve walkability in the area and provide more connectivity when designing the new stations for the future expansion of the light rail network. These findings could also aid the designers and planners of the new and expanding networks in other cities in Australia.

It is hoped that the recommendations will also aid in the development of capital works plans and policy. The academic literature reveals that the overall benefits of improving walkability and connectivity include reducing reliance on cars, and thus reducing city congestion and greenhouse gas emissions, improving the health of the general community and reducing obesity rates in the community.
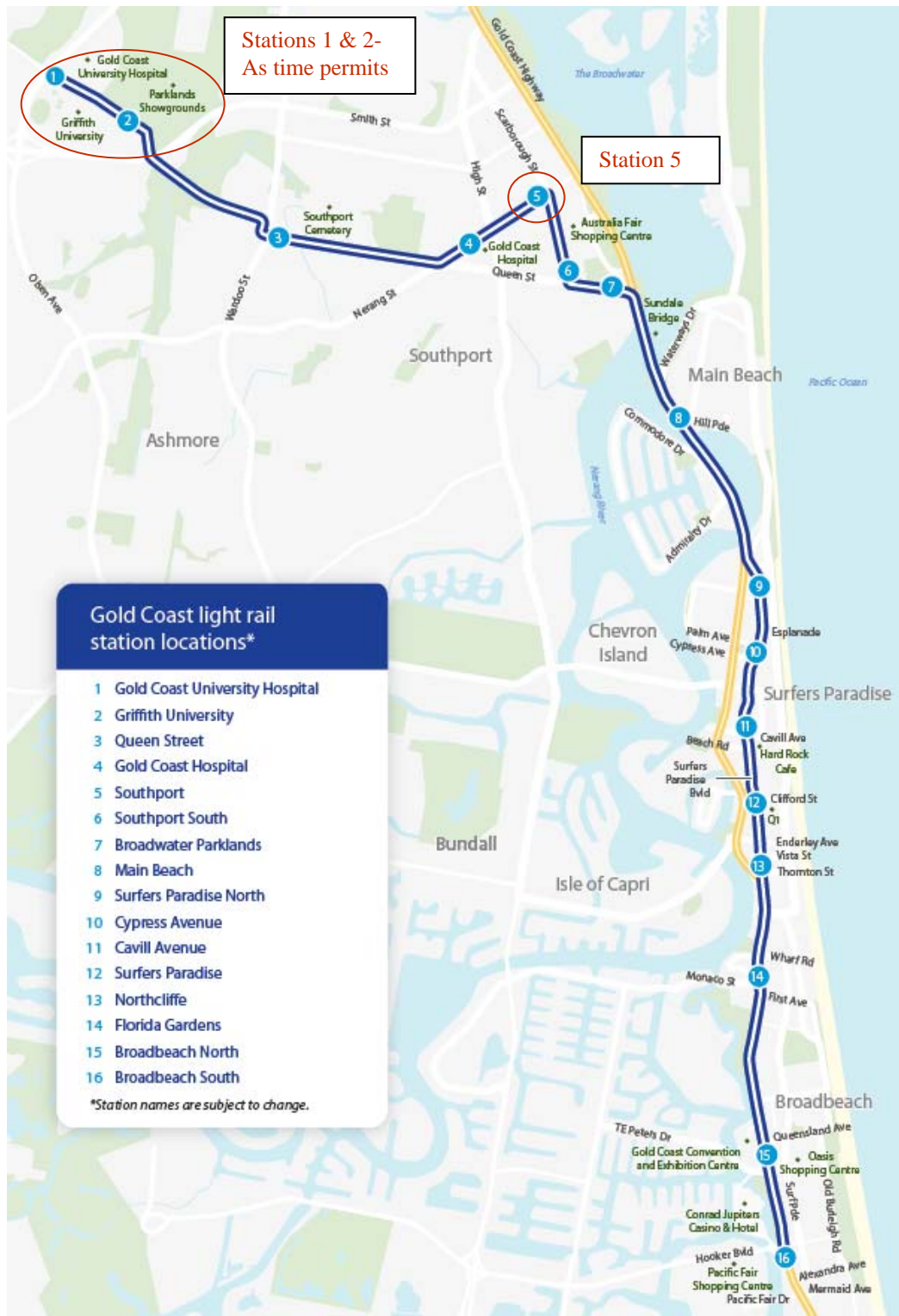
Figure 1.2 - Stage 1 Track & Station Location Map, G: Link Gold Coast Light Rail <http://www.goldlinq.com.au/workspace/assets/uploads/resources/120220-track-station-location-map-a4-v08-update-4f451feb.pdf>

1.3   Justification

Research has shown that transit-centric developments provide many benefits to society (Brown & Werner 2011). Societal benefits can include less urban sprawl, revitalising neighbourhoods and housing developments and decreased dependence on motor vehicles thus reducing fuel consumption (Brown & Werner 2011). In a society where issues such as environmental impact, traffic congestion and the community's health and wellbeing are becoming increasing concerns, it is important to identify ways to mitigate these problems.

Introduction of a light rail network provides opportunities to increase public transport usage. There is much academic literature which has proven that increased public transport use can lead to more walking and cycling. However, consideration must be made when designing the network that the location of the lines and their stops are convenient and attractive, in order to entice potential passengers (Brown & Werner 2011). Additionally, it is important to ensure that the passengers' destinations can be reached by an appealing, safe and easy to use path, regardless of whether that is footpath or cycle-way.

Ideally, the public transport system as a whole must be presented as an agreeable way for users to reach a wide variety of destinations. People should be able to use a combination of active transport and public transport not only for their daily commute, but also for social and recreational travel (GCCC 2012). The destinations to be reached should include commercial, retail and entertainment as well as green space areas (Ludlam n.d.).

The light rail on the Gold Coast is forecast to carry 50,000 passengers per day by the year 2016 (Currie & Burke 2013). It is in the environmental, economic and social interests of the community for this goal to be reached.

This project aims to provide advice and suggestions which could assist the achievement of this goal in a manner which can also be applied to all future light rail projects.

1.4   Outline

The first chapter of this thesis is the introductory chapter. It provides background information, outlines the objectives and justification, and identifies the consequential effects of this research paper.

Chapter 2 consists of the literature review, which begins with a brief history of the Gold Coast and more specifically Southport. The chapter then goes on to outline walkability and its effects on the population with respect to environmental, economic and social factors. The Light Rail and its environmental, economic and social benefits are discussed, and an assessment is carried out of some light rail networks around the world and in Australia. The chapter concludes with a discussion on the new light rail network on the Gold Coast upon which this paper is focussed.

The third chapter 'Research Design' contains the methodology adopted, as well as the resource requirements for the research. The next chapter provides a discussion of the results from the walkability audits carried out and the fifth chapter contains a discussion of the findings and recommendations. The final chapter, Chapter 6, provides a summary of the content of this dissertation, and concludes with suggestions for future research and some final comments.

1.5   Consequential effects

1.5.1 Sustainability

According to Cubukcu (2013, p. 34), 'sustainable living is defined as lifestyle that aims to reduce the use of natural resources'. Utilising green and renewable resources and also engaging in a 'life style that attempts to conserve and leave natural resources for future generations' are the two key ways to achieve this (Cubukcu 2013, p. 34). Recent trends show a desire within communities to live sustainably is on the rise.

There are many benefits to walking. Some of the key benefits are improved cardiovascular and general health, less reliance on vehicles, leading to subsequent reduction of traffic congestion and associated environmental ameliorations. Walking can a have positive impact on many health issues such as obesity, cardiovascular diseases, some forms of cancer and also diabetes (Leslie et al. 2007). Connectivity and accessibility play a major role in impacting the desirability of walking. There are often spatial and physical barriers to pedestrian connectivity (Cartlidge & O'Hare 2009). Spatial barriers include time and distance to reach end destinations, while the physical barriers are private open spaces and design focused on vehicles (Cartlidge & O'Hare 2009).

Walkability audits have been carried out along selected routes in the vicinity of a key light rail station. It was anticipated that some of the findings of the walkability audits would identify areas and routes which do not have high levels of connectivity. The aim of this project was to provide unbiased and constructive suggestions for improvements to routes if this did occur. The report has been prepared in such a manner that planners can utilise the suggestions for future projects or even to

improve the existing area based on the findings of the report. Private and Government planners could have the opportunity to determine priority in planning for and requirement for funding to improve facilities.

It is hoped that this dissertation may contribute to improvement in health, and a reduction of reliance on personal motor vehicles will be positive consequences to arise from this report. This would go some way in improving the adverse environmental impact of the Central Business District and thus making it a more sustainable place to live, work and play.

1.5.2 Safety and risk analysis

The project did involve field work in which a walking audit was conducted. The location of the audit was in the road reserves of Southport. Accordingly, there were hazards that must be assessed and mitigated prior to undertaking the field work. A Job Safety and Environment Analysis (JSEA) Form has been adopted with thanks to Andrews & Hansen Pty Ltd; see Appendix B. One high risk activity was identified, which was 'Work near a Tram Line'. From the matrix, the consequence is 'Major' meaning fatal and the likelihood is 'Moderate' meaning that it could occur. However, by applying control measures, such as working around the tram timetable when scheduling the audit of the area near the tram line and avoiding walking on or near the tram line when at all possible, the level of risk is reduced to 'L2'. This means the likelihood is now 'Unlikely' and the consequence is now 'Insignificant'. Other low level risks, or aspects, identified include working near a minor road, uneven ground, insect bites, sunburn, and rubbish left on site.

1.5.3 Ethical responsibility

In identifying ethical responsibilities relative to this project, the writer utilised the Professional Code of Conduct issued by The Planning Institute of Australia (PIA) in 2014. In carrying out this research the writer must act with the benefit of the whole community at the forefront of the mind.

The researcher must aim to produce the highest standard of work and must 'not act in any way that may bring themselves...into disrepute' (PIA 2014). In carrying out the work, all people should be treated fairly without a trace 'of discrimination on the grounds of race, creed, gender, age, location, social status or disability' (PIA 2014).

In providing advice and recommendations, the writer has a responsibility to aim to balance 'sustainable and ethical development' with 'efficient and economically sound outcomes' (PIA 2014). The writer must also consider the 'responsible management of natural and built resources' (PIA 2014).

The recommendations should be based on facts and evidence produced by the research with an aim to promote a 'pleasant, healthy, safe and socially connected working and living environment' (PIA 2014). The research will be carried out based upon facts and evidence found by the researcher through the literature review and audits. It is important to note that no people were interviewed as part of the research project and therefore clearance from the University of Southern Queensland Ethics Committee was not required.

1.6   Conclusion

By using a walkability audit tool, the objective of this dissertation has been to assess and analyse the quality and location of pedestrian connections between important facilities within a central business district to and from new light rail stops.

Prior to selecting the walkability audit template, a literature review was conducted. This literature review also contributed to the design of the methodology for forthcoming research going forward.

It was expected that the research would result in findings which indicate a need to improve design and planning processes when preparing for a new light rail network.

The aim of this project has been to provide recommendations to planners and policy makers, for improving network connectivity and walkability in the vicinity of a new light rail stop. Ultimately, the aim of this project is to assist in improving planning policies in order to provide a more sustainable central business district.

CHAPTER 2

2.0   LITERATURE REVIEW

2.1   Introduction

To aid in carrying out this research, a review of literature was undertaken to identify and analyse the impact of light rail on walkability, and to assess its relevance to the Gold Coast and its Central Business District (CBD).

This chapter begins with a brief history of the development of Southport and the Gold Coast, and goes on to describe the current urban conditions, as well as the facilities and attractors that bring people to the area. Literature defining walkability and its effects on the population with regard to environmental, economic and social factors has then been reviewed.

The review provides an overview of light rail implementations, and the environmental, economic and social benefits it can provide to a community. Existing light rail networks around the world have been researched and their successes described. The history of successes and failures of light rail in Australia have been identified, followed by a review of the existing, new and future networks for major cities including Melbourne, Sydney, Adelaide, Perth and Canberra. A review of the new Gold Coast light rail network will describe its historical development, scope and objectives. Finally, the chapter will conclude by synthesising the literature in order to support the need for this research project.

2.2 Southport and the Gold Coast – Then and now

Originally, the native indigenous Kombumerri people, also known as the Saltwater People, occupied most of the land between the Coomera and Nerang Rivers (GCCC 2013). From 1869, farmers and timber millers came to settle in the area known then as Nerang Creek Heads (GCCC 2013).
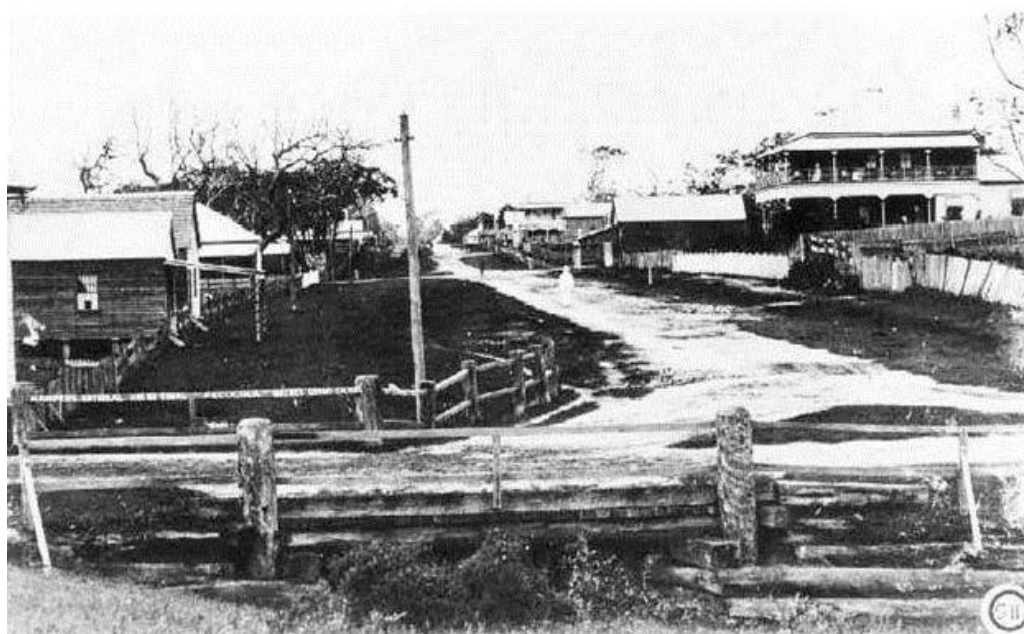
Figure 2.1- Nerang Street, facing west from the Esplanade during the 1800s, Have you seen the old Gold Coast?
<https://www.facebook.com/280745045301771/photos/pb.280745045301771.-2207520000.1409977436./766975203345417/?type=3&theater>

In the late 1800s, Southport began to be seen as a seaside resort and was established as a township in 1875 and the population grew to more than 1000 by the end of the century (GCCC 2013). St Hilda's School, established in 1882 for girls and The Southport School (TSS) established in 1901 for boys have both long been known as

prestigious, private day and boarding schools (GCCC 2013). Water supply to Southport was completed in 1932 (GCCC 2013).

Today the Gold Coast is the sixth largest city in Australia. It has a population of 544,165, making it the second largest city in the State of Queensland. The population is projected to increase to 798,417 by 2031 (GCCC 2013).

The region supports a booming $4.6 billion tourism industry, with the Gold Coast playing host to twelve million tourists annually (GCCC 2013). Tourism contributes almost one dollar in every five generated within the city, and employs 35,300 people (GCCC 2013).

The 21st Commonwealth Games will be hosted by Gold Coast City in April 2018 and will be live broadcast to 1.5 billion people worldwide (GCCC 2013). This can be seen as an excellent opportunity to promote Southport and the Gold Coast. The Commonwealth Games Village is currently under construction near Griffith University.

Southport has been declared a Priority Development Area under the *Economic Development Act 2012* and it is hoped that this will 'stimulate economic development and provide business confidence to position Southport as the city's true central business district' (GCCC 2013). As part of this development, Southport projects planned include a Chinatown Precinct, cruise ship terminal and resort, as well as plans 'to decorate the backstreet laneways, and unused spaces within the previously neglected areas for art galleries and workshops' (GCCC 2013).

There have been new high rise developments over the last decade 'breathing new life in to the city streets,' and its desirability as a place to shop and socialise is being re-

energised (GCCC 2013). An example of this is the three towers of Southport Central as seen below in Figure 2.2, located adjacent to Australia Fair, which is a mixed use development comprising of retail, commercial and residential units.

Figure 2.2 – Looking south over Southport, Surfers Paradise in the distance, Gold Coast Bulletin
<http://www.goldcoastbulletin.com.au/news/gold-coast/management-rights-deal-on-southport-central-could-be-one-of-the-citys-biggest/story-fnj94idh-1226841503988>

Recent and continuing projects include the upgrade of the Broadwater Parklands, and the new Gold Coast (GC) University Hospital. Upgrades of Griffith University include improvement of research, teaching and sporting facilities, as well as the connection with the GC University Hospital (GCCC 2013). The university is now ranked in the top five percent in the world (GCCC 2013).

Another educational facility, GC Institute of TAFE, which is located in the heart of Southport, has a range of programs including commerce, nursing, justice and education support (GCCC 2013).

The proposed relocation of Alamanda Private Hospital and upgrade of services to include emergency, and 'a full range of medical and surgical specialties are intended to include cardiology, oncology, urology, orthopaedic, neurosurgery, cardiac surgery, obstetrics, gynaecology and a new paediatric service…imaging, pharmacy and pathology' (GCCC 2013). It will initially have 284 beds, with room for growth to 400 as required (GCCC 2013).

Other existing facilities in Southport include the Police Station, and the Courthouse which services Coolangatta to Pimpama, ambulance and fire stations and Emergency Rescue (GCCC 2013). Places of interest include Southport Yacht Club (opened 1956), Seaworld Theme Park (opened 1970), and the Southport Mall, Marina Mirage and Australia Fair shopping centres (GCCC 2013).

The major development of the one billion dollar light rail network is a significant addition of much needed infrastructure in the area (GCCC 2013). It is a modern transport system that will connect Commonwealth Games Village, medical, sporting, entertainment and cultural facilities (GCCC 2013). John Witheriff, Chairman of GoldLinQ, the project developer, states "The construction of the light rail has facilitated the upgrading of the city's infrastructure to facilitate the growth in population over the next 25 years. It has also meant that we can retain one of the most important elements of this liveable city namely our ability to move around with ease and reliability" (GCCC 2013).

The vision for the Southport area, as specified in the recent Southport Priority Development Area Development Scheme, is to 'be a world-class centre for employment, community services, commerce and retail, offering a diverse range of housing options and highly desirable lifestyle amenity' (DSDIP 2014). Some of the methods proposed to achieve this vision include to 'activate public space', 'diversify and create unique urban character and experiences' and to 'leverage public transport …and…light rail experiences and opportunities' (DSDIP 2014).

The Southport Priority Development Area Development Scheme, which was released in September 2014 after the majority of this research project had been carried out, has outlined a number of Implementation Strategies in order to achieve the vision for the area. The first strategy is to improve national and international recognition of Southport as the central business district of the Gold Coast and to promote it as an 'emerging world-class business and lifestyle destination' (DSDIP 2014). There are plans to achieve this through encouragement of high quality development and regeneration of 'underutilised sites' as well as an aim to reduce the cost of operating businesses in the Central Business District (DSDIP 2014).

Another Implementation Strategy is to 'reinforce and leverage existing world-class infrastructure and regionally significant services to strengthen Southport as the key employment centre for the city' (DSDIP 2014). The opportunity for high levels of culture, entertainment and good quality infrastructure is seen as a driver for an 'increase in residential and commercial densities' in the area (DSDIP 2014). The scheme proposes to 'demonstrate innovative ways of working and flexible ways of doing business to increase productivity, reduce travel time, access new markets and knowledge transfer to support a 24 hour economy' (DSDIP 2014). Proposals to achieve this goal also include developing 'a retail strategy to improve the quality and

desirability of the CBD as a unique shopping and dining destination' as well as reinforcing 'the light rail station locations by creating destinations which contribute to the whole of journey experience' (DSDIP 2014).

An Implementation Strategy which directly impacts this research project is 'improving liveability through urban place making' (DSDIP 2014). The objective of this strategy is 'to create a vibrant and functional CBD by delivering urban improvements, activations and high quality public space to attract people to the CBD at all times of the day and night' (DSDIP 2014). Proposals to achieve this goal include activating urban spaces by way of arts and cultural performances, increasing use of public transport, and setting street design policies which enhance safety and create an environment conducive to walking (DSDIP 2014).

The final Implementation Strategy identified by the development scheme is 'to ensure that the appropriate operational and management initiatives are in place to support the ongoing requirements of a vibrant, active Gold Coast CBD' (DSDIP 2014). It is proposed to achieve this through such methods as developing funding strategies, carrying out annual monitoring of the area, and allowing various stakeholders to be involved in the monitoring and review (DSDIP 2014).

The facilities identified in this section, as well as the commercial, retail and residential land uses around the area of Southport, provide an ideal opportunity to increase active transport and public transport usage.

2.3   Walkability and its effects on the population with regard to environmental, economic and social factors

2.3.1   Environmental factors

'Only in the post-modernist planning era has walkability been identified as an important component of efficient, accessible, equitable, sustainable and liveable communities' (Hutabarat Lo 2009, p. 147). Communities that are active and healthy, and where people walk and ride bicycles as an alternative to motor transport, are considered important in reducing urban sprawl, traffic congestion, social fragmentation and obesity (du Toit et al. 2007). 'There is a new research agenda in public health to better understand the built environmental factors that may influence walking behaviours which is making strong new links to the urban planning and transportation research fields' (Leslie et al. 2007, p. 559).

Research has found that aesthetic factors are more influential to walkers for health and leisure, while those who walk for commuting find factors such as path width more important (Hutabarat Lo 2009). Aesthetic appeal to a pedestrian is affected by such things as 'street definition or enclosure; complexity of spaces and paths; building articulation and variation; the presence of overhangs and varied roof lines; buffering between pedestrians and traffic, presence of shade trees and lighting, transparency of the transitional zone; and the physical condition of sidewalks' (Hutabarat Lo 2009, p.158).

Cartlidge and O'Hare (2009) also identified that those aesthetics can be environmental barriers to walking. Other barriers to walking that were identified during their study were spatial barriers which include time and distance, spatial layout of development, proximity to destinations and route choice, physical barriers

including topographic, geographic, artificial waterways, private open spaces, car focussed route, and design barriers which include legibility, mix of land uses and provision of public space (Cartlidge & O'Hare 2009).

Recently, there have been many studies examining the 'influence of the built environment on physical activity' where features examined include residential density, street connectivity, land-use mix, neighbourhood aesthetics and footpaths' (Koohsari 2013). There has also been research which has proven that public open spaces, including parks and playgrounds, provide places to walk and 'can serve as interesting destinations that can persuade people to walk to reach them' (Koohsari 2013). However, the environmental attributes, including walking infrastructure such as paths, safety from crime and traffic and aesthetics, have been proven to be a determinant of the frequency and duration of walking (Koohsari 2013).

Street connectivity is 'the directness and availability of alternative routes from one point to another within a street network' (Koohsari 2013). In his study, Koohsari (2013) utilised space syntax theory, 'a set of techniques for the representation, quantification and interpretation of spatial configuration in buildings and settlements' (Koohsari 2013). This theory states that when spaces are well connected, they are likely to encourage more movement between the spaces (Koohsari 2013). 'Space syntax takes into account the topological dimension of the streets in an area and how they form a system that pedestrians and motorists must traverse in moving between destinations' (Koohsari 2013). Koohsari's study (2013) found that people who lived in a house with a young child or dog were 'significantly more likely to walk to or within public open space.'

Van Dyck et al. (2012) found that active transport is increasingly utilised when people perceive parking difficulties at their destinations. 'Perception is the process of attaining awareness or understanding of sensory information; what one perceives is a result of interplays between past experiences, one's culture and the interpretation of the perceived' (Ewing & Handy 2009). As a result of their studies Van Dyck et al. (2012) also conclude that 'improving the activity friendliness of an environment might have stronger effects on walking' and suggest that to do so, planners should improve land use mix, aesthetics, residential densities, walking and cycling facilities and reduce parking facilities to increase active transport.

