Integrated Land Use & Transport Study – Maitland CBD

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MAITLAND INTEGRATED LAND USE & TRANSPORT STUDY

MAITLAND CBD AREA

June 2008

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1.0 INTRODUCTION

1.1 Background

This report presents the findings and recommendations of a land use and transportation study conducted in the Maitland Central Business District (CBD) and adjacent area (the Study Area shown in Figure 1.1).

The Study was commissioned by Maitland City Council to investigate, assess and report on transportation issues in the study area with consideration to land use planning and future growth of the area.

The Study contains two core components:

- Part 1 – City Wide Study - an overall study for the entire LGA; and
- Part 2 - CBD Study - a study focusing on Maitland Town Centre.

This report contains Part 2 of the Study which encompasses the Maitland Town Centre and its environs.

1.2 Study Process

The study process has included the following activities:

Stage 1

- Investigation and review of overall land use and transport aspects of the study area.
- Site analysis of the area including land use, vehicular, cycle way and pedestrian route network.
- Literature review including governmental strategies and reports on proposed developments and land release areas.
- Workshop (i.e. technical consultation) to canvass information and exchange ideas between Council's staff and study team.

Stage 2

- Evaluation of comments from the workshop.
- Assessment of the existing and future major development sites within the study area.
- Assessment of land use and transport situation for the area with respect to its future growth
- Development of a traffic model for the study area
- Analyses of options for preparation of a route network strategy.
- Technical workshop to ensure that Council's staff are informed on findings of the study and that they have an important role in the decision making of options and trade-offs.

Stage 3

- Development of a route network strategy for the area.
- Development of traffic models for the year 2006 and 2026 for a "do nothing" scenario and optional scenarios.
- Development of access plan for the study area to address its existing and future needs.

1.3 Scope of the Report

The key outcomes required of this study are:

- A traffic and transport management plan that caters for both current traffic volumes and estimated traffic growth over the next 20 year period throughout the study area.
- A Pedestrian Access and Mobility Plan (PAMP) that caters for both current and future pedestrian needs.
- A bicycle plan for the study area and its environs that encourages walking and cycling as attractive alternate modes of travel to the Maitland Town Centre.
- A land use and parking strategy that accommodates the future growth and needs of the study area.
- A draft Section 94 Contributions Plan for Access and Transport.

This report is divided into five (5) sections:

Section 1: Introduction

Section 2: Briefly describes the study area and its urban characteristics

Section 3: Assesses the road network and the proposed measures

Section 4: Develops access plans for the area

Section 5: Provides strategies.

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1.4 Study Area

The study area covers the Central Maitland area with a focus on the CBD precinct.

FIGURE 1.2 - CENTRAL MAITLAND AREA - STUDY AREA

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2.0 SITE ANALYSIS

2.1 City Characteristics

The Central Maitland area is characterised by large blocks of low density residential land use with concentrations of commercial land uses while the extensive peripheral areas are comprised of flood liable agricultural and recretional lands.

The Maitland CBD has a distinct and unique layout - generally reflecting the early access along the Hunter River as well as the need to avoid flood liable land - with a strong urban character derived from its impressive historical building stock. Many of these are largely intact from the 19th and early 20th centuries. Indeed, the extent and richness of its built form, in contrast with the river and pastoral landscapes beyond, constitute one of Maitland's greatest attributes and an aspect of considerable cultural value.

An overview of the Maitland Town Centre for the years 1878 and 2007 are show in Figures 2.1 and 2.2, respectively.

The 1878 Town Centre consisted of a more elaborate area, mainly along High Street from Ward Street (on the east end) to Belmore Bridge and including south side of High Street up to Hannan Street.

The current Maitland Town Centre, however, shows more fragmented areas of activities within the Centre with a concentration of retail and commercial land uses along High Street between Cathedral Street to Belmore Bridge. Medium level of commercial activities also take place along northern end of Church Street while Maitland Railway Station is located at southern end of Church Street.

The following overview provides a general observation of the study area with a focus on major areas of interest.

2.2 Review of Archival Information

The main archival document of use in this review of the historic context of Maitland is the 1878 aerial perspective of central Maitland held in the Local Studies section of the Maitland City Library. The following observations are derived from this important archival print.

Hunter River was more sinuous and dominated the Horseshoe Flat area to the east of Central Maitland. Where the river came closest to High Street was the general area where the main street precinct began. That is, in the late 19th century (at least) the eastern edge of the main street noticeably began west of a point roughly opposite Smith and Ward Streets.

- Consistently larger buildings continued along High Street from this easterly point (more so on the northern side of the road) until reaching the vicinity of Bourke Street. Just before this there appeared to be a notable (and probably socially important) townscape precinct with the St John's complex on one side and the Wesleyan building on the opposite side and both observing generous setbacks – note the large tree in front of the latter building.
- The former three storey Cohen's Warehouse at 226 High Street dominates the eastern part of Central Maitland – only the ground floor remains (now Centrelink).

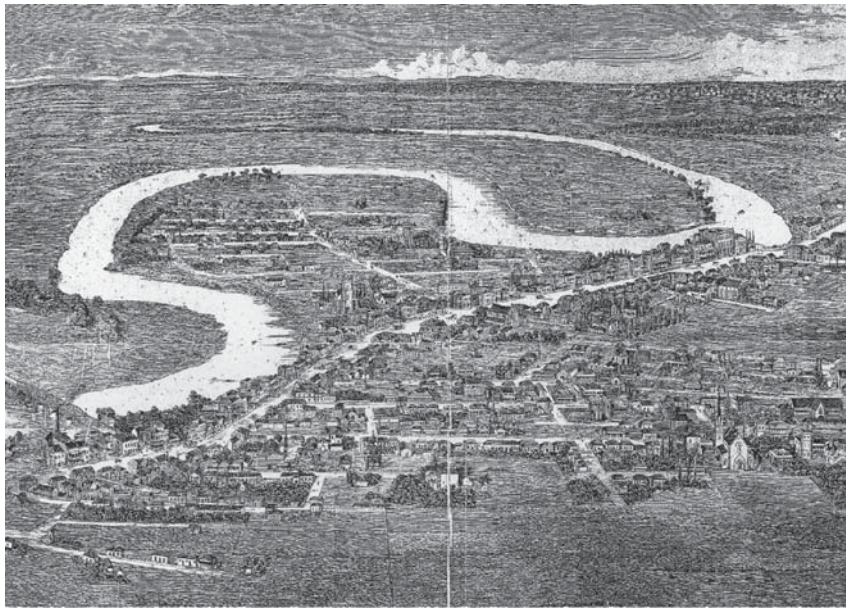

Figure 2.1

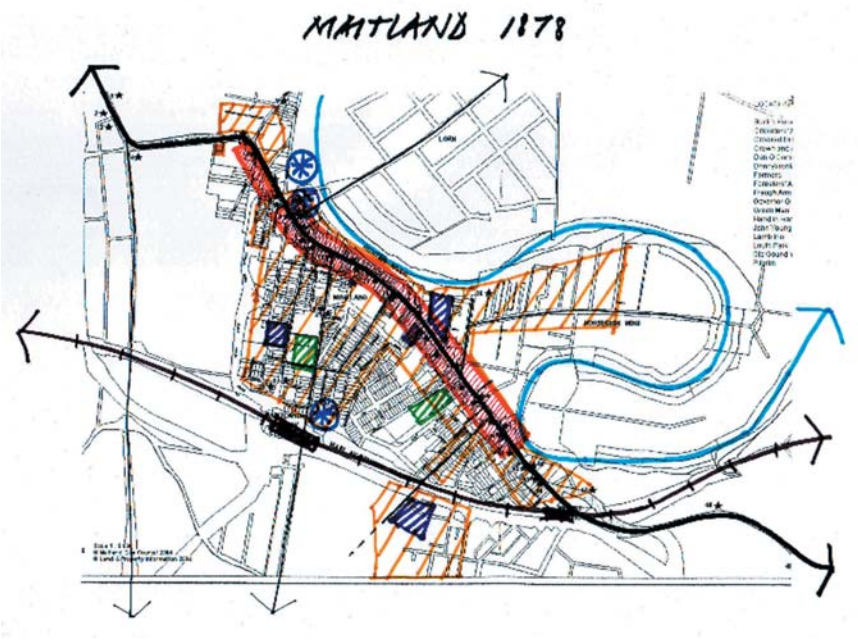

Figure 2.2

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(The present group of Council administrative buildings on the southern side of the road now reinforce the scale and civic importance of this section of the main street consistent with the scale of the 19th century group in the pictorial evidence. And since the aerial perspective later buildings have further extended this impressive civic presence along High Street to the west.)

- Mostly lower scale buildings continue along High Street from this point until reaching a factory building in the vicinity of the present library building. As the earlier bridge was still operating at this time the main access road onto the bridge was St Andrew Street. (The gap between the present power lines crossing the river at this point still interprets the corridor of this earlier bridge.)
- The section of High Street between the High Street railway station and the perceived start of the main street precinct was mainly lower scale buildings. The frontage to High street had many gaps.
- The aerial perspective also indicates a major townscape group around the St Mary's the Virgin church. Extant buildings include the church, its rectory, Grossmann House, Brough House, the school group and The Hermitage.
- Interestingly, the northern ends of half the streets off Carrington Street at Horseshoe Bend were linked by a public road that followed the river. The cadastral map even preserves evidence of these (Mallam Street and Hunter Terrace). The high levee bank has been built over these streets, obliterating them, yet the pathway along the top of the levee bank acts as a de facto access way linking the northern ends of the Horseshoe Bend streets and still providing public access – at least up to about Robins Street.

2.3 General Notes from Site Review

The following notes summarise observations of the present townscape based on site surveys on foot.

East end of High Street

- Area adjoining the High Street railway station is particularly uninviting. With a more flourishing eastern part of Central Maitland in the future this station will need an upgrade to provide more equitable access. The car park and general environment also requires an upgrade at least in terms of amenity if not for safety and function.
- Pedestrian access from the station needs addressing – the facility across the median near Sparke Street is inadequate and the main pavement has abrupt ramp grades; also the pedestrian pathway links across the street junctions always favour cars (eg. Sparke, Abbott, Ward, Smith Streets.).
- Many vacant premises, car yards and service station collectively contribute to a more 'down-market' visual/townscape and/or neglected character for this part of the main street. The northern side of the main street in this area provides a very weak edge to the streetscape.
- Abbott Street – as a continuation of Athel D'Ombrain Drive – seems a relatively busy little street and is obviously that part of the southern loop access that delivers vehicles back to the main street after bypassing the CBD. With a largely residential context the street has some wonderful early cottages (now increasingly uncommon compared to those evident in the archival record).
- Sparke Street (an industrial/commercial context) is currently blocked at the southern end. There appear to be possible opportunities to acquire land that would allow a link between Athel D'Ombrain Drive and Sparke St.
- Incidently, the Council-owned land between the Visitor Centre and the railway preserves part of the old 19th century High Street alignment before it was bypassed.

Southern part of the Central Maitland area

- At the southern end of Ward Street there is also a set of old Ravensworth sandstone steps and edges that have probably been relocated more recently to this site.
- The southern side of Abbott Street (at the bottom end of Rose Street) that adjoins the railway land could benefit from appropriate screening – the northern side of the road has it but the southern side adjoins an unsightly part of the railway land.
- Pedestrian access along Athel D'Ombrain Drive probably needs reviewing.
- Retain metal footbridge across railway from Devonshire Street as it contributes to the character of the place. The metal should be treated to stop corrosion and checked for its safety.
- The small recreation area at the end of Lee Street would benefit from a redesign.
- Review the intersection of Railway Street, Elgin Street and Athel D'Ombrain Drive taking into account the access for the railway station. There was once a hotel at this junction so there is the possibility of archaeological issues if any roadworks involve substantial excavation.

Southwestern side of the Central Maitland area

- The Church Street precinct from the railway station up to the St Mary's the Virgin group is an important and remarkably intact area of the city and deserves special attention to enhance the public domain (footpaths and edges) while avoiding unnecessary visual clutter (signs and structures).

  The civic importance of the precinct was recognised in the late 19th century aerial view and most of the key buildings remain intact.

  Unfortunately the commercial site opposite the St Mary's building detracts from the integrity of the precinct and represents an undesirable kind of urban infill. It is partly rescued by the low scale of the offending building and the screen planting across the front though it could be argued that the latter is otherwise unrepresented in the streetscape and is also a detractor.

Northern section of the Central Maitland area (from Belmore Bridge to Horseshoe Bend)

- More unsympathetic infill between Church and Albion Streets detracts from the quality and interest of the precinct (poor contribution to the townscape and streetscapes).
- Emergency services precinct at Caroline Street with good access to several nearby streets though probably ill-served by the one way direction of Church Street. The 'park' probably detracts from the area.
- St Andrew Street would benefit from street trees.
- The medians along High Street near St Andrew Street probably make a positive contribution to the streetscape and should be retained in principle though, in a effort to extend footpath dining without losing parking, a reduction in median width could be investigated.
- High Street warrants a streetscape facelift to enhance its civic qualities – this would include pavement surfaces, street furniture, plantings, dealing with clutter and signs. 'Community art' probably should be avoided unless it can be shown to be of a very high standard, engaging and directly relevant to Maitland or the specific site. (Too much community art is of a colloquial nature, naïve and irrelevant to the genius loci.)
- Existing library building does little to address the important corner site it occupies. There is an opportunity to positively engage with the courthouse opposite and create an outstanding urban setting at the northwestern entry to the main street.

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The same applies to the important and prominent development site to the northeast that addresses the Belmore Bridge, the Hunter River and the open space behind High Street.

- Considerable opportunities exist to capitalise on the broad plaza space behind High Street with an address to the river and Lorn: various options should be explored to demonstrate how this area could be developed to benefit the whole community that into account the need to retain access to the river and provide car parking. (The latter may have implications on the existing plane trees.)
- With the gradual upgrading of many commercial/retail premises to address the river, there may be implications for the width of the levee bank pathway in order to accommodate outdoor dining/cafes. We should provide some sections through indicating possible treatments for consideration.
- The levee bank probably warrants various landscape treatments – large shade trees (that allow views under) near the path edge to reduce the glare and the reinstatement of locally indigenous riparian species at the river edges.
- A pedestrian/cycle access link to Lorn by way of a new bridge off either Cathedral, Free Church or Hunter Streets would appear to be very beneficial.
- An additional lane for pedestrian use should be added to the southern side of the Belmore Bridge as the present lanes are too narrow – these could be used for cycles instead perhaps.
- There is the opportunity for pedestrian access from High and Carrington Streets to the river – they probably warrant upgrades to a lesser or greater extent depending on the location and amount of use.
- There is an opportunity to extend pedestrian/cycle access along levee beyond Hunter Street to connect with Carrington Street – at the moment a formed pathway goes as far as Cathedral St.
- Also need to address private appropriation of levee at Robins/ Portland Streets.
- Horseshoe Bend still has many older structures of historical importance (compare with 19th century aerial view) and establishes a strong, desirable character of great interest and benefit to the City.
- There are many vacant lots in this area (eg. Morgan Street) with infill development curtailed by flooding issues. This should be addressed in order to assist in providing more housing for the area though it needs to be done without compromising the character of the area.
- Opportunities for water-based use – limited commuter/ recreational?
- Opportunities to relocate powerlines underground? In many areas of the City power poles and powerlines mar views to otherwise scenic and picturesque rural and urban landscape.

Northwestern precinct of the Central Maitland area (The Long Bridge to Courthouse)

- Sempill/Hannan Streets precinct is quite interesting – many older buildings that create a strong and desirable character (care needed for new development).

Some erosion of the great qualities of this area is already evident along Sempil Street where the long stretch of car parking behind the courthouse has produced an unnecessarily harsh and austere environment out of scale and character with adjoining 19th century cottages.

- 'Moncrieff' allotment is an exceptional site within the City – a great asset that should be carefully managed. The site vegetation provides an important setting to the fine house and should be included in all heritage listings. Shame about its front fence.
- The Mineral Resources site at the corner of Hannan and High Streets is a prominent visual element along the main street and actually terminates the vista along High Street from The Long Bridge.
- Entry experience to the City off The Long Bridge: either side is immediately anchored by older buildings and associated large tree canopies providing a fine gateway to the City however, just beyond the impressive Gothic-revival residence and its large camphor laurels on the southern side, the new grey-walled commercial development seems a very ill-mannered additional to the local streetscape.

  This is an important high profile address to the main street yet the new development has only minimal active street frontage (some windows face the street), presenting high, mostly blank walls to the High Street address and managing to create a particularly harsh streetscape environment. The hard surfaces acting to reverberate traffic noise back at pedestrians.

  There are opportunities to relieve this harshness by introducing some large, umbrageous trees at strategic places to ameliorate the damage caused by this development – this should be part of a street tree strategy for the City.
- Walkway/cycleway off bridge to north providing access to the hospital area.
- South-western side of the road between Anlaby Street and Ken Tubman Drive – lack of street trees to match opposite side. Courthouse side of the street is well endowed with plane trees but sides need it.
- Important views to courthouse from along High Street on approach to City area.
- No crossing provision to courthouse side from State Debt Recovery building side.
- Plane Trees in front of courthouse need underpruning to raise the canopies in order to recover views of the courthouse from street. Also urban court in front of building needs an upgrade.

Central City area

- 1980s infill buildings detract considerably from the local streetscapes – no active frontages; harsh, overscaled external cladding panels; no landscape treatments to soften the structures - though dense screen planting could itself be seen as a detractor in the urban environment; an unpleasant pedestrian and motorist experience; grain of the townscape compromised with vastly overscaled buildings. Multi-storey car park doesn't do much better though saved a little by its partial transparency.
- Unfortunate contrast between these structures and adjoining city terraces, cottages and residential areas.

2.4 Outstanding Views: panoramas and vistas

- There is a fine vista from High Street along Smith Street to the St Paul's church tower - an example of a classic townscape principle.
- The eastern end of High Street provides fine views along the street to the Art Gallery site where its dominant Hoop Pine once acted as a landmark.
- There are rewarding views from the elevated part of Abbott Street (near the southern end of Ward Street) of the Town Hall tower as well as the St Paul's church tower and the nearby Araucarian pines (tall landmark trees that are also old).
- Lower end of Devonshire Street and Little Rose Street to former Hoop Pine at Art Gallery
- Rail Footbridge at Devonshire Street to former Hoop Pine at AG
- View up Victoria St to landmark Norfolk Island Pine at Sun building
- View to Town Hall tower and former Hoop Pine at Art Gallery from bus stop at rail station.

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- Nice contrast in views at either end of Steam street: the view east terminates in a 19th century residential building while the western view leads to the adjoining floodplain landscape and the Priv. PZ Trzecinski Bridge.
- The view west along Olive Street ends at the large fig trees and impressive residence 'The Hermitage'.
- The view south down Church Street terminates at the railway station buildings but motorists would generally not have this pleasure as it is a one-way street north.
- Ken Tubman Drive (between St Andrew Street and Elgin Street) provides a panorama out to West Maitland with landmark Araucarias on the horizon at the highway.
- A dismal building spoils the eastly view at the end of Moore St.
- The Long bridge provides fine views across the broad landscape to the Hospital and grounds with its landmark pines and the Walka Water Works site.
- Powerlines marr the view to the courthouse tower from the footpath along Sempill Street.
- The high embankment adjacent the river off Sempill Street provides excellent panoramic views down the Hunter River, across Lorn and Bolwarra and around to the mature vegetation around 'Moncrieff'.
- All along the river frontage east of the Belmore Bridge there are fine views along the bank to the St John's tower and across the river and Lorn.
- From the top of the levee bank beyond Horseshoe Bend (eg. off Morgan street) there are vistas back to major local landmarks – the St John's tower, St Mary's spire, post office tower and courthouse tower.
- From the levee bank between Plaistowe and Russell Streets there are vistas back to the Town Hall tower and former Hoop Pine at the AG.

2.5 Centre Precincts

The land use zones for the study area are shown in Figure 2.4. The areas along High Street are designated as "Business Zones" while the remaining areas have "Residential" zoning.

A further detailed characteristic of the area is illustrated in Figure 2.5. This overview analysis highlights some distinct uses of the area while maintaining a point of view for diversity of activities within each categorised area.

Figure 2.5 also suggests possible uses of the area for consideration as part of the Structure Plan for the Maitland CBD. It also identifies the gateways to Town Centre on the basis of historical context.

