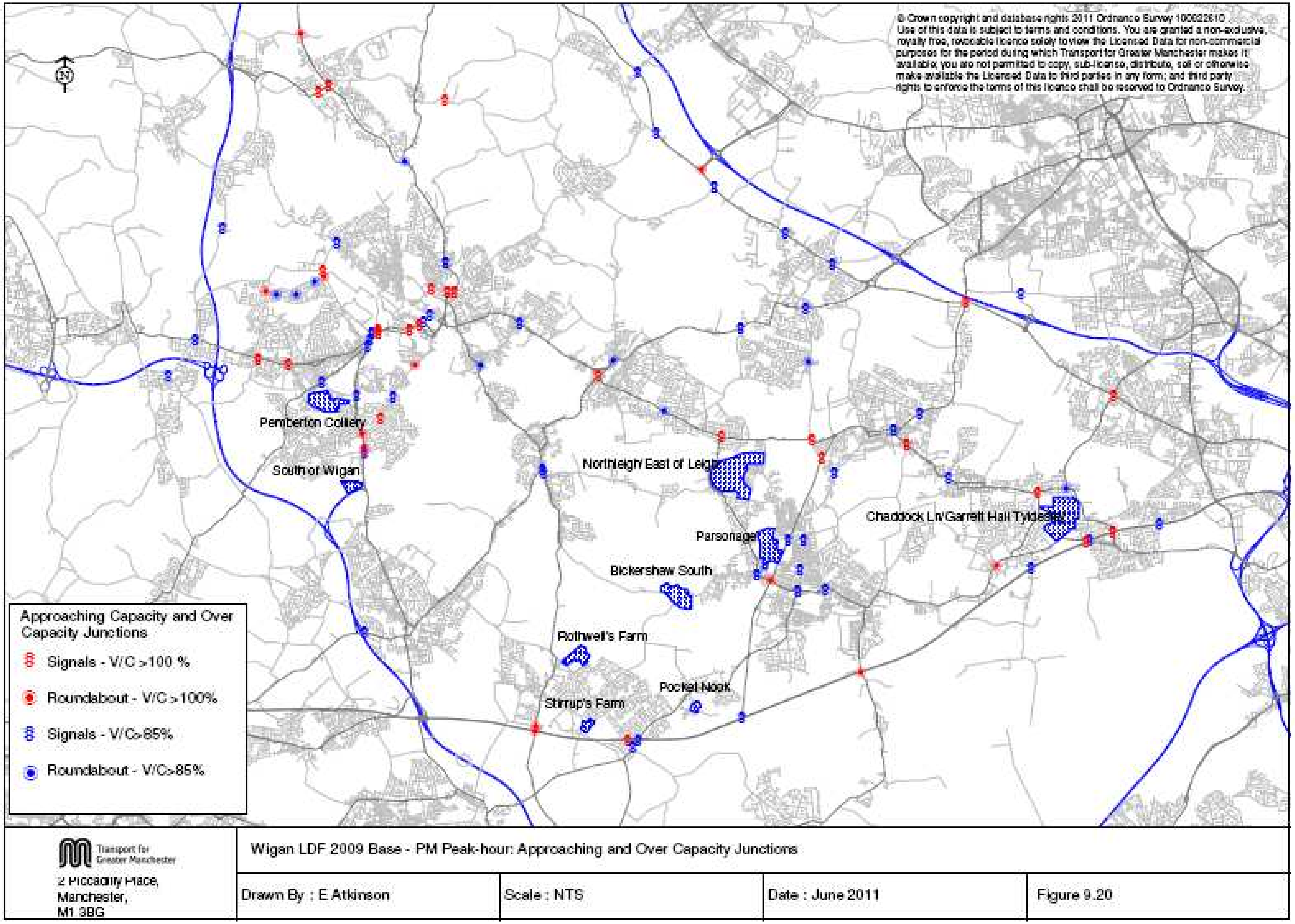
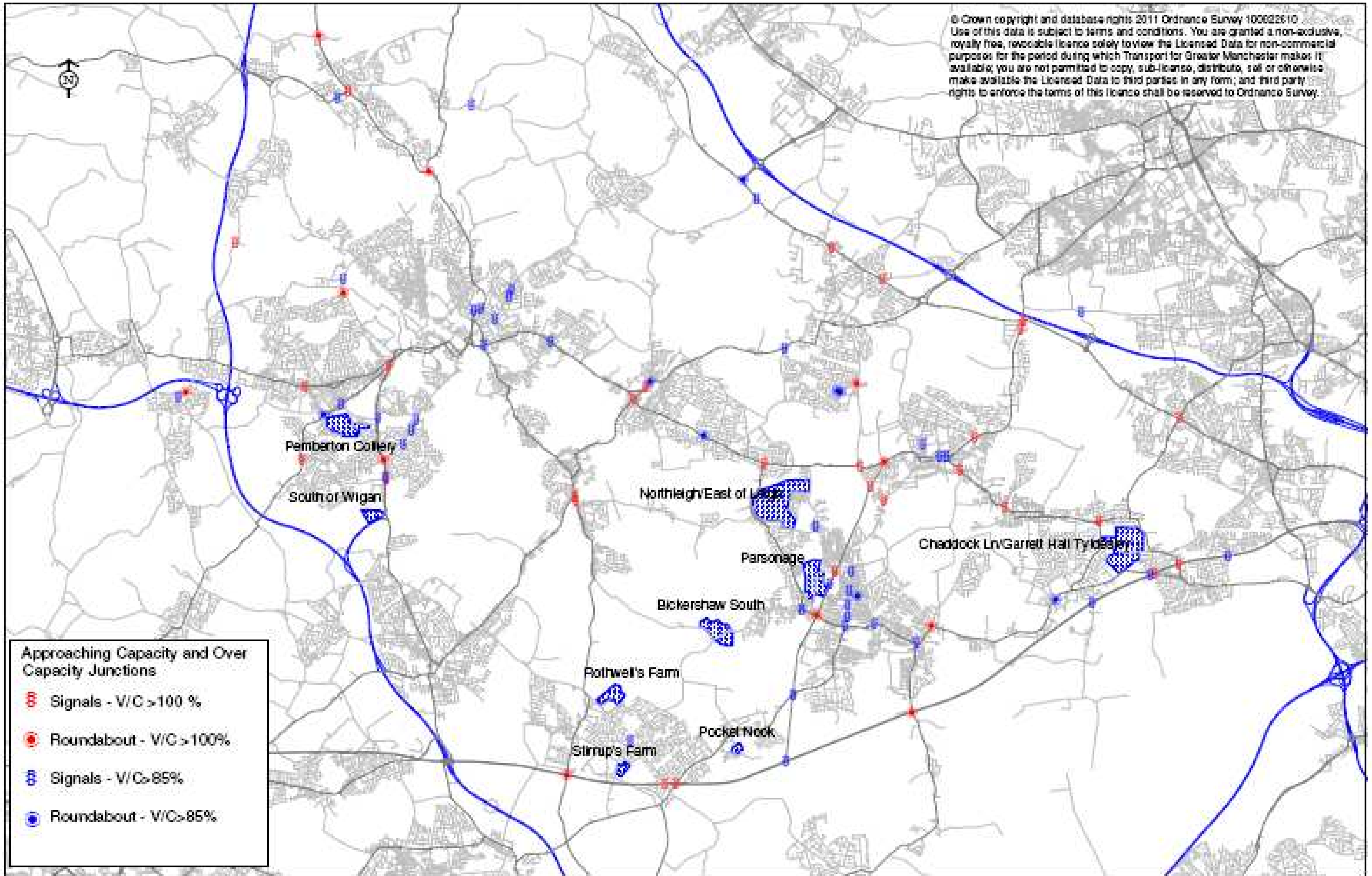
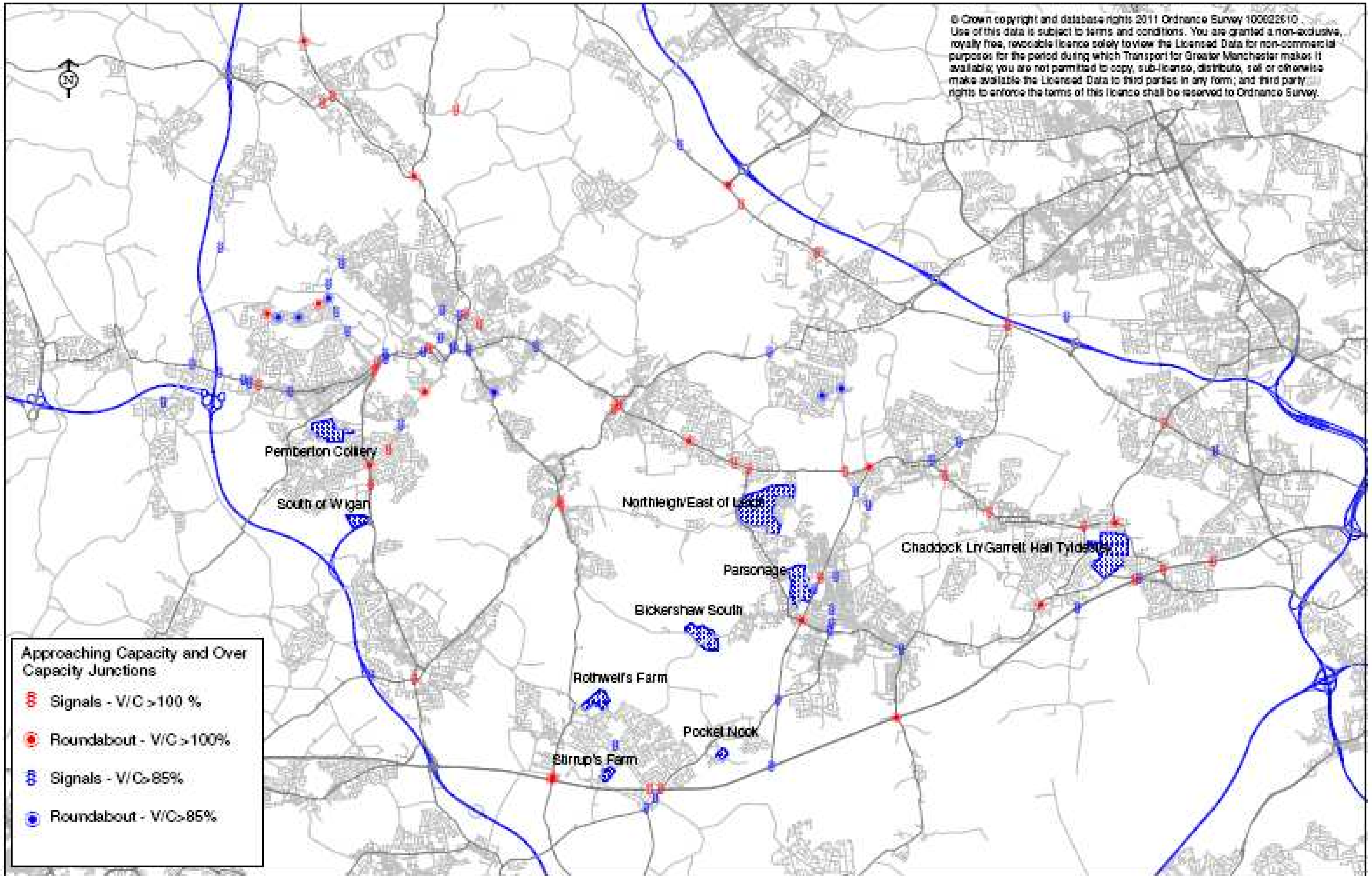

© Crown copyright and database rights 2011 Ordnance Survey 100022610.
Use of this data is subject to terms and conditions. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which Transport for Greater Manchester makes it available; you are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form; and third party rights to enforce the terms of this licence shall be reserved to Ordnance Survey.
N
Pemberton Colliery
South of Wigan
Northleigh/ East of Leigh
Chaddock Ln/Garrett Hall Tyldesley
Parsonage
Bickershaw South
Rothwell's Farm
Pocket Nook
Stirrup's Farm
Approaching Capacity and Over Capacity Junctions
Signals - V/C >100 %
Roundabout - V/C >100%
Signals - V/C>85%
Roundabout - V/C>85%
Transport for Greater Manchester
2 Piccadilly Place, Manchester, M1 3BG
Wigan LDF 2009 Base - PM Peak-hour: Approaching and Over Capacity Junctions
Drawn By : E Atkinson
Scale : NTS
Date : June 2011
Figure 9.20



Transport for Greater Manchester 2 Piccadilly Place, Manchester, M1 3BG	Wigan LDF 2016 Forecasting - AM Peak-hour: Approaching and Over Capacity Junctions			
	Drawn By : E Atkinson	Scale : NTS	Date : June 2011	Figure 9.21



Transport for Greater Manchester
2 Piccadilly Place,
Manchester,
M1 3BG

Wigan LDF 2016 Forecasting - PM Peak-hour: Approaching and Over Capacity Junctions

Drawn By : E Atkinson	Scale : NTS	Date : June 2011	Figure 9.22

LDF Development Site Traffic Impact

9.21 Figures 9.23 and 9.24 show where the development traffic from the LDF development sites has the most impact. The plots identify roads in Wigan where traffic generated by the LDF development sites makes up 5% or more of the total flow in the 2016 morning and evening peak hours.

9.22 Not surprisingly, it is clear from both the morning and evening peak hour plots that the roads with the most significant proportion of development traffic are close to the development sites. In particular, a significant proportion of the traffic on Plank Lane (up to 30% in both peak hours) is generated by the Bickershaw South, Parsonage and Northleigh sites. Development traffic on A578 Wigan Road is forecast to comprise between 10% and 15% of the total flow during the morning and evening peak hours respectively, again mostly generated by the Northleigh and Parsonage sites. The development traffic from Northleigh also increases traffic flow on B5237 Bickershaw Lane by about 10% (westbound direction) during the morning peak hour and by about 8% (in both directions) during the evening peak hour.

9.23 Traffic generated by the development sites accounts for about 10-15% of the traffic on the main roads in Golborne and Lowton. The development traffic is also forecast to contribute 5-10% (northwest bound) during the morning peak hour and 10-15% in the opposite direction during the evening peak of the total flow on B5207 Church Lane.

9.24 Development traffic generated by the South of Wigan (M6 Junction 25) and Pemberton Colliery sites contributes to the increased flows on the A49 Wigan Road. The development traffic entering (during the morning peak hour) and leaving (during the evening peak hour) the South of Wigan site is forecast comprise about 7% of the total flow on the A49 Wigan Road in the immediate vicinity of the site.

9.25 The development traffic generated by the Pemberton Colliery site is forecast to account for a significant proportion of the overall traffic flow on Little Lane in both peak hours. However, the development traffic is not forecast to significantly increase traffic flows on most of the links in and around Wigan town centre.

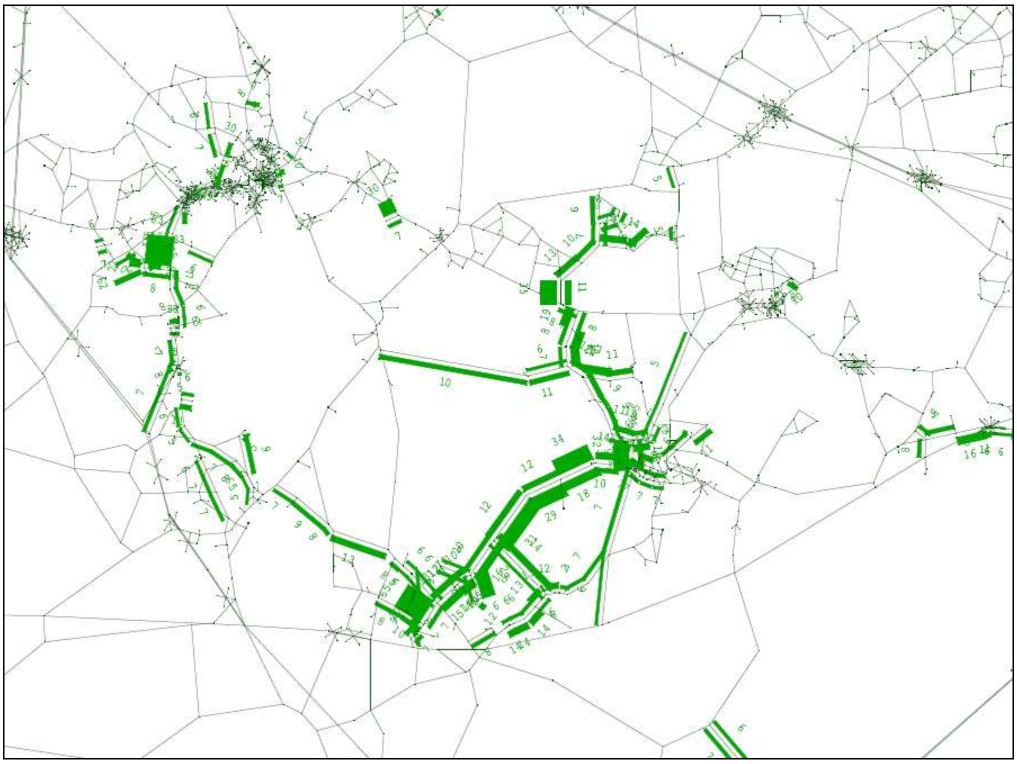


Figure 9.23: Development traffic percentage – AM peak-hour

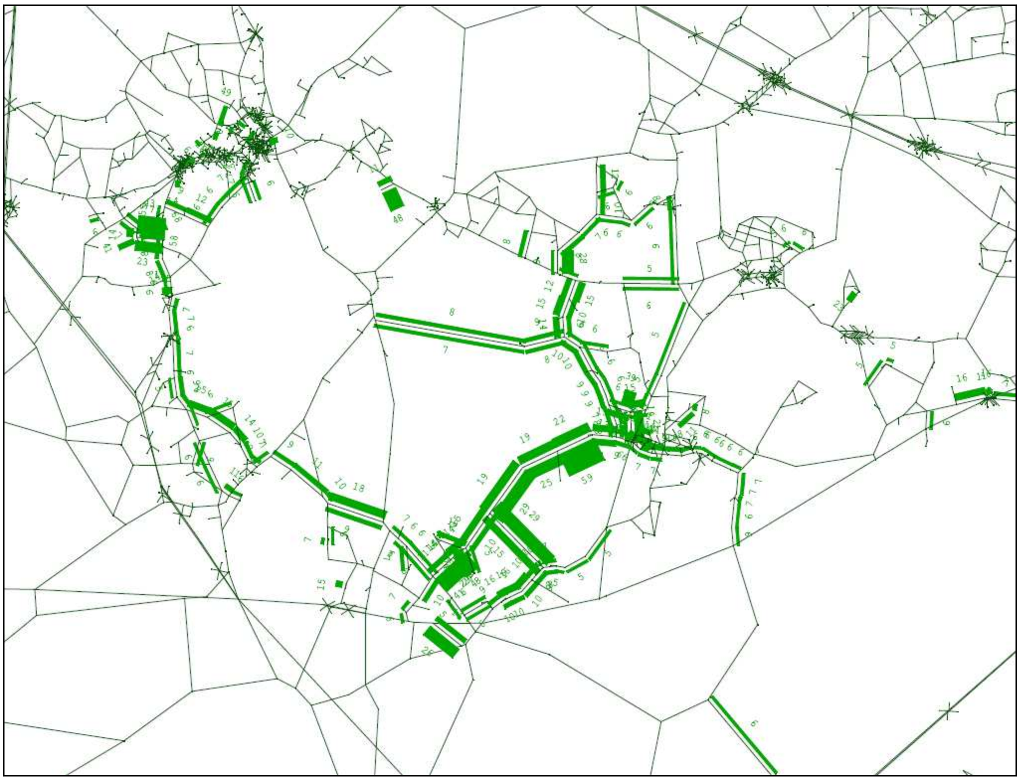


Figure 9.24: Development traffic percentage – PM peak-hour

Degradation in Junction Performance

9.26 To help identify the junctions where performance has deteriorated we have produced an additional set of junction performance plots comparing the 2009 Base with the 2016 forecast scenario.