Studies have found that the perception of the walking environment is also affected by 'architecture, landscape architecture, park planning, environmental psychology and visual preference and visual assessment' (Ewing & Handy 2009). There are many design qualities identified throughout the academic literature which include distinctiveness, diversity, linkage, compatibility, comfort, and openness (Ewing & Handy 2009). Physical features, urban design qualities and individual reactions are all determinants of overall walkability that impact walking behaviour as shown in Figure 2.3.
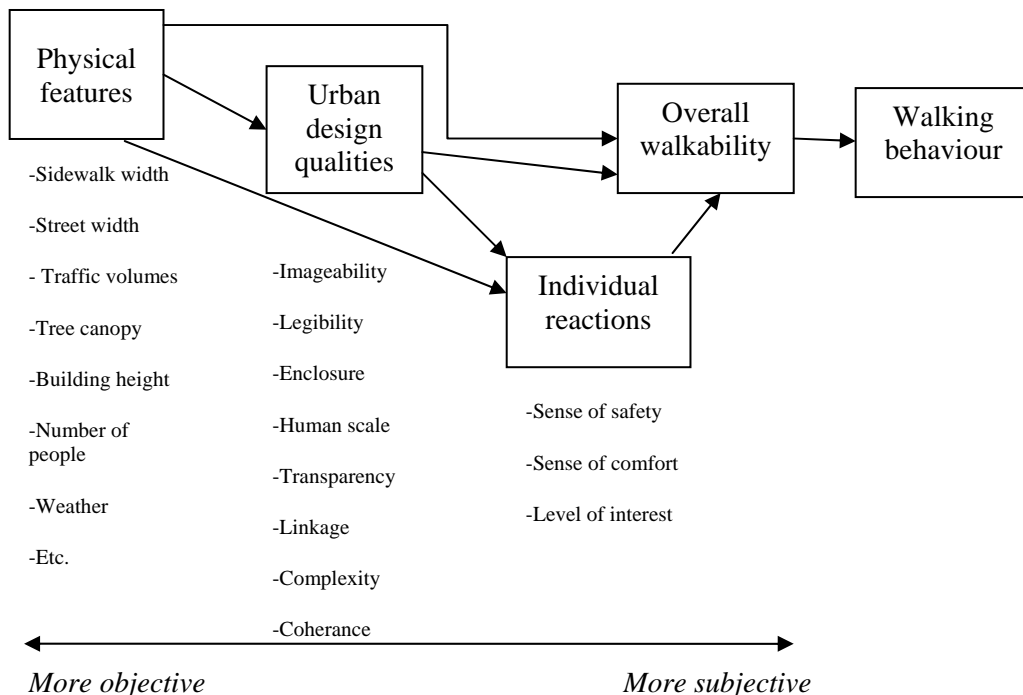
Figure 2.3 – What impacts walking behaviour (Ewing, & Handy, 2009)

Much of the research to date has found that people are more inclined to walk when they perceive that the walking facilities, such as paths and trails, are of good quality and have 'appealing scenery' (Brown et al. 2007).

2.3.2 Economic factors

Walking reduces or eliminates cost of transportation and can provide improved accessibility, particularly for those who do not drive (Ariffin & Zahari 2013). Cartlidge & O'Hare (2009) identified that barriers to pedestrian connectivity are often built into town designs due to a focus on vehicular access. These designs however, create an 'urban form that causes unnecessary pollution, CO_2 emissions

and fuel consumption' as well as encouraging an urban sprawl effect. Urban sprawl tends to result in lower economic outcomes for the community (Cartlidge & O'Hare 2009).

Suburban sprawl has also been encouraged through local government approvals to develop commercial areas such as shopping centres in locations which can only be accessed by cars (Leslie et al. 2007). 'The overall outcome has been a highly car dependent, polycentric, sprawling urban region in which vast areas are far removed from being the urban village type of urban design widely thought as being conducive to pedestrian movement' (Leslie et al. 2007).

'The character of the built environment in which people live, work, and play is largely influenced by the way land is used and transportation infrastructure' (Leslie et al. 2007). It is common that where there is good public transport infrastructure, new residential and commercial development will arise (Leslie et al. 2007). It is also common that new developments may entice capital works investment to provide new public transport opportunities in the area (Leslie et al. 2007).

Policy and practice barriers identified in the study by Cartlidge & O'Hare (2009) include building design, land use planning, finance and governance. These components are largely influenced and impacted upon by local and state governments.

Brown et al. (2007) suggest that although a central business district has 'economic-development interests in getting people to frequent' the area, the social and environmental factors help improve the experience of the visit.

2.3.3   Social factors

Walkability is defined as the ability for uninterrupted movement through streets and paths (Zook et al. 2011). Research has identified that perceptions about comfort, convenience and cost, in conjunction with levels of connectivity, mix of uses and feelings of personal safety are some of the key determinants impacting the motivation to walk. 'Walking, in particular, is the most common non-occupational and non-household physical activity behaviour of adults (Australian Bureau of Statistics 2003) and can influence a range of health outcomes, particularly chronic diseases such as diabetes, heart disease, and some cancers' (Leslie et al. 2007).

Historically, communities were laid out in such a way that mixed land uses and good access encouraged walking for both leisure and transport to different locations and attractors, resulting in an environment that promoted daily active living (Leslie et al. 2007). Since that time, the increase of urban sprawl has seen the development of communities which 'promote sedentary behaviour' by reducing the amount of active choices available to people (Leslie et al. 2007). 'There is emerging evidence in the public health field that sedentary lifestyle encouraged by the design of communities may be one of many factors contributing to rising rates of obesity' (Leslie et al. 2007).

If walking for health is a primary focus, then the routes should be connected, long enough and in suitable condition to allow for walking for exercise (Zook et al. 2011). Zook et al. (2011) found that 'extension of a limited number of continuously safe and comfortable paths that do not require multiple direction changes to access the greater street network may have better satisfied the exigencies of pedestrianism without overrunning adjacent neighbourhoods with through-traffic'.

The spatial layout of paths and roads directly affects the ability of pedestrians to reach destinations in acceptable time limits; the standard calculation is that a five minute walk is generally equivalent to a travelled distance of 400 metres (Cartlidge & O'Hare 2009). 'Distance and time are very important measures of connectivity' (Cartlidge & O'Hare 2009).

People who regularly walk experience greater social interaction, developing familiarity with other members of the community and the regular interaction inspires trust, respect and a connected feeling with the locality and their fellow residents (du Toit et al. 2007). du Toit et al. (2007) found that 'more walkable environments are more conducive to walking for transport, which, in turn, may help to develop a sense of community because it increases opportunities for social contacts within the neighbourhood,' but did not prove that the walkable neighbourhoods are more sociable stating, 'despite a different study design and large dataset, we were unable to demonstrate that pedestrian-friendly urban forms play a significant role in encouraging strong social ties between neighbours'.

Cartlidge and O'Hare (2009) identified that individuals' barriers to walking include safety, mobility, opportunity and social barriers. Throughout the literature, the public's perception of danger from crime and traffic has been found to be a significant determinant of walking behaviours in public open spaces including parks and roads. It has been suggested that decision makers could increase people's tendency to walk by 'developing policies to improve safety from crime' in those places (Koohsari 2013).

Some of the influences which incite fear include 'social incivilities such as disreputable-looking individuals or street confrontations; the absence of people;

physical (or non-human) incivilities such as unattended dogs, vacant lots, litter and graffiti; and limited visual surveillance of an area, as well as potential hiding places and blocked escapes' (Brown et al. 2007). In their walkability experiment, Brown et al. (2007) found that their pedestrian study group experienced either fear, or guilt and empathy, when encountering transients and people sleeping on the path, which lead the researchers to conclude that 'the social climate of an area …(is) one of the most important features people noticed.' Research has also identified pedestrians' perceptions of safety in areas with higher levels of traffic and traffic noise can deter them from walking (Brown et al. 2007).

Walking has many social, environmental and economic benefits common with light rail transit. These factors will now be discussed in the following sections.

2.4   Light rail – What is it and what are its benefits?

'Light rail should be regarded as complementary to other modes of transport rather than opposition to them' (Wilkie & Petersen 2010). In the majority of Australian cities, consideration that transport corridors may be more suited to light rail has not been satisfactorily made (Wilkie & Petersen 2010). It has been proven that 'public transport works best in high population centres where a critical mass of people are an easy walk or cycle from transfer stations' (Ludlam n.d.).

Light rail is proven as an effective method to 'increase CBD mobility and choice for commuters' and works well in conjunction with other transport modes' (Wilkie & Petersen 2010). Generally, people find that light rail is more comfortable than buses and 'feel confident about the service when they can see where it goes and feel confident that something will come' (Ludlam n.d.). This is important in enticing change in people's opinions about the way they travel and thus encouraging a change in the mode of travel.

A light rail network is capable of transporting more passengers per hour than buses due to the capacities of 200 to 300 passengers per vehicle (Wilkie & Petersen 2010). The vehicles can also be coupled, thus doubling the capacity (Wilkie & Petersen 2010). 'Each light rail vehicle carries the equivalent of approximately three articulated buses at capacity, enabling the system to carry 12,000 passengers per hour per direction' and as a result achieves 'greater asset utilisation than buses on medium and high intensity transport corridors' (Wilkie & Petersen 2010).

If the government were to attempt to have buses move the equivalent number of passengers, it would require priority provided to bus movement on the roads, more vehicles, and thus more bus drivers, all of which would significantly increase

economic costs (Wilkie & Petersen 2010). Alternatively, operating and capital costs reduce with the increase of passenger usage of light rail networks which means that the network is 'highly cost-efficient in high-density areas and relatively cost-efficient in moderately dense areas' (Wilkie & Petersen 2010).

Another benefit of light rail over buses is that the vehicles have just under double the life expectancy of buses, at 30 or more years of service (Wilkie & Petersen 2010). There has also been successful implementation of driverless systems, such as in East London, which would reduce the costs of operation even further (Wilkie & Petersen 2010).

2.4.1 Environmental benefits

Light rail, which operates utilising electricity, has been found to be the most sustainable of the public transport options (Wilkie & Petersen 2010). It is more energy efficient than other transport modes which are 'powered by internal combustion engines' (Wilkie & Petersen 2010). This is a major draw card for governments now that environmental impact is such a significant concern. According to Ludlam (n.d.):

'Cities that use light rail have:

41 percent lower energy use per passenger/km than bus cities;

18 percent lower automobile passenger kilometres per capita;

23 percent lower transport emissions per capita;

38 percent fewer transport deaths'

Light rail can be operated using any electrical source 'including renewable energy and regenerative energy from braking' allowing a large section of a city's public transport not to rely on non-renewable resources (Ludlam n.d.). These methods of energy efficient operations are already successfully in operation in many systems in the world such as in Spain and Canada (Wilkie & Petersen 2010).

With the reintroduction of light rail networks around the world, there has been a dramatic change in mode share; the reduction in car use is significantly improving the impact of congestion upon the environment (Wilkie & Petersen 2010). Research in the United States and United Kingdom found that of the people who currently use light rail, 20 percent of those used private automobiles for their travels previously (Wilkie & Petersen 2010).

2.4.2 Economic benefits

Research has found that light rail is more popular to travellers than buses (Ludlam n.d.) and is 'particularly effective in achieving mode shift away from private vehicle travel' (Wilkie & Petersen 2010). The 'efficiency, comfort and high capacity' that light rail provides, aids in its attractiveness to commuters (Wilkie & Petersen 2010). Increasing the use of light rail will reduce cost of congestion, which is approximately $12.9 billion in Australia (Wilkie & Petersen 2010).

The initial capital cost of a light rail is higher than for a bus network (Ludlam n.d.), and varies greatly depending on the construction requirements such as, tunnels and bridges, whether it will be combined with the existing road network or have its own

separate infrastructure (Wilkie & Petersen 2010). However, although this initial cost is higher, at $20 to $40 million per kilometre, vehicles included (Wilkie & Petersen 2010), the ongoing operating costs are lower than those of a bus network (Ludlam n.d.). This is due to the vehicles' capacities; the light rail network can transport many more people.

For example, a study in London found that when there were 4000 or more passengers per hour, light rail is the transport mode with the lowest operating cost (Wilkie & Petersen 2010). The research found that in transport corridors with medium to high passenger densities, a light rail network can be the most cost efficient (Wilkie & Petersen 2010).

'From a development perspective, light rail is conducive to urban regeneration projects, providing permanent infrastructure and frequently attracting a high ratio of associated investment' (Wilkie & Petersen 2010). It has been found to increase property values and 'stimulating economic activity to create new urban hubs' (Ludlam n.d.). Light rail has, as a result of its attractiveness and permanent nature, proven to be a stimulant to developers and town planners for development of residential and commercial projects (Wilkie & Petersen 2010). For example, the light rail network in Dallas, Texas, such as in Figure 2.4 will undergo US$2.3 billion worth of expansions which are expected to encourage yearly economic activity worth US$663 million (Wilkie & Petersen 2010).

Figure 2.4 – Green Line train passing Deep Ellum Station in Dallas, Texas
<http://en.wikipedia.org/wiki/DART_Light_Rail#mediaviewer/File:Traveling_Man_Deep_Ellum.jpg
>

2.4.3   Social benefits

'Improved public transport encourages interaction between communities and individuals and attracts skilled workers' (Wilkie & Petersen 2010). When developed in conjunction with mixed land use planning such as residential, commercial and retail, it encourages a lively local community in which people can live, work and play (Ludlam n.d.). Planning mixed use areas of medium to high density will provide employment, more housing choice and social opportunities in the local areas, thus reducing dependence on personal cars (Ludlam n.d.).

Land use planning and consideration of housing density is essential to a successful public transport network. It is generally considered that light rail is not as effective in

low density areas. Cities that are comprised of low density urban sprawl, means that people are so spread out that even a large public transport network will not place people within walking distance to a station or stop (Ludlam n.d.), thus leading to social fragmentation and other issues which significantly impact the human and physical environments. However, evidence has shown that a well-planned, combined public transport network including buses will greatly increase the numbers of passengers (Ludlam n.d.). According to Ludlam (n.d.) 'improving feeder networks in this way can dramatically improve the economics of trunk light rail or heavy rail routes and allows them to cross-subsidise less profitable bus services.' Decision makers should consider light rail during the early planning stages, so that the space and controls required for such a network are allowed for from the beginning, thus providing opportunity for efficient operations of the system once it is underway (Wilkie & Petersen 2010).

Aesthetically pleasing infrastructure also affects passengers' opinions of light rail. For example, some consider the overhead wires which energise the trams an eyesore, thus new innovations have created networks which can operate with 'underground cabling that is completely safe for pedestrians' (Wilkie & Petersen 2010). An example of this is the light rail system in Bordeaux, France as shown in Figure 2.5.

Figure 2.5 – Low floor tram on catenary-free section in Bordeaux
<http://www.dailykos.com/story/2007/07/15/357982/-Local-Rail-4-5-Light-Rail-Tram-Bus#>

The streetscape should be designed to deter the use of cars, providing sufficient infrastructure to accommodate pedestrians, cyclists and the light rail safely and to link them to the public transport system as a whole (Ludlam n.d.). The streetscape should also encourage personal feelings of safety, social interaction and community engagement thus further promoting the use of the public transport network (Ludlam n.d.).

Studies have found that people who use light rail 'have more healthy walking habits, lower car use, lower prevalence of obesity, higher place attachment and neighbourhood satisfaction, and are more positive about transit-oriented development' (Wilkie & Petersen 2010). Therefore, it can be said that there is a significant link between light rail and the enhancement of the liveability of a city through improving health, environment and community.

2.4.4 Conclusion

Light rail provides a sustainable solution to reduce traffic congestion, discourage urban sprawl, encourage healthier walking habits and improve liveability of a city. Research suggests that planners and decision makers should consider integrating light rail as part of the public transport system as a whole, in order to enjoy the proven economic, environmental and social benefits that impact local communities and cities as a whole.

2.5 Light rail around the world

Over the last two decades, there has been a global movement to support the implementation of light rail as an attempt to manage increasing oil prices, congestion, urbanisation and impact on the climate (Wilkie & Petersen 2010).

'There are 400 light rail networks operating world-wide, 200 being planned and 60 under construction' (Wilkie & Petersen 2010). Some of the 400 cities which have light rail include Portland, Ottawa, Melbourne, Sydney, Bordeaux and Barcelona (Department of Transport WA 2013). According to the 2012 Economic Intelligence Unit's global liveability index, only two of the top ten cities do not have light rail; Perth, Australia and Auckland, New Zealand (Department of Transport WA 2013).

Figure 2.6 - Tramway in Barcelona, Spain   <http://www.railway-technology.com/projects/barcelona/barcelona6.html>

Many of the cities in Europe have urban design which is well suited to light rail, thus the networks are most common there (Wilkie & Petersen 2010). However, this sustainable form of transport is becoming increasingly more popular in the United States, and some Asian and Middle Eastern countries such as India and Arabian Gulf states are now considering the possibilities (Wilkie & Petersen 2010).

In Portland, Oregon, an 85 km light rail network is considered one of the best in the world (Department of Transport WA 2013). 'In 2011, the Portland light rail system handled 40 percent of weekday transit trips' (Department of Transport WA 2013). It is estimated that the 85 station network, as shown in Figure 2.7, reduces automobile trips by 28.6 million annually, resulting in 'fewer cars on the roads, reduced vehicle emissions and, ultimately, cleaner air, which goes hand in hand with better health' (Department of Transport WA 2013).

Figure 2.7 – Map of the light rail system in Portland, Trimet Max
<http://www.trimet.org/pdfs/maps/railsystem.pdf>

The replacement of buses by the electric light rail network in Ottawa, Canada is estimated to reduce the city's emissions and oil usage by 10 million litres annually, not including the reductions from lower automobile usage, thus reducing costs (Department of Transport WA 2013). 'It is predicted that Ottawa Light Rail will reduce carbon dioxide emissions by 94,000 tonnes in 2031, which is equivalent to planting more than 9 million trees' (Department of Transport WA 2013).

Figure 2.8 - O-Train crossing Rideau River, Ottawa
<http://en.wikipedia.org/wiki/O-Train>

The light rail network in Zurich, Switzerland is an excellent example of a successful system. It has 13 routes which traverse 111.6 km, and in 2008 'attracted 64 percent of public transport passengers' which equates to 197.3 million trips (Wilkie & Petersen 2010). According to Wilkie & Petersen (2010), each Swiss resident makes

almost 550 trips annually which is 'at least four times greater than the total public transport use per person per year of any major city in Australia'. The network is currently under expansion and its success has been heralded as a result of 'a transit priority program over the past 30 years, a compact urban form and disincentives to private car travel' (Wilkie & Petersen 2010).

Figure 2.9 - Bahnhofstrasse, Zürich's premier shopping street <http://en.wikipedia.org/wiki/Trams_in_ZpercentC3percentBCrich>

2.6   Light rail in Australia

Historically, in Australia, there were many light rail systems in cities such as Adelaide, Brisbane, and Sydney, and in regional areas such as Kalgoorlie, Bendigo and Ballarat which were built during the gold rush period (Ludlam n.d.). In the early years, between the late 1800s and the 1940s, the majority of development (both residential and commercial) was focussed around the tram systems (Currie & Burke 2013). During that time, 'trams were also seen to be highly innovative in adopting what was then considered advanced technologies such as electrification' (Currie & Burke 2013). Such tram-centric development would also have co-existed with the contemporary socio-economic mores that saw many people walking for transport.
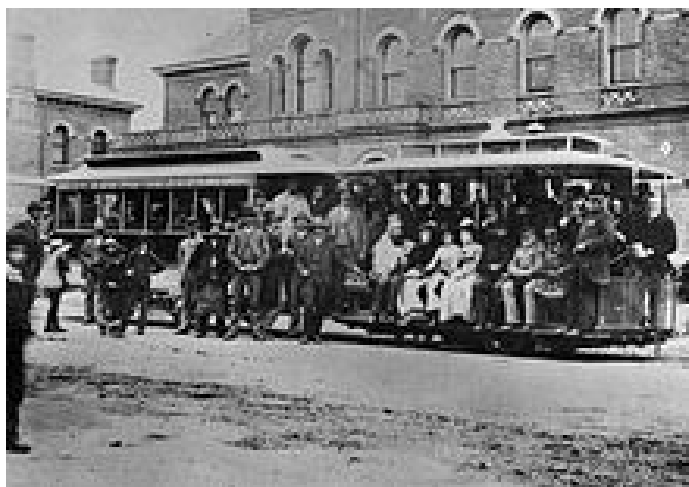
Figure 2.10 - Melbourne's first cable tram service on 11 November 1885 <http://en.wikipedia.org/wiki/Trams_in_Melbourne>

Figure 2.11 - The Kalgoorlie Electric Tramways closed on March 10, 1952. <http://www.kalgoorlietourism.com/kalgoorlie-tramways>

According to Currie & Burke (2013), in 1945, public transport was utilised for 70 percent of travel in Australian cities, 53 percent of which were tram travel. There were over one billion tram trips made by Australian passengers (Currie & Burke 2013). Personal cars were mostly owned by the more wealthy classes until the 1950s, thus transport for the masses consisted of trams and trains, horses and horse powered vehicles and of course, cycling and walking.

The majority of these light rail systems were removed after the war, with Sydney and Adelaide retaining only a small portion of the network and Melbourne being the only city in Australia to keep its light rail network (Ludlam n.d.). This was a result of personal car focussed transport planning and finance cuts (Currie & Burke 2013).

In line with global opinion, Australia's decision makers are also returning to the option of light rail as a method of reducing congestion, oil usage and the negative environmental impact of excessive private vehicle usage. New networks are being constructed in Sydney and the Gold Coast, and plans for networks in Perth and Canberra are underway as can be seen in Table 2.1.

	Route Name	Indicative Cost (A$m)	Route length (km)	Segregated right-of-way %	No. Stops	Ave Stop Spacing (m)	Estimated boardings
Under Construction							
Gold Coast (opening 2014)	Broadbeach-Parkwood	1,000	13	99	16	812	50,000 per day by 2016
Sydney (opening 2014)	Lilyfield-Dulwich Hill	172	5.6	100	9	622	3,105 per weekday by 2016
Approved*							
Perth	Perth-Mirrabooka	1,800	22	-	15	1,467	25,000 per day
Sydney	CBD-UNSW/Prince of Wales Hospital	1,600	12	-	-	-	-
Canberra	Civic-Gunghalin	614	12	-	15	800	-

*The proposed Adelaide-Semaphore link is not included. The South Australian Government placed light rail expansion to Port Adelaide and Semaphore on hold indefinitely in 2012.

Table 2.1 - Australian Tram/Light Rail Route Data (Currie & Burke 2013)

The Table 2.1 by Currie & Burke (2013) shows that the estimated number of passengers boarding the Gold Coast network will reach 50,000 per day by 2016, while those boarding the Perth network will reach 25,000 per day. If the growth in tram usage is equal to, or greater than, population growth, this will equate to substantially less car use, thus leading to a significant reduction in fuel consumption and traffic congestion.

2.6.1 Melbourne

Today Melbourne has the largest light rail network in the world, with 501 vehicles traversing 249 kilometres (Ludlam n.d.) and has been well integrated within the city's public transport system as a whole (Wilkie & Petersen 2010). The network has

29 routes, with 1773 stops and encompasses the suburbs east and west, north and south of the city centre and the central business district (Wilkie & Petersen 2010).

In the 2007-2008 period, 158.3 million passenger trips on the Melbourne network were recorded (Ludlam n.d.). The light rail system in Melbourne has been experiencing an increase in popularity, evidenced by passenger number growth of 12.5 percent which equates to 19.8 million during the 2008-2009 period (Wilkie & Petersen 2010). However, Ludlam (n.d.) and Wilkie & Petersen (2010) both state that the network is not growing in line with the increasing capacity demands.

