













Mallala and Two Wells

Traffic Impact Study

- **Draft Report**

infraPlan
InfraPlan (Aust) Pty Ltd

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2 Introduction

InfraPlan has been engaged by the District Council of Mallala to undertake a Traffic Impact Study of the Two Wells Township in response to anticipated residential growth and associated retail, commercial and community development and activity, as driven by the projections of the 30 Year Plan for Greater Adelaide (February 2010).

This investigation has included an assessment of traffic flow and circulation, a review of parking demand, the identification of optimum sites for shared use parking and the impact increased traffic will have on the Old Port Wakefield Road Town Centre precinct.

In addition, the study aims to formalise the number and location of car park spaces available within the Town Centre and offers additional recommendations to successfully facilitate the town's expansion, from a traffic management perspective for all users.

Investigations have been based on preceding documents provided by the District Council of Mallala, independent research, desktop survey and an on-site survey of the Two Wells township.

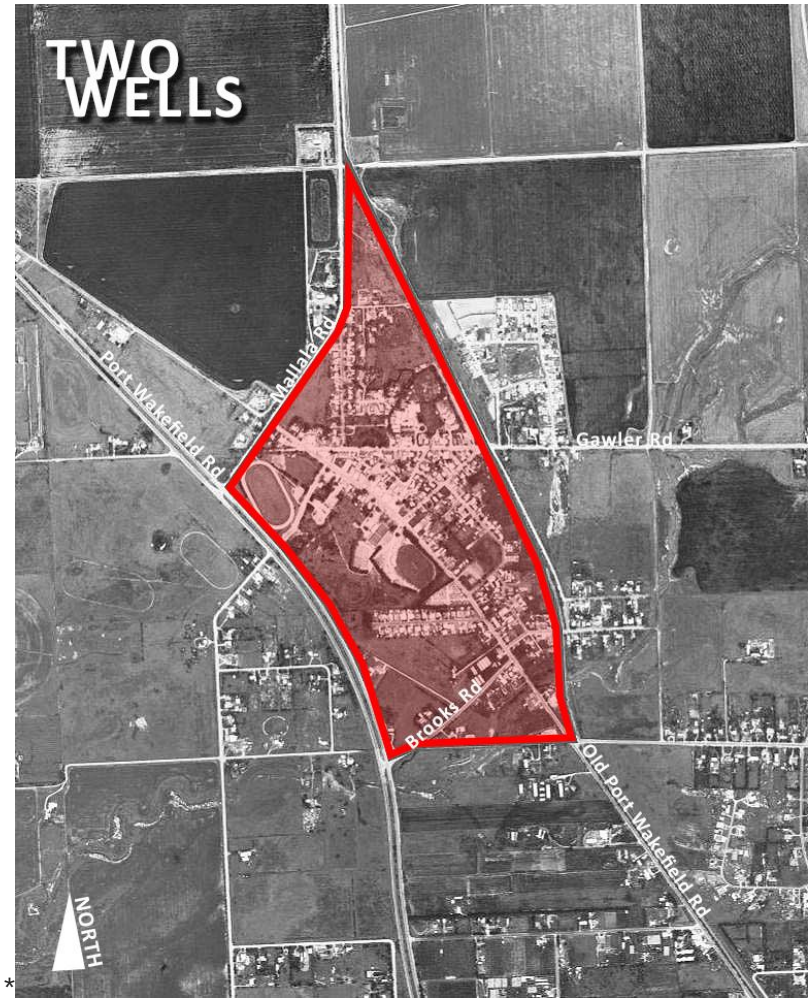


Figure 1: Two Wells Township (*Source: Nearmap_270613*)

3 Background

Two Wells sits within the broader District Council of Mallala on the northern periphery of metropolitan Adelaide (refer Figure 1); its 40km link to Adelaide being via the dual lane highway of Port Wakefield Road (Princes Highway). In 2011, the population was 2,297 people living in 904 dwellings, with an average household size of 2.73 persons. The age structure showed that the highest proportion of people living there were aged 35-49 years (ABS, 2013).

The Two Wells Town Centre functions as a hub, not only attracting residents of Two Wells but also offering services for many people living in nearby townships and developments. There is a strong culture of private motor vehicle use in the town and surrounding areas, as people rely heavily on their vehicles to travel between towns and to work in the northern suburbs, Adelaide, Gawler and Elizabeth daily. While coach operators run daily bus services to and from Adelaide, there are no public transport services to Two Wells. In addition, the train line which passes through the eastern fringe of Two Wells is not configured for metropolitan trains and there is no train stopping facility within Two Wells Township.

The 30 Year Plan for Greater Adelaide sets out the land-use policies to manage the growth and change forecast to occur across the region. This Plan is based upon 3 key objectives:

- Maintain/ improve liveability
- Increase competitiveness, and
- Drive sustainability and resilience to climate change.

Two Wells has been recognised in the 30 Year Plan for Greater Adelaide for its Existing Key Industry Areas, and has also been identified as a Future Urban Growth Area. Aside from Roseworthy, the 30 Year Plan identifies Two Wells as being one of the largest urban growth areas in the Barossa region. The 30 Year Plan for Greater Adelaide identified an anticipated residential growth of 3,500 households in Two Wells, this equating to between 9,000 and 12,000 additional persons.

The Two Wells Residential DPA was subsequently prepared to facilitate development in Two Wells in accordance with the provisions of the 30 Year Plan and has since been incorporated into the overall Mallala Council Development Plan. In conjunction with this, a Town Centre Master Plan and Urban Design Guidelines for the redevelopment and expansion of the Two Wells Town Centre (July 2010) were also developed.

In December 2011, the Hickinbotham Group of Companies released a Traffic Report (Land Division Master Plan Two Wells, MFY) addressing the impacts of rezoning a significant parcel of rural land (in excess of 400 hectares – refer Figure 2, overleaf) directly north of the township for residential development, with an anticipated yield of between 2,440 and 3,260 dwellings. A birth to year 12 school for up to 400 students is also proposed.

Such a significant increase in population over time can only be successfully managed by ensuring that there is complementary growth in key service provisions including retail, community, recreation and employment. This growth will in turn increase traffic movements and the associated demand for car parking, particularly within the town centre.

The Integrated Transport and Land Use Plan (ITLUP), October 2013 as prepared by the Government of South Australia sets out a number of priorities for regional South Australia. The third of these priorities is "Maintaining the liveability and appeal of regional towns". This priority states that "…Town bypasses and road upgrades will be investigated to help manage this (planned) growth in traffic efficiently and safely, and to preserve the attractiveness and sustainability of regional centres and towns…integrated passenger transport, and cycling and walking options will also be expanded…".

Relevant Solutions and Actions for Two Wells as identified in the ITLUP include:

- In line with growth, extend bus services as required to service growth areas of Buckland Park, Playford North, Angle Vale, Virginia/ Virginia North and Two Wells
- Improve walking and cycling facilities in catchment areas for schools
- Implement bicycle lanes on selected arterial roads
- Target upgrades of key intersections and sections of road to improve efficiency and safety performance
- Actively manage the operation and performance of the road network to give priority to movements along key freight and other traffic corridors
- Continue to implement the Road Safety Strategy and address road safety blackspot and higher risk locations
- Work with local councils to complete local transport strategies to complement land use directions of local development plans, with a focus on accessible neighbourhoods, integration with public transport networks and state/ major traffic networks.

The Council has also commissioned a number of other studies both prior to and in parallel with this commission to address these requirements and assess other impacts of the anticipated growth.

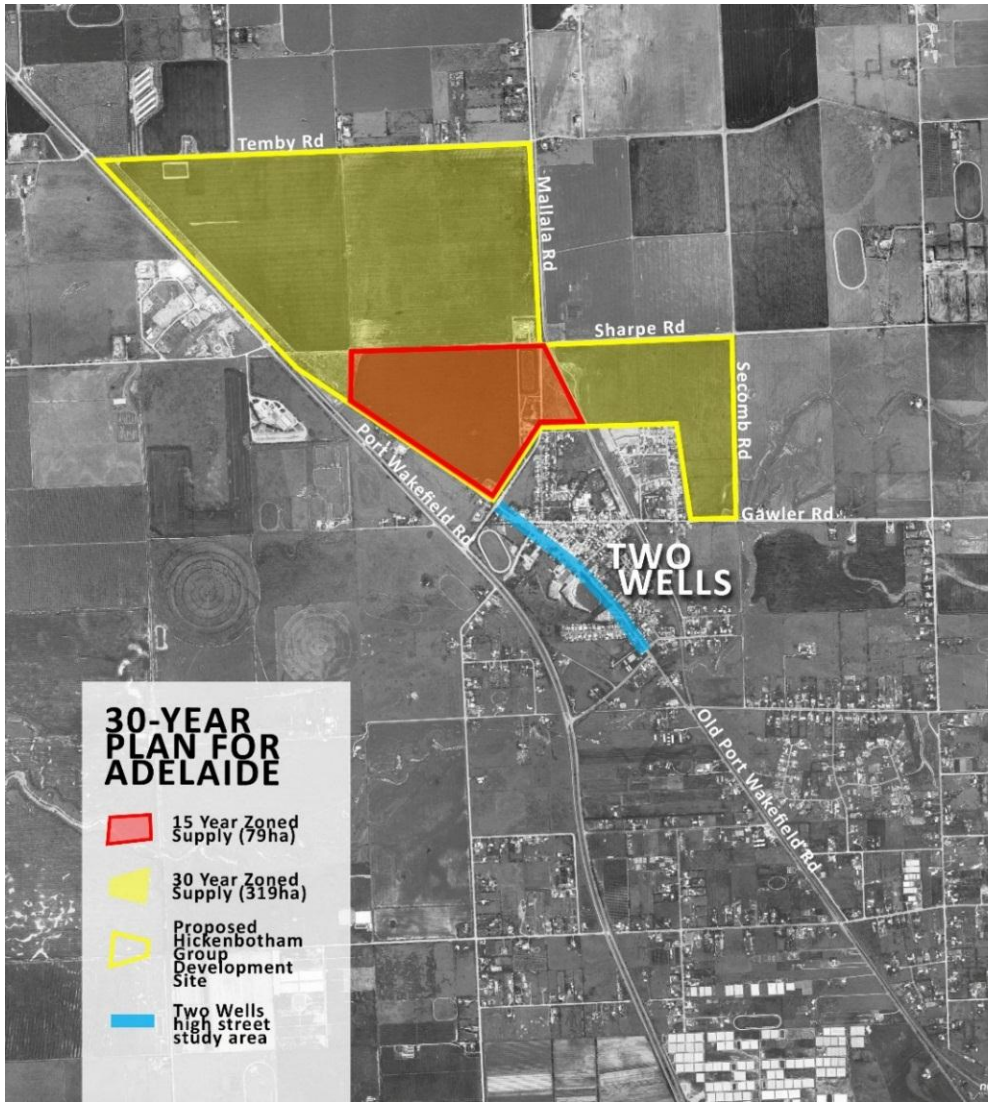


Figure 2: Proposed Development by Hickinbotham Group (Source: Nearmap_270613)

Collectively, existing reports relevant to this study include:

- KBR, Mallala Population Planning and Infrastructure Study, November 2005
- Village Well, Two Wells Roadmap With Appendix, August 2011
- Helen Smith Consulting, Two Wells Expansion Masterplan Report and Development Plan Amendment - Human Services Final Report, September 2011
- JPE / Wax Designs, Two Wells South Australia Main Street Design Guidelines, 2011
- Connor Holmes, Two Wells Township Expansion - The Report, December 2011
- MFY and Associates, Land Division Master Plan Two Wells, December 2011
- Alistair Tutte, Two Wells Retail Profile And Prospects, January 2012, and
- District Council of Mallala, Strategic Directions Report: Development Plan Review, February 2013.