9.27 The plots (Figures 9.25 – 9.26) highlight those junctions that suffer degradation in performance as a result of the growth in traffic to 2016 including the additional traffic generated by the LDF development sites during the morning and evening peak hours. They only show junctions that suffer from poorer performance as a result of the additional site traffic and also separate those junctions that suffer more severe increases in delay. The degradation of performance at signalised junctions and roundabouts is graded as follows:

- Green - junctions where delay has increased by between to 90 - 180 seconds (1½ - 3 minutes)
- Amber - junctions where delay has increased by between 180 seconds and 270 seconds (3 – 4½ minutes)
- Red - junctions where delay has increased by over 270 seconds (4½ minutes)

9.28 **Morning Peak Hour** (Figure 9.25)**:** The degradation plot for the AM peak-hour indicates that very few junctions have experienced more than 180 seconds (3 minutes) increase in delay and no junction experience an increase in delay above 270 seconds (4½ minute). The plot also shows that many of the junctions are remote from the LDF development site locations.

9.29 However, there are a number of junctions were the Development Sites are likely to have some impact, which may require mitigation measures.

9.30 The A577 Atherton Road / A578 Leigh Road signalised junction suffers an increase in delay on all turning movements, particularly on the Leigh Road exit arm and the right turn into Leigh Road from Atherton Road. Traffic generated by the Northleigh and Parsonage sites is likely to have the most significant impact on this junction.

9.31 Traffic generated by Northleigh and Parsonage using B5237 Bickershaw Lane is likely to have an impact on its junction with A573 Warrington Road and the Warrington Road / A58 Lily Lane junction in Platt Bridge. The right-turn from Bickershaw Lane into Warrington Road is forecast to operate over capacity as is the northbound straight-ahead movement at the Warrington Road / A58 Lily Lane junction.

9.32 The Chaddock Lane / Garret Hall site is forecast to have some impact on the A580 East Lancashire Road at its junctions with A572 Chaddock Lane, A577 Common Road and B5258 Newearth Road. Further to the west the Pocket Nook, Stirrups Farm and Rothwell's Farm sites are also likely to have some impact on the East Lancashire Road at its junction with A572 Newton Road and B5207 Church Lane. However, the increases in delay at these junctions are largely on the through movements where increases in the background traffic flow have the greatest impact.

9.33 Traffic generated by the Bickershaw South site is likely to have some impact on the B5207 Golborne Road / Slag Lane junction which is forecast to experience some increase in delay.

9.34 The M6 Junction 25 (South of Wigan) site is likely to have some impact on the A49 Warrington Road /Worthington Way junction particularly on the southbound right-turn into Worthington Way from Warrington Road. It is likely the both the South of Wigan and Pemberton Colliery sites will also have some impact on the A49 Warrington Road / B5238 Poolstock Lane roundabout though the increases in delay at this junction are influenced by the increase in background traffic.

9.35 **Evening Peak Hour** (Figure 9.26)**:** The degradation plot for the evening peak hour indicates a similar pattern to the morning peak hour, with few junctions experiencing an increase in delay of more than 180 seconds (3 minutes). However, two junctions on the A580 East Lancashire Road (at A577 Common Road and B5258 Newearth Road) suffer an increase in delay in excess of 270 seconds (4½ minutes).

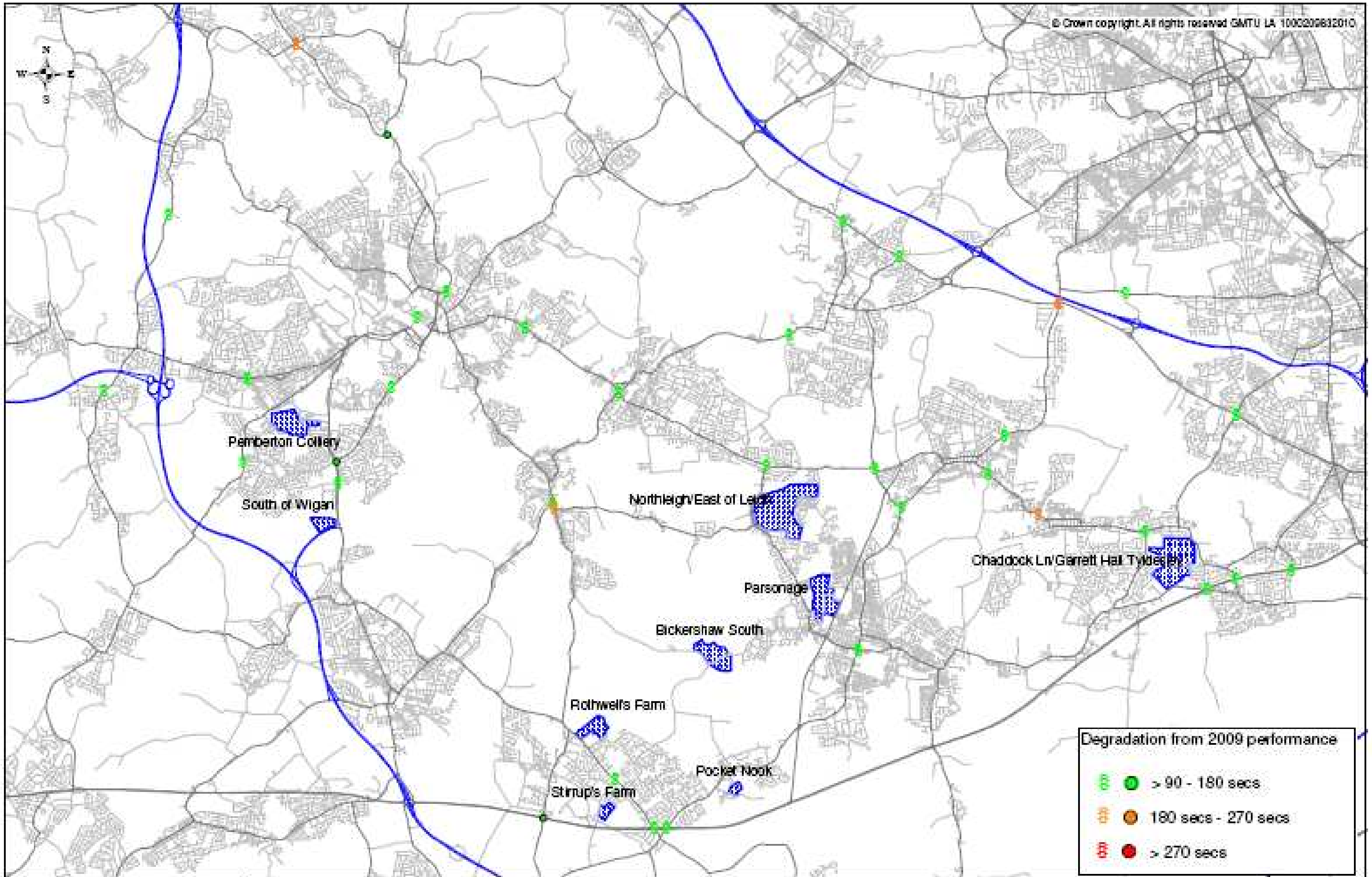
9.36 The A577 Atherton Road / A578 Leigh Road signalised junction suffers an increase in delay, again particularly on the Leigh Road exit arm and on the right turn into Leigh Road from Atherton Road due to traffic generated by the Northleigh and Parsonage sites. While to the east along the A577 there is an increase in delay at the Wigan Road / B5235 Lovers Lane junction, though this is more likely to be attributable to the growth in background traffic.

9.37 Traffic generated by the Parsonage and Bickershaw South sites is forecast to cause some degradation in performance at the A579 Atherleigh Way / A572 Twist Lane roundabout, particularly on the Atherleigh Way northbound approach.

9.38 Both the signalised junctions with the A573 Warrington Road (at Bickershaw Lane and Lily Lane) in Platt Bridge are forecast to experience an increase in delay with the right-turn from Bickershaw Lane into Warrington Road again a particular issue.

9.39 The traffic generated by the Pocket Nook, Stirrups Farm and Rothwell's Farm sites is likely to have some impact on delay at the A580 East Lancashire Road junctions with A572 Newton Road and B5207 Church Lane. However, as is the case during the morning peak hour, the main increases in delay are on the through movements at these junctions where increases in the background traffic flow have the greatest impact.

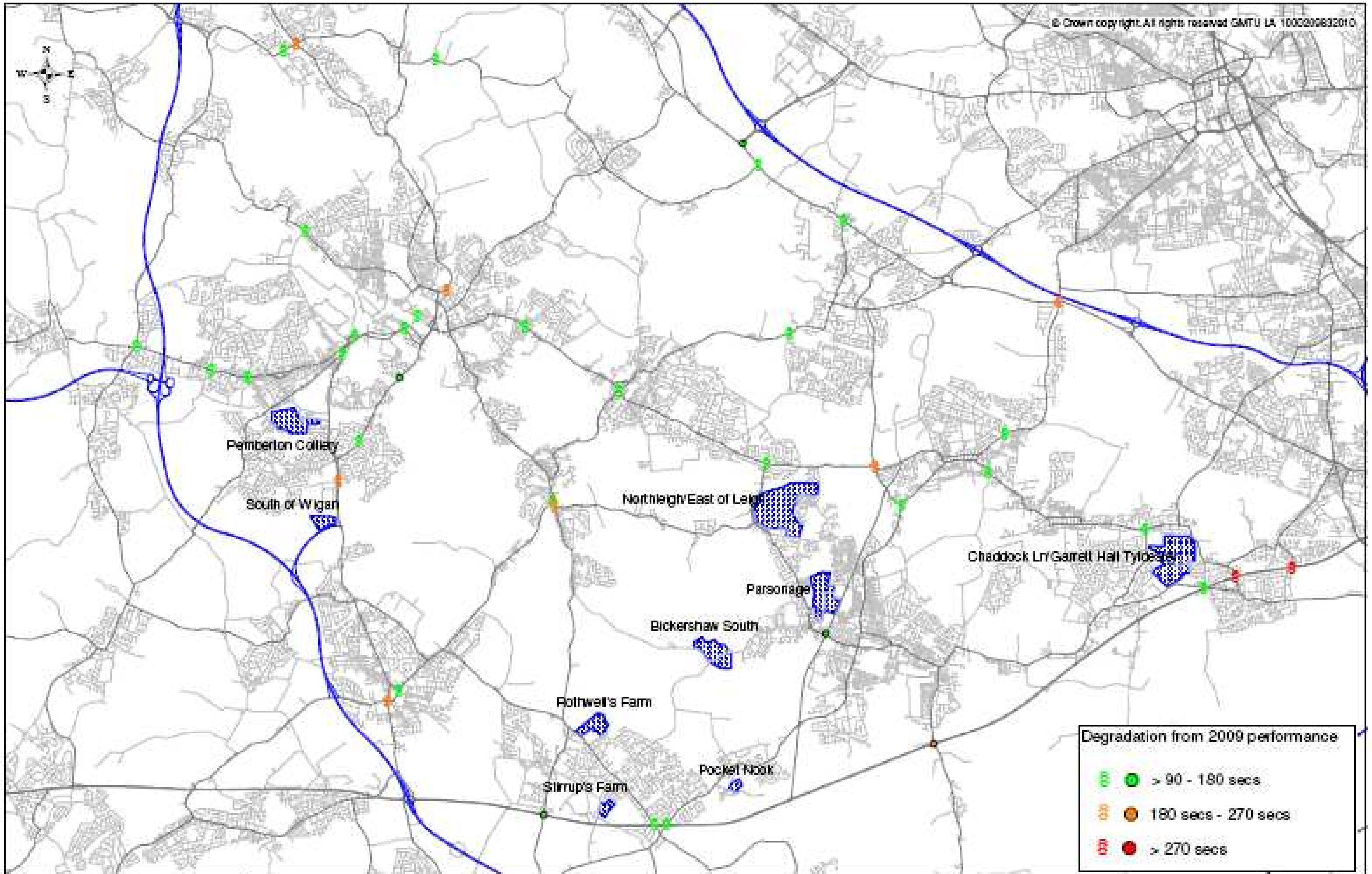
9.40 The M6 Junction 25 (South of Wigan) site is forecast to impact on the A49 Warrington Road / Worthington Way junction particularly on the right-turn from Worthington Way into Warrington Road resulting in an increase in delay.



Transport for Greater Manchester
2 Piccadilly Place, Manchester, M1 3BG

Over Capacity Junctions - 2016 AM Forecast scenario
Each junction graded by its degradation in performance compared with the 2009 Base scenario

Drawn By : E Atkinson	Scale : NTS	Date : June 2011	Figure 9.25



Transport for Greater Manchester 2 Piccadilly Place, Manchester, M1 3BG	Over Capacity Junctions - 2016 PM Forecast scenario Each junction graded by its degradation on performance compared to the 2009 Base scenario			
	Drawn By : E Atkinson	Scale : NTS	Date : June 2011	Figure 9.26

Summary

9.41 Overall the growth in background traffic to 2016 is likely to have a greater impact on junction performance in the Wigan district than traffic generated by the LDF development sites. Nevertheless, the traffic generated by the LDF development sites are forecast to have a modest detrimental impact on a number of junctions, in particular:

- **Northleigh and Parsonage** account for increased traffic volumes on A578 Leigh Road / Wigan Road and B5237 Bickershaw Lane resulting in a degradation in performance at the Leigh Road / Atherton Road signalised junction, Atherleigh Way / Twist Lane roundabout (PM peak-hour) and A573 Warrington Road junctions with Bickershaw Lane and A58 Lily Lane.

- **Bickershaw South** increases traffic flow on Plank Lane which impacts on the B5207 Golborne Road / Slag Lane junction (AM peak-hour).

- Traffic generated by the **Chaddock Lane / Garret Hall** is likely to have some impact on the A580 East Lancashire Road particularly at its junction with Chaddock Lane. There is also degradation in performance at the East Lancashire Road junctions with the A577 Common Road and B5258 Newearth Road, though increases in the background traffic flow are likely to have a greater impact at these junctions.

- **Pocket Nook, Stirrups Farm** and **Rothwell's Farm** are not likely to have a significant impact on the highway network given their relatively low trip generation. However, the combined traffic from these sites may have a detrimental impact on the A580 East Lancashire Road junctions with A572 Newton Road and B5207 Church Lane.

- The impact of traffic generated by the **M6 Junction 25 (South of Wigan)** site is primarily on the A49 Warrington Road / Worthington Way junction which is forecast to experience some increase in delay in both peak-hours. This traffic is also likely to have some impact on the Warrington Road / B5238 Poolstock Lane roundabout.

- The **Pemberton Colliery** site is forecast to significantly increase traffic flow on Little Lane and is likely to have some impact at junctions on the A49 Warrington Road.

9.42 We have identified where the traffic generated by the LDF development sites is likely to have most impact on the highway network across Wigan and which junctions are most likely to experience degradation in performance. There is further potential to examine the operation of particularly problematic junctions in more detail to identify the scale of improvements required to mitigate for the effects of the additional traffic. Mitigation measures could include introducing signal optimisation measures (i.e. MOVA or SCOOT) at signalised junctions currently using fixed times. Where appropriate, localised capacity improvements could also be considered to improve junction operation.

9.43 In some cases, the capacity problems may be such that only an unacceptable or unachievable junction improvement would be sufficient to resolve the capacity problems. In these cases, it would be possible to identify the LDF development sites generating the development traffic that is causing the problem and then determine either:

- A lower level of development that would remove / reduce the traffic impacts of the site down to an acceptable level; or

- Travel Plan measures and additional PT provision to reduce the impact of vehicle trips generated by the sites.

10. Emissions Modelling (EMIGMA)

The EMIGMA Database

10.1 Road traffic emissions were modelled using the atmospheric emissions inventory for Greater Manchester, EMIGMA.

10.2 The original EMIGMA database was compiled by the London Research Centre in 1997 on behalf of the Department of the Environment, Transport and the Regions (DETR) Air and Environment Quality Research Programme. Released in June 1997, it represents the second of a series of atmospheric emissions inventories covering many of the UK's major urban and industrial zones.

10.3 GMTU has been responsible for updating the road traffic components of the database since the late 1990s. GMTU took over responsibility for updating the non-traffic elements of the database in 2004.

10.4 The EMIGMA database is used to estimate mass emissions from selected areas across Greater Manchester and it allows the relative importance of different generating sources of emissions to be estimated. The emissions sources are grouped into three broad categories:

- Point / area sources – representing emissions from domestic and industrial sources
- Emissions from rail and aviation sources
- Road traffic emissions, representing emissions from vehicles travelling on roads in Greater Manchester.