There are some downfalls with the Melbourne light rail network which have been presented throughout the literature. Approximately 180 kilometres of the tracks are situated in the centre of the roads meaning the trams must share with the other road traffic (Currie & Burke 2013). This sharing of the roadways has impacted the speed of the light rail network with trams now travelling at 15 kilometres per hour, making it one of the slowest networks in the world (Currie & Burke 2013). This speed is increasingly being impacted by 'greater traffic congestion and also significant safety and access issues' (Currie & Burke 2013). Safety and access issues arise due to a significant portion of the tram stops being kerbside stops (Currie & Burke 2013) such as in Figure 2.12.

Figure 2.12 – Tram stop in Melbourne with passengers standing in the road reserve waiting to board <http://www.ptua.org.au/media/2003/october17.shtml>

According to Currie & Burke (2013), there are 38 to 53 accidents each year as a result of passengers having to traverse busy roads and wait kerbside in order to access the trams. These kerbside stops also make travel by people with physical disabilities difficult. 'Despite one of the largest low floor tram fleets in the world, most tram stops are not accessible for disabled people as a result of kerbside stops where boarding is from the road surface not at a platform' (Currie & Burke 2013).

2.6.2 Sydney

During its peak in the 1930s, Sydney operated the largest tram network in the country, however, it tramway service formally ended service in 1961 (Ludlam n.d.). In 1997, a 7.2 kilometre single line called Metro Light Rail began operation (Wilkie & Petersen 2010). This privately operated line runs from Central Station in the southern CBD to Lilyfield (an inner-western suburb), servicing the central business district and 'key business and leisure hubs' (Wilkie & Petersen 2010). The 24 hour per day system has 14 stops and seven trams which transport four million passengers annually (Wilkie & Petersen 2010).

Until recently, many proposals to extend the line failed to be achieved (Ludlam n.d.). Now, however, the light rail is being extended to feature an additional nine stops along 5.6 kilometres of an out of service freight line as shown in Figure 2.13 (Currie & Burke 2013). There are also now plans, and funding allocated, to construct 12 kilometres of new lines between the Central Business District and the south eastern suburbs which will service the Opera House, sporting facilities, the University of New South Wales and a hospital (Currie & Burke 2013). The aim of the expansion of the light rail network is to connect people, by means of public transport, from their homes to their workplace and major retail and entertainment hubs (Currie & Burke 2013).

Figure 2.13 – The Sydney Light Rail Network map showing existing and future routes <http://www.sydneylightrail.transport.nsw.gov.au/getmedia/a1102362-5d1b-42a2-83b6-e73fcdb165a3/SLR-Route-Map_12-05-2014?width=1000&height=707&ext=.jpg>

2.6.3 Adelaide

Until 1958, Adelaide had a light rail network which covered a large area of the city centre, of which all but the CBD to Glenelg line was closed (Ludlam n.d.). The 12.4 kilometre line has 21 stops, and in the 2008-2009 period recorded 2.6 million passenger trips on the eleven vehicles (Wilkie & Petersen 2010).

Wilkie & Petersen (2010) state 'to date the system has largely been a victim of its own success with patronage growth constrained by capacity, leading to the announcement of additional trams and track extensions in 2008.' Recently, there has been an extension of 2.8 kilometres to service the Entertainment Centre 'and a major

park'n'ride facility on the fringe of the city centre' (Currie & Burke 2013), and due to increasing demand, a further six trams have been added to the system (Wilkie & Petersen 2010).

It is intended that the network extension will improve access to the hospital, university, sporting facilities and parks in the area and 'facilitate associated urban regeneration in the surrounding areas' (Wilkie & Petersen 2010). The extension was designed to allow for another line to connect the Entertainment Centre with Port Adelaide, and possibly Semaphore and West Lakes (Wilkie & Petersen 2010). However, in 2012 the government of South Australia postponed the 35 million US dollar development indefinitely (Currie & Burke 2013).

Figure 2.14 - A pair of heritage Glenelg trams (at right) alongside modern Flexity tram (left) at station on new tramway extension on Opening Day.
<http://www.lightrailnow.org/features/f_ade_2007-11a.htm>

2.6.4 Perth

The Metro Area Express (MAX) light rail network is currently under design, with anticipated commencement of construction in 2019 and an operational goal situated at the end of 2022 (Public Transport Authority n.d.). The route is 22 kilometres in length with 16 stops running from the north at Mirrabooka, through the central business district and then forking in two directions, to The Causeway and to QEII Medical Centre (Public Transport Authority n.d.).

Public Transport Authority (n.d.) states that the route was selected as a result of high demand for transport to 'key educational, retail and leisure centres'. The Western Australian government has declared their objectives in this development are also to 'support urban transformation by providing high-capacity service and stimulating revitalisation and development in the corridor' (Currie & Burke 2013).

Future light rail lines are under consideration to connect the QEII Medical Centre with the University of Western Australia, Curtin University and the proposed new Perth Stadium (Public Transport Authority n.d.).

Figure 2.15 – Suburban centre station and vehicle, Government of Western Australia <http://www.pta.wa.gov.au/Portals/13/docs/suburban_station_concept_image.jpg>

2.6.5 Canberra

A new light rail system, called Capital Metro, is also currently in the early stages of design for Australia's capital city, Canberra. The line will run from the northern suburb of Gungahlin, south to the city central area 'Civic', as can be seen in Figure 2.16 (Currie & Burke 2013). This first stage will be 12 kilometres long (Currie & Burke 2013), but the number of stops have not yet been decided (Capital Metro 2014).

Another four light rail lines have been proposed which would add 42 kilometres to the network, however, this proposal is still in very early planning stages (Currie & Burke 2013). The planners in the ACT Government declare that the new light rail

network will aid in integrating 'the dispersed urban development of the city with public transport' (Currie & Burke 2013).
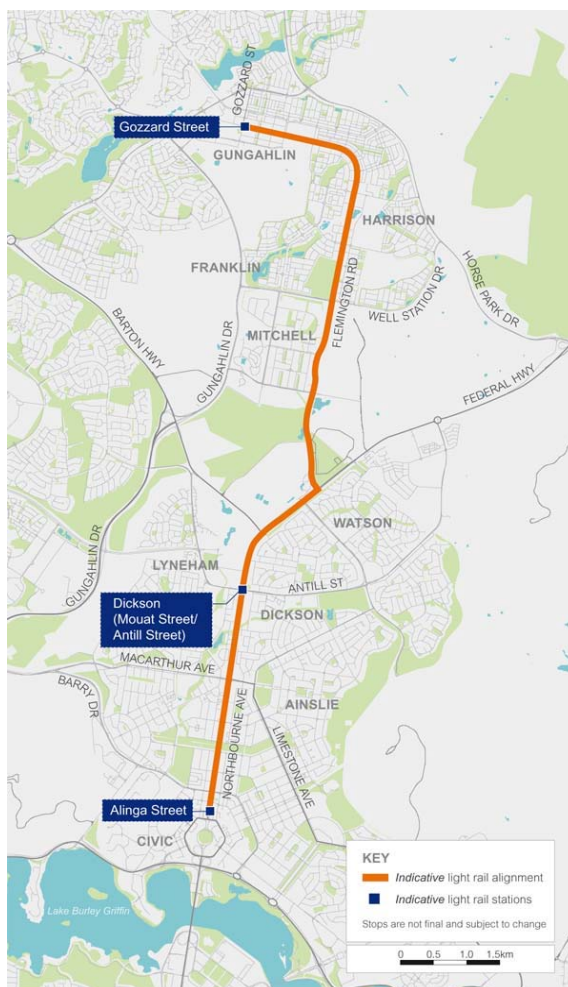
Figure 2.16 - Indicative route, Capital Metro, ACT Government
<http://www.capitalmetro.act.gov.au/stage-1-city-to-gungahlin/stops-locations>

2.6.6 Conclusion

In Australia, light rail networks have not substantially increased in size but total passenger numbers have increased by a significant 46 percent during the 2001 to 2012 period (Currie & Burke 2013). It is important to note that total public transport

usage only increased by nine percent, indicating that tram usage is the most popular mode of public transport (Currie & Burke 2013). Currie & Burke (2013) identified the following trends:
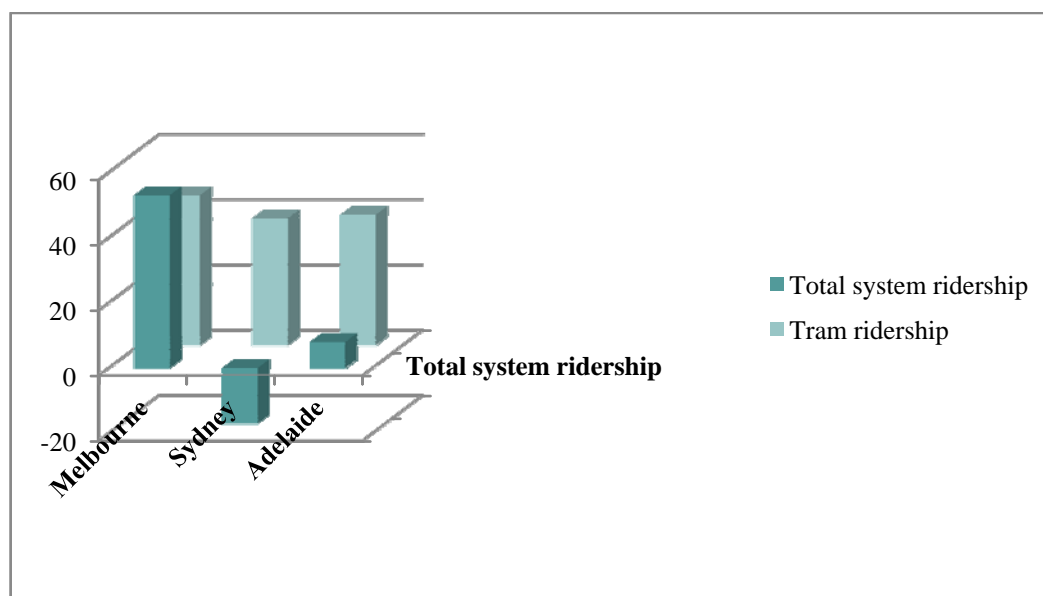
Table 2.2 – Table showing tram ridership growth during 2001 to 2012 (Data from Currie & Burke 2013)

The table above illustrates that in Melbourne, total system ridership increased by 53 percent while tram ridership increased by 46 percent. In Sydney, total system ridership decreased by 17 percent, however, tram ridership increased by 39 percent. While in Adelaide total system ridership increased by eight percent, but tram ridership increased by a significant 40 percent.

An influencing factor in the areas that are serviced by trams includes rates of car ownership. For example, in Sydney the car ownership rate is 280 per 1000 residents, while in Adelaide the rate is 550 cars per 1000 residents (Currie & Burke 2013).

Another influence is location of the services. For example, the system in Melbourne services a high density residential area, while Sydney services areas of high residential and employment densities (Currie & Burke 2013).

People travelling to work have increasingly been using trams over the last two decades, with growth in Adelaide a significant 284 percent, and in Sydney, an equally significant 240 percent (Currie & Burke 2013). Growth in tram commuting has consistently surpassed the growth of other public transport modes in all cities and most strongly in Adelaide and Sydney (Currie & Burke 2013). Even so, the volume of commuters in Melbourne is significantly higher than all other cities, with 70,496 tram commuters in 2011 (Currie & Burke 2013). This volume is higher than the commuters using all modes of public transport in Adelaide (Currie & Burke 2013).

Planners should take note of the issues encountered by and hampering the use and expansion of the Melbourne light rail system with regard to road sharing, including but not limited to speed, congestion and safety. It is clearly shown that a light rail network will be much more efficient and reliable when it has right of way rail lines (Currie & Burke 2013). This is especially important to the planners in Adelaide, Sydney, Perth and Canberra where the light rail network designs are in progress.

It has been found that, with the exception of the Adelaide service, while there has been significant growth in total ridership of trams, the levels of service have not grown in line with that demand (Currie & Burke 2013). Decision makers should consider improving the services available to passengers and also improving pedestrian accessibility around the tram stops, as a method to increase tram usage and as a result, increase walking, which has been proven to reduce city congestion, greenhouse gas emissions and improve public health.

2.7 Gold Coast light rail

'The Gold Coast light rail project is a A$1 billion 18 year Public Private Partnership (PPP) contract with the Queensland State Government to design, build, finance, operate and maintain a light rail public transportation system' (GoldLinQ 2013). It has been constructed and is operated by a number of contributors. GoldLinQ is a consortium of companies which include GoldLinQ Pty Ltd (the Operating Franchisee), McConnell Dowell Constructors Pty Ltd (responsible for engineering and construction), Bombardier Transportation Australia Pty Ltd, which provide the light rail vehicles and systems, and KDR Gold Coast Pty Ltd, who will be the operator of the system (GoldLinQ 2013). There are also equity partners which will contribute some of the funding for the project (GoldLinQ 2013). 'It is Australia's first new light rail project in a regional centre, jointly funded by the Commonwealth, State Government and Gold Coast City Council' (Ludlam n.d.).

Planning by the Gold Coast City Council and the Queensland Government for a light rail to attend to population growth and traffic congestion has been underway since the late 1990s (GoldLinQ 2013). A Concept Design and Impact Management Plan (CDIMP) was carried out with a great deal of community input (GoldLinQ 2013). A CDIMP is undertaken in order to 'assess the benefits and impacts of a project' and is a process used by the Queensland Government for all major infrastructure projects which are not required to be subject to a 'formal Impact Assessment Study under State or Commonwealth legislation' (GoldLinQ 2013). 'The CDIMP represents a 'best practice' process of assessing and defining options to meet the project service requirements as well as assessing impacts and mitigation measures' (GoldLinQ

2013). This project is the first occurrence of all three levels of government jointly funding a transport project (GoldLinQ 2013).

The early construction works which involved road widening, relocation of facilities, fences and driveways and upgrade of services infrastructure such as water, sewer and communications lines were funded by the Government, with the remaining works to be carried out by GoldLinQ (GoldLinQ 2013).

The first stage of the light rail network is 13 kilometres long, will have 16 stations along the route with 14 trams operating daily (McConnell Dowell 2014). The light rail vehicles operate on 'dedicated right-of-way' lines with the exception of two commercial hubs, through which they share the road reserve with other traffic (Wilkie & Petersen 2010).

The future stages under investigation include a route from Griffith University to Helensvale Train Station (heavy rail) and a route from Broadbeach to Burleigh Heads and then on to Coolangatta. If implemented, the line could potentially be 40 kilometres in length, however, planning for these stages is still in preliminary stages and funding has not yet been applied (GoldLinQ 2013). The 'Draft Gold Coast City Transport Strategy 2031' holds the light rail network as the centre point of the city's future transport and development plans (Currie & Burke 2013).

The network services the high density coastal corridor, which consists of high rise buildings occupied by tourists and residents, as well as retail and commercial areas. Presently, passengers must change from tram to bus to train in order to travel from the coast to Brisbane and the International Airport, adding time and inconvenience, thus not an attractive route. In the near future, it is planned to link the network with

the heavy rail thus providing passengers with an easy and desirable trip (Wilkie & Petersen 2010).

The project on the Gold Coast is the first regional light rail project to which the finance, knowledge and skills has been contributed from all three tiers of government plus private enterprise, making it a 'truly national approach to transport infrastructure prioritisation' (Wilkie & Petersen 2010).

The aim of the light rail network on the Gold Coast is to allow for city redevelopment and regeneration without the requirement for new roads and without increasing traffic congestion (Currie & Burke 2013). In order to achieve these goals, there must be a focus on increasing active transport in the Central Business District. The literature review has identified that pedestrian accessibility considerations such as connectivity to destinations and mixed land uses, quality of walking facilities and aesthetics should be a priority when designing transport infrastructure.

2.8   Conclusion

This literature review has identified common themes and important links between walkability and light rail. In a conducive environment, walking is a sustainable, free and healthy method of transport. Light rail is proven to be the most sustainable of all public transport modes because it is highly energy efficient and capable of transporting many passengers in one trip.

Both walking and light rail networks have been found to promote development and urban renewal, reduce traffic congestion and urban sprawl, as well as promote healthier walking habits within the community.

Walkability refers to how conducive an environment is to walking (Ariffin & Zahari 2013). This literature review has identified the factors which create an environment conducive to walking. Some of the key factors revealed include spatial layout of the development, time and distance to reach a destination, the condition of the walking facilities, land use mix, appealing scenery and the provision of street furniture, lighting and shade.

Light rail is becoming increasingly popular around the world many of which are highly successful networks such as Portland, Oregon and Zurich, Switzerland. In order to achieve a sustainable community, planners must aim to design with a focus around improving walkability as a priority.

The literature review has assisted in identifying the elements of a walkable environment and these elements will now be assessed for the area around a light rail stop in the Central Business District Southport on the Gold Coast.

CHAPTER 3

3.0 RESEARCH DESIGN

3.1 Introduction

This chapter has two components. The first is a discussion of the methodology undertaken for this research project. Included in this section is the routes selected, and justification for those selections. The methodology section also includes a description of the factors which have and have not been included in the walkability audits.

The second component is the resource requirements section which outlines all the equipment and software necessary to complete the research.

3.2   Methodology

Suburbs which are conducive to walking and cycling have been found to promote sustainable, healthy and safe environments (Dept. of Transport 2011). The aim of this report has been to determine the levels of walkability and connectivity in the Southport Central Business District. This research project used a mixed method approach. The first step comprised analysing the existing literature with regards to walkability and the implementation of light rail networks around the world and specifically in the other Australian cities. Then, based on the information gathered from the literature reviews, the author proceeded to a walkability audit of the defined area.

Research has found a number of predesigned walkability audits including those prepared by the Heart Foundation and the Queensland Government's 'Active Healthy Communities'. Upon review of the existing literature, an audit was adopted with thanks to the Western Australia Department of Transport. The completed templates are included in the Appendix C.

'Walking is a multidisciplinary activity, and therefore requires multidisciplinary metrics to measure the walkability of places' (Hutabarat Lo 2009). This audit has been selected due to its coverage of elements considered important after researching walkability. These elements include general impressions, footpath locations and condition, tram and road crossings, road accessories, safety and amenities (Dept. of Transport 2011). Connected and well-maintained footpaths, safety of crossings, low or no heavy and high-speed traffic, separation of path from traffic, density and diversity, green spaces, security and a sense of place are common factors to many walkability metrics (Hutabarat Lo 2009).

The audit is a quantitative test of these elements, judging them on a scale of 1 which is unsatisfactory, 2 being unsatisfactory but acceptable and 3 which is satisfactory (Dept. of Transport 2011).

The routes which will be audited will begin at Station 5 and continue to some of the most popular facilities. The routes are chosen for the most direct path from the station to the facility. The facilities to which each audit will be conducted will be the Southport Courthouse, Australia Fair Shopping Centre, the Southport Library, the Gold Coast Institute of TAFE, and Broadwater Parklands. The routes are shown in Figure 3.1.

Figure 3.1 - Map of Southport showing intended routes for the audit (imagery from Google Earth)

The Gold Coast City Library at Southport is a large branch which provides a number of services such as reading, visual and audio material loans and free use of the computers and internet. It also hosts a many community events and activities such as children's readings, author presentations and adult literacy support. This branch is also the location of the 'Local Studies Library' which houses archival material about the Gold Coast.

The Southport Courthouse is a district court which covers the area from Pimpama in the north, to Coolangatta which is the most southern part of the Gold Coast. The courthouse is open every weekday and has many visitors each day in the way of staff, jurors, lawyers, spectators and attendees. Many of these people could be using the new light rail network to access the location rather than driving and parking in the large parking lot located directly across the road.

Australia Fair Shopping Centre is a relatively large commercial shopping complex with over 230 shops and services and occupying approximately 60,000 square metres of land. It provides for retail and commerce entities as well as providing entertainment venues such as a large cinema and many restaurants and cafes.

The Gold Coast Institute of TAFE is the 'largest training provider on the Gold Coast' (QTAC 2014) and has 123 courses on offer (TAFE Queensland 2014). This facility was chosen as part of the research as there are a great number of students who attend this facility who could be using the new light rail.

The Broadwater Parklands is a recreational area adjoining the Broadwater, the body of water between the coast and Stradbroke Island. It is regularly the host of festivals and other events, as well as a desirable location for picnics and enjoying the sunshine.

These five destinations have been chosen as they are key attractors of the public to the area. The pedestrian routes will largely influence the public's decisions to take the light rail and walk to these attractors. The literature review identified many factors which influence people's decisions to walk rather than travel by car, including pedestrian accessibility, quality of the walking facilities, safety and the destinations. People are also more inclined to walk if there is traffic congestion creating longer travel times and also if there is a lack of parking facilities at their destination.

All of the routes are within 'Precinct 1 Central Business District' of the Southport Priority Development Area (PDA) Development Scheme 2014, which was released in October, after the majority of this research had been carried out. Precinct 1 is shown as the area in blue on Figure 3.2.

Figure 3.2 - Area in blue is Precinct 1, Central Business District (DSDIP 2014)

However, the fact that all five routes selected to be audited have been identified within the development scheme's network infrastructure map as 'Pedestrian Network' indicated by the bright blue lines on Figure 3.3, validates the author's selection of the routes.
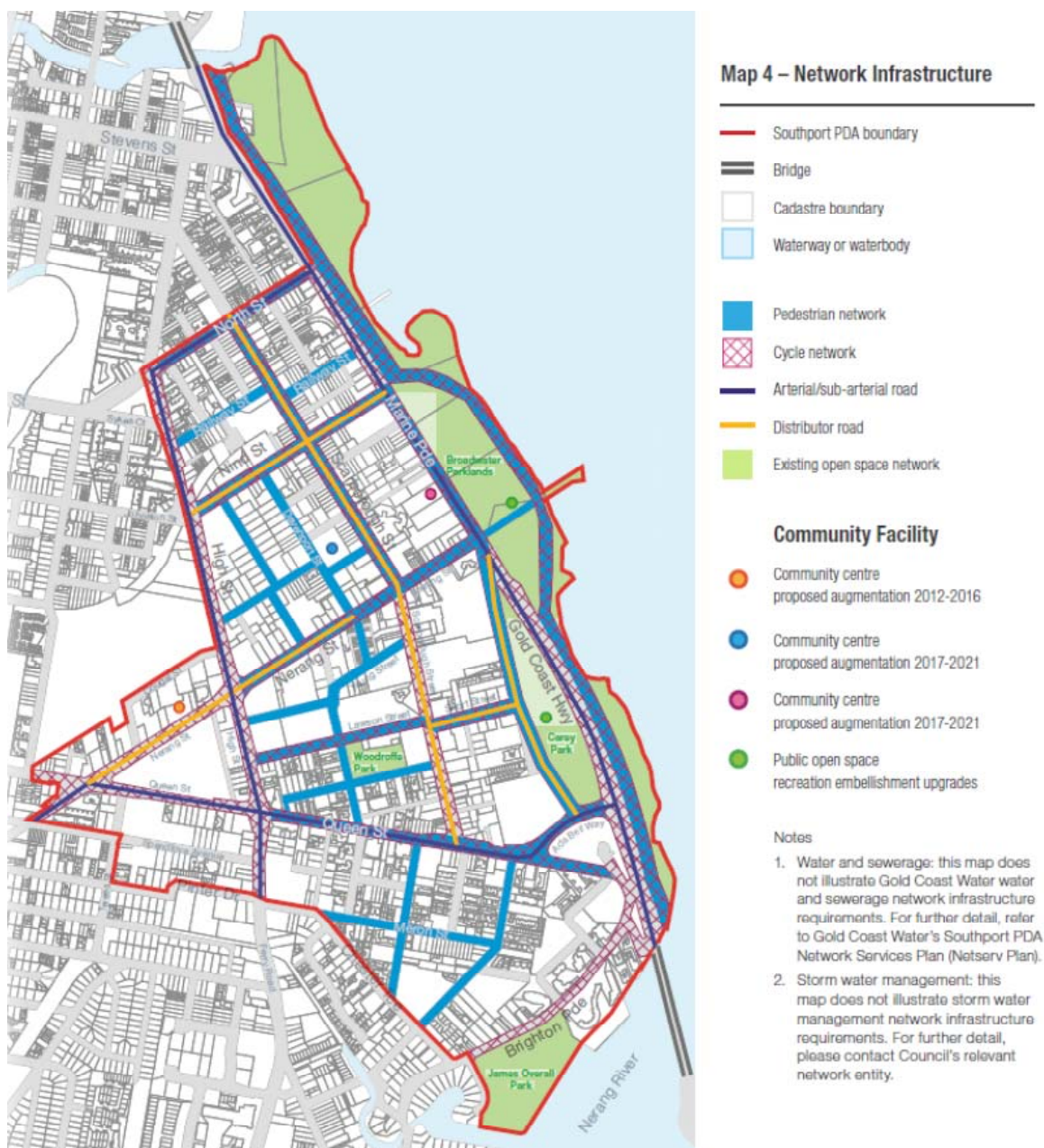
Figure 3.3 - Network infrastructure map - bright blue indicates 'Pedestrian Network' (DSDIP 2014)

The audit will be conducted during peak hour on an average weekday (Wednesday and not a public holiday) which reflects an average day in the Central Business District. This day and time is selected so that the paths and roads are at their heaviest pedestrian and vehicular traffic levels. This will allow for determination of whether path widths and road to pedestrian clearance is adequate to accommodate the levels of traffic during the busiest time of day.