The content of these documents has served either as relevant background information or as a source of data for analysis within this study. These previous investigations have been referred to where relevant throughout this report.

The Mallala District Council has concurrently undertaken two other studies:

- An All Age Friendly Access Assessment - to determine the accessibility of the town centre and facilities for the aged and others with mobility impairments, and
- A Retail Demand Analysis – to reassess the future status of Two Wells' retail and more specifically, the demand for convenience and comparison retail requirements for the future estimated residential population of Two Wells.

The outcomes of both of these reports have been considered as part of the Traffic Impact Study, to ensure consistency between all study outcomes and recommendations.

In accordance with the project brief, this Traffic Impact Study aims to identify the car parking implications of additional retail, civic and community land uses within the Town Centre, and determine the potential for a shared car parking area to service these expanded uses. The study also gives consideration to the implications of a revised road layout as outlined in Appendix A – Master Plan Option 4 of the Main Street Design Guidelines as prepared by JPE and WAX.

It is worth noting that the MFY report referred to above gives focus to the traffic impacts of future development on the junctions of Port Wakefield Road with Mallala Road and Brooks Road, and the intersection of Mallala Road with Old Port Wakefield Road.

This Traffic Impact Study gives further consideration to the impacts of development on key intersections and junctions within the heart of the township, including critical review of the MFY report prior to commencing further traffic analysis. Comments on the MFY report have been included where appropriate throughout this document.

4 Existing Road Network

The township of Two Wells lies approximately 40km to the north of Adelaide, to the east of Port Wakefield Road. Motorists approaching from the south can access the township via Port Wakefield Road (Princes Highway) and enter via either Brooks Road or Mallala Road to Old Port Wakefield Road. Those approaching from the north/east enter the township via Gawler or Mallala Roads, as identified in Figure 3.

4.1 Arterial Roads

Port Wakefield, Mallala Road, Gawler Road and Old Port Wakefield (between Mallala and Gawler Roads) all form part of the arterial road network, carrying traffic moving between important activity centres (for example between Adelaide and regional centres such as Port Augusta), and are under the care and control of the Department of Planning, Transport and Infrastructure (DPTI). These roads are also identified as freight routes; see section 4.8 and also refer the map of Two Wells shown in Figure 3 below with DPTI roads shown in yellow.

4.2 Collector Roads

Old Port Wakefield Road and Brooks Road have key roles in the local road network (under the care and control of Council); Old Port Wakefield Road functions as the main street of the township, catering for the full range of transport modes and ages of users. Old Port Wakefield Road is generous in width, with room for angled, on-street parking on both sides of the carriageway. Brooks Road provides a key link between Old Port Wakefield Road and the Princes Highway, and together with Mallala Road, provides a key road link into and out of the township.

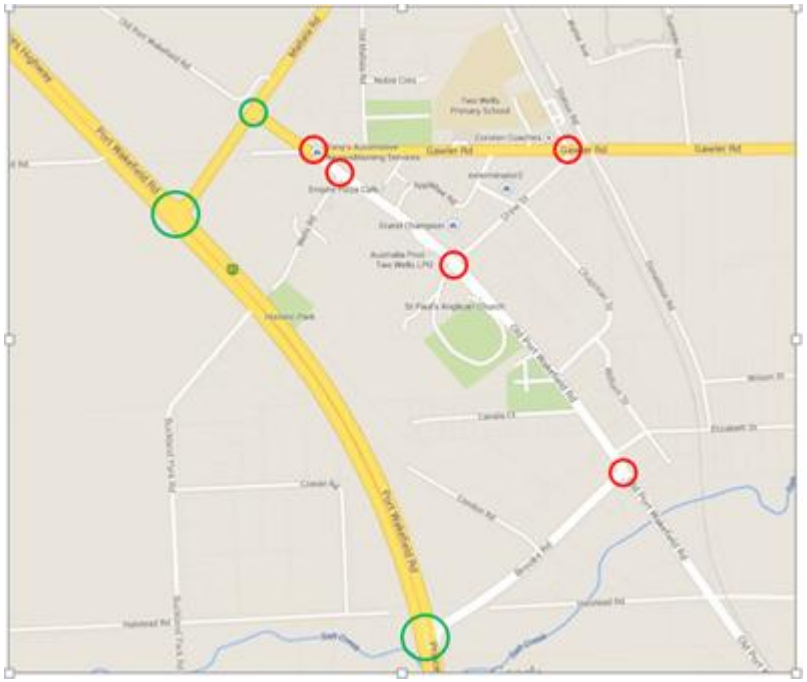


Figure 3: Two Wells township road map with key intersections identified (Source - *Googlemaps*)

4.3 Local Roads

All other roads within the Two Wells township are also under the care and control of the District Council of Mallala, linking residential areas and other local facilities to the wider road network.

It is worth noting that a 5 tonne limit applies to Drew Street; this being imposed by Council to ensure quarry trucks from the east of Two Wells and heading south make use of the designated heavy vehicle route via the Mallala Road - Port Wakefield Road junction rather than using Drew Street as a ‘short-cut’.

4.4 Freight Roads

Map D15 of the 30 Year Plan for Greater Adelaide identifies the major freight corridors and major road capital works. Port Wakefield Road is identified as a Primary Freight Road, and the Mallala – Two Wells Road is identified as a Secondary Freight Road. Gawler Road too, is an established Freight route.

4.5 Key Intersections and Junctions

Key intersections and junctions within the Two Wells township are largely confined to the 'main street' within Two Wells and at the junctions of Port Wakefield Road with Mallala Road and Brooks Road; the two key access/egress points from the township to the Princes Highway.

The following intersections and junctions are considered to play key roles in terms of the management of traffic movement in Two Wells; either within the Town Centre precinct or as access points to the Township of Two Wells. All are sealed, unsignalised and identified in Figure 3, below.

- Port Wakefield Road / Mallala Road – this connecting the northern end of the township of Two Wells with the Princes Highway.
- Mallala Road / Old Port Wakefield Road – this junction forms the northernmost end of the main street of Two Wells and forms part of the connection of the northern end of the township with the Princes Highway (to the west) or alternatively to Mallala (to the east).
- Port Wakefield Road / Brooks Road – this connecting the southern end of the township of Two Wells with the Princes Highway.
- Old Port Wakefield Road / Gawler Road – this acute angled junction lies at the northern end of the Town Centre precinct and forms part of the heavy vehicle network.
- Old Port Wakefield Road / Drew Street – this T-junction forming the western end of the local link between Old Port Wakefield Road and Gawler Street
- Old Port Wakefield Road / Brooks Road – this T-junction forming the eastern end of the road link between Port Wakefield Road and Old Port Wakefield Road.

4.6 Traffic Counts and Existing Intersection Performance

Traffic count data for this analysis has been sourced as follows:

- Mid-block traffic counts have been provided by DPTI for Port Wakefield Road, Mallala Road (north of the study area) and Gawler Road (near the Two Wells Primary School and east of the rail line).
- Council has provided traffic counts for Old Port Wakefield Road in front of the Post Office where plans to install a pedestrian crossing were completed but are yet to be installed.

No traffic turning movement data was available for the intersections within the Town Centre. In addition, there appears to be some confusion in the MFY report with the orientation of Figure 10 (ie traffic movement data appears to be in reverse for the time of day). In the absence of other traffic count data, infraPlan has made a number of assumptions and extrapolated the existing available mid-block traffic count information based upon our knowledge of housing density, commercial activity, recreational and health services and employment generators within the township to determine likely traffic activity at selected intersections and junctions. These assumptions and likely traffic volumes have been sent to Council (and have subsequently been verified) prior to their application in the traffic analysis for this commission.

A summary of the available mid-block traffic counts and estimated turning movement counts are indicated in Table 31 and 2 below.

Table 1: Summary of supplied traffic counts

Mallala Road, Korunye		5.5km north of Port Wakefield Rd		
DPTI 11-17 Nov 2013				
Two-way traffic	5-day avg	2,172	HV 5-day avg	321
	7-day avg	2,199	HV 7-day avg	273
	Est AADT	2,200	7 day avg HV %	12%
North bound	5-day avg	1,085		
	7-day avg	1,098		
South bound	5-day avg	1,088		
	7-day avg	1,101		

Gawler Road		200m west of Drew St		
DPTI 25-31 Mar 2011				
Two-way traffic	5-day avg	1,733	HV 5-day avg	218
	7-day avg	1,605	HV 7-day avg	187
	Est AADT	1,600	7 day avg HV %	12%
East bound	5-day avg	859		
	7-day avg	795		
West bound	5-day avg	874		
	7-day avg	810		

Port Wakefield Highway		970m north of Mallala Rd		
DPTI 12 months starting 1 Jan 2013				
Two-way traffic	5-day avg	9,459	HV 5-day avg	1,898
	7-day avg	9,424	HV 7-day avg	1,596
	Est AADT	9,400	7 day avg HV %	17%
South bound	5-day avg	4,644		
	7-day avg	4,707		
North bound	5-day avg	4,814		
	7-day avg	4,718		

Old Port Wakefield Road – Between Drew Street and Wells Road				
District Council of Mallala 25 Feb – 16 Mar 2013				
Two-way traffic	5-day avg	2,519	HV 5-day avg	37
	7-day avg	2,131	HV 7-day avg	21

Three intersections were selected for assessment of existing traffic conditions, as follows:

- Old Port Wakefield Road/ Gawler Road junction
- Old Port Wakefield Road/ Wells Road junction
- Old Port Wakefield Road/ Drew Street junction