10.5 The 2006 EMIGMA database covers an area of 1272 km^2 encompassing the ten administrative districts of Greater Manchester.

10.6 The database allows the magnitude and spatial distribution of emissions across Greater Manchester to be investigated and enables the relative importance of different sources of air pollution to be examined. The emissions data has a further role in providing the basis for dispersion modelling exercises and air quality management planning. In conjunction with transport models (as in this study) it also provides the basis for forecasting air quality and determining the effects of changes in land use planning and transportation policies on mass emissions.

Road Traffic Emissions

10.7 Road traffic emissions in EMIGMA are estimated using data from two sources:

- Traffic speeds and flow data from the Greater Manchester Saturn Model (or in this case, the Wigan Saturn model variant of the Greater Manchester Model)
- Road traffic emission factors and fleet composition data from the National Atmospheric Emissions Inventory website (NAEI, www.naei.org.uk)

10.8 The traffic speed and flow data from the Saturn model allows the impacts of changes in vehicle flows on emissions to be estimated, and the variation in vehicle emissions with traffic speed to be taken into account. (Traffic emissions are generally higher, for example, for vehicles travelling at low speeds – in congested areas – and for vehicles travelling at high speeds – on motorways).

10.9 The road traffic emission factors from the NAEI provide estimates of vehicle emissions (in g/km) for vehicles traveling at different speeds, complying with different Euro emission standards. Euro emission standards are normally tightened every five years or so, so that vehicles become less polluting over time, as older more polluting vehicles are replaced by newer/cleaner models. The impacts of changes in the fleet composition are predicted using fleet composition projections (also from the NAEI) to reflect changes in the proportion of vehicle kilometres travelled by vehicles in each of the Euro emission classes over time.

10.10 Within EMIGMA, traffic emissions are calculated separately for each of the time periods represented by the Saturn model, comprising the morning peak hour (0800-0900), the evening peak hour (1700-1800) and an average inter-peak hour for the period 1000-1530. The hourly emissions are then converted into daily and then annual totals, using road traffic annualisation factors derived from traffic counts.

10.11 Emissions are calculated separately for the following eight vehicle types:

- Motorcycles
- Petrol cars
- Diesel cars
- Petrol LGVs
- Diesel LGVs
- Rigid HGVs
- Articulated HGVs
- Buses.

10.12 The separate vehicle emissions are then combined to calculate all vehicle emissions for analysis. Emissions are initially calculated at the network link level. Link emissions can, however, be aggregated, to calculate emission totals within areas, such as traffic model zones, wards, districts and grid squares.

10.13 Emissions are estimated for the following pollutants:

- CO_2
- NO_X
- PM_{10}

Nitrogen Oxides (NO_x) Emissions

10.14 The NO_x emissions calculated by EMIGMA comprise nitrogen oxides (NO_x), representing the sum of nitric oxide, (NO), and nitrogen dioxide (NO_2). Traffic emissions mostly comprise NO, but this is transformed into NO_2 by reaction with ozone. (The EU has set target values limiting NO_2 emissions, to be met by January 2010). The reaction with ozone changes the proportion of NO_2, and this has to be allowed for if concentration dispersion modelling is undertaken. There is, however, the added complexity of background NO and NO_2 mixing with traffic emissions, so that prediction of NO_2 concentrations at the roadside is not straight forward ("A New Approach to Deriving NO_2 from NOx for Air Quality Assessments of Roads", http://uk-air.defra.gov.uk/reports/cat06/NewMethodforNOxtoNO2(Final).pdf).

10.15 Approximately 37% of the UK's emissions of NO_x were from road transport in 2004 (Environmental Assessment Techniques, DMRB Volume 11 Section 3 Part 1).

10.16 NO_2 concentrations are normally estimated from NO_x totals using dispersion models, employing methods based on chemical models, or empirical relationships.

10.17 Forecasts of NO_x emissions from EMIGMA indicate that emissions from road traffic have been falling steadily over time, and it might be expected that this would be reflected in observed NO_2 concentrations in Greater Manchester. In practice, however, this is not reflected on the ground, with observed concentrations of NO_2 at monitoring sites declining at a slower rate than predicted, or remaining static in many urban locations.

10.18 It is unclear why this is happening, although it has been suggested that it might reflect increased usage of diesel vehicles (which emit a greater proportion of NO_x as NO_2), or the effect of abatement equipment targeted at reducing particulates, which can produce increased emissions of NO_2. The forecast changes in road traffic NO_x emissions from EMIGMA should be treated with some caution, particularly when used as a proxy for changes in emissions of NO_2.

10.19 A dispersion model is required to properly understand the relationship between NO_x and NO_2 in specific locations for a specific time period. Only a dispersion model is capable of carrying out the necessary chemical reaction calculations for the weather conditions prevailing during the period of interest. If linked with a comprehensive inventory (such as EMIGMA), it will also be able to properly account for the traffic and non-traffic element of total NO_2 in the locality. Dispersion modelling at the county level is currently being undertaken by GMTU, including future year forecasts. Results from this work are expected to be available later this year.

PM_{10} Emissions

10.20 For the county as a whole, PM_{10} emissions have been forecast to increase by approximately 2% over the period 2009-2016. There is, however, considerable local variation, with approximately 30% of wards (in the county) showing a reduction in PM_{10} emissions, and 12 wards showing increases of more than 10%. (Percentage changes should be treated with some caution, as a large percentage change might be associated with a small absolute change from a low base). Possible reasons for local variations can be due to:

- Variations in traffic growth (due to redevelopment/land use changes)
- Local changes in vehicle kilometres (due to re-assignment/re-routing effects)

- Local variations in vehicle speeds due to modelled congestion
- Local changes in fleet composition (car/LGV/OGV proportions).

Emission Changes in Wigan 2009-2016

10.21 Figures 10.1 to 10.3 respectively show the forecast change in CO_2, NO_x and PM_{10} emissions between 2009 and 2016 assuming development levels on the draft Core Strategy sites described earlier in this report.

10.22 Carbon dioxide emissions tend to rise over time as they are closely related to increases in vehicle kilometres. From Figure 10.1, it is apparent that the largest CO_2 emission increases (increases of between 15 and 20%) are forecast to be in the Abram, Wigan Central, Wigan West and Douglas wards.

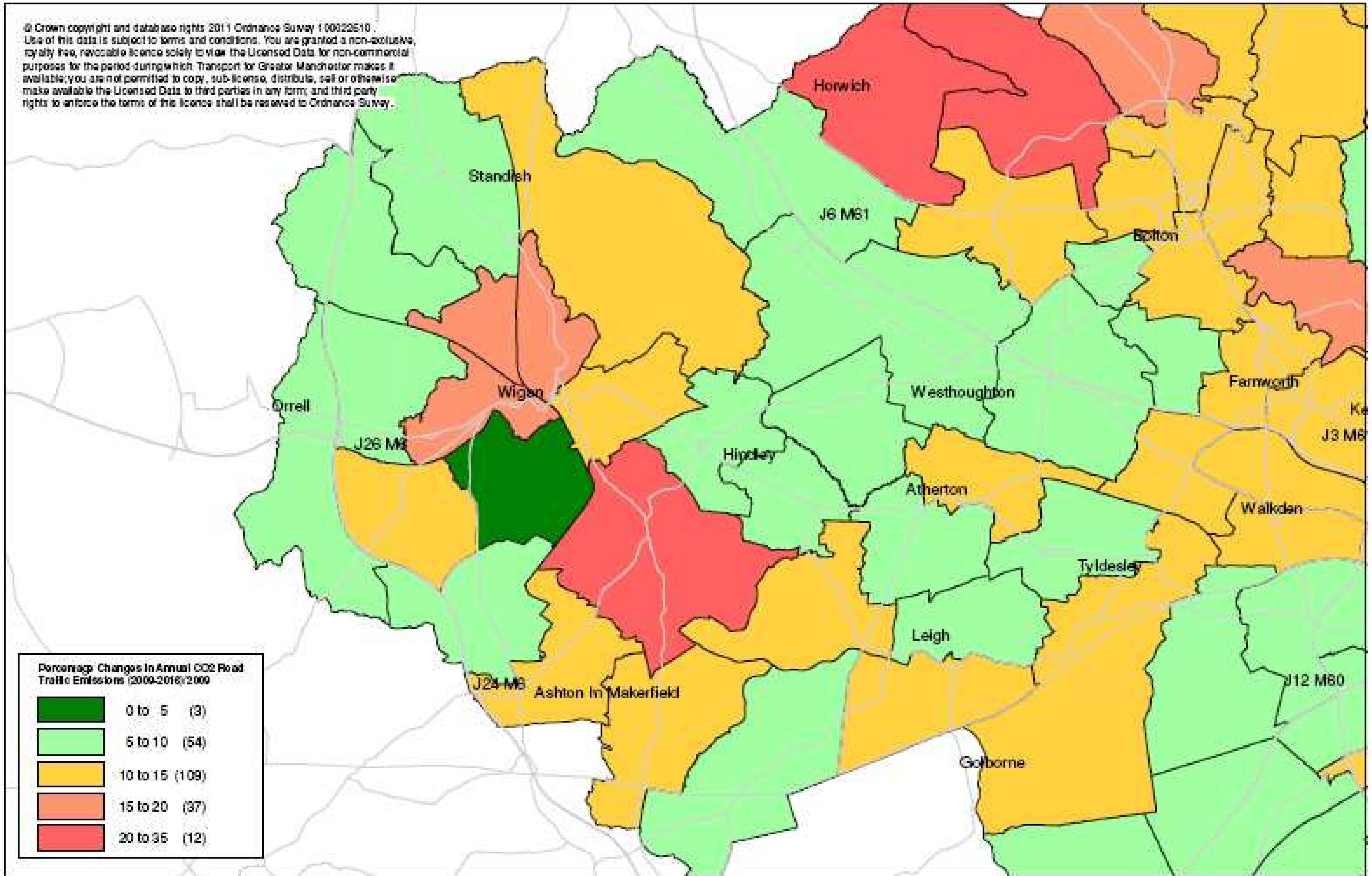
10.23 Emissions of Nitrogen oxides (NO_x) tend to fall over time, reflecting improvements in engine efficiency. This is shown in Figure 10.2, which identifies NO_X reductions of between 20 and 40% over large parts of the Wigan borough.

10.24 Emissions of PM_{10} particulates are affected both by increases in vehicle kilometres travelled and improvements in vehicle efficiency. Figure 10.3 shows that PM_{10} emissions fall in the less built-up parts of the borough, but that they increase in Wigan town centre wards and along an east-west corridor running through the central part of the borough between Wigan and Leigh.

10.25 Table 10.1 shows emissions by ward within Wigan in 2009 and anticipated changes by 2016 assuming the draft Core Strategy development proposals described earlier in this report. All emissions shown in the table are expressed in tonnes per annum.

10.26 For the borough as a whole, carbon dioxide emissions are forecast to increase by just over 10% between 2009 and 2016, while both nitrogen oxides and PM_{10} particulates are anticipated to fall by 30% and just under 2% respectively.

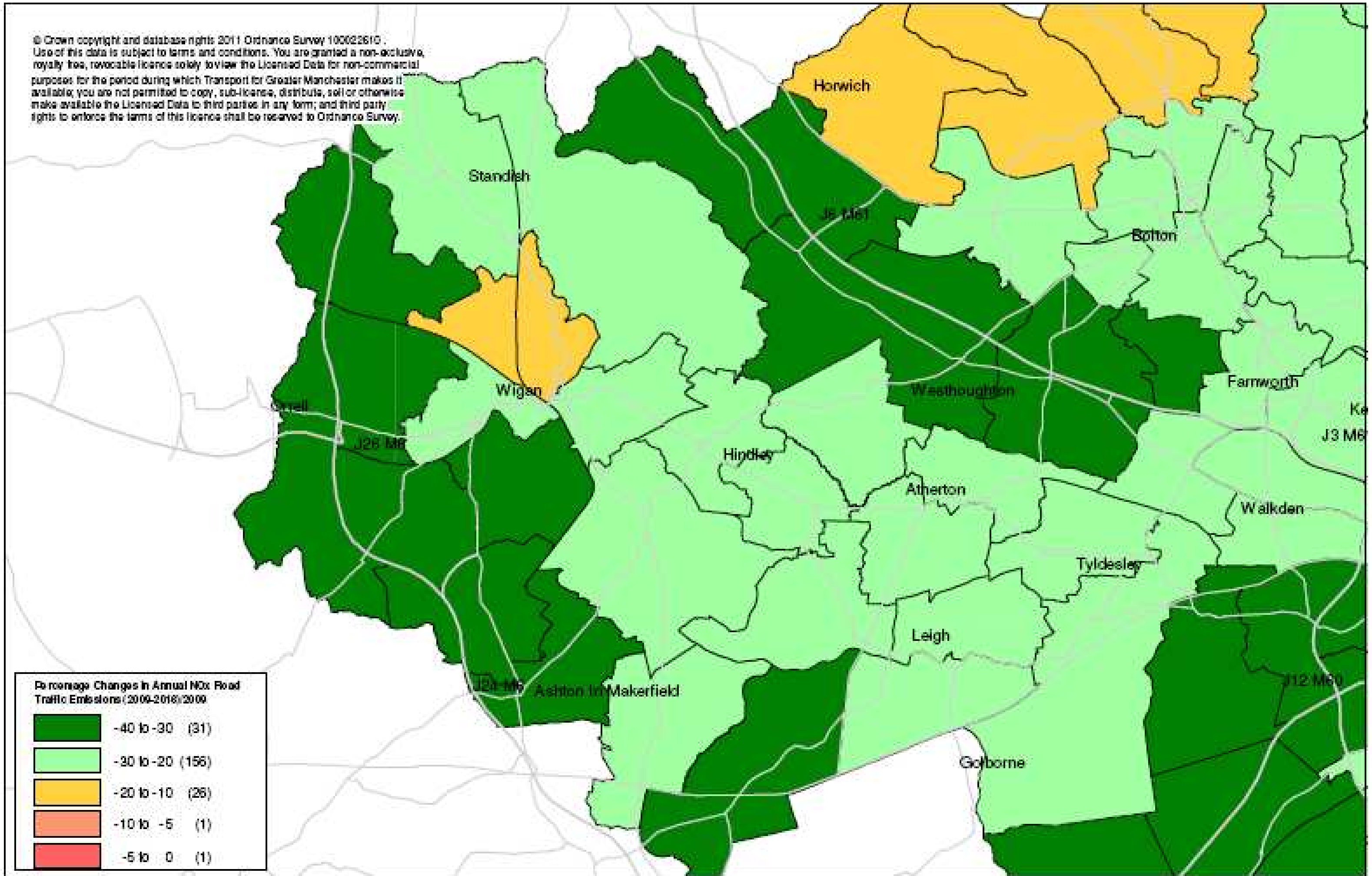
Table 10.1 Wigan Draft Core Strategy Forecast Change in Emissions (2009 to 2016) by Ward (Tonnes per Annum)									
Ward	**Carbon Dioxide**			**Nitrogen Oxides**			**PM10 Particulates**		
	2009 Total	**Change**	**% Change**	**2009 Total**	**Change**	**% Change**	**2009 Total**	**Change**	**% Change**
Abram	3284.4	670.3	20.4	35.6	-7.5	-21.1	4.201	0.344	8.2
Ashton	6602.0	717.9	10.9	84.7	-27.0	-31.8	7.228	-0.168	-2.3
Aspull New Springs Whelley	4952.3	671.0	13.5	55.5	-14.7	-26.5	6.161	0.159	2.6
Astley Mosley Common	6237.4	633.3	10.2	68.3	-19.8	-28.9	7.802	0.041	0.5
Atherleigh	3995.1	272.4	6.8	38.8	-10.2	-26.2	5.034	-0.048	-1.0
Atherton	2362.5	292.8	12.4	24.4	-5.9	-24.1	2.977	0.107	3.6
Bryn	12637.8	1157.6	9.2	168.4	-56.8	-33.7	12.534	-0.621	-5.0
Douglas	4471.6	852.8	19.1	50.3	-11.7	-23.2	5.610	0.165	2.9
Golborne and Lowton West	3531.7	364.3	10.3	37.3	-9.4	-25.1	4.512	-0.081	-1.8
Hindley	2293.7	166.2	7.2	25.8	-7.6	-29.6	2.904	-0.104	-3.6
Hindley Green	1892.8	164.0	8.7	18.8	-4.8	-25.3	2.371	-0.012	-0.5
Ince	2526.4	273.8	10.8	29.4	-7.9	-26.8	3.207	0.012	0.4
Leigh East	1923.5	184.1	9.6	21.6	-5.5	-25.4	2.557	0.008	0.3
Leigh South	6563.5	699.9	10.7	74.8	-21.2	-28.3	8.024	0.081	1.0
Leigh West	2789.5	367.6	13.2	30.0	-6.6	-22.1	3.687	0.096	2.6
Lowton East	6176.9	539.9	8.7	73.8	-23.5	-31.9	7.310	-0.220	-3.0
Orrell	16743.6	1512.7	9.0	218.5	-74.5	-34.1	16.543	-0.911	-5.5
Pemberton	9230.6	703.1	7.6	120.4	-41.3	-34.4	9.522	-0.505	-5.3
Shevington with Lower Ground	14881.0	754.3	5.1	200.0	-74.2	-37.1	13.877	-1.206	-8.7
Standish with Langtree	3641.6	255.5	7.0	37.6	-10.5	-27.9	4.683	-0.227	-4.8
Tyldesley	1966.9	175.4	8.9	19.8	-4.9	-24.9	2.651	0.012	0.5
Wigan Central	3699.0	716.9	19.4	41.2	-8.0	-19.4	4.672	0.435	9.3
Wigan West	1495.9	266.2	17.8	15.4	-2.5	-16.3	2.128	0.181	8.5
Winstanley	10145.7	1455.1	14.3	133.7	-41.4	-31.0	9.889	0.081	0.8
Worsley Mesnes	2572.0	116.2	4.5	28.3	-9.0	-31.9	3.231	-0.180	-5.6
Wigan Borough Total	**136617.5**	**13983.1**	**10.2**	**1652.5**	**-506.3**	**-30.6**	**153.3**	**-2.6**	**-1.7**



