Redland Priority Development Area

Weinam Creek Structure Plan – Traffic Masterplan Report

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Cardno
Shaping the Future

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Contact Information

Cardno (Qld) Pty Ltd
ABN 57 051 074 992

Level 11 Green Square North Tower
515 St Paul's Terrace
Locked Bag 4006
Fortitude Valley Qld 4006

Telephone: 07 3369 9822
Facsimile: 07 3369 9722
International: +61 7 3369 9822

transportqld@cardno.com.au
www.cardno.com.au

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1 Introduction

1.1 Background

On 21 June 2013, Weinam Creek was declared by the Queensland Government as a Priority Development Area (PDA).

The Weinam Creek PDA covers a total area of 42 hectares, 36.2 hectares of which is on land and 5.8 hectares is within Moreton Bay. Weinam is the main gateway to the Southern Moreton Bay Islands (SMBI), providing ferry services between the mainland and Russell, Macleay, Lamb and Karragarra Islands for commuters, students and shoppers. A secondary use of the harbour is for tourist and recreational boating.

The vision for the future of Weinam is to bring more facilities to the foreshore for residents and visitors of Moreton Bay. Improving the water transport facilities and associated land uses is a core consideration. Additionally, ensuring that the area is well-connected and integrated with the surrounding transport network, with particular respect to active and public transport, is a major goal.

Working with Redland City Council (RCC), Cardno was appointed to provide specialist traffic engineering and transport advice for the master planning stage of the PDA. Through extensive consultation with Council, a refined structure plan was developed to ensure the future Weinam Creek will be an accessible and integrated gateway.

1.2 Scope of Report

Following the project staging set out by Council, the key scope of the master planning exercise was clearly defined with stages set out as follows:

> Stage 1: Project inception and mobilisation
> Stage 2: Technical investigation and analysis, generation of draft options
> Stage 3: Scenario development, testing and development of preferred scenario
> Stage 4: Draft development scheme and infrastructure plan
> Stage 5: Preparation of final development scheme and infrastructure plan
> Stage 6: Implementation plan.

This structure plan report relates to the delivery of Stage 4. The process preceding this report involved an options development and refinement process, involving two workshop events. Tasks undertaken by Cardno leading up to the preparation of the final structure plan relate to Stages 2 and 3. These tasks are outlined in the following sections.

1.2.1 Stage 2: Technical investigation and analysis, generation of draft options

> Provide a short briefing paper pre-workshop for attendees to gain an appreciation of key strategic issues that should be considered at the workshop
> Attend the workshop and provide attendees on the day with direction and creative ideas that outwork the ideas to options being considered
> Assist preparing assessment criteria for assessing the options
> Assist in an evaluation of the options against the assessment criteria
> Potentially assist in further refinement of options, by allowing in the study methodology, meetings incorporating community and state feedback.

1.2.2 Stage 3: Scenario development, testing and development of preferred scenario

> Provide a short briefing paper pre workshop for attendees to gain an appreciation of the options to be considered
> Workshop to agree on preferred structure plan
> A report outlining the extent of requirements to be incorporated into the Development Scheme.

The final stage of input from Cardno involves the following tasks, outlined below.

1.2.3 Stage 4: Draft development scheme and infrastructure plan

> The output from Stage 4 will be the finalised structure plan, including planning study report and associated drawings
> Input to the development scheme.

1.3 References

> *Census of Population and Housing,* Australian Bureau of Statistics, 2011
> *Guide to Traffic Generating Developments,* Roads and Transport Authority (RTA), NSW Government
> *Journey Planner* and *Timetable Information*, TransLink, 2013
> *Preconstruction Processes Manual* (PPM), Department of Transport and Main Roads, QLD Government
> *Trip Generation Handbook,* Institute of Transportation Engineers (ITE)
> *Weinam Creek Priority Development Area Interim Land Use Plan,* Queensland Government, June 2013
> *Weinam Creek Social and Economic Impact Assessment and Management Plan,* SMEC, May 2011

1.4 Limitations

It is noted that the majority of the information adopted within the preparation of this report has been sourced from Redland City Council. As such, the accuracy of the findings and recommendations herein are subject to the accuracy of the information supplied.

Cardno have taken due care to ensure all assumptions are as accurate as possible. However, it is acknowledged that any changes in assumptions will ultimately affect the analysis.

2 Existing Situation

2.1 Introduction

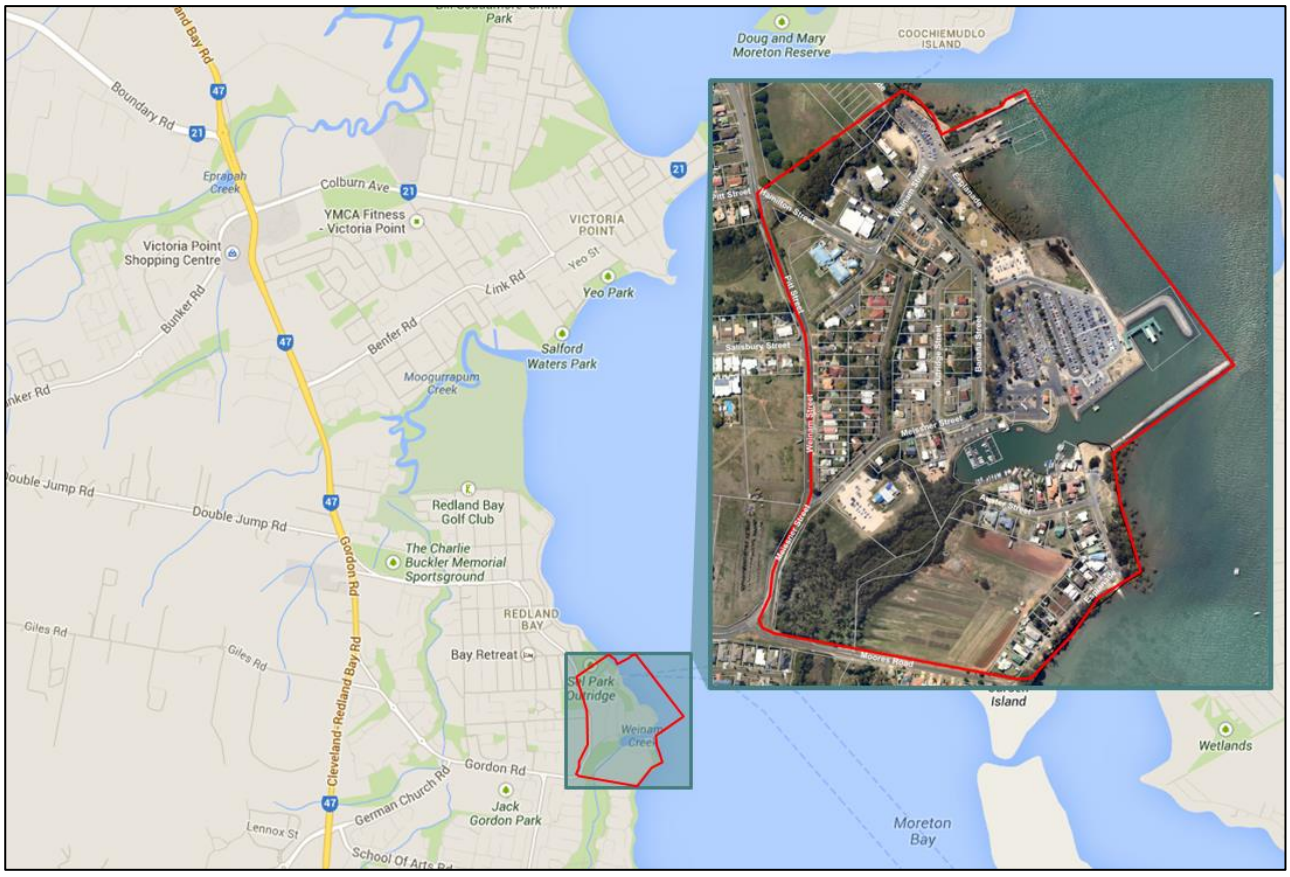
The Weinam Creek PDA covers a total area of 42 hectares, 36.2 hectares of which is on land and 5.8 hectares is within Moreton Bay. The extent of the PDA is indicated on Figure 2-1.

Located approximately 4.6km south-east of the Victoria Point shopping centre, Weinam is the main gateway to the Southern Moreton Bay Islands (SMBI), providing ferry services between the mainland and Russell, Macleay, Lamb and Karragarra Islands for commuters, students and shoppers. The ferry service is currently integrated within the Translink network, with the Redland Bay bus terminal located adjacent to the ferry terminal.

Much of the shorefront land area is taken up by parking for ferry users. Demand for parking is a major issue for SMBI residents, which is expected to exacerbate with the increase in population. Managing the parking for the redeveloped area will be an integral part of the success of the PDA.

The assessment methodology was based upon mode hierarchy, whereby active transport, public transport and vehicular traffic were assessed separately. This has allowed for a more holistic analysis of the traffic and transport study for the PDA, ensuring all road and path users are considered.

Figure 2-1 Weinam Creek Priority Development Area



2.1.2 Site Investigation

On Monday 8 July, 2013, a site investigation was conducted by Cardno to gain a clear sense of the use of the study area. Utilisation of parking areas was assessed, in addition to the existing standard of active and public transport facilities.

2.2 Active Transport

2.2.1 Existing Facilities

The current standard of active transport facilities is reasonable, with most streets within the study area having footpaths or shared paths along at least one side of the carriageway. However, there are a number of links with no pedestrian pathways on either side of the carriageway. These include:

> Hamilton Street, south of the Pitt Street intersection
> Outridge Street
> Esplanade

A shared path along the main external spine road, Pitt Street, currently exists along one side only. A sudden truncation mid-block results in pedestrians and cyclists needing to cross the road to continue along the path. A shared path along Banana Street extending from Weinam Street south to Moores Road provides reasonably good connections for recreational cyclists. Figure 2-1 highlights the areas where active transport facilities are provided.

2.2.2 Gaps in Facilities

While the existing standard of facilities is reasonable, there are still opportunities to improve upon the active transport network. Potential improvements to the active transport provisions within the PDA are outlined in the following sections.

2.2.2.1 Hamilton Street footpath

Ensuring a continuous path network is provided is an integral part to an accessible and legible active transport network. This is especially important when considering connections to the external path network. Hamilton Street currently functions as a trunk collector road, meaning path users rely on this link as a core connection. The current truncation of the footpath at the Hamilton Street/Pitt Street intersection need to be amended with a continuous path connecting to Weinam Street, as this acts as one of the main gateways to the ferry terminal.

2.2.2.2 Safe Pedestrian Crossings

Along the same lines of providing a clearly legible path network, formal pedestrian crossing points, using kerb ramps and pedestrian refuges where applicable, are required at all major intersections. Given the relatively high volume of traffic at the Banana Street/car park access intersection, and the Meissner Street/Moores Road intersection, it is expected and in particular warranted that formal crossing facilities will be provided. In the case of the Meissner Street/Moores Road intersection, where the intersection layout is complicated and the nearest crossing point is more than 100m east of the intersection, this is especially important.

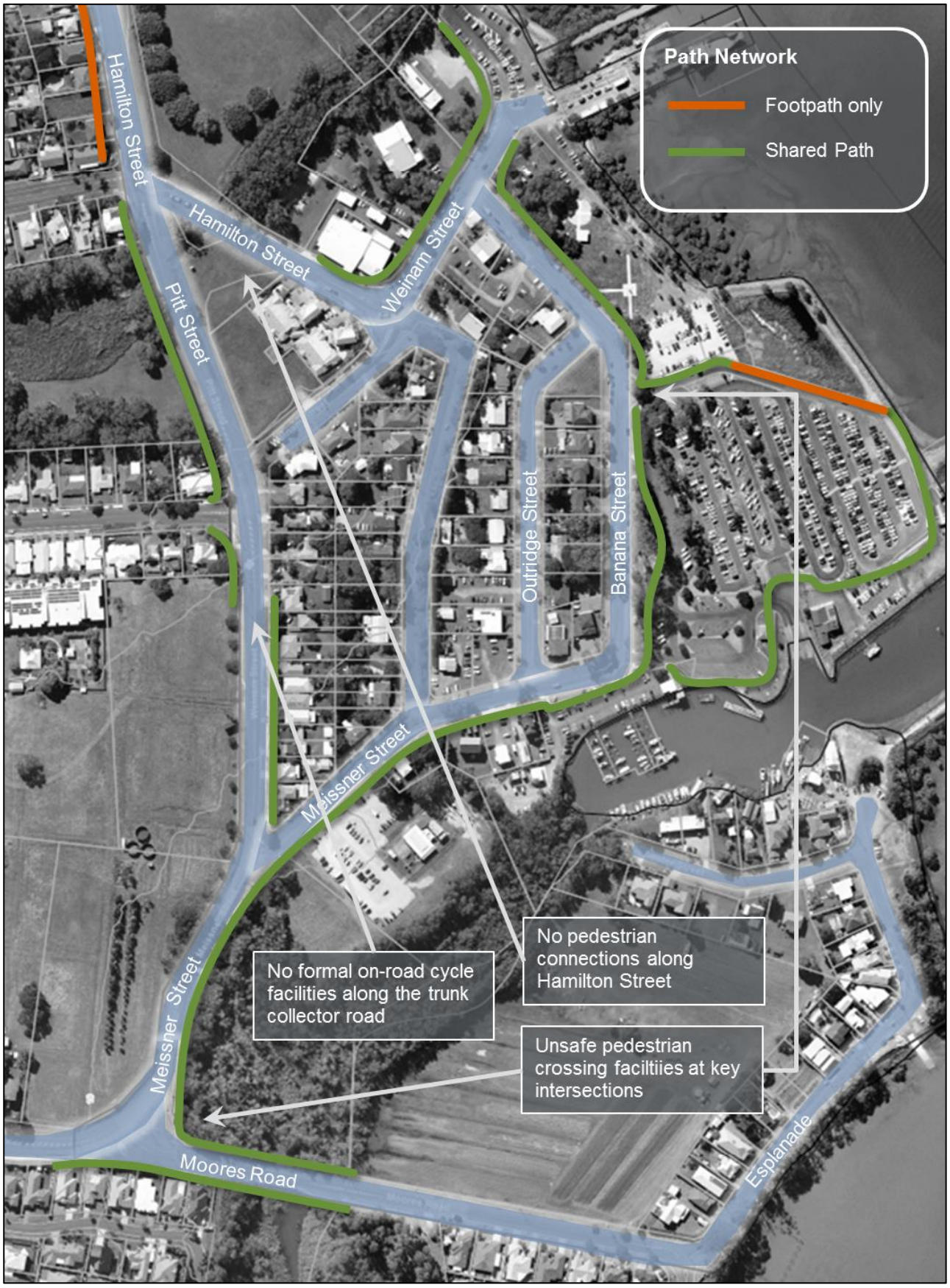
2.2.2.3 Cycle Lanes on Hamilton Street

Given the classification of Hamilton Street and Pitt Street as trunk collector roads, the provision of on-road cycle lanes is warranted, as specified in the Redland City Planning Scheme. The current carriageway does not designate any road space to cyclists, even though cycle lanes are provided along Government Road at the southern edge of the PDA study area. Providing a legible and convenient cycle network will greatly encourage use of the cycle paths for both commuters and recreational users.

2.2.3 Overview

While the existing level of active transport facilities are reasonable for the current uses of Weinam, the planned redevelopment which includes increased density of land uses, will require stronger and safer connections. These include ensuring that the path network connects all major land uses with transport hubs in addition to integrating the connections within the PDA to the external network.

Figure 2-2 Existing Active Transport Network



2.3 Public Transport

2.3.1 Existing Services and Facilities

2.3.1.1 Land Based Transport Facilities

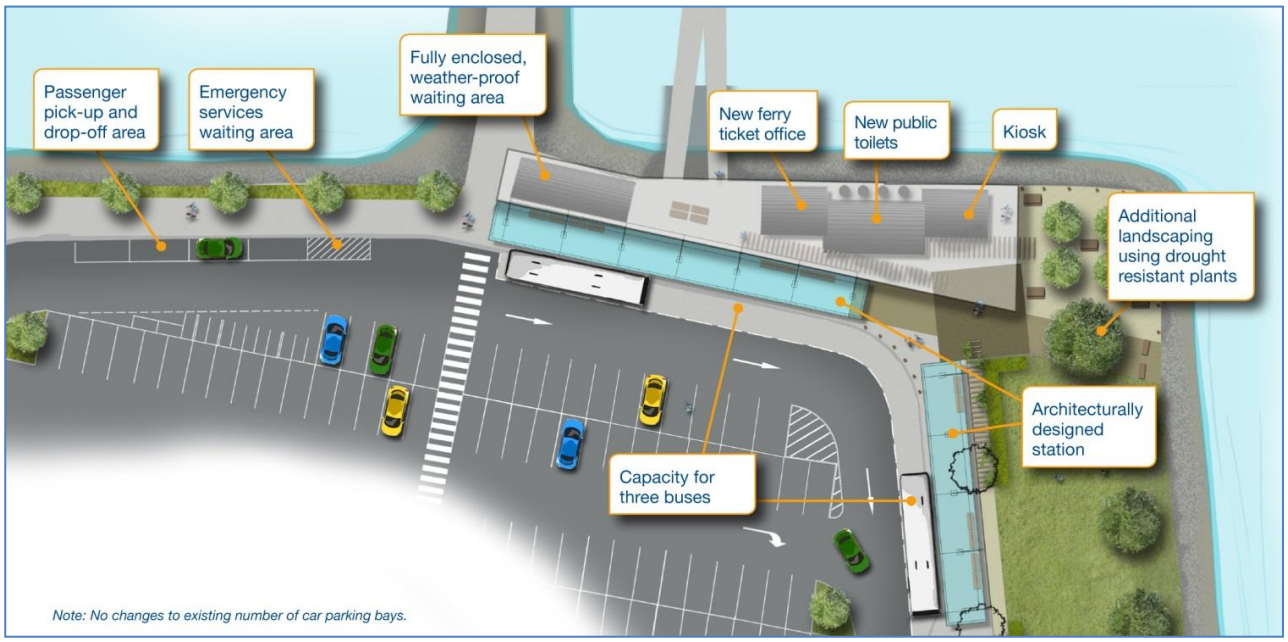
Within the PDA study area, there are a number of bus services which provide connections for ferry users at the Redland Bay ferry terminal. All the Translink bus routes service the Weinam Creek ferry terminal via Banana Street. These include services connecting to Victoria Point and the Brisbane CBD. Details for these services are summarised in Table 2-1.

