A61 BIRDWELL JUNCTION IMPROVEMENT

TRANSPORT ASSESSMENT

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Capabilities on project:
Transportation

Introduction

This report has been prepared on behalf of Barnsley Metropolitan Borough Council (BMBC) to support a planning application for a new highway layout at the “A61 Birdwell” roundabout to the north of junction 36 of the M1 motorway.

The scheme is being promoted in order to alleviate existing traffic problems at the junction that currently experience significant levels of congestion and delay at peak times.

The network has been modelled with both the existing layout and with the proposed improvements at a base year of 2014 as well as future design years of 2019 and 2024. In this way the operation of the network in its current form can be quantified and directly compared to the proposed improvements.

The conclusion being that the proposed changes will provide an improved level of operation greatly reducing the levels of delay and congestion on the network.

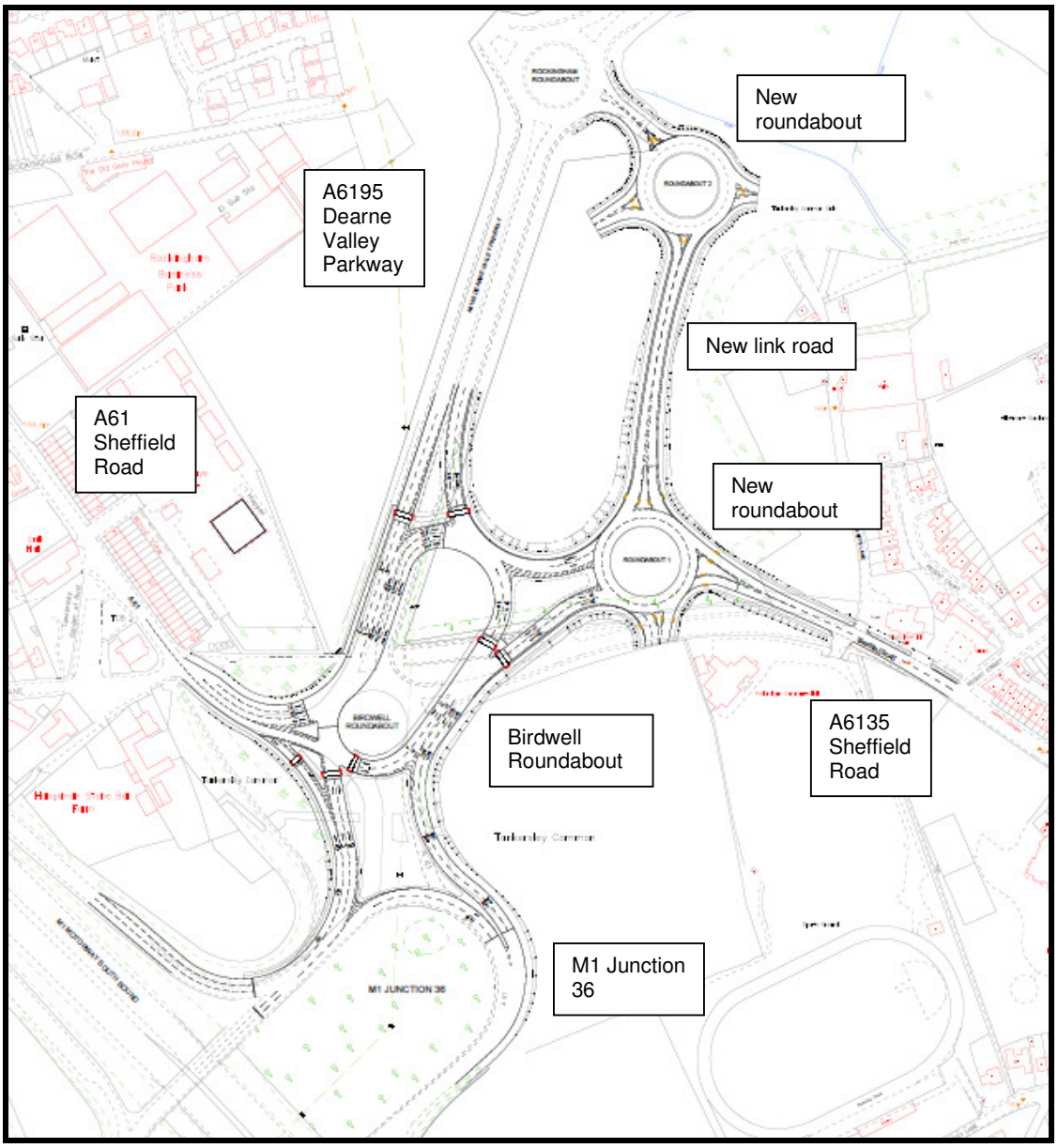
Following this brief introduction this report will set out the following chapters:

- A review of the proposals with detail on what is being proposed;
- A review of how existing public transport routes can still be accommodated;
- An assessment of the traffic impact, and
- A summary and conclusion.

Proposals

The proposed junction improvements are included within **Appendix A**, but can be shown below for ease of reference.

Figure 1 Proposed Layout



As can be seen from the above, it is proposed to elongate and signalise the existing Birdwell roundabout and realign the A6135 Sheffield Road to provide a new roundabout which will then allow a new link road to be provided to link to the A6195 Dearne Valley Parkway to the north.

Capabilities on project:
Transportation

The new roundabout on the A6135 will have part time signals installed on both the new link road and Sheffield Road approaches. These signals will become operational only when the traffic flow approaching from Birdwell Roundabout is being held back from entering the new roundabout and thus causing exit blocking back into Birdwell Roundabout.

The new Roundabout on the new link road will not be signal controlled.

Junction 36 of the M1 motorway would only be slightly amended to provide a flare on the southbound diverge approach to the junction and realignment and the introduction of traffic signals to the approach from the Birdwell junction (A61 north).

Controlled pedestrian facilities will be provided across the A61 to the south of the Birdwell junction, on the approach from Sheffield Road and on the approach from the A6195 Dearne Valley Parkway, with tactile paving and dropped kerbs being provided on all arms of the two new roundabouts.

Policy Overview

Introduction

Before considering the proposed development, it is important to examine the context of the proposals and how this relates to relevant planning policies and guidelines. This section of the report sets out these elements, providing an overall spatial and planning context for the development proposal.

The following national, regional and local planning documents have been reviewed:

- The Transport White Paper (2011);
- The National Planning Policy Framework (NPPF);
- The South Yorkshire Local Transport Plan 3; and
- The Barnsley Transport Strategy 2010 – 2026

National Planning Policy Guidance
The Transport White Paper (2011)

The Government's vision for a sustainable local transport system is set out in the January 2011 Transport White Paper: "Creating Growth, Cutting Carbon – Making Sustainable Local Transport Happen."