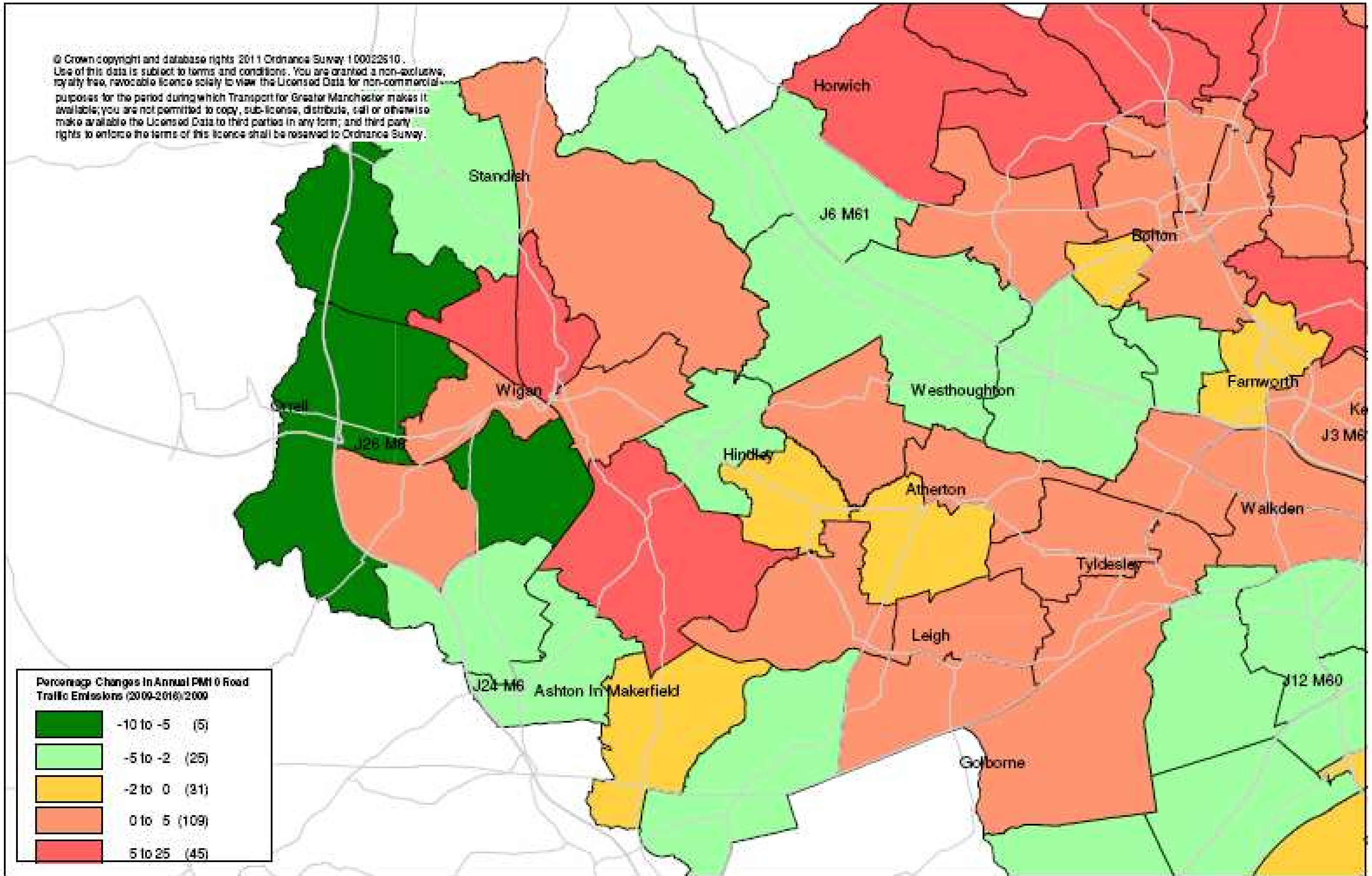
Transport for Greater Manchester
2 Piccadilly Place,
Manchester,
M1 3BG

Annual CO2 Road Traffic Emissions - Percentage Changes By Ward 2009 - 2016

Drawn By : A. Morris	Scale : NTS	Date : June 2011	Figure 10.1



Transport for Greater Manchester 2 Piccadilly Place, Manchester, M1 3BG	Annual NOx Road Traffic Emissions - Percentage Changes By Ward 2009 - 2016			
	Drawn By : A. Morris	Scale : NTS	Date : June 2011	Figure 10.2



Transport for Greater Manchester 2 Piccadilly Place, Manchester, M1 3BG	Annual PM10 Road Traffic Emissions - Percentage Changes By Ward 2009 - 2016			
	Drawn By : A. Morris	Scale : NTS	Date : June 2011	Figure 10.3

11. Draft Core Strategy Public Transport Impacts

Distribution of Public Transport Trips

11.1 The public transport trips forecast to be generated by each of the LDF Development Sites were distributed using the newly developed PT-DEVTRIPS program. A potential weakness of this approach is that the programme estimates the distribution of public transport trips on the basis of a level of supply contained in the GM-PT model. In other words, the distribution of public transport trips is dependent on the assumptions regarding future PT infrastructure and service provision made in the model. Because of this, it may not fully reflect areas where there is demand but that is poorly served by public transport services.

11.2 While this may provide a useful indication of what is possible in terms of PT trips the model does not provide any indication of where people might wish to travel by public transport and therefore where there might be gaps in current/planned PT supply.

11.3 In order to establish a picture of what might be regarded as “suppressed” demand, the PT trip volumes estimated through application of TRICS modal splits have therefore also been input to the standard highway-based DEVTRIPS programme. The outputs from this can be regarded as providing an indication of where people would travel if PT services were provided.

11.4 The outputs from the PT and highway-DEVTRIPS runs for each of the Development Sites are summarised below.

11.5 In considering the following summary, it should be noted that the forecast distribution of public transport trips is based on an estimate of the maximum “cost” (i.e. the combined cost of waiting time, in vehicle time and interchange time in “cost minutes”) that a prospective public transport passenger would be willing to accept. This means that there are no trips longer than this upper limit in the estimated distribution, on the basis that these trips would be made by an alternative mode.

11.6 Tables 11.1 and 11.2 show the total number and percentage proportion of two-way public transport trips to and from each ward within the Wigan district and for surrounding districts for each of the Development Sites. Ward or district locations that are forecast to account for 5% or more of the total public transport trips to/from each site are highlighted.

11.7 For simplicity in the site summaries below, we refer to areas which are groups of wards as follows:

Wigan Town Centre	Wigan Central, Wigan West and Douglas
Leigh	Leigh East, Leigh South and Leigh West
Atherton	Atherton and Atherleigh
Hindley	Hindley and Hindley Green

Site Public Transport Trip Distribution Summary

Bickershaw South (EM1G)

11.8 The Bickershaw South site is to be developed for employment and housing uses, but it is anticipated that only some of the housing elements will be delivered by the 2016 forecast year. Based on the TRICS mode choice estimates described earlier, the Bickershaw site is expected to generate only 8 public transport trips during the morning peak hour. This is an exceptionally low figure, based on the mode choice characteristics of other sites with similar land-uses and in similar locations. It suggests that very careful consideration should be given to suitable travel plan measures to encourage the use of more sustainable modes of transport as the site is brought forward.

11.9 Not surprisingly the majority of these trips are forecast to be to/from Leigh, which accounts for 52% and 43% of PT trips during the morning and evening peak hours respectively. Wigan Town Centre accounts for 6% and 12% of PT trips during the morning and evening peak hours respectively, which is probably indicative of poor public transport links between the site and Wigan Town Centre. Within the Wigan district the only other significant public transport origin/destination is Atherton, which accounts for 8% of trips during both the morning and evening peak hours.

11.10 Almost 20% of the public transport trips generated by the site would be to/from places outside the Wigan district, especially to/from the Manchester and Bolton districts.

Chaddock Lane / Garret Hall (EM1A 9 / SP4.3)

11.11 The Chaddock Lane (EM1A 9) is allocated for employment and Garret Hall (SP4.3) for housing. Together they are anticipated to generate 28 and 24 public transport trips during the morning and evening peak hours respectively. The site is located on the A572 with access to relatively high frequency bus services operating along this route.

11.12 During the morning peak hour, 51% of the public transport trips are anticipated to be to/from Wigan Town Centre, with much of the remainder (33%) accounted for by trips to/from outside the Wigan district. The site is particularly accessible from the districts of Salford and Manchester, which account for 17% and 10% respectively of the trips to/from the site during the morning peak hour. It is also interesting to note that 13% of public transport trips generated by the site would be to/from the Astley Mosley Common ward, which is the ward that the site is located in. However, given the relatively large size of this ward, this is to be expected.

11.13 During the evening peak hour there are far fewer public transport trips (only 2%) to/from Wigan Town Centre, suggesting that public transport linkages between the site and Wigan Town Centre may be poorer during this time period. The Manchester (33%), Salford (26%) and Bolton (8%) districts account for most of the public transport trips during the evening peak hour, which is a reflection of the site’s close proximity to districts to the east of Wigan. As was noted during the morning peak hour, 9% of public transport trips are expected to be within the Astley Mosley Common ward.

11.14 Although the Chaddock Lane / Garret Hall site is relatively close to Leigh, there are very few public transport trips between the site and Leigh (especially during the morning peak hour).

East Lancashire Road Corridor Housing Sites (SP4.6)

11.15 The location of the East Lancashire Road Corridor housing sites is as yet not fully determined, but could include development on Pocket Nook, Rothwell's Farm or Stirrup's Farm. For modelling purposes, we treated them as a single public transport origin/destination given their close proximity to each other and the uncertainty about which site would be brought forward.

11.16 The combined public transport trip generation from the three sites is low, with just 11 and 6 trips during the morning and evening peak hours respectively. The public transport provision along the East Lancashire Road corridor is currently relatively poor with no local bus services operating on the section of A580 through the Wigan borough. Even with a higher public transport demand at the sites, there would be very few public transport trips to/from districts outside Wigan. It suggests that very careful consideration should be given to suitable travel plan measures to encourage the use of more sustainable modes of transport as the site is brought forward.

11.17 Wigan and Leigh account for the majority of the public transport demand generated by the site during both peak hours suggesting that current service provision is adequate between the sites and Wigan and Leigh Town Centres.

Northleigh (SP3*)*

11.18 The Northleigh site is allocated for a mixture of housing and employment uses, but it is anticipated that only a portion of the housing allocation will be brought forward by 2016. Based on this land use and the site location, the site is only forecast to generate between 13 and 22 two-way peak hour public transport trips. This is a very low figure, given the scale of the development. It suggests that very careful consideration should be given to suitable travel plan measures to encourage the use of more sustainable modes of transport as the site is brought forward.

11.19 As would be expected, the majority of the public transport trips generated by the site would be to/from Leigh and Wigan Town Centre, which would account for between 56 and 60% of the site public transport trips.

Parsonage (EM1A 6)

11.20 The Parsonage site is allocated for a mixture of uses, but with an emphasis on employment uses. From the trip generation work described earlier in this report, it is anticipated that the site would generate more significant volumes of public transport trips.

11.21 The site is located relatively close to the centre of Leigh town centre and benefits from the regular bus services that radiate from town centre. As would be expected, the most important origin / destination for the site's public transport trips is to/from the Leigh wards, which account for approximately 45% of the peak hour public transport trips. Approximately 18% of the site's public transport trips are expected to go to/from Wigan town centre, while a further 8% are expected to go to/from Atherton. As many as 10-12% of the site's public transport trips are expected to go to/from areas outside the Wigan borough.

11.22 The higher volumes of public transport trips generated by the Parsonage development could put some stress on the local public transport network, particularly on services within the Leigh wards, but also between the site and Wigan town centre. These impacts would have to be examined in more detail as the development of the site is progressed.

Pemberton Colliery (EM1A 30)

11.23 The Pemberton Colliery site is proposed for employment and housing uses, but it is anticipated that only some of the housing elements will be delivered by the 2016 forecast year. Based on the public transport trip generation estimates detailed earlier in this report, the site will only generate a very small number of public transport trips by 2016. However, given that the site is adjacent to A49 Warrington Road, which has high frequency bus services serving a variety of destinations and it is also close to Pemberton rail station, the site has the potential for public transport to take a higher share of the total trips generated by the site.

11.24 Unsurprisingly, the majority of the public transport trips generated by the site would be to/from Wigan town centre wards (53 to 62%). Approximately 9% would go to/from the Pemberton ward and a further 9 to 12% to/from the Worsley Mesnes ward.

South of Wigan, M6 Junction 25 (SP4.5)

11.25 This site is allocated for employment uses, particularly warehousing and distribution. It is expected to generate between 35 and 39 peak hour two-way public transport trips in 2016. Approximately 30% of these trips would be to/from Wigan town centre, while a further 11-20% would be to/from the Winstanley and Worsley Mesnes wards. Perhaps surprisingly, only between 5 and 12 % of the public transport trips would be to/from the Ashton and Bryn wards.

Summary

11.26 This study examined the potential transport impacts of development on LDF sites up to 2016. Given that this is only a forecast for the next five years, the amount of development anticipated on the sites is relatively restricted. The analysis demonstrated that the traffic generated by these sites would cause some deterioration in the operation of a number of junctions in the vicinity of the sites, but that the volumes of traffic generated were not sufficient to cause wider congestion and capacity problems.

11.27 The majority of the sites identified in the draft Core Strategy are reliant on the bus services that radiate on routes out of Wigan and Leigh town centres. The only exception to this is the Pemberton Colliery site, which is also served by Pemberton rail station, giving access to rail services between Wigan and Kirby (with connections to Liverpool). Although there is a relatively good network of bus services operating on the main routes across the Wigan borough, some of the sites have poor public transport linkages to the borough's town centres.

11.28 With the exception of the Parsonage site, the remaining sites are expected to generate low numbers of public transport trips. The Parsonage site is expected to generate approximately 100 peak hour two-way public transport trips, which may require some limited improvements to capacity on nearby public transport routes.

11.29 The public transport catchment areas for the sites are largely restricted to the Wigan borough and the analysis demonstrates that there would be few new public transport trips to/from areas outside the district. The only real exception to this is the Chaddock Lane / Garret Hall site, which due to its location close to the borough boundary would generate some new public transport trips to/from surrounding districts.

11.30 Measures to encourage greater public transport usage at these sites and a detailed examination of any potential capacity issues related to increased passenger numbers should be addressed as part of the site specific travel plans developed as the sites are brought forward.

Appendix 1

WIRR 2009 Saturn Model – Local Validation Results Summary

Introduction

Wigan Council commissioned GMTU (now known as GMFAS and part of Transport for Greater Manchester) to undertake traffic modelling to identify transport impacts and possible remedial actions required to take forward their Local Development Framework Draft Core Strategy.

This latest work builds on results from previous LDF modelling (Phase 1 and 2a) carried out using the 2007 Wigan SATURN model, which was developed in 2005 for examination of highway proposals in the borough. For this latest phase of the work, the modelling will be carried out using the recently developed 2009 Wigan Inner Relief Route (WIRR) SATURN Model. The WIRR SATURN model is a variant of the Greater Manchester SATURN Model (GMSM) with network and zonal alterations to improve the representation of travel patterns in the Wigan area. This model also includes new origin-destination data collected at roadside interview survey sites in and around Wigan town centre during March 2010.

This briefing note reports the updated validation of the 2009 WIRR SATURN model using additional count data for the M61 and M6 motorways in the matrix estimation process. It also reports the revised model validation on the all-purpose highway network across the Wigan borough. This note forms a supplement to the full model development and validation report (GMTU Report 1630, August 2010).

Given that the Highways Agency is a key stakeholder in the development of a robust examination into the impacts of the draft LDF Core Strategy, it is important that the model reflects traffic flows and journey times on both the M6 and M61 with a good degree of accuracy. The primary concern of the HA is any potential impact that the LDF proposals may have on the motorway network.

The development of the 2009 Wigan Inner Relief Route SATURN Model is fully documented in the Data Collection and Surveys Report (GMTU Report 1635, August 2010) and the Model Development and Validation Report (GMTU Report 1630, August 2010).

Wigan Area Updated Model Validation

As stated previously, GMTU Report 1630 (LMVR) describes in detail the validation of the WIRR SATURN model and shows that the model validates well against DMRB criteria.

Additional count data was included in a further round of matrix estimation to improve the validation of traffic flows and journey times on:

- M6 – in the Wigan borough between Junctions 24 and 27
- M61 – running close to and parallel with the Wigan boundary (in Bolton MBC) between Junctions 4 and 6.

Recent (2008 and 2009) ATC count data (split into the individual vehicle classes; car, LGV, OGV) from these sections of motorway was used for the updated matrix estimation exercise. Matrix estimation was run for the inter-peak, morning and evening peak-hour modelled time periods.

Count Data Validation

Tables A.1 and A.2 compare observed and modelled traffic flows on the M6 and M61 respectively. To aid interpretation, the GEH values are shaded as follows:

- Green - GEH less than 5.0 is considered to validate well
- Amber - GEH in the range 5.0 to 7.5 is considered to validate acceptably
- Red - GEH is greater than 7.5 is considered to validate poorly.

Table A.1 shows that on the on the M6 motorway, the additional matrix estimation run improved the modelled representation of observed flows at all locations except on the section of M6 between Junctions 25 and 24 during the evening peak-hour. Assignment validation on the M6 Jn-25 link road (between M6 and A49) also improved considerably during both peak-hours.

Table A.2 shows that on the M61 motorway, the additional matrix estimation run improved the modelled representation of observed flows at most locations, particularly between M61 Junctions 4 and 5 (southeast bound during the morning peak-hour and northwest bound during the inter-peak and evening peak-hour). However, the evening peak-hour validation between M61 Junctions 5 and 6 remained relatively poor.

Tables A.3 - A.5 compare the morning, average inter-peak and evening peak-hour assignment validation between the base WIRR model and the updated model at various count sites across the Wigan borough. All three tables indicate that the improvements in motorway flow validation have not been at the expense of the wider model validation. Indeed, at a number of locations the validation has been improved.