Table 2-1 Existing Bus Services

Service	Route	Frequency	Hours of Operation
250	Redland Bay to City via Carindale	Every 30 minutes	4:30am to 12:50am
280	Talburpin to Garden City and Griffith University	Every hour	8:00am to 10:40pm
281	Talburpin to City via Garden City	Every 30 minutes during peak times, AM inbound and PM outbound only	AM peak - 5:30am to 7:00am PM peak – 5:30pm to 7:00pm
282	Victoria Point to Loganholme via Mount Cotton	Every hour	5:30am to 8:00pm

Waiting facilities at the ferry terminal were noted to be well utilised, indicating that future use may increase. Translink have proposed to upgrade the existing bus stop to an interchange standard, involving capacity for three buses and a fully sheltered area for waiting passengers. Figure 2-3 indicates the proposed upgrade changes.

Figure 2-3 Translink Upgrade for Redland Bay Interchange



2.3.1.2 Water Based Transport Facilities

The SMBI ferry, which connects the mainland to the four Southern Moreton Bay Islands, operates approximately every half hour throughout the day. Services run in both directions, clockwise and anti-clockwise, and continue until approximately midnight. Table 2-2 summarises the details for each operator.

Table 2-2 Existing Ferry Service

Service	Route	Frequency	Hours of Operation
SMBI Ferry	Redland Bay to Karragarra, Macleay, Lamb and Russell Islands	Approximately every 30 minutes	4:20am to 11:30pm (12:30am on Fridays)

2.3.2 Gaps in Facilities

2.3.2.1 Future Growth Considerations

Given the planned densification of the area, better facilities should be integrated to accommodate the increased population and subsequent increased use of public transport facilities. In particular, more frequent bus services to major centres such as Victoria Point and the Brisbane CBD should be considered.

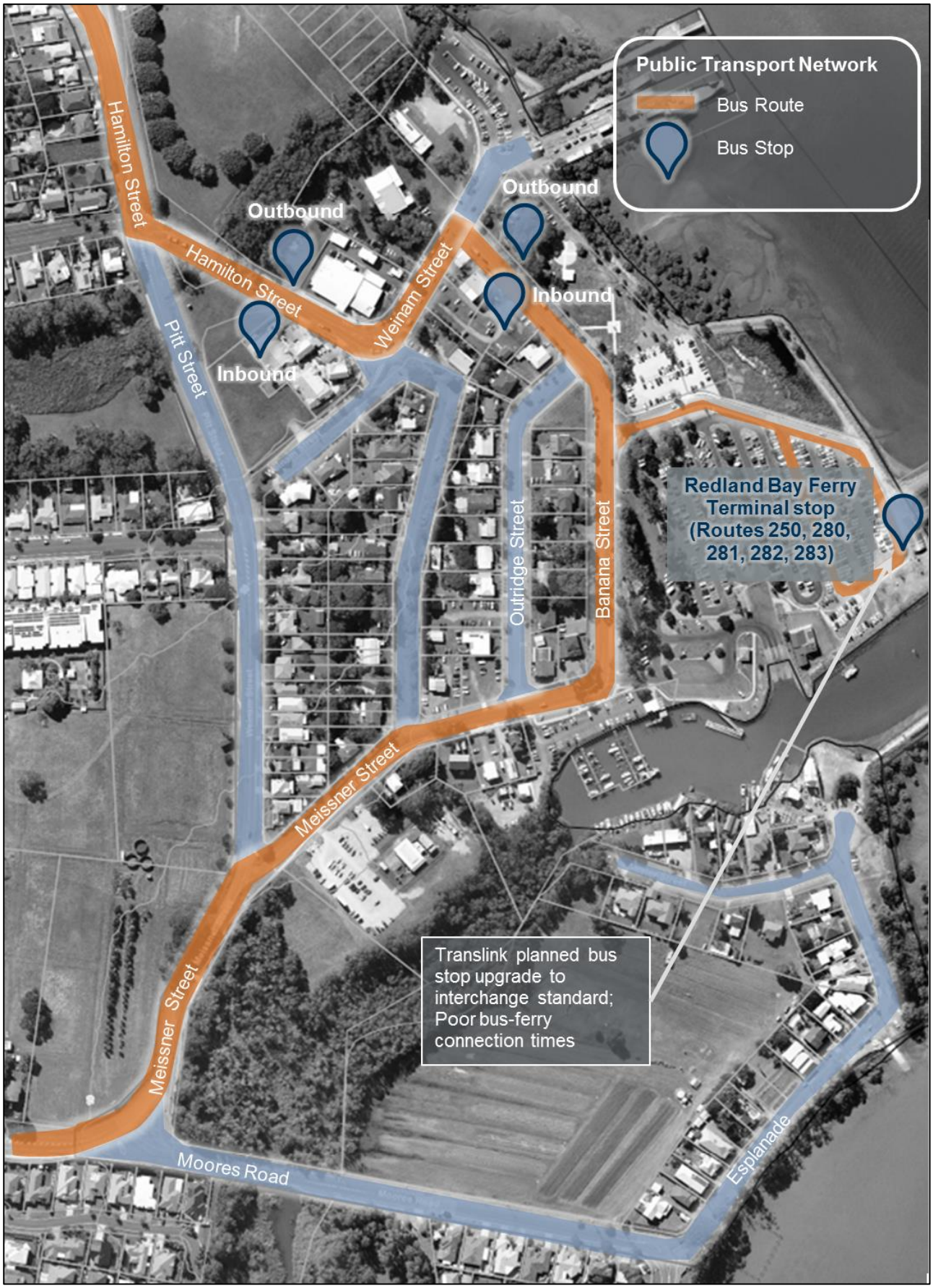
2.3.2.2 Timetable Connections

Good ferry-bus timetable connections are an important aspect of an integrated transport network. Currently, the average waiting time between ferry and bus services is 20 minutes, while some connections have a 45 minute waiting period. This issue will need to be rectified to encourage higher patronage of public transport services. Figure 2-3 illustrates the existing public transport facilities.

2.3.3 Overview

Maximising the patronage of bus services will be an important consideration for the future of a sustainable transport network for Weinam. The current level of services is reasonable for the existing patronage levels. Waiting facilities are reasonable and a number of bus routes service the ferry terminal linking to a variety of relevant destinations. Gaps in the current facilities, however, relate to the poor bus-ferry connection time and the increased future demand for convenient public transport services, which comes with a growing SMBI population. Heavy reliance on private vehicles poses another barrier to gaining higher public transport patronage.

Figure 2-4 Existing Public Transport Network



2.4 Road Network

2.4.1 Existing Road Network

The existing road network which was included in the study extended outside the PDA study area. The following roads were assessed:

- Hamilton Street
- Pitt Street
- Weinam Street
- Meissner Street
- Banana Street
- Moores Road
- Esplanade

The Redland City Planning Scheme has been referred to for the relevant road hierarchy to be used for the PDA. Table 2-3 indicates the road classifications and characteristics applicable to the Weinam Creek study area.

Table 2-3 Road Hierarchy Characteristics

Road Classification	AADT	Equivalent Residential Lots	Design Speed	Number of Lanes	Carriageway Width	Minimum Verge Width	Reserve Width
Access Street	1,000	100	30 km/h	2	6m	4m	15m
Local Collector	<3,000	300	40 km/h	2	7m	4m	18m
Trunk Collector	3,000 – 10,000	1,000	50 km/h	2	11 to 14m	4 to 6.5m	19 to 27m
Sub-arterial	15,000 – 20,000	2,000	60 km/h	2 or 4	12 to 20m	4 to 6.5m	20 to 33m

2.4.2 Road Connectivity

The existing road classification and functions of the study roads are highlighted in Table 2-4.

Table 2-4 Existing Road Function

Road Name	Road Classification	Function
Hamilton Street	Trunk Collector	Thoroughfare for external traffic and access from the north into the PDA
Pitt Street	Trunk Collector	Thoroughfare for external traffic
Weinam Street	Local Collector	Provide access to barge terminal and Banana Street
Meissner Street	Local Collector	Provide access to the southern section of the PDA and to the external road network via Pitt Street
Banana Street	Local Collector	Provide access to the main parking area and ferry terminal
Moores Road	Local Collector	Provide access to the southern residential areas and Esplanade
Esplanade	Access Street	Provide access to residential lots and the southern boat ramp

Some issues which result from the current network design include:

- Poor intersection design with respect to approach grade and angle, e.g. Meissner Street/Moores Road intersection
- Single access to the Redland Bay ferry terminal bus stop via the Banana Street access, requiring turn around facilities at the terminal car park

Figure 2-5 illustrates some examples of poor intersection design, as observed on the site investigation undertaken by Cardno. The first intersection, at Hamilton Street/Weinam Street, has staggered legs along the Weinam Street alignment, which causes confusion for drivers, particularly when vehicles need to give way.

The second intersection, at Meissner Street/Moores Road, has grade changes and a curved alignment along Meissner Street which results in poor visibility for drivers. The wide separation of movements also contributes to poor legibility for drivers.

The third intersection at Meissner Street/Weinam Street also has grade changes along the major road as well as on the minor road approach. Additionally, the entry angle of the minor approach, Meissner Street, is low, causing poor sight distance for drivers.

Figure 2-5 Existing Intersection Design – Site Investigation Observations

Top: Hamilton Street/Weinam Street intersection, from Weinam Street (east) approach, staggered legs cause driver confusion when giving way to other vehicles;

Middle: Meissner Street/Moores Road intersection, from Meissner Street (north) approach, grade change and segregated movements cause poor visibility and legibility;

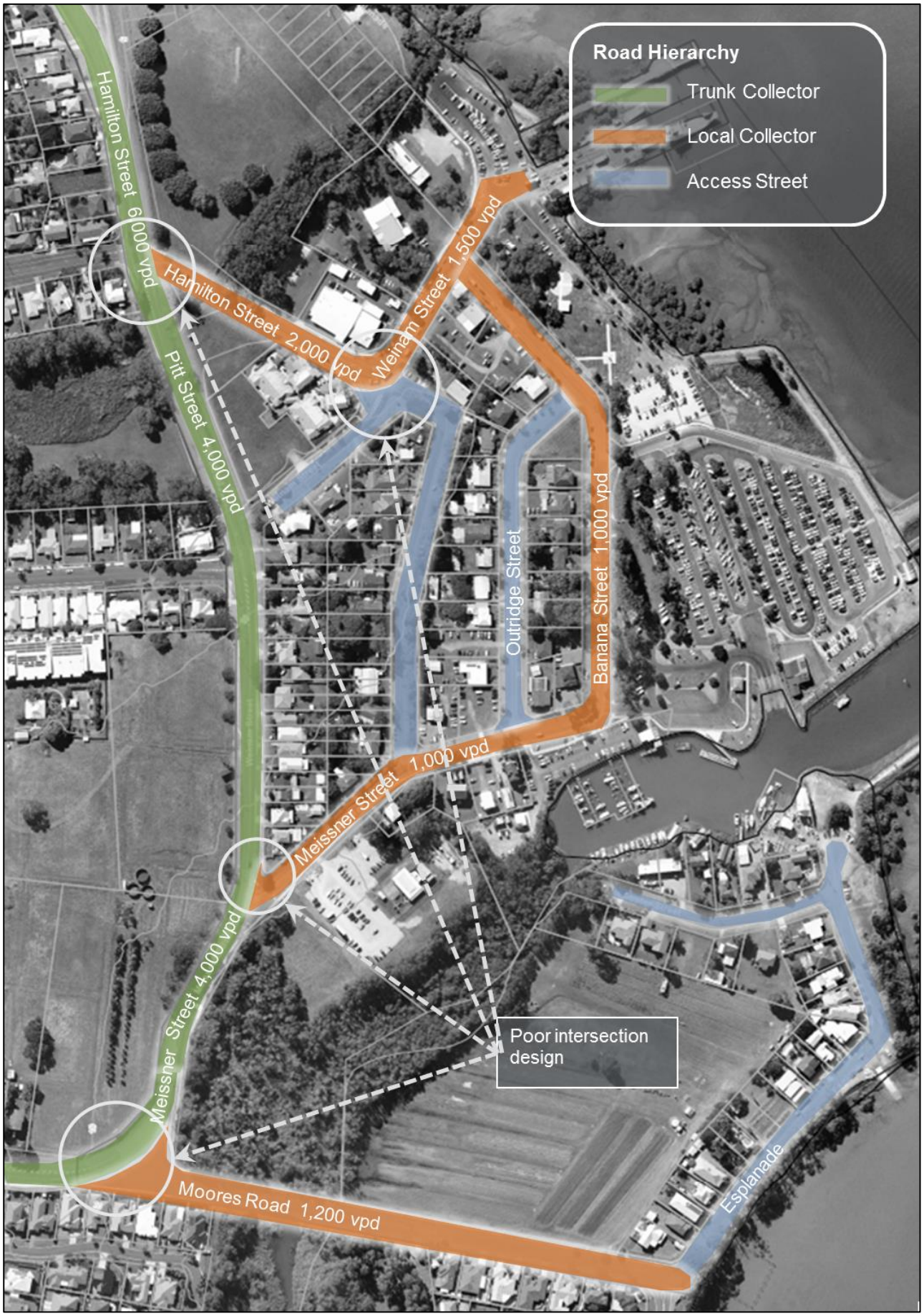
Bottom: Meissner Street/Weinam Street intersection, from Meissner Street (east) approach, grade changes and low entry angle cause poor visibility; photos dated 8 July 2013

2.4.3 Overview

While the current road network may adequately accommodate traffic in terms of operational capacity, the design of some key intersections within the PDA site raises concerns with regards to their unsafe operation. Poor visibility and driver confusion are some of the issues which have been identified at some intersections. The anticipated increase in traffic with the planned densification of the PDA will exacerbate these safety issues, in addition to straining the capacity of the road network.

Figure 2-6 indicates the road hierarchy, as adopted in the Redland City Planning Scheme.