The White Paper acknowledges that transport provision is essential for economic growth if the Government is to improve the economic deficit which it is currently facing. The Paper also recognises however, that the current levels of carbon emissions from transport cannot be sustained if the nation is to meet its national commitments on climate change as well as creating a safer and cleaner environment in which to live. With this in mind, the Government highlights sustainable transport solutions and network improvements as a means by which the economy can grow which will also see a positive impact on the local environment.

Whilst the Paper outlines the funding options which will be available for sustainable transport schemes, it also recognises that investment alone will not be enough and that help needs to be given to people to ensure that the transport choices they make are good for society as a whole. The Paper recognises that it is at the local level where most can be done to encourage sustainable transport modes and implement sustainable transport schemes. Solutions should be developed for the places they serve, tailored for the specific needs and behaviour patterns of individual communities.

Within the Paper, sustainable transport considers more than just public transport, walking and cycling schemes but acknowledges that it is not feasible for some trips to be undertaken by these modes. There is therefore a realisation that the car will continue to be an important mode of transport and a focus should be given to making car travel greener.

National Planning Policy Framework (NPPF)

The National Planning Policy Framework (2012) sets out the governments planning polices for England. Its aim is to allow local people and local authorities to produce their own distinctive local and neighbourhood plans which reflect the need of their community.

The framework states that plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people in order to:

- Give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;

- Create safe and secure layouts which minimises conflicts between traffic and cyclist or pedestrians, avoiding street clutter and where appropriate establishing home zones; and
- Consider the needs of people with disabilities by all modes of transport.

In recent years transport policy has been greatly influenced by concern over environmental issues and growing awareness of environmental problems related to unrestrained car usage. Therefore, current policies highlight the need to provide and encourage use of more sustainable modes of transport, such as walking, cycling and public transport and so increase accessibility.

In order to promote healthy communities the NPPF state decisions should aim to achieve;

- safe and accessible developments, containing clear and legible pedestrian routes, and high quality public space, which encourage the active and continual use of public areas; and
- ensure that established shops, facilities and services are able to develop and modernise in a way that is sustainable, and retained for the benefit of the community.

The NPPF emphasises that planning policies should aim for a balance of land uses within their area so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities. A key element of the NPPF highlights the need for councils to pursue sustainable growth and that local planning authorities should plan proactively to support an economy fit for the 21st century. The need for effective transport infrastructure underpins this.

Local Planning Policy Guidance

South Yorkshire Local Transport Plan 3 2011 - 2026

The South Yorkshire Local Transport Plan 3 is the statutory transport policy plan for the Sheffield City Region and has been prepared jointly by four local authorities; these are Barnsley, Doncaster, Rotherham and Sheffield. It sets out their priorities for the transport system across the region for the next 15 years, this is;

“Our transport system needs to help people get around as easily as possible, in order to enable them to be economically, socially and physically active.”

The LTP3 is underpinned by 4 goals which are;

- Support Economic growth by improving connectivity to local and national destinations by reducing congestion;
- Enhance Social Inclusion and health by providing access to medical, social and community services for all;
- Reduce emissions from vehicles by creating a culture whereby people are happy to make sustainable travel choices; and
- Make transport increasingly safe and secure by collaborating with the police to encourage safer road use and public transport usage.

It is considered that the proposed development would operate in a manner in keeping with the overarching goals of the LTP3 document through promoting the use of sustainable modes of transport and improving the local road network.

The Barnsley Transport Strategy 2010 – 2026

The Barnsley Transport Strategy is an element of the Local Development Framework (LDF) core strategy which aims to;

- Improve accessibility in the Accessibility Improvement Zone (AIZ);
- Implement the Northern Barnsley Connectivity study to identify, test and evaluate options for improved connections across the city;
- Improve sustainable transport links between employment, education, community and leisure facilities;

- Promote sustainable modes of transport through smarter travel choices.

The development proposals are in keeping with this strategy and will aid Barnsley to reach their aims.

Summary

This section has highlighted that the proposal generally accords with the transport related aspects of the planning policies included in the national and local planning documents.

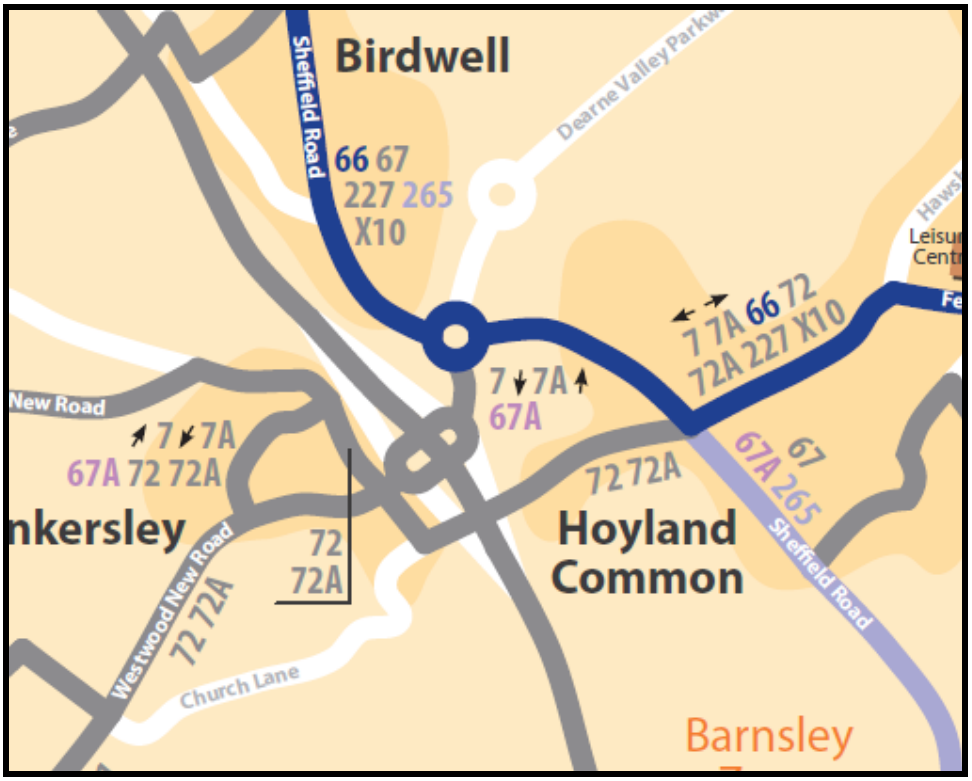
Accessibility

Introduction
This section will outline the existing public transport provision on the network and how this will then change as a result of the new highway layout

Public Transport
Within the vicinity of Junction 36 of the M1, between Barnsley and Rotherham there are a number of bus stops located, providing access to a number of services to the surrounding areas and areas further afield. Although it should be noted that no stops are directly affected by the proposals.

