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Summary Report

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Executive Summary

Background

The A483 Trunk Road passes through Newtown providing a key route for east-west and north-south traffic through mid-Wales. There is a long history of traffic problems in Newtown, and a Newtown Bypass scheme has been discussed for some time. Construction of the bypass is likely to start in 2014

A new Tesco store on the site of the former livestock market site opened in February 2010. As part of mitigation measures for the new Tesco store, A483 Pool Road/Kerry Road roundabout was converted to a signal controlled junction in late 2009, and a new signal controlled junction provided for the Tesco access.

The works also included linking of the five traffic signal controlled junctions on the A483 via a SCOOT traffic signal control system in order to improve coordination of the signals to reduce delay and increase capacity. The initial SCOOT calibration was not undertaken effectively, leading to significant congestion, increased delays, and public complaints.

A number of minor physical improvements were subsequently made to the Kerry Road junction, and changes made to the traffic signal configuration, leading to improved operation and journey times. Final minor configuration improvements are currently underway

Traffic Data

A wide range traffic data has been reviewed to compare the traffic conditions before and after the works.

Journey Time surveys through Newtown were undertaken between 2006 and 2011. These show that there was very slow moving traffic with initial signal configuration, and improved journey times due to the minor improvements and SCOOT recalibration. Journey times through Newtown are now quicker than with former roundabout.

A number of turning count surveys were undertaken between 2005 and 2011 at the Kerry Road junction. These showed a slight reduction in overall traffic levels from 2008 to 2011, and some evidence of rat-running traffic avoiding Kerry Road junction where alternative routes exist. Analysis of Automatic Traffic Count (ATC) data shows some overall reduction in traffic levels in Newtown in recent years, but not much more than national averages.

There is no significant accident record at Kerry Road junction for the former roundabout or the signal controlled junction.

Junction Modelling

The capacity of the roundabout and traffic signals at the Kerry Road junction has been assessed using industry standard software. The study showed that the earlier junction modelling for Tesco store overestimated capacity, and that the updated modelling shows that the traffic signals and roundabout would both close to capacity for current traffic levels. Both junction layouts would be significantly

over capacity for the forecast increased traffic levels in Tesco Transport Assessment.

Microsimulation Modelling

A VISSIM microsimulation model was developed for the Kerry Road junction including interaction with Tesco Access and Shortbridge Street junctions. The model was calibrated to local driver behaviour using video footage. Both the roundabout and traffic signal controlled junction were assessed for 2011 traffic levels for the PM peak period.

Comparison between the two modelled options showed improved journey time for the traffic signals in both the eastbound and westbound direction, with a particular improvement in the eastbound direction.

Overall, the traffic signals resulted in shorter queue lengths than the roundabout, although there is visually more stop-start traffic due the nature of traffic signals.

Summary

The initial traffic signal control system set up was poorly calibrated, leading to significant congestion, increased delays, and public complaints.

Minor junction improvements and signal configuration have improved journey times compared to the former roundabout. Final minor configuration improvements are currently underway.

Traffic signals at the Kerry Road junction provide safe and convenient pedestrian crossings not available at roundabout.

The current arrangement is the best that can be achieved with the current road layout. Any further capacity improvements would require third party land or property.

The Newtown Bypass will provide significant relief to the route.

1 Introduction

1.1 Background

Arup were commissioned by the Welsh Government (WG) to provide an independent review of the traffic issues in Newtown, Powys.

This included a review of previous study reports, discussions with relevant bodies, site visits and surveys. Over the course of the study, Arup staff visited Newtown on numerous occasions to undertake surveys and site observations, and met with Jeff Collins (WG), Robert Webster (WG), Andy Cochran (WG), David Hern (WG), and Dale Boyington (Powys County Council).

1.2 History

The A483 Trunk Road passes through Newtown providing a key route for east-west and north-south traffic through mid-Wales. There is a long history of traffic problems in Newtown, in particular during peak hours, and Bank Holiday weekends.

A Newtown Bypass scheme has been discussed for some time, and the Public Consultation was undertaken in September 2009, with a preferred route announced in October 2010 which will include a package of local transport improvement measures. Construction of the bypass is likely to start in 2014.

A new Tesco store on the site of the former livestock market site was granted planning permission in February 2009 and opened in February 2010. As part of mitigation measures for the new Tesco store, A483 Pool Road/Kerry Road roundabout was converted to a signal controlled junction in late 2009, and a new signal controlled junction provided for the Tesco access.

The works also included linking of the five traffic signal controlled junctions on the A483 via a SCOOT system in order to improve coordination of the signals to reduce delay and increase capacity, as highlighted on Figure 1.1. The junctions linked by the SCOOT system are (from west to east):

- Dolfor Road,
- Church Street,
- Shortbrigde Street,
- Kerry Road, and
- Tesco Access.

These works led to a reported worsening of the traffic congestion in Newtown.

2 Other Studies

2.1 Introduction

This chapter outlines and summarises the previous reports and studies relating to the Tesco store and traffic operations in Newtown.

2.2 Tesco Transport Assessment

The Transport Assessment in support of the Tesco store development was prepared by ADL Highways. Three revisions of the report were submitted for planning, the first in May 2006, the second in December 2007, and the final version in August 2008.

The Transport Assessment included detailed data collection of the traffic flows and operating conditions of the highway network in 2005, and assessed the key junctions for existing and forecast traffic conditions with the store in place. The traffic growth, trip generation, distribution, and modal split assumptions are rational and within expected values.

The traffic impact analysis in the first issue of the report showed that the existing junctions had sufficient spare capacity for the opening year and a future year of 2022, accommodating development traffic and 15 years of traffic growth.

However, in the first issue of the report, the junctions were modelled in isolation, with no consideration of the interaction between adjacent junctions. The second issue of the report included analysis of the interaction of the existing signal controlled junctions, and included proposals to improve the Kerry Road roundabout. This revised analysis highlighted that the junctions would be approaching their theoretical capacity with the traffic flows forecast for 2022.

In the final revision of the Transport Assessment, it is recommended that A483 Pool Road/Kerry Road junction is converted from a roundabout to a signal controlled crossroads, that the Tesco access should be signal controlled, and that the five sets of traffic signals on the A483 are linked with a SCOOT system. It is understood that these recommendations stem from work undertaken for Powys County Council by the use of a PARAMICS microsimulation traffic model developed by Capita Symonds (discussed below).

The junction modelling included in the Transport Assessment shows that the junctions would be over theoretical capacity by 2022, but notes that the PARAMICS modelling indicated that the traffic flows can be accommodated under the proposals.

2.3 Microsimulation Study

A PARAMICS Microsimulation model was developed by Capita Symonds for Powys County Council in order to independently assess the likely traffic impact of the Tesco development. The results of the modelling are summarised in a report dated March 2008.

This report considered the impact of the development by comparing modelled queue lengths and journey times on key routes through the town. The report

concludes that the capacity of the network could be enhanced by adjusting the traffic signal settings to manage a greater throughput of traffic, and that the impact of the Tesco store would be significant but localised.

2.4 Road Safety Audit

The highway improvements were subject to a series of Road Safety Audits (RSA), by TMS, including a Stage 3 audit upon opening, subsequent Stage 3 audits to consider improvement works, and a Stage 4 audit to monitor the operation after opening.

The initial Stage 3 audit, undertaken in February 2010, highlighted a number of serious concerns at the A483 Pool Road/Kerry Road junction which the auditor felt would lead to significant risk of vehicle-vehicle and vehicle-pedestrian collisions.

In particular, the signal staging when the junction was opened had Kerry Road and Cambrian Way running in the same signal stage, and the Pool Road (east) and Pool Road (west) arms running each in separate stages. It is unclear where this signal staging originated, as the signal staging in the Transport Assessment matches that which is currently implemented on site.

As such, the signal timings were adjusted, and a number of minor physical improvements were proposed to improve visibility for turning traffic, to separate conflicting traffic movements, and to improve pedestrian crossing facilities.

The junction was re-audited in June 2010 and May 2011 to address the improvements made. All of the recommendations in the Stage 3 audits have now been carried out.

A Stage 4 audit was undertaken to review the junction in June 2011, including analysis of accidents. Only one accident had occurred since the works were completed, involving two cars at Kerry Road junction. This was two weeks after the opening of the Tesco store, and prior to completion of the road markings for the right turn storage areas in the junction. These markings have since been introduced

2.5 SCOOT Calibration

Upon completion of the physical highway works, Siemens undertook the process of calibrating the SCOOT system. It is understood that there were some initial problems with the stability of the SCOOT controller, and on occasion the SCOOT system was off-line for a number of days leading to significant traffic congestion. This was partly due to a lack of SCOOT training and understanding at Powys County Council. This led to a period of regular remote monitoring by Siemens to ensure that the system was operational.

Initial site visits as part of this study suggest that the SCOOT calibration had not been undertaken effectively, leading to inefficient operation of the signal controlled junctions. This is discussed further in Section 3.2.

2.6 Pre and Post Tesco: Traffic Analysis

A study of the traffic conditions before and after the Tesco development was carried out by Parsons Brinckerhoff, and summarised a report dated March 2011.

Parsons Brinckerhoff had collected extensive data for the A483/A489 Newtown WelTAG Study in 2008, and collected new traffic data in early 2011 for comparison. In particular, the study includes a comparison of automatic traffic count data, turning count data at the A483 Pool Road/Kerry Road and Dolfor Road junctions, along with eastbound journey time surveys.

The study showed that the closure of the river crossing at Aberbechan had not changed traffic conditions, and thus the findings of the study were not affected. The ATC data collected for the study showed that there was little variation between the weekday traffic profiles in 2008 and 2011, but that the weekend traffic levels had reduced. Comparison of turning counts showed that traffic flows had remained relatively constant overall, with some evidence of traffic reassignment. Comparison of the journey time surveys showed that there was some variation in junction delay through Newtown, but resulting in an overall neutral effect.

In summary the report concluded that there was some change to the traffic conditions since the opening of the Tesco store, but that overall the network delays remained relatively constant with similar journey times.

2.7 SCOOT Recalibration

In parallel to the Arup study, the SCOOT system was recalibrated by JAH Traffic Company Ltd between April and June 2011 at the request of the Welsh Government.

In addition, some basic training was given to members of Powys County Council staff in order that they would be able to check the operation of the SCOOT system in the future, and make minor adjustments if necessary.

Some minor improvements to the traffic signal equipment were also recommended to improve the operation. These included provision of an additional detector loop at the Kerry Road junction to improve the detection of vehicles waiting to turn right from Pool Road to Cambrian Way, and kerbside detection of pedestrian crossings to cancel the demand for pedestrian signal stages if the pedestrian crosses in a gap in traffic. These works were completed in December 2011.

An interim recalibration of the SCOOT system was undertaken in December 2011, and a final round of recalibration was undertaken in March 2012.

3 Further Analysis

3.1 Introduction

This section sets out the findings of further investigations, including discussion of the signal operation, and comparisons of journey times, junction turning counts, automatic traffic counter information, and junction modelling results.

3.2 Signal Operation

3.2.1 General

Initial site visits for this study were undertaken in February and March 2011, and were timed to observe the Thursday interpeak and PM peak period, as local residents had highlighted that the Thursday PM peak was often the most congested.

Of the five signal controlled junctions along the A483 in Newtown, all seemed to work reasonably well in isolation. Although these junctions are linked with a SCOOT system, it was observed that the signal timings of the adjacent junctions were poorly coordinated, which lead to inefficient operation with wasted green time due to traffic being held at the junction upstream, or blocked by the queue from the junction downstream. The A483 Pool Road/Kerry Road junction appeared to be the focus of the problems, as once past this junction there are no significant queues in either direction.

It was also noted that there are a number of ‘yellow box’ and ‘keep clear’ markings along the A483, and on the whole, these are well observed by drivers. This, in addition to a number of accesses and minor junctions, was observed to lead to breakdown in the ‘platoons’ of traffic which further interrupted the effective operation of the signal controlled junctions.