Figure 2-6 Existing Road Hierarchy and Traffic Volumes



2.5 Parking

The current layout of Weinam Creek is dominated by parking areas. Not only do the parking areas segregate the foreshore from the residential areas of the PDA, but they utilise an open air design which takes up large blocks of area and detract from the visual amenity of the harbour. A total of 1,094 spaces are currently provided, in addition to 75 boat trailer spaces. The following parking areas have been identified:

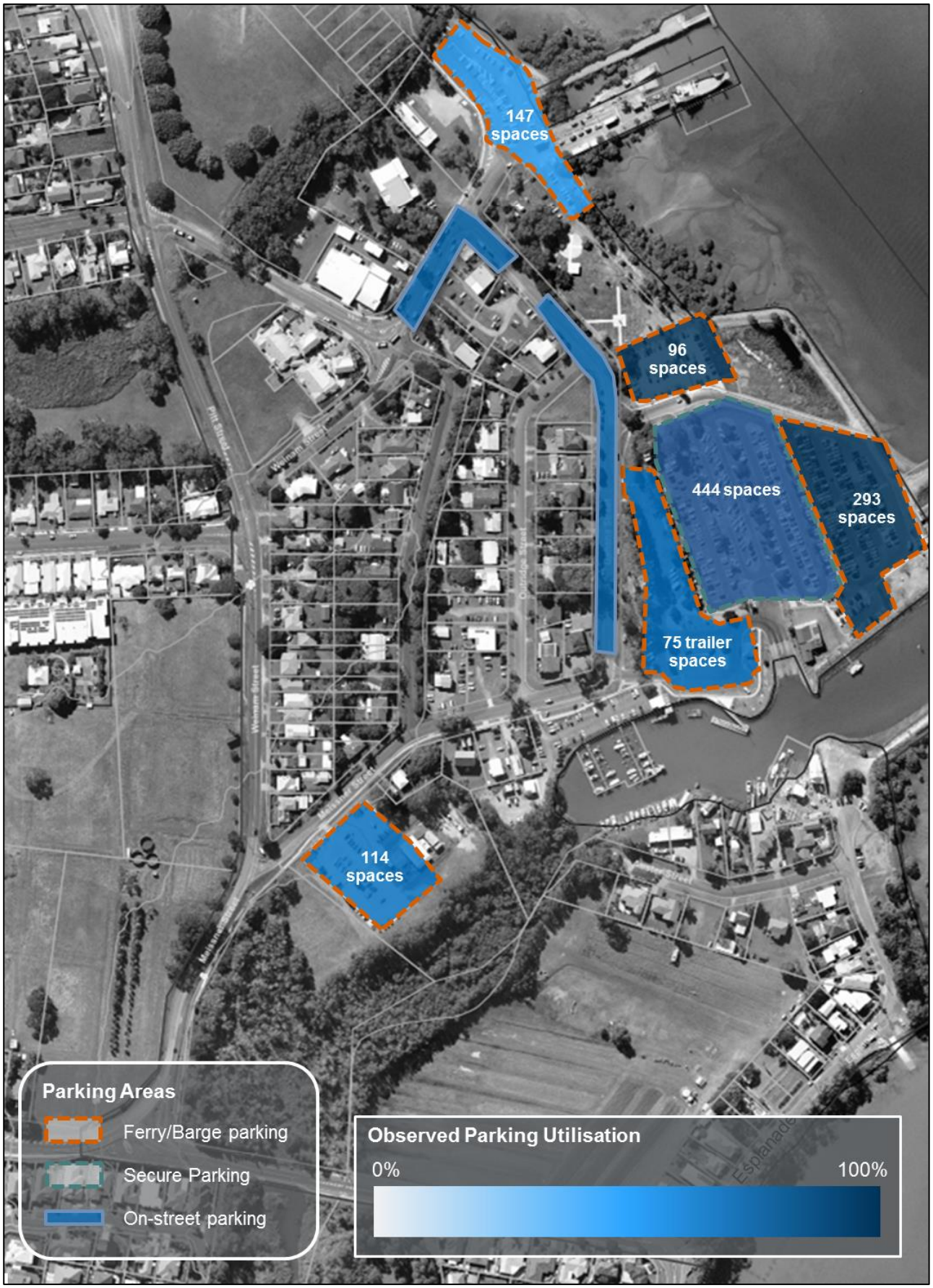
> Public ferry terminal car park – approximately 293 car bays
> Secure ferry terminal car park – approximately 444 car parking spaces
> Cenotaph car park – approximately 96 spaces
> Barge parking – approximately 147 spaces
> Meissner Street parking – approximately 114 spaces
> Banana Street boat trailer car park – approximately 75 spaces

It is noted that these parking numbers are approximate estimates only, taken from Nearmap aerial imagery dated 8 September 2013. On-site observations indicated that generally all parking areas were close to or at capacity. The identified parking areas and observed utilisation rates are shown on Figure 2-7.

2.5.1 Overview

Parking at Weinam Creek is acknowledged to be an issue, with high demand and constrained opportunities for further expansion. The majority of the site is dominated by parking, with most areas located along the foreshore. All the parking areas are currently at capacity, with overflow parking being accommodated by informal parking areas created on private lots. A potential increase in population on the SMBI will further increase demand for parking, given the heavy reliance on private vehicles by island residents.

Figure 2-7 Existing Parking Areas



3 Workshop Process

3.1 Introduction

The master planning process undertaken for the Weinam PDA involved the following involvement from Cardno, as defined by the stages set out by RCC in the Consultancy Brief:

> Preparation of a briefing paper to highlight the existing facilities, deficiencies and resulting issues
> Participation at Workshop 1 to provide high level input into the development of various development options
> Review of the developed options with respect to the opportunities and constraints from a traffic and transport perspective
> Participation at Workshop 2 to narrow the various options to a finalised plan
> Assessment of the finalised option

3.2 Initial Briefing Paper

Prior to the first workshop, a briefing paper was developed to outline the various traffic and transport considerations of the existing situation at Weinam Creek. Of particular focus for the paper were the following topics:

> Active transport facilities, in particular the standard and provision of footpaths and cycle paths
> Public transport facilities and service frequency
> Road network operation and intersection capacity
> Parking provision and demand

3.3 Workshop 1

The first workshop was held on Tuesday 16 July 2013, with all relevant design consultants and stakeholders in attendance. The purpose of the workshop was to develop a number of options for further consideration. Input from all parties was examined with the workshop resulting in three options being established for further assessment.

3.4 Options Review

Reviews of the three developed options were undertaken to assess the various strengths and weaknesses of each. The traffic and transport criteria adopted to evaluate the options included the following:

> Street efficiency – traffic connectivity
> Street efficiency – capacity/street design
> Parking effectiveness
> Effectiveness of water and land based public transport integration
> Active transport linkages and facilities

The assessment was hindered by a lack of detail, including:

> A lack of traffic survey data
> A lack of definite yields for the developments
> A lack of parking usage data, other than that gathered by Cardno

3.5 Workshop 2

On Monday 9 September 2013, the second workshop was held, once again involving all the relevant design consultants and stakeholders. The completion of the workshop resulted in the development of a refined structure plan outlining the finalised road network and development plan.

3.6 Outline of Final Option

This report has been prepared to provide an assessment of the finalised structure plan, in terms of traffic and transport.

4 PDA Structure Plan

4.1 Introduction

The original vision of the Weinam Creek redevelopment was to provide better community facilities supplemented with improved accessibility for transport facilities. With the proposed structure plan, this vision has largely been achieved. A combination of mixed use (commercial and retail) and residential land uses form the heart of the precinct, while ferry and maritime services are located along the foreshore with a boat ramp for recreational use located to the south. Additionally, a new marina will increase the number of recreational users to Weinam.

The proposed indicative yields, confirmed by RCC, are set out in Table 4-1.

Table 4-1 Land Use Yields – Structure Plan

Land Use	Yield
Commercial	4,500 sq.m
Retail	4,500 sq.m
Community centre	3,500 sq.m
Restaurant	2,000 sq.m
Residential – medium density	504 lots
Residential – high density	340 lots
Marine Services	2,800 sq.m
Marina	250 berths

4.2 Road Network Hierarchy

The planned road network involves a number of changes, including extending Hamilton Street to connect to Banana Street, creating a more direct link to the foreshore from the external network. Additionally, the existing car park circulation road off Banana Street will be formalised to create a loop road around the central core of the redevelopment, improving circulation in the area.

Figure 4-1 illustrates the indicative road hierarchy of the structure plan.

Figure 4-1 Proposed Road Hierarchy

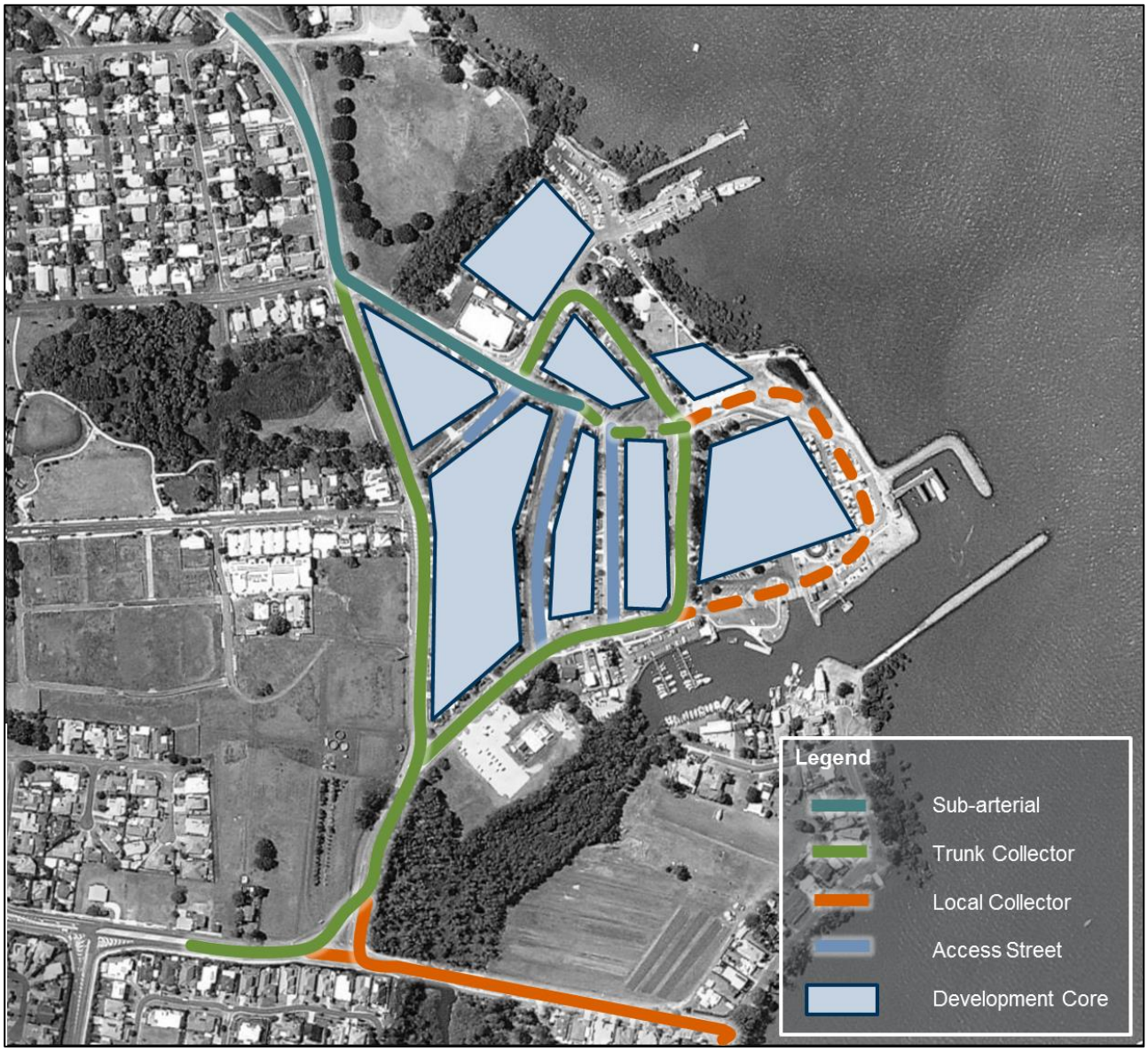


Table 4-2 describes the proposed road function with Table 4-3 summarising the road hierarchy of each of the study roads, while Figure 4-1 graphically illustrates the indicative road hierarchy of the structure plan.

Table 4-2 Proposed Road Function

Road Name	Road Classification	Function
Hamilton Street	Sub-arterial	Carry through traffic along the external road network and provide main access into Weinam
Pitt Street	Trunk Collector	Carry through traffic along the external road network
Weinam Street	Trunk Collector	Allow barge and ferry traffic to diverge from the main access street, while providing an alternate route to the PDA core
Banana Street	Trunk Collector	Carry traffic between the external road network and the core precinct
Meissner Street	Trunk Collector	Carry development traffic to and from the external road network and provide access to ferry parking areas
Moores Road	Local Collector	Provide access for boat ramp users and the southern residential area

Table 4-3 Proposed Road Hierarchy

Characteristic	Hamilton Street	Pitt Street	Weinam Street	Banana Street	Meissner Street	Moores Road
Road Classification	Sub-arterial	Trunk Collector	Trunk Collector	Trunk Collector	Trunk Collector	Local Collector
AADT	15,000 – 20,000	3,000 – 10,000	3,000 – 10,000	3,000 – 10,000	3,000 – 10,000	<3,000
Design Speed	60 km/h	50 km/h	50 km/h	50 km/h	50 km/h	40 km/h
Number of Lanes	2-4	2	2	2	2	2
Carriageway Width	12 to 20m	11 to 14m	11 to 14m	11 to 14m	11 to 14m	7m
Minimum Verge Width	4 to 6.5m	4 to 6.5m	4 to 6.5m	4 to 6.5m	4 to 6.5m	4m
Reserve Width	20 to 33m	19 to 27m	19 to 27m	19 to 27m	19 to 27m	18m

4.3 Public Transport

Ensuring that the ferry and bus services are well integrated via connected facilities will be an integral part to creating a sustainable transport network. This will be delivered via a transit hub, connecting the ferry terminal to a bus station, at the corner of Meissner Street and Banana Street. This will maximise the opportunity for integrated transport services.

The grid network, facilitated by the extension of Hamilton Street through to Banana Street, allows for a more efficient bus route, eliminating the need for a turn-around area. This arrangement allows bus routes to easily loop the PDA site via Banana Street and Meissner Street.

Table 4-4 provides a summary of the suitability of bus routes on the study roads. Figure 4-2 demonstrates the potential public transport amenity of the structure plan.

Figure 4-2 Proposed Public Transport Network

The figure indicates the 400m walkable catchments for the proposed bus interchange locations, in line with TMR guidelines. As shown, the bus stop is located so that approximately all land uses are within the walkable catchment.

Table 4-4 Required Public Transport Facilities

Characteristic	Hamilton Street	Pitt Street	Weinam Street	Banana Street	Meissner Street	Moores Road
Road Classification	Sub-arterial	Trunk Collector	Trunk Collector	Trunk Collector	Trunk Collector	Local Collector
Bus Route	Yes	Yes	Yes	Yes	Yes	Where appropriate

4.4 Active Transport

It is proposed to incorporate extensive lengths of boardwalk, with waterfront paths stretching from the top of the parkland to the bottom of the boat ramp at Moores Road. Links within the central hub, the mixed use and residential precinct, are reinforced with a strong path network extending along all the adjacent land use frontages.

Additionally, it is proposed a foot bridge be provided to cross Weinam Creek, joining Meissner Street with the southern boat ramp and parking area. With the proposed paths, pedestrian connectivity within the PDA site has greatly been improved. Improvements would be the continuous paths along both sides of Hamilton Street and the use of clear pedestrian areas around the high density core areas.

Table 4-5 summarises the active transport requirements, in accordance with the Redland City Planning Scheme.

Table 4-5 Active Transport Provision

Characteristic	Hamilton Street	Pitt Street	Weinam Street	Banana Street	Meissner Street	Moores Road
Road Classification	Sub-arterial	Trunk Collector	Trunk Collector	Trunk Collector	Trunk Collector	Local Collector
Pedestrian Path	N/A	N/A	N/A	N/A	N/A	1.5m
Shared Use Path	2.5 or 3.0m as determined	2.5 or 3.0m as determined	2.5 or 3.0m as determined	2.5 or 3.0m as determined	2.5 or 3.0m as determined	2.5 or 3.0m as determined
On-Road Cycling Facilities	On carriageway and verge, both sides, bicycle lanes 2.0m wide	On carriageway and verge, both sides, exclusive bicycle lanes 1.5m to 2.0m wide	On carriageway and verge, both sides, exclusive bicycle lanes 1.5m to 2.0m wide	On carriageway and verge, both sides, exclusive bicycle lanes 1.5m to 2.0m wide	On carriageway and verge, both sides, exclusive bicycle lanes 1.5m to 2.0m wide	Not required

Figure 4-3 Proposed Active Transport Network

4.5 Parking

One of the objectives for the PDA was to minimise the extent of parking areas, which currently consume the majority of land area at Weinam. This can be achieved reasonably well through a number of approaches, including the following:

> Locating the parking area for ferry users towards the southern end of the PDA, near the future ferry services and away from the main central hub
> Using sleaved parking areas nestled between buildings, ensuring that the visual amenity of the PDA is not deteriorated
> Using on-site parking areas for residential dwellings to maximise public parking space
> Separating the marina parking from the central hub to improve efficiency
> Minimising the level of on-street parking, to maintain the character of the PDA

Based upon the proposed land uses, the level of parking provision has been categorised into short, medium and long term parking areas. Table 4-6 details the proposed parking system and associated indicative parking provision required, in accordance with the Redland City Planning Scheme.

Table 4-6 Proposed Parking Provision

Parking Type	Description of User	Location	Parking Rate	Indicative Parking Spaces
Short Term	Customers of the retail and commercial centre (including visitors to the marina/waterfront) of the PDA with allocation for staff	Sleaved parking bordered by the new Esplanade and Banana Street at the foreshore	5 spaces per 100sq.m	550 spaces^
Medium Term	Marina Parking	To the north of the marina built on reclaimed land into the bay.	0.6 spaces per berth	150 spaces*
Medium Term	SMBI Residents, this level of parking would allow for day/overnight parking for user of the ferry who are using their cars to travel to work etc	To the south of Meissner Street and to the east of Weinam Creek.	Total of 967 spaces are currently allocated for passenger ferry patrons (calculated from total provision minus marina & boat ramp spaces)	At least 500 spaces†
Medium Term Parking	Provision of parking at for the users of the boat ramp.	To the immediate south of Weinam Creek, accessed via Moores Road	90 spaces per boat ramp	90 spaces#
Long Term Parking	Provision of secure long term parking for SMBI residents who require secure parking facilites	Bordering Moores Road between the residential and wetland area.	Total of 967 spaces are currently allocated for passenger ferry patrons (calculated from total provision minus marina & boat ramp spaces)	At least 500 spaces†

^ Assuming mixed use/restaurant areas comprise 11,000sq.m GFA

* Assuming 250 berth marina

† Total existing passenger ferry spaces provided, to be retained at minimum, between long term and medium term facilities

Assuming a single boat ramp

Where it is practical, parking will be sleaved, by buildings, to ensure that the parking does not dominate the urban space.