With reference to the South Yorkshire Bus map the existing routes in the vicinity of the works can be given as follows.

Figure 2 Existing bus routes



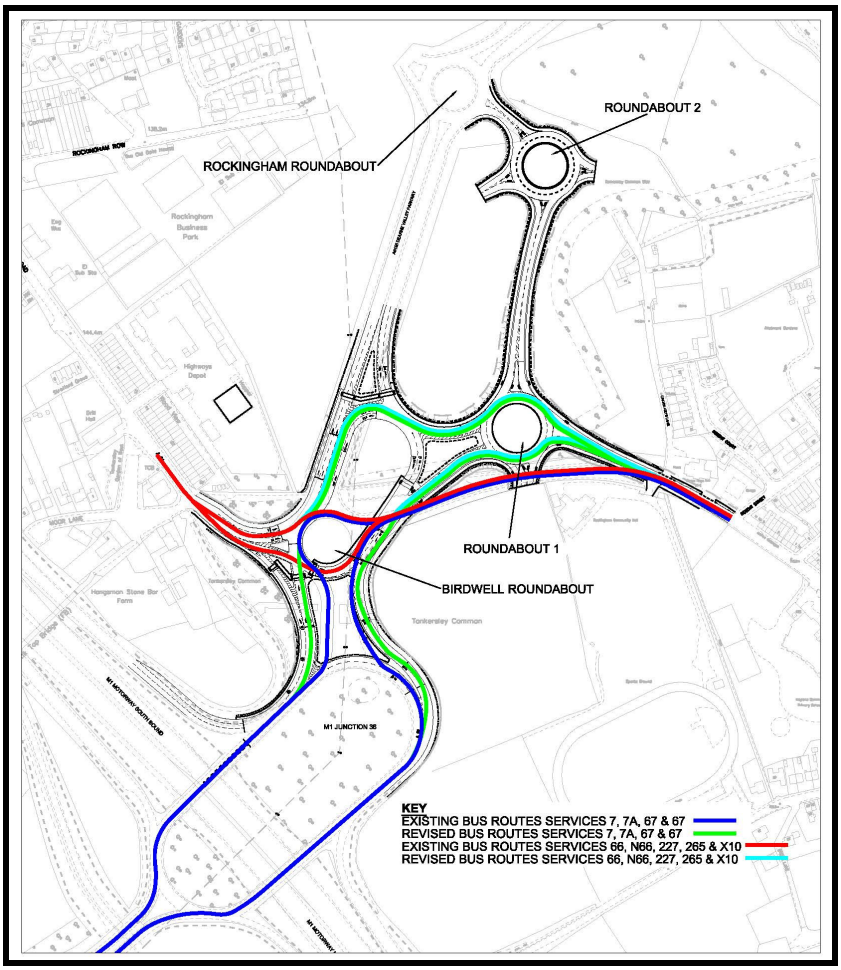
From the above the affected bus routes can be given as:

Table 1 – Bus Services and Frequencies

No.	Route	Frequencies					
		Monday - Saturday			Sunday		
		AM	INTER	PM	AM	INTER	PM
7	Barnsley-Worsbrough Bridge-Blacker Hill-Platts Common-Hoyland-Tankersley-Pilley-Birdwell	2 buses	3 buses	2 buses	No Service		
7A		2 buses	3 buses	2 buses	No Service		
66	Barnsley-Birdwell-Hoyland Common-Hoyland-Jump-Elsecar	10 mins	10 mins	20 mins	30 mins	30 mins	hourly
67	Barnsley-Worsbrough Common-Worsbrough-Birdwell-Hoyland-Jump-Cortonwood-Wombwell	hourly	hourly	hourly	hourly	2 hourly	2 hourly
67A		No Service	No Service	hourly	hourly	2 hourly	2 hourly
201	Chapeltown-Tankersley-Deepcar-Stocksbridge	hourly	hourly	hourly	No Service		
227	Rotherham-Greasbrough-Nether Haugh-Wentworth-Elsecar-Hoyland-Birdwell-Barnsley	hourly	hourly	hourly	hourly	hourly	hourly
265	Sheffield-Ecclesfield-Chapeltown-Hoyland Common-Birdwell-Worsbrough-Barnsley	30 mins	30 mins	30 mins	2 buses	hourly	hourly
X10	Barnsley-Worsbrough Bridge-Birdwell-Hoyland-Chapeltown-Eclesfield-Wincobank-Meadowhall	hourly	hourly	hourly	No Service		

As part of the development proposals a number of existing bus services which currently operate on the network will therefore be affected by the proposed new road layout, and the existing routes and revised routes are shown below:

Figure 3 – Existing and Revised Bus Routes



From the above, Services 7, 7A, and 67A currently operate from A6135 Sheffield Road to the A61 Westwood New Road via the Birdwell roundabout and Junction 36 gyratory, therefore the proposals will impact upon the existing routes.

It is proposed that the revised routes from A6135 will utilise Roundabout 1, Birdwell gyratory and Junction 36 gyratory providing access to A61 (Westwood New Road).

Services 66, 67, 227 and X10 currently operate along the A6135 Sheffield Road to the A61 Sheffield Road via the existing Birdwell roundabout; therefore the proposals will impact upon the existing routes. It is proposed that the revised routes from A6135 will utilise Roundabout 1 and the Birdwell gyratory providing access to A61 (Sheffield Road).

It is therefore considered that the existing bus routes will be unaffected by the proposals. Furthermore, whilst no bus journey time information is available, as there are no bus priority measures located within the study area it is likely that bus services would receive journey time benefits akin to those of general traffic, and this is considered to provide an overall benefit to existing services during peak times.

Assessment – VISSIM Structure

Introduction

AECOM Ltd has been commissioned by Barnsley Metropolitan Borough Council, hereinafter referred to as BMBC, to assess a proposed feasibility level arrangement at Birdwell Roundabout using VISSIM micro-simulation software. This chapter will therefore set out the extent of the model and data used in the construction and validation.

The assessment utilises an existing VISSIM model of the A61 corridor including the Westwood Roundabout through the Birdwell Roundabout which was developed for previous assessments in the area for BMBC in 2012. However, given the age of this previous study, the base model has been updated using new traffic count data, as provided by BMBC.

Table 2 details the VISSIM models to be coded as part of the assessment.