In response to these observations, recalibration of the SCOOT system was undertaken between April and June 2011 by JAH Traffic Company Ltd as part of this study. These works aimed to improve the coordination of the five signal controlled junctions in order to lead to a more efficient operation overall, increasing traffic capacity and reducing delay.

Further site visits in June, July and October were undertaken to review the operation of the traffic signals post recalibration. It was observed that the signal timing coordination between adjacent junctions was much improved, such that the individual junctions were able to operate more efficiently with less wasted green time due to blocking back.

This improved operation led to reduced congestion, and while queues were still present at the junctions, traffic was able to progress through the highway network more quickly, with a particular improvement in the westbound direction.

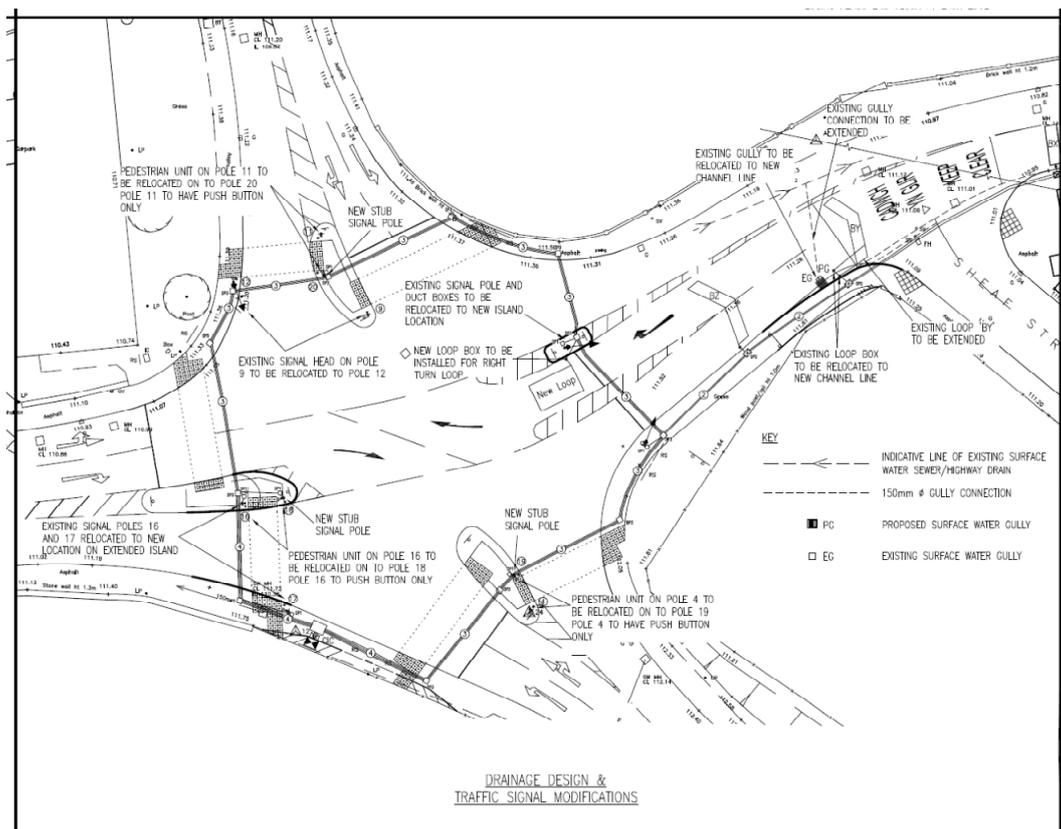
The journey time surveys undertaken during the site visit in July are discussed in Section 3.3 of this report.

3.2.2 A483 Pool Road/Kerry Road Junction

The latest configuration of the traffic signals at the A483 Pool Road/Kerry Road junction is shown on ADL Highways Drawing H649-901 revision C, an extract of which is included below.

This drawing represents the minor improvements that were carried out to the signal controlled junction early 2011. The changes to the island and road markings on Pool Road (East) create an improved right turn flare capacity, and improved alignment for straight through traffic. This arrangement also improves the visibility for traffic waiting to turn right from Pool Road (West) to Kerry Road. Other changes include the revised pedestrian crossing over the exit on Pool Road (West), to create a staggered crossing.

The introduction of controlled pedestrian crossing facilities makes pedestrian movements across the arms significantly easier and safer than the former roundabout configuration, and these crossings were observed to be well used. The signal staging included an unnecessary ‘all red’ stage for certain pedestrian crossings, resulting in additional delay to traffic. This was addressed as part of the minor improvements undertaken in March 2012.



While these changes improved the operation of the junction, the awkward alignment of straight through movement, and interaction of right turn lane and ‘keep clear’ markings remain, and significantly impact the smooth operation of the Pool Road (East) approach.

Photograph 3.1 highlights the poor straight through alignment from Pool Road (East). Photograph 3.2 demonstrates the limited right turn queuing length, and the

interaction with the 'keep clear' markings. Photograph 3.3 shows the impact of the right turn queue affecting the straight through movement.



Photograph 3.1: Showing the poor straight through alignment from Pool Road.



Photograph 3.2: Showing the right turn lane and the 'keep clear' markings over Sheaf Street.



Photograph 3.3: Showing vehicles waiting to right turn in the middle of the junction, whilst straight through traffic is restricted by the right turn queue.

3.3 Journey Time Comparison

3.3.1 Introduction

A number of Moving Observer Journey Time surveys have been undertaken through Newtown for the weekday PM peak period in recent years, and allow comparison of traffic conditions in the town.

Westbound

- 2006 by Powys County Council
- 2007 by Powys County Council
- 2011 by Welsh Government (pre SCOOT recalibration)
- 2011 by Arup (post SCOOT recalibration)

Eastbound

- 2008 by Parsons Brinkerhoff
- 2011 by Parsons Brinkerhoff (pre SCOOT recalibration)
- 2011 by Arup (post SCOOT recalibration)

In the westbound direction, the two surveys by Powys County Council capture the traffic conditions in Newtown prior to the junction works undertaken at Kerry Road and Tesco access. The survey by Welsh Government captures the traffic conditions in Newtown after the installation of traffic signals, but prior to the SCOOT recalibration. For this survey of a single run timings were recorded to the nearest minute only, thus while the survey is not entirely accurate it provides a useful comparison with the other surveys.

In the eastbound direction, the two surveys by Parsons Brinkerhoff capture the traffic conditions before and after the junction works undertaken at Kerry Road and Tesco access.

The surveys undertaken by Parsons Brinkerhoff were part of a longer survey route, and thus only the section from Mochdre Roundabout to Enterprise Park has been included for comparison. The Powys County Council surveys cover the section from Enterprise Park to Dolfor Road Junction.

The Arup surveys were undertaken in both directions from Enterprise Park to Mochdre Roundabout after the SCOOT recalibration. The surveys were recorded using a GPS tracker fitted to a vehicle driven at the prevailing traffic speeds back and forward through Newtown, and represent the average journey times through the network based on a series of survey runs.

Figure 3.2 presents the westbound journey time surveys as a graph of cumulative journey time against cumulative journey distance. Figure 3.3 presents the same for the eastbound direction. The timing points highlighted are as shown on Figure 3.1 (from west to east):

- Mochdre Roundabout
- Lon Cerddyn Junction
- Dolfor Road Junction
- New Church Street Junction
- Shortbridge Street Junction
- Kerry Road Junction
- Tesco Access Junction
- Wern Ddu Lane (Morrisons)
- Enterprise Park

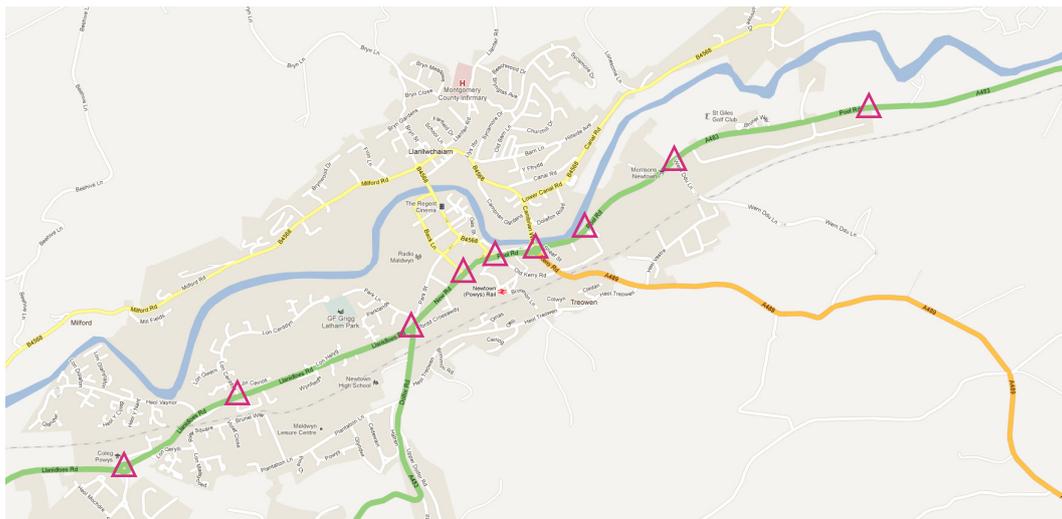


Figure 3.1: Journey Time Comparison Timing Points (© 2011 Google)

3.3.2 Results

In the westbound direction, the 2006 and 2007 surveys highlight significant congestion during the PM peak period, recording an average speed of 11.2 km/h (7.0 mph), and 10.0 km/h (6.2 mph) respectively between Enterprise Park and Dolfor Road.

The 2011 post SCOOT calibration surveys recorded an average speed of 24.4 km/h (15.1 mph) over the same section during the PM peak period, and an average speed of 29.3 km/h (18.2 mph) over the whole surveyed section from Enterprise Park to Mochdre Roundabout.

Comparison of the journey time profiles in Figure 3.2 show that the 2006 and 2007 surveys recorded very slow moving traffic throughout the length of the survey, with particularly slow speeds between Kerry Road and Shortbridge Street.

The 2011 survey prior to the SCOOT recalibration shows a modest improvement over the earlier journey times, but highlights that congestion was present on this route.

The 2011 post SCOOT recalibration survey shows a significantly improved journey speed, with some localised congestion on the approach to the Kerry Road junction.

In the eastbound direction, the 2008, 2011 pre and post SCOOT recalibration surveys show a similar journey time overall, recording average speeds of 33.3 km/h (20.7 mph), 35.4 km/h (22.0 mph), and 31.2 km/h (19.4 mph) respectively between Mochdre Roundabout and Enterprise Park.

Comparison of the journey time profiles in Figure 3.3 show that the 2008 survey recorded general delay from Lon Cerddyn to Wern Ddu Lane, while the 2011 pre SCOOT recalibration survey recorded improved speeds in general, but with a localised delay between the Kerry Road and Tesco Access junctions. The 2011 post recalibration survey recorded a particular delay approaching Church Street and between Shortbridge Street and Kerry Road, but overall these localised delays did little to adversely impact the overall journey time.

The minor junction improvements and SCOOT recalibration appear to have significantly improved the previously slow journey times though Newtown in the westbound direction both in comparison with the former roundabout configuration and the traffic signals prior to SCOOT recalibration, with little impact on the eastbound movement.

3.3.3 Summary

In the westbound direction, significant congestion was apparent in the 2006 and 2007 surveys, with average speeds of between 6 and 7 mph between Enterprise Park and Dolfor Road. The SCOOT recalibration appears to have improved this congestion to some extent, with an average speed of around 15 mph over the same section in 2011.

In the eastbound direction, the surveys from 2008, 2010, and 2011 all show similar journey times, with average speeds of around 19 to 22 mph.