The literature review identified many key factors that are important to enhance walkability of an area, all of which are included within the selected walkability audit forms. The completed forms are included in Appendix C. The audit is broken into seven sections which are overall impression, pathways, crossings, street furniture and signage, personal safety, adjacent traffic, and aesthetics and amenities.

The pathways section includes type of path, for example, shared or pedestrian only, width and capacity and condition of the path. It also includes obstructions such as café tables or low hanging shop signs. Other factors include path connectivity to destinations, and accessibility for prams and mobility or vision impaired people.

The crossings section of the audit includes condition, accessibility, location and type such as signalised pedestrian crossings or zebra crossings. It also includes an assessment of signal timing and pedestrian's ability to cross during the time allowed.

There is a section for street furniture type such as chairs and rubbish bins and their condition. Shade is assessed in this part of the audit, identifying if there are trees or structures to provide that protection from the elements. This section also assesses the type and condition of signage and pavement markings on the route.

The personal safety section assesses the feeling of safety along the routes during day and night. It covers such elements as the number of people around, types of adjoining uses and lighting.

The adjacent traffic is assessed under two criteria: general traffic issues and those at crossings and driveways. This section of the walkability audit covers such things as pedestrian separation from traffic, traffic calming devices (such as speed humps and protruding kerbs), and line of sight between drivers and pedestrians including children and people in wheelchairs.

The final element of the walkability audit covers aesthetics and amenities. This section includes perception of the route's attractiveness, evidence of litter and graffiti as well as air and noise pollution. The mix of adjoining land uses have been discussed in the results section of this research paper for each route. All of these sections of the walkability audit tool combine to provide a comprehensive assessment of the walkability of the route.

There are a few elements identified in the literature review which are not included in the walkability audit tool. Parking provision, or lack thereof, is not included in the walkability audit tool. However, for the purpose of this research project, this element was not considered pertinent to the analysis as there are three high capacity parking lots within the vicinity of the subject tram station, these have been indicated on the concept maps included in the results chapter.

Another element, which affects walkability, that was revealed in the academic literature is the level of interest. Although this element is not explicitly listed in the walkability audit tool, the researcher did consider the level of interest when rating the aesthetics and amenities section of the walkability audit tool.

Using the data collected, the author hoped to determine whether appropriate destinations had been identified and the levels of walkability along those routes can be improved, also to provide suggestions on how to do so, based on the extensive literature review. The study will finally identify the key factors that planners and designers should consider when designing pedestrian networks to and from a new light rail network.

3.3   Resource Requirements

The resources required for this project have been minimal. Literature resources were obtained through libraries, databases and the World Wide Web. These were accessed on a personal computer which has full access to the Microsoft Office programs such as Word and Excel as well as Adobe Acrobat Professional.

Physical resources used include a clipboard with the audit forms and writing implements, as well as a digital camera to provide evidence of the findings. A ten metre offset tape was also taken for when measurements were required.

Comfortable walking shoes, drinking water and sun protection including sun cream, a hat and long sleeves are always a personal necessity.

When carrying out the Audit, travel to and from Southport was by means of a work vehicle, courtesy of Andrews & Hansen Pty Ltd. The costs of this project will therefore only be for parking which will be in the range of $5.00 to $10.00 per day. These costs have been covered by the writer.

3.4   Conclusion

The Research Design chapter has outlines the tools and the locations for the walk audits which form the case study for this dissertation. The chapter has also discussed the resources required to complete the project.

This paper will henceforth discuss the results of the case study.

CHAPTER 4

4.0 RESULTS

4.1 Introduction

The literature review has revealed that rail users experienced many benefits such as decreased obesity rates, less reliance on cars, 'a stronger sense of general neighbourhood satisfaction' and 'stronger place attachment' (Brown & Werner 2011). Academic research has also found links between improving the walkability of the areas around a light rail station, and increases use of public transport.

The walk audits, carried out as part of this research project, have been a test to determine how walkable the routes to the selected destinations are. The results of the audits have been subdivided into three groups for discussion purposes. These groups are 'walking facilities', 'street furniture and signage' and 'traffic, safety and aesthetics'.

This chapter will henceforth briefly discuss the findings of the walkability audits and the analysis of the levels of walkability of the selected routes. The completed walkability audit forms are to be found in Appendix C. A visual representation of the results of the walk audits is provided at the commencement of each route discussion. Each section is scored out of three (shown in green for satisfactory), two (unsatisfactory but acceptable) is shown in yellow, and one (unsatisfactory) is shown in red.

4.2   Around the tram station itself

The area around Station 5 of the Gold Coast Light Rail Network has been recently upgraded as part of the network development and is henceforth analysed with respect to the walkability audit tool.

The context map in Figure 4.3 shows that there are cafes, assorted businesses, two pubs and a council building adjoining the area of the station. The light blue symbols on the figure also show the location and point in the direction of the photographs taken during the walk audit.
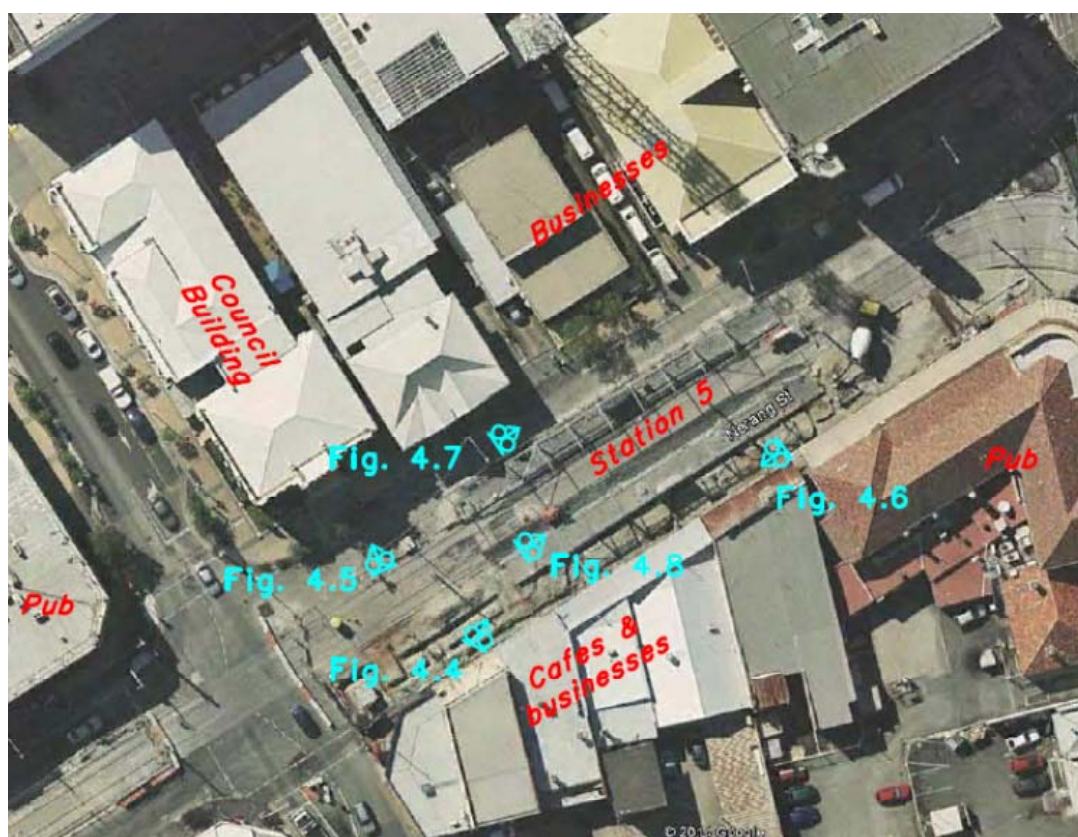
Figure 4.3 - Context map around Station 5, showing adjoining land uses and locations of photographs taken (imagery from Google Earth)

4.2.1 Walking facilities

The newly laid paths around the station are well-maintained, aesthetically pleasing and have a smooth walking surface. There is a signalised pushbutton pedestrian crossing across the tram tracks. The signal allowed fifteen seconds to cross, and took eight seconds before the walking phase commenced, however, the auditor witnessed a few pedestrians crossing with no regard for the signal.

The platform is accessed by both steps and ramps as can be seen in Figure 4.4 making the platform accessible for mobility impaired people and people with prams. The area also has tactile surfaces for vision impaired people as shown in Figure 4.5.

The waiting areas were sufficient to accommodate the pedestrian volume and were well marked. The drainage grates are smoothly set into the path (see Figure 4.6), thus posing no danger to pedestrians. The crossing over the tram lines is very smooth with the exception of the tracks, which would also be slippery when wet.

Figure 4.4 – Steps and ramps for access to the station platform

Figure 4.5 – Tactile surface for vision impaired pedestrians

Figure 4.6 – Looking west at path and access to Station 5 platform

4.2.2 Street furniture and signage

There was signage indicating the direction to Gold Coast Institute of TAFE, Southport Central, the bus stop and bicycle storage facilities as shown in Figure 4.7, however, no other facilities are identified by signage.

There were sufficient covered waiting areas with benches and low walls for seating and rubbish bins, as shown in Figure 4.8. There have also been a number of trees planted as part of the upgrades which provide shade and also improve the aesthetics of the area as can be seen in Figure 4.7.

Figure 4.7 – Sign indicating directions to TAFE, Southport Central, bus stop and bicycle storage

Figure 4.8 – Looking east on Station 5 platform with benches, seats and rubbish bins

4.2.3 Traffic, safety and aesthetics

The only traffic which impacts the area around the station is that of the trams themselves. However, there is a clear line of sight between the trams and pedestrians, and crossings are made safer by the installation of pushbutton signals. Pedestrians are separated from the tram lines, in places, by street furniture and the station shaded waiting structure.

The area surrounding the light rail station is aesthetically pleasing. The area is very clean and neat, with no sign of graffiti, dumped rubbish or litter. The area is also clear of both air and noise pollution because the trams make very little sound, as they operate using electricity.

The area around Station 5 provides ease of access, as a result of the upgraded walking facilities and the addition of shade trees and other street furniture. It is very well lit and has a moderate volume of pedestrians in the area, which assists in creating the sense of a safe environment.

4.3 Tram station to the Southport Library

It took the auditor eight minutes to walk this route, shown in Figure 3.1, which was chosen using a combination of personal experience and Google Earth. This route scored a walkability rating of 18 out of 21, a breakdown of the scores can be seen below in Table 4.1.

Walkability Audit Score Summary Station 5 to Library	
Overall Impression	2
Pathways	3
Crossings	3
Street Furniture and Signage	2
Personal Safety	2
Adjacent Traffic	3
Aesthetics and Amenities	3
Total Rating	18

Table 4.1 – Walkability score summary for Station 5 to the Library

The route to the library has a variety of adjoining land uses including shops, businesses, cafes and restaurants, as well as the large commercial and residential towers of Southport Central.

Figure 4.9 also indicates the location and direction of the photographs taken during the walkability audit and discussed in following sections.

Figure 4.9 - Context map for the route to Southport Library, showing adjoining land uses and locations of photographs taken (imagery from Google Earth)

4.3.1   Walking facilities

This route qualified as an easy walk suitable for most pedestrians with minimal changes in elevation. The path is continuous and is connected to other paths to form a pedestrian network.

Figure 4.10 – Walking path from building to kerb

The walking path is positioned from the buildings to the kerb in width, and is an average of about three metres wide. The path is mostly in good condition with no maintenance issues, as can be seen in Figure 4.10, however, it is slightly uneven in places. This figure also demonstrates that there are sections along the route where pedestrians are separated from the roadway by vehicle parking bays, light posts and a few trees.

This route requires crossing roads in three places. The crossing directly in front of the library (see Figure 4.12) is signalised with pushbuttons, which allow fifteen seconds to cross. The auditor did not see any pedestrians ignoring the signals, which indicates that the waiting time is adequate.

Both of the other crossings are zebra crossings as shown in Figure 4.11. All of the crossings appear to be satisfactory for the traffic and pedestrian volumes and are suitable for all users including people with prams and wheelchair users.

Figure 4.11 – Zebra crossing on the route and low walls suitable for sitting

Figure 4.12 – Library with push button pedestrian crossing in front

The section of the route closest to the tram line will form part of the new Chinatown Precinct and is occupied by cafes and restaurants as well as other various businesses. Some of these cafes and businesses have furniture and signs on the path, which narrows the width for pedestrians, as illustrated in Figure 4.13. However, the remaining path width of approximately two metres was adequate for the volume of pedestrian traffic.

Figure 4.13 – Furniture and signs on the path

4.3.2   Street furniture and signage

A key issue presented by this route is the lack of signage directing and connecting pedestrians to the library. Only one sign on the path indicates the direction of the station, as seen on Figure 4.14. This is approximately half way along the route but gives no indication of in which direction the library is located.

There are a few pedestrian oriented features along the way, including some benches and rubbish bins. There are also some seats at approximately half way on the route, which can be seen in Figure 4.14.

Figure 4.14 – Sign indicating the direction of the light rail station and an example of the new seats

4.3.2 Traffic, safety and aesthetics

Generally, the route was clean and neat, but there are some instances of graffiti giving the perception of an unsafe environment such as on Figure 4.16. Most of the buildings along the route are businesses and many of the buildings along the route are of an older construction date and show signs of deterioration, as shown in Figures 4.16 & 4.17. Also, most of these commercial and retail premises are unfrequented after business hours, contributing to a sense of diminished security in certain sections.

The route was clear of litter, dumped rubbish, and discarded items and was also clear of air and noise pollution.

Figure 4.15 - Approaching the library

Figure 4.16 – Example of outdated building facades and graffiti

Figure 4.17 – Example of outdated building facades

Another pertinent issue on this route is the obstructive impact of the block wall and hedge (see Figures 4.18(a) & 4.18(b)) on pedestrian and driver visibility. Drivers do not have a clear view of pedestrian traffic when exiting the alternative Australia Fair parking lot and pedestrians may not be aware of the driveway and potential drivers exiting the car park.

Figure 4.18(a) - Looking west at driveway with obstructed views

Figure 4.18(b) - Looking east at driveway with obstructed views

4.4　Tram station to the Courthouse

This route scored a walkability rating of 20 out of 21 and was a very short route, requiring only 2 minutes to walk.

Walkability Audit Score Summary Station 5 to Courthouse	
Overall Impression	3
Pathways	3
Crossings	3
Street Furniture and Signage	3
Personal Safety	2
Adjacent Traffic	3
Aesthetics and Amenities	3
Total Rating	20

Table 4.2 – Walkability score summary for Station 5 to the Courthouse

There are a variety of land uses adjoining this route which include a low rise residential building, assorted businesses, a cafe and a pub, a council building, and the Southport Police Station as shown on Figure 4.19. This context map also marks the location and direction of the photographs discussed in the following sections.

Figure 4.19 - Context map of route to Southport Courthouse, showing adjoining land uses and locations of photographs taken (imagery from Google Earth)

4.4.1 Walking facilities

The path was in reasonable condition and was neat and clean, with an average path width of three metres from building to kerb. The path is continuous and connected to other paths to form a pedestrian network. There were no crossings on this route after

leaving the station and it is suitable for people with prams, as well as mobility and visually impaired people.

There are some permanent obstructions in the form of bollards in front of the Courthouse, as can be seen in Figure 4.20, however, there is still adequate passing room for pedestrians.

Figure 4.20 – The Courthouse with bollards in front

There is no cycle lane on the road which could cause cyclists to use the path as well. As the path is only three metres wide, it is too narrow to accommodate both pedestrians and cyclists.

4.4.2 Street furniture and signage

There were well established street trees along the route as well as some street furniture including benches as can be seen in Figure 4.21. On this route, there were also restrooms available to the public.

One problem along this route was that there was no signage directing pedestrians from the tram to the Courthouse and there was no signage indicating if the path was intended as pedestrian only or to be shared with cyclists.

Figure 4.21 – Street furniture, trees and a neat wide path toward the Courthouse

4.4.3 Traffic, safety and aesthetics

The buildings along this route are clean, neat and tidy with no evidence of graffiti.
The route to the Courthouse was aesthetically pleasing, with adequate vegetation
including street trees and planters as shown in Figure 4.21, and there was no
evidence of dumped rubbish or litter.

Figure 4.22 – Example of cafes and businesses along the route with
residential units above

This route is frequently traversed by a comparatively high volume of pedestrians, and
the road is lined with a number of cafes and businesses, as shown in Figure 4.22.
These businesses are closed during the evening reducing the feeling of personal
safety during that time. However, it is important to note here that, with the exception
of the residential units above the building shown in Figure 4.22, there is less
incentive to walk this route at night because there are no attractors for evening walks
along this route.

4.5   Tram station to TAFE

This was also a very short route, taking the auditor only 2 minutes to walk and it scored 100 percent in the walkability rating.

Walkability Audit Score Summary Station 5 to TAFE	
Overall Impression	3
Pathways	3
Crossings	3
Street Furniture and Signage	3
Personal Safety	3
Adjacent Traffic	3
Aesthetics and Amenities	3
Total Rating	21

Table 4.3 – Walkability score summary for Station 5 to the TAFE

This section of Southport has been upgraded as part of the development of the tram station and is thus in very good condition. Figure 4.23 shows that the adjoining uses along this route include businesses, shops and a pub. The figure also shows the location and direction of the photographs which are included in the discussion below.
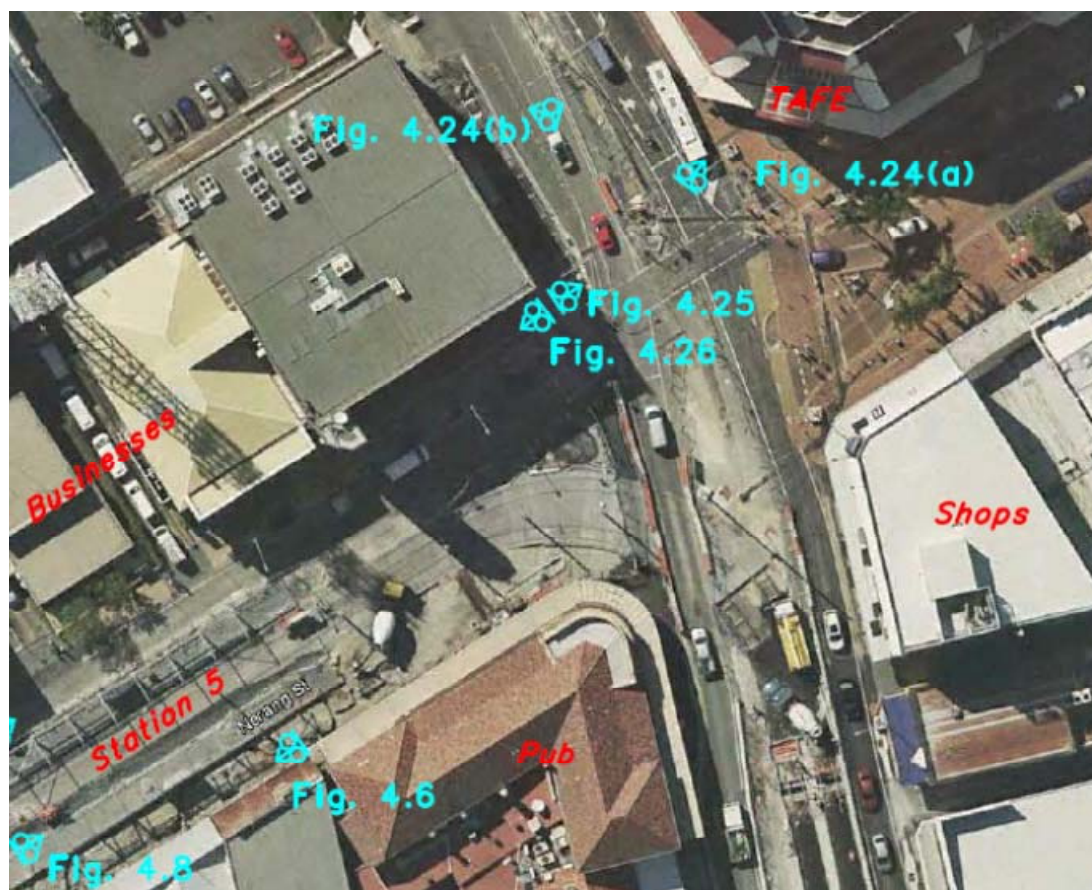
Figure 4.23 - Context map of route to TAFE, showing adjoining land uses and locations of photographs taken (imagery from Google Earth)

4.5.1   Walking facilities

This route provides connectivity to a large bus stop which is located in front of the TAFE as shown in Figures 4.24(a) and 4.24(b). The route is also connected to other paths thus providing a pedestrian network linking people to shops, entertainment venues and a community centre.

Figure 4.24(a) – TAFE and bus stop in front

The paths are an average of eight metres wide and are in excellent repair with no hazard or design issues. There is one crossing on this route which has pedestrian pushbutton signals, allowing the walker to cross two traffic lanes. The signal allows 34 seconds for the pedestrian to cross and took 28 seconds waiting time before the walking phase started. At this crossing, there is ample line of sight between pedestrians, including children and mobility impaired people, and approaching vehicles.

The waiting areas at that crossing are sufficient to hold the expected volume of pedestrians and are suitable for wheelchair users and also for vision impaired people, as can be seen in Figure 4.25.

Figure 4.24(b) – Bus stop across the road from TAFE

Figure 4.25 - Tactile surface and adequate waiting area at the crossing

4.5.2 Street furniture and signage

There are benches, low walls and rubbish bins furnishing the route and shade is provided by adjoining structures and some small trees, as can be seen in Figure 4.26. Along this route there are no permanent or temporary obstructions to the pedestrian.

There is adequate signage directing pedestrians to the TAFE, and due to the proximity of the station to the facility, a sign there indicating the direction of the station would be redundant. The signage and pavement markings are well painted, of non-slippery material, are visible in all conditions, and are in good repair.

Figure 4.26 – Looking west from the TAFE to the tram station, street trees and furniture along the path

4.5.3 Traffic, safety and aesthetics

This route has good aesthetics due in part to its recent construction. It is aesthetically pleasing, with no evidence of litter and graffiti. It is clear of air pollution and only a small amount of noise pollution from the vehicles on the one road which must be crossed.

The high volume of pedestrians, the outlook from adjoining uses and the good lighting provides a feeling of safety day and night.

One problem along this route is that there is not a dedicated area for bicycles. There is no indication of whether the path is intended to be shared, which means that cyclists could interrupt or collide with people walking. There is signage indicating a bicycle storage area which has been installed because bicycles are not permitted on the trams.

4.6   Tram station to Broadwater Parklands

This route took seven minutes for the auditor to walk and also scored 21 out of 21 in the walkability audit.

Walkability Audit Score Summary Station 5 to Parklands	
Overall Impression	3
Pathways	3
Crossings	3
Street Furniture and Signage	3
Personal Safety	3
Adjacent Traffic	3
Aesthetics and Amenities	3
Total Rating	21

Table 4.4 – Walkability score summary for Station 5 to Broadwater Parklands

There are multiple varieties of land uses adjoining this route which include shops, cafes, a number of education facilities such as language schools and a small campus for Central Queensland University and there is also a large high rise residential tower, as can be seen on the context map, Figure 4.27. The context map also indicates the location and direction of the photographs taken during the walkability audit.