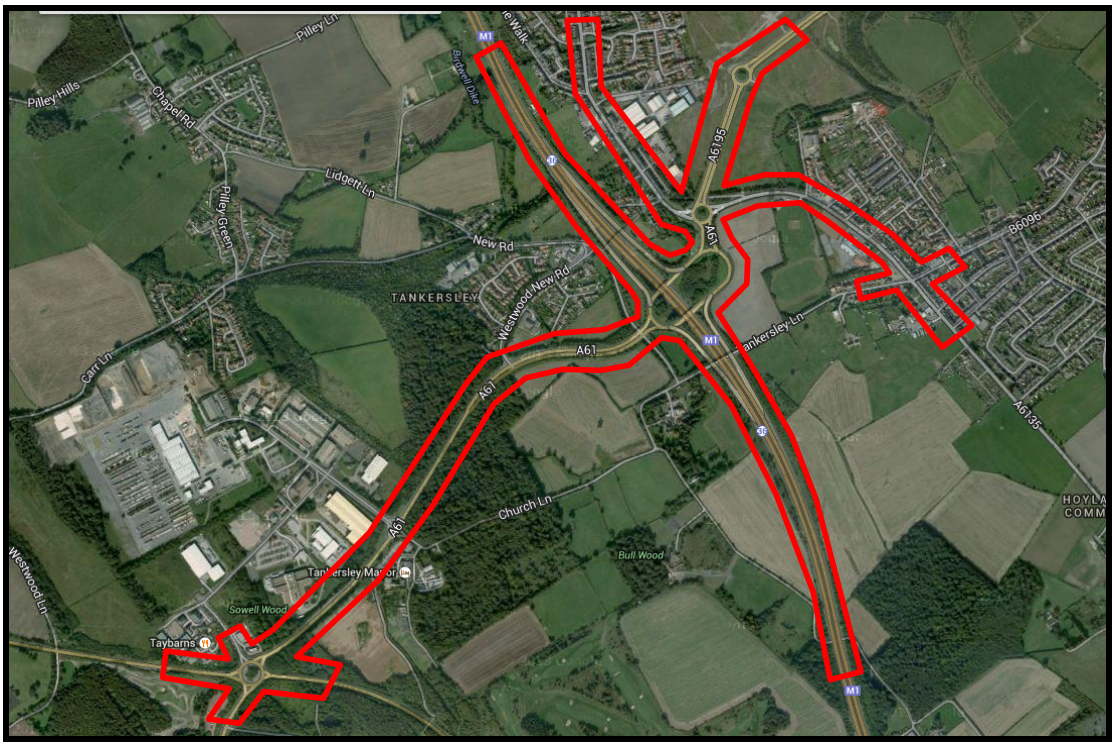
Table 2: M1 J36 VISSIM model scenarios

	VISSIM Model Scenarios (S)	
	AM Peak	**PM Peak**
2014 Base Model (Existing)	S1	S2
2014 Proposed Scheme Model	S3	S4
2019 Existing Case with TEMPRO Growth	S5	S6
2019 Proposed Scheme with TEMPRO Growth	S7	S8
2024 Existing Case with TEMPRO Growth	S9	S10
2024 Proposed Scheme with TEMPRO Growth	S11	S12

The study area encompasses the A61 / A616(T) Westwood Roundabout, Junction 36 of the M1, Birdwell Roundabout and the signalised junction of the A6135 and B6096 Allots Corner. Other minor access points on the A61 and Sheffield Road have also been included in the model.

Below illustrates the extents of the base and scheme VISSIM models for this commission.

Figure 4: VISSIM model network extents



Traffic Count Dataset

AECOM received manual classified turning count data for M1 J36 from BMBC that represent survey days of the 4th and 12th December 2013 along with turning count data for Westwood Roundabout from March 2010.

The existing base VISSIM model uses flow outputs from SATURN. In order to incorporate the turning count data at Junction 36, in and out flows have been used from the classified counts and then the turning volume ratios from the SATURN model to distribute these trips throughout the network. J36 turning volumes were then entered directly to the OD from the classified turning counts for input into VISSIM.

Flows at the Westwood Roundabout which are not destined for or coming from Junction 36 were taken from the manual classified turning counts of 2010. Following review, these counts were higher than predicted by the SATURN model and as such will therefore provide a more robust case.

No survey data is currently available for Birdwell Roundabout. Turning volumes which do not access or egress Junction 36 have as a result been retained from the SATURN model.

Please note, no bus journey information was provided as part of the base modelling and subsequently no bus journey time analysis was undertaken for future year modelling. However as no bus priority measures are located within the study area it is likely that bus services would receive journey time benefits akin to those of general traffic.

Existing Case Model network

This section details the assumptions and methodology adopted for the development of *Existing Case* models of the A61 corridor.

Vehicle compositions
OD flow data for the extents of the VISSIM model (**Figure 4**) is provided for four vehicle types; Car, LGV, MGV and HGV. Each of these four vehicle compositions are coded into the modelling. The following assumptions were made:

1. Pedal and motor cycles were not recorded within the “light” vehicles category;
2. Public service vehicles (PSV’s) were included in the “heavy” vehicles category. No specific PT routing was included in the model due to no data.

Vehicle inputs

Peak hour period
Data provided from the SATURN model indicated peak periods of 0700 to 0800 in the AM and 1600 to 1700 in the PM, these have therefore been retained in the model update.

Warm up flows
Each VISSIM model was coded with a 30 minute warm up period to populate the network prior to the peak hour commencing; this data was taken from the manual classified counts where available and where SATURN output flows was required to fill gaps, the 60 minute peak period flows were halved to populate the half hour warm up period.

Vehicle input flows are entered for 15 minute periods throughout the modelled period so as to reflect the fluctuation in flow patterns throughout the respective peak hour. SATURN counts at Birdwell Roundabout have been split into 15 minute periods based on the volume ratio of 15 minute periods at Junction 36.

Routing decisions
All node based routing was reviewed to ensure only legitimate movements could be undertaken by traffic. Dynamic assignment of traffic was utilised to create routes through the model. All models were run to convergence to ensure minimum deviation in vehicle trips.

Traffic signals
Signals are located at two locations in the base VISSIM models; the A6135/B6096 junction and Junction 36 of the M1.

Signal data was extracted from the existing VISSIM model for the A6135/B6096 junction.

Since the original VISSIM model build, additional signals at Junction 36 have been installed on the eastern and western A61 approaches along with alterations to lane allocations. These changes are reflected in the updated base model. No signal timings were available for the current operation of Junction 36, therefore a LinSig model, formerly used to test options as part of a separate commission, was adapted to provide signal timings. All timings were coded using VISVAP.

The timings utilised at Junction 36 in the base model are shown in **Tables 3, 4 and 5**.