Table 2: Summary of estimated turning movements

Old Port Wakefield Road (1) - Gawler Road (2)							
Standard T-junction							
AM Peak	Exit	veh/h	saturation %	PM Peak	Exit	veh/h	saturation %
NW OPW Rd	Left 2	63	5.8%	NW OPW Rd	Left 2	63	6.4%
	Thru 1	42	5.8%		Thru 1	53	6.4%
SE OPW Rd	Thru 1	74	4.7%	SE OPW Rd	Thru 1	26	2.8%
	Right 2	11	4.7%		Right 2	21	2.8%
E Gawler Rd	Left 1	11	0.7%	E Gawler Rd	Left 1	42	2.7%
	Right 1	53	4.9%		Right 1	53	5.1%

Old Port Wakefield Road (1) - Wells Road (2) (Town Centre Access North)							
Standard T-junction							
AM Peak	Exit	veh/h	saturation %	PM Peak	Exit	veh/h	saturation %
NW OPW Rd	Thru 1	1	3.9%	NW OPW Rd	Thru 1	95	5.0%
	Right 2	74	3.9%		Right 2	1	5.0%
SW Wells Rd	Left 1	2	0.5%	SW Wells Rd	Left 1	5	0.5%
	Right 1	5	0.5%		Right 1	2	0.5%
SE OPW Rd	Left 2	1	2.3%	SE OPW Rd	Left 2	1	2.6%
	Thru 1	42	2.3%		Thru 1	47	2.6%

Old Port Wakefield Road (1) - Drew Street (2)							
Standard T-junction							
AM Peak	Exit	veh/h	saturation %	PM Peak	Exit	veh/h	saturation %
NW OPW Rd	Left 2	21	2.8%	NW OPW Rd	Left 2	42	3.4%
	Thru 1	32	2.8%		Thru 1	21	3.4%
SE OPW Rd	Thru 1	55	3.2%	SE OPW Rd	Thru 1	26	2.3%
	Right 2	5	3.2%		Right 2	16	2.3%
NE Drew St	Left 1	42	5.4%	NE Drew St	Left 1	11	3.3%
	Right 1	32	5.4%		Right 1	32	3.3%

Each were found to operate at Level of Service (LOS) A with an average delay of less than 8 seconds, as summarised in Table 3 and Table 4 below.

Table 3: AM peak Intersection Assessment output

Intersection	Existing		
AM Peak	v/c	95th % Queue (m)	LOS*
Old Pt Wakefield Rd - Gawler Rd	0.06	1.8	A (Gawler Rd)
Old Pt Wakefield Rd - Wells Rd - North Access to Town Centre Give Way junction	0.04	0.8	A (Wells Rd)
Old Pt Wakefield Rd - Drew St	0.05	1.4	A (Drew St)

Table 4: PM peak Intersection Assessment output

Intersection	Existing		
PM Peak	v/c	95th % Queue (m)	LOS*
Old Pt Wakefield Rd - Gawler Rd	0.06	1.4	A (Gawler Rd)
Old Pt Wakefield Rd - Wells Rd - North Access to Town Centre Give Way junction	0.05	1.8	A (Wells Rd)
Old Pt Wakefield Rd - Drew St	0.03	0.8	A (Drew St)

4.7 Speed Limits

The posted speed limit on Port Wakefield Road in the vicinity of the Two Wells Township is 110km/h. On Brooks Road, the speed limit reduces to 50km/h. Mallala Road is signposted at 80km/h to the east of Port Wakefield Road, this reducing to 50km/h immediately following the turn onto Old Port Wakefield Road. The speed limit on all other roads within the study area is 50km/h.

4.8 Heavy Vehicle Access

Port Wakefield Road, Mallala to Two Wells Road and Gawler Road (with interconnecting sections of Mallala Road and Old Port Wakefield Road) are gazetted as part of a wider freight route for vehicles up to and including a 26m B-Double. These routes appear to be mainly used as commodity routes, utilised when gaining access for commodity providers to and from major distribution arterials such as Port Wakefield Road, Northern Expressway and Angle Vale Road. Information drawn from *RAVnet, (http://maps.sa.gov.au/RAVNET/), Government of South Australia, Department of Planning, Transport and Infrastructure*.

Access for large vehicles within Two Wells is required (as a minimum) to deliver stock for the IGA Supermarket, the Two Wells Hotel, the Commercial Hotel and landscaping and fodder stores. The hotels have access from outside of the suggested development areas (Gawler Road at the northern end, Old Port Wakefield Road, south of affected area at the southern end) leaving access to the IGA Supermarket, landscaping and fodder stores to be ensured during and following redevelopment works. These tasks do not require a vehicle greater than a semi-trailer and as such, the supply vehicles are free to utilise the general road network.

It has been confirmed by Council representatives and observed during site inspections that large vehicles regularly travel along Old Port Wakefield Road to the south of the Gawler Road junction. While this road section does not form part of the wider freight route, it continues to be utilised by these vehicles to access food outlets (including the popular bakery) and rest stop facilities located at the southern end of the Main Street. This behaviour continues despite the relative closeness of the purpose built roadhouses which lie 20km to the north at Dublin and at the junction of Port Wakefield Road and Bolivar Road, Paralowie 20km to the south.

In 2005, the Mallala Population Planning and Infrastructure Study recognised the future supply of residential land immediately north of the Two Wells to Mallala Road. To both service and complement the residential growth, the report recommended expansion of the Town Centre to the north, up to the Two Wells to Mallala Road. In addition to the consequential increase in passenger traffic movements, freight movements are also projected to increase on this same transport corridor.

Today, with residential development now occurring to the north of Mallala Road, the freight routes extending along the Mallala to Two Wells Road and along Gawler Road are no longer located on the edge of the township. Rather than forming a natural boundary to the township, existing freight routes now lie between the Town Centre and the surrounding residential area. The role and function of the roads upon which the freight routes are located will further change as residential development to the north continues to progress, as they cater for greater levels of local traffic, pedestrian and cyclist movements.

The large geometric and also the functional requirements of freight routes are considerably different to those of the local road network; accommodating both can have a double-detrimental effect, reducing both the efficiency of freight movements and the attractiveness and connectivity of the township for day-to-day activities. In this context, the location of the existing freight route along the Two Wells to Mallala Road has become less suitable in the context of the surrounding environment.

The 2005 Population Planning and Infrastructure Study recognised the potential for these issues, recommending that "…Council's resources will need to be directed towards the impacts of residential growth on increases in traffic from commuter and visitor activities and over time it will be necessary to allocate significant funds to ensuring the road works in the towns are efficient and safe and that linkages are available which are suitable and safe in areas of increasing activity…".

Council's desire to relocate the existing freight route on the Two Wells to Mallala Road to the north (to Sharpe Road) is consistent with the recommendations of the 2005 report.

4.9 Crash Statistics

Analysis of crash data supplied by DPTI shows four sites around Two Wells that had multiple reported traffic incidents in the five-year period spanning 2009-2013 as described below. Of these locations, the first three intersections recorded sufficient casualties during this period to qualify for Black Spot funding. No fatalities were recorded in this period.

Port Wakefield Road/Brooks Road

Port Wakefield Road comprises a dual lane carriageway with a wide median and protected right turn lanes, carrying a daily traffic volume of approximately 7,800 vehicles per day (vpd). Brooks Road is a single lane, undivided roadway linking Port Wakefield Road to Old Port Wakefield Road. The junction includes a left turn slip lane on the northern approach to Brooks Road, and a merge lane for traffic turning left from Brooks Road onto Port Wakefield Road. Brooks Road tees into the National Highway (Port Wakefield Road) at an unsignalised junction, located on the outside of a large sweeping bend in the carriageway (as shown in Figure 3 above).

Crash data includes seven reported incidents, resulting in fourteen casualties of which four were reported as serious injuries. These incidents were primarily categorised as Failure to Stand, Failure to Give Way and Inattention and generally resulted in Right Angle or Right Turn crash types.

Port Wakefield Road/Mallala Road

This is a T-junction on a straight section of National Highway. Mallala Road is a single lane, undivided arterial road with annual average daily traffic (AADT) of 2,000vpd.

Crash data includes eight reported incidents over the 5 year period, resulting in fifteen casualties but no serious injuries. Incidents at this location were primarily reported as Failure to Stand and Disobey Give Way Sign, resulting in Right Angle and Right Turn crash types.

Old Port Wakefield Road near Petticoat Lane

At this mid-block location, Old Port Wakefield Road is a straight section of 2-lane, 2-way carriageway with a solid white line centreline. The nearby Petticoat Lane is a pedestrian-only laneway, having been closed to vehicular

traffic since at least 1994. Four recorded incidents in this area have resulted in four casualties, of which one was reported as a serious injury.

There is no particular pattern to the incidents in this location however on-street parking may have been a contributing factor, with reversing vehicles either failing to observe or failing to be observed by main street traffic. In the vicinity, on-street parking consists of both parallel and 45° angle parking on both sides of the road.

Old Port Wakefield Road/Drew Street

Crash data indicates three reported incidents with no casualties, as a result of Failure to Give Way. It is worth noting that the junction of Drew Street with Old Port Wakefield Road functions more as a 4-way intersection than a 3-legged junction, due to the access/egress to the football oval and clubrooms located opposite the Drew Street approach on the southern side of Old Port Wakefield Road. Sightlines for motorists exiting Drew Street may be impeded by the shrubbery planted within the protuberances either side, together with the presence of parked cars.

4.10 Public Transport Provisions

Metropolitan public transport services do not extend as far north as Two Wells, due to the distance between the township and the Adelaide CBD, and the lack of demand for public transport services due to the relatively low residing population (the closest service reaches Virginia). Coach operators however run daily services between the township and the Adelaide CBD, stopping at major destinations along the route. These services however do not directly link Two Wells to public transport services in Gawler or Elizabeth (which in turn form part of the AdelaideMetro Public Transport Network), and as such are not conducive to daily use by commuters. As outlined in Section 3 however, one of the Relevant Solutions and Actions as identified in the ITLUP is "…In line with growth, extend bus services as required to service growth areas of Buckland Park, Playford North, Angle Vale, Virginia/ Virginia North and Two Wells…"

Similarly, the train line through the eastern fringe of Two Wells caters for interstate travel and freight transport, but not for metropolitan commuter services. There is no train station located within the Two Wells Township.

The District Council of Mallala provides a community bus service targeted at the elderly and frail for medical services, and a monthly bus service to Elizabeth Shopping Town operated by Corston Coaches at a cost of $5 per passenger, return. Other private vehicle hiring services are also promoted in the District Council newsletter and on the Council website.