Figure 4.27 - Context map of route to Broadwater Parklands, showing adjoining land uses and locations of photographs taken (imagery from Google Earth)

4.6.1 Walking facilities

Along this route, there are shops and other businesses, cafes and restaurants. There were instances of minor obstructions to the walker by the café seats and freestanding signs.

Figure 4.28 – Entry to the Broadwater Parklands

Figure 4.29 – Looking over the parklands, with the Broadwater in the background

The route was neat and clean, with very wide paths at an average width of ten metres. The path is the full width from the buildings to the kerb and there were no hazards or maintenance issues such as cracking or debris. The path is suitable for mobility and vision impaired persons, with the tactile path running the full length of the route, as shown in Figure 4.30(a).

However, there were some sections of minor unevenness of the path, as shown in Figure 4.30(a). There were also some interruptions to the tactile path, as shown in Figure 4.30(b) by the lids to underground services pits.

Figure 4.30(a) – Minor unevenness of the path

Figure 4.30(b) – Lids to underground services interrupt the tactile surface path for the vision impaired

There were two crossings, one of which was across a low speed, two lane road. There were two places for the pedestrian to cross this road, one of which (shown in Figure 4.31) had tactile surfaces for vision impaired people. The other crossing consisted of kerb ramps either side, and a median strip in the middle allowing pedestrians to cross in two stages.

Figure 4.31 – Low speed road pedestrian crossing with tactile surface

The other crossing to be made on this route was over the high traffic, five lane Gold Coast Highway. Here, pedestrians' crossing is controlled by pushbutton signals and well-marked painted signage indicating waiting areas (see Figure 4.32). The signals took 31 seconds before the walking phase commenced and allow 39 seconds for the pedestrian to cross. There is a median island allowing the pedestrian to cross in two stages and the waiting areas are adequate for the pedestrian volumes. The kerb ramps and path are designed suitable for mobility and vision impaired persons, as evidenced by the tactile surfaces which can be seen in the below photograph.

Figure 4.32 – Kerb ramp, safety bollards and tactile surfaces at the crossing of the Gold Coast Highway

4.6.2 Street furniture and signage

This route is furnished with benches and rubbish bins and there are a number of bicycle racks along the route. Many street trees and the adjoining buildings provide shade and pleasant aesthetics (see Figure 4.35).

On this route there were no signs directing pedestrians to the Broadwater Parklands, although there were signs directing one to the tram station, such as Figure 4.33(a), as well as a recreational 'Heritage Walk' tour sign (see Figure 4.33(b)).

Figure 4.33(a) – Signage directing the pedestrian to the tram station

Figure 4.33(b) – Signage for the 'Heritage Walk'

4.6.3   Traffic, safety and aesthetics

The route is clear of litter and is aesthetically pleasing, however, there is a degree of noise pollution as a result of the highway which must be crossed to reach the Parklands. The destination of this route is an attractive parkland area beside The Broadwater and, as can be seen in Figures 4.28 and 4.29, has an enticing main entryway, with vibrant vegetation and shade structures and trees.

Safety cameras, such those indicated in Figure 4.34, a perception of open space and higher volumes of people on this route due to the cafes, restaurants and shops provide a feeling of safety both day and night. The writer witnessed many more people walking this route than others in the audit, which indicates that people have a positive attitude to walking this route.

Figure 4.34 – Example of safety cameras in the area

Figure 4.35 – Street trees and awnings providing protection from the elements, street furniture including benches, rubbish bins and bicycle storage

The path is lined with traffic calming devices such as projecting kerbs, median islands and parking spaces. Pedestrians are also separated from motorists by bollards, trees and street furniture. The auditor witnessed cyclists riding on the path although there is no signage indicating that it is intended to be shared. There is no cycle lane along this route, but there appeared to be ample space for both modes on the wide path. There is adequate line of sight between drivers and all path users including children and wheelchair users.

4.7   Tram station to Australia Fair Shopping Centre

The route from the station to Australia Fair Shopping Centre scored a walkability rating of 20 from 21.

Walkability Audit Score Summary Station 5 to Australia Fair	
Overall Impression	3
Pathways	3
Crossings	3
Street Furniture and Signage	3
Personal Safety	3
Adjacent Traffic	3
Aesthetics and Amenities	2
Total Rating	20

Table 4.5 – Walkability score summary for Station 5 to the Australia Fair Shopping Centre

The concept map shown below in Figure 4.36 marks the location and direction of the photographs taken and discussed in the below sections. On this map, the adjoining land uses are also indicated and include shops, banks, cafes and a pub.

Figure 4.36 - Concept map for route to Australia Fair Shopping Centre, showing adjoining land uses and locations of photographs taken (imagery from Google Earth)

4.7.1 Walking facilities

This route has been upgraded as part of the tram line works and as a result is in very good condition, however, there was some slight unevenness in places. The average path width is 3.5 metres from building to kerb (as shown in Figure 4.37) and no hazard or maintenance issues. The route is suitable for prams and mobility impaired

persons, and there are tactile surfaces at the crossings for vision impaired pedestrians.

Figure 4.37 – A 3.5 metre wide path toward Australia Fair with street furniture

This continuous, uninterrupted path connects pedestrians from the tram station to the shops, businesses and another bus stop. It forms a pedestrian network by connecting to other paths, including the ones described in this audit.

On this route, the pedestrian must cross a low traffic two lane road, here there is no crossing facilities or signals however, the line of sight for both pedestrians and drivers is adequate.

There is also a driveway and alley which the pedestrian must pass. The surface either side of the driveway is tactile for vision impaired people, as seen in Figure 4.38 and provides a clear line of sight for both drivers and pedestrians.

Figure 4.38 – Tactile surface for vision impaired people

On this route, there is also a two lane, plus two tram lane crossing, as can be seen in Figure 4.39. This crossing has pushbutton signals and a median island to allow staged crossing. The signal here had a waiting time of 16 seconds and allows 32

seconds to cross. The waiting areas at the crossings are sufficient for the expected volumes of path users and the kerb ramps facilitate use by ensuring a comfortable slope.

Figure 4.39 – Signalised pedestrian crossing over the road and tram tracks

4.7.2 Street furniture & signage

Along this route, there are benches and low walls for seating, rubbish bins and bicycle racks, all of which are in good repair. As part of the upgrades of the paths, at approximately the half way point, some decorative and functional seating is installed, as shown in Figure 4.40.

Figure 4.40 – Example of the new street furniture as part of the upgrade

Shade is provided only by the adjoining structures, and the addition of some vegetation planters or street trees would improve the aesthetics.

Along this route, there are no signs directing people to different facilities or to the tram station.

4.7.3   Traffic, safety & aesthetics

The driveway and alley have been embellished with street art in an effort to deter graffiti and to improve the urban decay of the buildings, as shown in Figure 4.41.

Figure 4.41 – Alley with street art

Some of the shop fronts along this route are quite old and need updating to provide a feeling of uniformity with the new works in the road reserve.

There are signs advising pedestrians not to cross the road and tram line other than at the signalised crossing, as can be seen in Figure 4.42, however, there are no physical barriers preventing the crossing. The auditor witnessed a number of people crossing the road and tram tracks in non-signalised areas, which could pose a safety issue.

Figure 4.42 – 'Caution use signalised pedestrian crossing' sign

This is a busy road and there is minimal separation between pedestrians and vehicles, however, the vehicular speed limits compensate for the lack of separation. There is also a bike lane, allowing separation of cyclists and pedestrians on the path as shown in Figure 4.43.

Figure 4.43 – Photograph showing the separation of tram tracks, vehicle lanes and bike lanes

The types of adjoining uses such as shops, cafes and the fact that the road is relatively traffic intensive, ensures greater frequentation by the public, and an associated perception of increased safety. There is also good lighting along this route, which also contributes to an enhanced sense of safety at night.

CHAPTER 5

5.0 RECOMMENDATIONS

5.1 Introduction

The aim of this project has been to analyse walkability and pedestrian accessibility opportunities arising from a light rail stop. All five routes were of low elevation gradients and easy to walk, and were well connected to the tram station. The longest route, the station to the library, took only eight minutes to traverse. All of the routes audited scored high, the lowest score was 90 percent. Two scored 95 percent and two scored 100 percent in the walkability ratings. These scores indicate that the routes are very walkable, although it is noteworthy that the auditor did not witness many pedestrians on these routes.

One potential reason is that the time of day selected, between 4:45 pm and 6:00 pm, was not a good indicator of pedestrian usage. The time frame was selected because this is peak hour on the roads in and out of Southport, meaning that this is the time when people are leaving work or on the move. However, the lack of people walking reflects the figures 1.1(a) and 1.1(b) which show that the significant portion of people on the Gold Coast drive personal cars to and from work. Weather can be discounted as a contributor to the lack of pedestrians, as the audit was carried out on a mildly overcast day in August, when the weather was a pleasant temperature at 21 degrees Celsius.

On all walk audits, the writer witnessed people ignoring the pedestrian signals, as can be seen in Figure 5.1. This could be, in part, due to the low volume of vehicular traffic at that time and could also be occurring as a direct result of the clear line of

sight. However, this could also be an indication that the waiting time at these crossings is too long.

Figure 5.1 – Tram line with signalised pedestrian crossing and Southport Central towers in the background

The upgrades carried out as part of the light rail development have improved the walking facilities in the area. The paths are in good condition, are suitable for walkers and for people with prams, and most of the routes have been designed to be suitable for people with mobility and vision impairment. However, the lack of frequentation by the general public indicates that greater governmental initiative is required to encourage use of the pathways by the general public. The following sections provide suggestions and identify opportunities to improve the pedestrian accessibility and the walkability of an area around a central business district.

5.2   Restoration of urban decay

One of the aims listed in the recently released development scheme is that development in this area will 'provide a high quality urban environment and streetscapes that are inviting and exciting, and promote pedestrian activity' (DSDIP 2014, p. 24), however, this scheme is only applicable to new development. Local councils must actively encourage building owners to invest in suitable upgrades to existing premises.

The audits indicate that many of the buildings in the area are experiencing urban decay, and are aesthetically incompatible with the more recently constructed walking paths. Therefore the building owners should be encouraged to update the facades to improve the aesthetics of the area. This encouragement could possibly be in the form of the Council reducing building application fees or by reducing rates for a year for building owners as an incentive to update or improve the existing buildings' appearances.

With regard to the vacant shop fronts, potential solutions could include the local council encouraging building owners to install temporary window dressings such as art installations or local business' wares. This would reduce the perception to a walker of being 'alone', and would create a more interesting and visually pleasing route upon which to walk. An added benefit to these temporary window installations is that they can act as an advertising or promotional tool for local businesses and budding artists, thus also boosting the local economy.

5.3   Temporary uses

Another possibility for increasing pedestrian usage is to allow for temporary uses along those routes. This could include allowing buskers to play music and street vendors to sell food from mobile carts. The effect of having non-permanent attractors such as these along the routes would not only create a more vibrant environment, it would also increase the number of people in the area thus creating a greater feeling of safety and a more connected community. The newly released development scheme for the area has specified that the Southport Priority Development Area will be allowed flexibility for these pop up land uses (DSDIP 2014).

The route to the library takes in part of the future Chinatown Precinct and thus will continue to evolve. Allowing these temporary entertainments would be highly effective along that route with respect to walkability in that they would encourage people to walk further than the dedicated area of the precinct.

Regular street markets are also a possibility for improving the attractiveness of the area of Southport. Enticing people to an area for a market will subconsciously educate them that the area is suitable for walking. There are many successful examples of street markets around Gold Coast in which a portion of a local road is closed temporarily each week for the market.

This would work particularly well on Young Street, between the Chinatown Precinct and Australia Fair, because it is a low traffic road and if closed for a few hours on a Sunday or of an evening would not greatly disrupt the local traffic.
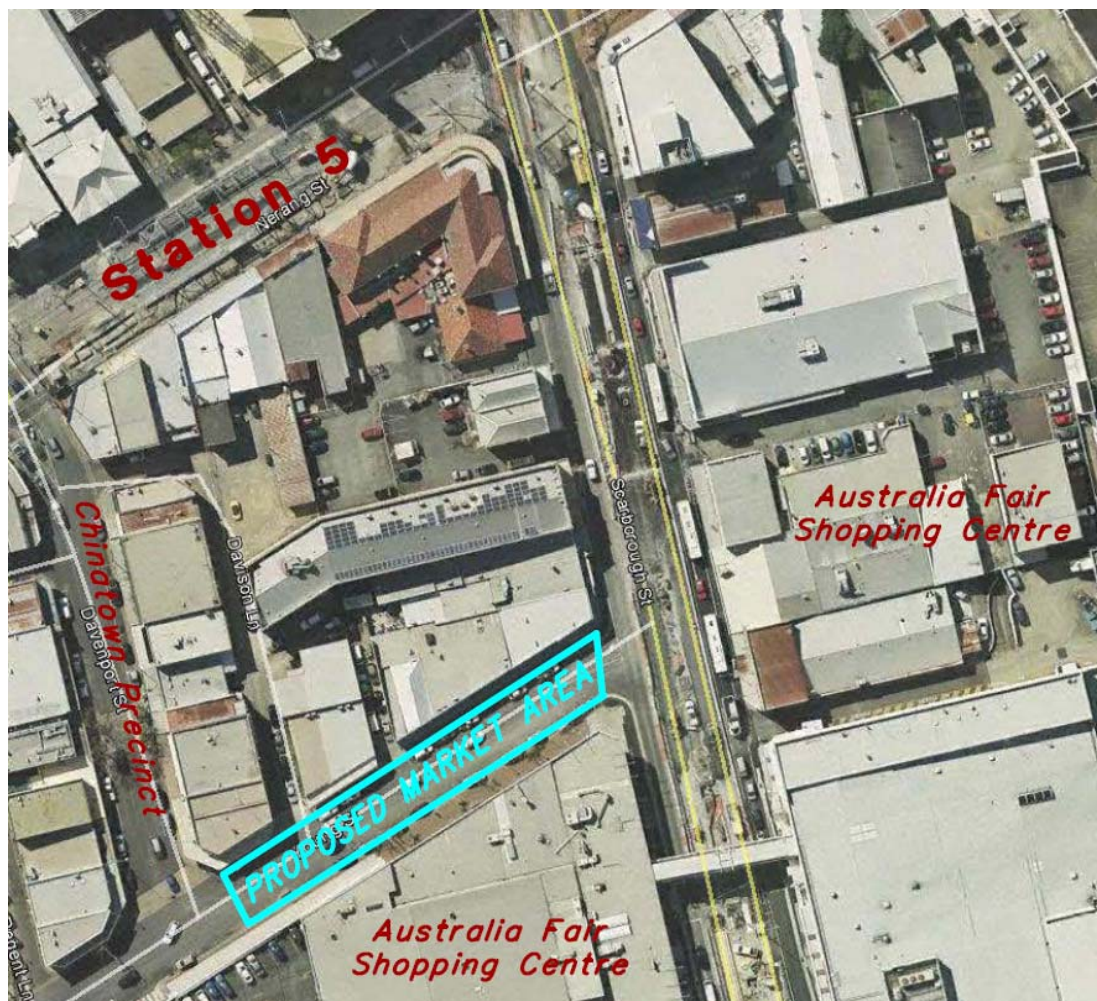
Figure 5.2 – Suggested location for weekly street markets (imagery from Google Earth)

As can be seen in Figure 5.2, the proposed location for street markets has shops and businesses adjoining the area and is easily accessible to the light rail Station 5.

5.4   Signage

Signage directing pedestrians to the facilities of the area are inadequate. They only identified Southport Central and TAFE, as can be seen in Figure 5.3. Most of the key attractors have not been indicated by signage at all, including the library, the Courthouse, Australia Fair, and Broadwater Parklands. These are important facilities in the area which the walkability audits have shown are well connected to the tram station. This lack of signage indicates that during the design process for the upgrades in the area many of the facilities have been overlooked by the designers.

Figure 5.3 – Sign at Station 5 directing pedestrians to Southport Central and to bicycle storage

In showing pedestrians what is easily accessed from the station, the general public will be more inclined to walk the routes (Brown et al. 2007). The installation of signage directing people to use these easy walking routes to access their destinations is highly recommended. The addition of a map on these signs would be useful to show people how to get to their destinations and also to inform people of what facilities are nearby.

The literature review identified that people are less inclined to walk if the distance is too far and time to walk is too long (Cartlidge & O'Hare 2009). Therefore, it would be advisable that the signage indicated a time and distance it takes to access the attractors, as a further incentive to get people to walk instead of driving cars.

Finally, there should also be signs along the routes instead of only at the tram station. There was one sign at the end of the Chinatown Precinct indicating the direction of the tram station, but there was no signage showing the direction of the library which is only a few minutes to walk from that point. By placing signs along the routes, the public will feel more confident that they can reach the attractors easily and comfortably.

The flow on effect of identifying the key attractors and placing signage along the routes to those facilities, will be that more people are likely to walk the routes (Brown et al. 2007), therefore providing more active street networks, leading to more self confidence in personal safety.

5.5   Utilisation of alleys

There are a number of alley ways in the Central Business District, Southport which are currently underutilised.

Laneway and alley way reactivation has been successfully carried out in many cities around the world, Melbourne is an excellent example of such regeneration. Melbourne is known around the world for its alley ways that are home to street art and galleries, boutique stores and many cafes and bars (Ripefruit Media Co 2014) such as shown in Figure 5.4.

Figure 5.4 - Photo of a Melbourne laneway, Viator, 2014, 'Melbourne Lanes and Arcades Waking Tour' <http://www.viator.com/tours/Melbourne/Melbourne-Lanes-and-Arcades-Walking-Tour/d384-3671ARCADES>

Some of the alley ways and laneways in the Southport Central Business District could undergo revitalisation in the same way, therefore creating a more vibrant and

interesting area and reducing that tendency of pedestrians to feel fear when walking through or near them. Prime locations could include Regents Lane and Davidson Lane, which could form part of the Chinatown Precinct shown on the map in Figure 5.6.

Figure 5.6 - Suggested locations for laneway activation (imagery from Google Earth)

An attempt has been made in one of these alleys to deter graffiti vandals by allowing street artists to paint the walls as was shown in Figure 4.41, however, the type of art could still be seen as a little confronting as there is a great deal of black in the artwork. It is recommended that advice be sought from an art expert to identify the colours which create a more vibrant and interesting appeal to the general public and a redesign of the art works be carried out. For example, orange is commonly known to be a happy colour while blue is known as a calming colour.

These alley way street art works should be redesigned to emphasise the character of the neighbourhood, integrating the themes of the central business district with the neighbouring parklands and the adjacent Broadwater. The 'work for the dole' schemes have provided artists paintings on the nearby Pacific Motorway sound barriers with a very effective outcome; perhaps the same could be applied here.

Another potential solution is the use of vertical plant walls, which could be maintained by local schools and pensioner workshops, thus integrating the local community into the visual project. By providing appealing scenery, the research has identified that people are more inclined to walk (Brown et al. 2007).

5.6   Vegetation

Some of the routes audited had a stark appearance. Installation of more planter boxes and vegetation would improve the aesthetics of the area. Areas of particular concern include the route to the library and the route to Australia Fair Shopping Centre. The path to Australia Fair Shopping Centre had very little greenery at all, as can be seen in Figure 5.7.

Figure 5.7 - Path to Australia Fair with almost no vegetation

Sections of the route to the library would also benefit from the addition of shade trees as parts of the walk do not have building awnings to protect the pedestrian from the sun, which was revealed by the literature review as an important element of a walkable environment (Hutabarat Lo 2009). The literature review identified that people are more likely to walk if they find a route attractive and pleasant, as well as comfortable to walk along. The addition of more greenery would improve the attractiveness and would provide comfort from the Queensland sun.

5.7   Promotion of the Central Business District

The Central Business District area will only be successfully revitalised if the project has the support of the local council, planners and developers as well as community approbation. The Southport Priority Development Area Development Scheme, which was released in September 2014 has provided a 'Vision' for the area and has identified a number of 'Implementation Strategies' to achieve the goals of the vision.

In order to gain the backing of the local planners and developers, it is important that they are aware of the strategies which are planned. If there is incentive schemes devised by the council to achieve the goals, those plans should be promoted to the planners and developers. For example, if changes in the Council fee structure relating to building upgrades in the area, then the developers and planners should be advised. In this way, they can further promote to their clients the advantages of working in the Central Business District.

Promotion of the area as a vibrant and interesting place to work, live and play is in the interest of all those concerned with the Central Business District. This promotion could come from not only the planners and developers revitalising the area, but also by local businesses creating events and providing a diverse mix of commercial and retail offerings. By creating more business and development interest in the area, there would be a flow on effect of attracting more people to the area, and if ensuring the Central Business District is attractive, interesting and easily accessible, the numbers of people walking and using public transport instead of driving cars will increase.

5.8 Provide multimodal incentives

Despite the fact that light rail vehicles can transport bicycles without adversely impacting capacities (Ludnam n.d.), at present, bicycles are not permitted on the Gold Coast trams and this has the potential to deter many people from using active and public transportation.

There are many facilities and attractors further afield from the area audited as part of this research, and there are also many residential areas. Many of these are too far to comfortably walk but are within a short cycle ride of the station. The same also applies for the destination stops. It is essential that bicycle users have the possibility of both storing their vehicles at the arrival and destination stations, and also transporting them between destinations in order to facilitate travel to and from those destinations.

Bicycles are permitted on the heavy rail trains. Therefore, once the future light rail link from Gold Coast Hospital station through to the heavy rail station at Helensvale has been constructed, allowing people to take their bicycles onto the light rail will increase the opportunity for multimodal transport.

Allowing bicycles to be taken on the trams is likely to increase the use of the tram service and will encourage people to be more active, and will reduce reliance on personal cars.

5.9   Conclusion

The installation of tram Station 5 has provided an opportunity to improve pedestrian connectivity in the Central Business District of Southport, however, the auditor found that there were not many people using the pedestrian networks to the important facilities selected in the area.

The walkability audits which have been carried out identified a number of elements which were lacking and recommendations have been provided. It was found that although the routes were well connected and the walking facilities were good, there are other aspects of the routes which must be attended to in order to attract more people to walk those routes rather than drive. Improvement of signage, updating the buildings, utilising the alley ways and allowing temporary uses along the routes are some of the recommendations which have arisen from this research paper.

CHAPTER 6

6.0   CONCLUSION

6.1   Summary

The aim of this research paper has been to assess the impact of light rail upon walkability in a central business district, with a specific focus upon pedestrian accessibility opportunities to key destinations in the vicinity of a new tram stop. The research project commenced with a brief background of the Central Business District Southport on the Gold Coast which was the focus of the case study and a review of the available academic literature with regard to the economic, social and environmental benefits of both light rail and walkability followed. A walkability audit was then selected which focused on the key elements identified in the literature review, and carried out in the case study area. An analysis of the audits was carried out, identifying areas requiring improvement and recommendations were provided as a way to increase walkability and light rail use in the area. This concluding chapter will now briefly summarise the findings of the research.

This research paper has revealed that there are significant links between light rail and walkability, and that the installation of a light rail system and the associated improvements to the walking infrastructure around the stops has the potential to, but does not automatically increase the volumes of people walking in the area.

The audits carried out by the writer found that the walkability ratings of the area around the newly developed light rail stop in the Southport Central Business District

were very good and the routes are very well connected, therefore only a few suggestions are made for improvements to the routes' walking facilities.

The positive results of these walkability audits have, however, led to questions relating to how to increase the numbers of people walking in the area. Although the routes rated very well, the auditor did not witness many people walking along those routes, and this indicates that more should be done than simply upgrading the functionality of the paths as a way to increase pedestrian usage.

During the course of this research, a number of recommendations have been identified as possible options, to improve the walkability and pedestrian accessibility of the area around a central business district and also to increase the numbers of people using active and public transport, rather than using cars. These recommendations include:

- restoring the area from urban decay, updating the aged building facades and installing temporary window dressings to empty front shops

- allowing temporary uses in the streets such as weekly markets, buskers and food vendors

- installation of signage to more of the key attractors

- regenerate and utilise the alley ways

- plant more vegetation to improve the aesthetics of the area

- promote the Central Business District not only as a place for doing business but also as a great place for recreation

- provide multimodal transport incentives

Implementation of these suggestions would require the support of the local government, as well as the residents and the businesses in the area. Policy makers

should note that some of these recommendations, such as allowing temporary uses, would require very little capital funding, and have shown great success in many other cities around the world such as Melbourne and New York.