Table 3: M1 Junction 36 Stage Information

Stream	Stage	Description	Phase Type
1	1	M1 Northbound Off-slip	Traffic
	2	Circulatory	Traffic
2	1	A61 Eastbound	Traffic
	2	Circulatory	Traffic
3	1	M1 Southbound Off-slip	Traffic
	2	Circulatory	Traffic
4	1	A61 Westbound	Traffic
	2	Circulatory	Traffic

Table 4: M1 Junction 36 AM Base Model Stage Timings

	Stage green time								Cycle time
Stream	**1**		**2**		**3**		**4**		
Stage	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	
Duration	18	32	31	19	23	27	14	36	60
Change Point	53	30	58	22	35	7	55	36	

Table 5: M1 Junction 36 PM Base Model Stage Timings

	Stage green time								Cycle time
Stream	**1**		**2**		**3**		**4**		
Stage	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	
Duration	18	17	15	21	13	22	22	13	45
Change Point	28	5	21	1	16	43	15	33	

Existing Case Model Calibration

Both Existing Case models were calibrated against vehicle turning counts and saturation flows. Each of these is discussed in turn below.

Turning counts

As previously mentioned, received OD data for the study area informs vehicle turning counts around the network. Calibration ensures that these recorded turning counts were reflected in each of the two Existing Case models. The method of comparing observed and modelled turning counts is to use the GEH statistic, discussed below:

GEH $= \sqrt{\frac{(M-C)^2}{(M+C)/2}}$, where M = modelled flows C = observed flows

The reason for using the GEH statistic is the inability of either the absolute difference or relative difference to cope over a wide range of flows. For example, an absolute difference of 100 vehicles per hour (vph) may be considered a big difference if the flows are of the order of 200vph, but would be less significant for flows of the order of several thousand vph. Equally, a 10% error in 100vph might not be important, whereas a 10% error in 3,000vph might mean the difference between constructing an extra lane or not. A GEH value compares the two data sets' numbers of vehicles such that a greater variation of total vehicles is permitted at points with lower overall counts, and less variation permitted where there are larger traffic flows. The criteria used to assess as to whether the correspondence is satisfactory are those described in TD Modelling Guidelines which states all GEH values should be less than 5 with critical links under 3.

Distribution of GEH values throughout the two models can be found in **Table 6.**

Table 6: GEH distributions for both Existing Case models

Number of movements within each GEH category						
AM	**Total**	GEH<1	GEH<2	GEH<3	GEH<4	GEH<5
	33	24	6	3	0	0
		73%	18%	9%	0%	0%
PM	**Total**	GEH<1	GEH<2	GEH<3	GEH<4	GEH<5
	33	29	3	1	0	0
		88%	9%	3%	0%	0%

The above table demonstrates very good calibration between observed and modelled turning movements throughout each model, with 93.9% of all movements returning a GEH value lower than 2. Full comparisons of observed and modelled turning counts can be found in **Appendix B**.

Proposed Scheme Model Network

This section details the assumptions and methodology adopted for the development of *Scheme Case* models of the A61 corridor.

The methodology for vehicle compositions and inputs along with routing decisions has been retained from the existing case model.

Model Build

The completed scheme model includes a number of schemes as agreed with BMBC, these include:

- Westwood hamburger roundabout;
- A61 dualling between Westwood Roundabout and M1 J36; and
- Birdwell Gyratory Scheme.

In order to include the above proposed schemes some assumptions have been made, these are as follows:

- Westwood hamburger roundabout:
    - Preliminary Design as provided in 2012 and dated 18th of July 2012 has been input into models, held in **Appendix A; and**
    - Signal timings as provided by AOne+ as a TRANSYT output in 2012 have been retained.

Considering the updated Westwood Roundabout proposal specifically, we believe that it is sufficiently similar to the modelled proposal to not have a significant impact on the Birdwell Gyratory scheme assessment. The updated scheme is unlikely to greatly affect throughput of traffic to or from the A61 north, whilst the impact of any small change in throughput is not anticipated to cause much change at Birdwell given the distance of Westwood Roundabout to Birdwell Gyratory.

- A61 dualling
    - No design provided therefore a design has been assumed; and
    - Right turn out of Wentworth Way prohibited due to the need to cross multiple lanes, traffic has been reassigned to exit from Maple Road.

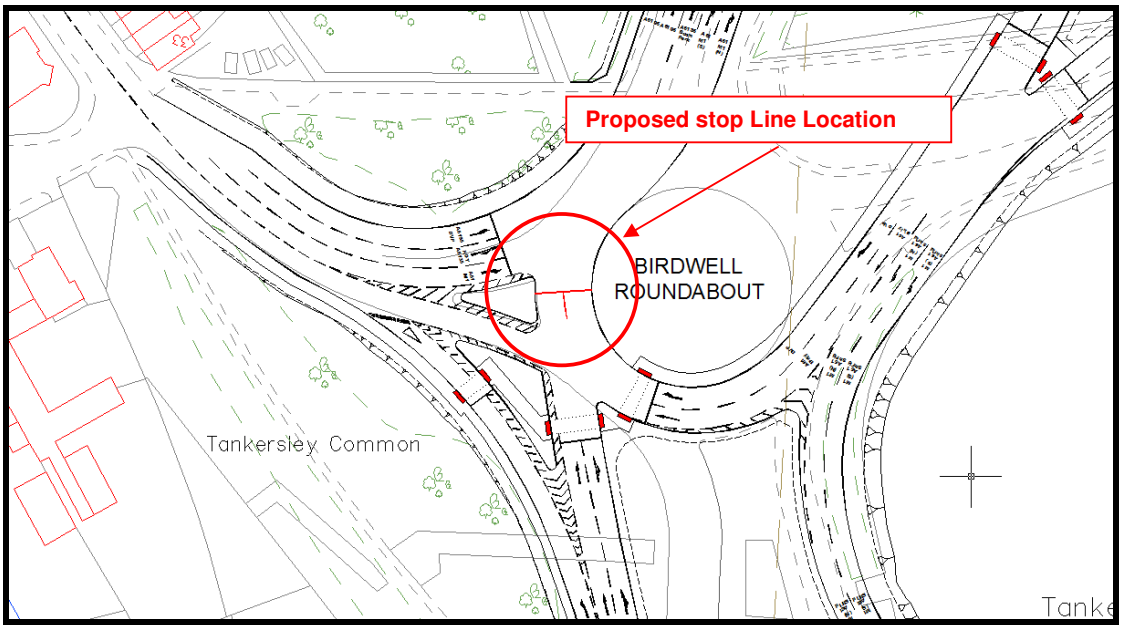
Whilst this dualling is not a committed scheme, its inclusion it is not considered to significantly impact upon the results as presented within this report.