Table A.1 Peak-hour Comparison between Val-2009 and Updated Model Traffic Flows at Count Sites on the M6 Motorway

Period	Location	Direction	Observed Count	Modelled Flows		Modelled - Observed		% Diff		GEH	
				Val-2009	Updated	Val-2009	Updated	Val-2009	Updated	Val-2009	Updated
AM	Jn 26 to 27	N	4853	4901	4871	48	18	1%	0%	0.69	0.26
	Jn 27 to 26	S	4552	4431	4427	-121	-125	-3%	-3%	1.81	1.87
	Jn 25 to A49 (link road)	N	1057	1111	1013	54	-44	5%	-4%	1.64	1.37
	A49 to Jn 25 (link road)	S	1137	1403	1108	266	-29	19%	-3%	7.46	0.87
	Jn 24 to 25	N	5520	6153	6032	633	512	10%	8%	8.29	6.74
	Jn 25 to 24	S	5961	6004	5700	43	-261	1%	-5%	0.56	3.42
IP	Jn 26 to 27	N	3933	3804	3806	-129	-127	-3%	-3%	2.07	2.04
	Jn 27 to 26	S	3382	3744	3729	362	347	10%	9%	6.06	5.82
	Jn 25 to A49 (link road)	N	805	774	784	-31	-21	-4%	-3%	1.10	0.75
	A49 to Jn 25 (link road)	S	1177	861	1017	-316	-160	-37%	-16%	9.90	4.83
	Jn 24 to 25	N	4637	4450	4445	-187	-192	-4%	-4%	2.77	2.85
	Jn 25 to 24	S	4776	4833	4977	57	201	1%	4%	0.82	2.88
PM	Jn 26 to 27	N	4550	4367	4336	-183	-214	-4%	-5%	2.74	3.21
	Jn 27 to 26	S	4911	5144	5138	233	227	5%	4%	3.29	3.20
	Jn 25 to A49 (link road)	N	1663	1197	1539	-466	-124	-39%	-8%	12.32	3.10
	A49 to Jn 25 (link road)	S	1753	1349	1668	-404	-85	-30%	-5%	10.26	2.06
	Jn 24 to 25	N	6165	5851	6158	-314	-7	-5%	0%	4.05	0.09
	Jn 25 to 24	S	5562	6510	6800	948	1238	15%	18%	12.20	15.75

Table A.2 Peak-hour Comparison between Val-2009 and Updated Model Traffic Flows at Count Sites on the M61 Motorway

Period	Location	Direction	Observed Count	Modelled Flows		Modelled - Observed		% Diff		GEH	
				Val-2009	Updated	Val-2009	Updated	Val-2009	Updated	Val-2009	Updated
AM	Jn 5 to 6	NW	4292	4488	4512	196	220	4%	5%	2.96	3.32
	Jn 6 to 5	SE	3690	3498	3354	-192	-336	-5%	-10%	3.20	5.66
	Jn 4 to 5	NW	4865	4681	4879	-184	14	-4%	0%	2.66	0.20
	Jn 5 to 4	SE	3732	4565	3711	833	-21	18%	-1%	12.93	0.34
IP	Jn 5 to 6	NW	3051	3397	3397	346	346	10%	10%	6.09	6.09
	Jn 6 to 5	SE	2858	3076	3074	218	216	7%	7%	4.00	3.97
	Jn 4 to 5	NW	3207	3931	3204	724	-3	18%	0%	12.12	0.05
	Jn 5 to 4	SE	3144	3224	3150	80	6	2%	0%	1.42	0.11
PM	Jn 5 to 6	NW	4443	5183	5169	660	726	14%	14%	10.67	10.47
	Jn 6 to 5	SE	4420	3799	3873	-621	-547	-16%	-14%	9.69	8.49
	Jn 4 to 5	NW	5077	5625	5083	548	6	10%	0%	7.49	0.08
	Jn 5 to 4	SE	4236	3941	4241	-295	5	-7%	0%	4.61	0.08

Table A.3 AM Peak-hour Comparison between Val-2009 and Updated Model Traffic Flows at Independent Count Sites in Wigan

Location	Direction	Observed Factored Count	Modelled Flows		Modelled - Observed		% Diff		GEH	
			Val-2009	Updated	Val-2009	Updated	Val-2009	Updated	Val-2009	Updated
B5239 Red Rock Lane	W	446	503	523	57	77	12.78	17.29	2.62	3.50
B5239 Red Rock Lane	E	357	600	597	243	240	68.07	67.27	11.11	10.99
A49 Caroline Street	NW	817	929	942	112	125	13.71	15.35	3.79	4.23
B5206 Gathurst Lane	S	568	467	463	-101	-104	-17.78	-18.47	4.44	4.62
B5206 Gathurst Lane	N	645	512	507	-133	-137	-20.62	-21.34	5.53	5.73
B5376 Mesnes Road	S	537	550	551	13	14	2.42	2.69	0.56	0.62
C Dorning Street	SE	165	92	114	-73	-50	-44.24	-30.71	6.44	4.29
C Wallgate	NE	510	463	444	-47	-65	-9.22	-13.01	2.13	3.04
U Mesnes Street	SE	51	38	38	-13	-12	-25.49	-26.37	1.95	2.02
A49 Wallgate	SW	903	975	908	72	5	7.97	0.58	2.35	0.17
A49 Wallgate	NE	1187	1163	1147	-24	-39	-2.02	-3.34	0.70	1.16
A577 Darlington Street East	E	366	430	427	64	61	17.49	16.78	3.21	3.08
A577 Darlington Street East	W	589	566	560	-23	-28	-3.90	-4.98	0.96	1.22
C Highfield Grange Ave	E	687	692	679	5	-7	0.73	-1.12	0.19	0.29
A49 Wigan Road	NW	478	435	489	-43	11	-9.00	2.23	2.01	0.48
B5375 Park Road	W	242	315	313	73	71	30.17	29.31	4.37	4.26
B5375 Park Road	E	380	371	367	-9	-12	-2.37	-3.41	0.46	0.67
B5375 Northway	E	1177	1107	1115	-70	-61	-5.95	-5.28	2.07	1.84
A49 High Street	SE	553	636	613	83	60	15.01	10.85	3.40	2.49
A49 High Street	NW	725	560	548	-165	-176	-22.76	-24.35	6.51	7.00
A5209 Almond Brook Road	S	586	715	699	129	113	22.01	19.34	5.06	4.47
A5209 Almond Brook Road	N	739	943	939	204	200	27.60	27	7.03	6.89
A49 Wallgate	E	1859	1976	2008	117	149	6.29	7.99	2.67	3.38
A577 Orrell Road	W	548	452	451	-96	-96	-17.52	-17.65	4.29	4.33
A577 Orrell Road	E	617	836	835	219	218	35.49	35.3	8.13	8.08
A573 Warrington Road	N	368	396	397	28	29	7.61	8.01	1.43	1.51
C Spencer Road West	E	586	489	518	-97	-67	-16.55	-11.61	4.18	2.89
A49 Warrington Road	N	1058	881	898	-177	-159	-16.73	-15.11	5.68	5.11
C Beech Hill Avenue	E	772	614	630	-158	-141	-20.47	-18.46	6.00	5.38
U Princess Road	SE	288	305	330	17	42	5.90	14.72	0.99	2.41
U King Street	NW	347	365	372	18	25	5.19	7.18	0.95	1.31
U Stadium Way	SE	105	137	138	32	33	30.48	31.88	2.91	3.03
U Mesnes Terrace	SW	104	59	64	-45	-39	-43.27	-38.71	4.98	4.40
U Bus Station Entrance	SE	84	68	68	-16	-15	-19.05	-18.9	1.84	1.82
A58 Lily Lane	SW	421	325	304	-96	-116	-22.80	-27.77	4.97	6.14
B5375 Northway	NW	784	829	832	45	48	5.74	6.14	1.58	1.69
B5408 Manchester Road	NW	417	626	598	209	181	50.12	43.47	9.15	8.05
C Hindley Road	W	309	377	447	68	138	22.01	44.81	3.67	7.12
U Nel Pan Lane	SW	218	199	195	-19	-22	-8.72	-10.47	1.32	1.59
A572 ST Helens Road	SW	538	559	556	21	18	3.90	3.27	0.90	0.75
B5408 Manchester Road	SE	437	383	375	-54	-61	-12.36	-14.09	2.67	3.05
C Hindley Road	E	211	327	294	116	83	54.98	39.53	7.07	5.25
U Nel Pan Lane	NE	270	370	370	100	100	37.04	37.06	5.59	5.59
A572 ST Helens Road	NE	644	630	629	-14	-16	-2.17	-2.64	0.55	0.67
A49 Warrington Road	N	1454	1552	1562	98	108	6.74	7.45	2.53	2.79
A571 Pemberton Road	N	527	508	512	-19	-14	-3.61	-2.89	0.84	0.67
A577 Orrell Road	E	865	929	929	64	64	7.40	7.44	2.14	2.15
C Spring Road	E	700	612	612	-88	-87	-12.57	-12.54	3.44	3.43
C Scot Lane	SW	1230	1122	1123	-108	-106	-8.78	-8.67	3.15	3.11
A49 Wallgate	SW	920	1037	1044	117	124	12.72	13.46	3.74	3.95
B5238 Poolstock Lane	SW	780	790	793	10	13	1.28	1.69	0.36	0.47
C Scot Lane	NE	899	822	836	-77	-62	-8.57	-7.03	2.62	2.15
A49 Wallgate	NE	1468	1607	1621	139	153	9.47	10.45	3.54	3.90
B5238 Poolstock Lane	NE	1157	1224	1224	67	67	5.79	5.83	1.94	1.96
B5375 Wigan Lower Road	E	705	659	663	-46	-41	-6.52	-6.02	1.76	1.62
A49 Wigan Lane	SE	1282	1127	1115	-155	-166	-12.09	-13.04	4.47	4.83
B5238 Wigan Road	SW	784	735	733	-49	-50	-6.25	-6.53	1.78	1.86
A577 Wigan Road	NW	913	762	761	-151	-151	-16.54	-16.69	5.22	5.27
A573 Warrington Road	NW	749	914	910	165	161	22.03	21.54	5.72	5.60

Table A.4 Inter-peak hour Comparison between Val-2009 and Updated Model Traffic Flows at Independent Count Sites in Wigan

Location	Direction	Observed Factored Count	Modelled Flows		Modelled - Observed		% Diff		GEH	
			Val-2009	Updated	Val-2009	Updated	Val-2009	Updated	Val-2009	Updated
B5239 Red Rock Lane	W	273	359	359	86	86	31.50	31.6	4.84	4.85
B5239 Red Rock Lane	E	237	337	338	100	101	42.19	42.79	5.9	5.98
A49 Caroline Street	NW	883	818	824	-65	-58	-7.36	-6.68	2.23	2.02
B5206 Gathurst Lane	S	404	380	388	-24	-15	-5.94	-3.95	1.21	0.8
B5206 Gathurst Lane	N	382	483	483	101	101	26.44	26.31	4.86	4.83
B5376 Mesnes Road	S	265	257	259	-8	-5	-3.02	-2.26	0.5	0.37
C Dorning Street	SE	155	109	119	-46	-35	-29.68	-23.48	4	3.11
C Wallgate	NE	433	289	283	-144	-149	-33.26	-34.53	7.58	7.9
U Mesnes Street	SE	65	40	40	-25	-24	-38.46	-38.59	3.45	3.46
A49 Wallgate	SW	946	928	835	-18	-110	-1.90	-11.73	0.59	3.72
A49 Wallgate	NE	1043	862	852	-181	-190	-17.35	-18.33	5.86	6.21
A577 Darlington Street East	E	389	389	388	0	0	0.00	-0.3	0	0.06
A577 Darlington Street East	W	488	496	491	8	3	1.64	0.63	0.36	0.14
C Highfield Grange Ave	E	441	492	491	51	50	11.56	11.38	2.36	2.32
A49 Wigan Road	NW	543	480	490	-63	-52	-11.60	-9.78	2.79	2.34
B5375 Park Road	W	289	228	224	-61	-64	-21.11	-22.5	3.79	4.06
B5375 Park Road	E	248	280	279	32	31	12.90	12.49	1.97	1.91
B5375 Northway	E	1126	710	664	-416	-461	-36.94	-41	13.73	15.43
A49 High Street	SE	463	555	548	92	85	19.87	18.37	4.08	3.78
A49 High Street	NW	600	521	517	-79	-82	-13.17	-13.91	3.34	3.53
A5209 Almond Brook Road	S	596	668	656	72	60	12.08	10.06	2.86	2.4
A5209 Almond Brook Road	N	673	692	701	19	28	2.82	4.11	0.73	1.06
A49 Wallgate	E	1889	1938	1941	49	52	2.59	2.74	1.12	1.18
A577 Orrell Road	W	539	571	568	32	29	5.94	5.4	1.36	1.24
A577 Orrell Road	E	507	713	708	206	201	40.63	39.61	8.34	8.15
A573 Warrington Road	N	330	320	317	-10	-12	-3.03	-3.83	0.55	0.7
C Spencer Road West	E	494	397	395	-97	-98	-19.64	-20.14	4.6	4.72
A49 Warrington Road	N	732	776	770	44	38	6.01	5.14	1.6	1.37
C Beech Hill Avenue	E	529	516	512	-13	-16	-2.46	-3.12	0.57	0.72
U Princess Road	SE	389	234	230	-155	-158	-39.85	-40.92	8.78	9.05
U King Street	NW	297	287	290	-10	-6	-3.37	-2.49	0.59	0.43
U Stadium Way	SE	90	212	212	122	122	135.56	135.01	9.93	9.9
U Mesnes Terrace	SW	54	11	11	-43	-42	-79.63	-79.07	7.54	7.47
U Bus Station Entrance	SE	87	80	80	-7	-6	-8.05	-8.56	0.77	0.82
A58 Lily Lane	SW	445	346	345	-99	-99	-22.25	-22.39	4.98	5.01
B5375 Northway	NW	603	653	670	50	67	8.29	11.05	2	2.64
B5408 Manchester Road	NW	499	503	581	4	82	0.80	16.49	0.18	3.54
C Hindley Road	W	147	319	264	172	117	117.01	79.72	11.27	8.17
U Nel Pan Lane	SW	252	197	197	-55	-54	-21.83	-21.82	3.67	3.67
A572 ST Helens Road	SW	430	681	671	251	241	58.37	56.01	10.65	10.27
B5408 Manchester Road	SE	339	263	262	-76	-76	-22.42	-22.73	4.38	4.45
C Hindley Road	E	148	232	232	84	84	56.76	56.75	6.09	6.09
U Nel Pan Lane	NE	244	298	297	54	53	22.13	21.83	3.28	3.24
A572 ST Helens Road	NE	438	507	505	69	67	15.75	15.34	3.17	3.09
A49 Warrington Road	N	1222	1282	1283	60	61	4.91	4.95	1.7	1.71
A571 Pemberton Road	N	352	382	384	30	32	8.52	9.16	1.57	1.68
A577 Orrell Road	E	786	832	818	46	32	5.85	4.12	1.62	1.14
C Spring Road	E	254	312	315	58	61	22.83	24.16	3.45	3.64
C Scot Lane	SW	1015	986	993	-29	-21	-2.86	-2.12	0.92	0.68
A49 Wallgate	SW	1049	1024	1031	-25	-17	-2.38	-1.68	0.78	0.55
B5238 Poolstock Lane	SW	668	803	796	135	128	20.21	19.13	4.98	4.72
C Scot Lane	NE	718	803	804	85	86	11.84	11.91	3.08	3.1
A49 Wallgate	NE	1324	1162	1171	-162	-152	-12.24	-11.56	4.59	4.33
B5238 Poolstock Lane	NE	673	737	739	64	66	9.51	9.79	2.41	2.48
B5375 Wigan Lower Road	E	335	382	385	47	50	14.03	14.8	2.48	2.61
A49 Wigan Lane	SE	733	672	644	-61	-88	-8.32	-12.18	2.3	3.4
B5238 Wigan Road	SW	558	606	611	48	53	8.60	9.58	1.99	2.21
A577 Wigan Road	NW	840	715	713	-125	-126	-14.88	-15.06	4.48	4.54
A573 Warrington Road	NW	653	647	648	-6	-4	-0.92	-0.72	0.24	0.19

Table A.5 PM Peak-hour Comparison between Val-2009 and Updated Model Traffic Flows at Independent Count Sites in Wigan