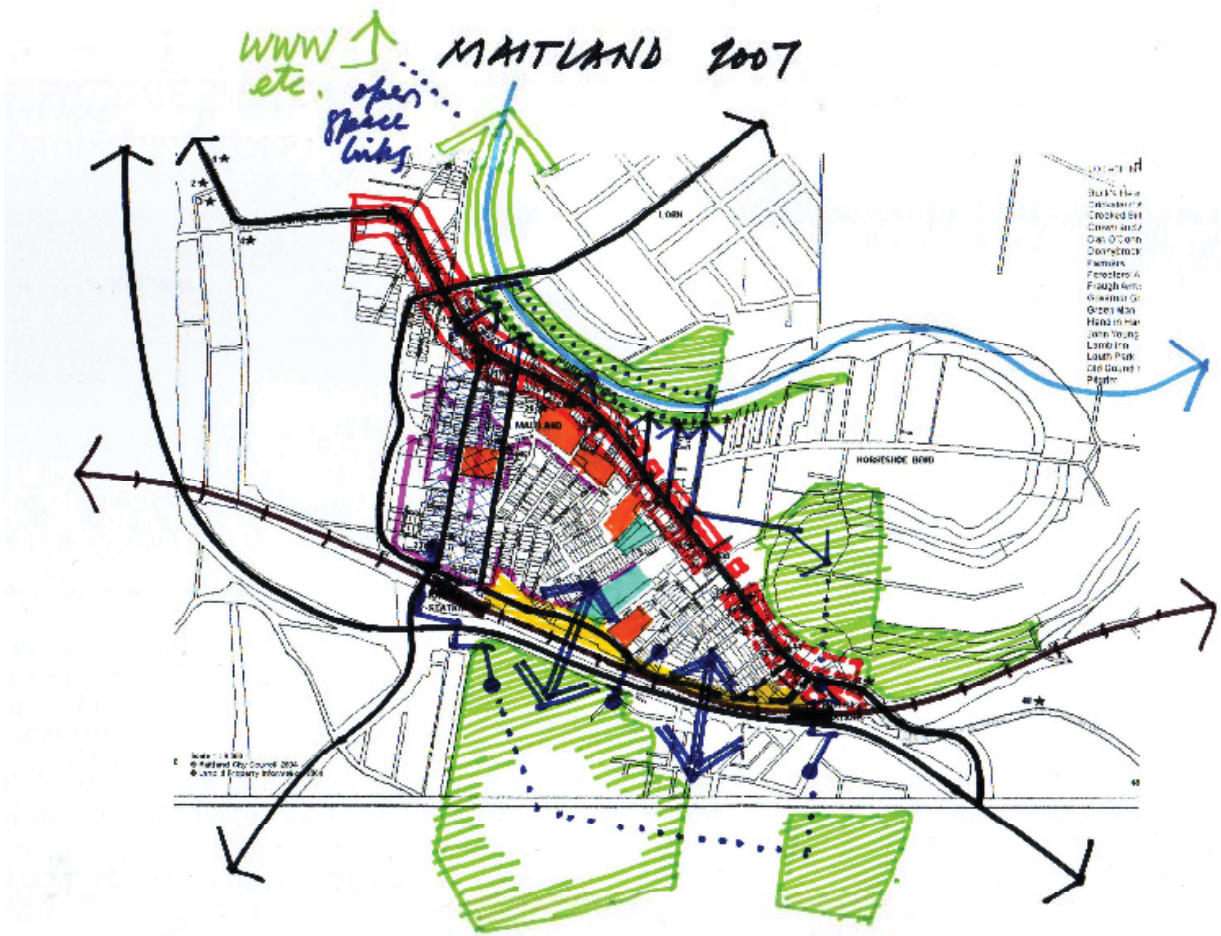

FIGURE 2.3 - STUDY AREA SITE ANALYSIS

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FIGURE 2.4 - LAND USE MAP

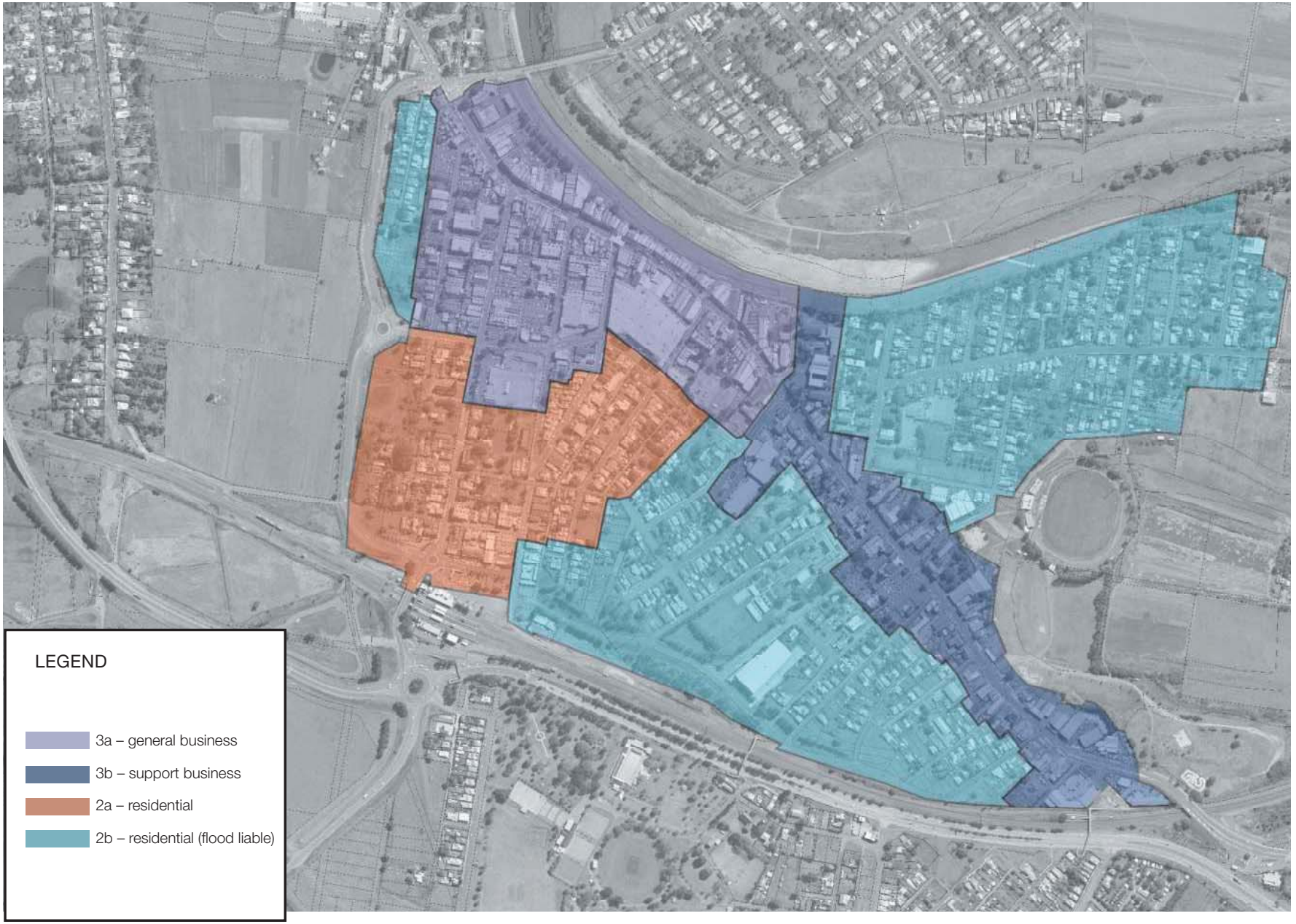

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FIGURE 2.5 - CENTRE PRECINCTS

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2.6 Workshops

As part of the study process a number of workshops took place to discuss various aspects of the study area.

The first workshop took place on 8th August 2007, followed by a presentation to Council's Central Maitland Working Group and included the following main points related to the CBD Study:

1. Discussion on vision building and area characteristics
2. Presentation of area analyses by the study team
3. Identification of growth areas within the CBD
4. Development of route network options with respect to existing and future needs.
5. Discussion on Hunter Mall and its role.
6. Issue of parking within the Centre and narrow nature of streets.

The second workshop was convened on 28 February 2008 at Council where the following relevant issues to this study were discussed:

1. Report on study progress
2. Presentation on land use and traffic generation
3. Presentation on study findings and possible options
4. Discussion on various street system options and their impact
5. Conclusions

During the study process a number of discussions were held with relevant bodies such as Hunter Valley Buses, the Roads and Traffic Authority and the Ministry of Transport.

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2.7 Opportunities and Constraints

An overview of the area characteristics are detailed in previous sections while the overall constraints and opportunities in the Maitland CBD are summarised in Table 2.1.

The following highlights some of the main transport related features within the Study Area:

- A low level of public transport use is experienced within the CBD.
- There is a high demand for car parking within a short distance to certain destinations within the CBD.
- A majority of the streets within the Centre have narrow carriageways which are restricted to one way movement due to high demand for on street parking.
- A high level of congestion is experienced during peak hours at certain intersections such as Church Street with Les Darcy Drive and High Street at Belmore Bridge.
- High Street traverses east – west along the entire length of Maitland. Its closure mid-block between Bourke and Elgin Streets is having a major impact on operation of the route network and traffic circulation within the CBD.
- There is a limited choice (in terms of routes) for vehicular traffic to pass through the core of CBD area - only Ken Tubman Drive and part of High Street provide such a link.
- There is limited use of Athel D'Ombrain Drive particularly by vehicular traffic despite its strategic location as part of the street system.
- There is need for bicycle parking racks at certain locations within the CBD.
- Buses have a limited access to popular destinations within the CBD due to traffic management measures along High Street and its part closure.

Table 2.1: Opportunities and Constraints for the CBD

Opportunities
Relatively level area suitable for walking and cycling
Access to the river front
Compact nature of the area
Heritage Character of the area
Good access to railway stations and bus stops
Opportunity to improve urban amenity/visual enhancement of the certain buildings
Relatively close distance between activity centres
Pedestrian Network
Constraints
Narrow width of carriageways
Single point of river crossing
Belmore Bridge narrow carriageway and footpath
Physical definition of CBD due to River, Rail, Les Darcy Drive and floodway
Inundation from flood
Organic nature of street system
Intrusive building facades
Limited traffic circulation due to one-way nature and closure of certain streets

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3.0 ROUTE NETWORK STRATEGY

3.1 Methodology

Part 1 of this study "ILUTS for Maitland LGA" covers various aspects of land use and road network issues that includes Central Maitland area. It puts forward a road network strategy for the LGA responding to its future growth and demand.

The assessment of existing land use, traffic flows and forecast land use developments has been made to establish a framework for evaluation of future scenarios for the road network system in the study area.

The study approach incorporated:

1. Evaluation of strategic road network (included in Part 1 of the study).
2. Development of a micro-simulation model for the CBD area
3. Detailed assessments of major roads and intersections.

The modelling assumptions included an additional workforce of some 3000 and 1300 residential dwellings within the Maitland Central area by the year 2026 (based on the Hunter Strategy). The traffic model also integrates the level of car use in relation to proximity of land use and to public transport or activity centres.

The traffic modelling scenarios have been developed on the basis of the following main considerations:

1. The base traffic models (2006) are the existing route network
2. The future traffic models (2026) are the proposed route network including:
   - Third River Crossing; and
   - Proposed Southern By-Pass (as detailed in Part 1)
   - Proposed route improvements in Central Maitland Area

3.2 Road Network

The existing route network for the Maitland LGA is shown in Figure 3.1. It also includes the proposed route options for the area.

The major approach routes to and from the Maitland CBD include New England Highway and High Street (east – west), Cessnock Road, south of Maitland and Belmore Road, north of Maitland.

The main access points to the Maitland CBD from the surrounding areas include:

- At High Street (east) and New England Highway intersection
- Via Church Street, Les Darcy Drive and Cessnock Road intersection
- Via Belmore Bridge
- Via Long Bridge

New England Highway forms a major arterial route providing a connection between East and West Maitland which also forms part of Sydney – Newcastle – Brisbane link road. Belmore Road functions as a main access route to Lorn, Bolwarra, Tocal and Patterson while Cessnock Road links to Kurri Kurri and Cessnock.

High Street is located strategically along the entire length of Maitland CBD which could provide a continuous access to the area. Church and Elgin Streets provide north-west connections while Ken Tubman Drive and Alan Walsh Drive function as circulation routes within the CBD area.

The study area route network has the following main characteristics:

- The CBD area is subject to a high level of through traffic in the east-west and north-south directions.
- The main traffic movements take place via High Street, Ken Tubman Drive and the Long Bridge and also via Les Darcy Drive, Alan Walsh Drive or Church Street.
- Church Street (between Railway Parade and High Street) and Elgin Street are one way streets restricted to northbound and southbound directions respectively, due to their narrow nature and parking along each side of the road.
- High Street (between Elgin and Bourke Streets) forms part of the Heritage Mall and its sections between Cathedral and Bourke Streets and Elgin and Church Streets are restricted to one way movements.
- A high level of vehicular queues and congestion are experienced daily during morning and afternoon peak hours at the intersections of Les Darcy Drive/Cessnock Road/Church Street and Ken Tubman Drive/High Street/Belmore Bridge.
- The Maitland City Centre is confined by the Hunter River on the northern side and a railway line on the southern side. The main east-west route is High Street which is closed mid-block as part of Heritage Mall,directing vehicular traffic along Ken Tubman Drive. The north-south road connections are also limited due to the natural formation of the city over the years.
- A majority of the streets within the Centre have narrow carriageways or are restricted to boundary lines.

The road hierarchy for the Maitland CBD is shown in Figure 3.2. The existing road hierarchy reflects the existing function of the route network with respect to its land use and area characteristics. The principles of the road hierarchy are detailed in Part 1 of this study.

As part of the study process and in order to reflect the existing and future needs of the area in terms of street system and traffic circulation a road hierarchy for the CBD area has been developed. The future road hierarchy (as shown in Figure 3.3) aims to:

- provide a route system for the area that caters for its future traffic movements with reduced levels of congestion.
- facilitate a better connectivity for the users of the area; and
- reflect future land use and characteristics of the area.

The future road hierarchy proposes the following main features (in comparison to the existing situation):

- Introduction of Athel D'Ombrain Drive as a major route parallel to New England Highway and High Street. This would provide better circulation within the route network while creating more capacity and choice for vehicular traffic.
- Recognition of Victoria Street as a major local road that could provide a similar role to Church and Elgin Streets (for eastern part of CBD).
- Possible connection of High Street to acknowledge its strategic location and facilitate vehicular circulation within the CBD area.

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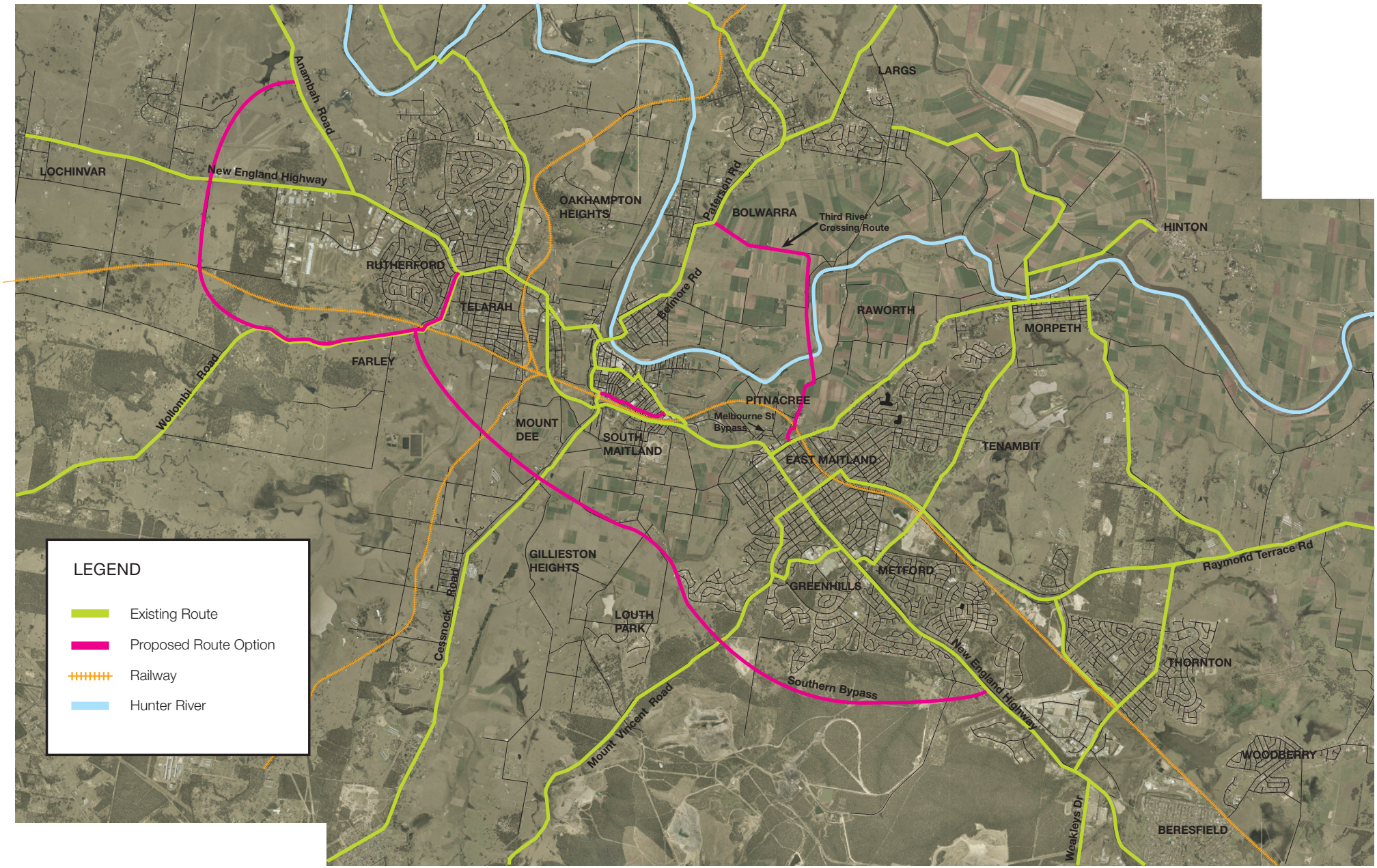
FIGURE 3.1 - STUDY AREA ROUTE NETWORK



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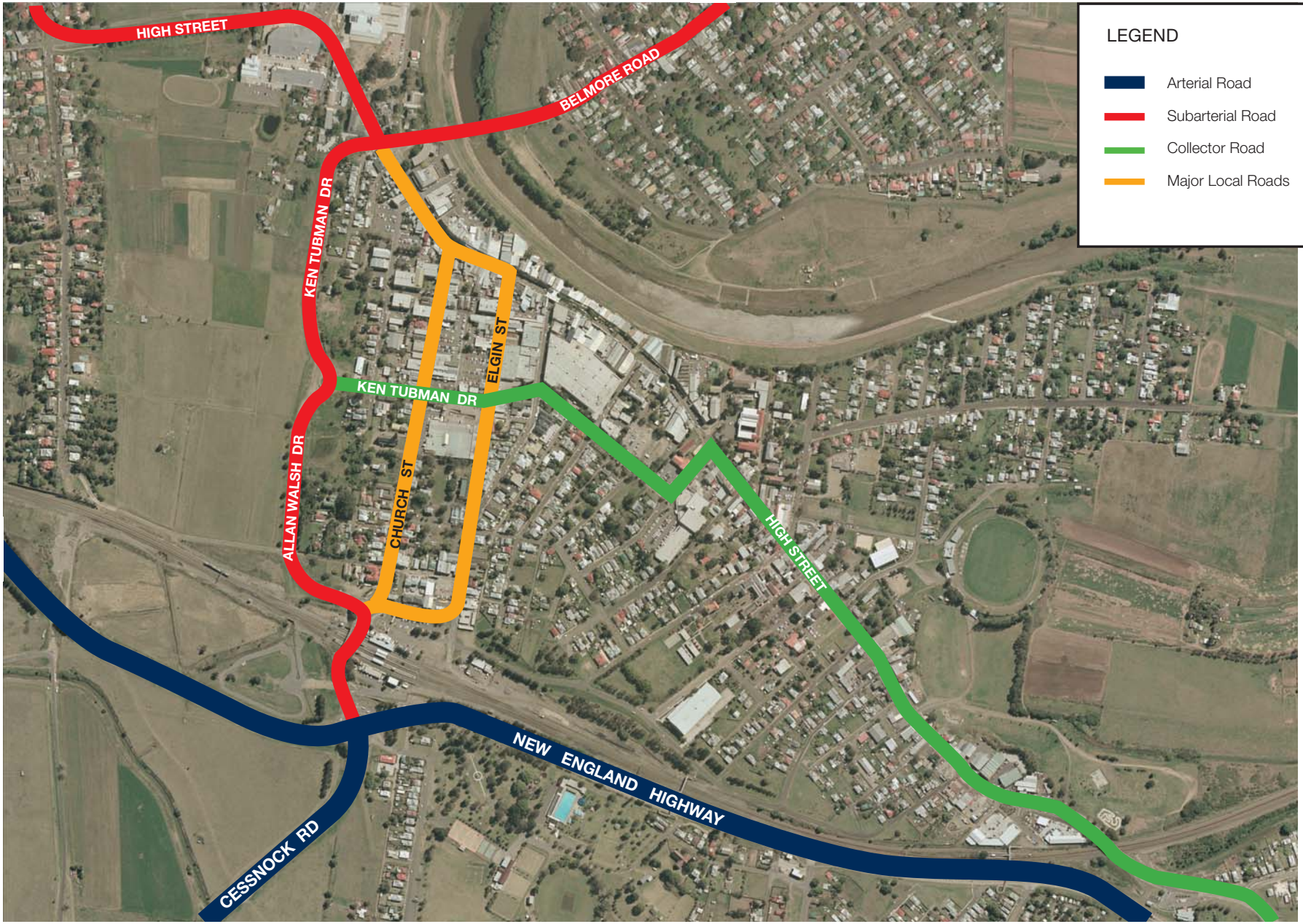

FIGURE 3.2 - EXISTING ROAD HIERARCHY MAITLAND CBD

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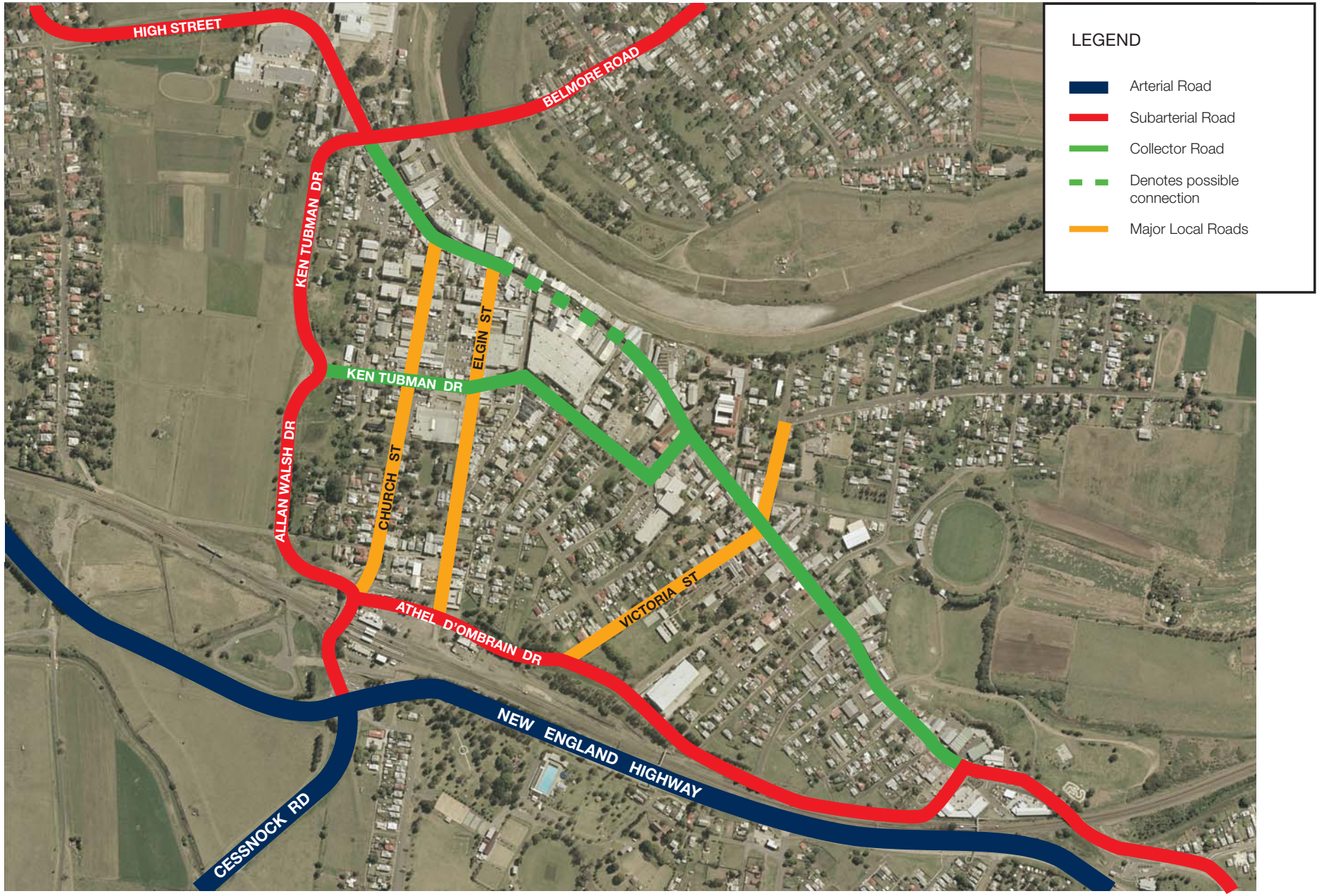
FIGURE 3.3 - FUTURE ROAD HIERARCHY MAITLAND CBD



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3.3 CBD Traffic Model

The Maitland CBD traffic model is represented with 51 zones as shown in Figure 3.4 in Appendix A. The model is based on AM and PM peak traffic volumes.