The Birdwell Gyratory Scheme has been coded in accordance with the latest design as issued by BMBC, as shown in **Appendix A**. Signal timings have been taken from an amended LinSig model of the original feasibility scheme; these are discussed in more detail in the following section.

Following initial reviews of the Birdwell scheme it was noted that there were issues with queueing from the A61 north-bound signals back onto J36. In order to improve the traffic throughput, the addition of an internal stop line on the gyratory to work in coordination with the A61/Sheffield Road approach was suggested. This was aimed at reducing lost green time resulting from large intergreen times.

This option was made feasible by the limited number of right turners approaching from the A6135. Traffic wishing to travel east to north is able to utilise the proposed roundabout and link road to the east of Birdwell Roundabout. BMBC agreed to the proposal and requested its inclusion in the scheme. **Figure** shows the proposed location of the additional stop line.

Figure 5: Proposed Internal Stop Line Location



Proposed Scheme Traffic Signals

Signals are located at four locations in the proposed scheme VISSIM models; Allots Corner A6135 / B6096 junction, Junction 36 of the M1, Westwood Roundabout and Birdwell Roundabout.

Signal data for each controlled junction was obtained from the following sources:

- A6135 / B6096 junction – Retained from existing case models;
- A61 / A616(T) Westwood Roundabout – Retained from AOne+ 2012 Transyt output;
- M1 J36 – Timings output from updated LinSig model; and
- Birdwell Gyratory – Timings output from updated LinSig model.

Concerning the LinSig modelling, a scheme model was built incorporating both the Birdwell Gyratory scheme and the M1 J36 scheme during the initial concept design stage. This model was then updated to include any design alterations since the initial concept design stage including the addition of the internal stop line at the south side of the gyratory as discussed above. Signal timings were then output for use in the VISSIM Scheme models.

The timings utilised at the Birdwell Gyratory and Junction 36 in the scheme model are shown in **Table 7** to **Table 12.**

Table 7: M1 Junction 36 Stage Information

Stream	Stage	Description	Phase Type
1	1	M1 Northbound Off-slip	Traffic
	2	Circulatory	Traffic
2	1	A61 Eastbound	Traffic
	2	Circulatory	Traffic
3	1	M1 Southbound Off-slip	Traffic
	2	Circulatory	Traffic
4	1	A61 Westbound	Traffic
	2	Circulatory	Traffic

Table 8: M1 Junction 36 AM Base Model Stage Timings

	Stage green time								Cycle time
Stream	1		2		3		4		
Stage	1	2	1	2	1	2	1	2	
Duration	44	36	28	52	29	51	61	19	90
Change Point	14	55	82	49	23	79	14	38	

Table 9: M1 Junction 36 PM Base Model Stage Timings

	Stage green time								Cycle time
Stream	**1**		**2**		**3**		**4**		
Stage	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	
Duration	18	17	15	21	22	13	27	8	45
Change Point	28	5	21	1	43	16	15	28	

Table 10: Birdwell Gyratory Stage Information

Stream	Stage	Description	Phase Type
1	**1**	Dearne Valley Parkway	Traffic
	2	Circulatory	Traffic
2	**1**	A6135	Traffic
	2	Circulatory	Traffic
3	**1**	A61 from J36	Traffic
	2	Circulatory	Traffic
4	**1**	A61/Sheffield Road	Traffic
	2	Circulatory	Traffic
5	**1**	Northbound Circulatory	Traffic
	2	Pedestrian Crossing	Pedestrian

Table 11: Birdwell Gyratory AM Base Model Stage Timings

	Stage green time										Cycle time
Stream	**1**		**2**		**3**		**4**		**5**		
Stage	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	
Duration	33	47	56	24	21	55	23	57	72	5	90
Change Point	5	57	25	54	79	53	83	55	37	47	

Table 12: Birdwell Gyratory PM Base Model Stage Timings

	Stage green time										Cycle time
Stream	**1**		**2**		**3**		**4**		**5**		
Stage	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	
Duration	40	40	56	24	14	62	18	62	72	5	90
Change Point	39	84	56	85	22	3	28	5	18	28	

Future Year testing
The chapter details the methodology used to derive and test future year traffic flows in the base and proposed scheme models.

BMBC have requested that the scheme be tested in the future years of 2019 and 2024 including all committed developments in the area. Growth rates have therefore been garnered from TEMPRO and represent the Hoyland Nether area; these have then been constrained to account for the committed development trips. The growth rates used are as follows:

- 2014 – 2019 AM: 1.081711
- 2014 – 2019 PM: 1.084835
- 2014 – 2024 AM: 1.167691
- 2014 – 2024 PM: 1.173731

However, it should be noted that as set out below some individual committed developments have been included in addition to the TEMPRO growth. This will then result in some double counting as such represents a level of robustness in the assessments.

It should be noted that signal timings have been retained from 2014 models to provide a direct comparison in 2019 and 2024.

Committed Developments
Committed Developments within the vicinity of J36 have been taken into consideration, which will form part of the road network base traffic flows. A total of 6 developments have been considered all of which generate vehicular trips within the VISSIM network, the considered development are listed below:

- Aldi Food Store, Sheffield Road;
- Residential Development on Land at Lidgett Lane;
- Residential Development on Land at New Road;
- Rockingham Phase 1 Commercial Development;
- UDP Housing Site 3; and
- UDP Housing Site 19.

Aldi Food Store
Planning approval was granted in October 2013 for a food store comprising of GFA 1,571m2 located on land off Sheffield Road between its junctions with A61 Birdwell Roundabout and Rockingham Row. The store will generate 91 two way vehicular trips (43 arrival and 48 departures) during the PM peak, which include a total of 9 diverted trips (already included within the road network). This development is located within node 2, 3 and 4 of the VISSIM model.

Within the VISSIM model the vehicular trips, excluding the 9 diverted trips (39 arrivals and 43 departures) have been distributed using the data obtained from the original Transport Assessment. However as the VISSIM model includes a wider network the distribution of the trips throughout the rest of the network has been based upon the existing traffic flow data.

Residential Development on Land at Lidgett Lane
Planning approval was granted in June 2014 for a residential development comprising of 35 dwellings located on land to the south of Lidgett Lane between its junctions with Knolls Cottages access to the east and New Road to the west. The development will generate 20 two way vehicular trips (6 arrival and 14 departures) during the AM peak and 23 two way trips (14 arrivals and 9 departures) during the PM peak. This development is located within node 15 of the VISSIM model.