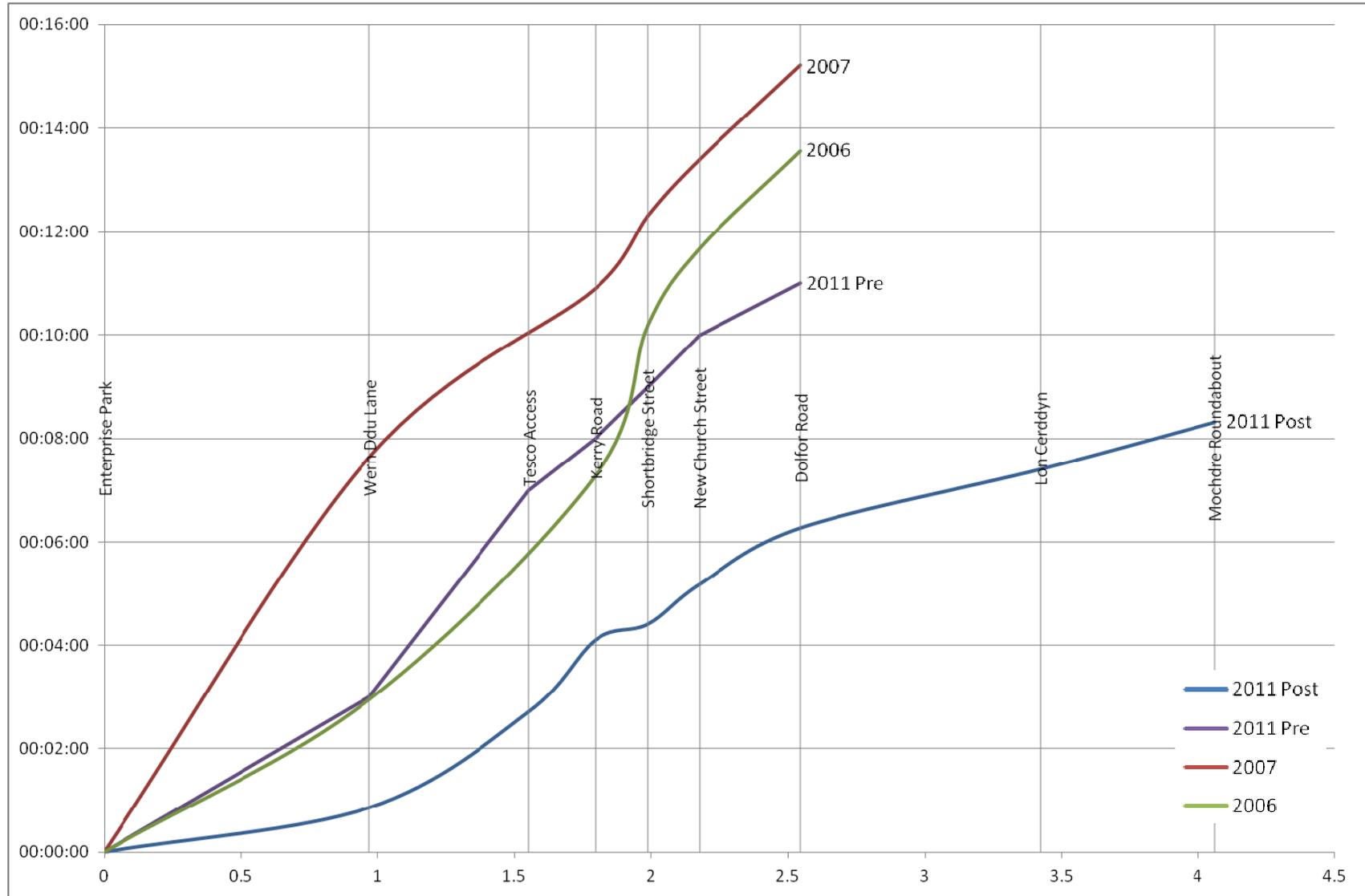


Figure 3.2: Westbound cumulative journey time against cumulative journey distance (in km)

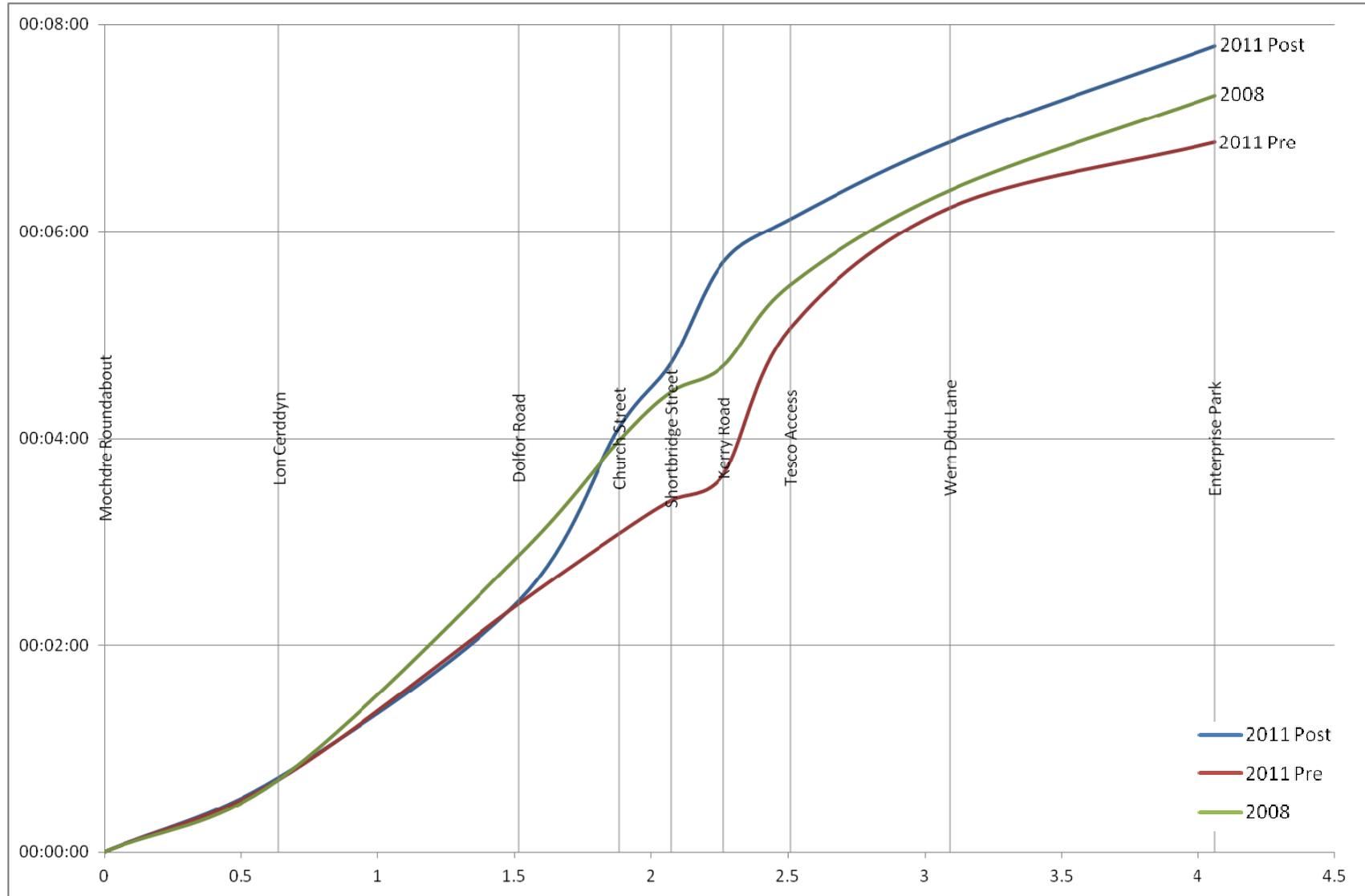


Figure 3.3: Eastbound cumulative journey time against cumulative journey distance (in km)

3.4 Turning Movements

3.4.1 Introduction

A number of turning count surveys and traffic forecasts have been undertaken for at the junction of A483 Pool Road/Kerry Road.

- 2005 – Paul Castle Traffic Count (Weekday PM and Saturday peaks)
- 2008 – Parsons Brinkerhoff (Weekday AM and PM, and Saturday peaks)
- 2011 – Parsons Brinkerhoff (Weekday AM and PM, and Saturday peaks)
- 2011 – Arup (Post SCOOT recalibration) (Weekday PM Peak Only)
- 2009 – ADL Traffic Forecast (Tesco TA) (Weekday PM and Saturday peaks)
- 2022 – ADL Traffic Forecast (Tesco TA) (Weekday PM and Saturday peaks)

These turning counts and forecasts are compiled in Figures 3.4, 3.5, and 3.6 for the Weekday AM, Weekday PM, and Saturday peak hours respectively.

The 2009 and 2022 traffic forecasts are extracted from the Transport Assessment for the Tesco store, and represent the estimated growth in traffic levels from 2005, plus the additional estimated traffic associated with the Tesco store.

3.4.2 Weekday AM Peak

The weekday AM peak hour was only surveyed in 2008 and 2011, and did not form part of the Tesco Transport Assessment. The turning movements for the AM peak hour are summarised in Figure 3.4.

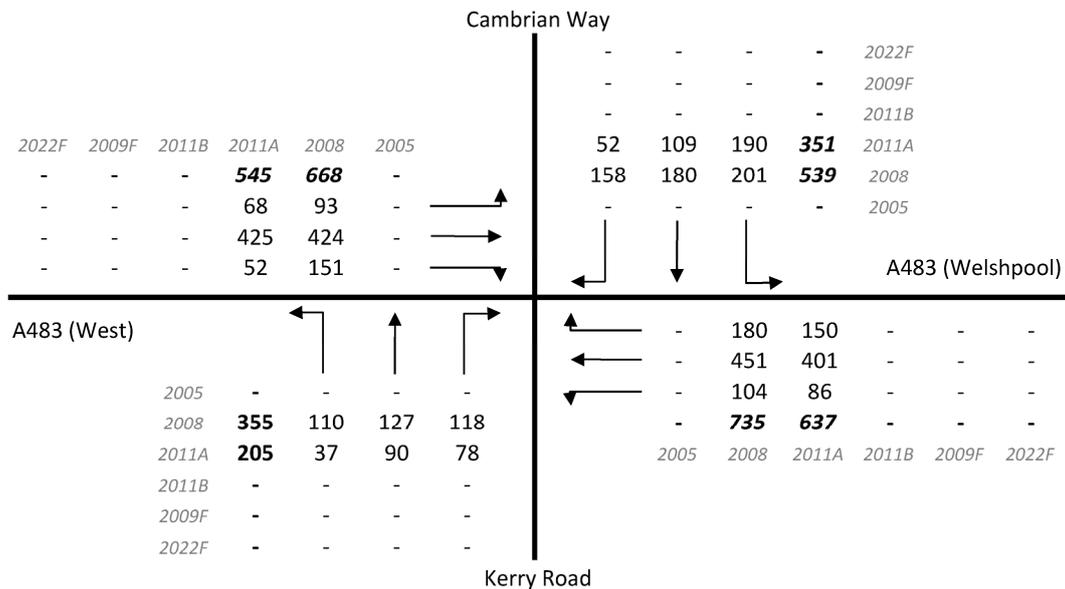


Figure 3.4: Weekday AM peak turning movements (in vehicles/hour)

Comparison of the two survey years shows generally similar turning proportions, but a slight reduction in traffic levels overall from 2008 to 2011.

Key differences are a significant reduction in right turning traffic from A483 Pool Road (West) to Kerry Road, and a similarly significant reduction in the opposite left turning movement from Kerry Road to Pool Road. There is also a significant reduction in right turning traffic from Cambrian Way to A483 Pool Road (West).

This would suggest that local traffic is diverting to alternative routes in order to avoid the Kerry Road junction, for example via Heol Treowen, Old Kerry Road, and Longbridge. There is no reliable historic traffic data on these routes to compare against current levels, and it is likely that there have been small increases on a number of routes.

In relation to the bridge closure on the B4389, it should also be noted that the traffic counts do not show an increase in right turning traffic from A483 (East) to Cambrian Way, or from Cambrian Way to A483 (East) as might have been expected without the ability to use this local ‘rat-run’.

3.4.3 Weekday PM Peak

The weekday PM peak hour was surveyed in 2005, 2008, and twice in 2011, and traffic forecasts prepared for 2009 and 2025 in the Tesco Transport Assessment. The traffic forecasts were based on the 2005 traffic counts, with an allowance for background traffic growth, committed developments, and traffic associated with the Tesco development. The turning movements for the PM peak hour are summarised in Figure 3.5.