Derivation of the AM and PM Trip Tables

A trip matrix consists of four independent parts:

1. Trips that start in the study area, and finish in the study area. These trips are referred to as "internal – internal" trips
2. Trips that start outside the study area, and finish in the study area. These trips are referred to as "external-internal" trips
3. Trips that start inside the study area, and travel outside the area. These trips are referred to as "internal-external" trips
4. Trips that start outside the study area, and travel to a point outside the area. These trips are referred to as "external-external" trips.

External-External Trips

For this study, the external-external trips have been derived from the City Wide model (Part 1 of this study). In the City Wide model, Maitland CBD is represented with two zones - 22500 and 22501.

Other Trip Components

The task of deriving the other three components is based on: land use (particularly the car parking spaces and special trip generators) and traffic counts.

Since the models required hourly traffic flows, these traffic counts have been processed in two-steps:

- As the Council counts were taken over several years, the counts were factored to the 2006 flows using historical factors from the RTA counts.
- These factored ADT counts were then factored again to the AM and PM flows using the same proportions from the RTA permanent counting station.

Interpretation of Results (Plots)

The traffic volume is represented as the width of the line in the plots. Thick lines represent more traffic than thin lines. The Outflow Scale is also shown on part of the plots.

The equally important measure of traffic flow is traffic density. Density is measured in vehicles per kilometre (veh/km). It represents the average number of vehicles on the link during the interval, divided by the length of the link. This is the time-average of the link density over the duration of the results interval.

In the modelling plots, the density is shown as occupancy. Occupancy is measured as a percentage. This measure is similar to density, but weighted by effective vehicle length and normalized to a per lane value. Thus, traffic queued to a standstill is always represented by an occupancy of 100%, regardless of the vehicle lengths or the number of lanes.

In summary, as part of the modelling plot, the thickness indicates the volume, and the colour indicates the lane occupancy. This is a measure of congestion. An occupancy of 100% is shown in brown-red colour which reflects a "bumper-to-bumper" situation i.e. the whole lane is occupied fully by cars.

In general the "cool" colours (eg. blue and green) indicate that the traffic is flowing smoothly close to the sign-posted speeds, and the "hot" colours (eg. red and orange) indicate grid-lock situations.

3.4 Assessments

An assessment of the existing situation for the road network within the City Centre was carried out using the *Dynameq* modelling software. The results from the modelling analyses are shown in Appendix A - Figures A3.5 and A3.6 for AM and PM peak traffic flow.

The results clearly indicate the problem areas and associated queuing lengths which occur at certain periods during peak hours. The major "hot spots" (i.e. areas with high queues and delays) were identified as:

- Intersection of Les Darcy Drive, Cessnock Road and Church St
- Intersection of Belmore Bridge and High Street
- A section of High Street near Victoria Street
- A section of Ken Tubman Drive, west of Bourke Street

A further analysis of traffic flows along major roads within the City Centre was also carried out. Traffic counts were conducted at 15-minute intervals for both the two-hour morning and afternoon peak hours.

A calibrated proportion of traffic that flows between 8:00-9:00am is shown in Figure A3.4.

This graph clearly shows that there are two distinct traffic streams in the AM peak.

- CBD traffic
  - the Maitland CBD traffic as shown by the High Street inbound and
  - the northbound traffic from the Les Darcy Drive roundabout on Church Street
- By pass traffic
  - the Belmore Bridge inbound traffic contains two traffic streams
    - + the Maitland CBD traffic - a smaller rise between 8:45 and 9:00am
    - + the longer distance traffic which peaks between 8:00-8:30am and
  - the High Street inbound traffic also contains the two traffic streams
    - + the Maitland CBD traffic - a smaller peak between 8:00-9:00am
    - + the longer distance traffic which peaks between 8:00-8:15am

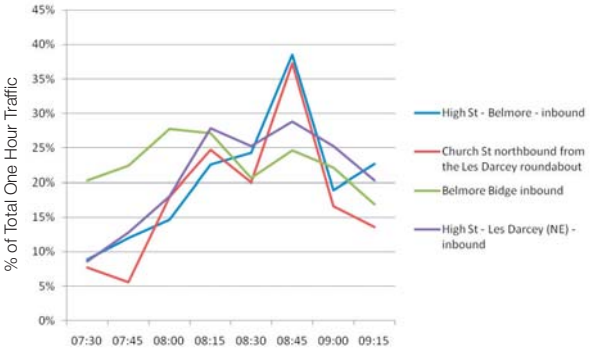

Figure 3.4: AM Peak Hour Traffic Flows

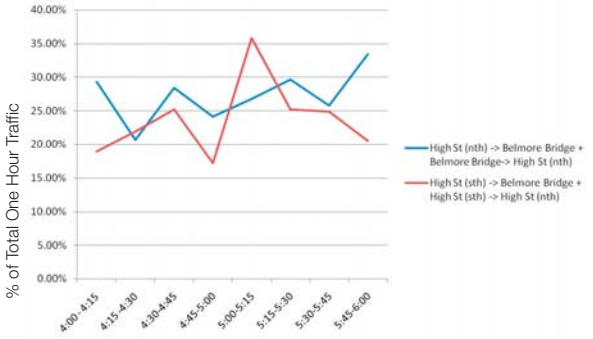

Figure 3.5: PM Peak Hour Traffic Flows

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There is also a clear distinction between the traffic to/from the Maitland CBD and the traffic that travels around the CBD.

The two traffic streams that most clearly represent these flows are:

- the right turn movements from Belmore Bridge into High Street (towards the Long Bridge) and the reverse movement, the left turn movement from High Street onto Belmore Bridge, and
- the traffic out of the Maitland CBD travelling northbound – turning right from High Street onto Belmore Bridge and continuing straight along High Street

The afternoon traffic flows as shown in Figure A3.8 in Appendix A indicates that a peak time between 5:00-5:15 pm for the CBD traffic while the bypass traffic peaks at the next interval: 5:15-5:30 pm.

Accordingly, these factors were considered as part of the micro simulations exercise.

3.4.1 Route Network Strategy

The Section 3.2 of this report highlighted a number of major points associated with the street system within the Maitland City Centre. Considering that the major traffic movements within the study area occur in an east-west direction and the levels of congestion at certain intersections, the following measures are considered as part of the route network options (note: the proposed traffic management measures are detailed in Section 4 of this report):

1. Upgrade of Athel D'Ombrain Drive: this measure will provide an alternative route to High Street and Les Darcy Drive for vehicular movements within the Centre. As part of this measure the following improvements will be required:
    - Realignment/upgrade of Sparke Street and provide its connection between High Street and Athel D'Ombrain Drive.
    - Installation of a traffic signal/roundabout at intersection of Sparke Street with High Street.
    - Upgrade of Athel D'Ombrain Drive and its realignment for a higher level of traffic use.
2. Provision of a free left turn at the roundabout from Church Street onto Les Darcy Drive (as a high priority for short to medium term).
3. Provision of a free left turn at the roundabout from Cessnock Road onto New England Highway (as a long term option).
4. Provision of traffic signals at intersection of Les Darcy Drive and Louth Park Road.

The above measures are included on the basis of the following rational/analysis:

- The introduction of Athel D'Ombrain Drive as an alternative route will provide a complementary road to High Street and Les Darcy Drive. It will create a better connection to the southern section of the Centre while providing opportunity for further development and activity along High Street.
- The proposal for free left turns from Church Street and Cessnock Road onto the New England Highway will improve the operational capacity of the roundabout at this location. Further, the installation of traffic signals at intersection of Louth Park Road and Les Darcy Drive will create gaps for vehicular traffic on the roundabout (i.e. Les Darcy Drive/Church Street/Cessnock Road) to negotiate safer and more efficient turning movements.
- The road system in the study area has limited capacity for its existing and future vehicular traffic demands, considering that Central Maitland provides a major connection between East and West Maitland. The above measures will aim to provide a higher level of road and intersection capacity in order to maintain an efficient operation of the street system.

A comparison of the 2006 PM model with 2026 PM model for the existing road network (i.e. S1 and S1F), provides the following general observations:

- Impact of the Third Hunter River Crossing
    - Reduction of traffic on Belmore Bridge
    - Reduction of traffic volumes on Ken Tubman and Allan Walsh Drive
- Increased dwellings and employment
    - Church St approaching the Les Darcy Drive roundabout needs additional capacity as it affects the roundabout at Railway Street
    - In the model, this path is congested, so the parallel path on Athel D'Ombrain Drive is chosen
- Impact of the proposed southern bypass
    - Increased traffic on Cessnock Road – this requires a left-turn lane from Cessnock Road to the New England Highway
    - Increased traffic on Les Darcy Drive due to proposed signalised access to Louth Park Road

3.4.2 Road Network Scenarios

The study has considered 14 route network scenarios (using strategic modelling network Emme/2 and Dynameq). These are:

2006 - Existing Scenarios

Scenario 1 (S1):	Existing Route Network
Scenario 2 (S2):	Existing Route Network with Athel D'Ombrain Drive upgrade
Scenario 3 (S3):	Existing Route Network with Heritage Mall open and a two way system along High Street
Scenario 4 (S4):	Similar to Scenario 2 with Heritage Mall having a one way system (i.e. westbound only between Bourke and Bulwer Streets and eastbound only between Elgin and Bulwer Streets while combining at Bulwer Street in a southbound direction)
Scenario 5 (S5):	Similar to Scenario 2 with Heritage Mall open and with High Street eastbound
Scenario 6 (S6):	Similar to Scenario 2 with Heritage Mall open and with High Street westbound
Scenario 7 (S7):	Similar to Scenario 4 with Church Street two way

2026 - Future Scenarios

Scenario 1F (S1F):	Future Route Network per City Wide Study*
Scenario 2F (S2F):	Similar to S1F with Athel D'Ombrain Drive upgrade
Scenario 3F (S3F):	Similar to S2F with Heritage Mall open with a two way system along High Street
Scenario 4F (S4F):	Similar to Scenario S2F with Heritage Mall having a one way system (i.e. westbound only between Bourke and Bulwer Streets and eastbound only between Elgin and Bulwer Streets while having a southbound operation along Bulwer Street between High Street and Ken Tubman Drive).
Scenario 5F (S5F):	Similar to Scenario S2F with Heritage Mall open and with High Street eastbound
Scenario 6F (S6F):	Similar to Scenario S2F with Heritage Mall open and with High Street westbound
Scenario 7F (S7F):	Similar to Scenario S4F with Church Street two way

Note:
- *Future scenarios include Third River Crossing and Southern By-Pass.
- Options for opening the Heritage Mall are considered only with a design speed of 35 km/hr (i.e. for the section of High Street between Bourke and Elgin Streets, to ensure a low speed environment).

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The results from the traffic modelling scenarios are shown in Tables 3.1 and 3.2 for the 2006 and 2026 scenarios, respectively.

Table 3.1A - 2006 Traffic Modelling Scenarios - AM - Peak (vph)

	S1	S2	S3	S4	S5	S6	S7
	Base 2006 AM	Athel D'Ombrain Drive Upgrade + Base 2006	Base 2006 + High St - 2 Way	Base 2006 + High St - one way each direction	Base 2006 + High St East Bound - One Way	Base 2006 High St West Bound - One Way	S4 + Two-way Church St
High St E of Athel D'Ombrain Dr	791	919	1,018	865	1,044	891	952
High St between Victoria and Ward St	1,163	976	1,153	986	1,152	1,054	1,083
High St E of Bourke	593	551	147	431	204	426	159
High St - Mall – if appl.			605	69	484	178	535
High St E of KT Dr	490	447	676	593	711	511	862
High St E of Long Bridge	1,195	1,128	1,230	1,150	1,167	1,215	1,234
KT DR between Bourke and Bulwer	583	538	142	416	195	411	142
KT DR between Bulwer and Elgin	457	436	182	288	187	405	110
KT DR between High St and AW Dr	1,057	1,022	869	923	799	1,027	744
AW Dr between Church St and KT Dr	1,248	1,224	1,032	1,168	1,019	1,179	1,026
Church St N of KT Dr	164	158	83	185	147	83	153
Elgin S of KT Dr	136	175	235	316	225	131	138
Elgin N of KT Dr	410	404	264	360	384	372	242
Belmore Bridge	1,403	1,446	1,379	1,394	1,398	1,382	1,422
Long Bridge	1,065	1,089	1,063	1,059	1,079	1,166	1,067
Athel D'Ombrain Dr E of Victoria St	309	675	585	646	632	556	608
Victoria St	373	281	310	302	335	289	273
Sparke Street (new link to Athel D'Ombrain Dr) future only	43	350	283	286	327	275	283

Note: KT - Ken Tubman Drive, AW - Allan Walsh Drive

Table 3.1B - 2006 Traffic Modelling Scenarios - PM - Peak (vph)

	S1	S2	S3	S4	S5	S6	S7
	Base 2006 AM	Athel D'Ombrain Drive Upgrade + Base 2006	Base 2006 + High St - 2 Way	Base 2006 + High St - one way each direction	Base 2006 + High St East Bound - One Way	Base 2006 High St West Bound - One Way	S4 + Two-way Church St
High St E of Athel D'Ombrain Dr	801	1,145	1,240	1,138	1,149	1,111	952
High St between Victoria and Ward St	1,255	1,088	1,240	1,100	1,101	1,093	1,083
High St E of Bourke	621	584	159	492	222	493	159
High St - Mall – if appl.			718	89	459	248	535
High St E of KT Dr	529	602	809	695	804	609	862
High St E of Long Bridge	1,040	1,046	1,051	1,036	1,038	1,099	1,234
KT DR between Bourke and Bulwer	607	570	148	473	215	477	142
KT DR between Bulwer and Elgin	488	465	243	294	259	474	110
KT DR between High St and AW Dr	917	830	625	693	636	863	744
AW Dr between Church St and KT Dr	1,226	1,191	829	1,014	1,006	1,094	1,026
Church St N of KT Dr	259	302	142	282	333	151	153
Elgin S of KT Dr	160	148	275	322	289	160	138
Elgin N of KT Dr	405	415	210	471	285	419	124
Belmore Bridge	1,187	1,249	1,242	1,206	1,260	1,239	1,422
Long Bridge	868	966	928	957	918	936	1,067
Athel D'Ombrain Dr E of Victoria St	347	834	715	837	832	740	608
Victoria St	445	341	361	328	356	313	273
Sparke Street (new link to Athel D'Ombrain Dr) future only	41	470	408	459	471	433	283

Note: All scenarios S2 to S7 include upgrade of Athel D'Ombrain Drive.

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Table 3.2A - 2026 Traffic Modelling Scenarios - AM - Peak (vph)

	S1F	S2F	S3F	S4F	S5F	S6F	S7F
	Citywide Network 20206	S1F + Athel D'ombrain Drive Upgrade Drive	S2F + High St - Two-Way	S2F + High St - One-Way Each Direction	S2F + High St - East Bound - One Way	S2F + High St - West Bound - One Way	S4F + Church St - Two Way
High St E of Athel D'Ombrain Dr	345	425	475	410	425	415	400
High St between Victoria and Ward St	655	565	610	470	520	545	520
High St E of Bourke	345	275	65	190	125	230	65
High St - Mall – if appl.			355	65	200	155	310
High St E of KT Dr	185	205	250	190	235	250	230
High St E of Long Brridge	505	540	565	520	595	580	575
KT DR between Bourke and Bulwer	335	275	55	205	120	235	70
KT DR between Bulwer and Elgin	235	230	85	115	90	235	55
KT DR between High St and AW Dr	535	520	505	525	540	555	520
AW Dr between Church St and KT Dr	665	715	580	635	680	645	535
Church St N of KT Dr	95	110	40	85	115	30	55
Elgin S of KT Dr	190	100	115	155	105	105	165
Elgin N of KT Dr	215	195	120	125	115	210	125
Belmore Bridge	670	660	640	670	665	675	655
Long Bridge	550	530	580	530	545	610	575
Athel D'Ombrain Dr E of Victoria St	160	380	290	380	330	310	335
Victoria St	195	155	105	130	140	110	125
Sparke Street (new link to Athel D'Ombrain Dr) future only	10	125	100	140	115	120	110

Note: KT - Ken Tubman Drive, AW - Allan Walsh Drive

Table 3.2B - 2026 Traffic Modelling Scenarios - PM - Peak (vph)

	S1F	S2F	S3F	S4F	S5F	S6F	S7F
	Citywide Network 20206	S1F + Athel D'ombrain Drive Upgrade	S2F + High St - Two-Way	S2F + High St - One-Way Each Direction	S2F + High St - East Bound - One Way	S2F + High St - West Bound - One Way	S4F + Church St - Two Way
High St E of Athel D'Ombrain Dr	883	1,283	1,330	1,289	1,294	1,274	1,279
High St between Victoria and Ward St	1,252	1,109	1,216	1,070	1,139	1,144	1,160
High St E of Bourke	671	663	184	567	318	505	190
High St - Mall – if appl.			793	95	487	307	673
High St E of KT Dr	600	658	819	710	829	668	825
High St E of Long Bridge	1,022	1,072	1,011	1,042	1,048	1,100	1,105
KT DR between Bourke and Bulwer	652	646	164	555	295	489	179
KT DR between Bulwer and Elgin	506	521	261	325	244	457	159
KT DR between High St and AW Dr	844	822	591	715	633	806	675
AW Dr between Church St and KT Dr	1,132	1,133	756	1,028	984	967	735
Church St N of KT DR	231	257	114	256	316	104	194
Elgin S of KT Dr	215	218	330	353	300	212	192
Elgin N of KT Dr	431	473	254	261	252	426	143
Belmore Bridge	1,145	1,130	1,127	1,124	1,100	1,118	1,106
Long Bridge	918	928	940	933	916	961	957
Athel D'Ombrain Dr E of Victoria St	409	971	823	1,023	940	867	879
Victoria St	465	335	289	272	299	286	274
Sparke Street (new link to Athel D'Ombrain Dr) future only	87	609	551	648	601	556	578

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These results are also illustrated in Appendix A - Figures A3.10 and A3.11 for 2006 and 2026 scenarios, respectively.

The following main points are made based on the assessment of the traffic modelling scenarios for the existing situation:

- The comparison of S1 and S2 indicates that the introduction of Athel D'Ombrain Drive as an alternative route will reduce congestion levels along High Street, east of Victoria Street with improvements at Les Darcy Drive/Church Street roundabout.
- The introduction of a free left turn from Church Street onto Les Darcy Drive will significantly improve the operation of their intersection at the roundabout.
- The options for opening the Heritage Mall (i.e. S3, S4, S5 and S6) do not have a significant impact on operation/ performance of the route network.
- It is shown that opening the Heritage Mall, westbound only, (i.e. S6) will create a higher level of delays along the route network particularly along Belmore Bridge and High Street.
- Scenario 4 (i.e. the opening of the Heritage Mall from each side) will have a similar impact as other scenarios on the road network with an increased queue length along Ken Tubman Drive at its intersection with Belmore Bridge and High Street.
- The results for two way system along Church Street (i.e. S7) show some overall improvements along the route network (i.e. mid-block capacity) while moderate levels of congestion are experienced at intersections particularly at Belmore Bridge and Church Street.
- The overall results indicate that the option for opening the Heritage Mall with a two way system (considering the upgrade of Athel D'Ombrain Drive as part of all other options) has a marginal advantage over the other options in terms of road network operations.
- As part of the Scenario S3 (Heritage Mall open with High Street a two way system), modification will be required at intersection of High Street and Cathedral Street such as installation of traffic signals.