It should be noted that the original Transport Statement does not include and distributions of junction assessments due to the low generation of trips, therefore it has been predicted that 50% of the overall trips will travel through the VISSIM network, distributed based upon the existing traffic flow data. Therefore the VISSIM network only considers 10 two way trips (3 arrival and 7

departures) during the AM peak and 12 two way trips (7 arrival and 5 departures) during the PM peak. These trips have been assigned to arriving and departing at node 15 within the VISSIM model.

Residential Development on Land at New Road

Planning approval was granted in June 2014 for a residential development comprising of 41 dwellings located on land to the north of New Road between its junctions with Lidgett Lane to the east and Silkstone Close to the west. The development will generate 23 two way vehicular trips (7 arrival and 16 departures) during the AM peak and 27 two way trips (16 arrivals and 11 departures) during the PM peak. This development is located within node 15 of the VISSIM model.

It should be noted that the original Transport Statement does not include and distributions of junction assessments due to the low generation of trips, therefore it has been predicted that 50% of the overall trips will travel through the VISSIM network, distributed based upon the existing traffic flow data. Therefore the VISSIM network only considers 12 two way trips (4 arrival and 8 departures) during the AM peak and 14 two way trips (8 arrival and 6 departures) during the PM peak. These trips have been assigned to arriving and departing at node 15 within the VISSIM model.

Rockingham Phase 1 Commercial Development

A Planning Application was submitted in October 2014 for a mixed use development comprising of B1 - 6,000m2, B8 – 9,000m2, Complimentary A1/A3/A5 uses – 1,000m2, Public House/Restaurant – 900m2, Hotel (60 rooms) – 2,700m2 and car showroom – 2,000m2 located on land to the north of A6195 Rockingham roundabout. The development will generate 337 two way vehicular trips (182 arrival and 155 departures) during the AM peak and 326 two way trips (156 arrivals and 170 departures) during the PM peak. Of these trips a total of 123 vehicles are diverted and are already included within the road network during the AM peak (arrivals) with 96 vehicular trips during the PM peak (arrivals). This development is located within node 5 of the VISSIM model.

Within the VISSIM model the 214 AM vehicular trips (59 arrivals and 155 departures) and 230 PM vehicular trips (60 arrivals and 170 departures) (excluding diverted trips) have been distributed using the data obtained from the original Transport Assessment. However as the VISSIM model includes a wider network the distribution of the trips throughout the rest of the network has been based upon the existing traffic flow data.

UDP Housing

The UDP Housing sites 3 and 19 were constructed in 2011, taking into consideration that the base traffic flows were undertaken in 2013, the traffic generated by these site are already included within the base data

Assessment – VISSIM Visual
Assessment

Visual Assessment Introduction

This section details the findings from a visual assessment of each model. Screenshots highlight queueing through the use of coloured vehicles with pink indicating stationary traffic moving through the spectrum to green highlighting free flow, a red line has been added to highlight the length of queues.

2014 Visual Assessment

Detailed below are screenshots illustrating the operation of the Birdwell roundabout in the 2014 Reference Case and 2014 Scheme modelling scenarios for the AM and PM peak periods. It should be noted that the modelled queuing does vary on all approaches over the course of the modelled hours such that none of the queue lengths shown in the screenshots below are consistently maintained over the entire time period.

Figure 6: 2014 AM Reference Case (Existing Layout)

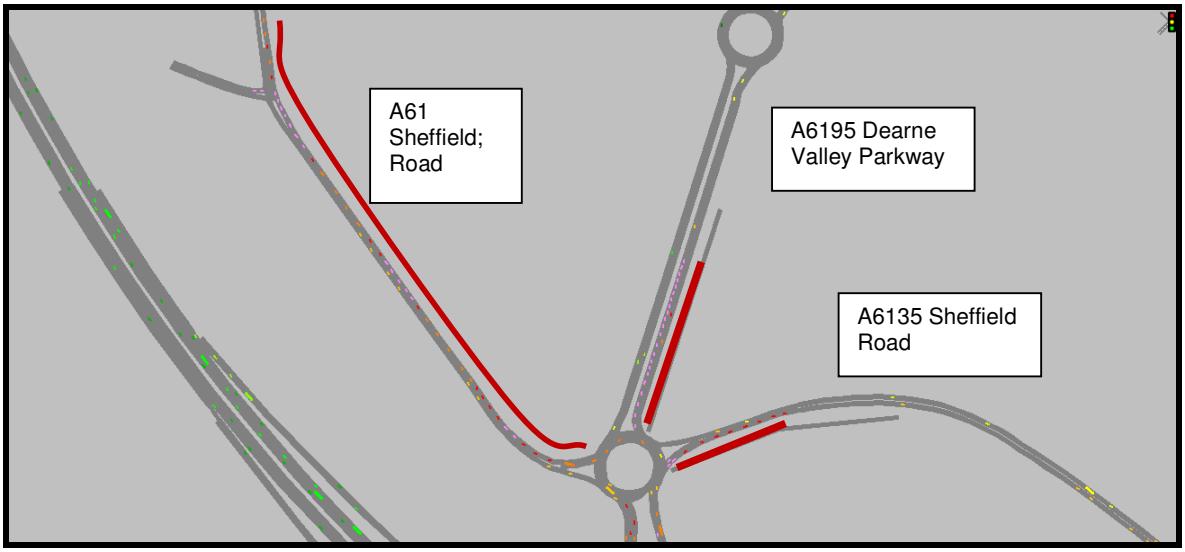
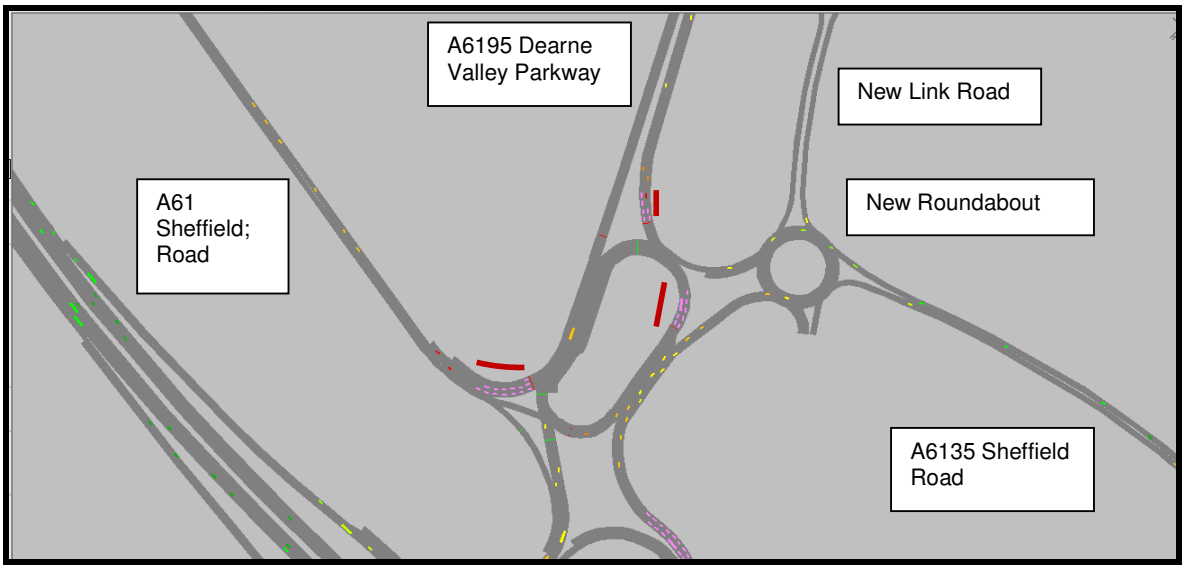