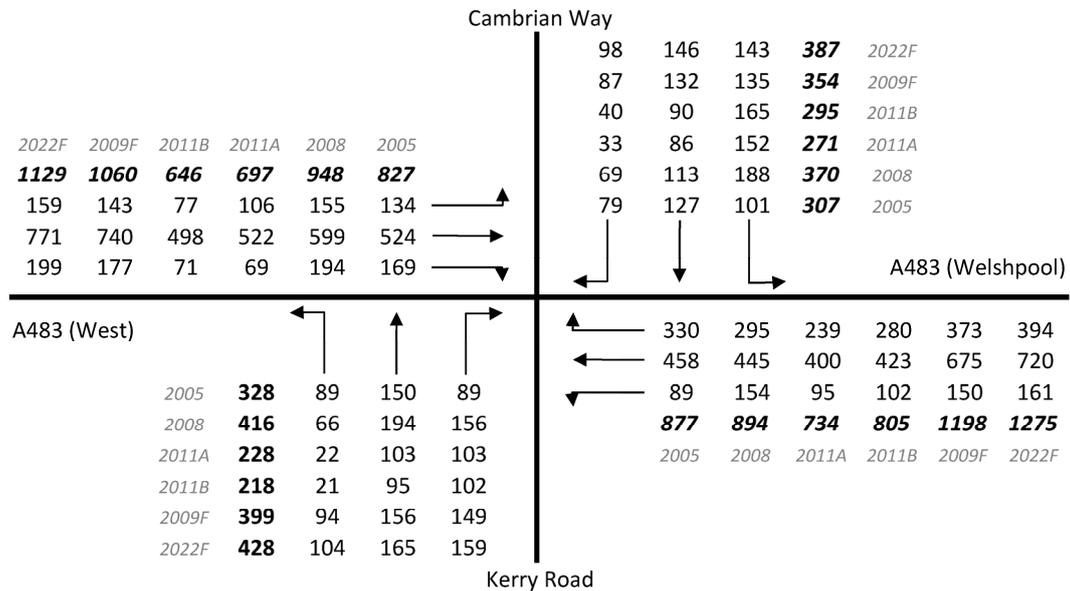


Figure 3.5: Weekday PM peak turning movements (in vehicles/hour)

Comparison of the three survey years shows generally similar turning proportions, with a general increase in traffic levels from 2005 to 2008, followed by a general decrease in traffic levels overall from 2008 to 2011.

As was noted for the AM peak hour, a significant reduction in right turning traffic from A483 Pool Road (West) to Kerry Road was recorded between 2008 and 2011, with a similar reduction in the opposite left turning movement from Kerry Road to Pool Road. There is also a significant reduction in right turning traffic from Cambrian Way to A483 Pool Road (West), again suggesting that local traffic

is diverting to alternative routes in order to avoid the Kerry Road junction, for example via Heol Treowen, Old Kerry Road, and Longbridge.

In relation to the bridge closure on the B4389, it should also be noted that the traffic counts do not show an increase in right turning traffic from A483 (East) to Cambrian Way, or from Cambrian Way to A483 (East) as might have been expected without the ability to use this local ‘rat-run’, as was shown in the AM peak.

The 2011 traffic counts are noticeably lower than the 2009 traffic forecasts from the Tesco Transport Assessment, suggesting that the level of traffic growth forecast has not been realised, and that the Tesco store is not attracting as many customers as was forecast in the Transport Assessment.

3.4.4 Saturday Peak

The Saturday peak hour was surveyed in 2005, 2008, and 2011, and traffic forecasts prepared for 2009 and 2025 in the Tesco Transport Assessment. The traffic forecasts were based on the 2005 traffic counts, with an allowance for background traffic growth, committed developments, and traffic associated with the Tesco development. The turning movements for the Saturday peak hour are summarised in Figure 3.6.

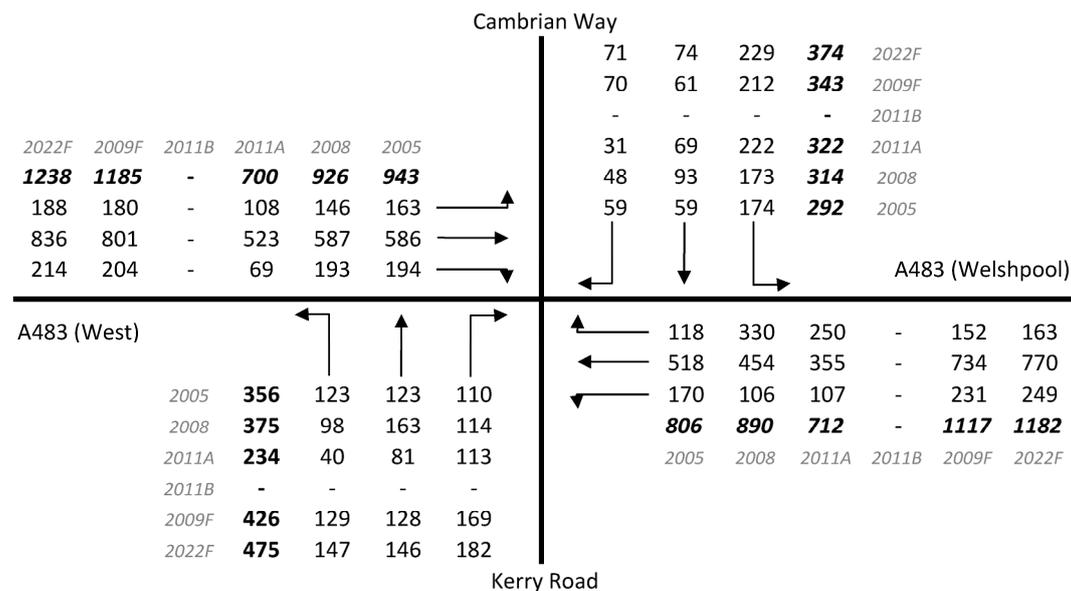


Figure 3.6: Saturday peak turning movements (in vehicles/hour)

Comparison of the three survey years shows generally similar turning proportions, with a general slight increase in traffic levels from 2005 to 2008, followed by a general decrease in traffic levels overall from 2008 to 2011.

As was noted for the weekday AM and PM peak hours, a significant reduction in right turning traffic from A483 Pool Road (West) to Kerry Road was recorded between 2008 and 2011, with a similar reduction in the opposite left turning movement from Kerry Road to Pool Road, suggesting that local traffic is diverting to alternative routes in order to avoid the Kerry Road junction, for example via Heol Treowen or Old Kerry Road.

Unlike the weekday AM and PM peak hours, a less significant reduction in right turning traffic from Cambrian Way to A483 Pool Road (West) was observed during the Saturday peak hour.

In relation to the bridge closure on the B4389, it should also be noted that the traffic counts do not show an increase in right turning traffic from A483 (East) to Cambrian Way, or from Cambrian Way to A483 (East) as might have been expected without the ability to use this local 'rat-run', as was shown in the AM and PM peaks.

As was found in the weekday PM peak, the 2011 traffic counts are noticeably lower than the 2009 traffic forecasts from the Tesco Transport Assessment, suggesting that the level of traffic growth forecast has not been realised, and that the Tesco store is not yet attracting as many customers as was forecast in the Transport Assessment.

3.4.5 Summary

Overall, all three peak periods show a similar pattern in traffic flows, recording some traffic growth from 2005 to 2008, followed by a reduction in traffic to 2011. Local traffic appears to divert away from the junction where alternative routes exist, though the closure of the river crossing on the B4389 does not appear to have increase turning movements at the junction. The 2011 traffic counts are significantly lower than the 2009 traffic forecasts in the Tesco Transport Assessment.

3.5 ATC Data

3.5.1 Introduction

In order to supplement and verify the turning counts, information has been obtained from Welsh Government permanent Automatic Traffic Counter (ATC) sites in and around Newtown.

- Site 165 – A489 West of Newtown
- Site 164 – A483 South of Newtown
- Site 94 – A483 New Road
- Site 93 – A483 West of Kerry Road Junction
- Site 333 – A483 St Giles Golf Course (East of Newtown)

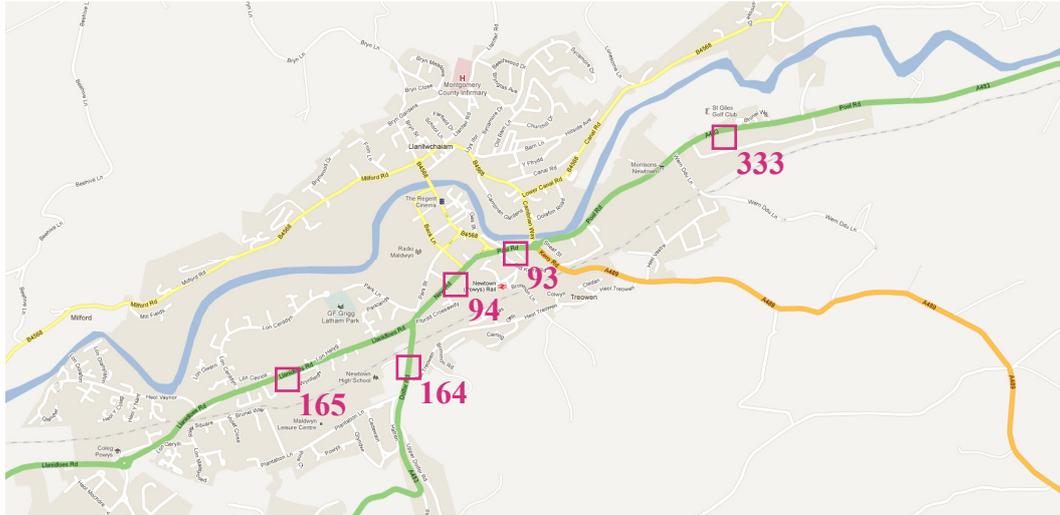


Figure 3.7: ATC Sites in and around Newtown (© 2011 Google)

Data was available for the years 2002 to 2011 in general, although for some sites data was not available for certain years, and the level of detail varied from site to site. For Site 93, the ATC closest to the Kerry Road junction, detailed information was provided, allowing an in-depth analysis of day-to-day and year-to-year variations.

3.5.2 Year-to-Year Comparison

For the five WG ATC sites in Newtown, the data has been compiled into directional Annual Average Daily Traffic (AADT), and a two way AADT. AADT represents the total daily traffic flows in vehicles for an average day during that year. These are summarised in Table 3.2, and displayed graphically on Figure 3.8.

For a number of the sites, for some years data was only collected for a limited number of months, and thus the daily average calculated may not be a true representation of the AADT. Where less than 6 months worth of data have been used to calculate the average, these are marked with a * in Table 3.1, and whilst not statistically accurate have been included to allow comparison. For some sites, the data from some years is missing altogether, and is thus not included in the table.