The analyses of 2026 traffic modelling scenarios revealed similar outcomes to 2006 including:

- The proposed upgrade of Athel D'Ombrain Drive will support a satisfactory operation of the road network. For example, the proposed free left turn facility at the intersection of Church Street and Les Darcy Drive (from Church Street onto Les Darcy Drive) will experience a high level of congestion and delays if the upgrade of Athel D'Ombrain Drive is not provided (see Appendix A - Figure A3.9 (S1F) and Figure A3.11 (S2F).
- There would be a need for a free left turn facility from Cessnock Road onto New England Highway at their intersection as part of the future road improvements. Consideration should also be given to possible realignment of Cessnock Road.
- There would be a higher demand for right turning movements from New England Highway onto Cessnock Road.
- All scenarios show satisfactory levels of service in terms of road network operations; considering that a number of improvements (e.g. road and intersection upgrades) are included as part of these scenarios.
- The intersection of Belmore Bridge and High Street will experience a better level of operational performance once the Third River Crossing is implemented.

Table 3.3: Traffic Flow Analysis of Scenarios (2026- PM Peak Hour)

	S1F	S2F	S3F	S4F	S5F	S6F	S7F
High Street – Mall – if applicable	0	0	793	95	487	307	673
KT Dr between Bulwer and Elgin	506	521	261	325	244	457	159
Athel D'Ombrain Dr E of Victoria Street	409	971	823	1,023	940	867	879
Total	915	1,492	1,877	1,443	1,671	1,631	1,711
Traffic taken off Les Darcy Drive	0	577	962	528	756	716	796

Table 3.3 shows that Scenarios S4F and S2F (i.e. one-way system along Heritage Mall and the Heritage Mall closed, respectively) are less effective in taking traffic off the Les Darcy Drive. All other scenarios attract more traffic off Les Darcy Drive with Scenario S3F (i.e. opening the Mall with two way system) showing the highest figure. However, it should be noted that part of this traffic would be using a section of High Street with a low speed limit of 35 km/hr, hence increasing the level of delays as part of network assessment – while increasing the fluidity/connectivity of the street system.

As part of this evaluation, the same travel demand has been used for all the options, therefore any differences are purely due to the different network options.

Therefore, it is important to understand the ramifications of the options in terms of their impact and the desired outcome for the Maitland CityCentre.

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3.5 Summary

The evaluation of the traffic modelling scenarios is represented in a dynamic format. This means that network performance levels change though time. Therefore, the interpretation of results is subject to a chosen time period; however, they do represent a trend.

The “Speed” and “Delay” profile of various scenarios are illustrated in Figures 3.6 to 3.9.

The comparisons of the above figures indicate that most scenarios have broadly similar characteristics in terms of road network performances.

Further analyses of results however reveal that each scenario has a particular impact on the road network. The reconnection of High Street scenario showed no adverse impact on operation of the street system. However, introduction of a two, one-way system from each direction along High Street (Heritage Mall section) will produce the similar operational results to the existing situation (i.e. closed section).

It should be noted that while modelling scenarios do not provide a conclusive verdict on reconnection of High Street, they do however show two important factors a) there will be no adverse impact if High Street is reconnected; and b) marginal improvements on street network performance would be experienced if such a measure is introduced.

Therefore, such proposals should also rely on other relevant aspects including amenity, area connectivity, economic vitality and urban development.

The results of the traffic modelling analyses for each scenario are shown in Appendix A. They represent the operation of the route network in terms of road capacity and level of congestions (vehicular queues) at intersections. The evaluation of the traffic modelling scenarios is represented in a dynamic format. This means that network performance levels change though time. Therefore, the interpretation of results is subject to a chosen time period; however, they do represent a trend.

The “Speed” and “Delay” profile of various scenarios are illustrated in Figures 3.6 to 3.9.

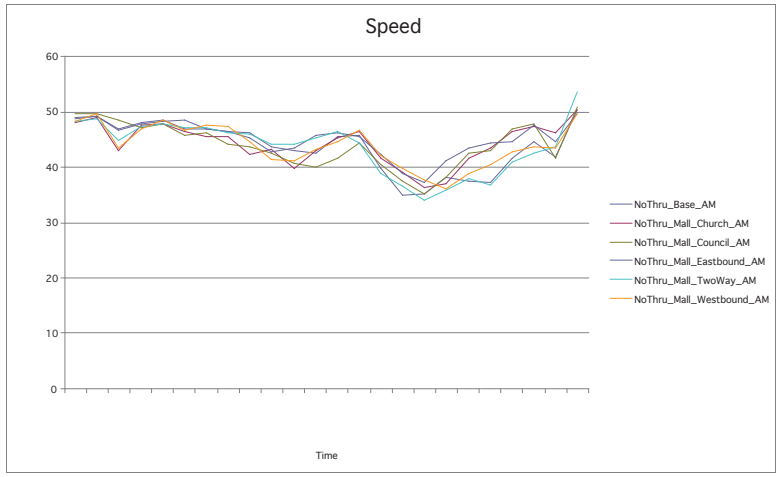

Figure 3.6 Speed Profile Internal CBD Trips Only – Existing Road Network

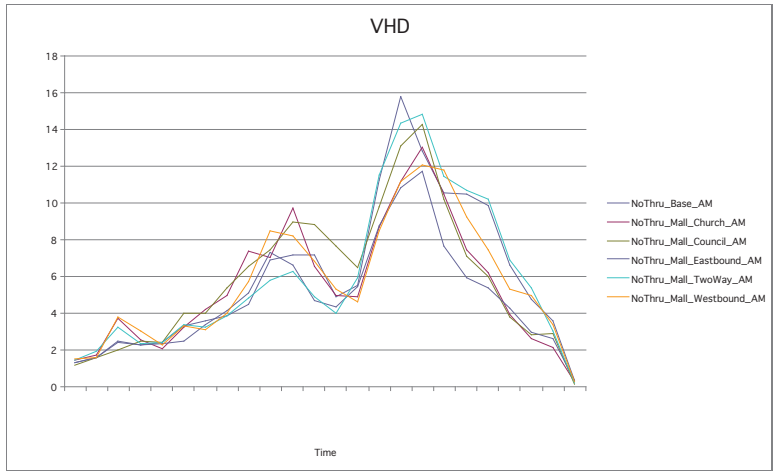

Figure 3.7 Delay Profile Internal CBD Trips Only – Existing Road Network

Note: VHD = vehicle hours delay

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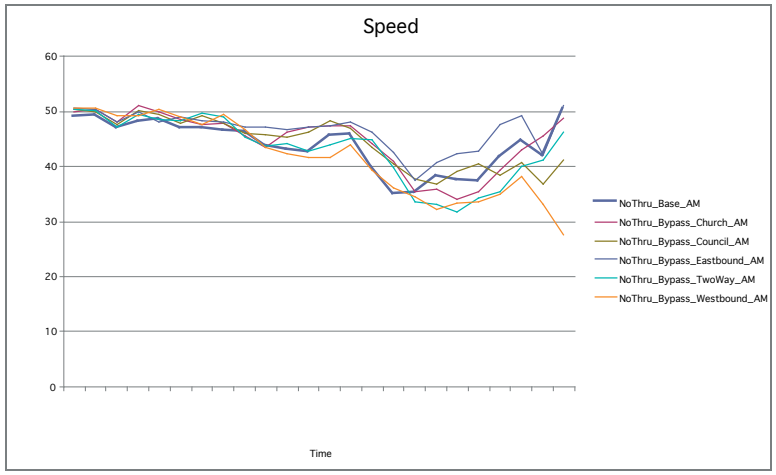

Figure 3.8 Speed Profile Internal CBD Trips Only – Road Network with Athel D'Ombrain Drive Upgrade

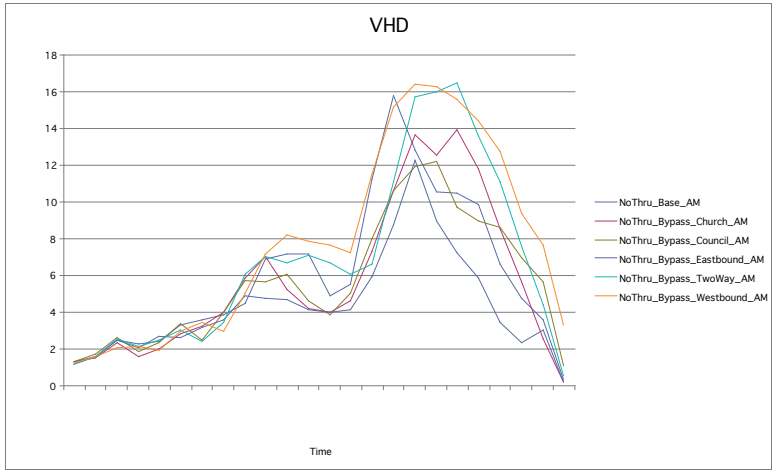

Figure 3.9 Delay Profile Internal CBD Trips Only – Road Network with Athel D'Ombrain Drive Upgrade

Note: VHD = vehicle hours delay

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4.0 ACCESS PLAN

4.1 Introduction

The access plan in terms of traffic and pedestrian aspects sets out measures and strategies to accommodate the present and future needs of the City Centre. It has been the aim of the study to establish solutions that are feasible, practical and also achieve the objectives of an integrated land use and transport management plan.

The Access Plan for Maitland City Centre encompasses a number of strategies that are detailed in the following plans.

4.2 Pedestrian Access and Mobility Plan

Most streets within the Maitland City Centre have a level surface which makes it ideal for the movement of pedestrians and cyclists. The Centre is also furnished with appropriate pedestrian facilities.

There are number of links and walks available within the City that provides connections throughout the Centre and could also be used for recreational and/or sightseeing purposes. Some of the major walks include:

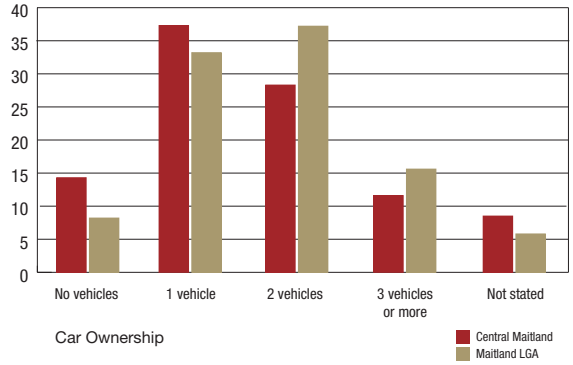
- River Walk: the promenade along the Hunter River
- Heritage Walk: a walk within the Central Precinct
- High Street Walk: experiencing High Street from its east end to Long Bridge and further

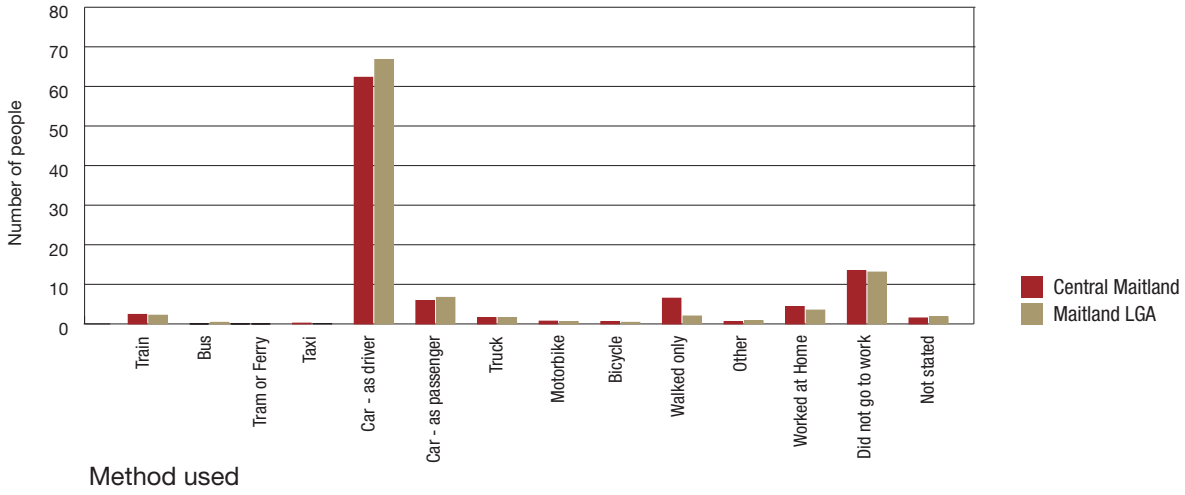
Accordingly, a number of measures have been identified (as part of the Pedestrian Access and Mobility Plan - PAMP) for the Centre to further improve its pedestrian safety and amenity. These measures have considered that:

- the proposed measures would have a minimal impact on parking provisions along streets, therefore some modifications to RTA guidelines have been adopted only if they were necessary. It should be recognised that the parking supply within a CBD environment is vital to its daily function, operation and various demands.
- the proposed measures are practical and feasible with respect to the road environment, road network requirements and capacity; and
- there would be no adverse impact on the operation of the road system nor on intersection performance or bus services.

The main objectives of a Pedestrian Access Plan are (based on RTA Guide, 2002):

- To facilitate improvements in level of pedestrian access and priority, particularly in areas of pedestrian concentration.
- To reduce pedestrian access severance and enhance safe and convenient crossing opportunities on major roads.
- To identify and resolve pedestrian crash clusters.
- To facilitate improvements in the level of personal mobility and safety for pedestrians with disabilities and older persons through the provision of pedestrian infrastructure and facilities which cater to the needs of all pedestrians.
- To provide links with other transport services to achieve an integrated land use and transport network of facilities that comply with best technical standards.
- To meet obligations under the Commonwealth Disability Discrimination Act (1996).





The activities of the pedestrian route system within the study area are shown in Figure 4.1 and are identified in two groups:

- **High Activity Routes:** mainly the core section of High Street and the area near the Maitland Railway Station.
- **Medium Activity Routes:** the eastern part of High Street and the side streets along the Heritage Mall.

With consideration to the above and the following factors, appropriate pedestrian facilities and traffic management measures are proposed for the area as shown in Figure 4.3 and Table 4.1.

- Road geometry
- Relevant guidelines and standards
- Level of pedestrian usage and demand
- Road safety principles
- Level of vehicular traffic and conflict between pedestrians and vehicles
- Characteristics of street and its pedestrian interactions

The PAMP also proposes a 40km/h speed limit management system as shown in Figure 4.2. The appropriate traffic management measures would be applied along these roads to ensure a low speed environment.

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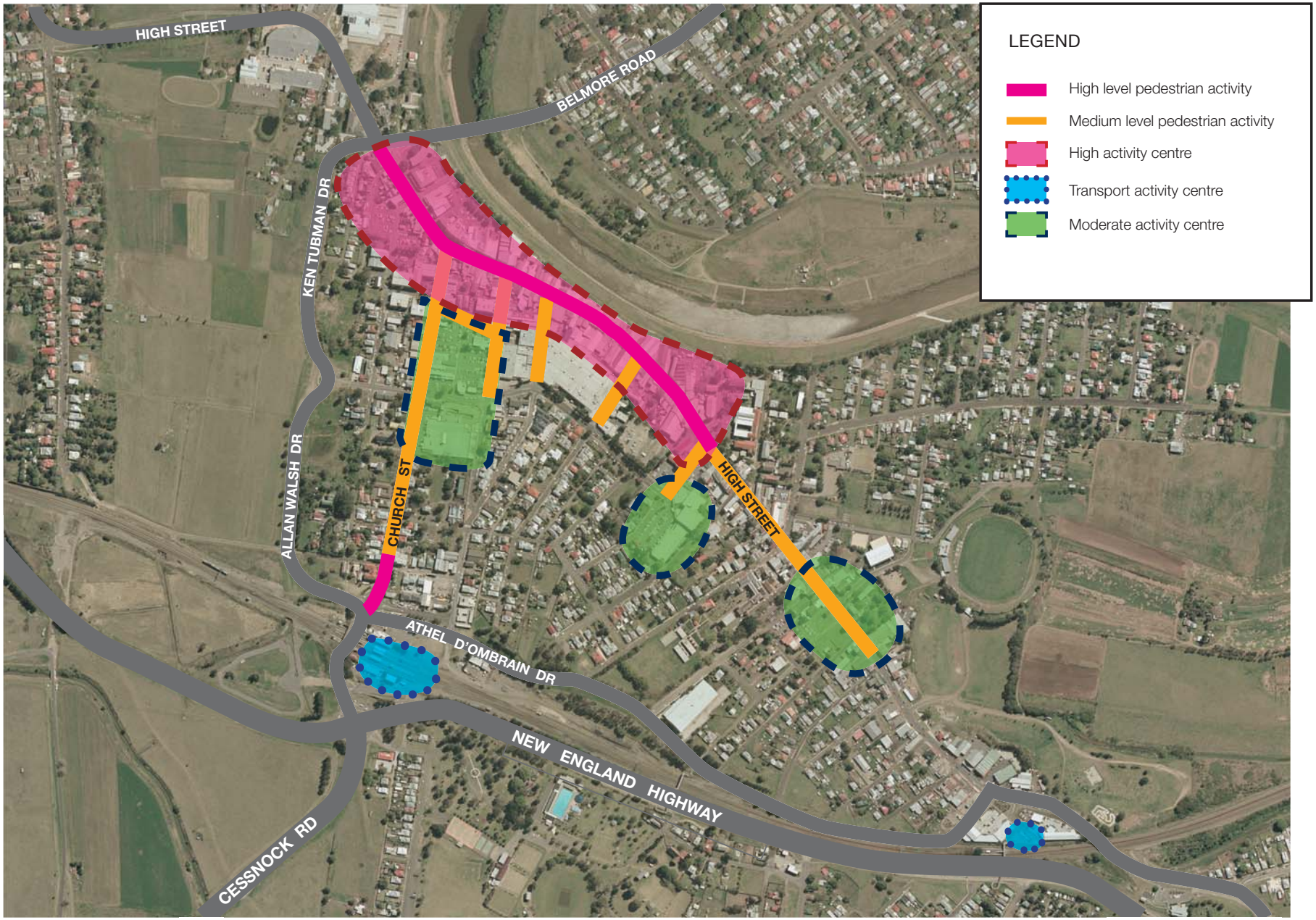

FIGURE 4.1 - PEDESTRIAN ACTIVITY

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FIGURE 4.2 - PROPOSED SPEED ZONES

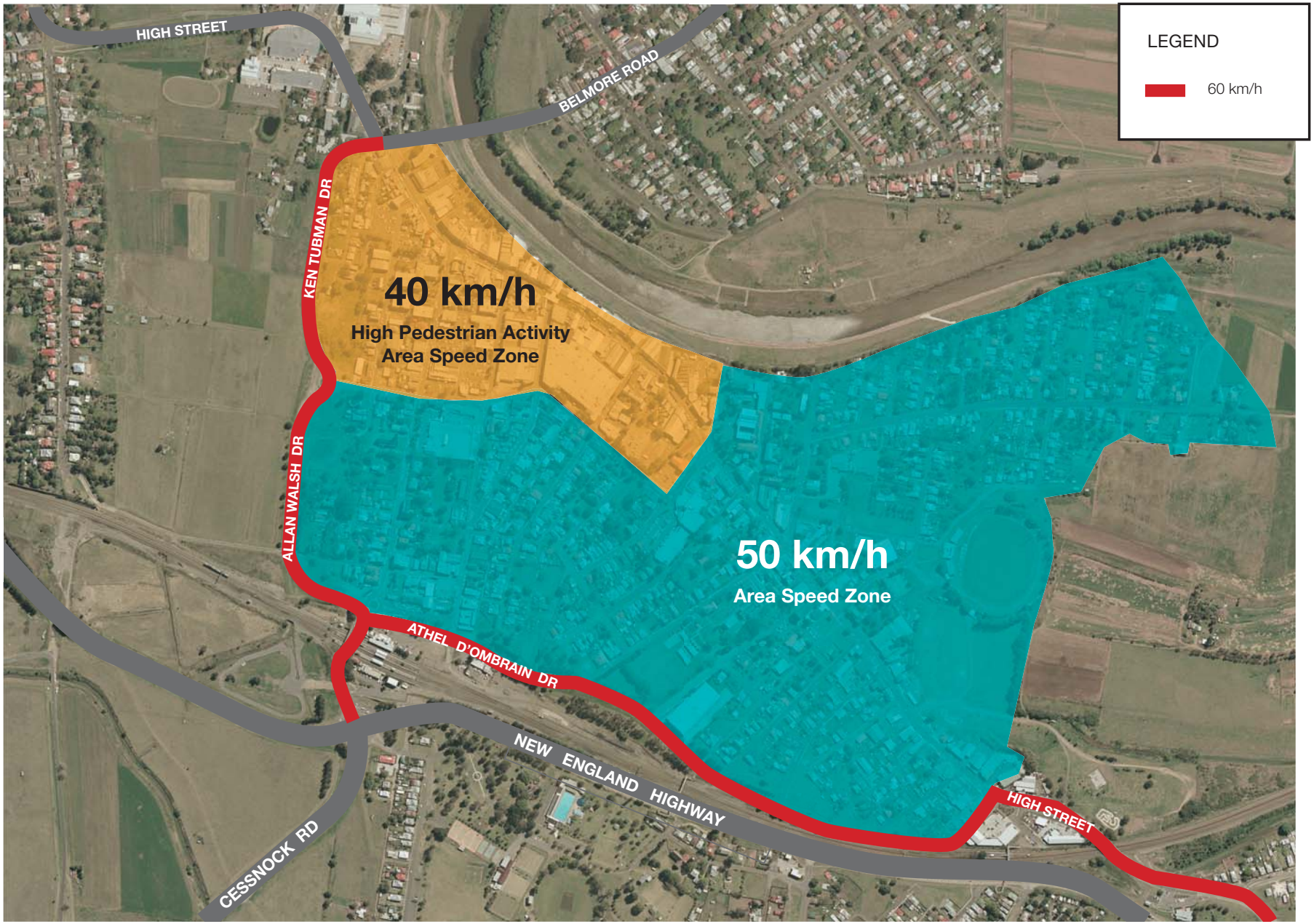

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Table 4.1: Pedestrian Access Implementation Plan