With regards residential parking provision, it is intended that new townhouses would have parking provision within the development lot. In line with Redlands City Planning Scheme, residential parking would be as follows:

> Townhouses would require a provision of 2 spaces per dwelling; and
> Unit development would require 1 space per dwelling plus 1 visitor space per every 4 dwelling.

The vehicle ferry terminal would remain in its current location, and the parking provision associated with its use would be retained.

5 Options for Sustainable Transport Improvements

5.1 Introduction

The issue of parking supply and affordability has long been a problem for residents and Council alike. As such, previous studies have been conducted to understand the social and economic impact of parking price increases. If left unaddressed, these issues will be further exacerbated regardless of the proposed PDA redevelopment, due to the potential population increase of residents on the SMBI.

This assessment has identified common trends and connectivity issues, particularly in relation to work related trips. Potential mitigation options to benefit the residents of the SMBI and alleviate the demand on parking at Weinam Creek have been identified for further investigation.

5.2 Data Analysis

Census and other data were gathered from various publicly available studies for the Weinam Creek area, namely the *Weinam Creek Social and Economic Impact Assessment and Management Plan* (SEIA), prepared by SMEC in 2011 (available at the Redland City Council website). The data gathered focussed on the potential impact on the SMBI residents and stakeholders of implementing an increase in the paid parking scheme at Weinam Creek. Surveys and Census data were collated to understand:

- Population demographics of SMBI residents
- Socioeconomic background of SMBI residents
- Car ownership by SMBI residents
- Parking demand at Weinam Creek
- Travel behaviour, particularly mode share and trip purpose

This information has been vital in forming a clearer idea of the needs and demands of the SMBI residents.

5.3 Key Travel Trends and Issues

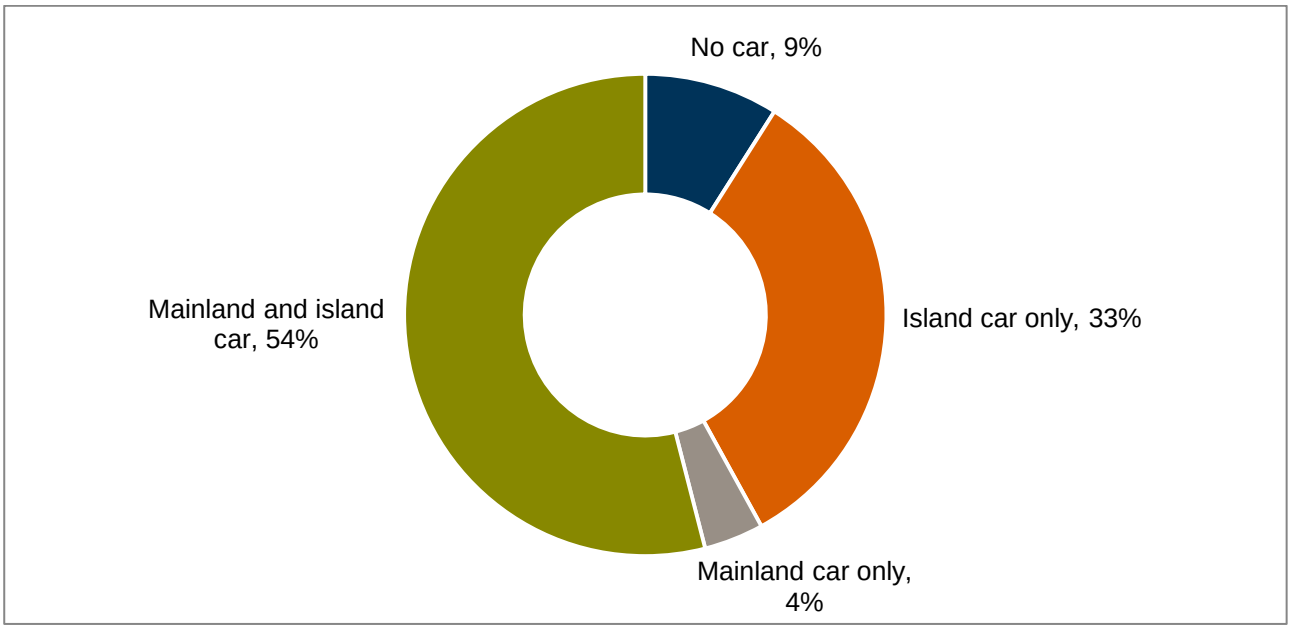
5.3.1 Demographics

Census data indicates that the population of the SMBI (Lamb, Russell, Macleay and Karragarra islands) was 5,632 in 2011. This has represented a 6.6% p.a. population growth since the 2006 Census when the population was counted as 4,232.

The mean total family income for residents of the SMBI is $55,100; however the majority of families (51%) have a total family income in the range of $21,000 to $42,000. It is noted that the family composition of residents mainly comprises no family (single person) (47%) or couples with no children (30%). This data suggests that the residents have a high sensitivity to cost increases, given the low income and single income reliance.

Figure 5-1 indicates the proportion of car ownership for residents in 2011, based on a Socialdata survey. The data shows that the majority own at least two cars, located on both the island and mainland. It is understood that residents use their mainland vehicle for travel on the mainland, parking at Weinam Creek while on the islands, given the high cost of vehicle barge trips. This has been a major factor in the parking demand problem for Weinam.

Figure 5-1 Car Ownership – SMBI Residents (2011)

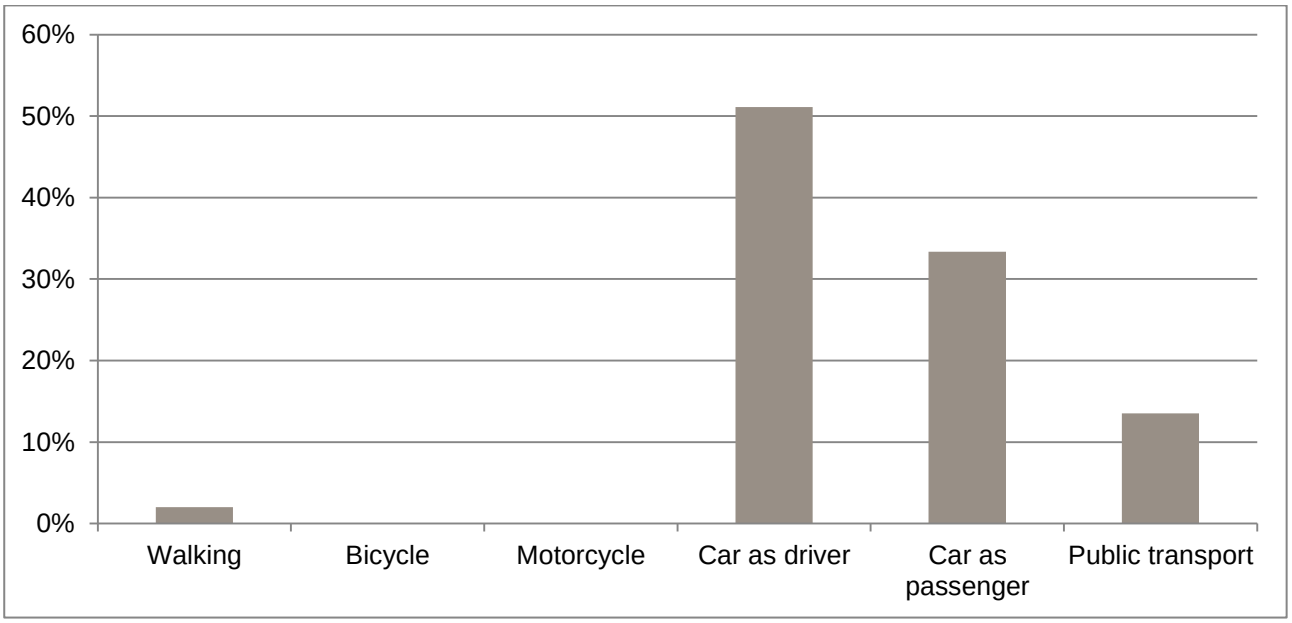


Source: SEIA report, from Socialdata survey, 2011

5.3.2 Mainland Trips by Mode

Survey data procured has indicated that over 84% of mainland trips are made by car. Public transport represents 14% and walking represents 2% of all mainland trips. This mode share split is indicated on Figure 5-2. It is evident that there is heavy reliance on private modes of transport.

Figure 5-2 Mode Share – Mainland Trips

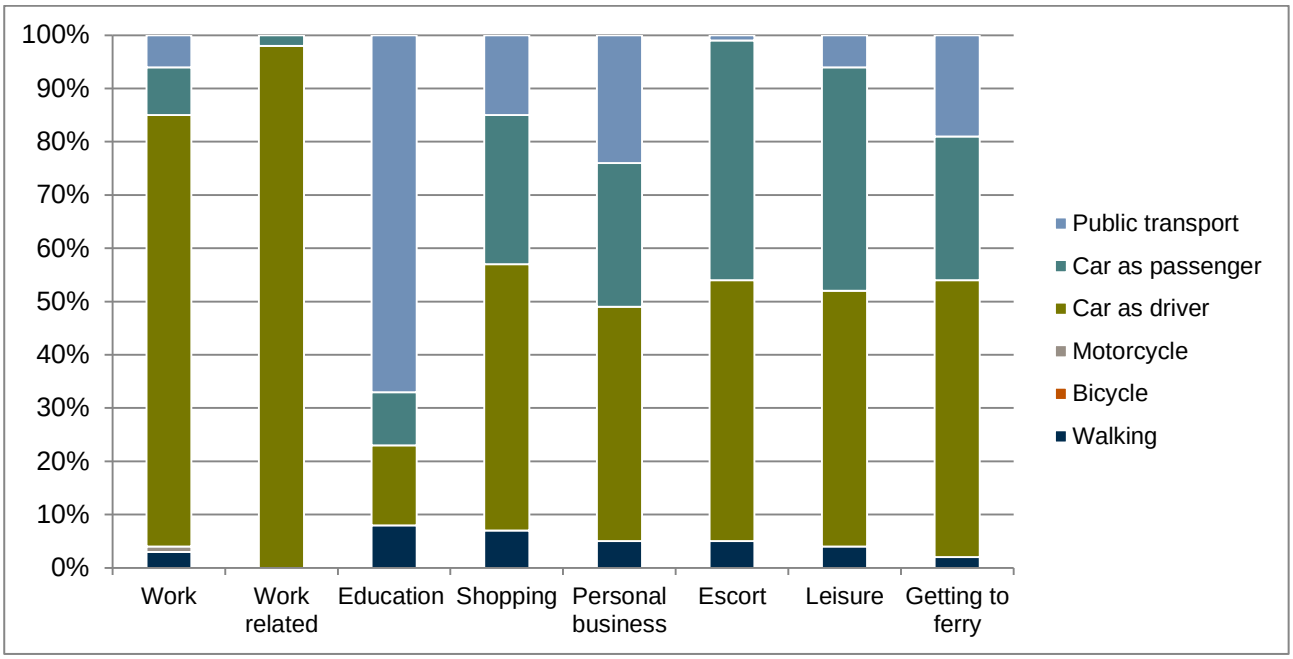


Source: SEIA report, from Socialdata survey, 2011

5.3.3 Mainland Trips by Purpose

When considering the trip purpose as shown on Figure 5-3, it can be seen that the mode share trend is consistent with that identified from Figure 5-2. The majority of trips were made by car, with the exception of education trips which were mainly made by public transport. Work and work related trips, which accounted for over 30% of mainland trips, heavily relied on private vehicles.

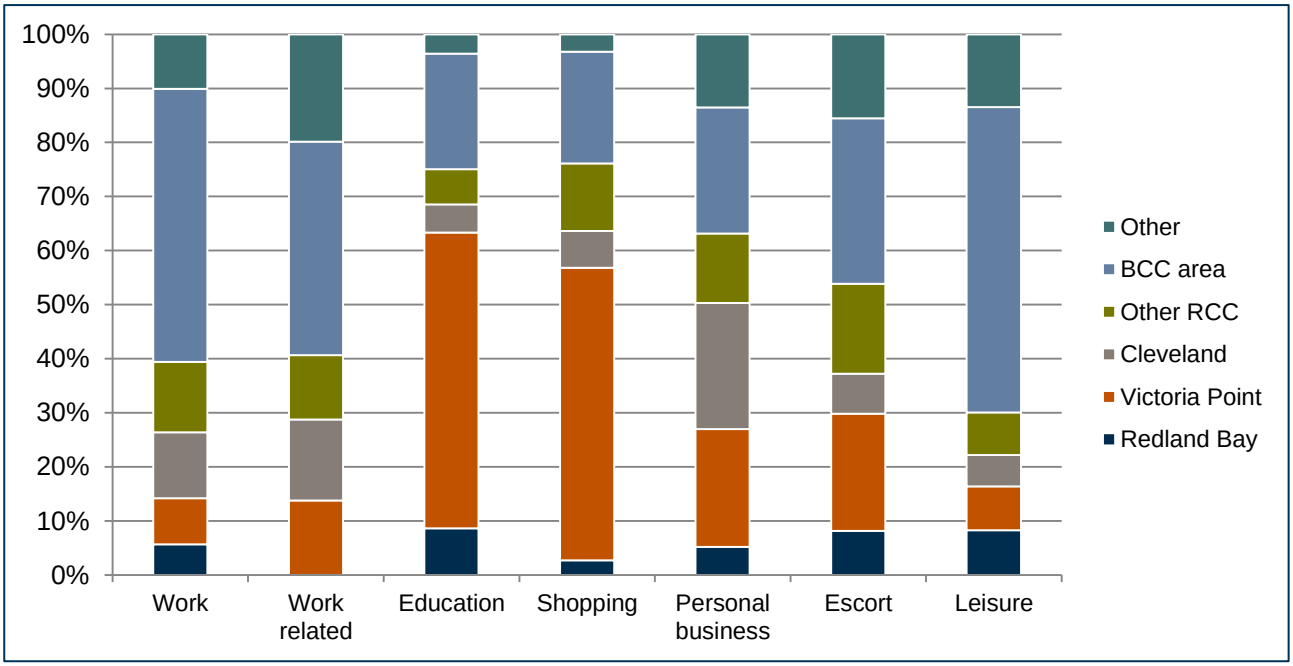
Figure 5-3 Mode Share by Trip Purpose – Mainland Trips



Source: SEIA report, from Socialdata survey, 2011

Figure 5-4 presents the proportion of trip purposes by destination. The data suggest that Brisbane was the main destination for work and leisure trips, with Victoria Point being the major location for education and shopping trips.

Figure 5-4 Trip Purpose by Destination



Source: SEIA report, from Socialdata survey, 2011

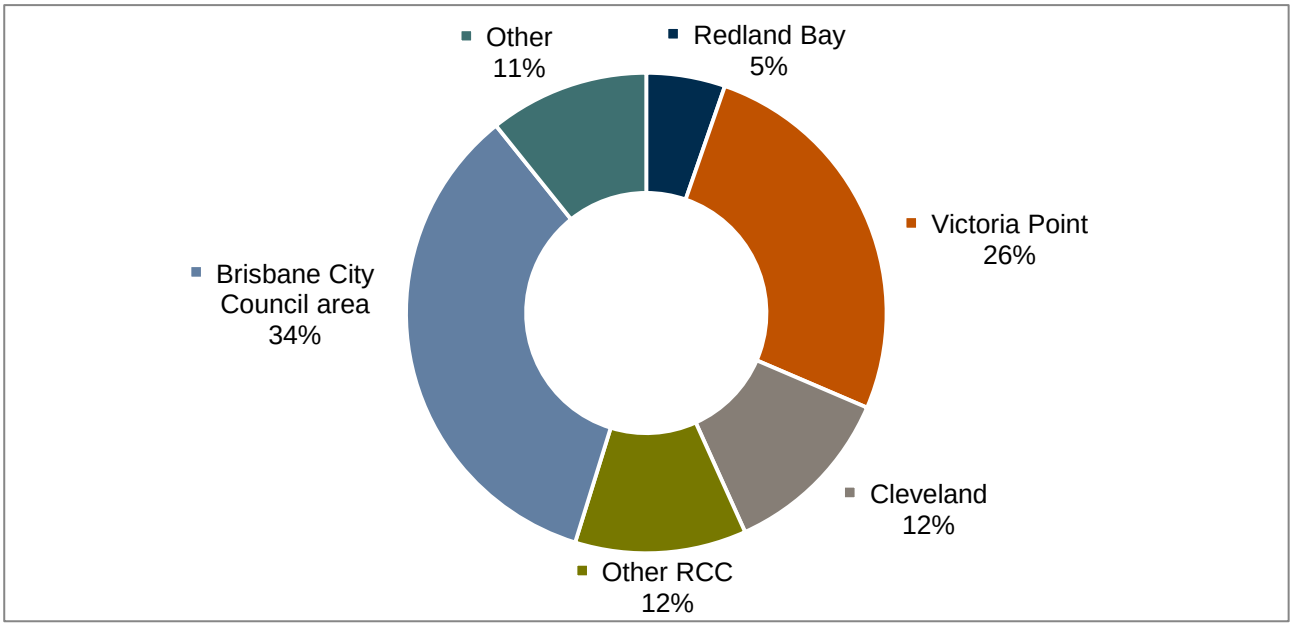
When assessing the retail facilities at Victoria Point, there appears to be mainly supermarkets and specialty stores. This would indicate that shopping trips made to Victoria Point would generally be for the weekly grocery shop. These trips would be preferably made by private vehicle, as there is little convenience for shopping bags on public buses.