Limited opportunities for Public Transport and mode shift options exist given the remote nature of the site and the separation of new developments from the commercial town centre.

4.11 Bicycle Routes

Two Wells and its surrounds do not feature in any Bike SA maps or suggested ride routes on the Bike SA website or publications. There is no evidence of any existing or planned cycling infrastructure in this area other than that shown in the Concept Plan. No existing cycling infrastructure (eg bike racks, drinking fountains, showers) was observed during the site visit to Two Wells on July 1, 2014.

It is worth noting however that the generous width of roads within the township (including Old Port Wakefield Road) would easily cater for cyclist activity, and as part of the new roundabout on Mallala Road, bicycle crossing provisions will be provided.

4.12 Pedestrian Provisions

The footpaths throughout the Two Wells Town Centre precinct are largely in good repair and (particularly on the western side) have good width. South of the Memorial Gardens however, footpaths provisions cease on the south western side of the carriageway. Pedestrians walking on this side of Old Port Wakefield Road are forced to walk on the edge of the parallel service road.

While this is safer than walking along the Old Port Road carriageway, footpaths are notably lacking.

It has also been observed that there are currently no formal crossing provisions for pedestrians along Old Port Wakefield Road; pedestrians therefore cross randomly along the length of the main street. In addition, kerb ramps are not evident at a number of street corners, making access particularly difficult for aged and mobility impaired persons. A study conducted in 2013 for the planning of a pedestrian crossing highlighted the need for such facilities, but installation of a formal crossing point within the main street has not occurred due to community concerns regarding the potential loss of on-street parking.

The concurrent All Age Friendly Access Assessment provides more detailed reference regarding current and future pedestrian provisions within the township. This includes recognition of a key pedestrian crossing desire line across Old Port Wakefield Road, between the existing Post Office and the IGA.

5 Existing Parking Provisions

5.1 Parking Supply

A combination of desktop analysis and site investigation was undertaken to quantify the existing parking stock within the Two Wells Town Centre precinct. InfraPlan used aerial imagery courtesy of Nearmaps and Googlemaps, further supported by information gathered visually during the site visit on July 1 2014 and meetings and discussions with Council representatives.

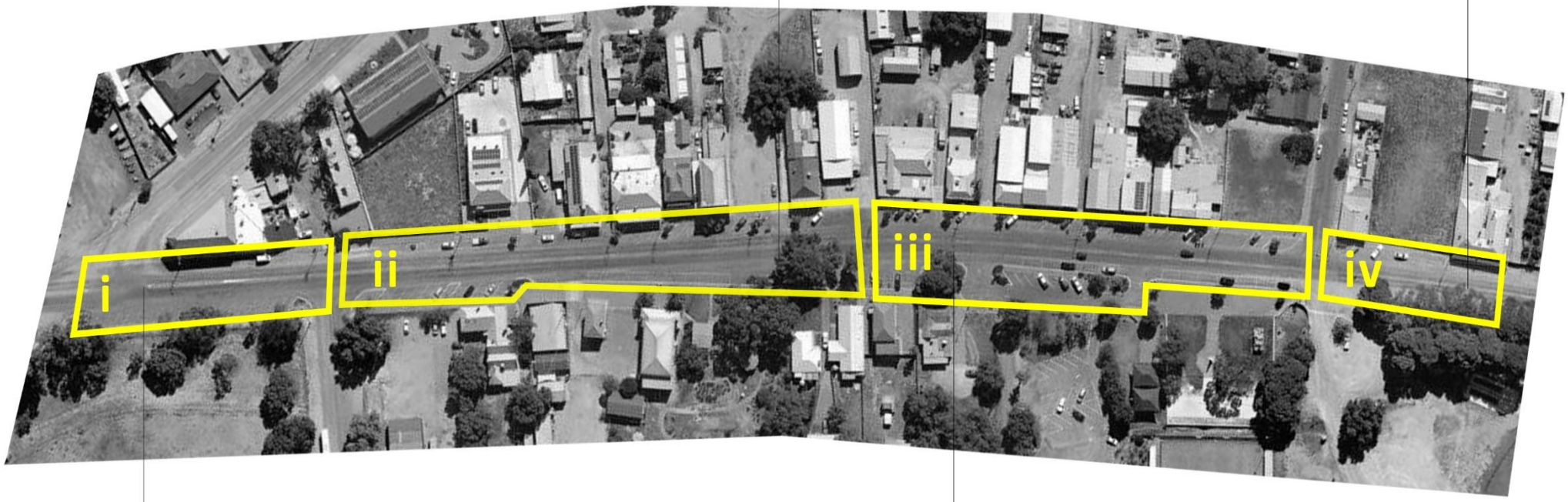
The current parking supply largely comprises on-street parking with some formal and informal off-street parking also evident. No parking restrictions have been applied to the existing parking supply.

5.2 On-street Parking

Parking supply within the main street of Two Wells generally comprises angled or parallel parking at the frontage of each business and community service. On the western side of the street, to the south of the Post Office, the generous carriageway width of Old Port Wakefield Road has been reconfigured to provide two sections of segregated off-street parking parallel to the main street; one directly south of the Post Office, the other near the football oval, opposite the bakery.

Area **ii.** has **50 on-street car parks** which are a combination angled and parallel parking servicing the Heritage Medical Centre, Main Street Cafe, Empire Pizza Cafe, Raine and Horne Realty and Council Chambers.

Area **iv.** has **16 on-street car parks** which are a combination parallel and informal angled parking servicing the Two Wells bakery and Football Club.



Area **i.** has **29 on-street car parks** which are a combination angled and parallel parking servicing the Two Wells Tavern and motel.

Area **iii.** has **44 on-street car parks** which are a combination angled and parallel parking servicing the IGA Grocer, Adelaide Plains Veterinary Surgery, Australia Post Office, Chemplus Pharmacy and other local businesses.

ON-STREET CAR PARKING

NORTH

Figure 4: On street car parking areas

Table 5 below summarises the provision of on-street parking on Old Port Wakefield Road within the Town Centre precinct, divided into four areas as illustrated in Figure 4.

Table 5: Existing on-street parking on Old Port Wakefield Road by sub-area

Area	North East side	South West side	Total
I	20	9	29
Ii	24	26	50
iii	24	20	44
Iv	8	8	16

5.3 Off-street Parking

From site observations, the parking demand generated by retail, commercial and community facilities in the main street of Two Wells appears to be met by the on-street parking stock.

The Bowls Club provides a sealed and marked off-street car park for up to 40 vehicles and the Two Wells Motel provides up to 15 car parks for guests. The Commercial Hotel has off-street space for approximately 25 cars on the southern portion of the site but this has not been formalised for use as a car parking area.

The area between the Old Council Chamber and Library (in front of the Council annex) is also a popular off-street parking area, especially on Friday nights.

There are however no general off-street carparks within the township for public use.

5.4 Supply vs Demand

The Mallala District Council Development Plan specifies a minimum number of off-street parking spaces per square metre footprint, according to the business type. Applying *Table Mal/1 - Off Street Vehicle Parking Requirements* from the Development Plan (consolidated 29 August 2013) and using retail floor space assessments provided to infraPlan by Property & Advisory Pty Ltd (who have been engaged by Council to undertake retail floor space analysis for Two Wells), it has been calculated that the demand for parking to service existing businesses and civic services in the town centre of Two Wells is approximately 250 spaces.

It was calculated that there are a total of 139 on-street car parks and approximately 80 off street car parks, giving a total (formal) township parking stock of 219 spaces.

In theory, this indicates a shortfall of 31 spaces in the township, and yet site observations indicate that there are generally carparking spaces available within the ‘main street’. This is likely due to the fact that the Development Plan considers the carparking requirements for each land use based on the peak demand for that land use only; ie no consideration or discount is applied to reflect the fact that people often drive to the township to park and undertake more than one task at a time (eg visit the post office and the bank, or the hairdresser and the bakery, for example). This behaviour (often known as ‘trip-linking or trip-chaining) lowers the overall carparking demand, and explains the general availability of spaces.

5.5 Current Parking Behaviour

In a fashion typical of country towns, traders and shoppers in Two Wells often expect to be able to park in front of their premises or destination. Occupancy of these spaces by traders in particular can have a limiting effect

on business, where a lack of convenient, nearby parking spaces may result in shoppers choosing to take their business elsewhere.

6 Proposed Development

In September 2013, the State Government approved a $1.2 billion plan to expand the small town of Two Wells.

Hickinbotham Homes have produced this development plan including the construction of between 2,500 and 2,900 homes, a birth to Year 12 education facility and small retail opportunities.

To support this, a small-medium scale commercial development and at-grade car parking facility is planned to the west of the existing main street precinct, behind the civic and community services on the western side of Old Port Wakefield Road (refer Retail Demand Analysis Report). This development is expected to include a major supermarket as well as other large retailers and specialty stores. Vehicle access is proposed from Old Port Wakefield Road, via Wells Road and a new road, currently shown on the Masterplan to be in the location of the existing Police Station.

6.1 Commercial Development

The township is expected to incorporate a total of 17,000m^2 gross leasable floor area (GLFA) by 2031, comprising the following:

Food

It is expected that the proposed Two Wells Township expansion will most likely require a 3,500m^2 (approximate area) supermarket before 2026 and an additional 3,500m^2 of food retailing that will develop gradually through to the end of the 2020's. Thus an approximate 7,000m^2 floor area has been considered for superstore and food retailing while estimating the traffic generated from town centre expansion.

It is expected that up to 1,000m^2 of this food retailing will be created through in-fill developments such as cafés, restaurant and convenience stores along the north of Old Port Wakefield Road.

Non-Food

It is forecast that non-food retail will see demand for approximately 2,000m^2 by 2021, an additional 3,000m^2 by 2026 and another 5,000m^2 again by 2031. Some of the latter 5,000m^2 might be absorbed by a bulky goods development.

Thus approximately 10,000m^2 of non-food retail/bulky goods area is expected to be part of the town centre expansion.

It is expected that up to 1,500m^2 of the total 10,000m^2 non-food retail will be in-fill developments in form of specialty store, retail outlets along the north of Old Port Wakefield Road.

Community Facilities

There are a number of existing historic buildings within the township, including the Library, Old Council Chamber, Service Centre and Court House; these buildings are planned to remain, however the facilities and operations within each may alter over time.

The existing Police Station and Post Office are expected to be redeveloped, and other changes are likely in response to changes in residential and commercial activity.

Approximately 1,000m^2 of community facilities have been considered when estimating trips generated from the town centre.