Table 3.1: AADT (Annual Average Daily Traffic) (in vehicles/day)

ATC Site	Dir	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Site 165 A489 West of Newtown	WB	8373	8668	8604	8560	8411	8547	8119	-	8020	7910*
	EB	8187	8452	8410	8374	8200	8320	7970	-	7680	7593*
	Tot	16560	17120	17014	16934	16611	16867	16089	-	15700	15503*
Site 164 A483 South of Newtown	SB	2941	2982	2861*	2919	3106	3080	2932	-	-	-
	NB	2945	2961	2715*	2987	3270	3311	3304	-	-	-
	Tot	5886	5943	5576*	5906	6376	6391	6236	-	-	-
Site 94 A483 New Road	SWB	7329	7487	7621	-	7619	7552	7236*	-	-	-
	NEB	10382	10637	10294	-	10487	10448	10352*	-	-	-
	Tot	17711	18124	17915	-	18106	18000	17588*	-	-	-
Site 93 A483 Pool Road (West of Kerry Road)	SWB	7883	8204	8391	8538	8374*	8604	8484	8220	7262	7467
	NEB	7985	8265	8482	8584	8460*	8770	8633	8466	7869	7804
	Tot	15868	16469	16874	17122	16834*	17374	17117	16686	15131	15271
Site 333 A483 St Giles Golf Course	WB	5417	5645	5683	5716	5767	5803*	6050	5820	5876	-
	EB	5568	5732	5900	5841	5957	5986*	5835	5527	5356	-
	Tot	10984	11377	11583	11558	11724	11789*	11884	11347	11232	-

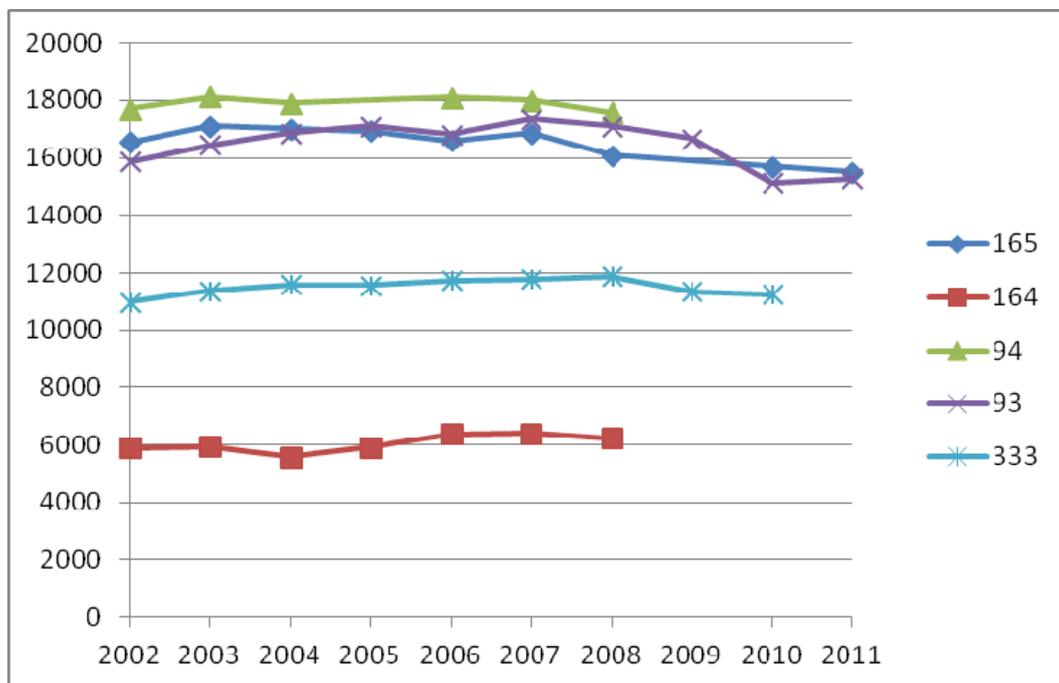


Figure 3.8: Year-to-year comparison of two-way AADTs (in vehicle/day)

The general trends show no growth in traffic overall in the Newtown area over the years considered, with yearly fluctuations both up and down. Site 93, immediately to the west of the Kerry Road junction mirrors the trends observed in the turning counts, with reduction in traffic from 2008 to 2010, with 2011 remaining at a similar level to 2010. Site 333 on the outskirts of Newtown to the east also shows

a reduction in traffic from 2008 to 2010, but to a lesser degree, while Site 165 on the outskirts of Newtown to the west shows a less significant change. This suggests that much of the reduction in traffic observed in the locality of the Kerry Road junction is due to diversion of local traffic rather than a wider reduction in traffic overall.

On a national level, there has been a reduction in traffic levels since 2007, such that 2010 traffic levels were around 3.3% lower than in 2007. The same trend has been recorded in Wales, where 2010 traffic levels were 3.5% lower than in 2007.

3.5.3 Daily Profile

The daily profile for an average day has been plotted to allow year-to-year comparison of the traffic patterns in Newtown. Site 93, immediately to the west of the Kerry Road junction, and Site 165 on the A489 to the west of Newtown have been compared to allow local and wider changes to be investigated.

Weekday

The two-way data for Site 93 is shown on Figure 3.9, and mirrors the findings of the analysis of the turning counts and wider ATC data, showing that there is little change in the traffic profile from 2006 to 2008, with a reduction in traffic levels in 2010 and 2011 throughout the day. The shape of the profile highlights that there has been no spreading of the peak periods, rather a general reduction in traffic throughout the course of the day.

Interrogation of the directional profile data in Figure 3.10 suggests that the reduction in the westbound direction is larger than the reduction in the eastbound direction. This would seem to correspond with the increased delay observed in the in the westbound direction compared with the eastbound direction.

Site 165 on the outskirts of Newtown shows a much more limited reduction in traffic flows in 2010 and 2011 compared to the earlier years, reinforcing the earlier findings that much of the reduction in traffic at the Kerry Road junction is likely to be due to the diversion of local trips to avoid the delay, rather than due to traffic avoiding the Newtown areas in general.

Saturday

A similar pattern is observed for the Saturday profiles shown in Figure 3.12, with little change in the profile from 2006 to 2008, a slight reduction in 2009, and a further reduction in 2010 and 2011. The shape of the profile highlights that there has been no spreading of the peak period rather a general reduction in traffic throughout the course of the day.

Interrogation of the directional profile data in Figure 3.13 suggests that the reduction in the westbound direction is larger than the reduction in the eastbound direction. This would seem to correspond with the increased delay observed in the in the westbound direction compared with the eastbound direction.

Site 165 on the outskirts of Newtown shows a much more limited reduction in traffic flows in 2010 and 2011 compared to the earlier years, reinforcing the earlier findings that much of the reduction in traffic at the Kerry Road junction is likely to be due to the diversion of local trips to avoid the delay, rather than due to traffic avoiding the Newtown areas in general.