Location	Direction	Observed Factored Count	Modelled Flows		Modelled - Observed		% Diff		GEH	
			Val-2009	Updated	Val-2009	Updated	Val-2009	Updated	Val-2009	Updated
B5239 Red Rock Lane	W	460	602	602	142	142	30.85	30.87	6.16	6.16
B5239 Red Rock Lane	E	384	499	482	115	98	30.01	25.52	5.48	4.71
A49 Caroline Street	NW	609	557	553	-51	-56	-8.58	-9.20	2.16	2.32
B5206 Gathurst Lane	S	644	635	641	-8	-3	-1.35	-0.47	0.34	0.12
B5206 Gathurst Lane	N	471	488	486	17	15	3.71	3.18	0.80	0.69
B5376 Mesnes Road	S	262	258	258	-3	-4	-1.72	-1.53	0.28	0.25
C Dorning Street	SE	99	66	54	-32	-45	-33.49	-45.45	3.65	5.14
C Wallgate	NE	328	221	223	-106	-105	-32.73	-32.01	6.48	6.33
U Mesnes Street	SE	48	34	34	-13	-14	-29.68	-29.17	2.23	2.19
A49 Wallgate	SW	850	880	958	30	108	3.5	12.71	1.01	3.59
A49 Wallgate	NE	967	854	858	-112	-109	-11.68	-11.27	3.74	3.61
A577 Darlington Street East	E	476	481	489	5	13	1.1	2.73	0.24	0.59
A577 Darlington Street East	W	387	401	409	14	22	3.61	5.68	0.70	1.10
C Highfield Grange Ave	E	564	501	467	-62	-97	-11.24	-17.20	2.75	4.27
A49 Wigan Road	NW	536	325	501	-210	-35	-39.33	-6.53	10.16	1.54
B5375 Park Road	W	389	389	394	0	5	-0.02	1.29	0.00	0.25
B5375 Park Road	E	280	247	257	-32	-23	-11.78	-8.21	2.03	1.40
B5375 Northway	E	1417	849	865	-567	-552	-40.06	-38.96	16.86	16.34
A49 High Street	SE	546	700	711	154	165	28.16	30.22	6.16	6.58
A49 High Street	NW	794	785	799	-8	5	-1.12	0.63	0.32	0.18
A5209 Almond Brook Road	S	722	715	710	-6	-12	-1.02	-1.66	0.27	0.45
A5209 Almond Brook Road	N	813	871	873	58	60	7.15	7.38	2.00	2.07
A49 Wallgate	E	1789	1757	1752	-31	-37	-1.78	-2.07	0.76	0.88
A577 Orrell Road	W	635	617	612	-17	-23	-2.81	-3.62	0.71	0.92
A577 Orrell Road	E	468	568	558	100	90	21.44	19.23	4.41	3.97
A573 Warrington Road	N	383	404	398	21	15	5.6	3.92	1.08	0.76
C Spencer Road West	E	562	446	453	-115	-109	-20.68	-19.40	5.18	4.84
A49 Warrington Road	N	835	918	911	83	76	9.99	9.10	2.82	2.57
C Beech Hill Avenue	E	606	600	611	-5	5	-0.95	0.83	0.23	0.20
U Princess Road	SE	252	248	326	-3	74	-1.74	29.37	0.28	4.35
U King Street	NW	342	351	347	9	5	2.61	1.46	0.48	0.27
U Stadium Way	SE	251	185	193	-65	-58	-26.12	-23.11	4.44	3.89
U Mesnes Terrace	SW	3	7	7	4	4	141.87	133.33	1.88	1.79
U Bus Station Entrance	SE	79	67	67	-11	-12	-15.47	-15.19	1.43	1.40
A58 Lily Lane	SW	541	502	502	-38	-39	-7.29	-7.21	1.73	1.71
B5375 Northway	NW	987	838	824	-148	-163	-15.09	-16.51	4.93	5.42
B5408 Manchester Road	NW	804	1131	1131	327	327	40.65	40.67	10.51	10.51
C Hindley Road	W	322	346	314	24	-8	7.51	-2.48	1.32	0.45
U Nel Pan Lane	SW	341	251	235	-89	-106	-26.48	-31.09	5.25	6.25
A572 ST Helens Road	SW	656	355	356	-300	-300	-45.93	-45.73	13.4	13.34
B5408 Manchester Road	SE	399	318	322	-80	-77	-20.32	-19.30	4.28	4.06
C Hindley Road	E	249	337	313	88	64	35.17	25.70	5.12	3.82
U Nel Pan Lane	NE	288	243	240	-44	-48	-15.5	-16.67	2.74	2.95
A572 ST Helens Road	NE	505	532	529	27	24	5.26	4.75	1.17	1.06
A49 Warrington Road	N	1819	1681	1686	-137	-133	-7.58	-7.31	3.30	3.18
A571 Pemberton Road	N	651	652	648	1	-3	0.17	-0.46	0.04	0.12
A577 Orrell Road	E	877	903	897	26	20	2.94	2.28	0.87	0.67
C Spring Road	E	436	450	450	14	14	3.22	3.21	0.67	0.67
C Scot Lane	SW	1339	1233	1233	-105	-106	-7.95	-7.92	2.97	2.96
A49 Wallgate	SW	1236	1277	1279	41	43	3.32	3.48	1.16	1.21
B5238 Poolstock Lane	SW	965	1020	1019	55	54	5.74	5.60	1.76	1.71
C Scot Lane	NE	1047	1019	1002	-27	-45	-2.72	-4.30	0.89	1.41
A49 Wallgate	NE	1141	999	991	-141	-150	-12.47	-13.15	4.35	4.59
B5238 Poolstock Lane	NE	685	672	688	-12	3	-1.83	0.44	0.48	0.11
B5375 Wigan Lower Road	E	440	472	470	32	30	7.23	6.82	1.49	1.41
A49 Wigan Lane	SE	830	649	677	-180	-153	-21.76	-18.43	6.64	5.57
B5238 Wigan Road	SW	751	809	812	58	61	7.67	8.12	2.06	2.18
A577 Wigan Road	NW	672	607	592	-64	-80	-9.67	-11.90	2.57	3.18
A573 Warrington Road	NW	638	614	616	-23	-22	-3.76	-3.45	0.96	0.88

Journey Time Validation

In order to assess how well the updated 2009 WIRR model replicates journey times on the M6 and M61, we compared modelled and observed journey times between Junctions 24 and 27 of the M6, and Junctions 4 and 6 of the M61. Although the M61 does not cross the Wigan district boundary, the section between Junctions 4 and 6 passes within 2 km of the boundary and any changes to the Wigan network could potentially impact on this section of the M61.

The observed journey times were estimated using Trafficmaster© data for the period September 2008 to August 2009. This data is collected on behalf of the Department for Transport by Trafficmaster© Plc, and provides information about average vehicle speeds on roads across the UK for vehicles fitted with GPS devices.

The information in the database was processed by GMTU to exclude observations collected during school and national holidays, and to calculate average times for non-stopping vehicles (i.e. excluding buses and taxis) for standardised time periods. For the purpose of the analysis, the modelled times were compared with observed weekday journey times during the morning peak hour (0800-0900), an average inter-peak hour, and the evening peak hour (1700-1800).

The DMRB requirement for journey time validation is that modelled times should be within 15% (or 1 minute if this is higher) of the observed time on more than 85% of routes. Tables A.6 - A.9 summarise the journey time validation for the M6 northbound and southbound (Figure 2.1), and M61 north-westbound and south-eastbound (Figure 2.2) routes respectively during the morning, inter-peak and evening peak hours. Figures 2.3 to 2.14 show the time-distance plots for the four journey time routes during the morning, inter and evening peak hours.

Analysing the journey time data, we note that:

- the M6 northbound and M61 southbound routes meets DMRB guidelines during all three modelled hours, while the M6 southbound route meets DMRB guidelines during the inter-peak and evening peak hour, and on the M61 north-westbound during the morning peak hour and inter-peak.
- the model slightly under-estimates southbound journey times on the M6 by 17% in the morning peak hour
- M61 north-westbound journey times during the evening peak hour are slightly over-estimated by 33% (or 1.3 minutes). This is partially due to the model over-estimating the traffic flow between Junctions 5 and 6.

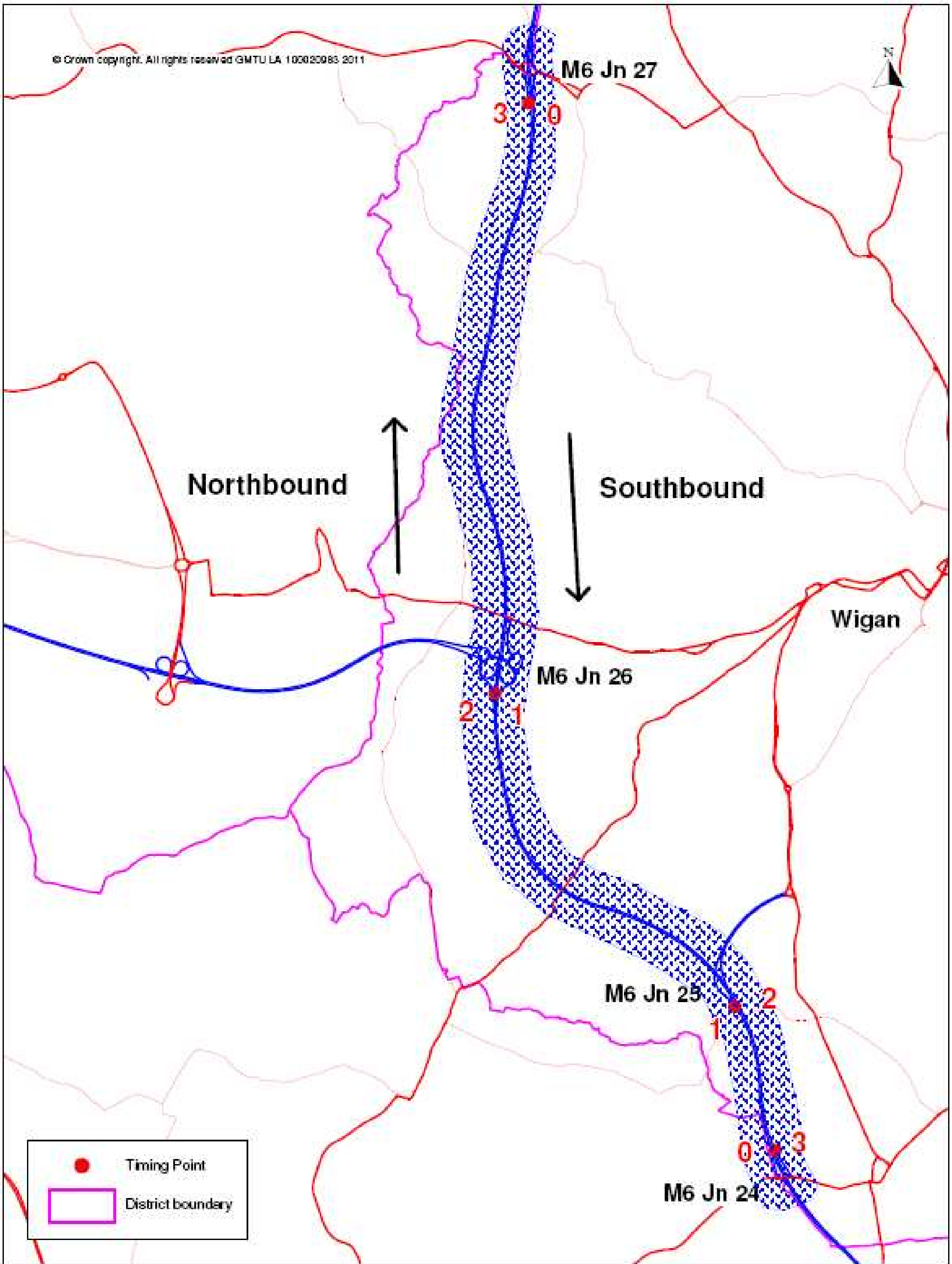
Table A.6 M6 Northbound (Junction 24 – 27) Journey Time Route Comparison

Pk-hr	From Junction 24 to….	Cumulative Distance km	Cumulative Observed Time min	Cumulative Modelled Time min	Diff min	% Diff	DMRB Pass
AM	1 M6 Jn 25 off-slip	1.5	0.9	1.0	0.0	4%	
	2 M6 Jn 26 off-slip	5.9	3.4	3.4	-0.1	-3%	
	3 M6 Jn 27 off-slip	12.3	6.9	6.8	-0.2	-2%	
	Total	**12.3**	**6.9**	**6.8**	**-0.2**	**-2%**	✓
IP	1 M6 Jn 24 off-slip	1.5	0.9	1.0	0.1	9%	
	2 M6 Jn 25 off-slip	5.9	3.3	3.3	0.0	1%	
	3 M6 Jn 26 off-slip	12.3	6.7	6.7	0.0	1%	
	Total	**12.3**	**6.7**	**6.7**	**0.0**	**1%**	✓
PM	1 M6 Jn 24 off-slip	1.5	1.0	1.0	-0.1	-9%	
	2 M6 Jn 25 off-slip	5.9	3.6	3.4	-0.2	-7%	
	3 M6 Jn 26 off-slip	12.3	7.1	6.8	-0.3	-4%	
	Total	**12.3**	**7.1**	**6.8**	**-0.3**	**-4%**	✓

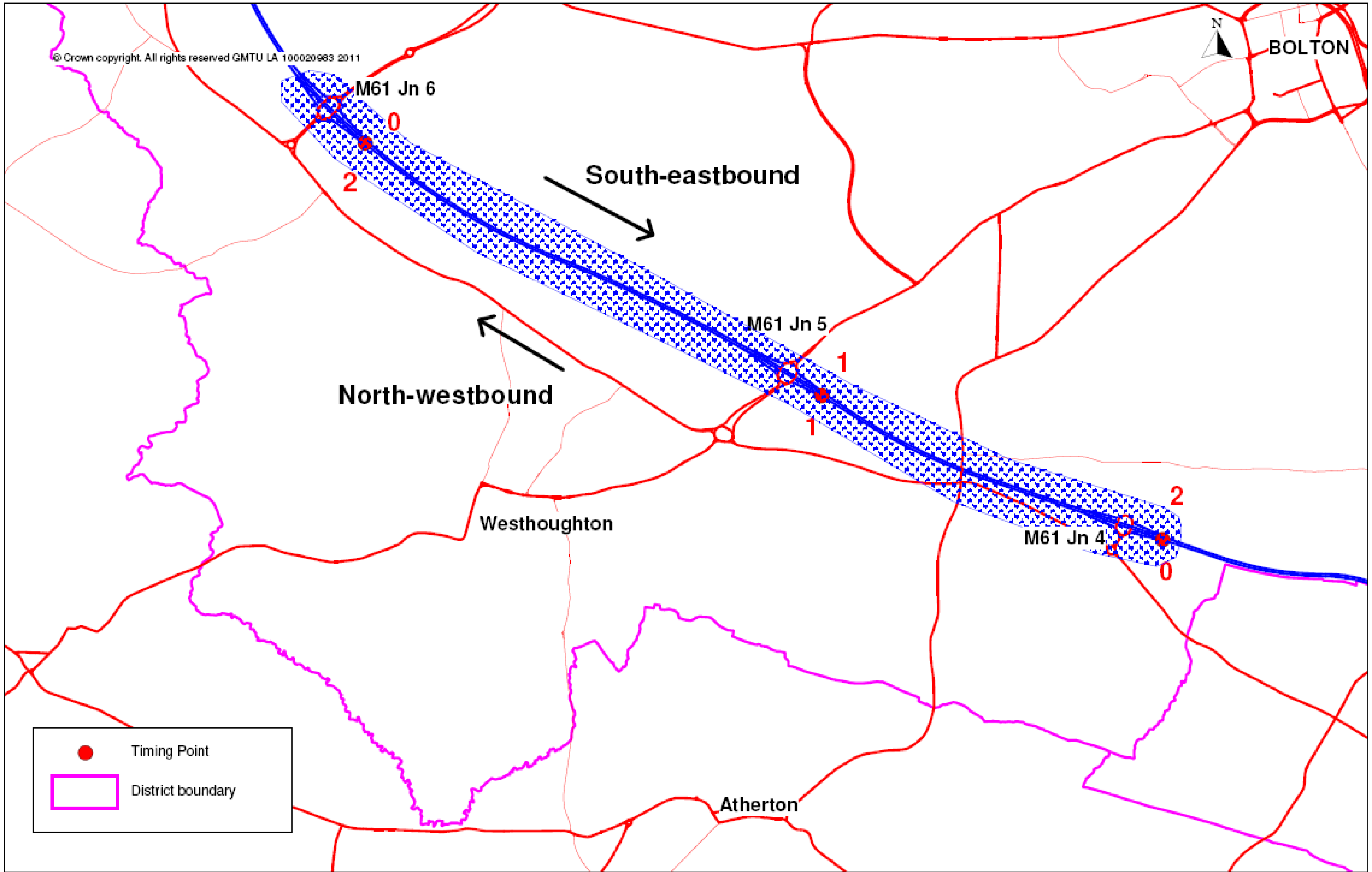
Table A.7	**M6 Southbound (Junction 27 – 24) Journey Time Route Comparison**						
Pk-hr	**From Junction 27 to….**	**Cumulative Distance km**	**Cumulative Observed Time min**	**Cumulative Modelled Time min**	**Diff min**	**% Diff**	**DMRB Pass**
AM	1 M6 Jn 26 off-slip	5.9	4.1	4.0	-0.1	-2%	
	2 M6 Jn 25 off-slip	10.5	7.8	6.4	-1.3	-17%	
	3 M6 Jn 24 off-slip	12.3	9.2	7.6	-1.6	-17%	
	Total	**12.3**	**9.2**	**7.6**	**-1.6**	**-17%**	✗
IP	1 M6 Jn 26 off-slip	5.9	3.2	3.6	0.4	11%	
	2 M6 Jn 25 off-slip	10.5	5.7	6.0	0.3	5%	
	3 M6 Jn 24 off-slip	12.3	6.7	7.2	0.5	7%	
	Total	**12.3**	**6.7**	**7.2**	**0.5**	**7%**	✓
PM	1 M6 Jn 26 off-slip	5.9	3.6	4.6	1.1	5.9	
	2 M6 Jn 25 off-slip	10.5	6.2	7.1	0.9	10.5	
	3 M6 Jn 24 off-slip	12.3	7.9	8.3	0.4	12.3	
	Total	**12.3**	**7.9**	**8.3**	**0.4**	**12.3**	✓

Table A.8 M61 North-westbound (Junction 4 – 6) Journey Time Route Comparison								
Pk-hr	**From Junction 4 to….**		**Cumulative Distance km**	**Cumulative Observed Time min**	**Cumulative Modelled Time min**	**Diff min**	**% Diff**	**DMRB Pass**
AM	1	M61 Jn 5 off-slip	3.0	1.6	1.7	0.1	7%	
	2	M61 Jn 6 off-slip	7.1	3.9	4.5	0.7	17%	
		Total	**7.1**	**3.9**	**4.5**	**0.7**	**17%**	✓
IP	1	M61 Jn 5 off-slip	3.0	1.6	1.7	0.1	6%	
	2	M61 Jn 6 off-slip	7.1	3.8	4.1	0.3	7%	
		Total	**7.1**	**3.8**	**4.1**	**0.3**	**7%**	✓
PM	1	M61 Jn 5 off-slip	3.0	1.8	2.2	0.4	25%	
	2	M61 Jn 6 off-slip	7.1	4.1	5.4	1.3	33%	
		Total	**7.1**	**4.1**	**5.4**	**1.3**	**33%**	✗

Table A.9 M61 South-eastbound (Junction 6 – 4) Journey Time Route Comparison								
Pk-hr	**From Junction 6 to….**		**Cumulative Distance km**	**Cumulative Observed Time min**	**Cumulative Modelled Time min**	**Diff min**	**% Diff**	**DMRB Pass**
AM	1	M61 Jn 5 off-slip	4.2	2.3	2.4	0.1	5%	
	2	M61 Jn 4 off-slip	7.2	4.5	4.1	-0.4	-9%	
		Total	**7.2**	**4.5**	**4.1**	**-0.4**	**-9%**	✓
IP	1	M61 Jn 5 off-slip	4.2	2.2	2.4	0.1	7%	
	2	M61 Jn 4 off-slip	7.2	3.9	4.1	0.2	5%	
		Total	**7.2**	**3.9**	**4.1**	**0.2**	**5%**	✓
PM	1	M61 Jn 5 off-slip	4.2	2.3	2.6	0.3	12%	
	2	M61 Jn 4 off-slip	7.2	4.0	4.5	0.5	13%	
		Total	**7.2**	**4.0**	**4.5**	**0.5**	**13%**	✓