MAITLAND CBD PEDESTRIAN ACCESS IMPROVEMENTS PLAN				
	LOCATION	**SECTION**	**PROPOSED WORKS**	**COMMENTS**
1	Church Street	At Les Darcy Drive	Extend the pedestrian bridge over the proposed left turn lane slip lane to join with the footway on the railway overbridge.	As part of the overall improvement of roundabout operation at New England Highway/Cessnock Road
2	Church Street	Les Darcy Drive to Railway Street	Install RTA verge style pedestrian fence (or similar).	Road safety measure - to separate vehicle and pedestrian traffic
3	Railway Street	East of Church Street	Close the splitter island pedestrian refuge island and install a marked foot crossing. Install RTA verge style pedestrian fence (or similar) in the northern footway to direct pedestrians to the crossing.	To improve road safety at key pedestrian desire line.
4	Church Street	North of Railway Street	Enlarge and redirect the pedestrian refuge within the roundabout splitter island.	To improve the amenity of the refuge island for pedestrian movements.
5	Allan Walsh Drive	At Steam Street	Define edges of the road carriageway with kerb and gutter and kerb ramps and install a pedestrian refuge island. Raise the west footway approach to improve the sight line between drivers and pedestrians/cyclists.	To provide a crossing facility for pedestrians and cyclists on the major road.
6	Moore Street	Church Street to Elgin Street	Signpost as a shared zone.	To create pedestrian use due to the narrow footway
7	Pedestrian bridge over the railway corridor	Devonshire Street to Athel D'Ombrain Drive	Replace the steel bridge with an accessible structure consistent with the standard of the adjoining pedestrian bridge over the New England Highway.	To improve access by providing ramps.
8	Athel D'Ombrain Drive	Elgin Street to Devonshire Street	Provide kerb and gutter and an off-road shared pedestrian/cycle path on the south side of Athel D'Ombrain Drive to link the railway overbridge to Maitland Station transport interchange.	To provide connection between South Maitland and Maitland Railway Station.
9	Athel D'Ombrain Drive	At Devonshire Street	Install pedestrian refuge island.	To provide crossing facility adjacent to railway overbridge.
10	Athel D'Ombrain Drive	West of Bent Street	Install pedestrian refuge island.	As part of PAMP to school and recreational facility.
11	Bent Street	At Athel D'Ombrain Drive	Install pedestrian refuge island.	As part of PAMP to school and recreational facility.
12	Nicholson Street	At Victoria Street	Install kerb extensions.	To define local residential area.
13	Elgin Street	North of Olive Street	Remove marked foot crossing and install pedestrian refuge island.	As part of the proposed roundabout at Elgin and Bulwer Street.
14	Ken Tubman Drive	At High Street (east)	Consult with owner of the corner property to adjust/remove sign and wall to improve sight line between pedestrians and drivers.	To improve pedestrian safety at intersection.
15	Belmore Road	High Street to west end of Belmore Bridge	Install RTA verge style pedestrian fence (or similar) both sides.	To separate vehicle and pedestrian traffic - better use of traffic signal.
16	Belmore Bridge		Investigate the feasibility of widening the southern footway only (minimum), both footways (desirable), and construction of a new pedestrian/cycle bridge to provide a two way shared path link to Lorn.	To provide sufficient footway width to cater for both pedestrians and cyclists.
17	High Street	At Smith Street	Gateway treatment incorporating a marked foot crossing.	To improve pedestrian crossing at High Street near sports fields.
18	Area wide		Audit pedestrian facilities and footpaths for adequacy and standard of kerb ramps, crossing facilities, need for tactile ground surface indicators, hazards and footpath construction and maintenance.	As part of the overall pedestrian improvement program.

High Priority **Medium Priority** **Low Priority**

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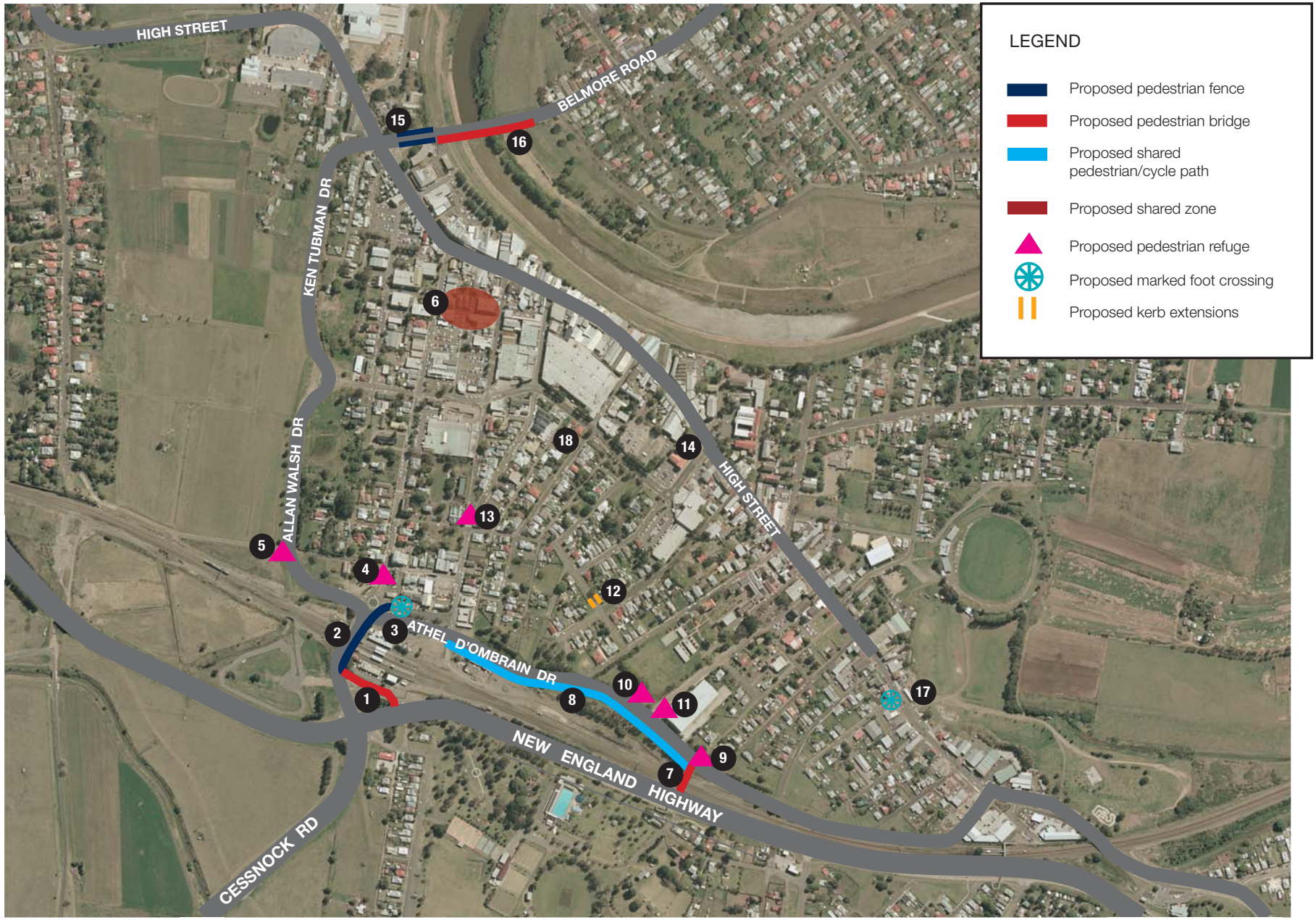
FIGURE 4.3 - CBD PEDESTRIAN ACCESS IMPROVEMENTS



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The proposed treatment has aimed to reduce vehicular speeds within the Centre with minimum impact on pedestrian activities. This proposed scheme should be complemented with appropriate urban design elements while providing ample amenities for pedestrian movements.

In addition to the proposed PAMP for the area, it is also recommended that consideration be given to the following strategic measures:

- A new pedestrian bridge over the Hunter River to link the eastern section of High Street (near Bourke or Cathedral Streets) to Lorn
- Improve the existing pedestrian bridges over Les Darcy Drive/railway line (connecting South Maitland to Maitland CBD) by way of urban design and refurbishment
- Further improvements of access links to river frontage

4.3 Bike Plan and Facilities

The existing Maitland Bike Plan has identified bike routes within the CBD area. The existing bike routes include a connection between East Maitland, South Maitland and Lorn via Harold Gregson reserve, Smith Street, Athel D'Ombrain Drive, Allan Walsh Dive and Belmore Road.

An assessment of existing bike routes/facilities has been carried out and a number of measures and routes are identified as shown in Table 4.2.

Figure 4.4 shows the existing and proposed bike routes within the study area.

As part of the future strategy for the Centre and to reduce car dependency the following concepts are proposed for consideration:

- Provision of bike storage facilities at strategic locations such as railway stations, shopping and recreational areas.
- A rental facility that would allow people to hire a bike for a short term as their means of travel within the City Centre. These could be located at the Railway Station/s or near the river.
- Introduction of a "bike day" concept. This would require the allocation of all or part of a day in a month or week to ban vehicles from certain streets. This would allow bike riders or people on skate boards to use the streets free from any conflicts with cars.

Table 4.2: Bike Plan Implementation Plan

MAITLAND CBD BIKE PLAN			
	LOCATION	**SECTION**	**PROPOSED WORKS**
1	Bike Plan 2005	Map 3 of Council's Bike Plan	Progressive implementation.
Key additional facilities proposed common with the pedestrian access improvements plan:			
2	Allan Walsh Drive	At Steam Street	Define edges of the road carriageway with kerb and gutter and kerb ramps and install a pedestrian refuge island. Raise the west footway approach to improve the sight line between drivers and pedestrians/ cyclists.
3	Pedestrian bridge over the railway corridor	Devonshire Street to Athel D'Ombrain Drive	Replace the steel bridge with an accessible structure consistent with the standard of the adjoining pedestrian bridge over the New England Highway.
4	Athel D'Ombrain Drive	Elgin Street to Devonshire Street	Provide kerb and gutter and an off-road shared pedestrian/cycle path on the south side of Athel D'Ombrain Drive to link the railway overbridge to Maitland Station transport interchange.
5	Athel D'Ombrain Drive	At Devonshire Street	Install pedestrian refuge island.
6	Athel D'Ombrain Drive	West of Bent Street	Install pedestrian refuge island.
7	Belmore Bridge		Investigate the feasibility of widening the southern footway only (minimum), both footways (desirable), and construction of a new pedestrian/cycle bridge to provide a two way shared path link to Lorn.
8	High Street	At Smith Street	Gateway treatment incorporating a marked foot crossing.
Proposed additional on-road routes (subject to survey and design):			
9	Church Street	Railway Street to High Street	Mark left hand side edge line for shared parking and cycle lane minimum 3.4m wide (2.0m parking/1.4m cycle lane).
10	Elgin Street	Railway Street to High Street	Mark left hand side edge line for shared parking and cycle lane minimum 3.4m wide (2.0m parking/1.4m cycle lane).
11	Victoria Street	Athel D'Ombrain Drive to Carrington Street	Mark left hand side edge lines for shared parking and cycle lanes minimum 3.4m wide (2.0m parking/1.4m cycle lane).
12	Athel D'Ombrain Drive	Rose Street to Sparke Street	Route upgrade proposed in Maitland CBD Traffic Management Plan (includes section of Abbot Street and connection to Sparke Street).

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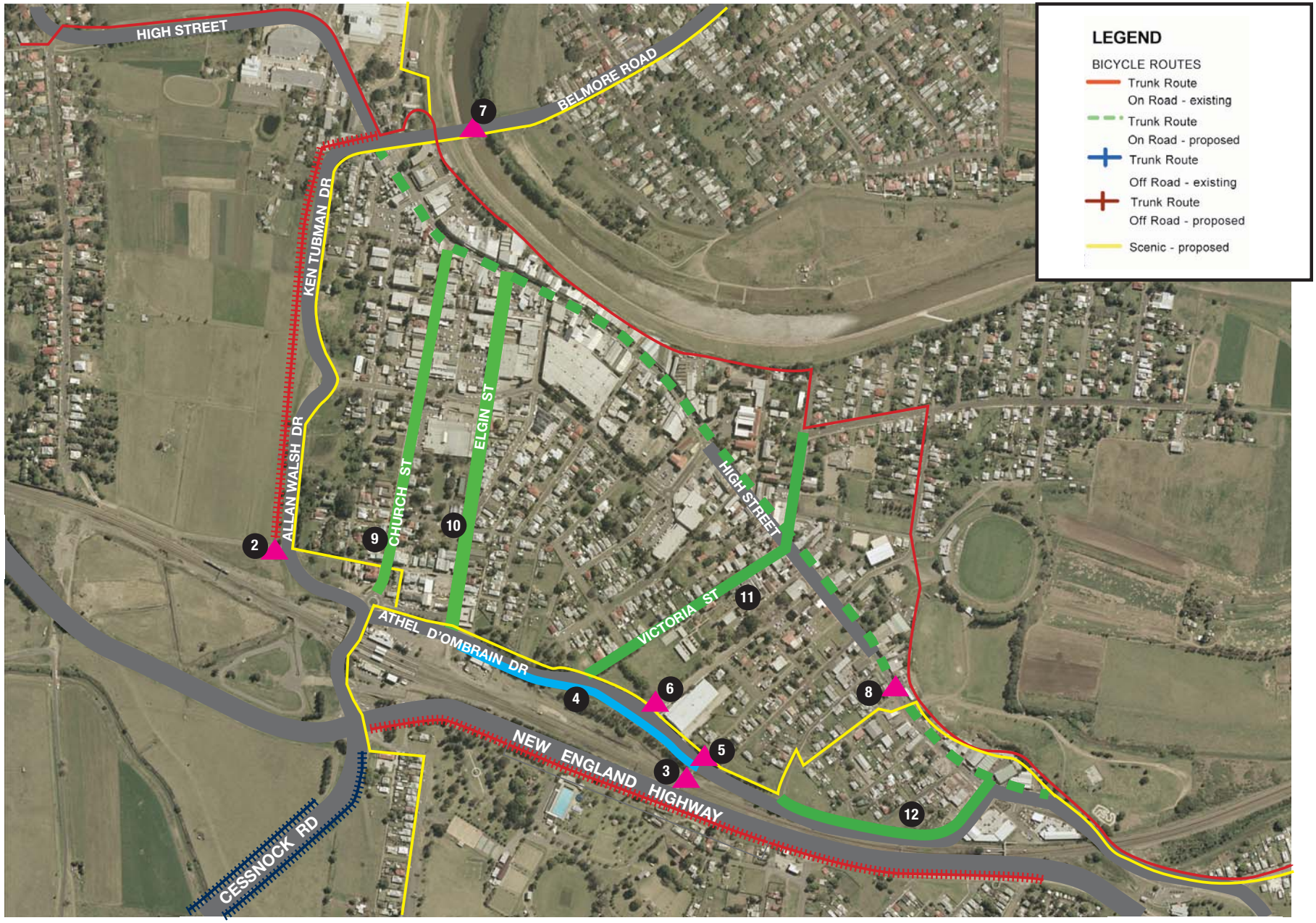
FIGURE 4.4 - MAITLAND CBD BIKE PLAN



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4.4 Public Transport

The Maitland City Centre is well serviced by public transport. There are two railway stations (High Street and Maitland) within the study area while buses provide services along High, Church and Elgin Streets and Ken Tubman Drive.

The existing bus routes and taxi ranks within the study area is shown in Figure 4.5.

In order to improve the accessibility to/from Maitland Railway Station, an interchange concept plan has been prepared and is shown in Figure 4.6. The proposed plan aims to rationalise the existing vehicular movements at the site while providing better amenity for pedestrians and users of the area. Further, urban design elements could be integrated with the proposed plan to create a better ambience for the area.

It is also recommended that appropriate steps will be taken (with relevant bodies e.g. Rail Corp) to improve the current situation at High St Railway Station.

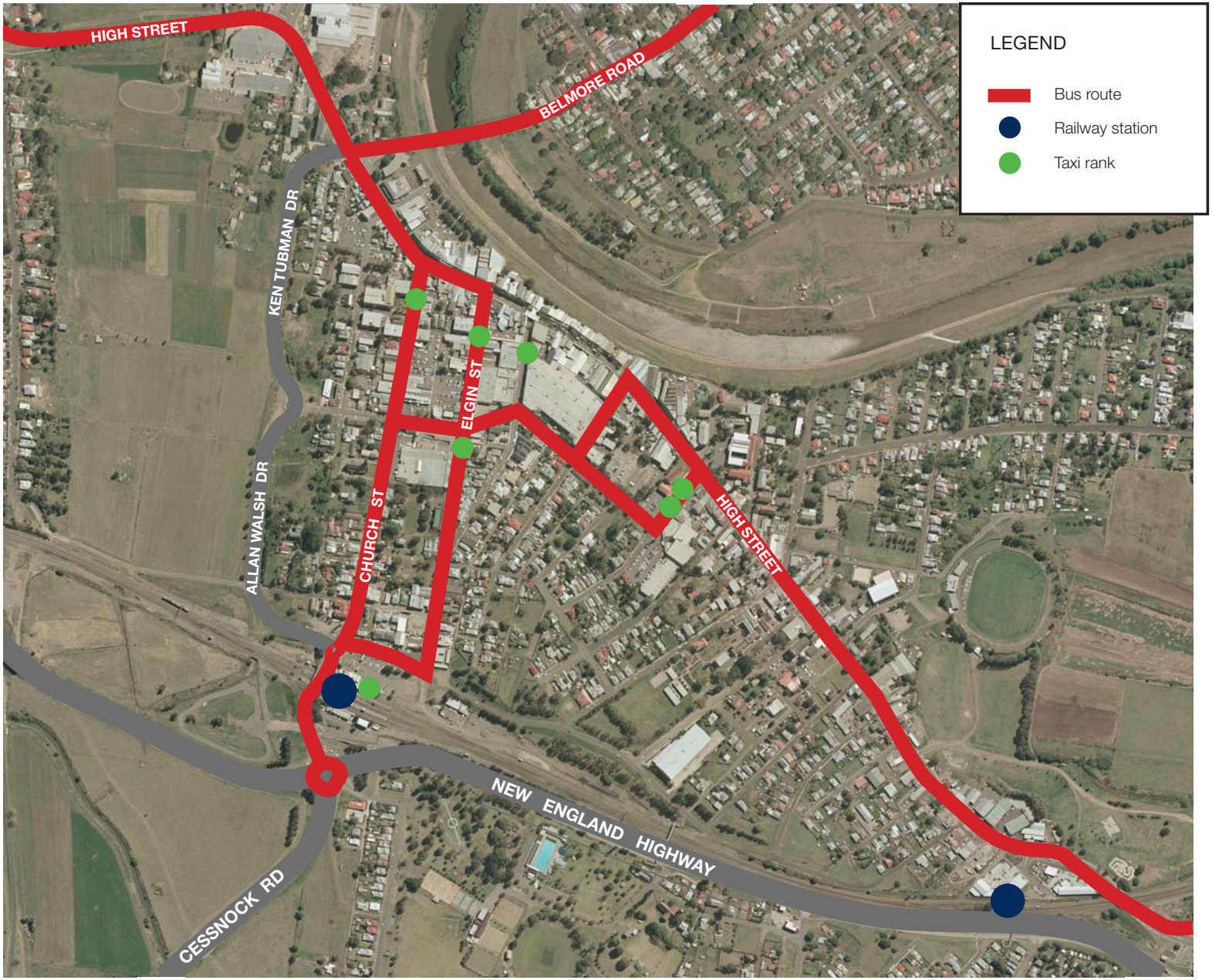

FIGURE 4.5 - EXISTING BUS ROUTES & TAXI RANKS

Note: Lower Hunter Transport Guide provides comprehensive information about all the public transport services in the region

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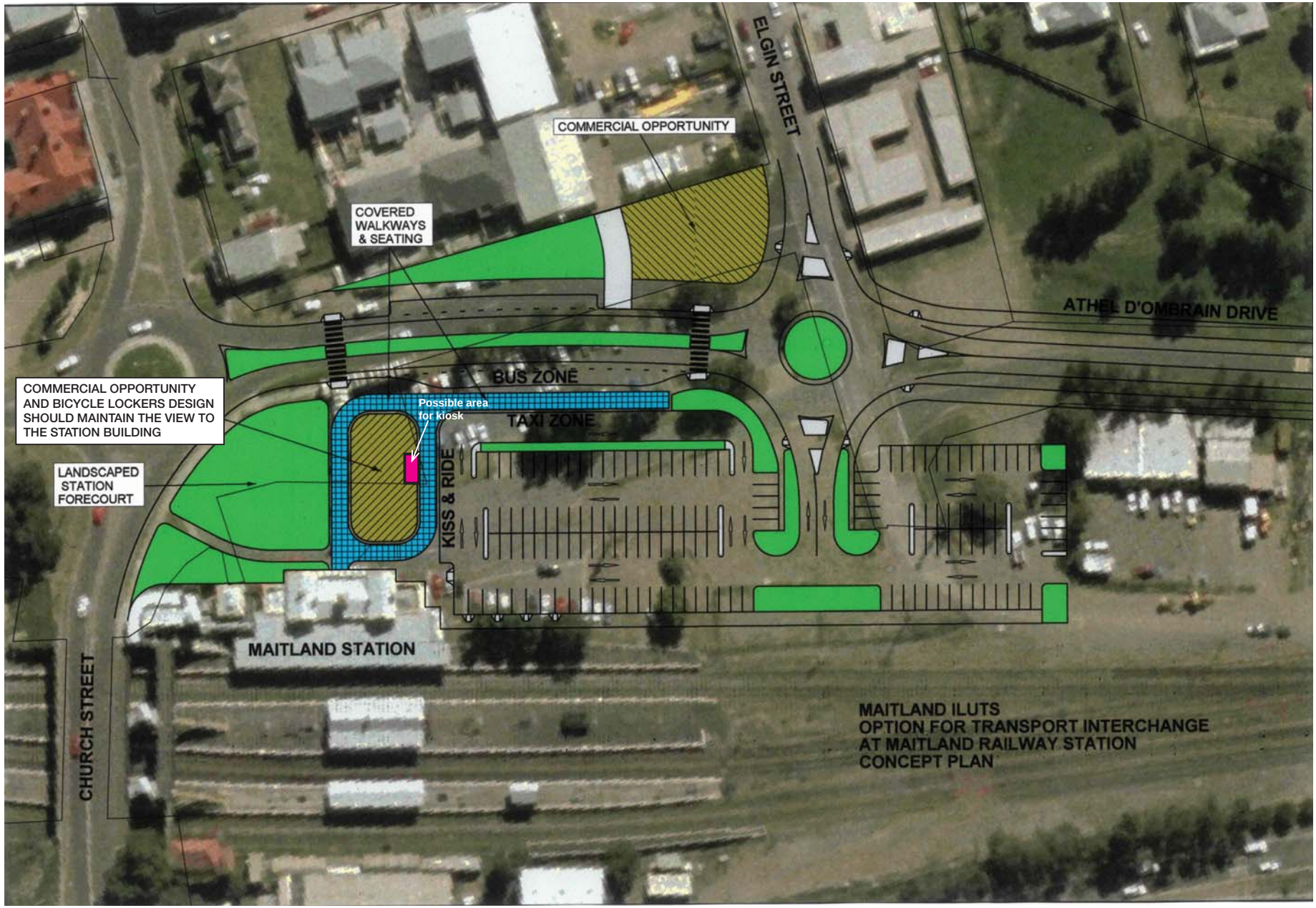
FIGURE 4.6 - TRANSPORT INTERCHANGE CONCEPT PLAN



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4.5 Access Management Plan

A traffic management plan for the area has been developed in order to:

- Provide a better amenity for pedestrians, cyclists and users of the area.
- Improve vehicular traffic movements within the area.
- Reduce vehicular as well as pedestrian conflicts within the area.
- Provide better accessibility and a safer road system for the community.
- Respond to the needs of the community for the existing issues as well as future requirements of the area.