7 Assessment of Traffic Impacts

7.1 General

The traffic impacts of the proposed residential, retail, commercial and community development for Two Wells on the town centre has been based on:

- the residential development proposed by Hickinbotham and as described in the MFY report (see below) and
- further advice from Propad on the extent of non-residential components of the anticipated expansion.

The assessment of traffic impacts has comprised the following:

- Review of the assumptions contained in the MFY traffic report, prior to their direct application. As a result, adopted trip generation rates have been refined; this is described in more detail in the section below.
- Review and refinement of the distribution of generated traffic across the township road network, based on the MFY traffic report and traffic counts from the Council and DPTI.
- Assessment of the performance of key intersections within the township for the year 2031, these including:
    - Old Port Wakefield Road / Gawler Road
    - Old Port Wakefield Road / Wells Road (serving as Northern Access to new commercial development)
    - Old Port Wakefield Road / new Southern Access to proposed commercial development
    - Old Port Wakefield Road / Drew Street
    - Old Port Wakefield Road / Brooks Road, and
    - Consideration of traffic impacts on the Gawler Road level crossing.
    - Consideration of the effects of increased traffic movement on other transport modes, including cycling, walking and public transport.

Intersections analysed within the MFY report have not been reanalysed as part of this study, namely:

- Port Wakefield Road / Mallala Road junction
- Port Wakefield Road / Brooks Road junction, and
- Mallala Road / Old Port Wakefield Road junction.

7.2 Trip Generation – review of the MFY Report

MFY in their report *Land Division Master Plan – Two Wells: Traffic Report* have considered that up to 9,000m^2 of retail area will be built as part of town centre expansion to cater to the needs for expanded Two Wells township.

The assumed trip generation rate of 1.5 trips/100m^2 for the proposed retail development during morning peak hour seems reasonable. The assumed rate of 9 trips/100m^2 during the afternoon peak hour seems significantly high however, for the following reasons:

- A significant portion of the total afternoon peak trips attracted by the town centre could be passing trade trips (employees and visitors going to/returning from Adelaide City).
- No discount for trip chaining has been applied. Given the nature and plan for the town centre expansion, most of the elements of the expanded town centre (retail shops, superstore, healthcare facilities, café/restaurants and other facilities etc) would be expected to be within walking distance of one another.
- While considering trips from the western portion of the development, as indicated in Figure 5 of this report (6,000 daily trips to Town Centre – MFY Report Page 8) it would be fair to assume that one vehicular trip to / from the town centre will include visits to multiple elements (shop, café, school, day care etc) within the same trip. This would thereby reducing the total number of trips

from the western portion of the development site to individual shops in the town centre.

- The presence of a School Bus will also reduce the number of trips at each end of the school day.
- InfraPlan acknowledges that there could be some additional trips within the town centre (people choosing to drive between two nearby shops in lieu of walking), however trips from the western side of the development need to be reviewed in the context of trip chaining and passing trade trips.

InfraPlan have chosen to consider the Roads and Maritime Services (RMS) Guidelines and Institute of Traffic Engineers (ITE) Guidelines in estimating the number of trips generated from the proposed town centre expansion as explained in detail below.

7.3 Trip Generation – InfraPlan

The *Roads and Maritime Services (RMS)*, formerly known as Roads and Traffic Authority (RTA) New South Wales, has ready to use trip generation rates for various land uses. The proposed expansion with different land uses is assessed as "Shopping Centre" for the purpose of this analysis.

Using RMS guidelines for Shopping Centre which provides the following equation for estimating trips generated from the expanded town centre:

V(P) = 20 A(S) + 51 A(F) + 155 A(SM) + 46 A(SS) + 22 A(OM)

Where:

V(P)= vehicles during peak hour (Thursday afternoon peak)

A(S)= Slow Trade gross leasable floor area (Gross Leasable Floor Area in square metres) includes major department stores such as David Jones and Myer, furniture, electrical and whitegoods stores

A(F)= Faster Trade GLFA - includes discount department stores such as K-mart and Target, together with larger specialist stores such as Fosseys

A(SM)= Supermarket GLFA - includes stores such as Franklins and large fruit markets

A(SS)= Specialty shops, secondary retail GLFA - includes specialty shops and take-away stores such McDonalds. These stores are grouped as they tend to not be primary attractors to the centres

A(OM)= Office, medical GLFA: includes medical centres and general business offices

The proposed town centre expansion (approx. 17,000m^2) has been classified in the following land uses for estimating trips generated:

4,500m^2 A(S) – Slow trade area = Bulky Goods

2,000m^2 A(F) – Fast trade area = other food retail, includes in-fill along north of Old Port Wakefield Road

3,500m^2 A(SM) – Supermarket

6,000m^2 A(SS) – Specialty shops = retail outlets, includes in-fill along north of OPW Rd

1,000m^2 A(OM) – office and medical facilities = includes expanded consulting facilities and day care facilities

It should be noted that the RMS guide does not provide an exclusive trip rate for estimating morning peak hour trips.

Using the RMS trip generation equation, the proposed town centre (expanded) is estimated to generate approximately **1,020 trips during Thursday afternoon peak**.

This translates to afternoon peak hour trip rate of 6 trips/100m^2 for a 17,000m^2 town centre.

The *Institute of Traffic Engineers (ITE, USA)*, Trip Generation Manual is widely used by traffic engineers all over the world. The ITE manual has ready to use trip generation rates for various land uses. The proposed expansion with different land uses is assessed as "LUC 820: Shopping Centre" for the purpose of this analysis.

> *A shopping center is an integrated group of commercial establishments that is planned, developed, owned and managed as a unit. A shopping center's composition is related to its market area in terms of size, location and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands…some of these centres contained non-merchandising facilities, such as office buildings, movie theatres, restaurants, post offices, banks, health clubs, and recreational facilities (e.t. ice skating rinks or indoor miniature golf courses)*

Table 6: ITE trip generation equations

ITE Trip Gen Manual	Land Use 17000m^2	ITE LUC	Variable Square feet	Trip Rate Average	ITE Equation
Weekday Daily	Shopping Centre	820	1000	42.92	0.643 * Ln(X) + 5.866
Weekday AM Peak	Shopping Centre	820	1000	1.03	0.596 * Ln(X) + 2.329
Weekday PM Peak	Shopping Centre	820	1000	3.74	0.66 * Ln(X) + 3.403

Using ITE trip generation equations,

- morning peak hour is forecast to generate 230 trips (trip rate of 1.35 trips / 100m^2)
- afternoon peak hour is forecast to generate 940 trips (trip rate of 5.53 trips / 100m^2)

Forecasting traffic far into the future is a complex process and often involves a variety of assumptions and calculations. While infraPlan can estimate the number of trips likely generated by the expanded town centre would extremely difficult to pin point the exact land uses within the in-fill development along northern side of Old Port Wakefield Road and within the town centre itself.

Considering the above along with trip chaining and passing trade trips, the following trip rates have been adopted to forecast traffic generated by the expanded town centre:

Morning peak hour	= 2.0 trips / 100m^2
Afternoon peak hour	= 7.5 trips / 100m^2
Daily	= 65 trips / 100m^2

This translates into:

Morning peak hour trips	**= 340**
Afternoon peak hour trips	**= 1,275**
Daily trips	**= 11,100**

7.4 Trip Distribution

The anticipated trip distribution for the expanded town centre has been derived from the original trip distribution as set out in the MFY Report (shown in Figure 5), with the following modifications:

- 85% trips are expected to be to / from the western development site

- 5% trips are expected to be from to / from the eastern development site
- 5% trips are expected to be local (existing Two Wells township)
- 5% trips are expected to be to / from south-east of the Two Wells township

It is envisaged that during the morning peak hour some of the trips originating from the western development site would visit the town centre on their way to metropolitan Adelaide (eg stopping for coffee on the way, drop-off kids to school, etc). Similarly, in the afternoon peak hour, return trips from metropolitan Adelaide are envisaged to visit the expanded town centre on the way home. These trips are termed as *passing trade trips*.

However, adopting a conservative approach it was assumed that all the trips to the town centre in the morning peak hour would be *primary trips,* thus returning to their origin (western development site, eastern development site, local trips etc) at the end of their journey.

7.5 Intersection Assessment

Future Conditions - Year 2031

While due care has been exercised when estimating traffic volumes for the future condition (year 2031) scenario these volumes are still based on limited information about existing turning movement counts at the study intersections and a conservative background traffic growth rate of 1.6%. The analysis presented in this report is intended for identifying the constraints and measures to mitigate any shortfall arising due to the proposed expansion of the town centre and residential township.

It is recommended that up-to-date traffic counts be collected at the time of DA for the town centre expansion.

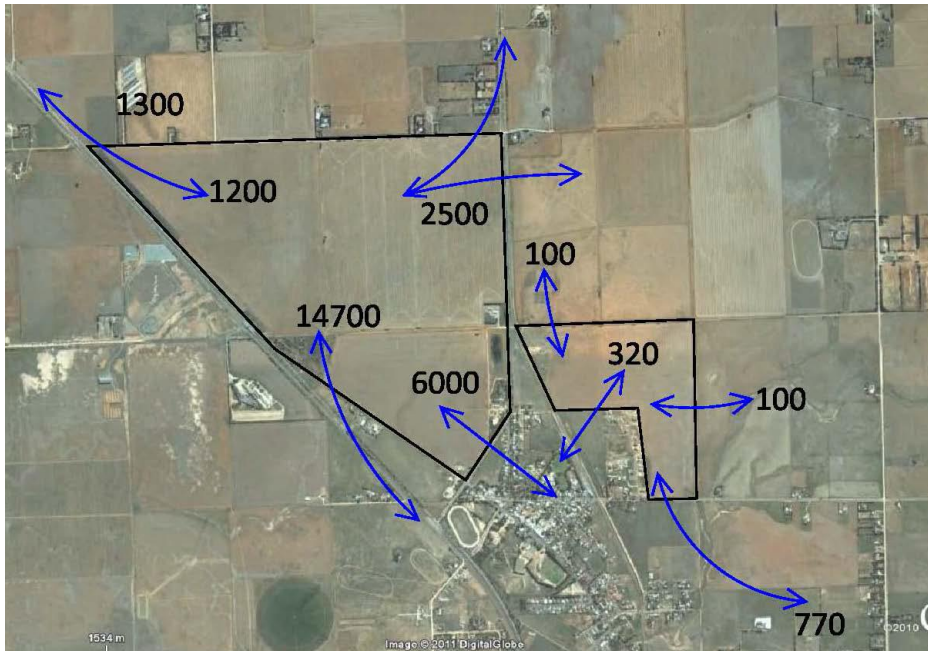


Figure 5: Trip Generation summary (MFY Land Division Masterplan; Traffic Report)

Old Port Wakefield Road Junction with Gawler Road

As explained in section 7.4 above, approximately 85% of the traffic to/from the town centre is expected to pass through the junction of Old Port Wakefield Road and Gawler Road. With existing traffic levels at the junction being fairly low, the additional traffic due to the western development site is expected to have only marginal negative impact on the intersection's performance.