Promotion of the Central Business District as a place to live, work and play will encourage more investment in the area and the flow on result would be to make the central business district more desirable to the masses. Providing these diverse land uses in the area will mean that people can walk to many of their destinations such as from their home to work, to shops, to entertainment venues and to public transport stops.

By improving the aesthetics and appearances, and by providing more attractors in the Central Business District, more people will be inclined to walk in the area.

6.2 Future research

As mentioned earlier, the focus area of this project has been on the Central Business District in Southport which was recently declared a Priority Development Area, the development scheme for which was only released in September 2014 after the majority of this research project had been carried out. The recommendations which have arisen from this research project are appropriate to the vision and implementation strategies identified in that document. Future research could involve an assessment of the execution of these strategies relative to the recommendations from this paper and whether they impact upon numbers of pedestrians in the area.

As the Gold Coast Light Rail network only opened in July 2014, perhaps more time is required for its popularity to gain momentum. Another future line of research could involve carrying out pedestrian counts soon and in the future, to see if there is an increase in pedestrians in the area over time resulting from the new network and the associated walking infrastructure.

The audits for this project were carried out during what is considered peak hour for driving in and out of Southport. Pedestrian counts at different times of the day and on weekends, as well as at other stations in the area, would provide an alternative picture of when and where people are more likely to walk in a central business district.

The results of all three of these research angles could be used to inform planners and decision makers of how successful the development of the light rail has been in increasing walking, and how to further encourage active and public transport in a central business district.

6.3   Final comments

The academic literature has identified a number of benefits that are common to both light rail and walkability. Both of these transport modes have been proven to enhance urban development, improve health and reduce obesity levels and also to reduce traffic congestion and the associated greenhouse gas emissions. It is therefore in the interests of a city at large to increase the volumes of people walking and using the light rail network.

This research paper has found that the installation of a light rail network and the upgrade of pedestrian infrastructure around the stops will not automatically increase the number of people who walk in an area. Aesthetics and signage, as well as interesting features and destinations are key factors that impact upon a person's desire to walk. Planners and decision makers would do well to consider these additional triggers when planning future capital works and funding, whether for the upgrade of an existing pedestrian network or in developing new networks.

APPENDICES

APPENDIX A - PROJECT SPECIFICATION FORM

University of Southern Queensland
FACULTY OF ENGINEERING AND SURVEYING

ENG4111/4112 – Research Project
PROJECT SPECIFICATION

FOR: **NADYA MILLER**

TOPIC: THE IMPACT OF A NEW LIGHT RAIL NETWORK UPON WALKABILITY IN A
CENTRAL BUSINESS DISTRICT

SUPERVISOR: Mrs Paula Grant
Senior Lecturer (Urban & Regional Planning)

ENROLMENT: ENG4111 – S1, 2014
ENG4112 – S2, 2014

PROJECT AIM: To analyse the walkability of an area with specific focus upon new
pedestrian accessibility opportunities arising from the new light rail stops in
Southport and to provide recommendations to improve the levels of
walkability and connectivity in that area.

SPONSORSHIP: Nil

PROGRAMME: Issue A - 19th March, 2014

1. Research background information relating to walkability and why it is desirable, with a focus
on Southport, Gold Coast and its facilities.

2. Adapt a walkability audit from a recognised establishment, or if this is not suitable design an
audit based on a number of established examples.

3. Conduct the walkability audit at Southport Station Number 5 with particular focus on
pedestrian routes to and from high attraction facilities.

4. Undertake an analysis of the data gathered from the audit with particular regard to
connectivity to the facilities identified as having high attraction.

5. Provide recommendations to improve walkability between facilities and the new light rail
stop.
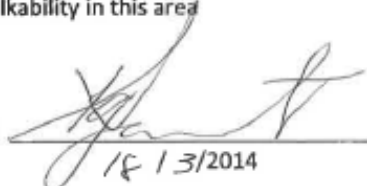
As time permits:

6. Conduct the walkability audit at Health and Education Precinct Stations 1 & 2

7. Undertake an analysis of the data gathered

8. Provide recommendations to improve walkability in this area

AGREEED:

18/03/2014 (Student) /8/3/2014 (Supervisor)

APPENDIX B- JOB SAFETY & ENVIRONMENT ANALYSIS FORM

Job Safety and Environment Analysis Form

JSEA No:	1		Version No.	1

Process/Task/Activity Title:	AUDIT TO DETERMINE WALKABILITY AND CONNECTIVITY. THERE IS ONE HIGH RISK ACTIVITY HAVING BEEN IDENTIFIED IN THIS JSA: SEE RELEVANT LEGISLATION BELOW
Project No.:	ENG4111
Project:	Research Project
Equipment Required:	Clip board, audit forms, 10 metre offset tape
Prescribed Occupations:	Auditor
Relevant Legislation/ Standards/Codes:	Surveyors Act, Workplace Health & Safety Act 2011, WHS regs of 2011, Electrical Safety Act & regs 2002, MUTCD of 2010, Hazardous Manual Tasks Code of Practice 2011, Nature Conservation Act 1992, Vegetation Management Act 1999, Environmental Protection and Biodiversity Act 1999.

Developed By: Date:	31/05/2014	Approved By: Date:	NM 31/05/2014	Reviewed By: Date:	

Job Safety and Environment Analysis Form

		Consequences				
Image / Reputation		Slight impact	Limited impact	Local area impact	State wide impact	National Impact
Environment		Slight effect	Minor on-site contamination	Major on-site contamination with potential for off-site contamination	Minor off - Site contamination	Major off-site contamination
Plant / Equipment		Slight Damage (< $2K)	Component level replacement /repair ($2K - $8K)	Equipment level replacement /repair ($8K - $12K)	Multiple equipment replacements ($12K - $20K)	Massive widespread equipment damage ($20K +)
People		First Aid Injury	Medical Treatment Injury	Lost Time Injury	Fatality	Multiple Fatalities
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Common, occurs frequently / Almost certain	High (10)	High (12)	Extreme (18)	Extreme (21)	Extreme (25)
	It is known to occur. It has happened / Likely	Moderate (6)	High (11)	High (14)	Extreme (20)	Extreme (24)
	Could occur or have heard of it occurring / Moderate	Low (3)	Moderate (7)	High (13)	Extreme (19)	Extreme (23)
	Not likely to occur / Unlikely	Low (2)	Low (5)	Moderate (9)	High (16)	Extreme (22)
	Practically impossible / Rare	Low (1)	Low (4)	Moderate (8)	High (15)	High (17)

Level of Risk

E Extreme Risk – *Do not undertake Operation – re-evaluate proposed work methods*

H High Risk – Significant risk control measures to be implemented before works commence

M Moderate Risk – Corrective action other than administrative controls may be needed

L Low Risk – Managed by routine Procedures and Work Practices

This JSEA is based on the Tenix approved format, but developed by Andrews & Hansen Pty Ltd for carrying out of site survey works.
Job Safety and Environment Analysis Form

Number Allocated	General Control Hierarchy	Prevention of Falls Control Hierarchy
1	Elimination	Elimination
2	Substitution	Passive Fall prevention
3	Engineering	Work Positioning System
4	Administrative	Fall Injury Prevention System
5	Personal Protective Equipment	Ladders
6		Administrative

Process/Task/ Activity Description	Hazards / Aspects	Risks / Impacts	Risk Score (E H M L)	Control Measures	Hierarchy of control (1 to 6)	Residual Risk / Score (E H M L)	Monitoring
Carry out audit	Proximity to minor road	Struck by vehicle, serious injury	M/7	Avoid walking close to pavement	3,6	L/5	Regular monitoring of passing traffic
	Uneven ground	Slips trips falls	L/3	Correct footwear & other PPE; care when moving around	4,5	L/2	Continual assessment by auditor when moving around on site; ensure always wearing appropriate attire
	Work near minor road	Struck by vehicle	L/2	Avoid walking close to road when at all possible	1	L/1	Constantly check both directions of traffic
	Work near a tram line	Struck by tram	H/13	Avoid walking on or near the tram line when at all possible; schedule the audit of the area near the tram line relative to the tram timetable	1	L/2	Constantly check both directions of tram traffic
	Stings, insect bites, sun burn	Allergic reaction, skin irritation	M/6	Appropriate clothing, insect repellent and sunscreen	5	L/2	Ensure insect repellent and sunscreen in back pack
	Rubbish left on site	Damage to environment, fauna	L/5	Take all rubbish and materials away when audit complete.	1,2,4	L/1	Ensure all waste is removed and do not leave any marks behind

Review / comments: (Addition / deletions required on review, *including date of review.* All employees to acknowledge revised controls.)

This JSEA is based on the Tenix approved format, but developed by Andrews & Hansen Pty Ltd for carrying out of site survey works.
Job Safety and Environment Analysis Form

JSEA Read & Signed by **All Employees & Subcontractors** involved in Activity:		
Name	**Signature**	**Date**

APPENDIX C - WALKABILITY AUDIT FORMS

C1   Courthouse to Tram Station 5

Walkability Audit Forms

Appendix 2

Form 1 General Information and Overall Impression

1.1 General Information	• Tick where appropriate and write comments or sketch in spaces available as a guide to help you write your report • Mark additional comments on map of area, including locations of photos taken to identify issues for each section		
Auditor / Audit Team:	Nadya		
Date and time:	5:10-5:12pm		
Audit location:	Courthouse	Section 1:	
Land uses:	Retail, Commercial	Section 2:	
Primary users:		Section 3:	
Purpose of the audit:			
Weather conditions:	☐ fine ☐ rainy ☐ windy ☒ overcast ☐ other		

1.2 Overall Impression

General Comments	Neat clean Fast walk

Overall Impression Rating	1 unsatisfactory	2 unsatisfactory but acceptable	3 satisfactory

After completion of each section for the audit – enter the overall ratings below to find out a total walkability rating (higher total = more walkable)

Summary Form		Example	Section 1	Section 2	Section 3
1	Overall Impression	2	3		
2	Pathways	3	3		
3	Crossings	2	3		
4	Street Furniture and Signage	3	3		
5	Personal Safety	1	2		
6	Adjacent Traffic	3	3		
7	Aesthetics and Amenities	3	3		
	Total rating	17	20		

Form 2 Pathways

Section Location (mark issues on map)

2.1 Path Type		Yes	No	N/A	Don't know
	• Is a path present	☒	☐	☐	☐
	• What type? (See walkability audit tool guidelines figure 5 for photo examples) ☐ pedestrian path ☒ pedestrian path near property boundary ☒ pedestrian path near kerb ☐ shared use path ☐ separated path ☐ unpaved path ☐ no facility ☐ other				
Comments	• Is the path provided on both sides of the road?	☒	☐	☐	☐
	• Which direction is most of the pedestrian traffic? ☒ both directions ☐ one direction ☐ unclear				
	• Is the path suitable for pedestrian/ cyclist volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
2.2 Path Width and Capacity	• Average width of path _____3_____ metres				
	• Is the path wide enough to for pedestrian/cyclist volumes and types of users? (See walkability audit tool guidelines table 2 for desirable width requirements)	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
2.3 Path Condition	• Are there any hazard or maintenance issues? (See walkability audit tool guidelines figure 6) ☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other	☐	☒	☐	☐
	• Are there any design issues? ☐ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs	☐	☒	☐	☐
Comments	☐ other Slight unevenness in parts • Is the head room of the path sufficient (free of overhanging foliage and low mounted signs) Yes				
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				

Form 2 Pathways

		Yes	No	N/A	Don't know
2.4 Path Obstructions	• Are there any permanent obstructions? (See walkability audit tool guidelines figure 7)	☒	☐	☐	☐
	☐ signs ☐ bus stops/shelters ☒ street furniture/bins/seats ☐ trees/bushes ☐ poles ☐ street art ☐ other _____ bollards				
	• Are there any temporary obstructions? (See walkability audit tool guidelines figure 8)	☐	☒	☐	☐
	☐ parked bicycles ☐ parked cars ☐ portable signs ☐ seats from cafes ☐ shop stands ☐ wheelie bins ☐ other _____				
	• The minimum effective width of path is _____ 2 _____ metres				
Comments	• Is the effective width of the path suitable for pedestrian / cyclist volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable ==3 satisfactory==				
2.5 Path Connectivity	• Is it continuous (i.e. no missing sections)? (See walkability audit tool guidelines figure 9)	☒	☐	☐	☐
	• Is the connected to other paths to form a pedestrian network?	☒	☐	☐	☐
	• Is it connected to key destinations along the route?	☒	☐	☐	☐
	☒ train station ☐ bus station ☐ bus stop ☐ school ☐ shops ☐ park ☐ community centre ☐ offices ☐ industrial area ☐ other				
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable ==3 satisfactory==				
2.6 Path Accessibility (PWD)	• Is the surface of the path suitable for use by prams, wheelchairs and mobility-impaired persons?	☒	☐	☐	☐
	• Are ramps provided as an alternative to stairs for people with disabilities (PWD)?	☒	☐	☐	☐
	• Are level landings, handrails or guard rails provided for steep walking surfaces? (see guidelines 4.2.6)	☐	☐	☒	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable ==3 satisfactory==				
Form 2 Overall Pathways Rating	1 unsatisfactory 2 unsatisfactory but acceptable ==3 satisfactory==				

Form 3 Crossings

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
3.1 Type of Crossing	• What type of crossing is present? (See walkability audit tool guidelines figure 10 for photo examples)				
	☐ median island / refuges ☐ zebra ☐ automatic pedestrian signals ☒ pedestrian signals with pushbuttons ☐ traffic lights without pedestrian signals ☐ overpass ☐ underpass ☐ school crossing ☐ no facility ☐ other _____				
	• How many traffic lanes do pedestrians have to cross? _____ 2 tram lanes _____ lanes				
	• Are median islands provided to allow pedestrians to cross in two stages?	☐	☒	☐	☐
Comments	• Is the crossing suitable for the type and size of road, traffic and pedestrian volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable ==3 satisfactory==				
3.2 Location of Crossing	• Are sufficient crossings provided?	☒	☐	☐	☐
	• Are crossings at logical locations e.g. entrances/exits to key destinations or connections to other paths?	☒	☐	☐	☐
	• Do pedestrians use the crossing points provided correctly?	☒	☐	☐	☐
	• If crossing is prohibited, are pedestrians directed via physical barriers and signs to another crossing point? (See walkability audit tool guidelines figure 11)	☐	☐	☒	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable ==3 satisfactory==				
3.3 Ability to Cross	• **At signalised intersection:** do the traffic signals allow enough time to cross the safely?	☒	☐	☐	☐
	• Is the waiting time short enough to discourage people from ignoring the pedestrian signals?	☒	☐	☐	☐
	Allows _____ 15 _____ seconds to cross				
	Took _____ 8 _____ seconds waiting time before walking phase started				
	• **At unsignalised intersection:** Do the gaps in the traffic flow allow people to cross the road safely?	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory ==2 unsatisfactory but acceptable== 3 satisfactory				

Form 3 Crossings

		Yes	No	N/A	Don't know
3.4 Condition of Crossing	• Are there any hazard or maintenance issues? ☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other _____	☐	☒	☐	☐
	• Are there any design issues? ☒ rough uneven surface ☒ slippery surface ☐ uplifts in pavement ☐ low mounted road signs ☐ other _____ Tram tracks are uneven, are slippery in wet	☒	☐	☐	☐
Comments	• Is the waiting area sufficient to accommodate the expected pedestrian volumes? • Is the crossing sufficiently well marked, wide enough, at a logical location and clearly visible? • Are the kerb ramps and waiting areas lined up with the crossing, median and refuge areas?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
3.5 Access at Crossing for PWD	• Are kerb ramps provided at the kerb, median and refuge areas to accommodate wheelchairs and prams? • Is the slope from the path to the road safe, smooth and comfortable to use? • Are waiting areas level with sufficient manoeuvring space to accommodate wheel chairs and all users?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments	• Can vision impaired pedestrians identify the crossing via tactile surfaces provided? • Do pedestrian signals have audio-tactile devices for vision impaired pedestrians? (See figure 12) • Can children and people in wheelchairs reach the pushbuttons of signalised crossings?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
Form 3 Overall Crossing Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 4 Street Furniture and Signage

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
4.1 Street Furniture and Shade	• Is street furniture provided? • What type of street furniture is present? (See walkability guidelines figure 13 for photo examples) ☒ benches ☐ low walls, sufficient to sit on ☐ rubbish bins ☐ drinking fountains ☒ public restrooms ☐ other _____ Bike Racks	☒	☐	☐	☐
	• Is the street furniture provided in good condition (not damaged, no graffiti etc.)? • Is shade provided to the path by trees or structures? • Is shade provided at resting places and areas with street furniture, by trees or structures? (See walkability audit tool guidelines figure 14 for photo examples	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
4.2 Signage	• Is signage provided to guide and direct pedestrians to the key destinations in the area? (See walkability audit tool guidelines figure 15 for photo examples) • Are street names clearly visible to pedestrians? • Are pedestrian routes/crossings clearly visible to motorists via warning signs and pavement markings?	☐ ☒ ☒	☒ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	• Are pedestrian routes/crossings clearly visible to pedestrians by markings and signs? • Is the type of path clearly marked as a shared path, pedestrian only path etc? • Are signage and pavement markings in good condition? ☒ well painted ☒ non slippery material ☒ visible day and night ☒ not damaged ☐ other	☒ ☐ ☒	☐ ☒ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
Form 4 Overall Street Furniture and Signage Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 5 Personal Safety

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
5.1 Personal **Safety** **Daytime**	• Do you feel safe walking on this route section during the day?	X	☐	☐	☐
	• Is the path visible from adjacent land uses and activities during the day?	X	☐	☐	☐
	• Are there enough people around to make you feel safe during the day?	X	☐	☐	☐
	• Are underpasses well lit during daytime?	☐	☐	X	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
5.2 Personal **Safety** **Night-time**	• Do you / would you feel safe walking on this route section during the night?	☐	X	☐	☐
	• Is the path visible from adjacent land uses and activities during the night?	X	☐	☐	☐
	• Are there / would there be enough people around to make you feel safe during the night?	☐	X	☐	☐
	• Is there good lighting in the area during the night?	X	☐	☐	☐
Comments	• Are underpasses well lit during the night?	☐	☐	X	☐
	Rating 1 unsatisfactory **2 unsatisfactory but acceptable** 3 satisfactory				

Form 5 Overall Personal Safety Rating	1 unsatisfactory **2 unsatisfactory but acceptable** 3 satisfactory

Form 6 Adjacent Traffic

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
6.1 Adjacent **Traffic,** **General** **Traffic Issues**	• Is the motorised traffic speed or volume satisfactory for pedestrian safety and amenity?	X	☐	☐	☐
	• Are there any traffic calming devices? (See walkability audit tool guidelines figure 16 for photo examples) ☐ speed humps ☐ median islands ☐ chicanes ☐ roundabouts ☐ projecting kerbs ☐ other	☐	X	☐	☐
	• Is separation provided between motorists and pedestrians? (see figure 17 for photo examples) ☐ verge ☐ safety rail ☒ bollards ☐ trees ☐ street furniture ☐ lighting columns ☐ vegetation ☐ other Only in front of courthouse; parking	X	☐	☐	☐
	• Is the path used by other traffic? ☒ wheelchairs ☒ prams ☐ bikes ☐ scooters ☐ skateboards ☐ other recreational devices ☐ other _____	X	☐	☐	☐
	• Is the path well designed for this purpose with no resulting hazards and conflicts?	X	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
6.2 Adjacent **Traffic,** **Traffic Issues** **at Crossings** **and Driveways**	• Are parked vehicles clear of pedestrian crosswalks?	X	☐	☐	☐
	• Are drivers aware of the presence of pedestrians?	X	☐	☐	☐
	• Do drivers give way to pedestrians at e.g. zebras, driveways, loading docks and when turning left?	X	☐	☐	☐
	• Is oncoming traffic clearly visible to pedestrians (no obstructions blocking sight lines) at crossings?	X	☐	☐	☐
	• Can children and people in wheelchairs clearly see approaching vehicles?	X	☐	☐	☐
	• Is the driver's sight distance to the pedestrian crossing adequate with the drivers line of sight uninterrupted?	X	☐	☐	☐
Comments	• Are all types of pedestrians, including children and people in wheelchairs, visible to approaching vehicles?	X	☐	☐	☐
	• Does the footpath continue uninterrupted through driveway crossovers?	X	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 6 Overall Adjacent Traffic Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**

Form 7 Aesthetics and Amenities

Section Location (mark issues on map)					

		Yes	No	N/A	Don't know
7.1 Aesthetics and Amenities	• Is the route section:				
	- attractive and pleasant to walk around?	X	☐	☐	☐
	- clear of litter, dumped rubbish, discarded items and graffiti?	X	☐	☐	☐
	- clear of air pollution (e.g. diesel fumes and factory emissions)?	X	☐	☐	☐
	- clear of noise pollution (e.g. construction, factories and traffic)?	X	☐	☐	☐
	• Does the section provide pedestrian oriented features?	X	☐	☐	☐
	X benches ☐ low walls, sufficient to sit on ☐ rubbish bins ☐ drinking fountains X public restroom				
	☐ other_____				

Comments

	Rating	1 unsatisfactory	2 unsatisfactory but acceptable	3 satisfactory

Form 7 Overall Aesthetics and Amenities Rating		1 unsatisfactory	2 unsatisfactory but acceptable	3 satisfactory

Additional comments regarding this section

Nowhere for bikes

Everything closes at night

C2 Library to Tram Station 5

Form 1 General Information and Overall Impression

1.1 General Information	• Tick where appropriate and write comments or sketch in spaces available as a guide to help you write your report • Mark additional comments on map of area, including locations of photos taken to identify issues for each section		
Auditor / Audit Team:	Nadya		
Date and time:	4:49-4:57pm		
Audit location:	Library	Section 1:	
Land uses:	Retail, Commercial, Residential	Section 2:	
Primary users:		Section 3:	
Purpose of the audit:			
Weather conditions:	☐ fine ☐ rainy ☐ windy ☒ overcast ☐ other		

1.2 Overall Impression

General Comments	Buildings look outdated Australia fair d/way bad for pedestrians (blindd entry) No signage

Overall Impression Rating	1 unsatisfactory	2 unsatisfactory but acceptable	3 satisfactory

After completion of each section for the audit – enter the overall ratings below to find out a total walkability rating (higher total = more walkable)

Summary Form		Example	Section 1	Section 2	Section 3
1	Overall Impression	2	2		
2	Pathways	3	3		
3	Crossings	2	3		
4	Street Furniture and Signage	3	2		
5	Personal Safety	1	2		
6	Adjacent Traffic	3	3		
7	Aesthetics and Amenities	3	3		
Total rating		17	18		

Form 2 Pathways

Section Location (mark issues on map)

2.1 Path Type		Yes	No	N/A	Don't know
	• Is a path present	☒	☐	☐	☐
	• What type? (See walkability audit tool guidelines figure 5 for photo examples) ☐ pedestrian path ☒ pedestrian path near property boundary ☒ pedestrian path near kerb ☐ shared use path ☐ separated path ☐ unpaved path ☐ no facility ☐ other				
Comments	• Is the path provided on both sides of the road?	☒	☐	☐	☐
	• Which direction is most of the pedestrian traffic? ☒ both directions ☐ one direction ☐ unclear				
	• Is the path suitable for pedestrian/ cyclist volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
2.2 Path Width and Capacity	• Average width of path _____ 3 _____ metres				
	• Is the path wide enough to for pedestrian/cyclist volumes and types of users? (See walkability audit tool guidelines table 2 for desirable width requirements)	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
2.3 Path Condition	• Are there any hazard or maintenance issues? (See walkability audit tool guidelines figure 6) ☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other	☐	☒	☐	☐
	• Are there any design issues? ☐ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs	☒	☐	☐	☐
Comments	☐ other Slight unevenness in parts • Is the head room of the path sufficient (free of overhanging foliage and low mounted signs) Yes				
	Rating 1 unsatisfactory **2 unsatisfactory but acceptable** 3 satisfactory				