Wigan LDF - M6 Journey Time Routes		
GMTU 3rd Floor Heron House 47 Lloyd Street Manchester M2 5LE	Drawn By : EA	Date : April 2011
	Scale : NTS	Figure : 2.1



GMTU 3rd Floor Heron House 47 Lloyd Street Manchester M2 5LE	Wigan LDF - M61 Journey Time Routes			
	Drawn By : EA	Scale : NTS	Date : April 2011	Figure 2.2

Figure 2.3 - M6 Northbound AM Peak-hour Journey Time Comparison

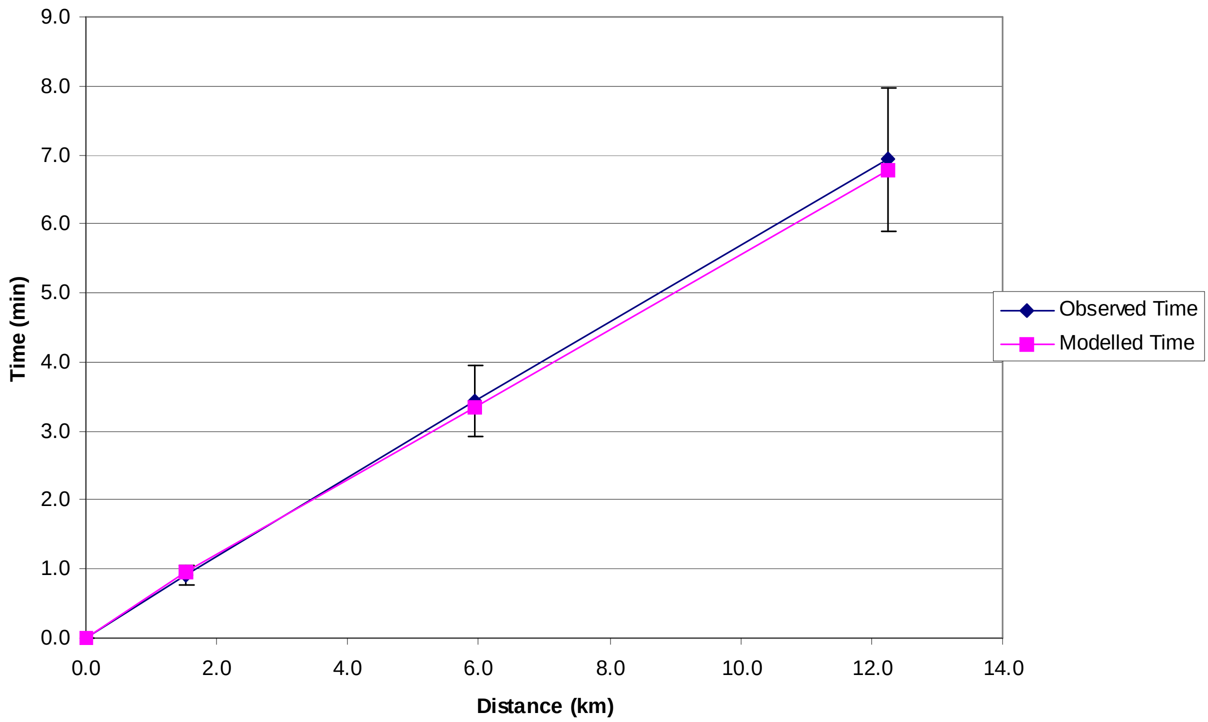


Figure 2.4 - M6 Northbound Inter-peak Journey Time Comparison

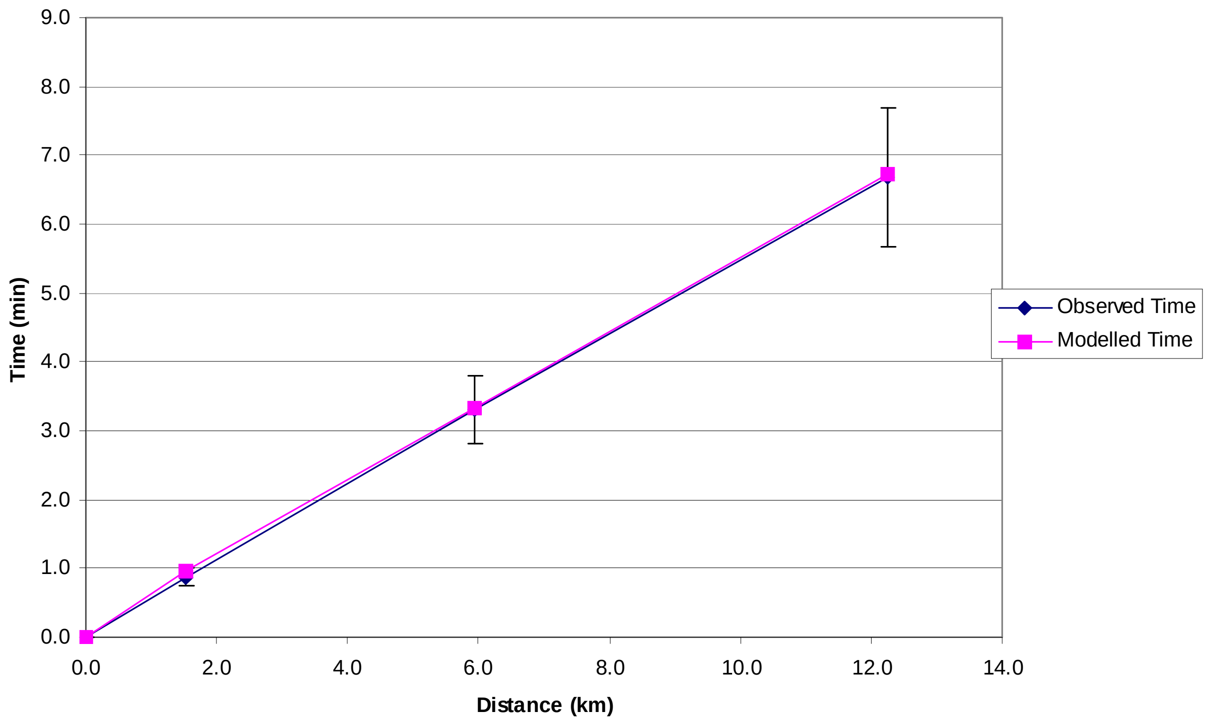


Figure 2.5 - M6 Northbound PM Peak-hour Journey Time Comparison

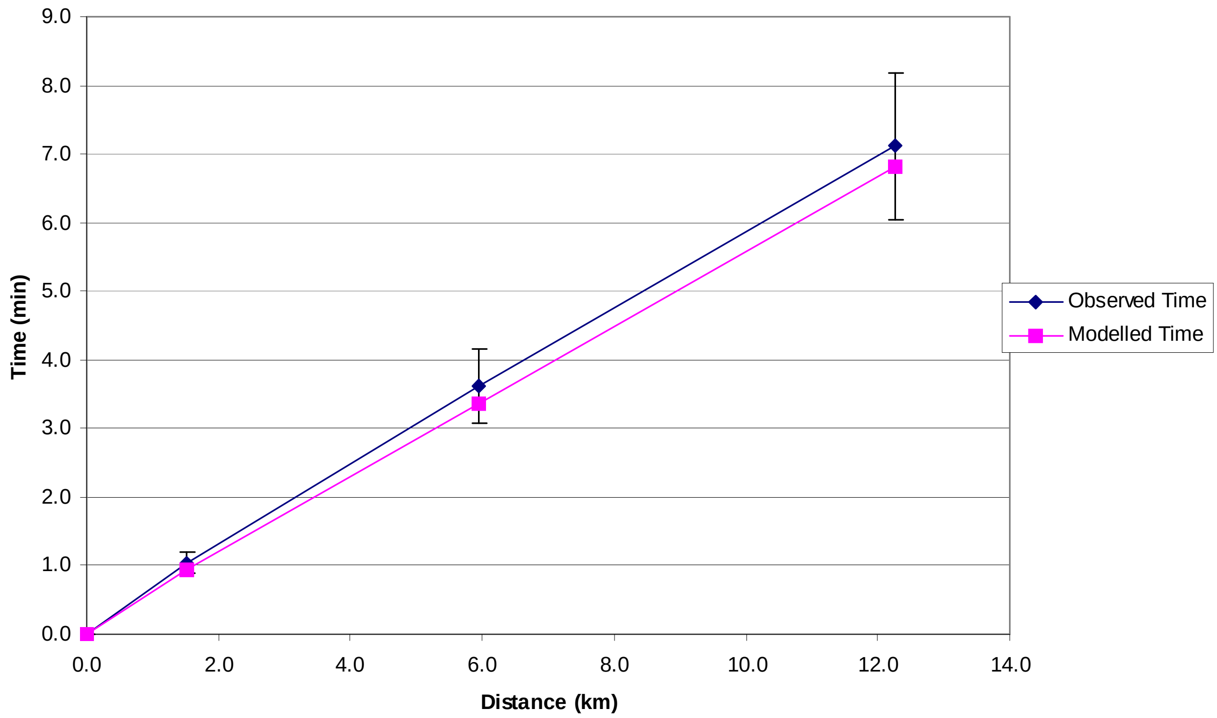


Figure 2.6 - M6 Southbound AM Peak-hour Journey Time Comparison

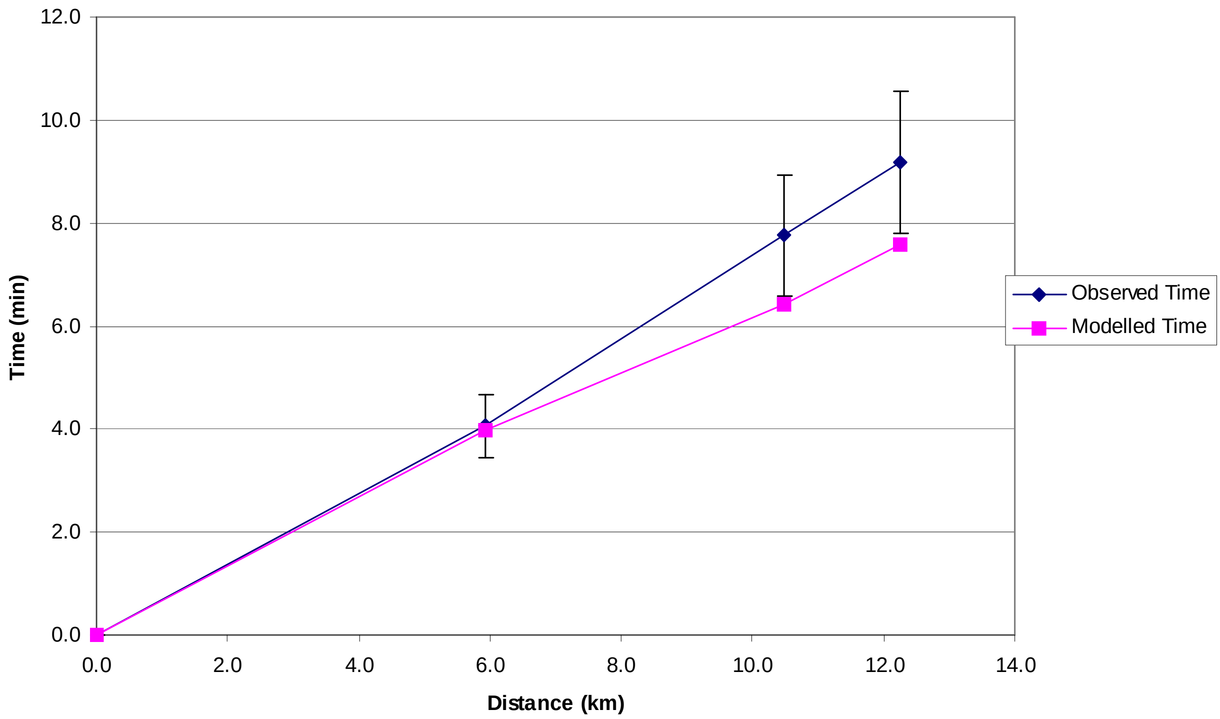


Figure 2.7 - M6 Southbound Inter-peak Journey Time Comparison

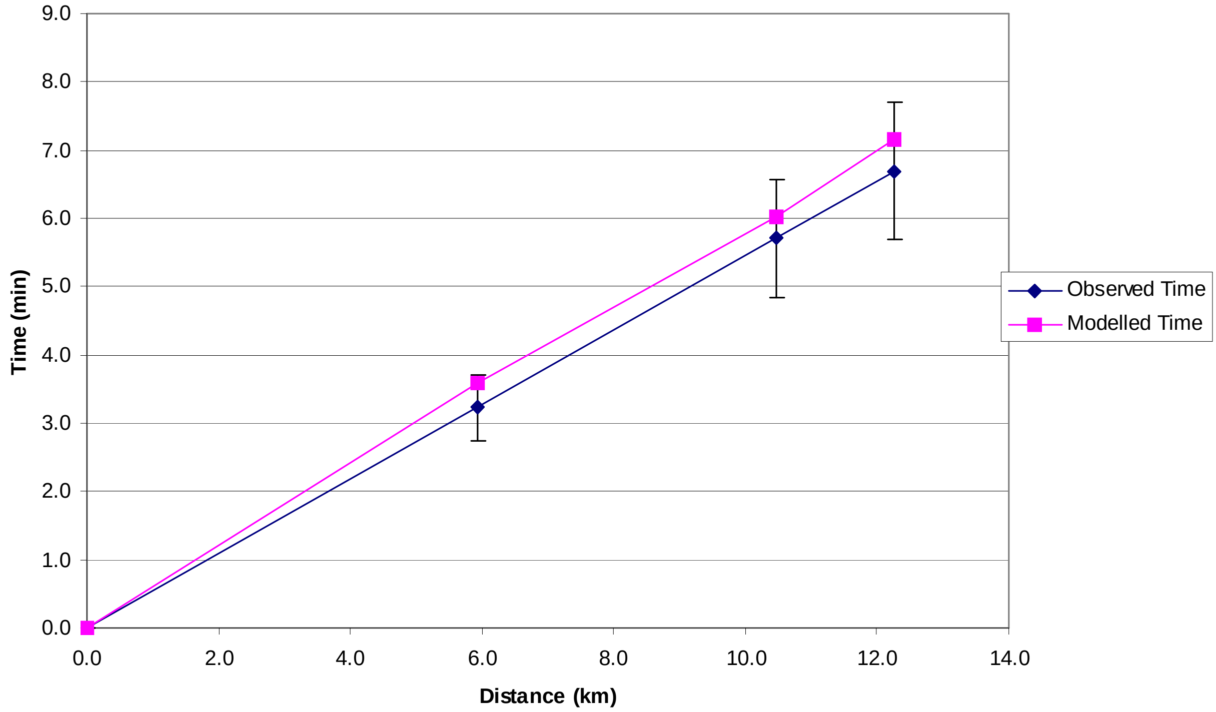


Figure 2.8 - M6 Southbound PM Peak-hour Journey Time Comparison

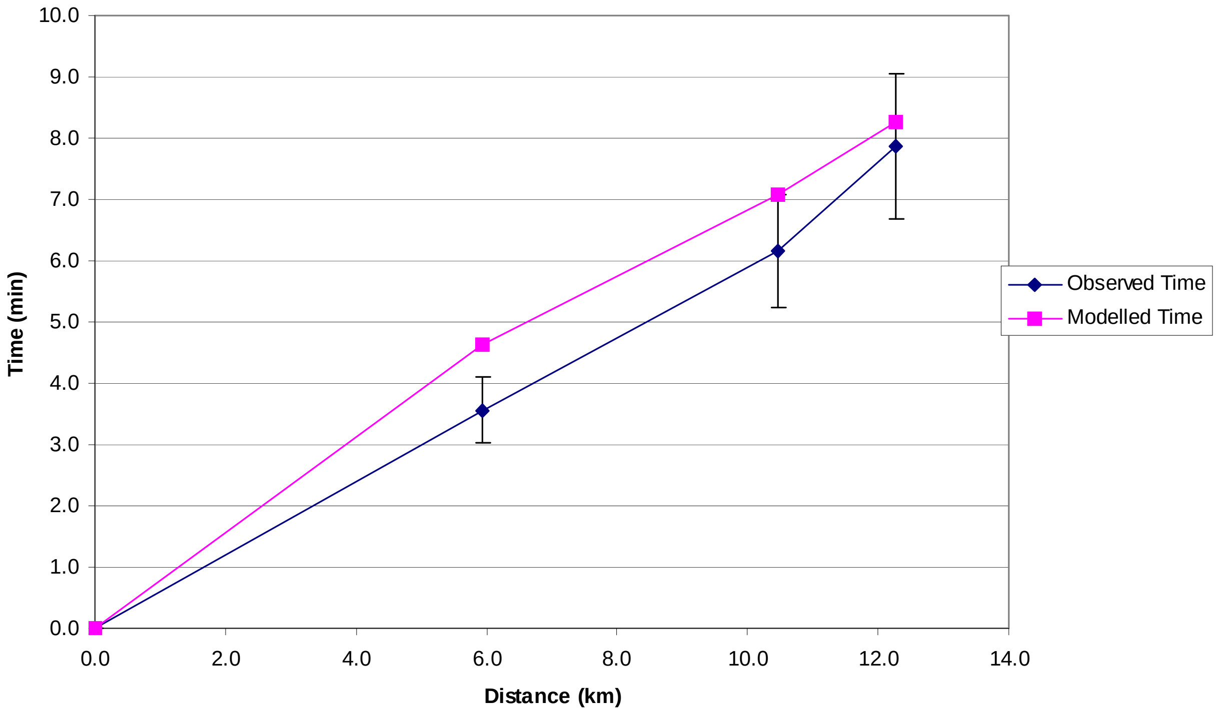


Figure 2.9 - M61 North-westbound AM Peak-hour Journey Time Comparison

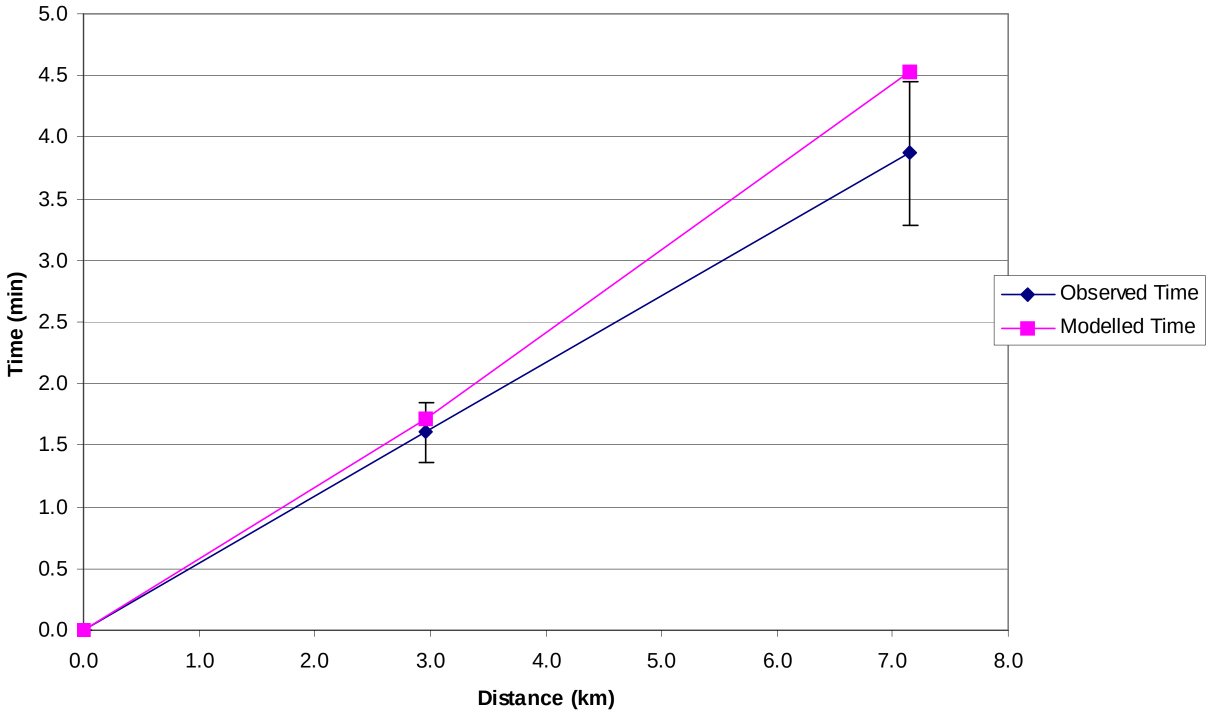


Figure 2.10 - M61 North-westbound Inter-peak Journey Time Comparison

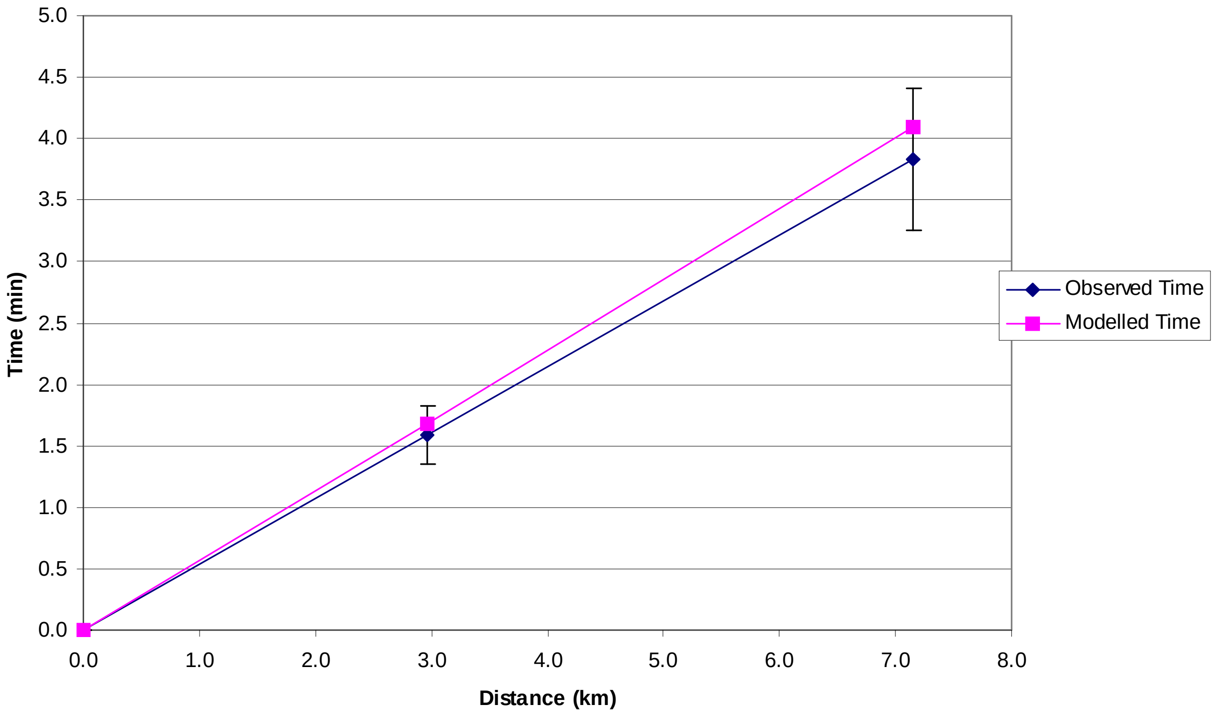


Figure 2.11 - M61 North-westbound PM Peak-hour Journey Time Comparison

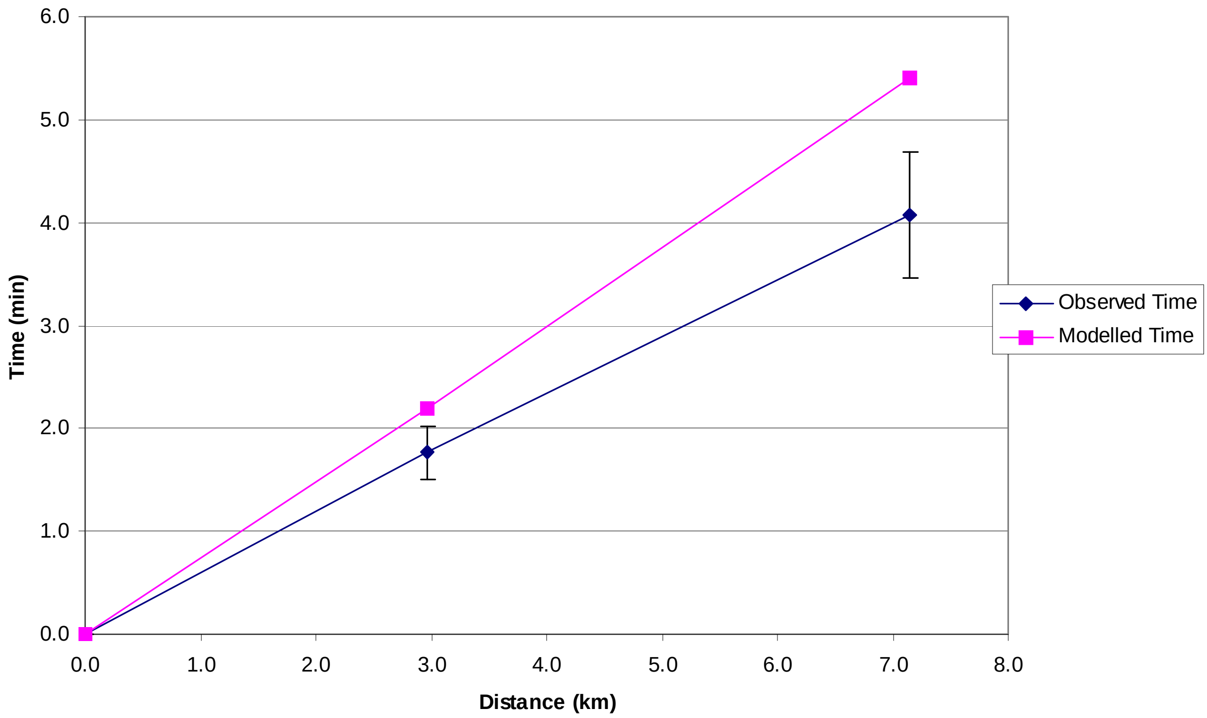


Figure 2.12 - M61 South-eastbound AM Peak-hour Journey Time Comparison

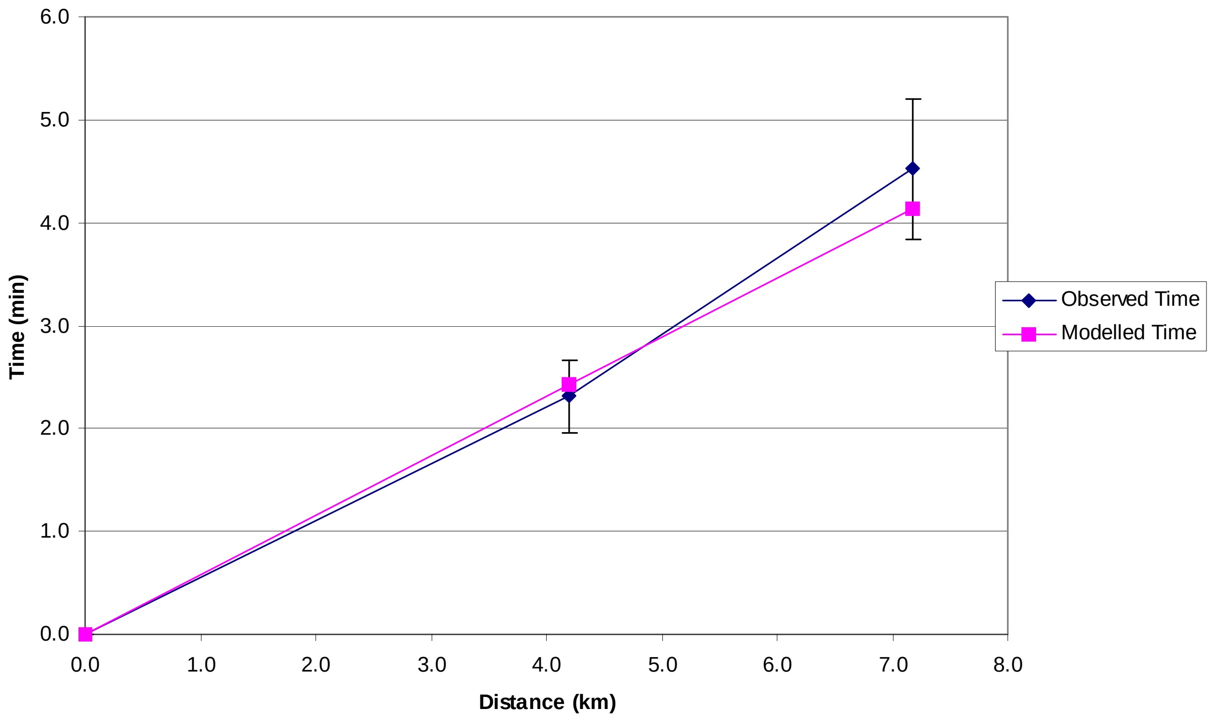


Figure 2.13 - M61 South-eastbound Inter-peak Journey Time Comparison