Additionally, the locations of bulky goods stores (household appliances) in the Redland City area were investigated. It was recognised that the most likely destinations for these shopping trips were Cleveland, Capalaba and Mount Gravatt (Garden City). Given the distance to these locations and difficulty of handling bulky goods, it is not surprising that trips to these areas rely on private vehicles, as seen in the next section.

5.3.4 Mainland Trips by Destination

A key factor in understanding the travel behaviour of a population is to investigate the travel destinations. This can help to identify where the demand for travel is focussed. As seen in Figure 5-5, most trips are to Brisbane, with Victoria Point being the second most travelled location. It is noted that trips to Brisbane include the entire Brisbane City Council area, not just the CBD, hence the larger proportion of trips.

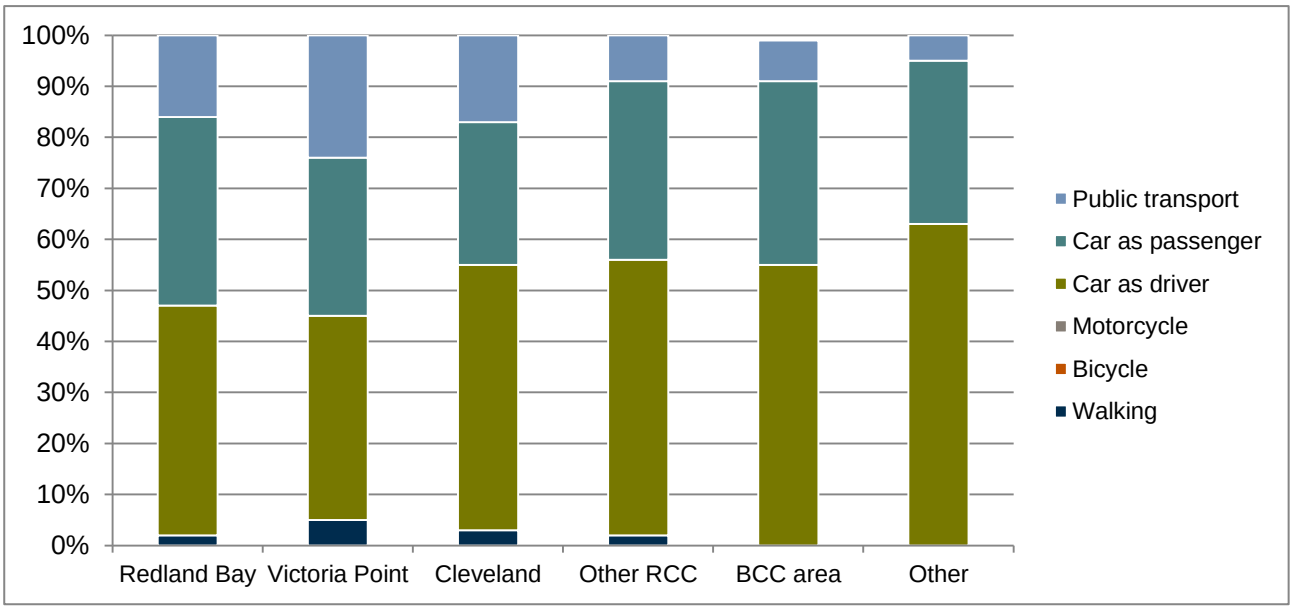
Figure 5-5 Trips by Destination – Mainland Trips



Source: SEIA report, from Socialdata survey, 2011

When considering the mode by which these destinations are reached, as presented in Figure 5-6, it can be seen that as destinations get further from the ferry terminal, modes tend to shift more towards private vehicles and less for sustainable transport modes. The longer travel times for these destinations mean that travel by public transport is not as time efficient as driving, hence the preference for cars.

Figure 5-6 Trip Destination by Mode – Mainland Trips



Source: SEIA report, from Socialdata survey 2011

5.3.5 Transport Limitations

With respect to travel modes, the survey data has indicated that the majority of trips are made by either car or public transport. Given the length of time residents have had to accommodate to these travel behaviours, it is unlikely that travel choice will shift from car use. Additionally, the time savings gained from driving, as

indicated in Table 5-1, provide some insight into travel choices. Figure 5-7 graphically represents these travel time savings.

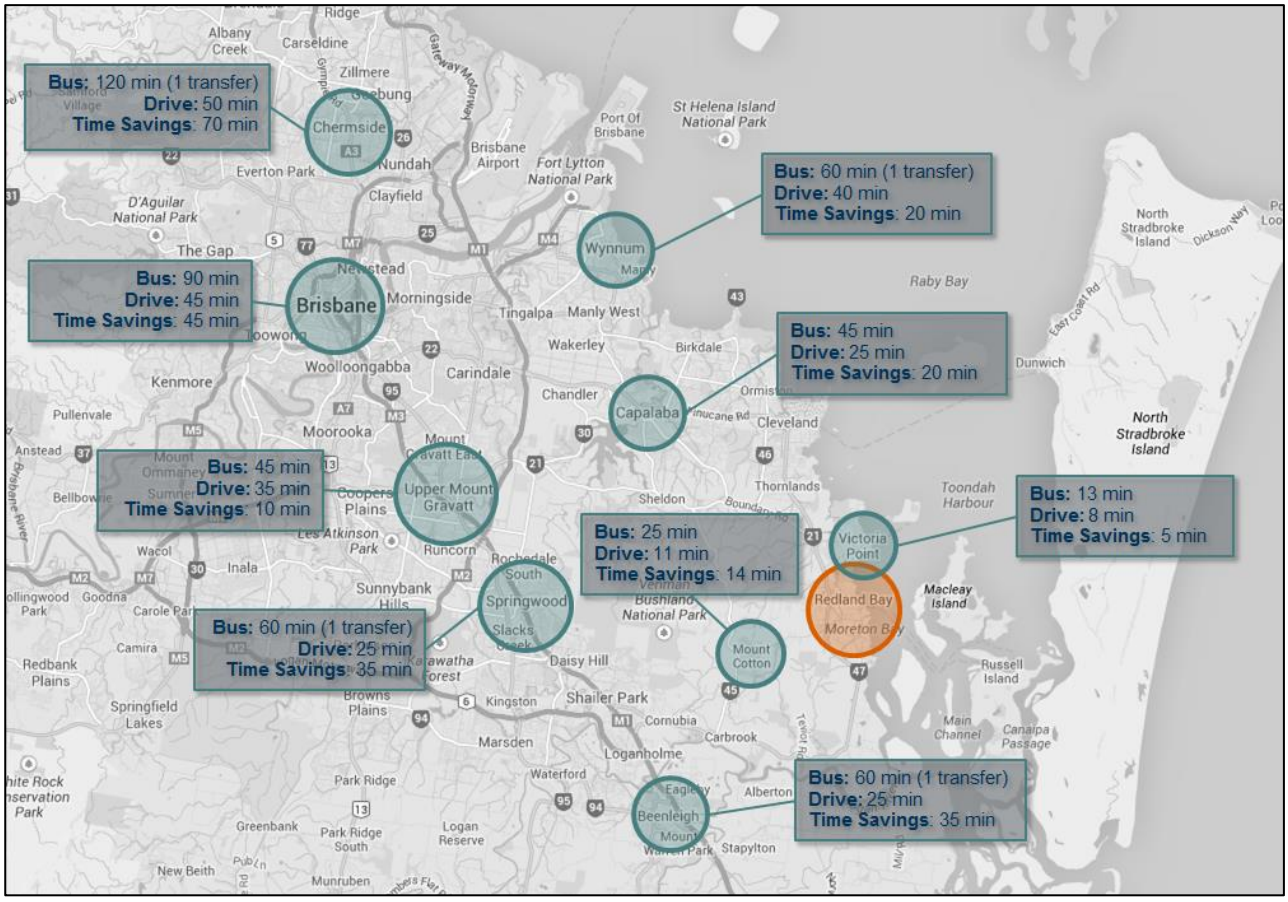
For destinations within Redland City, time savings in the order of 10-15 minutes are gained by driving compared to taking a bus. However, when the destination is further afield, such as to Beenleigh or the Brisbane CBD, time savings rise to in excess of 30 minutes. This significant benefit of driving may mean that a mode shift towards more sustainable modes would be difficult to enact.

Table 5-1 Travel Time Comparison

Local Area	Destination	Public Transport (Bus)			Car	Potential Travel Time Savings (car vs bus)
		Approximate Travel Time	Service Frequency	Maximum Trip Time	Travel Time	
Redland City Council	Redland Bay	4 mins	30 mins	34 mins	2 mins	2 mins
	Victoria Point	13 mins	30 mins	43 mins	8 mins	5 mins
	Cleveland	30 mins	30 mins	60 mins	16 mins	14 mins
	Mount Cotton	25 mins	60 mins	85 mins	11 mins	14 mins
Brisbane and other areas	Beenleigh	60 mins	60 mins	120 mins	25 mins	35 mins
	Mount Gravatt	45 mins	60 mins	105 mins	35 mins	10 mins
	Brisbane CBD	75-90 mins	30-60 mins	105-120 mins	45 mins	30-45 mins

Source: Translink journey planner; Google directions

Figure 5-7 Travel Time Savings – To/From Weinam Creek



Source: Google maps, www.maps.google.com.au

After investigating the ferry-bus timetable connections, it has been found that the waiting time can be as long as 20 minutes in the morning and afternoon peaks with some connections having a 45 minute waiting period. This is a major concern, as the travel time for residents using public transport is considered to already be

lengthy without including the waiting time as well. It is likely that this consideration may be a deciding factor in mode choice.

Connections to train services, namely to Cleveland and Beenleigh stations, have been investigated. However, when reviewing the travel times associated with a complete trip from the ferry terminal to the CBD via train, it is deemed less efficient than travelling by bus (routes 280, 281) as the bus services provide a faster, more direct trip.

5.4 Potential Mitigations

The 2011 SEIA report introduced twelve mitigation measures for future investigation. A number of these have been echoed in this report; however reservations concerning feasibility have also been noted.

The two main categories for the proposed mitigations focus on the following methods:

> Catering to the current demand for travel modes, and
> Trying to shift demand towards more sustainable options.

While it is easier to cater to travel demand, it is more beneficial in the long term to shift demand. This is, however, the more difficult and costly option. The following sections describe possible measures for each of these categories which could invite further investigation.

Key trends identify a significant reliance on private vehicles for all trip purposes and destinations, with the majority of public transport trips being for educational purposes and to Victoria Point. The focus of this section is to make public transport for these existing users more amenable.

Alternatively, focussing on a mode shift approach, there are a number of recommendations which have been proposed. However, the low feasibility or lack of support from residents may make these suggestions unviable.

Table 5-2 summarises the proposed mitigation measures, with a quantitative scoring matrix analysis indicating the relative attractiveness of each option. The scoring system uses a 1-5 scale, 1 being the least attractive and 5 being the most attractive.

Table 5-2 Potential Mitigation Assessment

Proposed Mitigation	Description	Cost	Ease of Impleme-ntation	Impact on mode share	Total Score	Further Comments
Better Bus Connections	Currently, there are poor bus-ferry connections due to long wait times between trip legs. It is therefore proposed that these connections should be reviewed to minimise wait times, preferably to less than 5 minutes. This may involve negotiating bus timetables to follow the ferry timetable or, in turn, changing the ferry timetable to link to the bus timetable. Regardless, discussions with Translink and the Department of Transport and Main Roads (TMR) will need to be held.	3	4	3	**10**	More frequent services to major transport hubs such as Victoria Point and the Garden City interchange may provide better connections for transfer trips.
Better Bus Facilities	Although it is acknowledged that the majority of shopping trips are made by private vehicles, 15% of these trips are made by public transport. It has also been acknowledged by SMBI residents that there is a portion of the population which relies on public transport for bulky goods shopping trips. Therefore, the point of more convenient storage on bus services to larger shopping centres, such as Cleveland, Capalaba and Garden City Mount Gravatt, has been previously raised. This includes larger storage areas and ramp facilities to allow for flatbed trolley access.	1	2	2	**5**	

Proposed Mitigation	Description	Cost	Ease of Impleme-ntation	Impact on mode share	Total Score	Further Comments
Demand Responsive Transport (DRT) Solutions	The implementation of Demand Responsive Transport (DRT) options has been found to be successful in a few areas in Queensland, including the Sunshine Coast and Hervey Bay. DRT options are based on customers calling for an on-demand service. Unlike taxi services however, these services follow a set route, with minor deviations where required. This could be implemented for SMBI and Redland Bay residents to circuit the Redland Bay/Victoria Point area to travel to local or community facilities, and may replace a number of personal business or leisure trips within the area.	3	2	2	**7**	Examples of DRT options being successfully implemented include the Kan-go service in Hervey Bay and the Flexilink service on the Sunshine Coast. The Kan-go service is a bus which runs a pre-determined route circuiting the town centre then picking up and dropping off passengers who have pre-booked the service. The cost is the same as a regular bus fare and runs up to 11 services a day from Monday to Saturday. The Sunshine Coast Flexilink service is a four passenger taxi which travels between Boreen Point and Tewantin. It offers three return services a day, operating from Monday to Saturday. Customers are advised to call two hours in advance to book a service as if no bookings are made, no vehicle is dispatched. The service is heavily subsidised by Council and TMR, costing customers $2 for an adult ticket.
Free Shuttle Service	The possibility of a free or subsidised shuttle service between the ferry terminal and Victoria Point bus interchange has already been suggested previously. This option targets the proportion of vehicle trips made to Victoria Point and connecting areas, and may also appeal to existing public transport users. The aim of this option is to allow residents to leave their mainland vehicles behind, by using public transport immediately from the ferry terminal. A flow on effect of this may include residents eliminating the need for a mainland vehicle altogether.	1	3	3	**7**	

Proposed Mitigation	Description	Cost	Ease of Impleme-ntation	Impact on mode share	Total Score	Further Comments
Car Share Scheme	A car share scheme has previously been raised as an option. This involves providing a number of vehicles for short term hire by registered users for a monthly or annual subscription. Although this has been successfully implemented in a number of cities, Brisbane included, it has been noted that the likelihood of SMBI residents taking up this option is very low. A survey undertaken by the Integrated Open Space Services (IOSS) has indicated that 88% of residents would not use car sharing facilities. Of the remaining 12% however, most would be willing to pay up to $20 a day for the service.	5	3	2	**10**	This scheme can be implemented and managed by third parties, e.g. GoGet.
Introduce More Services to Weinam Creek	Instead of focussing on how residents travel to their destinations, another approach is to bring the services they seek to them. By providing retail, medical and commercial services at Weinam Creek, the need for travel outside of Redland Bay can be reduced. There is an opportunity to build up this area with the further development of the Masterplan. Alternatively, more services can be introduced to the islands themselves. The current level of services is quite low, with only Macleay and Russell islands providing any services at all; Lamb and Karragarra islands have no essential services. With the projected population increase, this is an important factor to consider for the future sustainability of the islands.	1	1	3	**5**	Although Macleay and Russell islands have services such as post offices, medical centres and primary schools, there is still a need for Centrelink centres, supermarkets and motor mechanic garages, amongst other facilities.

5.5 Summary

Following an investigation into the travel behaviour of SMBI residents on the mainland, a number of key findings have been identified. These are listed as follows:

> Generally, the SMBI residents are of a lower socioeconomic class
> There is a low level of services currently on the islands
> Residents rely heavily on private vehicles, with the majority of residents owning a vehicle on both the island and mainland
> Over 80% of trips are made by private vehicle
> The majority of work or work related trips were to the Brisbane area and were made by car
> Educational trips were mainly made by public transport
> The majority of education and shopping trips had a destination in Victoria Point
> The comparatively longer travel times when using public transport mean that driving is significantly preferable
> Poor connections between bus and ferry timetables (sometimes in excess of 20 minutes) may also be a major factor for a preference for driving
> Trips to the CBD via train were found to be longer than bus only trips, meaning connections to train stations may not offer the most beneficial transport option for residents

A number of potential mitigations have been proposed to either make current public transport facilities more convenient and hence more attractive, or trying to change the current travel modes of residents. These include:

> Improving the current bus services and facilities, including more frequent services and better bus-ferry timetable connections to minimise waiting times
> Improving on-bus storage areas for passengers with bulky goods
> Introducing demand responsive transport solutions to the Redland Bay/Victoria Point area, such as the Kan-go and Flexilink services seen elsewhere
> Providing a free or subsidised shuttle service between the ferry terminal and Victoria Point to provide better connections at the bus interchange and reduce car travel
> Investigating the feasibility of a car share scheme, based at the ferry terminal
> Providing more essential services at Weinam Creek and/or on the islands, to reduce the need to travel outside of the Redland Bay area

Each of these proposals will need further investigation to understand the full impact and attractiveness to residents. However, these mitigation measures should result in better facilities for residents and potentially reduce the reliance and use of cars, and hence reduce parking demand at Weinam Creek.