The proposed measures are shown in Figure 4.7 and are itemised in Table 4.3.

It should be noted that the proposed plan is based on a holistic approach to the study area rather than applying traditional "local area traffic management". This method will aim to provide a more integrated solution with consideration to all modes of transport as well as land use activity and character. This results in an integrated movement plan for the area where the issue of accessibility and mobility for all users are considered and addressed.

The main outcomes of the proposed access management plan for the Maitland CBD are summarised below:

1. Upgrade of Athel D'Ombrain Drive: the introduction of this alternative route will provide a higher capacity for the road network hence, better mobility, accessibility and choice of routes for users of the area.
2. Movement plans for pedestrians and cyclists: the proposed measures will improve or provide facilities for pedestrian and cyclists, they also form part of the access plan for the area. For example, possible replacement of the current roundabout at intersection of High Street and Ken Tubman Drive (east end) - while it provides better facility for pedestrians, it also integrates as part of the overall vehicular movement throughout the area as well.
3. Proposed road hierarchy plan: it aims to represent a functional utilisation of the streets within the network i.e. appropriate use of the streets and balanced distribution of vehicular traffic. For example, recognition of Victoria Street as a "major local" road.
4. Route Network Options: the tested scenarios aimed to address the issue of vehicular circulation within the Maitland CBD. The assessment of traffic modelling results showed that there would be no adverse impact if High Street would be reconnected (i.e. opening the Heritage Mall) and in fact marginal improvement of route network operation could also be experienced.
5. Intersection improvements: these measures will contribute to overall operation of the street system while providing facility for the community e.g. proposed traffic signals at intersection of Les Darcy Drive at Louth Park Road. Part 1 of the study has also detailed the assessment of major intersections within the study area. It is recognised that the operation of certain intersections such as Les Darcy Drive with Church Street and Belmore Road with High Street will be improved by introduction of future route proposals (e.g. Third River Crossing) in conjunction with measures outlined in this study.

Table 4.3: Traffic Management Implementation Plan

MAITLAND CBD TRAFFIC MANAGEMENT PLAN				
	LOCATION	**SECTION**	**PROPOSED WORKS**	**COMMENTS**
1	Athel D'Ombrain Drive	At Elgin Street	Install roundabout	To improve circulation and access to the railway station.
2	Athel D'Ombrain Drive	At Victoria Street	Install roundabout	As part of future road heirarchy for better connectivity and circulation within the area.
3	Sparke Street	At High Street	Install roundabout	New intersection to facilitate the Athel D'Ombrain Drive upgrade proposal.
4	Athel D'Ombrain Drive	Church Street to Sparke Street	Route upgrade (includes section of Abbot Street and connection to Sparke Street)	As part of the Athel D'Ombrain Drive upgrade for its higher use.
5	New England Highway	At Louth Park Road	Install traffic control signals	To provide safer access to South Maitland.
6	New England Highway	At Cessnock Road and Church Street	Modify existing roundabout to provide left turn slip lanes into the New England Highway and close Walker Street approach	To improve intersection capacity operation.
7	Elgin Street	At Bulwer Street	Install roundabout	To improve intersection safety - safety measure.
8	Ken Tubman Drive	At Bulwer Street	Install roundabout	To improve circulation.
9	Ken Tubman Drive	At entry to cinema carpark	Modify central island of existing roundabout – remove signs and enlarge central island (fully mountable)	Urban design improvements.
10	Ken Tubman Drive	At High Street (west)	Investigate option to extend the left turn lane from Ken Tubman Drive	To improve intersection operation and capacity.
11	Ken Tubman Drive	At High Street (east)	Investigate option to remove roundabout and install traffic signals (in conjunction with any future change to traffic flow in High Street between Elgin and Bourke Streets).	To improve pedestrian amenity and safety.

High Priority **Medium Priority** **Low Priority**

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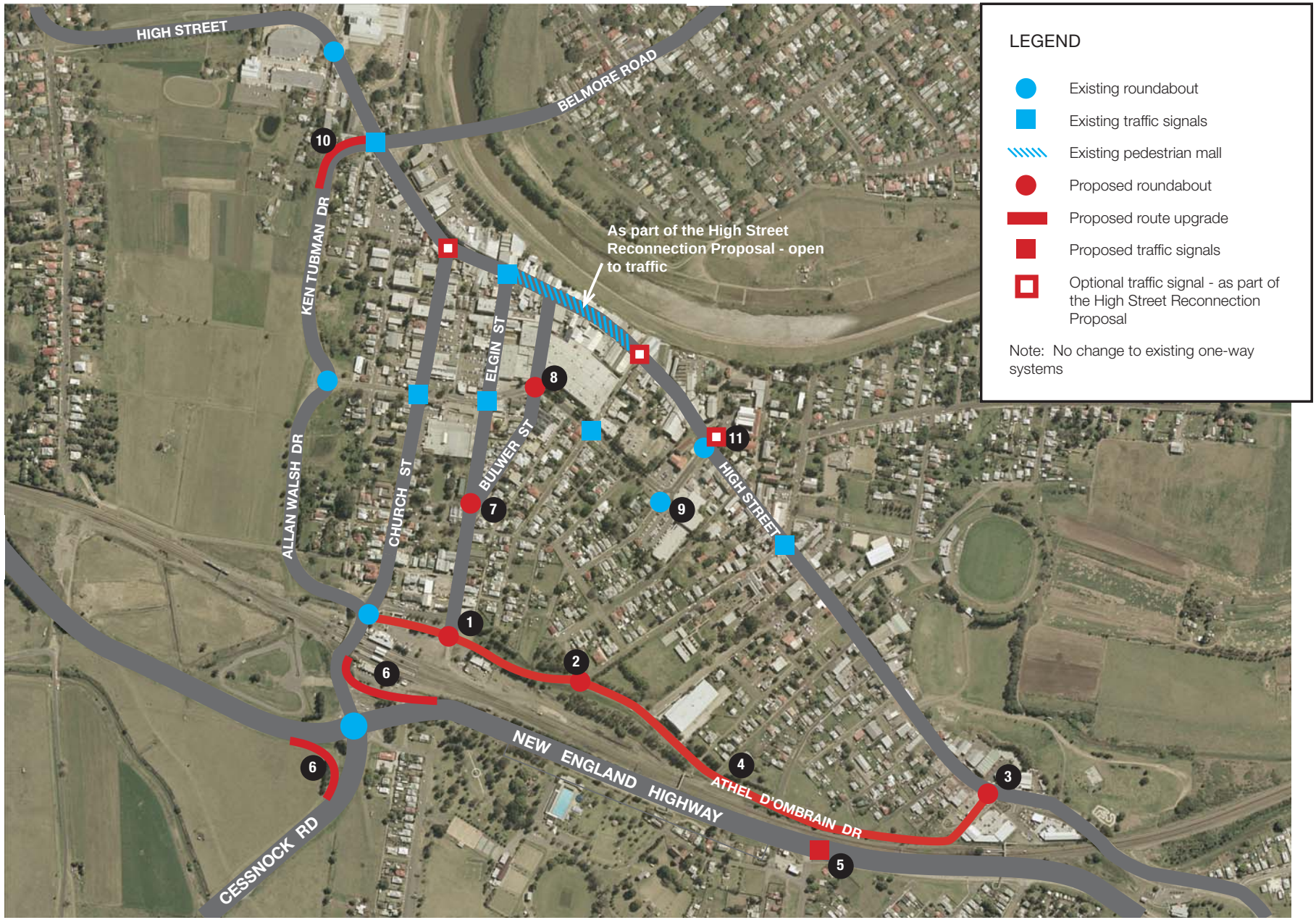
FIGURE 4.7 - CBD TRAFFIC MANAGEMENT PLAN



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5.0 STRATEGIES

5.1 Parking within the CBD

Taking into account that parking strategies play an important role as part of an integrated transport planning approach, recommendations should be based on an awareness of overall and long-term visions for the area. This means supporting strategies that are towards a more sustainable and less car dependent environment while maintaining the vitality and vibrancy of the area. Therefore, this study has aimed to develop and propose parking policies that are in line with the characteristics and the need of the area.

The documents Maitland City Centre Marketing Review (2005) and the Maitland CBD Parking Review (2004) provide detailed assessment of the parking supply and demand within the study area. Based on these documents and site analysis of the area, a parking review has been carried out.

Generally, parkers can be divided into the following indicative categories (during a weekday):

- **Resident Parkers:** Those vehicles leaving the study area between 7 AM and 9 AM and returning between 4 PM and 6 PM or those vehicles parked all day without moving or making in/out trips.
- **Short Stay Visitors:** Those vehicles, which park for less than 3 hours.
- **Long Stay Visitors/ Part-Time Workers/Commuters:** Those vehicles, which park for up to 6 hours.
- **Full Time Workers/Commuters:** Those vehicles, which park for over 6 hours (generally an 8 hours stay)

The overall parking supply for the Maitland CBD is shown in Table 5.1. There are a total of some 3,902 parking spaces within the City Centre, of which 597 are on street, 2,428 are public off street and 877 are private unrestricted off street spaces.

The current parking situation within the CBD shows an overall utility rate of about 79% for on-street parking. Similarly the off street parking occupancy rates vary from 60% to 94% with the exception of the Cinema Complex which experiences an average utility rate of only 40%.

An overview of parking survey results and general observations of the parking activity within the CBD area indicates that:

- Generally there is a high demand for both on and off street parking.
- The demand for parking is higher within the north - western sections of the CBD particularly the areas near High, Church, Elgin, St Andrews, Burke and Bulwer Streets.
- While many parking areas experience a full occupancy during peak activity times such as Christmas shopping period, these parking demands reduces to a lower level during normal periods.
- The results from parking study and pilot surveys of various parking sites within the study area indicate that currently the area operates at near capacity in terms of parking requirements. It appears that there is a high demand for long stay parkers at the designated western section.
- It is evident that parking demand is greatest at the areas close to parkers' destinations. This can be seen by the low usage of parking areas such as Pender Place multi storey area where the top level generally operates at 33% occupancy or top level of Kmart parking facility with about 45% utility rate.

Table 5.1: Parking Supply

Type of Parking	Number of spaces
On Street	
Time restricted	307
Unrestricted	291
Total On Street	**598**
Off Street	
Time restricted	1,204
Unrestricted – Public	1,224
Unrestricted - Private	876
Total Off Street	**3,304**
Total Restricted	1,511
Total Unrestricted	2,391
Total Parking Supply	**3,902**

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5.2 Parking Strategy

The parking strategy for the CBD comprises of two major elements: a) Review of Maitland City Council's Car Parking Development Control Plan (DCP); and b) Parking Management Measures, with consideration to the following points:

- To complement and stimulate the revitalisation of the CBD
- To meet the existing and future environmental and transport initiatives/responsibilities
- To provide a specific response to the need and demand of the area
- To reflect the aim and objectives of the Central Maitland Structure Plan

A review of gross floor area (GFA) for various uses within the CBD area shows a total of 75,408 m^2 of retail, 79,255 m^2 of commercial use, 17,191 m^2 of industrial land and 7,364 m^2 of medical use .

The parking rates (number of spaces per GFA) based on different land uses are shown in Table 5.2. The overall assessment indicates a total of some 154,663 m^2 for combined retail and commercial use with some 3,500 parking spaces would result in a parking rate of 1 space per 44 m^2 for the area (considering the remaining some 400 parking spaces are for industrial and other uses). However, applying the Council's rates for commercial and retail uses results in a parking demand of some 3,900 spaces. It is clearly evident that parking supply for the area reflects its current demand at near capacity (in consideration with the survey results) particularly at the western section of the CBD.

Table 5.2: Parking Rates for Maitland CBD

Category	Retail	Commercial	Medical	Industry	Medium Density Housing
Council	Shops less than 1000 m^2 – 1 space per 25 m^2 GFA 1 space per 35 m^2 GFA for new floor space Shops greater than 1000 m^2 – 1 space per 16 m^2 GFA	Business Premises including medical 1 space per 45 m^2	1 space per 45 m^2	1 space per 75 m^2	1 space for each one or two bedroom dwelling or 2 spaces for each dwelling containing more than two bedrooms plus 1 visitor space for the first three dwellings and 1 space for every five thereafter or par thereof
RTA	1 space per 20 – 30 m^2 *	1 per 40 m^2	4 per 100 m^2	1 per 77 m^2	1- 1.5 per unit + visitor parking 1space/5 units
Parking Study 2004	1 per 20 m^2*	1 per 37 m^2			

* assuming GLA is about 0.80 of GFA for areas less than 10,000 m^2 to over 30,000 m^2.

Accordingly, the following policies are suggested as part of a DCP – Car Parking for the area:

1. The Maitland CBD could be zoned into eastern and western sections with Victoria Street forming the boundary line.
2. The current Council's code would be applicable to the eastern section with adoption of 1 space per 35 m^2 for all retail uses.
3. The parking rate for retail and commercial uses in the western section could be limited to a maximum of 1 space per 50 m^2.
4. The current Council's parking rate for medium density housing would be maintained for both eastern and western sections.
5. Any deficiency on parking requirements (with exception of residential developments) as part of a development application could be compensated by way of contribution for provision of a common car parking area.

The above parking policies aim to encourage retail and business developments within the area while encouraging a higher use of active and public transport. These also respond to the context of the area by having a lower impact on sites with specific character as part of a potential redevelopment proposal.

As part of the overall parking management in the study area and improve the parking situation while responding to the area characteristics, the following measures are proposed:

- Installation of directional signs to show parking areas
- Provide parking facilities for short stay parkers closer to their destination – by managing time restrictions
- Encourage long stay parkers to utilise car parks that are within walking distance but away from attraction areas - by managing time restrictions
- Redevelopment of Church and Elgin Streets with a multi level car park
- Possible redevelopment of the car park at the north-west corner of Charles and Ken Tubman Drive (subject to site's acquisition)
- Inclusion of above ground parking level as part of the design schemes for redevelopments sites (as addressed in Structure Plan)
- Removal of the car parking areas at Cathedral and St Andrews Streets along the river side. These sites could be utilised for more appropriate use as part of the urban renewal.
- Investigate the introduction of Resident Parking Scheme for its feasibility and possible implementation
- Provide bicycle storage areas throughout the CBD area to encourage bicycle use.
- Negotiate with the owners of the Cinema Complex (or other possible areas) to use "excess" parking supply within the Complex for use by the public. This could be accommodated by time restriction or lease arrangement.
- Ensure that any car parking facility that would be provided is safe and elements of "crime prevention by design" are employed.
- Introduce incentive measures for employees who use active or public transport such as parking concession to employers who provide such schemes.

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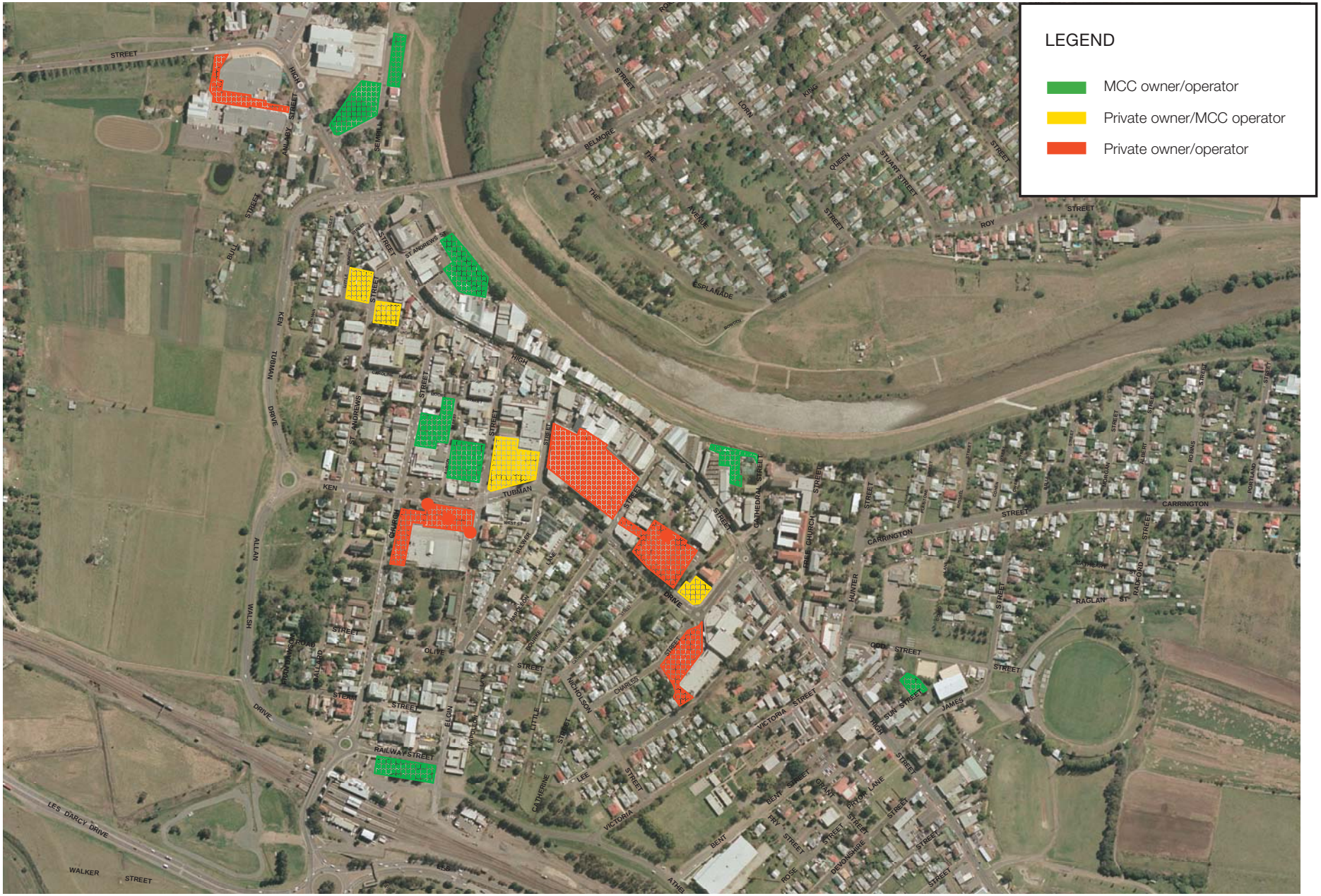

FIGURE 5.1 - EXISTING CAR PARKING AREA

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5.3 Heritage Mall

The Heritage Mall forms one of the most important components of the public domain within the Maitland City Centre. It is also the focus of major retail and commercial activities while its function and success plays an important role in contributing to the vitality of the City Centre.

Marketing studies for Maitland City Centre (City Marketing, 2005) have identified a number of strategies for improvement and revitalisation of the Centre.

As part of this study a number of route network scenarios (as detailed in Section 3.0 of this report) for a section of High Street, associated with the Heritage Mall (i.e. along High Street between Bourke and Elgin Streets) have been considered and analysed. These scenarios included:

a) Maintain the existing situation

b) Opening of the Mall with two one way systems (i.e. one way westbound from Ken Tubman Drive to Bulwer Street and one way eastbound from Church Street to Bulwer Street) with a one way system southbound onto Bulwer Street as an access road to car parking areas

c) Opening of the Mall with a one way system (between Ken Tubman Drive and Church Street) - eastbound or westbound; and

d) Opening of the Mall as a two way road along High Street

The following comments with respect to the above scenarios are provided for consideration:

- The option with westbound one way system would marginally have a higher level of delay and congestion along the route system with an impact on the performance of the Belmore Bridge and High Street intersection.
- The option with two one-way systems will have a similar characteristic to the existing situation. It will have a low impact on improving the operation of the road network. It also promotes the streets as an access road to the car parking areas along Bulwer Street which would conflict somewhat with the image of the City Centre and its main street.
- The options of opening the Heritage Mall to two way or eastbound one-way will have positive impacts on the operation of the road network. The opening of the Mall with a two way system along High Street will significantly improve the connectivity of the streets within the City Centre.
- However, any such treatments in the vicinity of the Heritage Mall should be based on sound urban design and neighbourhood planning principles. As an example of this, part of the design criteria used for the traffic modelling in this area was to adopt a low speed environment (i.e. maximum of 35km/h) for the section of High Street between Bourke and Church Streets. As a consequence the traffic modelling results could not clearly indicate particular advantages for any option.
- Of all the precincts in the City Centre, the Heritage Mall has the highest vacancy rate (Maitland City Centre, Product Analysis; 2005).