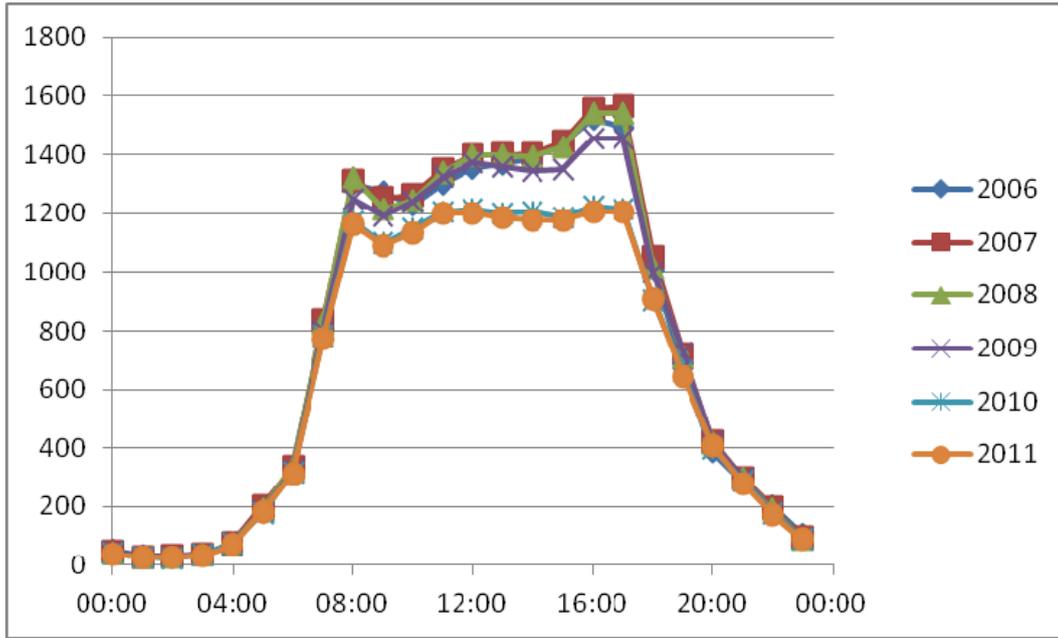


Figure 3.9: Weekday Two-Way Daily Profiles for Site 93

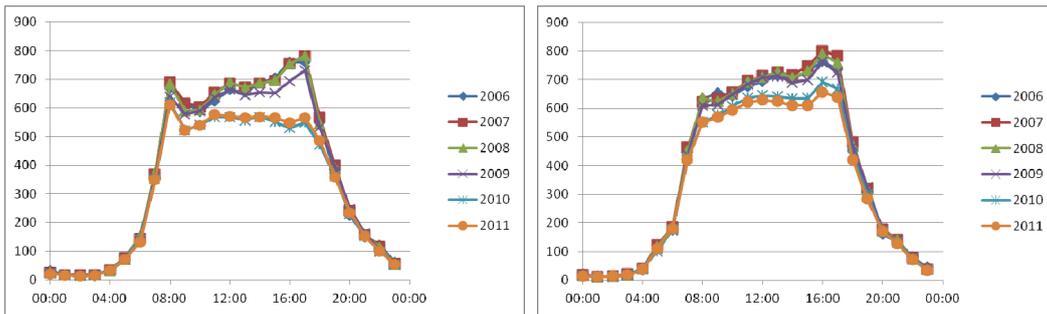


Figure 3.10: Weekday SW bound and NE bound Daily Profiles for Site 93

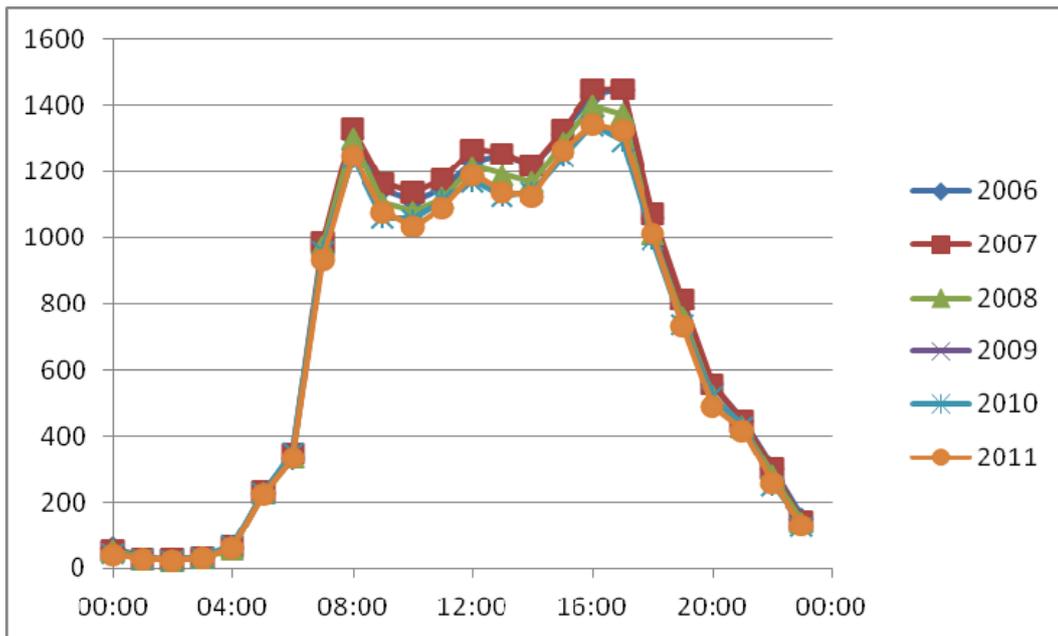


Figure 3.11: Weekday Two-Way Daily Profiles for Site 165

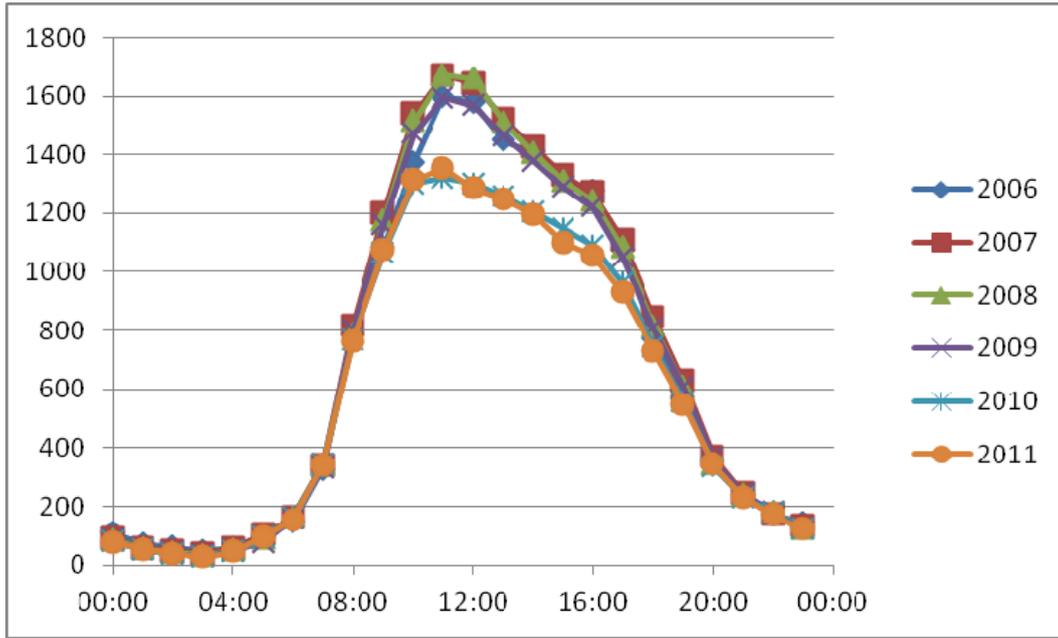


Figure 3.12: Saturday Two-Way Daily Profiles for Site 93

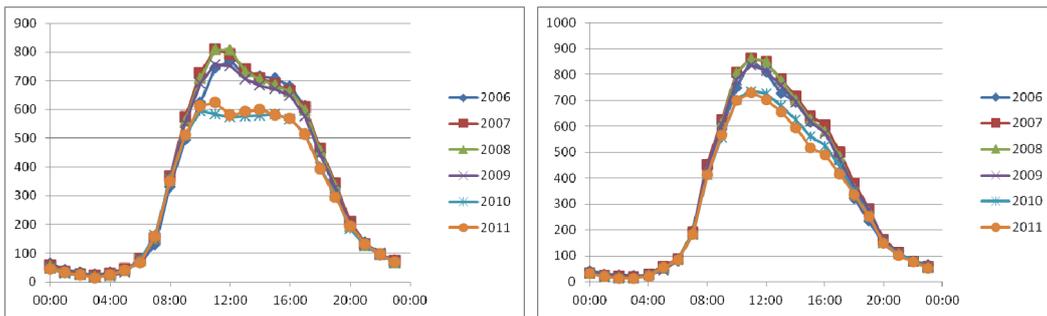


Figure 3.13: Saturday SW bound and NE bound Daily Profiles for Site 93

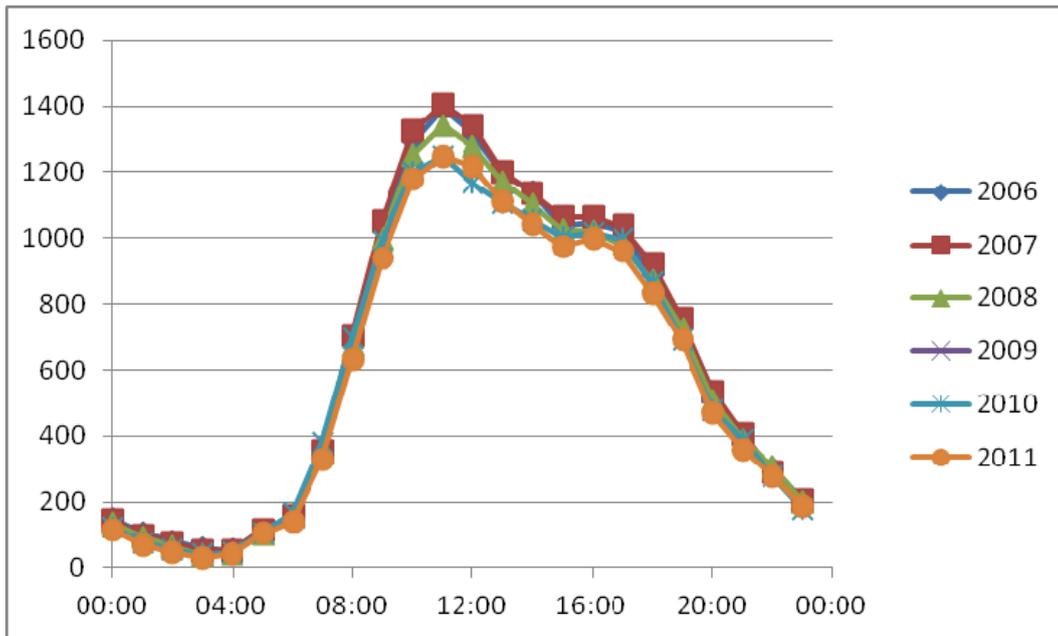


Figure 3.14: Saturday Two-Way Daily Profiles for Site 165

3.5.4 Day-to-Day Variation

For Site 93, immediately to the west of the Kerry Road junction, the hourly traffic levels have been summarised from the ATC data for a typical week in 2008 and 2010. These flows have been colour coded in order to show the variation visually in Table 3.2, with the same colour scale used for each year to allow comparison.

Table 3.2: Two-way hourly traffic flow (in vehicles)

Year								Scale	
2008		Mon	Tue	Wed	Thu	Fri	Sat	Sun	
	00:00	40	44	42	48	48	86	99	100
	01:00	28	29	27	29	33	55	66	200
	02:00	29	29	29	30	35	43	52	300
	03:00	48	35	37	37	38	35	37	400
	04:00	86	68	64	68	69	50	30	500
	05:00	209	188	185	180	183	92	42	600
	06:00	368	337	332	328	310	161	75	700
	07:00	862	837	826	830	777	342	140	800
	08:00	1354	1330	1306	1323	1280	791	252	900
	09:00	1199	1213	1202	1226	1226	1175	594	1000
	10:00	1236	1232	1192	1248	1311	1516	1114	1100
	11:00	1329	1322	1263	1327	1448	1671	1293	1200
	12:00	1377	1372	1314	1371	1547	1660	1373	1300
	13:00	1358	1370	1315	1379	1574	1513	1264	1400
	14:00	1342	1349	1313	1384	1572	1409	1267	1500
	15:00	1357	1383	1389	1438	1564	1312	1267	1600
	16:00	1471	1520	1535	1575	1609	1245	985	1700
	17:00	1489	1525	1581	1619	1484	1083	813	
	18:00	923	949	1015	1057	1132	816	668	
	19:00	615	627	687	758	862	608	517	
	20:00	350	356	378	442	558	347	372	
	21:00	247	263	290	327	350	238	258	
	22:00	152	169	189	215	222	181	151	
23:00	69	76	80	97	132	124	77		
	17538	17623	17591	18336	19364	16553	12806		
2010		Mon	Tue	Wed	Thu	Fri	Sat	Sun	
	00:00	39	37	36	42	45	82	96	
	01:00	30	29	26	30	34	50	67	
	02:00	25	23	24	24	30	38	52	
	03:00	44	34	33	31	36	29	42	
	04:00	91	71	70	71	72	46	33	
	05:00	197	175	166	167	174	93	46	
	06:00	363	321	306	307	292	161	77	
	07:00	839	788	758	768	745	343	155	
	08:00	1189	1179	1172	1159	1154	770	268	
	09:00	1106	1070	1085	1101	1123	1067	578	
	10:00	1148	1128	1091	1147	1227	1301	1067	
	11:00	1215	1186	1140	1205	1276	1320	1233	
	12:00	1222	1198	1178	1200	1268	1301	1274	
	13:00	1179	1177	1160	1192	1292	1257	1185	
	14:00	1180	1185	1168	1212	1277	1205	1184	
	15:00	1159	1166	1169	1203	1235	1147	1161	
	16:00	1204	1214	1228	1220	1248	1092	937	
	17:00	1187	1217	1237	1240	1200	963	784	
	18:00	828	827	902	921	1040	746	639	
	19:00	563	578	626	696	840	557	500	
	20:00	328	330	372	422	541	335	347	
	21:00	235	252	272	318	352	231	239	
	22:00	135	156	173	203	211	176	150	
23:00	70	75	88	97	132	123	77		
	15576	15416	15480	15976	16844	14433	12191		

The data for 2008 shows that Monday to Thursday show a similar daily profile, with higher traffic volumes in the PM peak than the AM peak. The Friday profile shows higher traffic flows throughout the day, with a wider PM peak period. Overall, the Thursday PM peak hour represents the highest hourly flow of a weekday, confirming the reports that the Thursday peak hour typically has the worst congestion. The Saturday peak is shorter and more focused during the middle of the day, at a similar level to the weekday PM peak.

The 2010 data shows a similar overall profile to the 2008 data, with the same general patterns found for 2008, however the 2010 traffic levels are lower overall than the 2008 levels.

3.6 SCOOT Data

Historic data from the SCOOT system is stored in an ASTRID database. Data has been extracted from the ASTRID database for two comparable weeks in 2010 and 2011, 1st November 2010 to 7th November 2010 and 31st October 2011 to 6th November 2011, to allow evaluation of the improvements implemented to the SCOOT system.

The internal units of the SCOOT system are Link Profile Units (LPUs), a hybrid measure of traffic flow and detector occupancy. As such, due to the way that the SCOOT detectors are calibrated, they cannot be used to give accurate absolute values for traffic flow, but do allow relative comparison over different time periods.

This SCOOT modelled flow is retained from a previous cycle if the SCOOT detector is seen as congested. This is essential for the correct operation of the SCOOT optimisers in congested conditions, but does mean that the flow values obtained do not necessarily reflect the circumstances on street.

At the Kerry Road junction, the comparison in Table 3.3 shows that there has been an overall increase in traffic flow through the junction from 2010 to 2011, with a particular improvement in the eastbound direction.

Table 3.3: Average Peak Hour Flow (LPUs/hour)

	AM Peak Hour			PM Peak Hour		
	2010	2011	Change	2010	2011	Change
A483 Westbound	852	870	+2%	930	984	+6%
A483 Eastbound	241	388	+61%	224	284	+27%
Total	1093	1258	+15%	1154	1268	+10%

The ASTRID database also stores the link saturation. This gives a measure of congestion at the junction, as summarised in Table 3.4. Overall, this shows a reduction in saturation at the junction from 2010 to 2011, with a particular improvement in the eastbound direction, but a slight deterioration in the westbound direction.

Table 3.4: Average Saturation (%)

	AM Peak Hour			PM Peak Hour		
	2010	2011	Change	2010	2011	Change
A483 Westbound	81.6	88.8	+9%	88.2	89.6	+2%
A483 Eastbound	218.0	135.0	-38%	242.0	176.0	-27%
Average	149.8	111.9	-25%	165.1	132.8	-20%

As such, the data from ASTRID database shows that overall the improvements implemented to the SCOOT system have increased the throughput of traffic and reduced congestion compared to the initial configuration.

3.7 Junction Modelling

3.7.1 Introduction

The Kerry Road junction has been modelled independently by Arup for comparison with results from the Tesco Transport Assessment, and to allow consideration of other traffic flow scenarios, both for the existing traffic signals and for the former roundabout.

To allow comparison, the various models have been assessed for 2008 and 2011 traffic counts, and the 2009 traffic forecast from the Tesco Transport Assessment, which assumes full utilisation of the Tesco Store, but limited background traffic growth. The earlier analysis of the Automatic Traffic Count data suggests the background traffic growth in Newtown has been negligible, and thus the 2022 forecast growth in the TA is likely to have been an overestimate.

This initial modelling work does not take into account the interaction with neighbouring junctions, and due to limitations of the industry standard software used, cannot fully account for some of the localised effects of short flare lengths with designated turning movements, and the interaction of traffic queues.

As such, the modelling gives a good indication of the junction capacity at Kerry Road, but cannot consider the effects of traffic platooning or blocking back from adjacent junctions. The microsimulation modelling described in Section 3.8 allows a more detailed assessment of these effects.