6 Road Network Capacity

6.1 Indicative Traffic Generation

Traffic generation rates have been sourced from multiple engineering publications, including the following:

> *Preconstruction Processes Manual* (PPM), Department of Transport and Main Roads, QLD Government
> *Guide to Traffic Generating Developments,* Roads and Transport Authority (RTA), NSW Government
> *Trip Generation Handbook,* Institute of Transportation Engineers (ITE)

These sources have been noted in Table 5-1 below, for each land use identified on the structure plan.

Table 6-1 Trip Generation Rates

Land Use	Daily Generation Rate	Peak Hour Generation Rate	Source
Commercial	10 vpd/100sq.m	2 vph/100sq.m	RTA
Retail	121 vpd/100sq.m	16.3 vph/100sq.m	RTA
Community centre	24.6 vpd/100sq.m	2.9 vph/100sq.m	ITE
Restaurant	60 vpd/100sq.m	5 vph/100sq.m	RTA
Residential - medium density	5 vpd/dwelling	0.5 vph/dwelling	RTA
Residential - high density	6 vpd/dwelling	0.29 vph/dwelling	PPM
Marine Services	9 vpd/100sq.m	0.9 vph/100sq.m	PPM
Marina - berth	3.2 vpd/berth	0.23 vph/berth	ITE

Given the indicative yields and the generation rates indicated above, the following traffic generation for the Weinam PDA has been estimated.

Table 6-2 Traffic Generation Volumes

Land Use	Indicative Yield	Daily Generation	Peak Hour Generation
Commercial	4,500 sq.m	450 vpd	90 vph
Retail	4,500 sq.m	5,445 vpd	734 vph
Community centre	3,500 sq.m	861 vpd	102 vph
Restaurant	2,000 sq.m	1,200 vpd	100 vph
Residential – medium density	504 lots	2,520 vpd	252 vph
Residential – high density	340 lots	2,040 vpd	99 vph
Marine Services	2,800 sq.m	252 vpd	25 vph
Marina	250 berths	800 vpd	58 vph
Total		**13,568 vpd**	**1,460 vph**

6.2 Link Capacity

Due to the extensions to the existing road network proposed in the structure plan, the following roads have been assessed in this report. These include:

> Hamilton Street, extended east to meet Banana Street
> Pitt Street
> Weinam Street
> Banana Street
> Meissner Street
> Moores Road

These identified links have been assessed with the estimated AADT informing the selection of appropriate road hierarchy classifications. Table 6-3 highlights the proposed road classifications for these links.

Table 6-3 Proposed Road Hierarchy

Characteristic	Hamilton Street	Pitt Street	Weinam Street	Banana Street	Meissner Street	Moores Road
Road Classification	Sub-arterial	Trunk Collector	Trunk Collector	Trunk Collector	Trunk Collector	Local Collector
AADT (Capacity)	15,000 – 20,000	3,000 – 10,000	3,000 – 10,000	3,000 – 10,000	3,000 – 10,000	<3,000
Daily Volume (vpd)	17,100	7,600	5,300	4,900	4,500	1,800

6.3 Intersection Capacity

6.3.1 Assessment Thresholds

The performance of each study intersection was analysed including and excluding project traffic using SIDRA Intersection 5.1 (SIDRA). SIDRA is an industry recognised analysis tool that estimates the capacity and performance of intersections based on input parameters, including geometry and traffic volumes, and provides estimates of an intersection's Degree of Saturation (DOS), queues and delays. Simplistically, DOS is a measure of the proportion of traffic entering an intersection relative to the intersection's capacity.

Table 6-4 provides the TMR defined DOS thresholds for intersections.

Table 6-4 TMR Thresholds for Intersection Performance

Level of Service Description	DOS Threshold
Signalised intersections	less than or equal to 0.90
Roundabouts	less than or equal to 0.85
Priority controlled intersections	less than or equal to 0.80

Source: TMR *Guidelines for Assessment of Road Impacts of Development*

The guideline notes that a DOS exceeding the values indicated in Table 6-1 indicates that an intersection is nearing its practical capacity and upgrade works may be required. Above these threshold values, users of the intersection are likely to experience rapidly increasing delays and queuing.

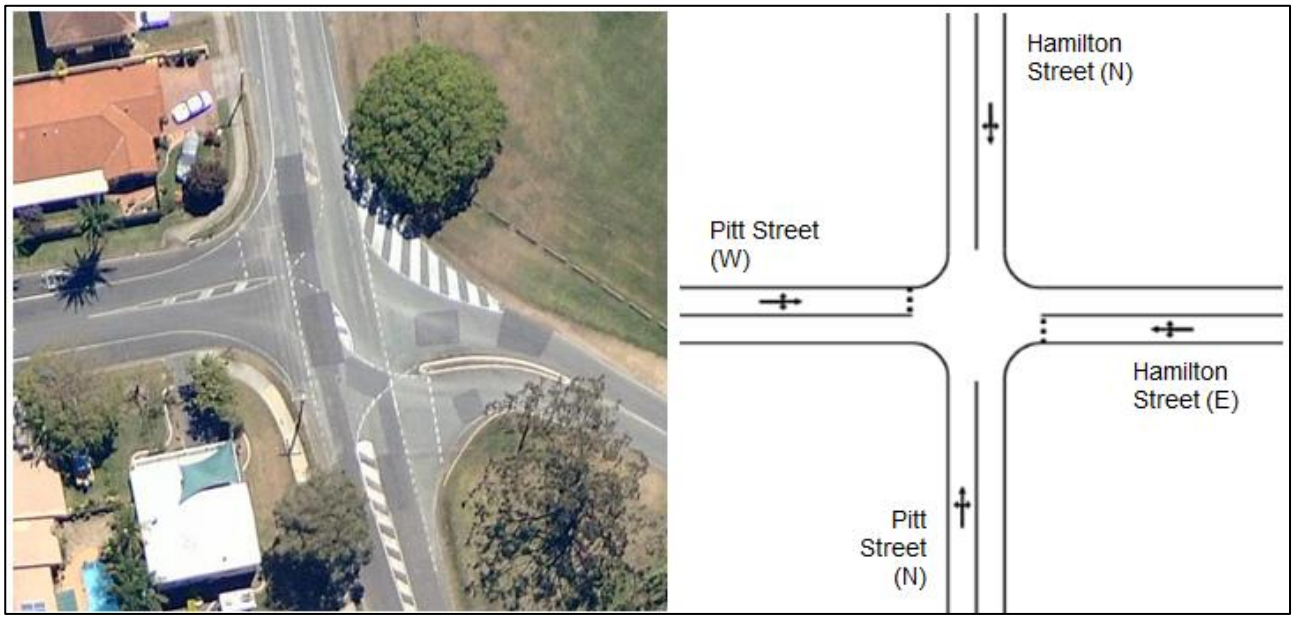
Importantly, it is noted that DOS is not the only performance indicator and that other measures such as critical delay should also be considered when assessing the performance of an intersection. Other authorities such as the NSW Roads and Maritime Services (RMS) recommend the use of the critical movement delay for assessing the performance of priority-controlled intersections.

The following sections provide a brief overview of the analysis findings particularly with respect to any upgrade works required as a result of the development. Detailed results from the SIDRA analyses are provided at Appendix A.

6.3.2 Hamilton Street/Pitt Street

The existing priority controlled intersection form at Hamilton Street and Pitt Street is shown on Figure 6-1. Analysis results indicate that with the ultimate build out of the PDA, the existing form will be adequate in terms of capacity.

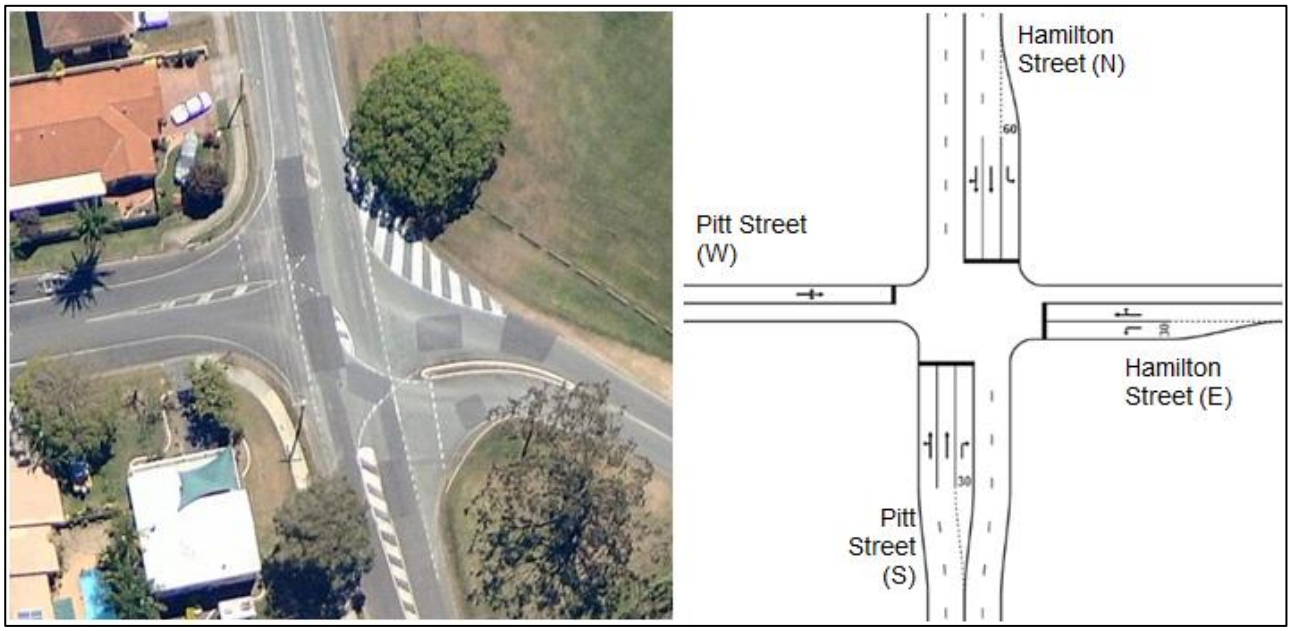
Figure 6-1 Hamilton Street/Pitt Street – Existing Layout



However, as the Priority Infrastrure Plan for Redland City has indicated a lane duplication for the corridor, this has been incorporated into the analysis as a future upgrade. Additionally, as the intersection is a key crossing point for all users to and from the development, particularly vehicles and pedestrians, it is proposed that a signalised form will be the safest option.

Figure 6-2 illustrates the proposed intersection layout. Analysis results indicate that this form will be able to adequately accommodate the future traffic demands without exceeding capacity thresholds.

Figure 6-2 Hamilton Street/Pitt Street – Upgrade Layout



6.3.3 Weinam Street/Banana Street

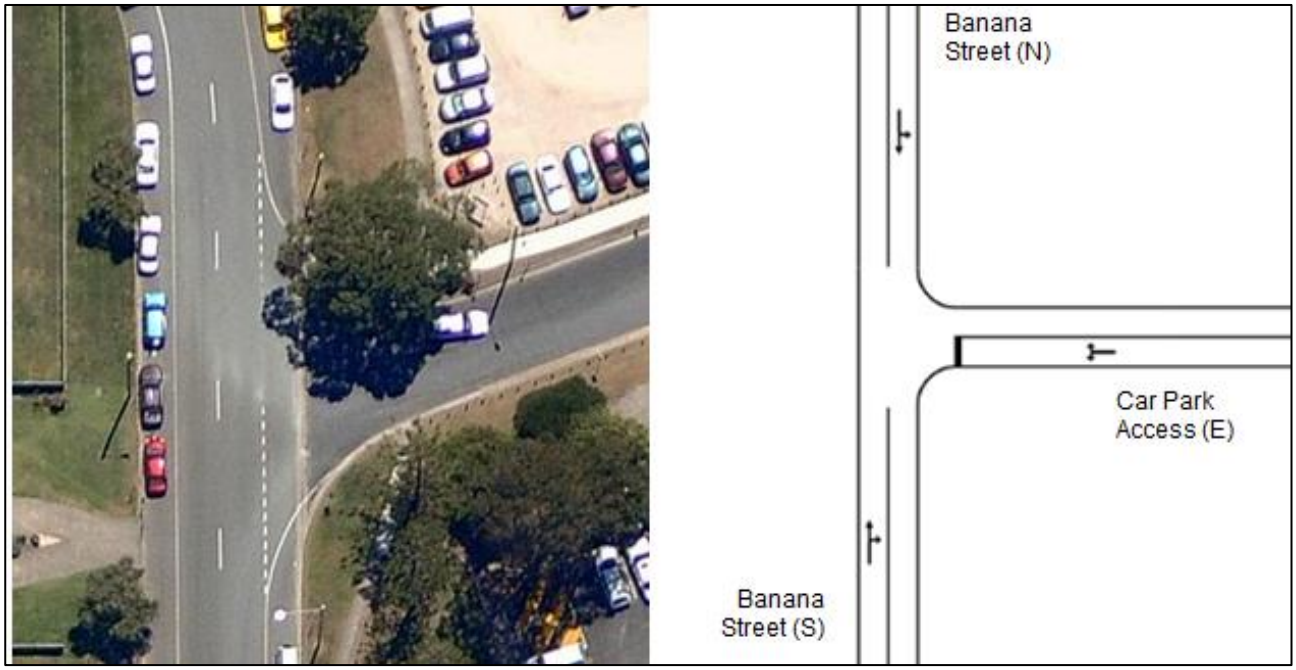
The existing priority controlled intersection form at Weinam Street and Banana Street is shown on Figure 6-3. Analysis results indicate that with the ultimate build out of the PDA, the existing form will be adequate in terms of capacity. As such, no upgrade works are required.

Figure 6-3 Weinam Street/Banana Street – Existing Layout

6.3.4 Banana Street/Car Park Access/*Future Hamilton Street Link*

The existing priority controlled intersection form at Banana Street and the Car Park Access is shown on Figure 6-4. Analysis results indicate that with the ultimate build out of the PDA, the existing form will be adequate in terms of capacity.

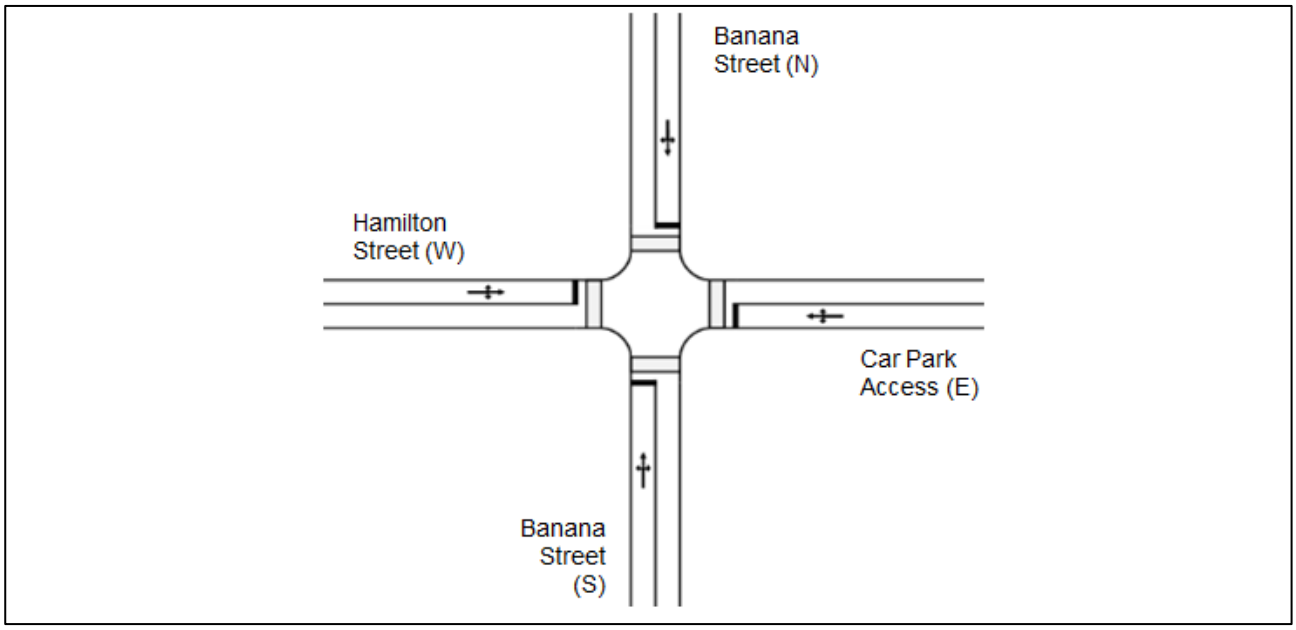
Figure 6-4 Banana Street/Car Park Access – Existing Layout



Given the proposed Hamilton Street extension as part of the structure plan, the existing form will be upgraded to a four way intersection even though the capacity thresholds are not exceeded. In addition, as the intersection is a key crossing point for all users to and from the development, particularly vehicles and pedestrians, it is proposed that a signalised form will be the safest option. As such, the upgraded signalised form which has been analysed is illustrated on Figure 6-5. Results indicate that this form will be adequate for

the anticipated traffic volumes. It is noted that this upgrade will occur as part of Stage 1, when the Hamilton Street extension is being constructed.