Accordingly, the following general strategies are made:

- The street environment (i.e. slow speed/pedestrian friendly) should play an important role as part of the future character of the area.
- A revitalisation of streetscape along High Street should be considered as part of the urban design improvement for the area; regardless of keeping the Mall as is or opening it to traffic.
- Promote higher use of the area during after hours and its interaction with the river front (e.g. noodle bars or kiosk along the river front arcades connecting to the river as well as upgrading existing lanes and streets with connections between High Street and the river).
- Review the street environment connections between the Mall and other sections of High Street (east and west) as well as those linking it to the south with the main rail station
- Review the viability of the Heritage Mall with consideration to current urban design and planning practices.

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5.4 City Centre

In consideration to the urban character and street system of the area the following strategies are suggested:

Uniting the Centre:

The divisive nature of principal roadways, barriers and natural features such as Les Darcy Drive, Ken Tubman Drive, closure of High Street at the Mall, the railway line and the river have collectively contributed to reducing accessibility within the City and its surrounding suburbs. Therefore, strategies such as the proposed Access Plan (e.g. pedestrian access to Lorn or South Maitland or upgrade of Athel D'Ombrain Drive) need to be considered to address the current lack of accessibility and connectivity within the Centre and its surrounding areas.

Establishment of a Main Axis:

The recognition of High Street (particularly considering its built environment and land uses) as a main axis within the City Centre would help to establish (or, historically, re-establish) a clear structure as part of the definition and legibility of the CBD. This would enable us to experience and appreciate the traditional principal street by way of a journey along its entire length - whether on foot, bike or by a car or bus. The precincts near Ward Street and Belmore Bridge define the gateways to the CBD on the basis of its historical context.

Sustainable City:

A review of the City Centre land use zones are recommended to address its future need and growth potential. Consideration should be given to encouraging mixed uses of residential, commercial and retail activities. Urban development opportunities could be explored along Athel D'Ombrain Drive, the river frontage and existing development areas within the Centre. This will support the notion of a sustainable city where people can work and live and where dependency on car use would be minimised. The sensitive, careful and clever use of appropriate modern architectural design could be beneficially employed while recognising the important and iconic historical soul of the area.

References:

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Core Study Team

Dr Kam Tara	Project Management - Analysis & Assessment
Paul van den Bos	Transport Modelling
Craig Garner	Traffic Management and Road Design
Geoffrey Britton	Urban Design
Robyn Hawes	Urban Planning
Michelle Hessing	Graphic Design/Report Presentation
Dr Ben Wallace	Botanical Expert

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APPENDIX A

TRANSPORT MODELLING RESULTS
SECTION A - AS REPORTED IN THE MAIN DOCUMENT

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FIGURE A3.4 - MAITLAND CBD TRAFFIC MODEL (TRAFFIC ZONE)

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FIGURE A3.5A - AM PEAK HOUR - QUEUE LENGTH AT BELMORE BRIDGE

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FIGURE A3.5B - AM PEAK HOUR - QUEUE LENGTH AT LES DARCY DRIVE

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FIGURE A3.5C - ROAD NETWORK PERFORMANCE - EXISTING SITUATION (AM PEAK HOUR)

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FIGURE A3.6A - PM PEAK HOUR - QUEUE LENGTH AT BELMORE BRIDGE

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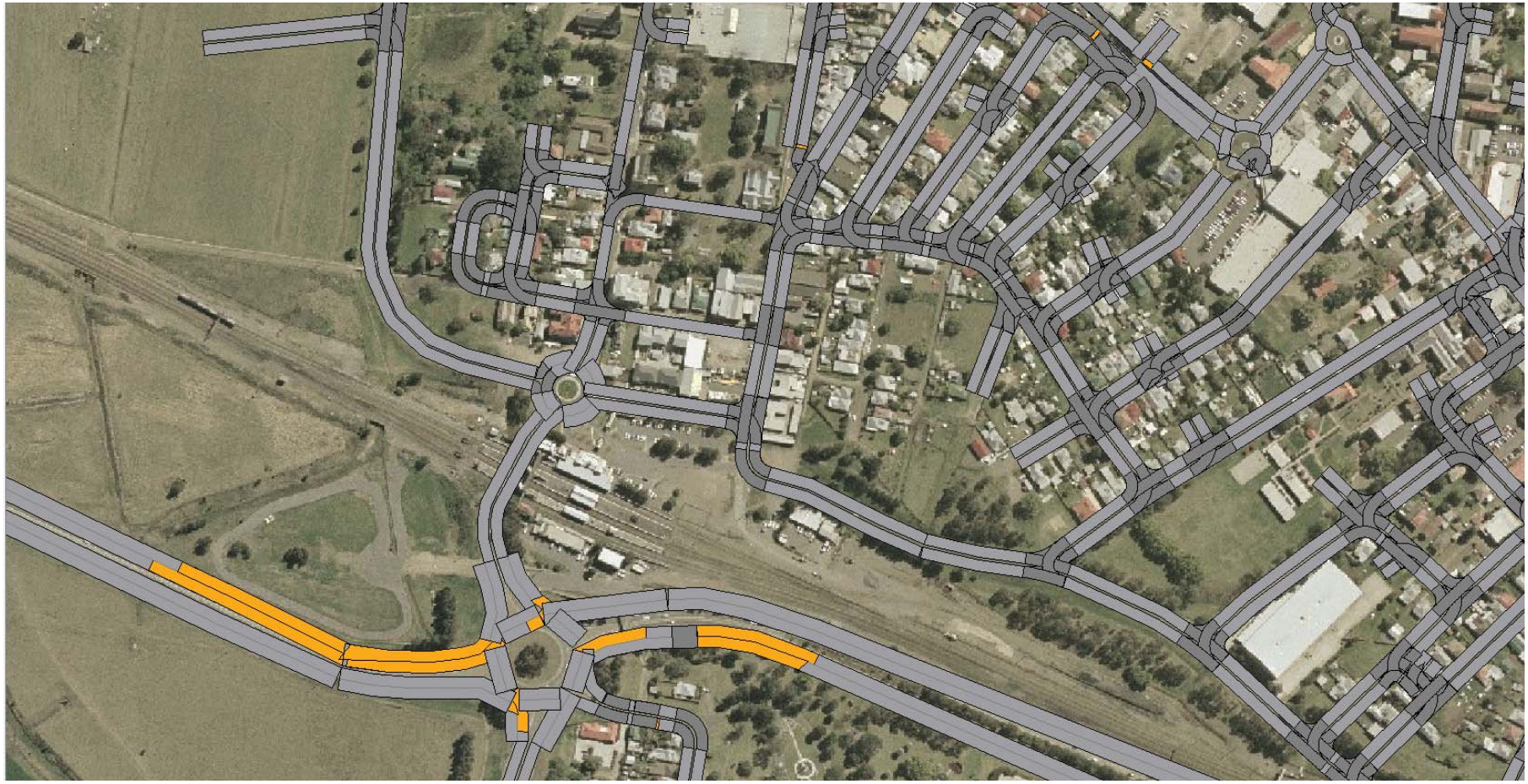
FIGURE A3.6B - PM PEAK HOUR - QUEUE LENGTH AT LES DARCY DRIVE



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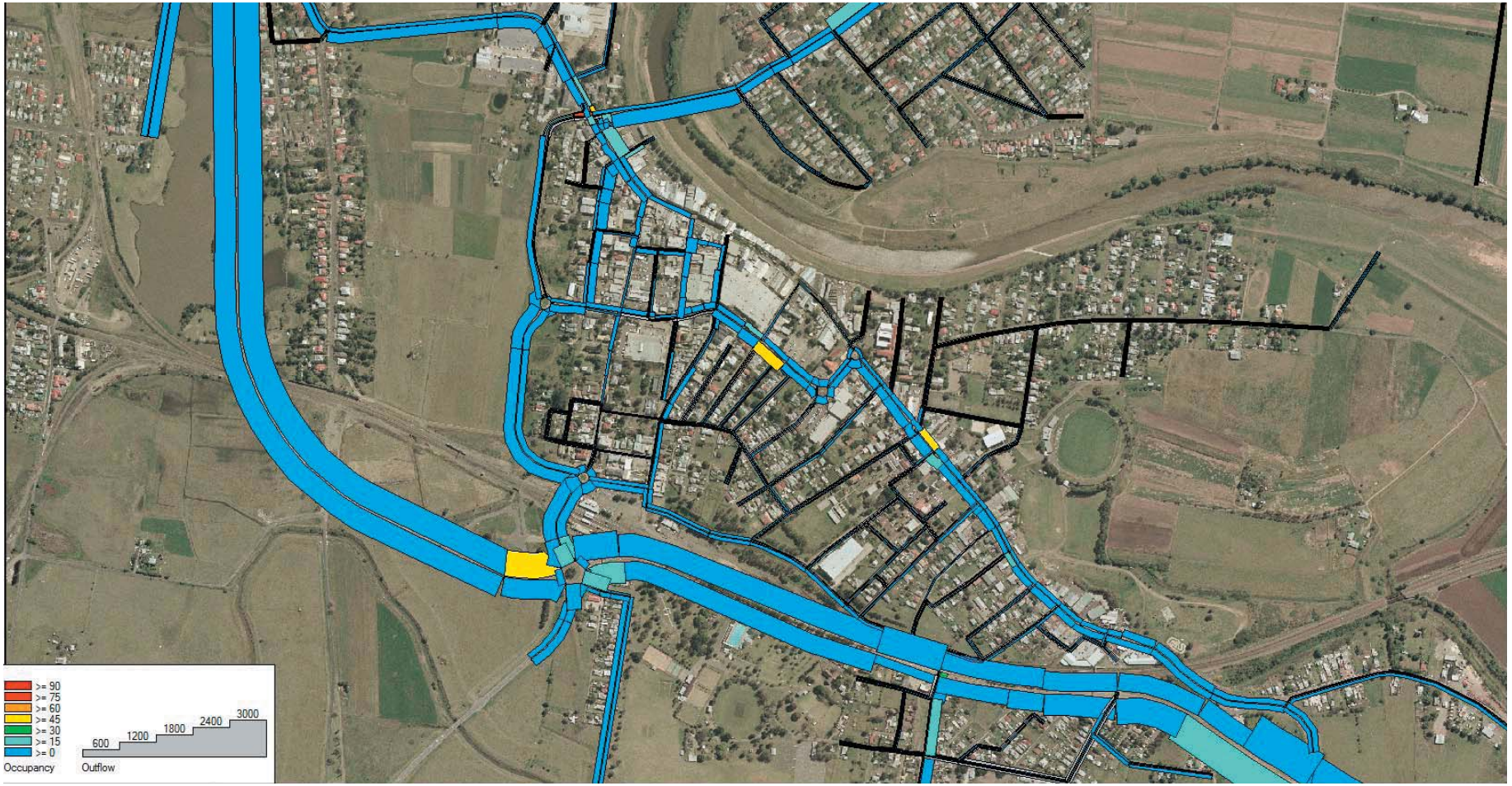

FIGURE A3.6C - ROAD NETWORK PERFORMANCE - EXISTING SITUATION (PM PEAK HOUR)

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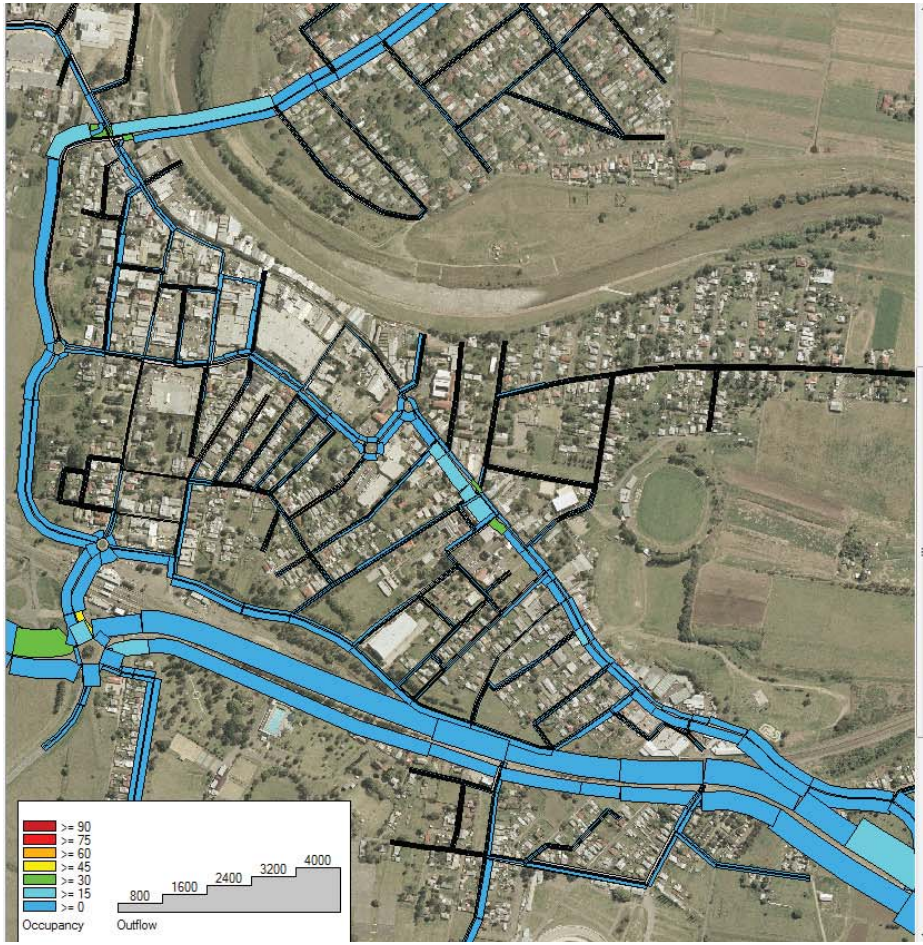
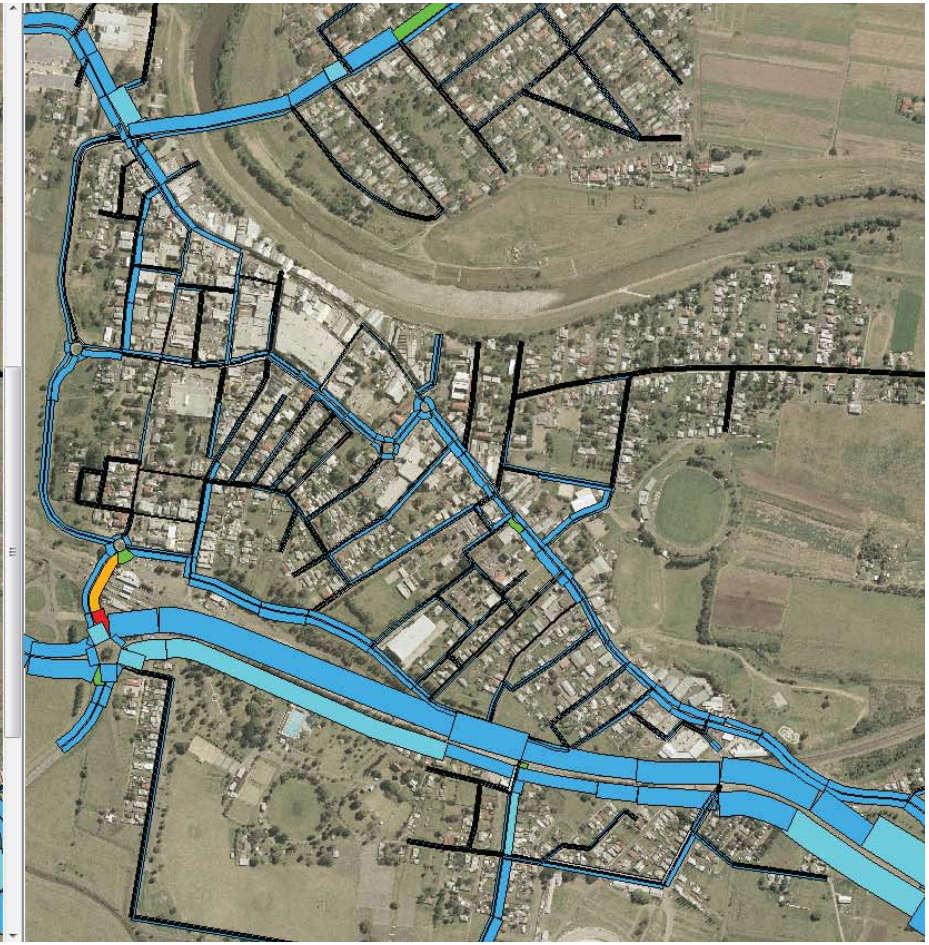
FIGURE A3.9 - COMPARISON OF THE 2006 PM MODEL WITH 2026 PM MODEL



2006



2026

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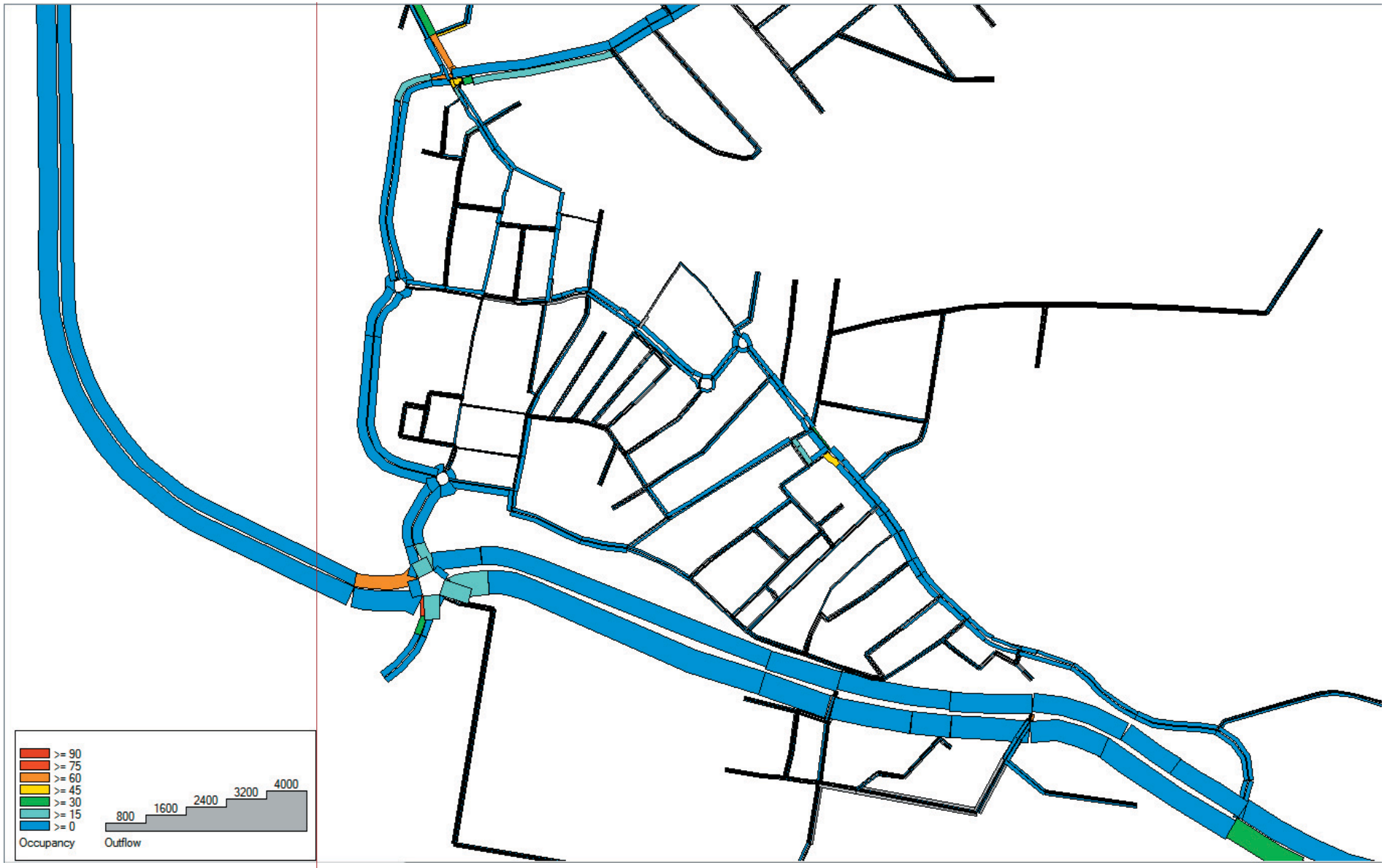

FIGURE A3.10A - SCENARIO S1 2006

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FIGURE A3.10B - SCENARIO S2 2006