The analysis undertaken for the Tesco Transport Assessment highlighted that the roundabout was operating above theoretical design capacity in 2009 without the development during the Friday PM peak hour, and the traffic signals would also operate above theoretical capacity in the Friday PM and Saturday peak hours with the development in place. However, it stated the overall level of queuing would be less with the development and traffic signals than without.

3.7.2 Kerry Road Roundabout

3.7.2.1 Introduction

ARCADY is the industry standard software for analysing the operation of roundabout junctions, published by the Transport Research Laboratory (TRL).

However, ARCADY is unable to model for unequal lane usage, which is particularly apparent when the roundabout has lane markings defining lane usage, and will over-estimate the capacity of such a junction. A method for correcting this shortcoming is described in the March 1997 TEC article 'Arcady Health Warning' by Barbara Chard, which has been used in the Arup assessment of the former roundabout. The correction is unable to fully take into account the interaction of queuing vehicles in adjacent lanes.

The modelling of the roundabout in the ADL Transport Assessment for Tesco failed to take into account this effect and as such overestimated the capacity of the former roundabout.

The modelling in the Transport Assessment was undertaken in version 5.0 of the software, and the current version is 7.1, although there are no fundamental changes to the method of analysis.

The Arup assessment of the former roundabout was undertaken using geometry measured from historic orthorectified aerial photography and Ordnance Survey mapping. Limited data was available to calibrate the model, and thus the model was developed using 2008 traffic flows to allow comparison with junction delays observed in the journey time surveys, and then tested for other traffic flow scenarios.

3.7.2.2 Geometry

The key input to ARCADY is the measured geometry of each approach, including the approach half width, entry width, effective flare length, entry radius, inscribed circle diameter (ICD), and the conflict angle.

The geometry in the ADL model has been reviewed and appears to be generally acceptable, although it was noted that the flare lengths modelled are shorter than those measured, perhaps in an attempt to reduce the capacity of the junction model to better match on site observations.

However, as noted above, the ADL model does not take into account the limitation of ARCADY when modelling unequal lane usage.

3.7.2.3 Modelling Results

The results from the Arup model of the Kerry Road roundabout for 2008 Weekday PM Peak conditions are summarised in Table 3.5.

Table 3.5: Arup ARCADY model results, 2008 Weekday PM Peak

Lane	RFC	Queue (veh)	Delay (s/veh)
Pool Road (East)	1.04	35	113
Kerry Road	0.51	1	8
Pool Road (West)	1.11	64	184
Cambrian Way	0.86	5	44

The level of queuing and delay from the Arup model is understood to be generally representative of that observed on site at the time, with 2 to 3 minutes of delay on the Pool Road east and west approaches. The practical capacity for a roundabout is normally taken as the Ratio of Flow to Capacity (RFC) of 85% or 0.85., however junctions can still operate with an RFC of up to or exceeding 100%, albeit with a lower level of confidence. As such, the junction was operating over the accepted level of practical capacity, and is likely to have been exceeding theoretical capacity during peak periods. This is consistent with the reports of congestion prior to the conversion to a traffic signal controlled junction.

For comparison, the results of the two ARCADY models are summarised in Table 3.6 for the 2008 traffic levels and Table 3.7 for the 2009 traffic forecasts from the Tesco Transport Assessment with full utilisation of the store, for a weekday PM peak period.

Table 3.6: Model results for 2008 Weekday PM Peak

Lane	Arup Model			ADL Model		
	RFC	Queue (veh)	Delay (s/veh)	RFC	Queue (veh)	Delay (s/veh)
Pool Road (East)	1.04	35	113	0.97	17	59
Kerry Road	0.51	1	8	0.48	1	7
Pool Road (West)	1.11	64	184	0.78	3	11
Cambrian Way	0.86	5	44	0.65	2	15

Table 3.7: Model results for 2009 traffic forecasts, Weekday PM Peak

Lane	Arup Model			ADL Model		
	RFC	Queue (veh)	Delay (s/veh)	RFC	Queue (veh)	Delay (s/veh)
Pool Road (East)	1.45	305	1051	1.32	204	635
Kerry Road	0.51	1	8	0.49	1	7
Pool Road (West)	1.16	97	278	0.84	5	15
Cambrian Way	0.68	2	18	0.69	2	19

The comparison in Table 3.6 shows that the Arup model of the Kerry Road Roundabout, which includes correction for unequal lane usage, has less capacity than the ADL model which excludes this correction. The delays recorded in the 2006, 2007, and 2008 journey time surveys suggest that the delays output by the Arup model are more consistent with those observed onsite during peak periods.

Table 3.7 shows that both junction models forecast that the roundabout would be over capacity for the 2009 traffic levels with full utilisation of the Tesco store, with the Arup model showing over 17 minutes delay on the Pool Road (East), and over 4.5 minutes of delay on Pool Road (West) with very significant queuing on these arms.

As such, the former roundabout would thus not be expected to operate satisfactorily for the forecast traffic flows, and the junction capacity reported in the Tesco Transport Assessment is an over estimate compared to the on-site operation.

3.7.3 Kerry Road Traffic Signals

3.7.3.1 Introduction

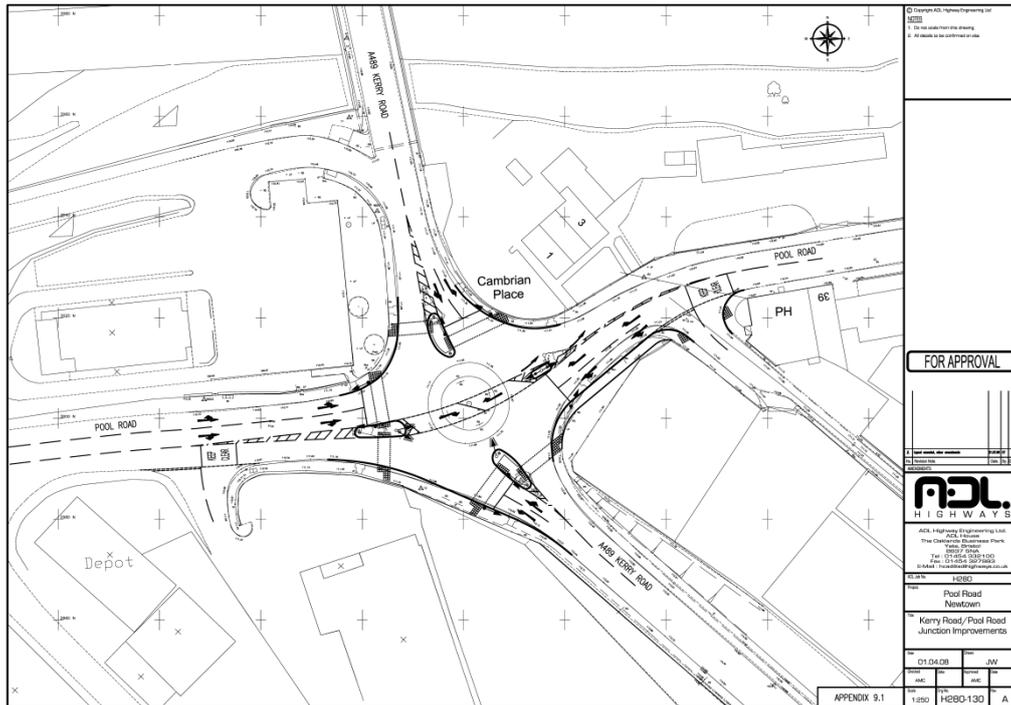
LinSig is one of the industry standard software packages for analysing the operation of traffic signal controlled junctions, published by JCT Consultancy. It is typically used for the detailed analysis of standalone junctions or small networks of junctions.

Alternative software includes TRANSYT, for less detailed modelling of larger networks of signal controlled junctions, and OSCADY for simple modelling of standalone junctions.

The modelling undertaken in the Transport Assessment used LinSig version 2. The latest version, 3.1, has some significant improvements which allow more detailed modelling of flared approaches and improved network capabilities. As such the Arup assessment has been undertaken in LinSig version 3.1.

The Arup model has been built to represent the junction operation observed on site. Arup undertook a high mast video survey to record the operation of the junction, and undertook queue length and journey times surveys to help calibrate the model.

The junction layout assessed for the Tesco Transport Assessment has a different layout to that which was built. In particular, the Pool Road (west) arm has been modelled as two straight ahead lanes (a straight and left, and a straight and right), with a very short merging length on the exit. This layout is also shown on the junction drawing which accompanies the Transport Assessment, as shown below. In practice this would not have operated effectively. The junction as built has a straight and left lane, and a right turn lane on this arm.



3.7.3.2 Saturation Flows

The saturation flow is the theoretical traffic flow which would be obtained if there was a continuous queue of vehicles and they were given 100 percent of the green time. It is generally expressed in vehicles per hour of green time.

It is normal to estimate saturation flows for new junctions using the method set out in ‘TRRL Research Report RR67 - The prediction of saturation flows for road junctions controlled by traffic signals’. The RR67 method estimates the saturation flow based on the measured geometry of the lane, including width, curvature, and gradient. Guidance on adjustments to the estimated saturation flow to take account of other site characteristics is given in TRL Traffic Software News, Issue 33.

Once a junction is built and operational, the saturation flow can be measured on site. Table 3.8 provides a comparison of the saturation flows assumed in for the Tesco Transport Assessment, the Arup model, and those measured on site. This table also includes comparison of the modelling assumptions made for flare length and the number of right turning vehicles that are stored in front of the stop line whilst waiting to give way.

Table 3.8: Lane Saturation flow and Flare Lengths

Lane	ADL Model	Arup Model	Observed
Pool Road (East) Straight and Left	1926	1630*	1635
Pool Road (East) Right	1943 (7 vehicle flare) (3 vehicle storage)	1774 (4 vehicle flare) (2 vehicle storage)	1807
Kerry Road Left	1883 (3 vehicle flare)	1849 (2 vehicle flare)	2232
Kerry Road Straight and Right	1981	1752	
Pool Road (West) Straight and Left	1965	1787	1759
Pool Road (West) (Straight and) Right	2063 (3 vehicle storage)	1723 (10 vehicle flare) (2 vehicle storage)	N/A†
Cambrian Way Left	1805 (3 vehicle flare)	1768 (2 vehicle flare)	2273
Cambrian Way Straight and Right	1865	1849	

*10% reduction to RR67 calculated saturation flow due to limited visibility and interaction with keep clear markings

† It is not possible to measure the saturation flow of this lane on site as it does not receive an unopposed green signal

‡ It is not possible to measure the saturation flow of the short flare independently, and thus the observed value represents the effective saturation flow for the arm as a whole, for comparison with the equivalent saturation flow from the model

It is clear that the modelling undertaken for the Tesco Transport assessment overestimates the saturation flow and usable flare lengths, in particular for the lanes on the key arms of Pool Road east and west. While these were estimated using the same RR67 method as the Arup model, they appear to be generous with the geometry measurements and fail to take into account the curvature of the straight through movements. The Arup estimated saturation flows are a close match to those observed onsite.

As such the junction capacity reported in the Tesco Transport Assessment is an over estimate compared to the on-site operation.

3.7.3.3 Modelling Results

The results from the Arup model of the Kerry Road junction for 2011 Weekday PM Peak conditions are summarised in Table 3.9.

Table 3.9: Arup LinSig model results, 2011 Weekday PM Peak

Lane	DoS	Queue (veh)	Delay (s/veh)
Pool Road (East)	96.4%	34	63
Kerry Road	93.6%	12	124
Pool Road (West)	82.2%	20	41
Cambrian Way	95.7%	14	120

The level of queuing and delay from the Arup model is representative of that observed on site. The normally accepted practical limit of capacity is 90% Degree

of Saturation (DoS). As such, the junction is currently operating over the accepted level of practical capacity, and close to theoretical capacity during peak periods.

As the junction is close to theoretical capacity, it would be very sensitive to increases in traffic demand. As a sensitivity test, the calibrated model was assessed for the 2008 weekday PM peak, as summarised in Table 3.10.