Form 2 Pathways

		Yes	No	N/A	Don't know
2.4 Path Obstructions	• Are there any permanent obstructions? (See walkability audit tool guidelines figure 7)	X	☐	☐	☐
	☐ signs ☐ bus stops/shelters ☒ street furniture/bins/seats ☐ trees/bushes ☐ poles ☐ street art ☐ other minor obstructions				
	• Are there any temporary obstructions? (See walkability audit tool guidelines figure 8)	X	☐	☐	☐
	☐ parked bicycles ☐ parked cars ☐ portable signs ☒ seats from cafes ☒ shop stands ☐ wheelie bins ☐ other_____				
	• The minimum effective width of path is 2 metres				
Comments	• Is the effective width of the path suitable for pedestrian / cyclist volumes and types of users?	X	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
2.5 Path Connectivity	• Is it continuous (i.e. no missing sections)? (See walkability audit tool guidelines figure 9)	X	☐	☐	☐
	• Is the connected to other paths to form a pedestrian network?	X	☐	☐	☐
	• Is it connected to key destinations along the route?	X	☐	☐	☐
	☒ train station ☐ bus station ☐ bus stop ☐ school ☒ shops ☐ park ☒ community centre ☐ offices ☐ industrial area ☐ other Library				
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
2.6 Path Accessibility (PWD)	• Is the surface of the path suitable for use by prams, wheelchairs and mobility-impaired persons?	X	☐	☐	☐
	• Are ramps provided as an alternative to stairs for people with disabilities (PWD)?	X	☐	☐	☐
	• Are level landings, handrails or guard rails provided for steep walking surfaces? (see guidelines 4.2.6)	X	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
Form 2 Overall Pathways Rating	**1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory**				

Form 3 Crossings

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
3.1 Type of Crossing	• What type of crossing is present? (See walkability audit tool guidelines figure 10 for photo examples)				
	☐ median island / refuges ☒ zebra ☐ automatic pedestrian signals ☒ pedestrian signals with pushbuttons ☐ traffic lights without pedestrian signals ☐ overpass ☐ underpass ☐ school crossing ☐ no facility ☐ other_____				
	• How many traffic lanes do pedestrians have to cross? _____ 2 _____ lanes				
	• Are median islands provided to allow pedestrians to cross in two stages?	☐	☒	☐	☐
	• Is the crossing suitable for the type and size of road, traffic and pedestrian volumes and types of users?	X	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
3.2 Location of Crossing	• Are sufficient crossings provided?	X	☐	☐	☐
	• Are crossings at logical locations e.g. entrances/exits to key destinations or connections to other paths?	X	☐	☐	☐
	• Do pedestrians use the crossing points provided correctly?	X	☐	☐	☐
	• If crossing is prohibited, are pedestrians directed via physical barriers and signs to another crossing point? (See walkability audit tool guidelines figure 11)	☐	☐	☒	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
3.3 Ability to Cross	• **At signalised intersection:** do the traffic signals allow enough time to cross the safely?	X	☐	☐	☐
	• Is the waiting time short enough to discourage people from ignoring the pedestrian signals?	X	☐	☐	☐
	Allows _____ 15 _____ seconds to cross				
	Took _____ 8 _____ seconds waiting time before walking phase started				
	• **At unsignalised intersection:** Do the gaps in the traffic flow allow people to cross the road safely?	X	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				

Form 3 Crossings

		Yes	No	N/A	Don't know
3.4 Condition of Crossing	• Are there any hazard or maintenance issues? ☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other _____	☐	☒	☐	☐
	• Are there any design issues? ☐ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs ☐ other_____	☐	☒	☐	☐
	• Is the waiting area sufficient to accommodate the expected pedestrian volumes?	☒	☐	☐	☐
	• Is the crossing sufficiently well marked, wide enough, at a logical location and clearly visible?	☒	☐	☐	☐
Comments	• Are the kerb ramps and waiting areas lined up with the crossing, median and refuge areas?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
3.5 Access at Crossing for PWD	• Are kerb ramps provided at the kerb, median and refuge areas to accommodate wheelchairs and prams?	☒	☐	☐	☐
	• Is the slope from the path to the road safe, smooth and comfortable to use?	☒	☐	☐	☐
	• Are waiting areas level with sufficient manoeuvring space to accommodate wheel chairs and all users?	☒	☐	☐	☐
	• Can vision impaired pedestrians identify the crossing via tactile surfaces provided?	☐	☒	☐	☐
	• Do pedestrian signals have audio-tactile devices for vision impaired pedestrians? (See figure 12)	☒	☐	☐	☐
Comments	• Can children and people in wheelchairs reach the pushbuttons of signalised crossings?	☒	☐	☐	☐
	Rating 1 unsatisfactory **2 unsatisfactory but acceptable** 3 satisfactory				
Form 3 Overall Crossing Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 4 Street Furniture and Signage

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
4.1 Street Furniture and Shade	• Is street furniture provided?	☒	☐	☐	☐
	• What type of street furniture is present? (See walkability guidelines figure 13 for photo examples) ☒ benches ☐ low walls, sufficient to sit on ☒ rubbish bins ☐ drinking fountains ☐ public restrooms ☐ other_____ Bike Racks				
	• Is the street furniture provided in good condition (not damaged, no graffiti etc.)?	☒	☐	☐	☐
	• Is shade provided to the path by trees or structures?	☒	☐	☐	☐
	• Is shade provided at resting places and areas with street furniture, by trees or structures? (See walkability audit tool guidelines figure 14 for photo examples	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
4.2 Signage	• Is signage provided to guide and direct pedestrians to the key destinations in the area? (See walkability audit tool guidelines figure 15 for photo examples)	☐	☒	☐	☐
	• Are street names clearly visible to pedestrians?	☒	☐	☐	☐
	• Are pedestrian routes/crossings clearly visible to motorists via warning signs and pavement markings?	☒	☐	☐	☐
	• Are pedestrian routes/crossings clearly visible to pedestrians by markings and signs?	☒	☐	☐	☐
	• Is the type of path clearly marked as a shared path, pedestrian only path etc?	☐	☒	☐	☐
	• Are signage and pavement markings in good condition? ☒ well painted ☒ non slippery material ☒ visible day and night ☒ not damaged ☐ other	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory **2 unsatisfactory but acceptable** 3 satisfactory				
Form 4 Overall Street Furniture and Signage Rating	1 unsatisfactory **2 unsatisfactory but acceptable** 3 satisfactory				

Form 5 Personal Safety

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
5.1 Personal Safety Daytime	• Do you feel safe walking on this route section during the day?	☒	☐	☐	☐
	• Is the path visible from adjacent land uses and activities during the day?	☒	☐	☐	☐
	• Are there enough people around to make you feel safe during the day?	☒	☐	☐	☐
	• Are underpasses well lit during daytime?	☐	☐	☒	☐
Comments					

Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

		Yes	No	N/A	Don't know
5.2 Personal Safety Night-time	• Do you / would you feel safe walking on this route section during the night?	☐	☒	☐	☐
	• Is the path visible from adjacent land uses and activities during the night?	☐	☒	☐	☐
	• Are there / would there be enough people around to make you feel safe during the night?	☐	☒	☐	☐
	• Is there good lighting in the area during the night?	☒	☐	☐	☐
Comments	• Are underpasses well lit during the night?	☐	☐	☒	☐

Rating   1 unsatisfactory   **2 unsatisfactory but acceptable**   3 satisfactory

Form 5 Overall Personal Safety Rating   1 unsatisfactory   **2 unsatisfactory but acceptable**   3 satisfactory

Form 6 Adjacent Traffic

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
6.1 Adjacent Traffic, General Traffic Issues	• Is the motorised traffic speed or volume satisfactory for pedestrian safety and amenity?	☒	☐	☐	☐
	• Are there any traffic calming devices? (See walkability audit tool guidelines figure 16 for photo examples) ☐ speed humps ☐ median islands ☐ chicanes ☐ roundabouts ☐ projecting kerbs ☐ other	☒	☐	☐	☐
	• Is separation provided between motorists and pedestrians? (see figure 17 for photo examples) ☐ verge ☐ safety rail ☐ bollards ☐ trees ☐ street furniture ☐ lighting columns ☐ vegetation ☐ other	☒	☐	☐	☐
	• Is the path used by other traffic? ☒ wheelchairs ☒ prams ☐ bikes ☐ scooters ☐ skateboards ☐ other recreational devices ☐ other_____	☒	☐	☐	☐
Comments	• Is the path well designed for this purpose with no resulting hazards and conflicts?	☒	☐	☐	☐

Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

		Yes	No	N/A	Don't know
6.2 Adjacent Traffic, Traffic Issues at Crossings and Driveways	• Are parked vehicles clear of pedestrian crosswalks?	☒	☐	☐	☐
	• Are drivers aware of the presence of pedestrians?	☒	☐	☐	☐
	• Do drivers give way to pedestrians at e.g. zebras, driveways, loading docks and when turning left? Except Aus Fair D/way	☒	☐	☐	☐
	• Is oncoming traffic clearly visible to pedestrians (no obstructions blocking sight lines) at crossings?	☒	☐	☐	☐
	• Can children and people in wheelchairs clearly see approaching vehicles?	☒	☐	☐	☐
	• Is the driver's sight distance to the pedestrian crossing adequate with the drivers line of sight uninterrupted?	☒	☐	☐	☐
Comments	• Are all types of pedestrians, including children and people in wheelchairs, visible to approaching vehicles?	☒	☐	☐	☐
	• Does the footpath continue uninterrupted through driveway crossovers?	☒	☐	☐	☐

Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

Form 6 Overall Adjacent Traffic Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

Form 7 Aesthetics and Amenities

Section Location (mark issues on map)								
					Yes	No	N/A	Don't know

7.1 Aesthetics and Amenities

- Is the route section:
  - attractive and pleasant to walk around?   Somewhat

	Yes	No	N/A	Don't know
- attractive and pleasant to walk around? Somewhat	☒	☐	☐	☐
- clear of litter, dumped rubbish, discarded items and graffiti?	☒	☐	☐	☐
- clear of air pollution (e.g. diesel fumes and factory emissions)?	☒	☐	☐	☐
- clear of noise pollution (e.g. construction, factories and traffic)?	☒	☐	☐	☐
• Does the section provide pedestrian oriented features?	☒	☐	☐	☐

☒ benches   ☒ low walls, sufficient to sit on   ☒ rubbish bins   ☐ drinking fountains   ☐ public restroom
☐ other_____

Comments

Rating	1 unsatisfactory	2 unsatisfactory but acceptable	**3 satisfactory**		

Form 7 Overall Aesthetics and Amenities Rating

	1 unsatisfactory	2 unsatisfactory but acceptable	**3 satisfactory**

Additional comments regarding this section

Everything is closed at night

C3 Broadwater Parklands to Tram Station 5

Form 1 General Information and Overall Impression

| 1.1 General Information | • Tick where appropriate and write comments or sketch in spaces available as a guide to help you write your report |
| | • Mark additional comments on map of area, including locations of photos taken to identify issues for each section |

Auditor / Audit Team:	Nadya	
Date and time:	5:38-5:43pm	
Audit location:	Broadwater Parklands	Section 1:
Land uses:	Retail, Commercial, Residential	Section 2:
Primary users:		Section 3:
Purpose of the audit:		
Weather conditions: ☐ fine ☐ rainy ☐ windy ☒ overcast ☐ other		

1.2 Overall Impression

General Comments

Neat clean wide
Cyclists on path

Overall Impression Rating	1 unsatisfactory	2 unsatisfactory but acceptable	3 satisfactory		
After completion of each section for the audit – enter the overall ratings below to find out a total walkability rating (higher total = more walkable)					
Summary Form		**Example**	**Section 1**	**Section 2**	**Section 3**
1	Overall Impression	2	3		
2	Pathways	3	3		
3	Crossings	2	3		
4	Street Furniture and Signage	3	3		
5	Personal Safety	1	3		
6	Adjacent Traffic	3	3		
7	Aesthetics and Amenities	3	3		
Total rating		17	21		

Form 2 Pathways

Section Location (mark issues on map)		Yes	No	N/A	Don't know
2.1 Path Type					
	• Is a path present	☒	☐	☐	☐
	• What type? (See walkability audit tool guidelines figure 5 for photo examples)				
	☐ pedestrian path ☒ pedestrian path near property boundary ☒ pedestrian path near kerb				
	☐ shared use path ☐ separated path ☐ unpaved path ☐ no facility ☐ other				
Comments	• Is the path provided on both sides of the road?	☒	☐	☐	☐
	• Which direction is most of the pedestrian traffic? ☒ both directions ☐ one direction ☐ unclear				
	• Is the path suitable for pedestrian/ cyclist volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
2.2 Path Width and Capacity	• Average width of path _____ 10 _____ metres				
	• Is the path wide enough to for pedestrian/cyclist volumes and types of users?	☒	☐	☐	☐
	(See walkability audit tool guidelines table 2 for desirable width requirements)				
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
2.3 Path Condition	• Are there any hazard or maintenance issues? (See walkability audit tool guidelines figure 6)	☐	☒	☐	☐
	☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other				
	• Are there any design issues?				
	☐ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs	☐	☒	☐	☐
Comments	☐ other Slight unevenness in parts				
	• Is the head room of the path sufficient (free of overhanging foliage and low mounted signs) Yes				
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 2 Pathways

		Yes	No	N/A	Don't know
2.4 Path Obstructions	• Are there any permanent obstructions? (See walkability audit tool guidelines figure 7)	☐	☒	☐	☐
	☐ signs ☐ bus stops/shelters ☒ street furniture/bins/seats ☐ trees/bushes ☐ poles ☐ street art ☐ other _____ Bike racks				
	• Are there any temporary obstructions? (See walkability audit tool guidelines figure 8)	☐	☒	☐	☐
	☒ parked bicycles ☐ parked cars ☐ portable signs ☒ seats from cafes ☒ shop stands ☐ wheelie bins ☐ other _____				
	• The minimum effective width of path is _____ 6 _____ metres				
Comments	• Is the effective width of the path suitable for pedestrian / cyclist volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
2.5 Path Connectivity	• Is it continuous (i.e. no missing sections?) (See walkability audit tool guidelines figure 9)	☒	☐	☐	☐
	• Is the connected to other paths to form a pedestrian network?	☒	☐	☐	☐
	• Is it connected to key destinations along the route?	☒	☐	☐	☐
	☒ train station ☐ bus station ☐ bus stop ☐ school ☒ shops ☒ park ☒ community centre ☒ offices ☐ industrial area ☐ other				
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
2.6 Path Accessibility (PWD)	• Is the surface of the path suitable for use by prams, wheelchairs and mobility-impaired persons?	☒	☐	☐	☐
	• Are ramps provided as an alternative to stairs for people with disabilities (PWD)?	☒	☐	☐	☐
	• Are level landings, handrails or guard rails provided for steep walking surfaces? (see guidelines 4.2.6)	☐	☐	☒	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
Form 2 Overall Pathways Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 3 Crossings

Section Location (mark issues on map)					
		Yes	No	N/A	Don't know
3.1 Type of Crossing	• What type of crossing is present? (See walkability audit tool guidelines figure 10 for photo examples)				
	☒ median island / refuges ☐ zebra ☐ automatic pedestrian signals ☒ pedestrian signals with pushbuttons ☐ traffic lights without pedestrian signals ☐ overpass ☐ underpass ☐ school crossing ☐ no facility ☐ other _____				
	• How many traffic lanes do pedestrians have to cross? _____ 5 _____ lanes				
	• Are median islands provided to allow pedestrians to cross in two stages?	☒	☐	☐	☐
Comments	• Is the crossing suitable for the type and size of road, traffic and pedestrian volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
3.2 Location of Crossing	• Are sufficient crossings provided?	☒	☐	☐	☐
	• Are crossings at logical locations e.g. entrances/exits to key destinations or connections to other paths?	☒	☐	☐	☐
	• Do pedestrians use the crossing points provided correctly?	☒	☐	☐	☐
	• If crossing is prohibited, are pedestrians directed via physical barriers and signs to another crossing point? (See walkability audit tool guidelines figure 11)	☐	☒	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
3.3 Ability to Cross	• **At signalised intersection:** do the traffic signals allow enough time to cross the safely?	☒	☐	☐	☐
	• Is the waiting time short enough to discourage people from ignoring the pedestrian signals?	☐	☒	☐	☐
	Allows _____ 39 _____ seconds to cross				
	Took _____ 31 _____ seconds waiting time before walking phase started				
	• **At unsignalised intersection:** Do the gaps in the traffic flow allow people to cross the road safely?	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 3 Crossings

		Yes	No	N/A	Don't know
3.4 Condition of Crossing	• Are there any hazard or maintenance issues? ☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other _____	☐	☒	☐	☐
	• Are there any design issues? ☐ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs ☐ other _____	☐	☒	☐	☐
Comments	• Is the waiting area sufficient to accommodate the expected pedestrian volumes? • Is the crossing sufficiently well marked, wide enough, at a logical location and clearly visible? • Are the kerb ramps and waiting areas lined up with the crossing, median and refuge areas?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
3.5 Access at Crossing for PWD	• Are kerb ramps provided at the kerb, median and refuge areas to accommodate wheelchairs and prams? • Is the slope from the path to the road safe, smooth and comfortable to use? • Are waiting areas level with sufficient manoeuvring space to accommodate wheel chairs and all users?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments	• Can vision impaired pedestrians identify the crossing via tactile surfaces provided? • Do pedestrian signals have audio-tactile devices for vision impaired pedestrians? (See figure 12) • Can children and people in wheelchairs reach the pushbuttons of signalised crossings?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
Form 3 Overall Crossing Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 4 Street Furniture and Signage

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
4.1 Street Furniture and Shade	• Is street furniture provided?	☒	☐	☐	☐
	• What type of street furniture is present? (See walkability guidelines figure 13 for photo examples) ☒ benches ☐ low walls, sufficient to sit on ☒ rubbish bins ☐ drinking fountains ☐ public restrooms ☐ other _____				
	• Is the street furniture provided in good condition (not damaged, no graffiti etc.)? • Is shade provided to the path by trees or structures? • Is shade provided at resting places and areas with street furniture, by trees or structures? (See walkability audit tool guidelines figure 14 for photo examples	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments	**Rating** 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
4.2 Signage	• Is signage provided to guide and direct pedestrians to the key destinations in the area? (See walkability audit tool guidelines figure 15 for photo examples)	☒	☐	☐	☐
	• Are street names clearly visible to pedestrians? • Are pedestrian routes/crossings clearly visible to motorists via warning signs and pavement markings?	☒ ☒	☐ ☐	☐ ☐	☐ ☐
	• Are pedestrian routes/crossings clearly visible to pedestrians by markings and signs? • Is the type of path clearly marked as a shared path, pedestrian only path etc? • Are signage and pavement markings in good condition? ☒ well painted ☒ non slippery material ☒ visible day and night ☒ not damaged ☐ other	☒ ☐ ☒	☐ ☒ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments	**Rating** 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
Form 4 Overall Street Furniture and Signage Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 5 Personal Safety

Section Location (mark issues on map)

5.1 Personal		Yes	No	N/A	Don't know
Safety	• Do you feel safe walking on this route section during the day?	X	☐	☐	☐
Daytime	• Is the path visible from adjacent land uses and activities during the day?	X	☐	☐	☐
	• Are there enough people around to make you feel safe during the day?	X	☐	☐	☐
	• Are underpasses well lit during daytime?	☐	☐	X	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

5.2 Personal		Yes	No	N/A	Don't know
Safety	• Do you / would you feel safe walking on this route section during the night?	X	☐	☐	☐
Night-time	• Is the path visible from adjacent land uses and activities during the night?	X	☐	☐	☐
	• Are there / would there be enough people around to make you feel safe during the night?	X	☐	☐	☐
	• Is there good lighting in the area during the night?	X	☐	☐	☐
Comments	• Are underpasses well lit during the night?	☐	☐	X	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 5 Overall Personal Safety Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

Form 6 Adjacent Traffic

Section Location (mark issues on map)

6.1 Adjacent		Yes	No	N/A	Don't know
Traffic,	• Is the motorised traffic speed or volume satisfactory for pedestrian safety and amenity?	X	☐	☐	☐
General	• Are there any traffic calming devices? (See walkability audit tool guidelines figure 16 for photo examples)	X	☐	☐	☐
Traffic Issues	☐ speed humps X median islands ☐ chicanes ☐ roundabouts X projecting kerbs				
	☐ other Parking				
	• Is separation provided between motorists and pedestrians? (see figure 17 for photo examples)	X	☐	☐	☐
	☐ verge ☐ safety rail ☐ bollards ☐ trees ☐ street furniture ☐ lighting columns ☐ vegetation				
	☐ other				
	• Is the path used by other traffic?	X	☐	☐	☐
	X wheelchairs X prams X bikes ☐ scooters ☐ skateboards ☐ other recreational devices				
	☐ other____				
	• Is the path well designed for this purpose with no resulting hazards and conflicts?	X	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

6.2 Adjacent		Yes	No	N/A	Don't know
Traffic,	• Are parked vehicles clear of pedestrian crosswalks?	X	☐	☐	☐
Traffic Issues	• Are drivers aware of the presence of pedestrians?	X	☐	☐	☐
at Crossings	• Do drivers give way to pedestrians at e.g. zebras, driveways, loading docks and when turning left?	X	☐	☐	☐
and Driveways	• Is oncoming traffic clearly visible to pedestrians (no obstructions blocking sight lines) at crossings?	X	☐	☐	☐
	• Can children and people in wheelchairs clearly see approaching vehicles?	X	☐	☐	☐
	• Is the driver's sight distance to the pedestrian crossing adequate with the drivers line of sight uninterrupted?	X	☐	☐	☐
Comments	• Are all types of pedestrians, including children and people in wheelchairs, visible to approaching vehicles?	X	☐	☐	☐
	• Does the footpath continue uninterrupted through driveway crossovers?	X	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 6 Overall Adjacent Traffic Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

Form 7 Aesthetics and Amenities

Section Location (mark issues on map)							

				Yes	No	N/A	Don't know
7.1 Aesthetics and Amenities	• Is the route section:						
		- attractive and pleasant to walk around?	Somewhat	☒	☐	☐	☐
		- clear of litter, dumped rubbish, discarded items and graffiti?		☒	☐	☐	☐
		- clear of air pollution (e.g. diesel fumes and factory emissions)?		☒	☐	☐	☐
		- clear of noise pollution (e.g. construction, factories and traffic)?		☐	☒	☐	☐
	• Does the section provide pedestrian oriented features?			☒	☐	☐	☐
	☒ benches ☐ low walls, sufficient to sit on ☒ rubbish bins ☐ drinking fountains ☐ public restroom						
	☐ other_____						

Comments

	Rating	1 unsatisfactory	2 unsatisfactory but acceptable	**3 satisfactory**

Form 7 Overall Aesthetics and Amenities Rating		1 unsatisfactory	2 unsatisfactory but acceptable	**3 satisfactory**

Additional comments regarding this section

Heavier pedestrian and bike traffic

Very wide clear area

C4   TAFE to Tram Station 5

Form 1 General Information and Overall Impression

1.1 General Information	• Tick where appropriate and write comments or sketch in spaces available as a guide to help you write your report
	• Mark additional comments on map of area, including locations of photos taken to identify issues for each section

Auditor / Audit Team:	Nadya		
Date and time:	5:26 - 5:28pm		
Audit location:	TAFE	Section 1:	
Land uses:	Retail, Commercial, Residential	Section 2:	
Primary users:		Section 3:	
Purpose of the audit:			
Weather conditions: ☐ fine ☐ rainy ☐ windy ☒ overcast ☐ other			

1.2 Overall Impression

General Comments	Very New

Overall Impression Rating	1 unsatisfactory	2 unsatisfactory but acceptable	3 satisfactory

After completion of each section for the audit – enter the overall ratings below to find out a total walkability rating (higher total = more walkable)