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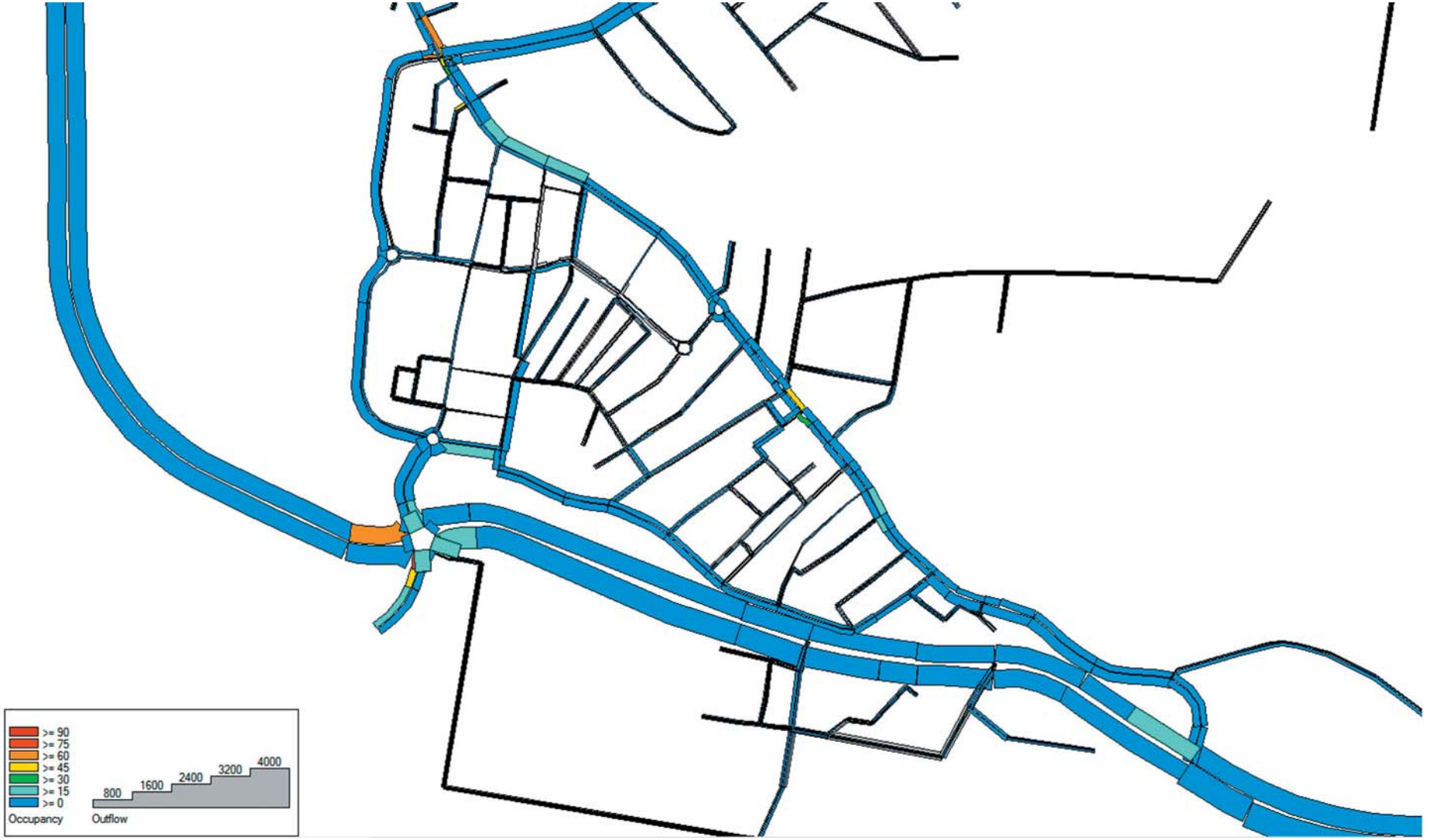

FIGURE A3.10C - SCENARIO S3 2006

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FIGURE A3.10D - SCANARIO S4 2006 COUNCIL

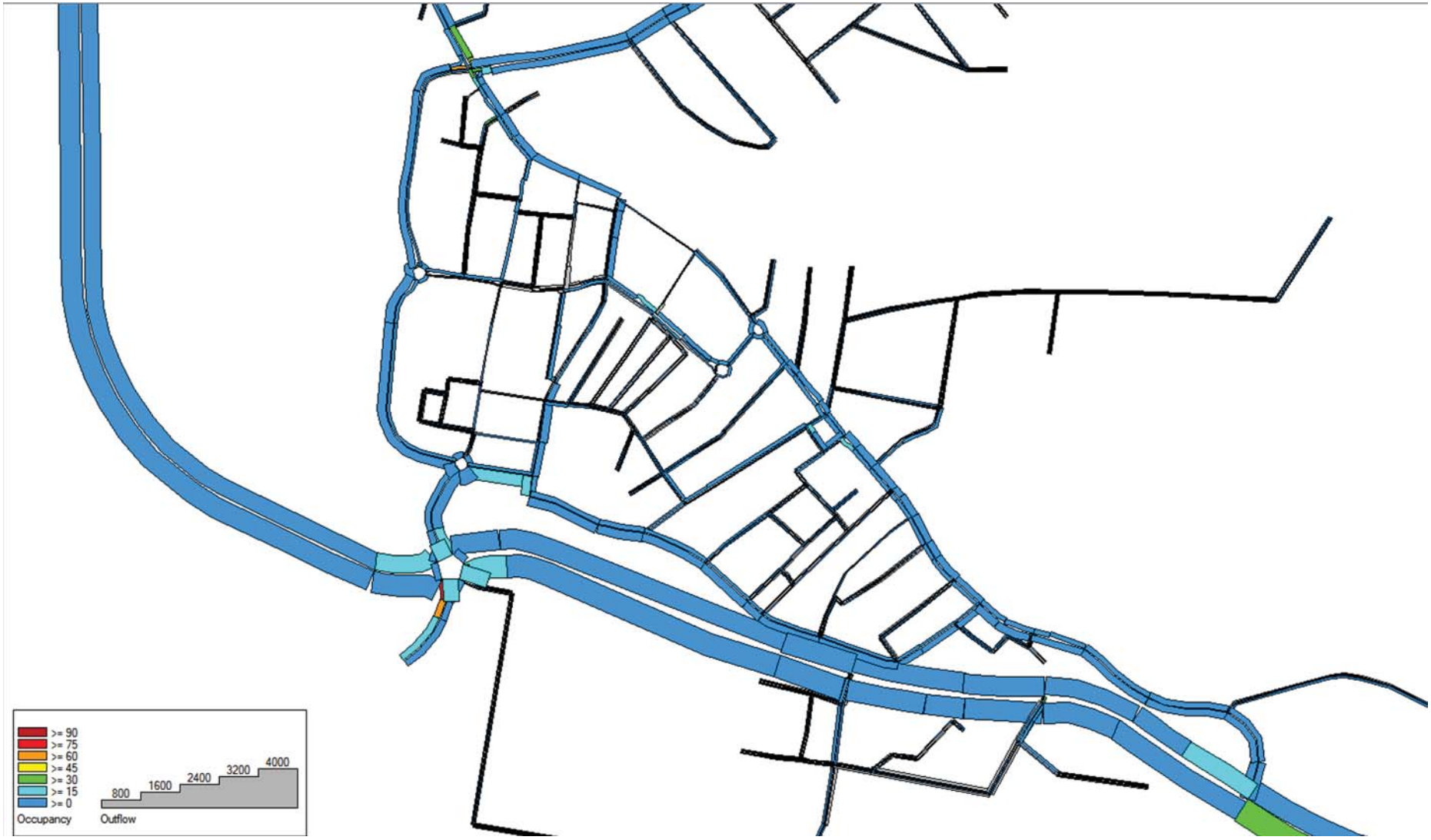

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FIGURE A3.10E - SCENARIO S5 2006 EAST BOUND

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FIGURE A3.10F - SCENARIO S6 2006 WEST BOUND

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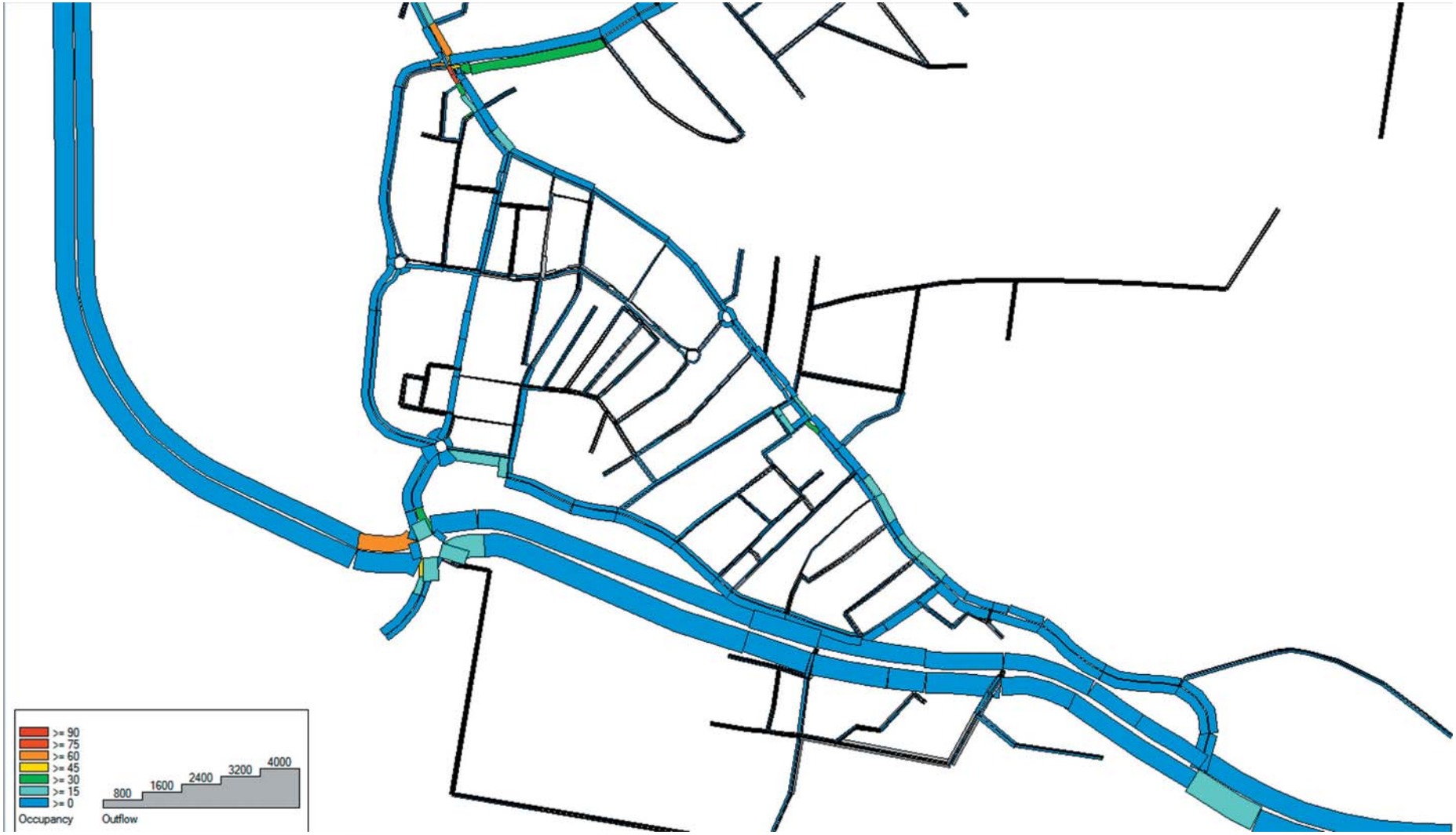

FIGURE A3.10G - SCENARIO S7 2006 CHURCH

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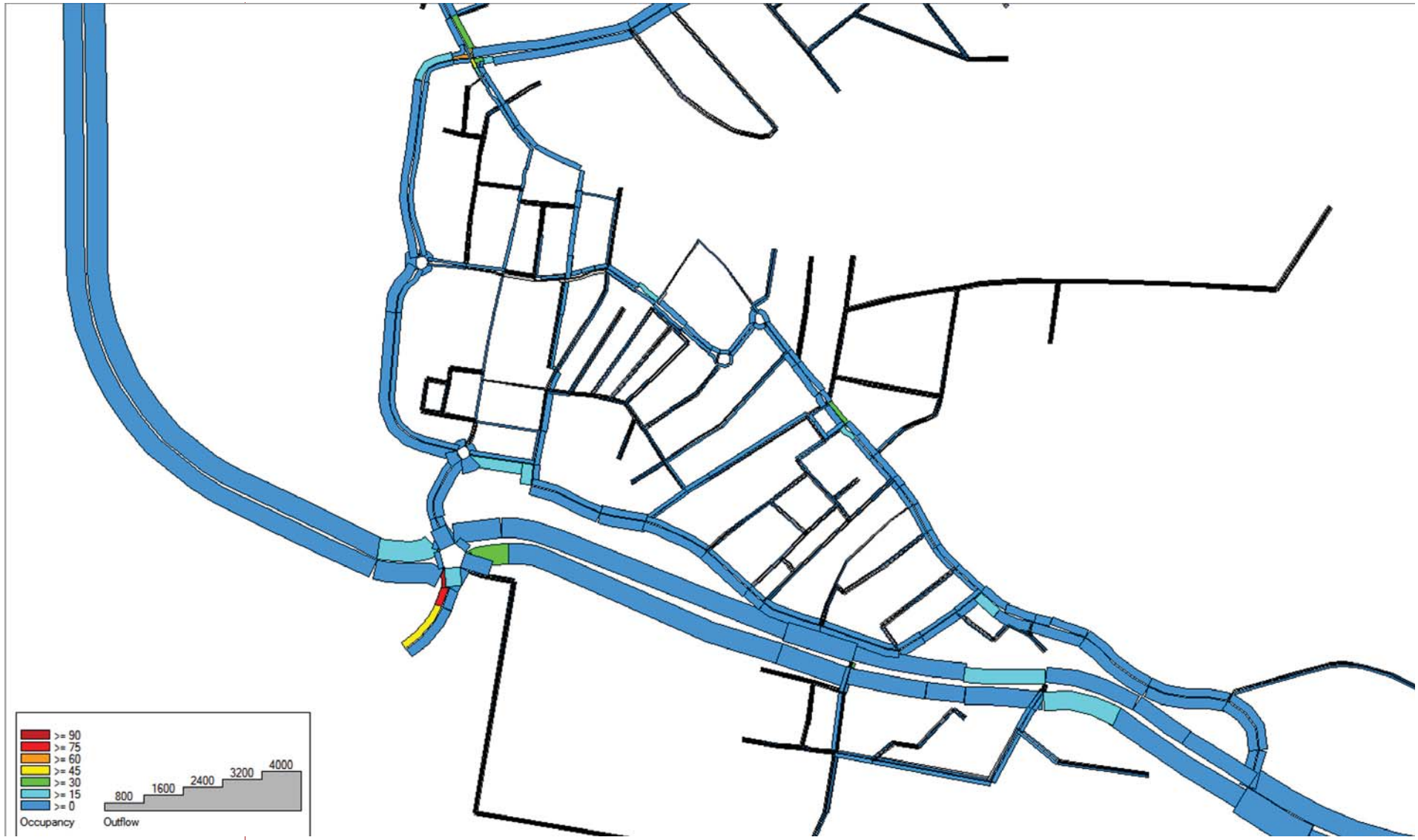
FIGURE A3.11A - SCENARIO S2F 2026 BASE



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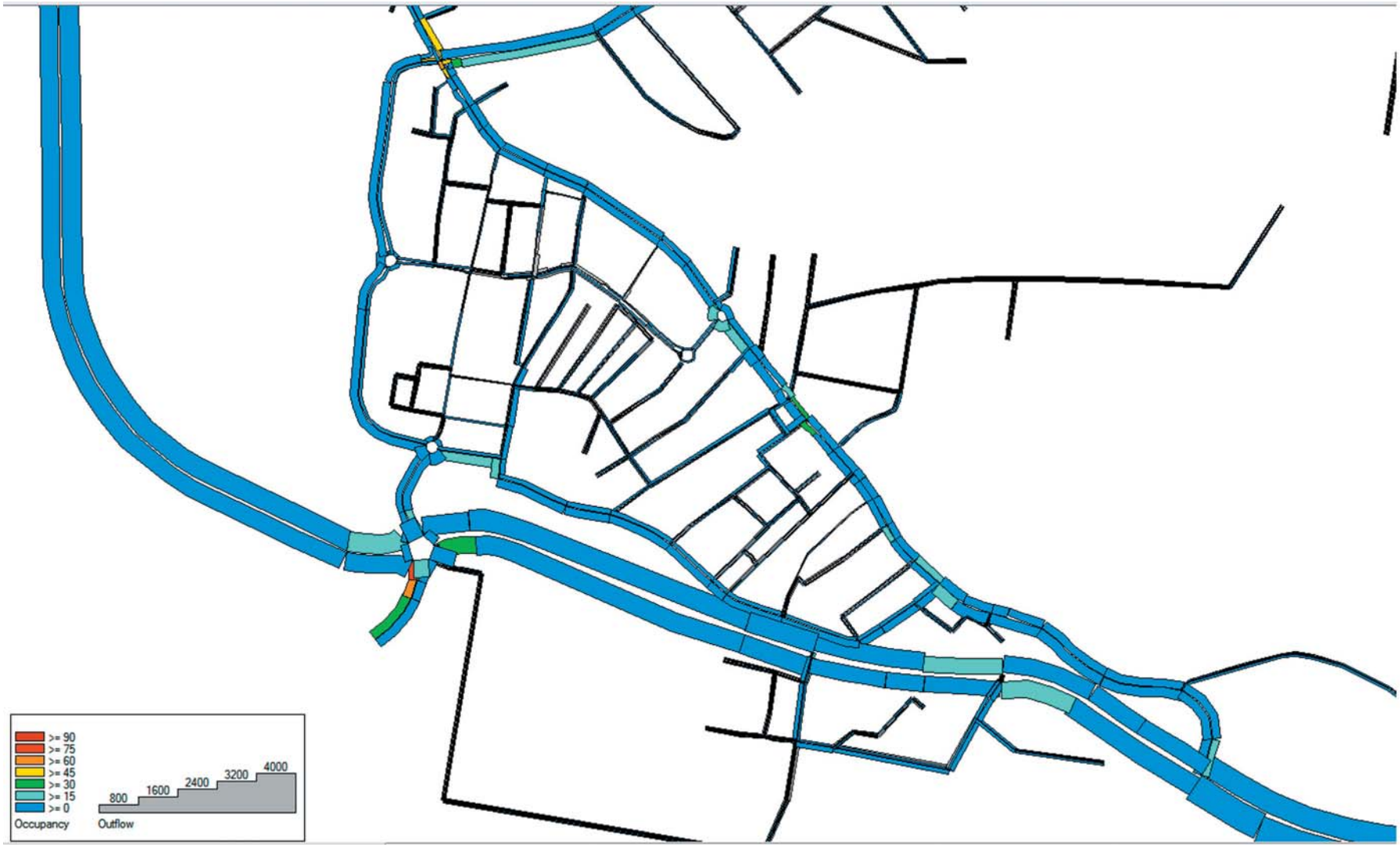

FIGURE A3.11B - SCENARIO S3F 2026 TWO WAY

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FIGURE A3.11C - SCENARIO S4F 2026

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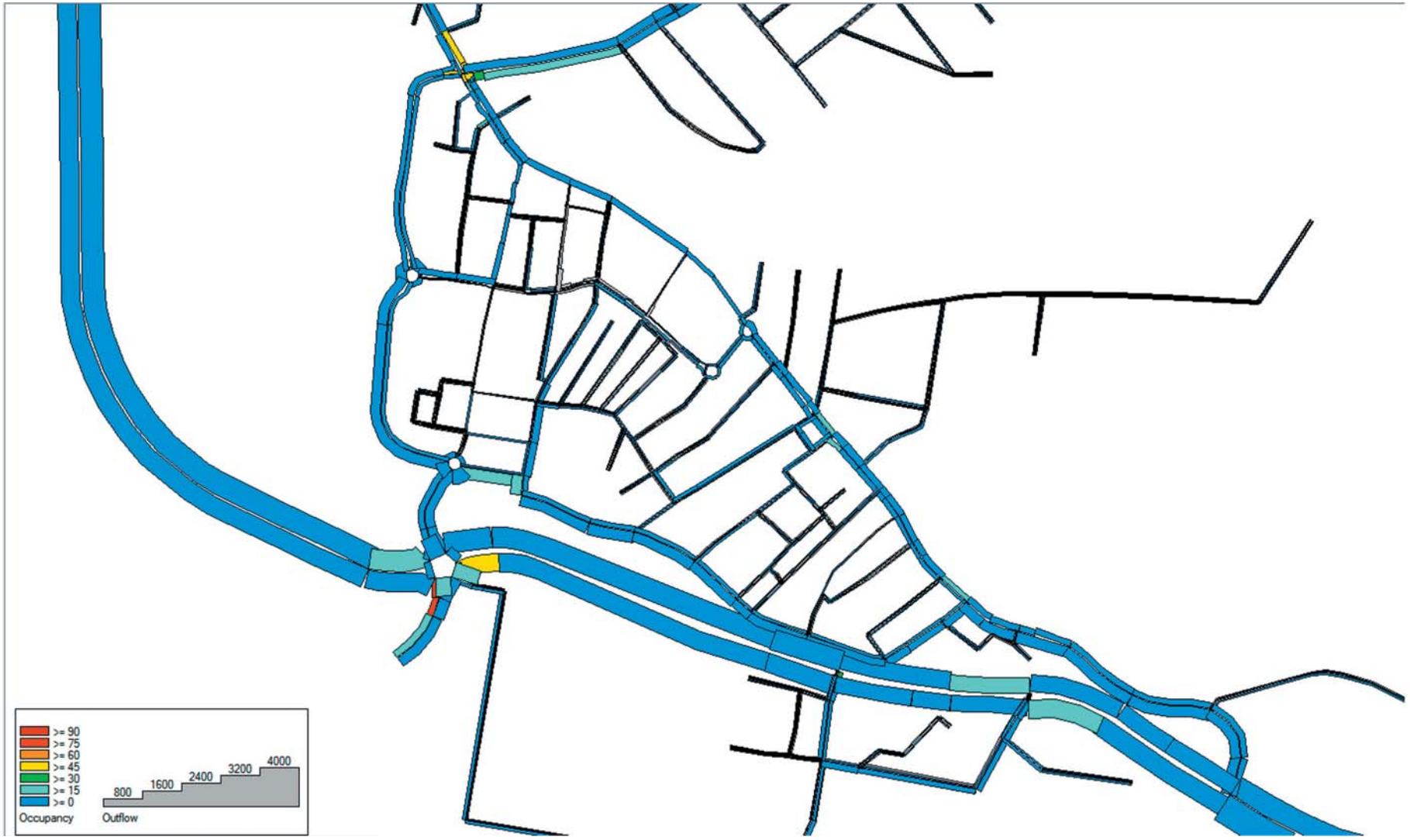

FIGURE A3.11D - SCENARIO S5F 2026 EAST BOUND

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FIGURE A3.11E - SCENARIO S6F 2026 WEST BOUND

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FIGURE A3.11F - SCENARIO S7F 2026 CHURCH

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URaP / TTW
Urban Research & Planning

URaP – TTW Pty Ltd
Level 3, 48 Chandos Street
St Leonards NSW 2065

Phone: (02) 9439 7288
Fax: (02) 9439 3146
Email: urap@ttw.com.au

ABN 24 101 643 010

ACN 101 643 010