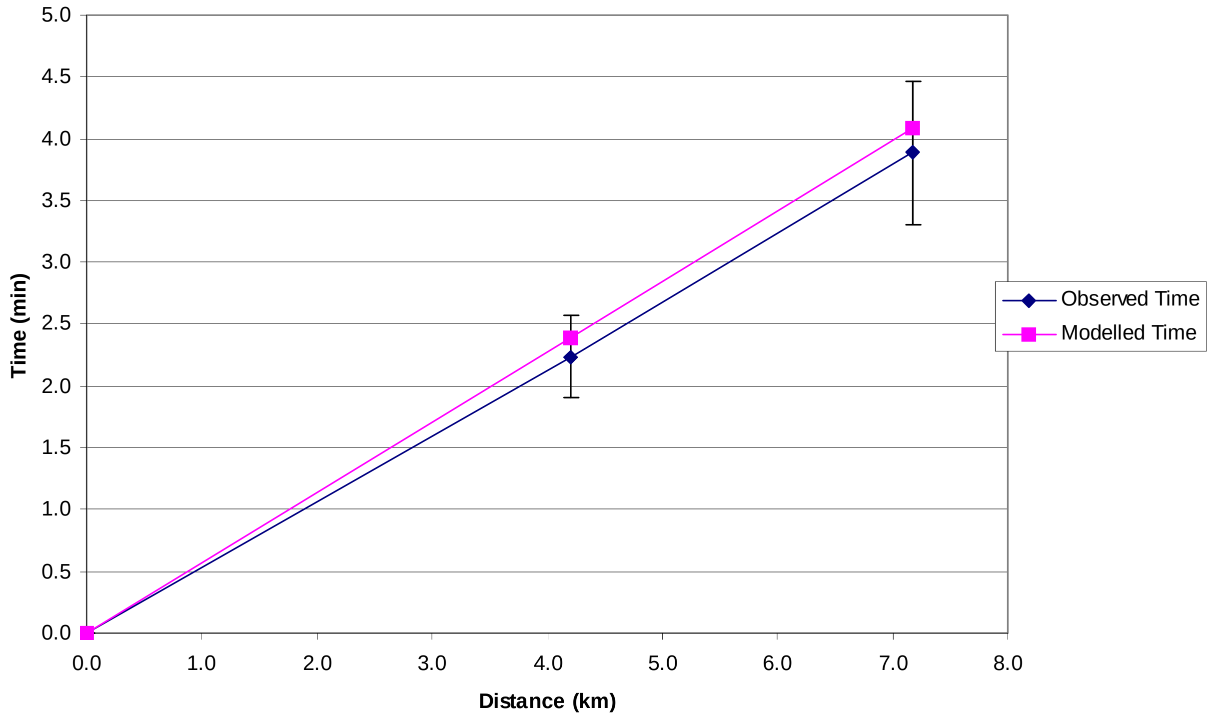
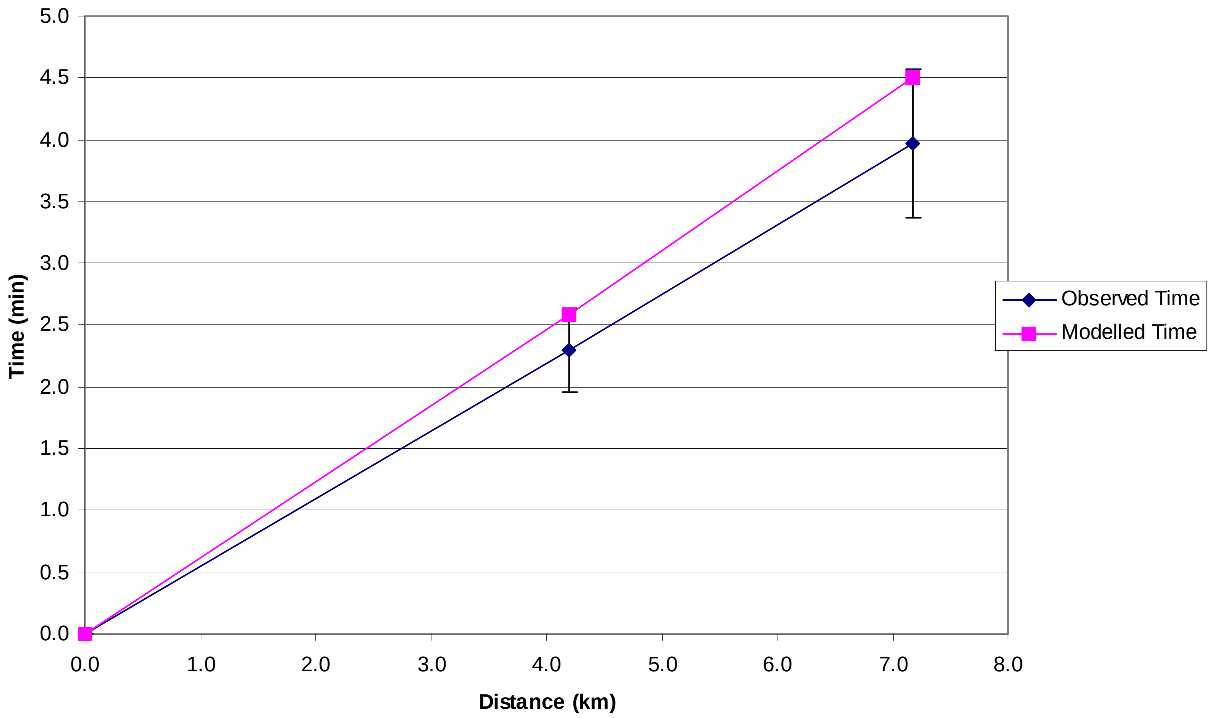


Figure 2.14 - M61 South-eastbound PM Peak-hour Journey Time Comparison



Summary and Conclusions

The WIRR SATURN Model was recently validated across Wigan to 2009 traffic flows. For this current piece of work, we carried out some further work to improve the validation of traffic flows and journey times on the M6 and M61. The model already validated well on the local authority highway network in the Wigan borough, but to allay any concerns from the Highways Agency we also confirmed that the model can replicate current conditions on both the M6 and M61, to ensure that the subsequent analysis into the impacts of the LDF Core Strategy is robust.

An additional run of matrix estimation using observed flow data on both the M6 and M61 motorways considerably improved the validation of motorway flows compared to the original WIRR model, while overall validation across Wigan generally remained unaffected and in some instances, actually improved.

The journey time validation on both the M6 and M61 is good, with the majority of modelled journey times meeting DMRB requirements in all the three modelled time periods.

In view of the above, we believe that the updated version of the 2009 WIRR SATURN model is a robust and reliable tool for the Phase 2b study to examine the potential impacts of the Wigan LDF Core Strategy study.