While this intersection would continue to operate at LOS C with the additional traffic, the 95th percentile queue length on the southern approach in the PM peak is estimated to extend to 45m long. The increase in queue length is expected due to an increase in right turns from Old Port Wakefield Road to Gawler Road.

The volume to capacity (v/c) ratio is 0.4 in the afternoon peak hour indicating sufficient road capacity to cater for additional traffic demand.

A right turn lane on the southern approach to the intersection is recommended to reduce the right turn queuing (of vehicles waiting to turn in Gawler Road) and impact on through traffic on Old Port Wakefield Road. It is advised that periodic monitoring (every 2 to 3 years) of the intersection turning movements be undertaken when town centre expansion is underway, to determine the appropriate timing at which this treatment should be installed.

Please refer to

Table **7** and Table 8 for details on the existing and future intersection performance with development (2031) LOS summary.

Main Street Access

Old Port Wakefield Road Junction with Wells Road (Commercial development – Northern Access)

Wells Road would provide direct access to the main car park of the commercial development (refer fig 6.3 of WAX report) and thus is considered likely to attract significant traffic to the new commercial development. Within the *Two Wells Main Street Design Guidelines* it is recommended that the southern access be designed as a pedestrian friendly shared zone thus it would be expected that more traffic will choose to access the site via the northern access.

The Old Port Wakefield Road / Wells Road junction was analysed as both a Give Way sign controlled junction and as a roundabout (as per the existing conditions, and as proposed as part of the overall Main Street Design Guidelines). Both options are forecast to operate at LOS A, with only a marginal difference in 95th percentile queue length.

The v/c ratio is estimated to reach 0.45; thus indicating plenty of spare road capacity available to cater for increases in future traffic. Please refer to

Table **7** and Table 8 for details on the existing and future intersection performance with development (2031) LOS summary.

Old Port Wakefield Road Junction with Town Centre – Southern Access

Access to the commercial development from the south is proposed via a new access located approximately 150m west of Drew Street. The *Two Wells Main Street Design Guidelines* recommends the southern access to be designed as a pedestrian friendly shared zone.

This Town Centre Southern Access junction with Old Port Wakefield Road was analysed as a roundabout, in accordance with the *Main Street Design Guidelines* as prepared by WAX. This intersection is projected to operate at LOS A, with a 95th percentile queue length less than 15m (ie two car lengths).

The v/c ratio is estimated to be approximately 0.25, indicating sufficient intersection capacity available to cater for any increase in future traffic.

Please refer to

Table **7** and Table 8 for details on the existing and future intersection performance with development (2031) LOS summary.

Drew Street Junction with Old Port Wakefield Road

It is envisaged that Drew Street would provide a primary access to the town centre for residents travelling to and from the proposed eastern residential development site (country living zone). This eastern site is forecast to generate approximately 5% of the total trips to/from the proposed commercial development.

Analysis shows that the Drew Street/Old Port Wakefield Road junction is projected to operate in 2031 at LOS A, with a 95th percentile queue length less than 5m (ie one car length).

The v/c ratio is estimated to be approximately 0.1 indicating sufficient intersection capacity available to cater for any increase in future traffic. Please refer to

Table **7** and Table 8 for details on the existing and future intersection performance with development (2031) LOS summary.

Old Port Wakefield Road Junction with Brooks Road

Given the results of the assessment of surrounding intersections and the lack of traffic counts on Old Port Wakefield Road, this intersection has not been subjected to detailed analysis. Up to 5% of trips to the proposed commercial development are anticipated to pass through this intersection. This low level of additional town centre traffic is not anticipated to significantly adversely impact the performance of this intersection.

Gawler Road Level Crossing

The Gawler Road level crossing is the only location within the town of Two Wells where vehicles are required to cross the interstate train line. There are no plans to create any additional crossing points. For safety reasons, informal crossings north of Gawler Road have been closed off to prevent their use. **There may be some future need to increase road storage capacities on the road approaches, particularly on the western side of the level crossing in future.**

Table 7: AM peak Intersection Assessment output

Intersection	Existing			2031 Future Condition		
AM Peak	**v/c**	**95th %ile Queue (m)**	**LOS***	**v/c**	**95th %ile Queue (m)**	**LOS**
Old Port Wakefield Rd - Gawler Rd	0.06	1.8	A (Gawler Rd)	0.18	6.3	A
Old Port Wakefield Rd - Wells Rd - North Access to Town Centre **Give Way**	0.04	0.8	A (Wells Rd)	0.15	5.6	A
Old Port Wakefield Rd - Wells Rd - North Access to Town Centre **Roundabout**				0.18	7.2	A
Old Port Wakefield Rd - Access to park (Roundabout-2031)				0.12	4.3	A
Old Port Wakefield Rd - Drew St	0.05	1.4	A (Drew St)	0.1	2.6	A

Table 8: PM peak Intersection Assessment output

Intersection	Existing			2031 Future Condition		
PM Peak	**v/c**	**95th %ile Queue (m)**	**LOS***	**v/c**	**95th %ile Queue (m)**	**LOS**
Old Port Wakefield Rd - Gawler Rd	0.06	1.4	A (Gawler Rd)	0.38	43.4 (OPW Rd)	C (Gawler Rd)
Old Port Wakefield Rd - Wells Rd - North Access to Town Centre **Give Way**	0.05	1.8	A (Wells Rd)	0.43	22.3 (OPW Rd N)	A
Old Port Wakefield Rd - Wells Rd - North Access to Town Centre **Roundabout**				0.45	27.5 (OPW Rd N)	A
Old Port Wakefield Rd - Access to park (Roundabout-2031)				0.25	10.6	A
Old Port Wakefield Rd - Drew St	0.03	0.8	A (Drew St)	0.1	2.5	A

7.6 Local Road Network

Local road network impacts of the proposed township growth will be greatest on and in the vicinity of Old Port Wakefield Road. As shown in the current development plans, both car park access roads link to the main street, this forcing greater volumes of traffic into the main thoroughfare. Design Guidelines produced by Wax designs and JPE indicate pedestrianisation of this main street precinct to encourage more activity in the town centre. Such measures will need to be balanced against the need to continue to cater for all transport modes in a manner which is both sympathetic and responsive to the community needs and desires.

7.7 Rear of Premises Access

During the site visit InfraPlan staff assessed the potential for providing rear of allotment access to those existing retailers on Old Port Wakefield Road that require heavy vehicle access for deliveries and sales. Rear of premises provisions for loading/unloading and car parking provides a number of advantages, including:

- Greater capacity of off-street car parking through the removal of fences and the like which in turn will result in greater efficiency.
- Reduced heavy vehicle movements within the main street, which would in turn reduce the potential for conflict with pedestrian activity.
- Increased capacity of on-street parking, particularly for developments where tenants and employees usually park at 'front-of-shop'.

It was found however, that due to the presence of large sheds, old barns and other obstacles the creation of a suitable extent of land at the rear of premises would have significant effect on some businesses and a potentially cost prohibitive exercise at this point in time. It is recommended that council consider this as a potential long-term opportunity to assist in reducing the impacts of large delivery vehicles operating from the main street and the demand for front-of-shop car parking. The removal of surplus driveway access points from the Main Street will further improve pedestrian safety and allows for additional on-street parking.

7.8 Heavy Vehicle Movements

InfraPlan has conferred with DPTI regarding a previous study/proposal to divert heavy vehicles further to the north; a greater distance from the township centre and with less impact on current and future residential areas. DPTI has conveyed throughout the planning process for the Two Wells development and re-iterated for this study that Mallala Road is identified as a Freight Route in *A Functional Hierarchy for South Australia's Land Transport Network*, and previously expressed that the layout / design etc of the development should reflect this function. DPTI has also advised that Council's current Development Plan does not indicate any changes to this route, and that DPTI has no plans to divert existing heavy vehicles from this road.

As discussed in Section 4.8, the provision of safe and efficient linkages between the residential development to the north of the Two Wells to Mallala Road and the expanded Town Centre would be enhanced by relocation of the freight route further to the north and this has been previously intimated in the 2005 KBR report. This proposal will require detailed negotiation with DPTI and will need to be supported by a formal qualitative and quantitative assessment of the suitability of the proposed new route, and accompanying re-consideration of the relevant sections of the Development Plan.

7.9 Speed limits

Pedestrianisation of the main street precinct will require traffic calming measures that should include consideration of lowering of the speed limit to 40km/h. Studies have shown that the risk of pedestrian fatality falls sharply with the reduction of vehicle speeds and that at 40km/h, the risk of fatality is less than 50%, as shown in Figure 6 below.

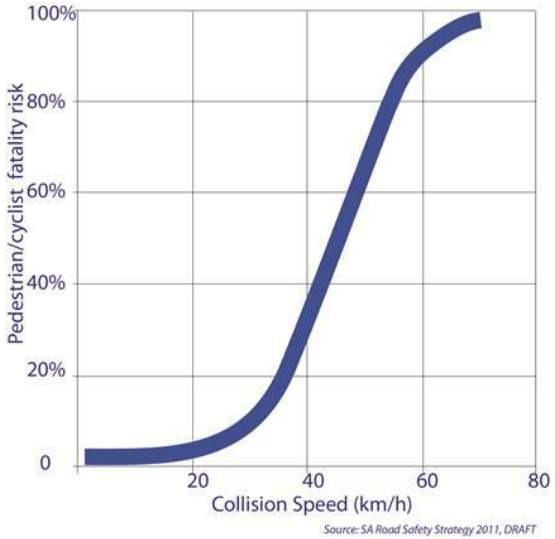


Figure 6: Cyclist collision speed graph

There are no recommendations at this stage to alter speed limits throughout other parts of the town of Two Wells at this stage. The speed limit on Mallala Road is currently 80km/h, this will need to be reduced in the vicinity of any future residential development, particularly to provide safe crossing points for cyclists and pedestrians moving between the township centre and new development areas.

8 Other Considerations

8.1 Public Transport Provisions

As referred to previously, one of the Actions as identified in the ITLUP Report states:

"…In line with growth, extend bus services as required to service growth areas of Buckland Park, Playford North, Angle Vale, Virginia/ Virginia North and Two Wells…"

While there are no known current or future plans to provide for public transport to Two Wells or to connect the town's residents to existing services in Elizabeth or Gawler. While the current population of the township does not generate sufficient demand to warrant such links, future growth projections may make this is a feasible consideration.