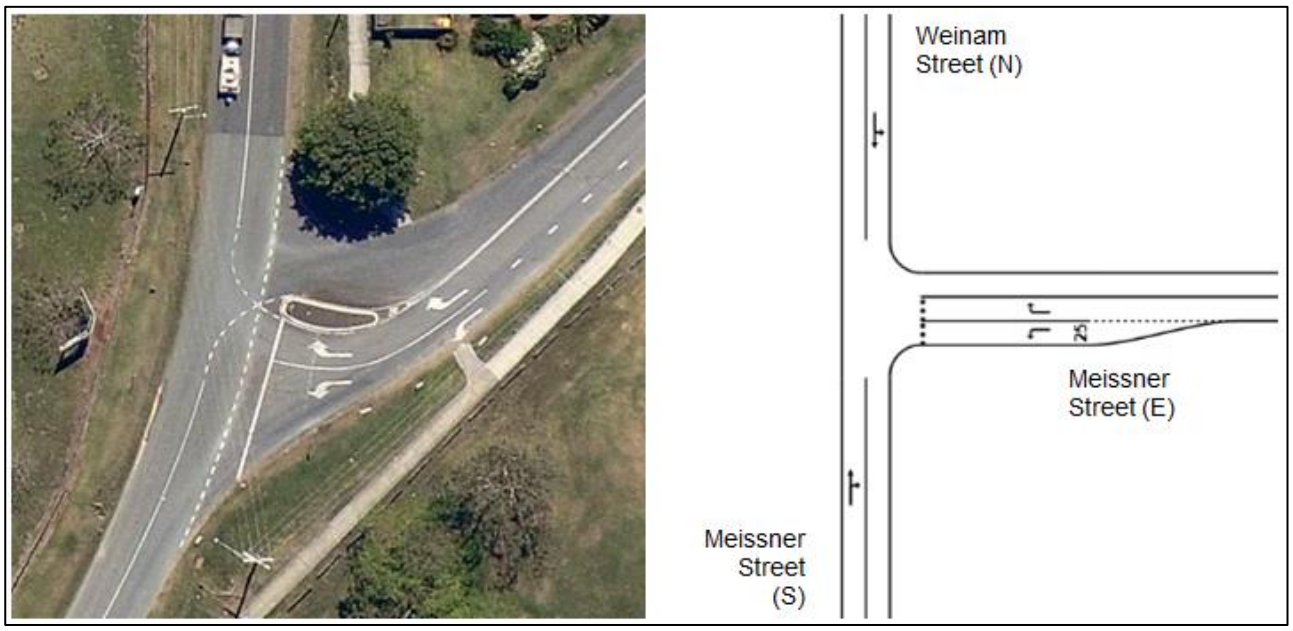
Figure 6-5 Banana Street/Car Park Access/Future Hamilton Street Link



6.3.5 Meissner Street/Weinam Street

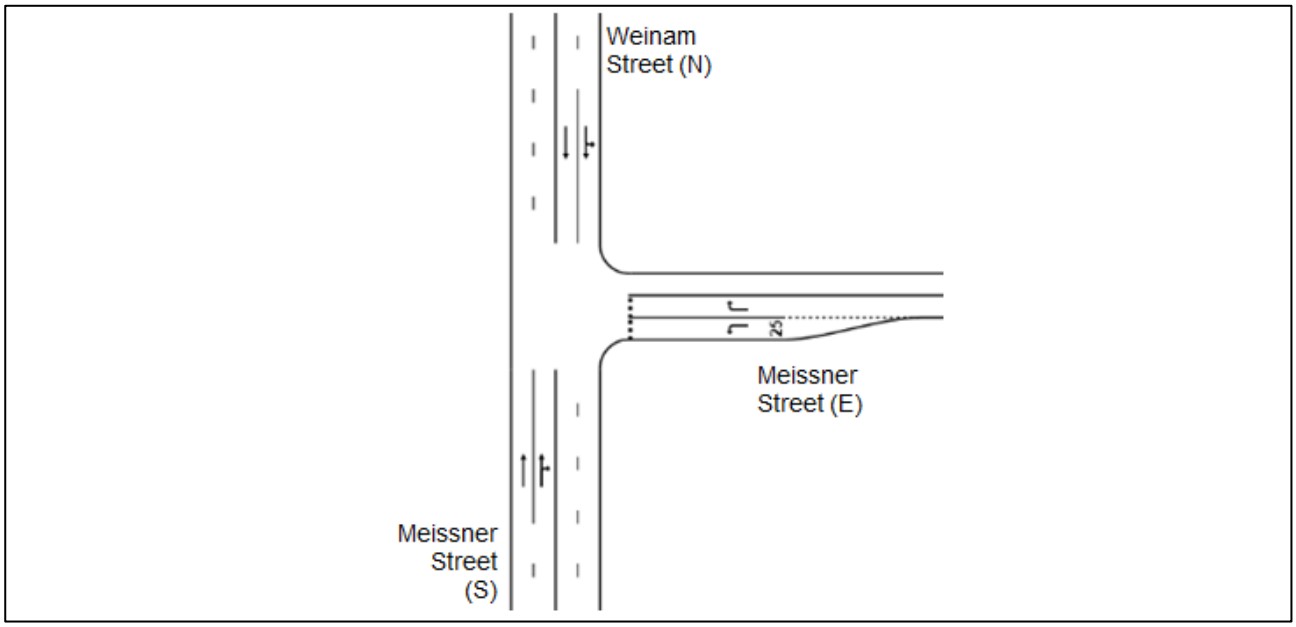
The existing priority controlled intersection form at Meissner Street and Weinam Street is shown on Figure 6-6. Analysis results indicate that with the ultimate build out of the PDA, the existing form will be adequate in terms of capacity. It is noted, however, that the current design of the intersection is not adequate from a road safety viewpoint, and will require upgrading as a priority.

Figure 6-6 Meissner Street/Weinam Street – Existing Layout



However, as the Priority Infrastrure Plan for Redland City has indicated a lane duplication for the corridor, this has been incorporated into the analysis as a future upgrade. Figure 6-7 illustrates the analysed intersection form. Analysis results have indicated that the upgraded form will be able to adequately accommodate future traffic demands without exceeding capacity thresholds.

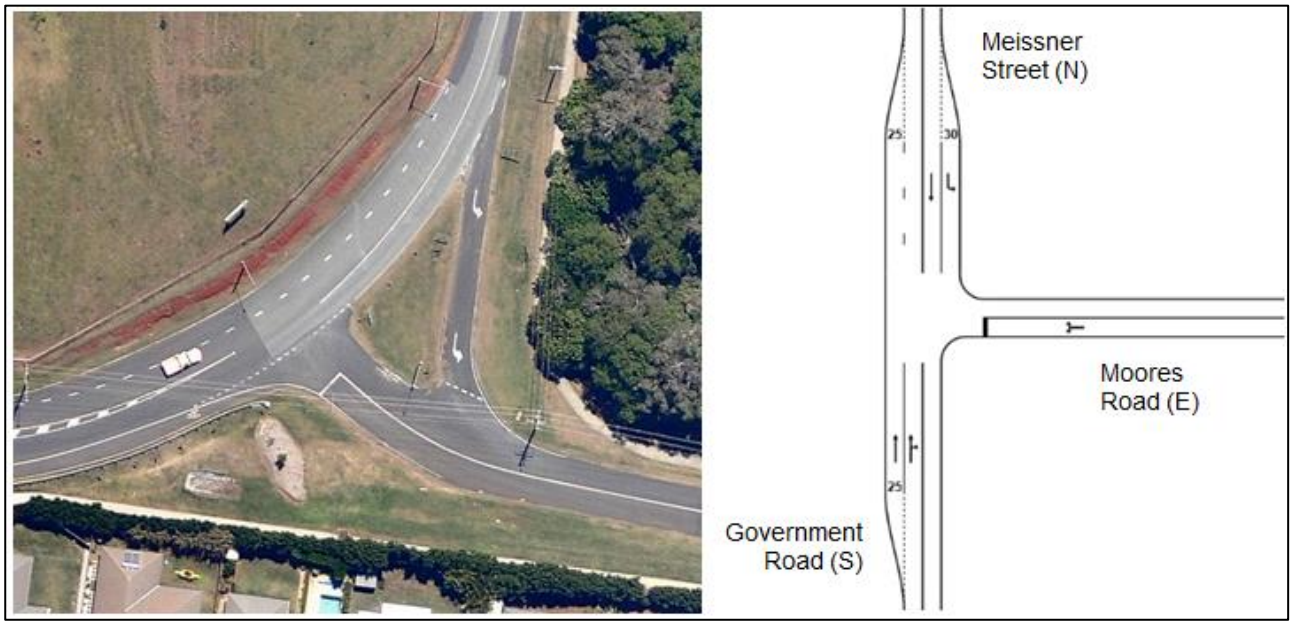
Figure 6-7 Meissner Street/Weinam Street – Upgrade Layout



6.3.6 Meissner Street/Moores Road

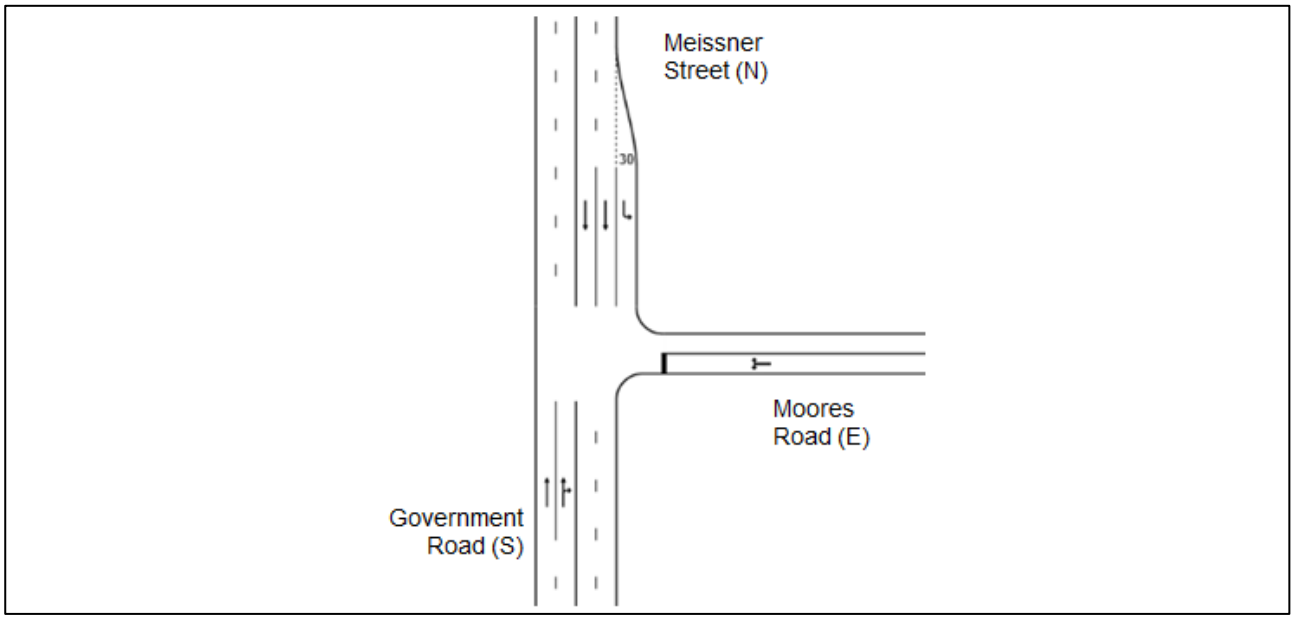
The existing priority controlled intersection form at Meissner Street and Moores Road is shown on Figure 6-8. Analysis results indicate that with the ultimate build out of the PDA, the existing form will be adequate in terms of capacity. It is noted, however, that the current design of the intersection is not adequate from a road safety viewpoint, and will require upgrading as a priority.

Figure 6-8 Meissner Street/Moores Road – Existing Layout



However, as the Priority Infrastrure Plan for Redland City has indicated a lane duplication for the corridor, this has been incorporated into the analysis as a future upgrade. Figure 6-9 illustrates the analysed intersection form. Analysis results have indicated that the upgraded form will be able to adequately accommodate future traffic demands without exceeding capacity thresholds

Figure 6-9 Meissner Street/Moores Road – Upgrade Layout



6.4 Summary

The current intersection forms for the five existing intersections were found to not need any upgrade works for the future development scenarios as a result of capacity constraints. However, where new road links have been proposed and subsequently intersections would require upgrades, the proposed modifications were found to adequately accommodate the assessed traffic scenarios.

In addition to the upgrades proposed as part of the structure plan, Redland City Council has identified the need to upgrade the spine road comprising Hamilton Street, Pitt Street, Weinam Street and Meissner Street with a planned lane duplication from 2 lanes to 4 lanes, proposed to be completed by 2016. The analysis has incorporated these plans and results have indicated that the capacity afforded by the upgrades will not be exceeded by the future traffic demands.

It is noted, however, that the current forms of two intersections are not adequate in terms of road safety and will require upgrading as a priority. These intersections are:

> Meissner Street/Weinam Street
> Meissner Street/Moores Road

As a priority, it is strongly recommended that these intersections be upgraded to a standard that allows for safe and efficient operation.

7 Summary

7.1 Road Network

The planned road network involves a number of changes, including the following:

> Extending Hamilton Street to connect to Banana Street, creating a more direct link to the foreshore from the external network
> Formalising the existing car park circulation road off Banana Street to create a loop road around the central core of the redevelopment, improving circulation in the area

In addition to the upgrades proposed as part of the structure plan, Redland City Council has identified the need to upgrade the spine road comprising Hamilton Street, Pitt Street, Weinam Street and Meissner Street with a planned lane duplication from 2 lanes to 4 lanes. As this upgrade has been identified in Council's Priority Infrastructure Plan to be complete by 2016, it has been assumed to represent the future base road network and has been incorporated into the analysis.

7.2 Intersections

All existing intersection forms were found to be adequate for future traffic scenarios. Where intersection upgrades are required due to new road links proposed as part of the structure plan or planned upgrades by Council, the minimal standard of upgrades was found to be adequate. Table 7-1 summarises the final forms required for each of the study intersections for the PDA.

Table 7-1 Study Intersections

Intersection	Structure Plan Outcome
Hamilton Street /Pitt Street	Council planned lane duplication upgrade is adequate
Weinam Street/Banana Street	Existing priority controlled form is adequate
Banana Street/Car Park Access/Future Hamilton Street	Upgrade to signals with full pedestrian crossings, for safety and efficient operation
Meissner Street/Weinam Street	Council planned lane duplication upgrade is adequate
Meissner Street/Moores Road	Council planned lane duplication upgrade is adequate

7.3 Parking

One of the objectives for the PDA was to minimise the extent of parking areas, which currently consume the majority of land area at Weinam. This has been achieved reasonably well through a number of approaches, including the following:

> Locating the parking area for ferry users towards the southern end of the PDA, near the ferry services and away from the main central hub
> Using sleaved parking areas nestled between buildings, ensuring that the visual amenity of the PDA is not deteriorated
> Using on-site parking areas for residential dwellings to maximise public parking space
> Separating the marina parking from the central hub to improve efficiency
> Minimising the level of on-street parking, to maintain the character of the PDA

With the proposed maximum yields for the PDA, it is estimated that approximately 1,757 spaces will be required for ferry users and commercial/retail users. Residential parking is assumed to be contained on site, and has not been included in this parking estimate.

7.4 Public Transport

Ensuring that the ferry and bus services are well integrated via connected facilities will be an integral part to creating a sustainable transport network. This will be delivered via a transit hub, connecting the relocated ferry terminal to a bus station, at the corner of Meissner Street and Banana Street. This will maximise the opportunity for integrated transport services.

The grid network, facilitated by the extension of Hamilton Street through to Banana Street, allows for a more efficient bus route, eliminating the need for a turn-around area. This arrangement allows bus routes to easily loop the PDA site via Banana Street and Meissner Street.

7.5 Active Transport

The structure plan has incorporated extensive lengths of boardwalk, with waterfront paths stretching from the top of the parkland to the bottom of the boat ramp at Moores Road. Links within the central hub, the mixed use and residential precinct, are reinforced with a strong path network extending along all the adjacent land use frontages.

Additionally, a foot bridge will be provided to cross Weinam Creek, joining Meissner Street with the southern boat ramp and parking area. Pedestrian connectivity within the PDA site has greatly been improved. Of note are the continuous paths along both sides of Hamilton Street and the use of clear pedestrian areas around the high density core areas.