Summary Form		Example	Section 1	Section 2	Section 3
1	Overall Impression	2	3		
2	Pathways	3	3		
3	Crossings	2	3		
4	Street Furniture and Signage	3	3		
5	Personal Safety	1	3		
6	Adjacent Traffic	3	3		
7	Aesthetics and Amenities	3	3		
Total rating		17	21		

Form 2 Pathways

Section Location (mark issues on map)

2.1 Path Type		Yes	No	N/A	Don't know
	• Is a path present	☒	☐	☐	☐
	• What type? (See walkability audit tool guidelines figure 5 for photo examples)				
	☐ pedestrian path ☒ pedestrian path near property boundary ☒ pedestrian path near kerb				
	☐ shared use path ☐ separated path ☐ unpaved path ☐ no facility ☐ other				
Comments	• Is the path provided on both sides of the road?	☒	☐	☐	☐
	• Which direction is most of the pedestrian traffic? ☒ both directions ☐ one direction ☐ unclear				
	• Is the path suitable for pedestrian/ cyclist volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
2.2 Path Width and Capacity	• Average width of path _____ 8 _____ metres				
	• Is the path wide enough to for pedestrian/cyclist volumes and types of users?	☒	☐	☐	☐
	(See walkability audit tool guidelines table 2 for desirable width requirements)				
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
2.3 Path Condition	• Are there any hazard or maintenance issues? (See walkability audit tool guidelines figure 6)	☐	☒	☐	☐
	☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches				
	☐ other				
	• Are there any design issues?	☐	☒	☐	☐
Comments	☐ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs				
	☐ other Slight unevenness				
	• Is the head room of the path sufficient (free of overhanging foliage and low mounted signs) Yes				
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 2 Pathways

		Yes	No	N/A	Don't know
2.4 Path Obstructions	• Are there any permanent obstructions? (See walkability audit tool guidelines figure 7)	☐	☒	☐	☐
	☐ signs ☐ bus stops/shelters ☒ street furniture/bins/seats ☐ trees/bushes ☐ poles ☐ street art ☐ other Bike racks				
	• Are there any temporary obstructions? (See walkability audit tool guidelines figure 8)	☐	☒	☐	☐
	☐ parked bicycles ☐ parked cars ☐ portable signs ☐ seats from cafes ☐ shop stands ☐ wheelie bins ☐ other _____				
	• The minimum effective width of path is 4 metres				
Comments	• Is the effective width of the path suitable for pedestrian / cyclist volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
2.5 Path Connectivity	• Is it continuous (i.e. no missing sections?) (See walkability audit tool guidelines figure 9)	☒	☐	☐	☐
	• Is the connected to other paths to form a pedestrian network?	☒	☐	☐	☐
	• Is it connected to key destinations along the route?	☒	☐	☐	☐
	☐ train station ☐ bus station ☒ bus stop ☐ school ☒ shops ☐ park ☒ community centre ☐ offices ☐ industrial area ☐ other TAFE				
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
2.6 Path Accessibility (PWD)	• Is the surface of the path suitable for use by prams, wheelchairs and mobility-impaired persons?	☒	☐	☒	☐
	• Are ramps provided as an alternative to stairs for people with disabilities (PWD)?	☐	☐	☒	☐
	• Are level landings, handrails or guard rails provided for steep walking surfaces? (see guidelines 4.2.6)	☐	☐	☒	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
Form 2 Overall Pathways Rating	**1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory**				

Form 3 Crossings

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
3.1 Type of Crossing	• What type of crossing is present? (See walkability audit tool guidelines figure 10 for photo examples)				
	☐ median island / refuges ☐ zebra ☐ automatic pedestrian signals ☒ pedestrian signals with pushbuttons ☐ traffic lights without pedestrian signals ☐ overpass ☐ underpass ☐ school crossing ☐ no facility ☐ other _____				
	• How many traffic lanes do pedestrians have to cross? _____ 2 _____ lanes				
	• Are median islands provided to allow pedestrians to cross in two stages?	☒	☐	☐	☐
Comments	• Is the crossing suitable for the type and size of road, traffic and pedestrian volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
3.2 Location of Crossing	• Are sufficient crossings provided?	☒	☐	☐	☐
	• Are crossings at logical locations e.g. entrances/exits to key destinations or connections to other paths?	☒	☐	☐	☐
	• Do pedestrians use the crossing points provided correctly?	☐	☒	☐	☐
	• If crossing is prohibited, are pedestrians directed via physical barriers and signs to another crossing point? (See walkability audit tool guidelines figure 11)	☐	☐	☒	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
3.3 Ability to Cross	• **At signalised intersection:** do the traffic signals allow enough time to cross the safely?	☒	☐	☐	☐
	• Is the waiting time short enough to discourage people from ignoring the pedestrian signals?	☐	☒	☐	☐
	Allows _____ 34 _____ seconds to cross				
	Took _____ 28 _____ seconds waiting time before walking phase started				
	• **At unsignalised intersection:** Do the gaps in the traffic flow allow people to cross the road safely?	☐	☐	☒	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				

Form 3 Crossings

		Yes	No	N/A	Don't know
3.4 Condition of Crossing	• Are there any hazard or maintenance issues? ☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other _____	☐	☒	☐	☐
	• Are there any design issues? ☐ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs ☐ other _____	☐	☒	☐	☐
	• Is the waiting area sufficient to accommodate the expected pedestrian volumes? • Is the crossing sufficiently well marked, wide enough, at a logical location and clearly visible? • Are the kerb ramps and waiting areas lined up with the crossing, median and refuge areas?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
3.5 Access at Crossing for PWD	• Are kerb ramps provided at the kerb, median and refuge areas to accommodate wheelchairs and prams? • Is the slope from the path to the road safe, smooth and comfortable to use? • Are waiting areas level with sufficient manoeuvring space to accommodate wheel chairs and all users?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	• Can vision impaired pedestrians identify the crossing via tactile surfaces provided? • Do pedestrian signals have audio-tactile devices for vision impaired pedestrians? (See figure 12) • Can children and people in wheelchairs reach the pushbuttons of signalised crossings?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
Form 3 Overall Crossing Rating	1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				

Form 4 Street Furniture and Signage

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
4.1 Street Furniture and Shade	• Is street furniture provided? • What type of street furniture is present? (See walkability guidelines figure 13 for photo examples) ☒ benches ☐ low walls, sufficient to sit on ☒ rubbish bins ☐ drinking fountains ☐ public restrooms ☐ other _____ Bike Racks • Is the street furniture provided in good condition (not damaged, no graffiti etc.)? • Is shade provided to the path by trees or structures? • Is shade provided at resting places and areas with street furniture, by trees or structures? (See walkability audit tool guidelines figure 14 for photo examples	☒ ☒ ☒ ☒	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
4.2 Signage	• Is signage provided to guide and direct pedestrians to the key destinations in the area? (See walkability audit tool guidelines figure 15 for photo examples) • Are street names clearly visible to pedestrians? • Are pedestrian routes/crossings clearly visible to motorists via warning signs and pavement markings?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	• Are pedestrian routes/crossings clearly visible to pedestrians by markings and signs? • Is the type of path clearly marked as a shared path, pedestrian only path etc.? • Are signage and pavement markings in good condition? ☒ well painted ☒ non slippery material ☒ visible day and night ☒ not damaged ☐ other	☒ ☐ ☒	☐ ☒ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
Form 4 Overall Street Furniture and Signage Rating	1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				

Form 5 Personal Safety

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
5.1 Personal Safety Daytime	• Do you feel safe walking on this route section during the day?	X	☐	☐	☐
	• Is the path visible from adjacent land uses and activities during the day?	X	☐	☐	☐
	• Are there enough people around to make you feel safe during the day?	X	☐	☐	☐
	• Are underpasses well lit during daytime?	☐	☐	X	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
5.2 Personal Safety Night-time	• Do you / would you feel safe walking on this route section during the night?	X	☐	☐	☐
	• Is the path visible from adjacent land uses and activities during the night?	X	☐	☐	☐
	• Are there / would there be enough people around to make you feel safe during the night?	X	☐	☐	☐
	• Is there good lighting in the area during the night?	X	☐	☐	☐
Comments	• Are underpasses well lit during the night?	☐	☐	X	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
Form 5 Overall Personal Safety Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 6 Adjacent Traffic

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
6.1 Adjacent Traffic, General Traffic Issues	• Is the motorised traffic speed or volume satisfactory for pedestrian safety and amenity?	X	☐	☐	☐
	• Are there any traffic calming devices? (See walkability audit tool guidelines figure 16 for photo examples) ☐ speed humps ☐ median islands ☐ chicanes ☐ roundabouts ☐ projecting kerbs ☐ other Traffic lights	X	☐	☐	☐
	• Is separation provided between motorists and pedestrians? (see figure 17 for photo examples) ☐ verge ☐ safety rail ☐ bollards ☐ trees ☐ street furniture ☐ lighting columns ☐ vegetation ☐ other	☐	X	☐	☐
	• Is the path used by other traffic? X wheelchairs X prams ☐ bikes ☐ scooters ☐ skateboards ☐ other recreational devices ☐ other_____	X	☐	☐	☐
	• Is the path well designed for this purpose with no resulting hazards and conflicts?	X	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
6.2 Adjacent Traffic, Traffic Issues at Crossings and Driveways	• Are parked vehicles clear of pedestrian crosswalks?	☐	☐	X	☐
	• Are drivers aware of the presence of pedestrians?	X	☐	☐	☐
	• Do drivers give way to pedestrians at e.g. zebras, driveways, loading docks and when turning left?	☐	☐	X	☐
	• Is oncoming traffic clearly visible to pedestrians (no obstructions blocking sight lines) at crossings?	X	☐	☐	☐
	• Can children and people in wheelchairs clearly see approaching vehicles?	X	☐	☐	☐
	• Is the driver's sight distance to the pedestrian crossing adequate with the drivers line of sight uninterrupted?	X	☐	☐	☐
Comments	• Are all types of pedestrians, including children and people in wheelchairs, visible to approaching vehicles?	X	☐	☐	☐
	• Does the footpath continue uninterrupted through driveway crossovers?	☐	☐	X	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				
Form 6 Overall Adjacent Traffic Rating	1 unsatisfactory 2 unsatisfactory but acceptable **3 satisfactory**				

Form 7 Aesthetics and Amenities

Section Location (mark issues on map)					

			Yes	No	N/A	Don't know
7.1 Aesthetics and Amenities	• Is the route section:					
	- attractive and pleasant to walk around? Somewhat		☒	☐	☐	☐
	- clear of litter, dumped rubbish, discarded items and graffiti?		☒	☐	☐	☐
	- clear of air pollution (e.g. diesel fumes and factory emissions)?		☒	☐	☐	☐
	- clear of noise pollution (e.g. construction, factories and traffic)?		☒	☐	☐	☐
	• Does the section provide pedestrian oriented features?		☒	☐	☐	☐
	☒ benches ☒ low walls, sufficient to sit on ☒ rubbish bins ☐ drinking fountains ☐ public restroom					
	☐ other_____					
Comments						
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>					

Form 7 Overall Aesthetics and Amenities Rating	1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>

Additional comments regarding this section

Nowhere for bikes, must walk

Bus stop in front of TAFE

C5 Australia Fair to Tram Station 5

Form 1 General Information and Overall Impression

1.1 General Information	• Tick where appropriate and write comments or sketch in spaces available as a guide to help you write your report
	• Mark additional comments on map of area, including locations of photos taken to identify issues for each section

Auditor / Audit Team:	Nadya	
Date and time:	6:00 - 6:04pm	
Audit location:	Australia Fair	Section 1:
Land uses:	Retail, Commercial, Residential	Section 2:
Primary users:		Section 3:
Purpose of the audit:		
Weather conditions: ☐ fine ☐ rainy ☐ windy ☒ overcast ☐ other		

1.2 Overall Impression

General Comments — Newly constructed pathway

Overall Impression Rating	1 unsatisfactory	2 unsatisfactory but acceptable	3 satisfactory	

After completion of each section for the audit – enter the overall ratings below to find out a total walkability rating (higher total = more walkable)

Summary Form		Example	Section 1	Section 2	Section 3
1	Overall Impression	2	3		
2	Pathways	3	3		
3	Crossings	2	3		
4	Street Furniture and Signage	3	3		
5	Personal Safety	1	3		
6	Adjacent Traffic	3	3		
7	Aesthetics and Amenities	3	2		
Total rating		17	20		

Form 2 Pathways

Section Location (mark issues on map)

2.1 Path Type		Yes	No	N/A	Don't know
	• Is a path present	☒	☐	☐	☐
	• What type? (See walkability audit tool guidelines figure 5 for photo examples)				
	☐ pedestrian path ☒ pedestrian path near property boundary ☒ pedestrian path near kerb				
	☐ shared use path ☐ separated path ☐ unpaved path ☐ no facility ☐ other				
Comments	• Is the path provided on both sides of the road?	☒	☐	☐	☐
	• Which direction is most of the pedestrian traffic? ☒ both directions ☐ one direction ☐ unclear				
	• Is the path suitable for pedestrian/ cyclist volumes and types of users?	☒	☐	☐	☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
2.2 Path Width and Capacity	• Average width of path _____ 3.5 _____ metres				
	• Is the path wide enough to for pedestrian/cyclist volumes and types of users?	☒	☐	☐	☐
	(See walkability audit tool guidelines table 2 for desirable width requirements)				
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				
2.3 Path Condition	• Are there any hazard or maintenance issues? (See walkability audit tool guidelines figure 6)	☐	☒	☐	☐
	☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other				
	• Are there any design issues?	☒	☐	☐	☐
	☒ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs				
Comments	☐ other Slight unevenness				
	• Is the head room of the path sufficient (free of overhanging foliage and low mounted signs) Yes				
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable 3 satisfactory				

Form 2 Pathways

		Yes	No	N/A	Don't know
2.4 Path Obstructions	• Are there any permanent obstructions? (See walkability audit tool guidelines figure 7)	☒	☐	☐	☐
	☐ signs ☐ bus stops/shelters ☒ street furniture/bins/seats ☐ trees/bushes ☐ poles ☐ street art ☐ other Bike racks				
	• Are there any temporary obstructions? (See walkability audit tool guidelines figure 8)	☒	☐	☐	☐
	☐ parked bicycles ☐ parked cars ☐ portable signs ☐ seats from cafes ☐ shop stands ☐ wheelie bins ☐ other _____				
	• The minimum effective width of path is _____ metres				
	• Is the effective width of the path suitable for pedestrian / cyclist volumes and types of users?	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
2.5 Path Connectivity	• Is it continuous (i.e. no missing sections)? (See walkability audit tool guidelines figure 9)	☒	☐	☐	☐
	• Is it connected to other paths to form a pedestrian network?	☒	☐	☐	☐
	• Is it connected to key destinations along the route?	☒	☐	☐	☐
	☒ train station ☐ bus station ☒ bus stop ☐ school ☒ shops ☐ park ☐ community centre ☐ offices ☐ industrial area ☐ other				
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
2.6 Path Accessibility (PWD)	• Is the surface of the path suitable for use by prams, wheelchairs and mobility-impaired persons?	☒	☐	☐	☐
	• Are ramps provided as an alternative to stairs for people with disabilities (PWD)?	☒	☐	☐	☐
	• Are level landings, handrails or guard rails provided for steep walking surfaces? (see guidelines 4.2.6)	☐	☐	☒	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
Form 2 Overall Pathways Rating	1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				

Form 3 Crossings

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
3.1 Type of Crossing	• What type of crossing is present? (See walkability audit tool guidelines figure 10 for photo examples)				
	☒ median island / refuges ☐ zebra ☐ automatic pedestrian signals ☒ pedestrian signals with pushbuttons ☐ traffic lights without pedestrian signals ☐ overpass ☐ underpass ☐ school crossing ☐ no facility ☐ other _____				
	• How many traffic lanes do pedestrians have to cross? _____ 2 + 2 _____ lanes				
	• Are median islands provided to allow pedestrians to cross in two stages?	☒	☐	☐	☐
	• Is the crossing suitable for the type and size of road, traffic and pedestrian volumes and types of users?	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
3.2 Location of Crossing	• Are sufficient crossings provided?	☒	☐	☐	☐
	• Are crossings at logical locations e.g. entrances/exits to key destinations or connections to other paths?	☒	☐	☐	☐
	• Do pedestrians use the crossing points provided correctly?	☐	☒	☐	☐
	• If crossing is prohibited, are pedestrians directed via physical barriers and signs to another crossing point? (See walkability audit tool guidelines figure 11)	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
3.3 Ability to Cross	• **At signalised intersection**: do the traffic signals allow enough time to cross the safely?	☒	☐	☐	☐
	• Is the waiting time short enough to discourage people from ignoring the pedestrian signals?	☐	☒	☐	☐
	Allows _____ 32 _____ seconds to cross				
	Took _____ 16 _____ seconds waiting time before walking phase started				
	• **At unsignalised intersection**: Do the gaps in the traffic flow allow people to cross the road safely?	☒	☐	☐	☐
Comments					
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				

Form 3 Crossings

		Yes	No	N/A	Don't know
3.4 Condition of Crossing	• Are there any hazard or maintenance issues? ☐ potholes ☐ cracking ☐ protruding tree roots ☐ flooding ☐ debris/sand/glass ☐ obstructing branches ☐ other _____	☐	☒	☐	☐
	• Are there any design issues? ☐ rough uneven surface ☐ slippery surface ☐ uplifts in pavement ☐ low mounted road signs ☐ other_____	☐	☒	☐	☐
Comments	• Is the waiting area sufficient to accommodate the expected pedestrian volumes? • Is the crossing sufficiently well marked, wide enough, at a logical location and clearly visible? • Are the kerb ramps and waiting areas lined up with the crossing, median and refuge areas?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
3.5 Access at Crossing for PWD	• Are kerb ramps provided at the kerb, median and refuge areas to accommodate wheelchairs and prams? • Is the slope from the path to the road safe, smooth and comfortable to use? • Are waiting areas level with sufficient manoeuvring space to accommodate wheel chairs and all users?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments	• Can vision impaired pedestrians identify the crossing via tactile surfaces provided? • Do pedestrian signals have audio-tactile devices for vision impaired pedestrians? (See figure 12) • Can children and people in wheelchairs reach the pushbuttons of signalised crossings?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
Form 3 Overall Crossing Rating	1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				

Form 4 Street Furniture and Signage

Section Location (mark issues on map)

		Yes	No	N/A	Don't know
4.1 Street Furniture and Shade	• Is street furniture provided? • What type of street furniture is present? (See walkability guidelines figure 13 for photo examples) ☒ benches ☒ low walls, sufficient to sit on ☒ rubbish bins ☐ drinking fountains ☐ public restrooms ☐ other _____ Bike Racks	☒	☐	☐	☐
	• Is the street furniture provided in good condition (not damaged, no graffiti etc.)? • Is shade provided to the path by trees or structures? • Is shade provided at resting places and areas with street furniture, by trees or structures? (See walkability audit tool guidelines figure 14 for photo examples	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments	Rating 1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				
4.2 Signage	• Is signage provided to guide and direct pedestrians to the key destinations in the area? (See walkability audit tool guidelines figure 15 for photo examples) • Are street names clearly visible to pedestrians? • Are pedestrian routes/crossings clearly visible to motorists via warning signs and pavement markings?	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
	• Are pedestrian routes/crossings clearly visible to pedestrians by markings and signs? • Is the type of path clearly marked as a shared path, pedestrian only path etc? • Are signage and pavement markings in good condition? ☒ well painted ☒ non slippery material ☒ visible day and night ☒ not damaged ☐ other	☒ ☐ ☒	☐ ☒ ☐	☐ ☐ ☐	☐ ☐ ☐
Comments	Rating 1 unsatisfactory <mark>2 unsatisfactory but acceptable</mark> 3 satisfactory				
Form 4 Overall Street Furniture and Signage Rating	1 unsatisfactory 2 unsatisfactory but acceptable <mark>3 satisfactory</mark>				

Form 5 Personal Safety

Section Location (mark issues on map)

5.1 Personal Safety Daytime		Yes	No	N/A	Don't know
	• Do you feel safe walking on this route section during the day?	X	☐	☐	☐
	• Is the path visible from adjacent land uses and activities during the day?	X	☐	☐	☐
	• Are there enough people around to make you feel safe during the day?	X	☐	☐	☐
	• Are underpasses well lit during daytime?	☐	☐	X	☐

Comments

Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

5.2 Personal Safety Night-time		Yes	No	N/A	Don't know
	• Do you / would you feel safe walking on this route section during the night?	X	☐	☐	☐
	• Is the path visible from adjacent land uses and activities during the night?	X	☐	☐	☐
	• Are there / would there be enough people around to make you feel safe during the night?	X	☐	☐	☐
	• Is there good lighting in the area during the night?	X	☐	☐	☐
	• Are underpasses well lit during the night?	☐	☐	X	☐

Comments

Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

Form 5 Overall Personal Safety Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

Form 6 Adjacent Traffic

Section Location (mark issues on map)

6.1 Adjacent Traffic, General Traffic Issues		Yes	No	N/A	Don't know
	• Is the motorised traffic speed or volume satisfactory for pedestrian safety and amenity?	X	☐	☐	☐
	• Are there any traffic calming devices? (See walkability audit tool guidelines figure 16 for photo examples) ☐ speed humps X median islands ☐ chicanes ☐ roundabouts X projecting kerbs ☐ other	X	☐	☐	☐
	• Is separation provided between motorists and pedestrians? (see figure 17 for photo examples) ☐ verge ☐ safety rail X bollards ☐ trees ☐ street furniture ☐ lighting columns ☐ vegetation ☐ other Kerb and some furniture only in parts	X	☐	☐	☐
	• Is the path used by other traffic? x wheelchairs X prams X bikes ☐ scooters ☐ skateboards ☐ other recreational devices ☐ other _____	X	☐	☐	☐
	• Is the path well designed for this purpose with no resulting hazards and conflicts? Somewhat	X	☐	☐	☐

Comments

Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

6.2 Adjacent Traffic, Traffic Issues at Crossings and Driveways		Yes	No	N/A	Don't know
	• Are parked vehicles clear of pedestrian crosswalks?	X	☐	☐	☐
	• Are drivers aware of the presence of pedestrians?	X	☐	☐	☐
	• Do drivers give way to pedestrians at e.g. zebras, driveways, loading docks and when turning left?	X	☐	☐	☐
	• Is oncoming traffic clearly visible to pedestrians (no obstructions blocking sight lines) at crossings?	X	☐	☐	☐
	• Can children and people in wheelchairs clearly see approaching vehicles?	X	☐	☐	☐
	• Is the driver's sight distance to the pedestrian crossing adequate with the drivers line of sight uninterrupted?	X	☐	☐	☐
	• Are all types of pedestrians, including children and people in wheelchairs, visible to approaching vehicles?	X	☐	☐	☐
	• Does the footpath continue uninterrupted through driveway crossovers?	X	☐	☐	☐

Comments

Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

Form 6 Overall Adjacent Traffic Rating   1 unsatisfactory   2 unsatisfactory but acceptable   **3 satisfactory**

Form 7 Aesthetics and Amenities

Section Location (mark issues on map)					

			Yes	No	N/A	Don't know
7.1 Aesthetics and Amenities	• Is the route section:					
	- attractive and pleasant to walk around? Somewhat		X	☐	☐	☐
	- clear of litter, dumped rubbish, discarded items and graffiti?		X	☐	☐	☐
	- clear of air pollution (e.g. diesel fumes and factory emissions)?		X	☐	☐	☐
	- clear of noise pollution (e.g. construction, factories and traffic)?		X	☐	☐	☐
	• Does the section provide pedestrian oriented features?		☐	☐	☐	☐
	X benches X low walls, sufficient to sit on X rubbish bins ☐ drinking fountains ☐ public restroom					
	☐ other_____Bike Racks_____					
Comments						
	Rating	1 unsatisfactory	2 unsatisfactory but acceptable		3 satisfactory	

Form 7 Overall Aesthetics and Amenities Rating		1 unsatisfactory	2 unsatisfactory but acceptable	3 satisfactory	

Additional comments regarding this section	
	Some of the shop fronts loot old; need updating
	Busy road, not much separation of pedestrians with traffic but there is a bike lane

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