It is recommended that in time (depending on the rate of take up of dwellings) the provision of a shuttle service be investigated for residents travelling to and from Adelaide and the northern suburbs to link them to passenger rail services. It is likely however that this will not be warranted for approximately 10 years.

Future projections of resident numbers employed south of Two Wells and in the City of Adelaide will increase significantly over time and the provision of rapid and convenient linkages to existing public transport infrastructure will help to limit the impact on the road network as a result of the planned residential development.

8.2 Bicycle Routes and Facilities

An important strategy in retaining the character and activity of the existing town centre and main street precinct is to provide walking and cycling connections to encourage new residents of Two Wells to experience the town in a direct and personal manner, which cannot be done by from a motor vehicle. As the vast majority of car parking is to be provided off the main street, pedestrian (and bicycle) movement and connectivity is vital to retain retail activity on the eastern side of Old Port Wakefield Road.

The provision of bicycle routes and shared paths throughout the new development and linkages to the town centre where end-of-journey provisions including lock-up facilities, toilet amenities, rest stops and pubic open spaces is important in developing a culture of walking and cycling within the expanded township of Two Wells.

It is recommended that a contra-flow bike lane also be provided on the western side of Old Port Wakefield Road to avoid clashes between cyclists and angled car parking on the eastern side. Alternatively, a separated bike path or shared path should be established on the western side of the town centre.

8.3 Pedestrian Provisions

Safe crossing of Old Port Wakefield Road for pedestrians is considered a very real priority, for both the current and future population of Two Wells. As discussed previously, there is no clear location along Old Port Wakefield Road where pedestrians can feel confident crossing vehicle paths. This issue will be further exacerbated with the project township growth and increased town centre activity.

The design of the proposed commercial development is in its infancy, and assessment of the impacts on the Two Wells Town Centre (particularly the main street) in response to the proposed growth are well advanced, but not yet at a stage of detailed design changes to the streetscape. In order to support retailers operating in the main street, it is imperative that the vitality of the main street character can compete with the convenience of the proposed commercial development. As part of this, it is recommended that crossing points be provided on Old Port Wakefield Road close to junctions with car park access roads to connect new car parking facilities in the

western part of the precinct with existing and new businesses with Old Port Wakefield Road frontages.

There are also a number of opportunities to provide additional facilities in public open spaces such as seating, shade trees, toilet facilities and lighting. The area including the Memorial Gardens and playground, with the nearby bakery and sportsgrounds has been identified as a prime opportunity where existing foot traffic and partial amenity can be supplemented to provide the sort of public open space that encourages residents and visitors to Two Wells to linger in the town centre, retaining and enhancing activity within the main street precinct.

Petticoat Lane too, offers an excellent opportunity to create a welcoming point to sit, linger and chat, well sited between existing restaurants and cafes.

The plans for a market precinct also provides opportunities to include improved pedestrian facilities at regular intervals throughout the precinct.

8.4 School Pick-Up and Drop-Off Zones

It is noted that the Two Wells Primary School on Gawler Road and the two child care centres adjacent the school generate high volumes of traffic movement and parking near the school at drop-off and pick up times. The Primary School has issued a parent information booklet stating that:

> *Parent parking is available on the Gawler/Two Wells Rd off Old Mallala Rd and at the far side of the oval using the Two Wells Community Children's Centre drive way.*

It has been observed by Council that many parents instead use the reserve immediately west of the school. The council has provided a parking and turn around area at the western extent of the reserve and blocked off entrance to the site from the southern boundary. However it is apparent from the wear to the reserve and visible vehicle tracks that many parents are driving across the reserve to pick children up at the side gate to the school. The wear from vehicular travel is so evident that it is shown as an unnamed roadway on Google Maps.

Further consideration should be given to improving and controlling stopping and pick up facilities around these educational institutions to improve safety for students and restrict parents to formalised zones for pick-up and drop-off activities. Council has been advised that an Aboriginal Burial site has been identified within the reserve (which gives further cause for preservation of the integrity of the reserve) but the precise location has not yet been disclosed.

8.5 Emergency Services Multifunctional Facility

District Council of Mallala is currently considering the opportunity to reconcile Emergency Services within the Town Centre precinct and to introduce Ambulance, Fire and SES operations into Two Wells to coincide with the anticipated growth.

This multifunction emergency services facility will cater for Police, Ambulance, Fire and SES services at a single location, integrating services with a view to providing greater efficiency.

Ongoing negotiations between state and local governments and with emergency services have not yet confirmed a final location for this multifunction emergency services facility, but unimpeded vehicular access and egress will be of the highest priority. Ideally, the location would include relatively direct access to Port Wakefield Road, but be away from the core main street activity.

9 Assessment of Car Parking Impacts

9.1 Impact Assessment (Supply v Demand)

Future car parking demand for Two Wells is most significantly affected by the planned new commercial development on the western side of the main street. An intrinsic part of this development is a large at grade parking facility to be located between the new development and the rear of the existing allotments on the western side of Old Port Wakefield Road. Initial assessments by Property & Advisory Pty Ltd indicate a total retail floor space of approximately 12,000m^2 (3,500m^2 supermarket, 3,500m^2 other food outlets and 5,000m^2 retail space) in the completed development by the year 2030, including infill and upgrade of existing main street properties. Development of this scale will require parking in the range of 660 additional spaces if the development plan requirements are applied in full.

9.1 Shared Parking Analysis

The project brief specifies that parking requirements in Two Wells Town Centre are to be assessed with a shared parking analysis approach. Traditional car park requirement analysis has apportioned a number of car parks required for each business type based on the gross floor space or number of consulting rooms for each outlet. This approach typically results in an oversupply of car parking and thus large expanses of underutilised space.

In recent times, town centre and other dense retail precincts have taken a precinct-wide approach to minimise the overall supply of car parking while providing sufficient capacity and thus getting most efficient use of the space. This approach is built on the understanding that not all land uses have the same temporal profile to their parking demand, that is peak demand occurs at different times of day depending on the outlet in question. For example, the local hotel is unlikely to require car parking at the same time as the local church.

A compact main street precinct with a good mix of land uses, such as is the case in Two Wells, is well suited to this shared parking approach. There is an opportunity to more carefully consider the car parking requirements of the township across the day and the week to ensure that car parking stock is sufficient to meet needs, makes efficient use of public space and avoids creating excessively large expanses of underutilised car parking. Figure 7 shows a typical Temporal Distribution graph showing the varying parking requirements (as a percentage of maximum) by land use throughout the day.

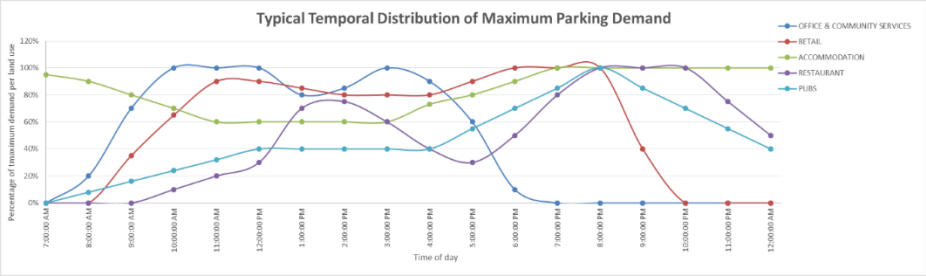


Figure 7: Typical temporal distribution graph

Temporal Analysis

Options to consider shared parking were developed for facilities on both the eastern side of Old Port Wakefield Road and to determine the overall designed capacity of future parking facilities of the west side of the town. Shared parking facilities can be dedicated to long-term parking, leaving on street parking for short term parking for visitors and shoppers.

InfraPlan has assessed the demand for future parking with a temporal model that allows for the sharing of car parking facilities based on outlet types and their individual peak demand characteristics. The outcome of this assessment is that the overall future demand for Two Wells Town Centre precinct is approximately 885 spaces compared to 980 spaces under traditional assessment criteria. This equates to a reduction of approximately 10% compared to traditional demand calculation techniques. The graphs

below show that the major demand driver is the large scale new retail and supermarket development. Any increase in parking provision will need to be accommodated within the new development car park, including the replacement of those lost on Old Port Wakefield Road as a result of redevelopment.

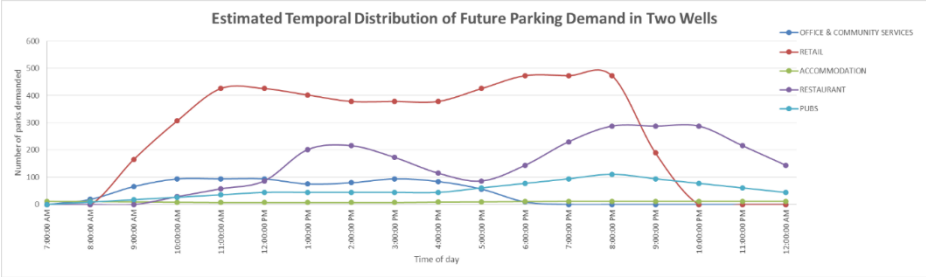


Figure 8: Post development parking demand by land use

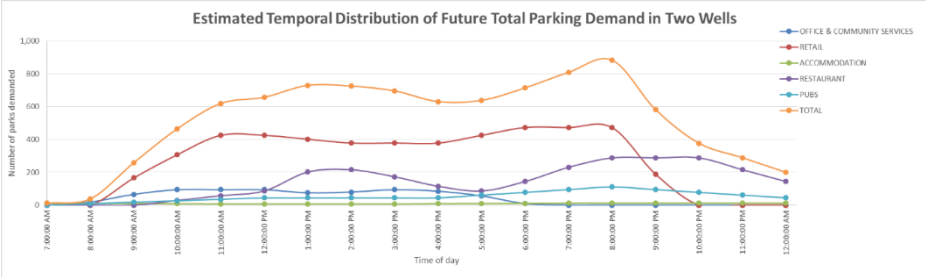


Figure 9: Post development parking demand by land use and temporal total

9.2 Rationalising On-Street Parking

Past experiences including stakeholder and retailer consultation has indicated that the retention of shop-front on street parking is extremely important to retailers in Two Wells. InfraPlan recommends the retention of the existing parking provisions where possible, particularly front-of-shop parking on the eastern side of Old Port Wakefield Road where the majority of retail outlets are located.