Weinam Creek Structure Plan – Traffic Masterplan Report

APPENDIX A
INTERSECTION ANALYSIS RESULTS

Cardno
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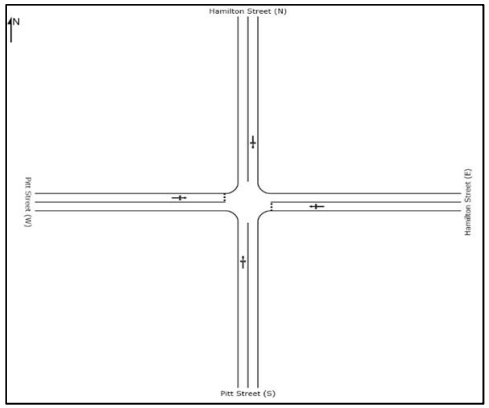
Hamilton Street/Pitt Street - Existing Layout

SIDRA Layout



Aerial Photography

Scenario	Peak	Pitt Street (South)			Hamilton Street (East)			Hamilton Street (North)			Pitt Street (West)		
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue
2013 BG	AM	0.15	1 sec	7m	0.16	10 sec	3m	0.10	4 sec	5m	0.02	9 sec	1m
	PM	0.10	2 sec	5m	0.12	10 sec	3m	0.22	3 sec	10m	0.01	9 sec	0m
2029 BG	AM	0.17	1 sec	8m	0.12	10 sec	3m	0.11	4 sec	5m	0.03	9 sec	1m
	PM	0.11	2 sec	6m	0.13	11 sec	3m	0.25	3 sec	12m	0.01	9 sec	0m
2039 BG	AM	0.19	1 sec	9m	0.13	10 sec	3m	0.12	4 sec	6m	0.03	9 sec	1m
	PM	0.12	2 sec	7m	0.14	11 sec	3m	0.26	3 sec	13m	0.02	9 sec	0m
2029 BG+Ult Dev	AM	0.30	6 sec	22m	0.89	22 sec	60m	0.44	9 sec	36m	0.03	10 sec	1m
	PM	0.23	8 sec	15m	1.05	56 sec	163m	0.53	6 sec	44m	0.02	10 sec	1m
2039 BG+Ult Dev	AM	0.31	6 sec	24m	0.92	26 sec	72m	0.44	9 sec	38m	0.04	10 sec	1m
	PM	0.24	8 sec	17m	1.11	78 sec	213m	0.55	7 sec	50m	0.02	10 sec	1m

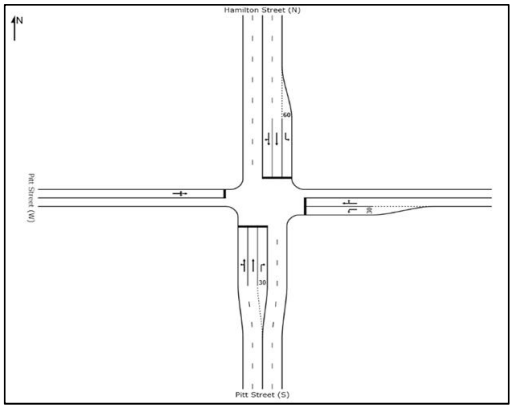
Fig No 1A — **SIDRA Analysis Results - Hamilton Street/Pitt Street**

Project: Redlands Weinam and Toondah PDA *Project No.:* CEB06456

Cardno Shaping the Future

Hamilton Street/Pitt Street - Upgrade Layout

SIDRA Layout



Aerial Photography

Scenario	Peak	Pitt Street (South)			Hamilton Street (East)			Hamilton Street (North)			Pitt Street (West)		
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue
2013 BG	AM												
	PM												
2029 BG	AM												
	PM												
2039 BG	AM												
	PM												
2029 BG+Ult Dev	AM	0.47	31 sec	70m	0.82	44 sec	215m	0.82	40 sec	259m	0.04	29 sec	8m
	PM	0.55	33 sec	35m	0.88	50 sec	258m	0.88	40 sec	256m	0.02	27 sec	4m
2039 BG+Ult Dev	AM	0.47	29 sec	73m	0.82	45 sec	213m	0.82	38 sec	250m	0.05	29 sec	8m
	PM	0.55	33 sec	38m	0.89	53 sec	271m	0.88	41 sec	262m	0.03	28 sec	5m

Note: Background traffic scenarios have not been analysed as the upgraded form will only be utilised by development traffic scenarios

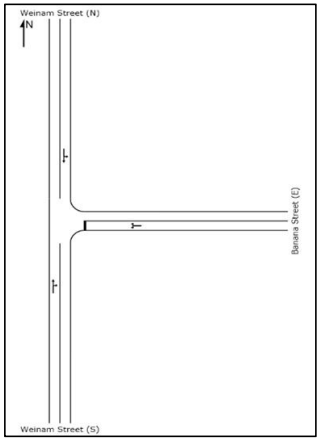
Fig No 1B **SIDRA Analysis Results - Hamilton Street/Pitt Street - Upgrade Layout**

Project: Redlands Weinam and Toondah PDA *Project No.:* CEB06456

Cardno Shaping the Future

Weinam Street/Banana Street - Existing Layout

SIDRA Layout



Aerial Photography

Scenario	Peak	Weinam Street (South)			Banana Street (East)			Weinam Street (North)		
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue
2013 BG	AM	0.03	5 sec	1m	0.06	10 sec	2m	0.02	1 sec	0m
	PM	0.07	6 sec	3m	0.05	10 sec	2m	0.02	1 sec	0m
2029 BG	AM	0.03	5 sec	1m	0.06	10 sec	2m	0.02	1 sec	0m
	PM	0.07	6 sec	3m	0.05	10 sec	2m	0.02	1 sec	0m
2039 BG	AM	0.03	5 sec	1m	0.06	10 sec	2m	0.02	1 sec	0m
	PM	0.07	6 sec	3m	0.05	10 sec	2m	0.02	1 sec	0m
2029 BG+Ult Dev	AM	0.13	4 sec	5m	0.11	10 sec	4m	0.07	0 sec	0m
	PM	0.15	5 sec	6m	0.11	10 sec	4m	0.07	0 sec	0m
2039 BG+Ult Dev	AM	0.13	4 sec	5m	0.11	10 sec	4m	0.07	0 sec	0m
	PM	0.15	5 sec	6m	0.11	10 sec	4m	0.07	0 sec	0m

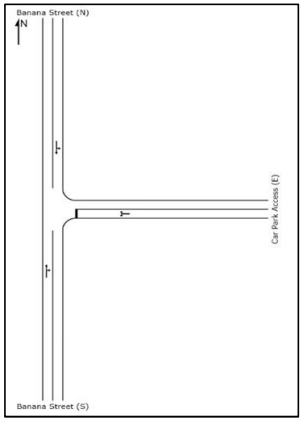
Fig No 2 — **SIDRA Analysis Results - Weinam Street/Banana Street**

Project: Redlands Weinam and Toondah PDA *Project No.:* CEB06456

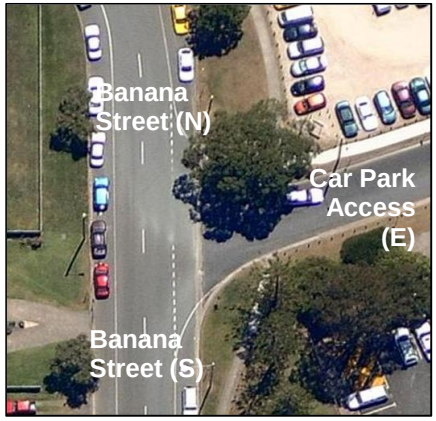
Cardno Shaping the Future

Banana Street/Car Park Access - Existing Layout

SIDRA Layout



Aerial Photography



Scenario	Peak	Banana Street (South)			Car Park Access (East)			Banana Street (North)		
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue
2013 BG	AM	0.03	5 sec	1m	0.06	10 sec	2m	0.02	1 sec	0m
	PM	0.07	6 sec	3m	0.05	10 sec	2m	0.02	1 sec	0m
2029 BG	AM	0.03	5 sec	1m	0.06	10 sec	2m	0.02	1 sec	0m
	PM	0.07	6 sec	3m	0.05	10 sec	2m	0.02	1 sec	0m
2039 BG	AM	0.03	5 sec	1m	0.06	10 sec	2m	0.02	1 sec	0m
	PM	0.07	6 sec	3m	0.05	10 sec	2m	0.02	1 sec	0m
2029 BG+Ult Dev	AM									
	PM									
2039 BG+Ult Dev	AM									
	PM									

Note: Development traffic scenarios have not been analysed as the existing form will only be utilised by background (i.e. without development) traffic scenarios

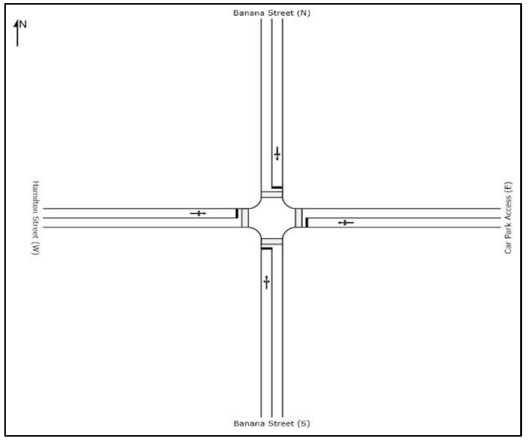
Fig No 3A | **SIDRA Analysis Results - Banana Street/Car Park Access**

Project: Redlands Weinam and Toondah PDA *Project No.:* CEB06456

Cardno Shaping the Future

Banana Street/Car Park Access/Future Hamilton Street - Upgrade Layout

SIDRA Layout



Scenario	Peak	Banana Street (South)			Car Park Access (East)			Banana Street (North)			Hamilton Street (West)		
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue
2013 BG	AM												
	PM												
2029 BG	AM												
	PM												
2039 BG	AM												
	PM												
2029 BG+Ult Dev	AM	0.56	62 sec	76m	0.56	19 sec	127m	0.37	59 sec	50m	0.29	11 sec	66m
	PM	0.59	67 sec	61m	0.65	18 sec	181m	0.63	63 sec	93m	0.22	12 sec	47m
2039 BG+Ult Dev	AM	0.56	62 sec	76m	0.56	19 sec	127m	0.37	59 sec	50m	0.29	11 sec	66m
	PM	0.59	67 sec	61m	0.65	18 sec	181m	0.63	63 sec	93m	0.22	12 sec	47m

Note: Background traffic scenarios have not been analysed as the upgraded form will only be utilised by development traffic scenarios

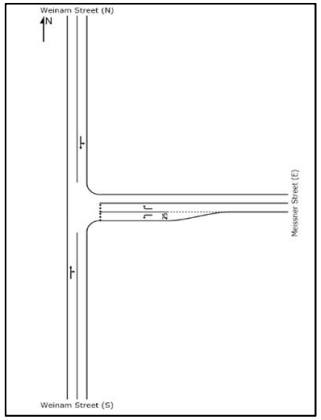
Fig No 3B | **SIDRA Analysis Results - Banana Street/Car Park Access/Future Hamilton Street**

Project: Redlands Weinam and Toondah PDA *Project No.:* CEB06456

Cardno Shaping the Future

Meissner Street/Weinam Street - Existing Layout

SIDRA Layout



Aerial Photography

Scenario	Peak	Meissner Street (South)			Meissner Street (East)			Weinam Street (North)		
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue
2013 BG	AM	0.13	1 sec	5m	0.02	8 sec	1m	0.06	0 sec	0m
	PM	0.12	3 sec	5m	0.02	9 sec	1m	0.13	1 sec	0m
2029 BG	AM	0.16	1 sec	6m	0.03	8 sec	1m	0.07	0 sec	0m
	PM	0.15	3 sec	6m	0.03	9 sec	1m	0.15	1 sec	0m
2039 BG	AM	0.17	1 sec	7m	0.03	8 sec	1m	0.07	0 sec	0m
	PM	0.16	3 sec	7m	0.03	9 sec	1m	0.16	1 sec	0m
2029 BG+Ult Dev	AM	0.27	3 sec	12m	0.10	9 sec	3m	0.12	1 sec	0m
	PM	0.26	5 sec	12m	0.11	9 sec	4m	0.22	1 sec	0m
2039 BG+Ult Dev	AM	0.28	3 sec	12m	0.10	9 sec	3m	0.12	1 sec	0m
	PM	0.27	5 sec	12m	0.11	9 sec	4m	0.23	1 sec	0m

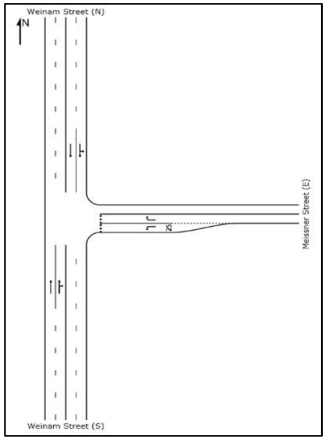
Fig No 4A — **SIDRA Analysis Results - Meissner Street/Weinam Street**

Project: Redlands Weinam and Toondah PDA *Project No.:* CEB06456

Cardno Shaping the Future

Meissner Street/Weinam Street - Upgrade Layout

SIDRA Layout



Scenario	Peak	Meissner Street (South)			Meissner Street (East)			Weinam Street (North)			
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	
2013 BG	AM										
	PM										
2029 BG	AM										
	PM										
2039 BG	AM										
	PM										
2029 BG+Ult Dev	AM	0.16	3 sec	5m	0.25	11 sec	7m	0.06	1 sec	0m	
	PM	0.22	5 sec	7m	0.16	11 sec	4m	0.11	1 sec	0m	
2039 BG+Ult Dev	AM	0.17	3 sec	6m	0.27	12 sec	8m	0.06	1 sec	0m	
	PM	0.23	4 sec	7m	0.18	11 sec	4m	0.12	1 sec	0m	

Note: Background traffic scenarios have not been analysed as the upgraded form will only be utilised by development traffic scenarios

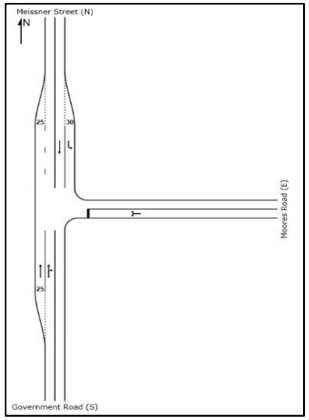
Fig No 4B **SIDRA Analysis Results - Meissner Street/Weinam Street - Upgrade Layout**

Project: Redlands Weinam and Toondah PDA *Project No.:* CEB06456

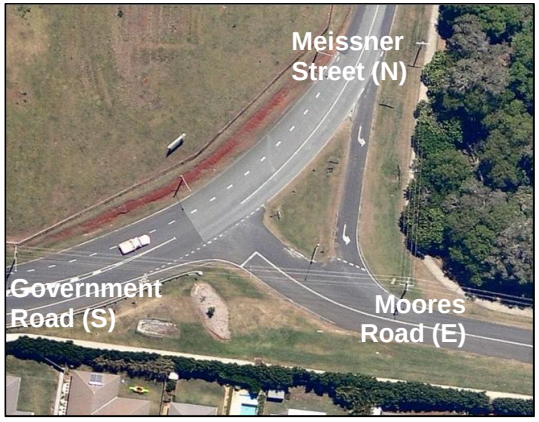
Cardno Shaping the Future

Meissner Street/Moores Road - Existing Layout

SIDRA Layout



Aerial Photography



Scenario	Peak	Government Road (South)			Moores Road (East)			Meissner Street (North)		
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue
2013 BG	AM	0.11	1 sec	5m	0.07	13 sec	2m	0.07	1 sec	0m
	PM	0.11	2 sec	5m	0.07	12 sec	2m	0.10	2 sec	0m
2029 BG	AM	0.13	1 sec	6m	0.08	13 sec	2m	0.09	1 sec	0m
	PM	0.13	2 sec	7m	0.07	12 sec	2m	0.12	2 sec	0m
2039 BG	AM	0.13	1 sec	7m	0.08	13 sec	2m	0.10	1 sec	0m
	PM	0.14	2 sec	7m	0.08	13 sec	2m	0.13	2 sec	0m
2029 BG+Ult Dev	AM	0.21	2 sec	12m	0.16	15 sec	4m	0.11	2 sec	0m
	PM	0.21	3 sec	13m	0.14	14 sec	3m	0.16	2 sec	0m
2039 BG+Ult Dev	AM	0.22	2 sec	13m	0.17	15 sec	4m	0.12	2 sec	0m
	PM	0.22	3 sec	14m	0.15	15 sec	4m	0.17	2 sec	0m

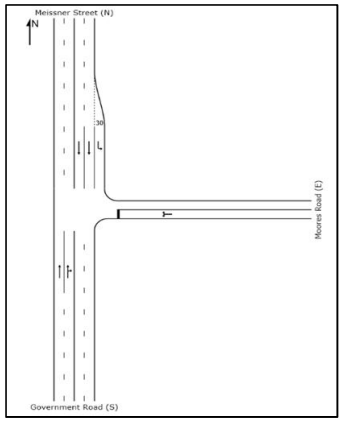
Fig No 5A — **SIDRA Analysis Results - Meissner Street/Moores Road**

Project: Redlands Weinam and Toondah PDA *Project No.:* CEB06456

Cardno Shaping the Future

Meissner Street/Moores Road - Upgrade Layout

SIDRA Layout



Scenario	Peak	Government Road (South)			Moores Road (East)			Meissner Street (North)			
		DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	DOS	Delay	95th %ile Queue	
2013 BG	AM										
	PM										
2029 BG	AM										
	PM										
2039 BG	AM										
	PM										
2029 BG+Ult Dev	AM	0.13	1 sec	8m	0.29	21 sec	8m	0.06	2 sec	0m	
	PM	0.14	2 sec	7m	0.26	21 sec	7m	0.08	2 sec	0m	
2039 BG+Ult Dev	AM	0.14	1 sec	9m	0.31	22 sec	9m	0.06	2 sec	0m	
	PM	0.14	2 sec	8m	0.27	22 sec	7m	0.09	2 sec	0m	

Note: Background traffic scenarios have not been analysed as the upgraded form will only be utilised by development traffic scenarios