Table 3.10: Arup LinSig model results, 2008 Weekday PM Peak

Lane	DoS	Queue (veh)	Delay (s/veh)
Pool Road (East)	135.6%	169	558
Kerry Road	132.9%	79	572
Pool Road (West)	137.4%	185	593
Cambrian Way	134.1%	65	570

The results indicate that the junction would operate over capacity, with delays of up to 10 minutes. For comparison, the results of the two LinSig models are summarised in Table 3.11 for the 2009 traffic forecasts from the Tesco Transport Assessment with full utilisation of the store, for a weekday PM peak period.

Table 3.11: Model results for 2009 traffic forecasts, Weekday PM Peak

Lane	Arup Model			ADL Model		
	DoS	Queue (veh)	Delay (s/veh)	DoS	Queue (veh)	Delay (s/veh)
Pool Road (East)	156.1%	293	747	99.6%	36	74
Kerry Road	150.6%	97	751	98.0%	20	119
Pool Road (West)	156.8%	262	771	84.4%	27	46
Cambrian Way	154.7%	88	775	100.6%	20	145

The Arup calibrated junction model shows that the junction would be significantly over capacity for this scenario, with 12 to 13 minutes of delay per vehicle on each approach with very significant queuing, compared to the 1 to 2 minutes quoted in the TA report.

The current junction would thus not be expected to operate satisfactorily for the forecast traffic flows, and the junction capacity reported in the Tesco Transport Assessment is an over estimate compared to the on-site operation.

3.7.4 Summary

The modelling undertaken by ADL for the Tesco Transport assessment overestimated the junction capacity at Kerry Road for both the roundabout and the signal controlled junction.

The initial modelling of the junction at Kerry Road undertaken by Arup has shown that the traffic signal controlled junction is operating close to capacity during the peak periods with current traffic levels, and the former roundabout was operating over capacity. The modelling has shown that both the former roundabout and existing signal controlled junction would be over capacity during peak periods with the traffic levels forecast for full utilisation of the Tesco store.

Due to the limitations of this initial modelling, in particular for the roundabout, it is not possible at this stage to prove conclusively which junction form would have the highest capacity. As such, a microsimulation model was developed to investigate this in more detail, as described in the following section.

3.8 Microsimulation Modelling

3.8.1 Introduction

A microsimulation traffic model has been built to model the Kerry Road junction including the interaction with the neighbouring junctions with Shortbridge Street and the Tesco Access.

Microsimulation is a traffic modelling technique that operates on the level of individual vehicles. The output is a real-time visual display showing vehicles driving on the highway and interacting with each other. As such, a microsimulation model can provide a powerful presentational tool for the highway options and their impacts on traffic patterns which can be presented in an easily understandable 3D visual format. The model can also be used to provide data on vehicle operations on the road network, and can be used to inform an assessment of vehicle pollutant and greenhouse gas emissions.

The model has been developed using VISSIM 5.30 software, and calibrated to local driver behaviour from on site observations and using video footage of the traffic signal controlled junction. A still from the video is shown in Photo 3.4.

Both the roundabout and traffic signal model scenarios use 2011 PM peak traffic flows to allow a direct comparison of the junction operation. For both models journey times were extracted for the eastbound and westbound movements on the A483.



Photo 3.4: Video footage used to help calibrate the microsimulation model

3.8.2 Kerry Road Roundabout

A screenshot of the VISSIM model for the roundabout is shown in Figure 3.14, and eastbound and westbound journey times given in Table 3.12. A video of the model is included in Appendix A.



Figure 3.14: VISSIM Screenshot of Roundabout Scenario (2011 PM Peak)

Table 3.12: VISSIM Journey time results for roundabout scenario

Eastbound	mm:ss	Westbound	mm:ss
Shortbridge Street to Kerry Road	2:02	Tesco Access to Kerry Road	1:00
Kerry Road to Tesco Access	0:46	Kerry Road to Shortbridge Street	0:41
Total	2:48	Total	1:42

3.8.3 Kerry Road Traffic Signals

A screenshot of the VISSIM model for the traffic signals is shown in Figure 3.15, and eastbound and westbound journey times given in Table 3.13. A video of the model is included in Appendix A.



Figure 3.15: VISSIM Screenshot of Traffic Signal Scenario (2011 PM Peak)

Table 3.13: VISSIM Journey time results for traffic signal scenario

Eastbound	mm:ss	Westbound	mm:ss
Shortbridge Street to Kerry Road	1:34	Tesco Access to Kerry Road	1:03
Kerry Road to Tesco Access	0:40	Kerry Road to Shortbridge Street	0:34
Total	2:14	Total	1:37

3.8.4 Summary

The microsimulation modelling has expanded on the initial junction modelling work to allow the interaction of the neighbouring junctions and queuing vehicles in short flares to be included.

The journey time results show that the traffic signal controlled junction is able to deliver an improved eastbound journey time with a smaller improvement in the westbound journey time compared to the former roundabout with 2011 traffic levels. Both junctions show a level of congestion that is comparable to the observed conditions and journey times described in Section 3.3.

3.9 Accident Data

Accident data from 2001 to 2005 is summarised in the ADL Tesco Transport Assessment, and from 2006 to May 2011 in the TMS Stage 4 Road Safety Audit. During this time, only one injury accident was recorded at the Kerry Road junction. This was in March 2010 after the opening of the Tesco Store, but prior to the completion of the road markings at the signal controlled junction.

It is understood however that there were a number of near misses at the former roundabout due to poor lane discipline and driver behaviour. As only 12 months of accident data is available for the signal control junction, no trends or firm conclusions can be made.

4 Key Issues

4.1 Signal Coordination/SCOOT Calibration

Initial site visits highlighted that the five traffic signal controlled junctions on the A483 in Newtown were not well coordinated, leading to inefficient operation. In addition, 'yellow box', 'keep clear' markings, and minor accesses disrupted the 'platoons' of traffic leading to a breakdown in steady traffic flow across the stopline. This led to significant stop-start queuing, with the westbound queue being particularly slow moving.

The recalibration of the SCOOT system undertaken between April and June 2011, improved the coordination of the traffic signals, improving the operation of the junctions. Queues are still present at the junctions, but traffic is able to progress more quickly, with a particular improvement in the westbound direction which had been the main problem prior to recalibration.

Journey time surveys showed the initial configuration of the traffic signals to overall be no better or no worse than the former roundabout configuration, but that the recalibrated system works more effectively with reduced journey times compared to both the earlier signal configuration and the roundabout.

4.2 A483 Pool Road/Kerry Road Junction

4.2.1 Traffic Signal Operation

The current configuration is likely to be the most appropriate signal controlled junction within the space that is currently available. The ongoing minor improvements to the detectors and controller configuration are likely to further reduce delay and improve operation.

The critical constraint to capacity is the eastern A483 Pool Road approach, which has an awkward alignment that limits through flow. The interaction with the queue from the right turn lane and the 'keep clear' markings also impact capacity.

The introduction of controlled pedestrian crossing facilities makes pedestrian movements across the arms significantly easier and safer than the former roundabout configuration, and these crossings were observed to be well used.

While the current signal controlled configuration now seems to be working significantly more efficiently than when it was first implemented, it is unlikely to be able to cater for any significant traffic growth without further physical improvements at the junction. These are likely to include straightening of the Pool Road (East) approach which would be likely to require third party land. Such improvements are currently outside the scope of this study.

The initial junction modelling confirms these findings, highlighting that the junction is currently operating close to theoretical capacity, and would be significantly over capacity for the increased traffic levels forecast in the Tesco Transport Assessment.

The microsimulation model of the traffic signal controlled junction is able to more accurately reflect the current junction configuration than the LinSig model. The

modelled journey time results and overall junction operation are comparable to those observed on site.

4.2.2 Roundabout Operation

The junction modelling has shown the former roundabout was operating over capacity, and would have been significantly over capacity for the traffic levels forecast in the Tesco Transport Assessment.

The initial junction modelling has indicated that the former roundabout may have had slightly more capacity than the signal controlled junction in isolation, but the interaction with adjacent junctions means this additional capacity is unlikely to be realised. The microsimulation modelling confirms this, showing a longer journey time in the eastbound direction than the traffic signal controlled junction for the same 2011 traffic levels, and a similar westbound journey time.

There is public pressure to reinstate the former roundabout at Kerry Road, however this would not be recommended. There are two possible options, either to:

- Reconfigure the islands to recreate the former roundabout, or
- Retain the current splitter islands, and create a smaller roundabout in the space remaining.

Reconfigure the islands to recreate the former roundabout

The recent SCOOT recalibration has improved the traffic operation, and the reintroduction of the roundabout would disrupt the traffic platooning and negatively impact on the operation of the other signal controlled junctions in the town.

Even if a localised improvement were observed at the Kerry Road junction, overall this would likely increase the journey times and delay through Newtown. In addition the conversion to a roundabout would remove the controlled pedestrian crossings, and thus increase the risk of vehicle-pedestrian collisions. There would also be significant disruption to traffic during the construction works

Retain the current splitter islands, and create a smaller roundabout in the space remaining

This would lead to a non-standard roundabout with insufficient circulatory width, and unusual geometry, which would have safety implications and a reduced capacity. It would also remove the controlled pedestrian crossings, and thus increase the risk of vehicle-pedestrian collisions.

4.2.3 Summary

Overall, the traffic signals at the Kerry Road junction, in coordination with the SCOOT recalibration of the traffic signals in Newtown, now provide improved journey times for through traffic on the A483 than the former roundabout. The junction provides controlled pedestrian crossings, making pedestrian movements easier and safer than former configuration.

4.3 Traffic Patterns

Analysis of the available turning count data at the A483 Pool Road/Kerry Road junction showed that there was some limited traffic growth from 2005 to 2008, followed by a reduction in traffic to 2010.

Much of this reduction is likely to be due to local traffic diverting away from the junction where alternative routes exist. The closure of the river crossing on the B4389 does not appear to have increased turning movements at the junction.

Interrogation of the ATC data confirms these findings, with sites on the outskirts of the town showing little or no reduction in traffic levels, while the site adjacent to the A483 Pool Road/Kerry Road junction showing a reduction in recent years.

The 2009 and 2022 traffic forecasts in the Tesco Transport Assessment are significantly higher than the current traffic levels, and thus it is unlikely that the current highway network would be able to handle this high level of traffic growth.

The Newtown Bypass will provide significant relief to the route.

5 The Way Forward

Upon introduction of the traffic signals at the Kerry Road junction, the SCOOT system was poorly calibrated, leading to increased congestion and significant delays to traffic. Recalibration of the SCOOT system, along with a number of minor physical improvements at the Kerry Road junction, now provide improved journey times for through traffic on the A483 than the former roundabout. The junction provides controlled pedestrian crossings, making pedestrian movements easier and safer than former configuration.

The journey time surveys have shown that the former roundabout at Kerry Road operated no better than the current traffic signal controlled junction. Local opinion is likely to have been swayed by the period during 2010 when the signal controlled junctions were not operating effectively.

The initial junction modelling has indicated that the former roundabout may have had slightly more capacity than the signal controlled junction in isolation, but the interaction with adjacent junctions means this additional capacity is unlikely to be realised. This is shown in the results of the microsimulation modelling of the two junction forms, where the traffic signals show improved journey times compared to the roundabout for the same traffic levels.

Journey time surveys show no significant impact in the eastbound direction, but a significant saving in the westbound direction now that the minor junction improvements and SCOOT recalibration works have taken place in comparison with the roundabout and the initial traffic signal configuration. Queues are still observed on the approaches to the junctions, but this is to be expected for signal controlled junctions, and the queues are observed to pass through the network effectively.

Current traffic levels are significantly lower than the forecast traffic levels in the Tesco Transport Assessment, thus it is unlikely that the highway network in Newtown would have sufficient capacity for future traffic growth.

As such it is recommended that:

- Traffic levels and congestion in Newtown continue to be monitored;
- A range of local and wider ranging highway network improvements be considered and assessed;
- Improvements to other travel modes, including walking, cycling and public transport be developed to reduce the dependency on car travel; and
- Improved travel information is made available such that residents and visitors to Newtown can plan their journeys appropriately.

Appendix A

Microsimulation Model Videos

Please note that the videos are not included with the electronic version of this report