During the site visit to Two Wells, the importance to retailers to retain the on-street parking on the eastern side of Old Port Wakefield Road was emphasised, with experiences including previously abandoned plans for a pedestrian crossing used to demonstrate this point. As such, and with acknowledgement of the decision to reject off-street parking on the eastern side, all efforts should be made to retain as much of the existing on-street parking as possible, particularly on the eastern side of Old Port Wakefield Road. This provision should then be supplemented where available with rearrangement of other parking and street furniture.

It is noted that the introduction of junctions to provide access to the new development car park to the western side will result in losses of some existing on-street car parks. There are also opportunities however, to introduce new on street car parks and rearrange the existing to provide additional on-street parking spaces on Old Port Wakefield Road.

It is recommended that any future modification of the carriageway be focussed on the western side of Old Port Wakefield Road, to preserve the on-street parking on the eastern side of the carriageway which services the adjacent main street shop fronts.

9.3 Off-Street Parking

It should be noted that the existing Master Plan for the Two Wells Town Centre shows an access road to the new development and car park in the location of the current Police station, the white roofed buildings just north east of area 3 shown in Figure 11: Off-street parking opportunities within Two Wells Town Centre precinct (*Source: Googlemaps2014*). Co-location of pedestrian access, utilising the planned market place areas can provide rapid and convenient access between the car park facility and the eastern side of Old Port Wakefield Road.

Centralisation of parking facilities is intrinsic to plans to change the nature of the main street precinct from a vehicle dominated roadway to a pedestrian

friendly space. This encourages visitors to walk the precinct, leading to greater interaction with and activation of both existing and future main street retail and community services.

In previous, similar projects, infraPlan has found that by defining off-street locations where traders and employees can park all day, in close walking distance to their shops on the main street, shop front parking allowances are made available for the customers and visitors to the town centre. It is proposed that future planning incorporate a staff and traders area into car park design to alleviate the impact of loss of car parking due to pedestrianisation improvements and introduction of car park access roads.

Two Wells has a large supply of vacant land within the heart of the town centre which currently serves as informal parking along the main street of Old Port Wakefield Road. Through consultation with Council representatives, it has been determined that these identified allotments on the eastern side of Old Port Wakefield Road are all under private ownership and therefore not appropriate for council to consider for a car park development. As there is also no intent to provide a shared parking facility on the eastern side of Old Port Wakefield Road, the development of off-street parking facilities will be concentrated west of the main street precinct as shown in development plans.

The table overleaf however provides a summary demonstrating the potential informal capacities of the identified vacant land areas.

Table 9: Off-street parking capacities

Area	Capacity	Comments
1	6343	Currently unused as site is fenced off
2	151104	Large, open site with multiple access points and a number of large trees. Unsealed. Paved, planned capacity of approximately 140.
3	8835	Not currently used as a car parking facility. Paved, designed capacity of approximately 45.
4	4235	Vacant block at the southern extent of town. Accessible but appears to be unutilised. Paved, designed capacity of approximately 45.
5	8781	Large block with access to both Drew Street and Old Port Wakefield Road. Paved, designed capacity of approximately 110 but has greater potential for alternative development.
A	5138	Scout hall adjoins this site, appears to be used for parking. Unsealed, unmarked. Paved, designed capacity of approximately 50.
B	10	Limited space, wrapped around a building. Concept plan shows redevelopment in this area.
C	2814	Rear of IGA Supermarket, currently unsealed and unmarked. Potential capacity of approximately 30.
D	40	Sealed, marked Bowls Club car park



Figure 10: Vacant lots within the Two Wells Town Centre precinct



Figure 11: Off-street parking opportunities within Two Wells Town Centre precinct (*Source: Googlemaps2014*)

10 Summary

In summary:

- This investigation has included an assessment of traffic flow and circulation, a review of parking demand, the identification of optimum sites for shared use parking and the impact increased traffic will have on the Old Port Wakefield Road Town Centre precinct.
- This study acknowledges the traffic work already undertaken in response to the proposed Hickinbotham development, and gives further consideration to the impacts of development on key intersections and junctions within the heart of the township. This study has also given critical review to the MFY report prior to commencing further traffic analysis.
- Key intersections and junctions within the Two Wells township are largely confined to the 'main street' within Two Wells and at the junctions of Port Wakefield Road with Mallala Road and Brooks Road; the two key access/egress points from the township to the Princes Highway.
- Limited traffic data has been available for this study, including no traffic turning movement data for the intersections within the Town Centre. InfraPlan has made a number of assumptions and extrapolated existing data to determine likely traffic activity at selected locations. These assumptions and volumes have been verified by Council prior to their application in the traffic analysis.
- Three intersections were selected for assessment of existing traffic conditions, including:
    - Old Port Wakefield Road/ Gawler Road junction
    - Old Port Wakefield Road/ Wells Road junction
    - Old Port Wakefield Road/ Drew Street junction
- Each were found to operate at LOS A with an average delay of less than 8 seconds.
- Crash data indicates the following intersections meet Black Spot funding criteria:
    - Port Wakefield Road/Brooks Road junction
    - Port Wakefield Road/Mallala Road junction
    - Old Port Wakefield Road, near Petticoat Lane
- Current public transport provisions do not extend to Two Wells.
- There is a notable lack of cycling infrastructure within Two Wells.
- No formal pedestrian crossing provisions exist along Old Port Wakefield Road. Kerb ramps also do not exist at a number of street corners, and there are a number of opportunities to install footpath protuberances to reduce potential conflicts between pedestrians and outdoor diners.
- Currently there are a total of 139 on-street car parks and approximately 80 off-street car parks within the vicinity of the town centre.
- Traffic analysis for the year 2031 indicates minimal adverse impacts at key intersections within the township as a result of the projected growth. A right turn lane on the southern approach to the intersection of Old Port Wakefield Road and Gawler Road is recommended however, to reduce the queuing of vehicles waiting to turn right into Gawler Road.
- Key laneway linkages to Port Wakefield Road from the wider local road network (eg Applebee Road and Petticoat Lane) require upgrade to improve safety and amenity, and to encourage greater use.
- The Gawler Road level crossing may also require a future increase in vehicle storage capacities on the road approaches, particularly on the western side of the level crossing.
- DPTI has confirmed that there are no plans to divert existing heavy vehicles from the current route. Should Council wish to pursue route

relocation further north, more detailed negotiations (and route assessment) will be required with DPTI.

- Other recommendations include improved linkages to public transport, improved cycling and walking provisions and more effective school drop-off/pick up provisions in the vicinity of Two Wells Primary School.
- There are a number of opportunities within the scope of revitalisation of the main street that can be implemented to improve the safety, amenity and efficiency of movement for all transport modes.
- With consideration of shared parking provisions, the overall future demand for the Two Wells Town Centre precinct is approximately 885 spaces.
- Key traffic generators such as the bakery, IGA and the Post Office require particular consideration to ensure that adequate carparking and footpath provisions (including appropriate surface provisions) are provided for both vehicular and pedestrian activity.

11 Conclusion

The list below summarises key conclusions from the overall project investigations:

1. Based on the analysis presented in this report, the road network within the Two Wells township has sufficient capacity to accommodate the current levels of traffic activity, and is supported by an adequate number of carparking spaces to meet day to day parking demands. In addition, there are also areas where overflow carparking can occur to meet increased demand at times of key events.
2. Further, there is sufficient capacity within the current road network to meet the additional demands expected to be generated by the proposed increase in residential and commercial development (as described in section 6) to the north of Mallala Road.
3. The existing freight routes along Mallala Road and Gawler Street however which once bounded the township to the north will now fall within the township, and their presence creates an element of segregation between the existing township heart and the evolving area to the north. It is recommended that further investigation be undertaken to relocate freight movement further to the north, beyond the planned residential development, for both safety and amenity reasons.
4. Sustainable transport modes are expected to grow:
    - there is longer-term intent to extend bus services to Two Wells to meet future transport demands
    - cycling is expected to become a more popular travel mode in the township, partly due to an increase in population and partly in response to providing attractive infrastructure and a vibrant mainstreet environment

- pedestrian movements will similarly increase in the township, and a vibrant main street environment will encourage people to walk rather than drive between destinations. Key crossing points will need to be identified and designed to enable users to safely cross Old Port Wakefield Road and to move between the main street and the proposed commercial development on its south-western side.

5. The proposed concentration of emergency services within a single facility will require a location which has efficient access to and from the surrounding road network, particularly Port Wakefield Road.
6. The successful integration of the existing township of Two Wells with the new residential development to the north and the commercial development proposed to the west will be dependent on safe and efficient links for walking, cycling and passenger vehicles. The achievement of this will be greatly enhanced by relocation of the existing freight route to a route further to the north (eg Sharpe Road).
7. Many of the findings and recommendations of this report are consistent with those contained in the Two Wells Age Friendly Assessment and the Main Street Design Guidelines for Two Wells.

12 Further Considerations

Through discussions with Council, site assessment and analysis, a number of other considerations have been raised which are related to, but for various reasons, lie beyond the scope of this study. These considerations have been summarised below, for future reference and investigation as required.

12.1 Encourage Alternative Transport Modes

Council has expressed a desire to include cycling and pedestrian paths in any new development, acknowledge the value in precinct planning and to promote the use of non-motorised transport alternatives within a community redevelopment.

Provision of cycling and walking paths connecting new development areas with the main street is vital to encourage non-motorised transport use. Destination facilities such as bike storage in the town centre not only provides for cyclists but also makes visible the transport choices being made to encourage others to adopt these choices.

12.2 Introduction of on-street parking restrictions

The introduction of on-street parking restrictions can be used to effectively manage the turnover of on-street parking, providing an opportunity for more customers to park at front-of-shop.

With the support of a centralised off-street facility for longer term parking, the number and location of on-street parking spaces can be better tailored to customer needs. Visitors to the town centre could be encouraged to park in an off-street facility and visit multiple outlets during a long stay while the more convenient on-street parking is kept available for those making short trips to a single destination.

12.3 Bus Stopping Facility

Coach companies have been reported to use the main street precinct as a stopping point to make use of public amenities and as a food stop, particularly the Two Wells Bakery.

A formal bus stopping area at the southern extent of the Town Centre precinct, linked to the suggested improvements around the Memorial Gardens would encourage coaches to stop at a dedicated location.

12.4 Catering for events-based parking

Council have noted that provision of new community facilities will require relocation of existing RSL and Scout halls. These facilities cater for events, with fluctuating car parking demands depending on the type of event being held. Consideration of the location of these facilities and the potential for the shared use of planned car parking should also be considered as part of the overall planning process.

13 References

Mallala Rural Road Map. District Council of Mallala; Rural Roads, Rack Plan 960 (Mar 2012):
http://www.sa.gov.au/__data/assets/pdf_file/0008/20978/Rural_Road_Maps_Mallala.pdf

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