Figure 7: 2014 AM Scheme (Proposed Scheme)



The 2014 reference case highlights queueing on Sheffield Road, Dearne Valley Parkway (DVP) and the A6135. Queues extend off the end of the model on Sheffield Road with queues reaching around 200 metres on DVP and the A6135. As can be seen in **Figure 7** no major queues are observed in the scheme models with queues reaching a maximum of around 50 metres before receiving a green signal.

The PM models indicate similar traffic scenarios with queues on all arms in the base model but no major queueing evident in the scheme model as highlighted in **Figure 8** and **Figure 9.** Approaches to Junction 36 incur very minor queueing intermittently in the base and this is replicated in the scheme models. All screenshots have been taken half way through the peak hours (0830 and 1630).

At Westwood Roundabout the hamburger scheme throughputs traffic well, however, it should be noted that the give way egress from Maple Road was unable to throughput demand resulting in 379 vehicles that could not access the model, this majority of this flow was destined for the A61 southbound or the east and westbound A616 arms.

Figure 8: 2014 PM Reference Case (Existing Layout)

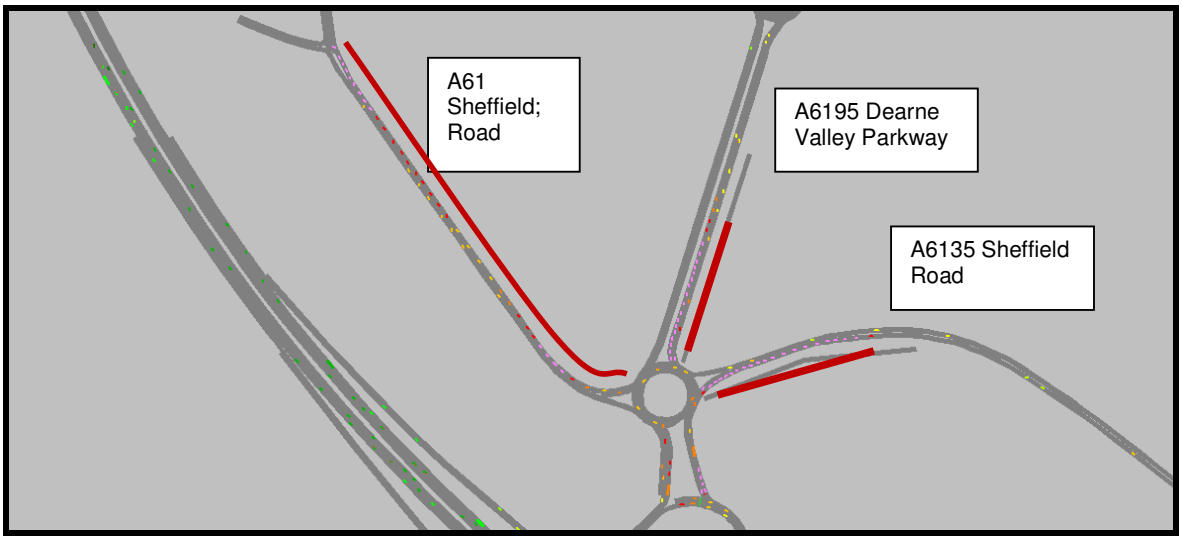
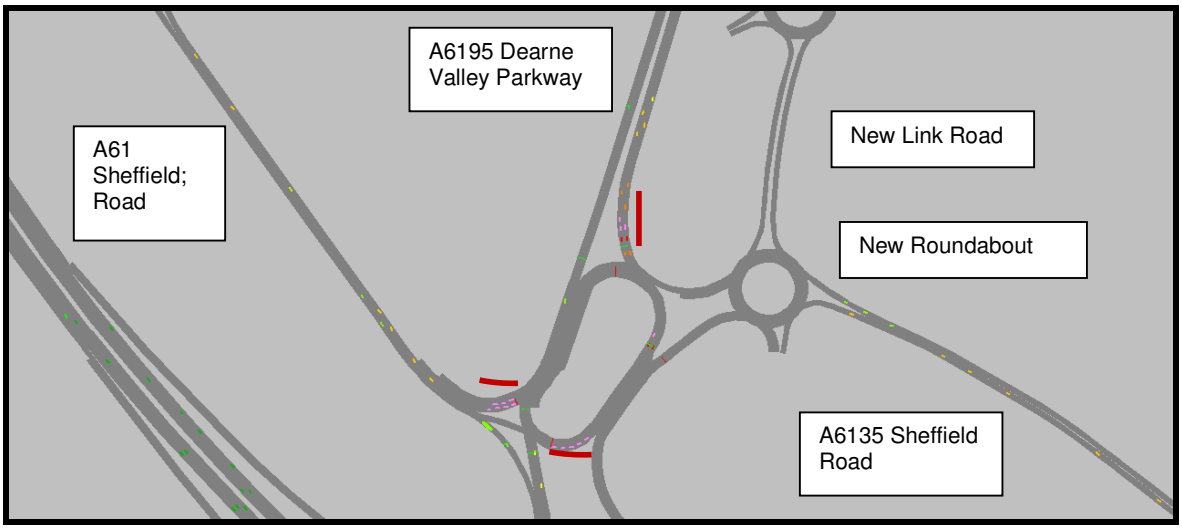


Figure 9: 2014 PM Scheme (Proposed Scheme)



2019 Visual Assessment

Figure 10 to **Figure 13** highlights the operation of the Birdwell roundabout in the 2019 Reference Case and 2019 Scheme modelling scenarios for the AM and PM peak period. As noted above, the modelled queuing does vary on all approaches over the course of the modelled hours such that none of the queue lengths shown in the screenshots below are consistently maintained over the entire time period.

Figure 10: 2019 AM Reference Case (Existing Layout)

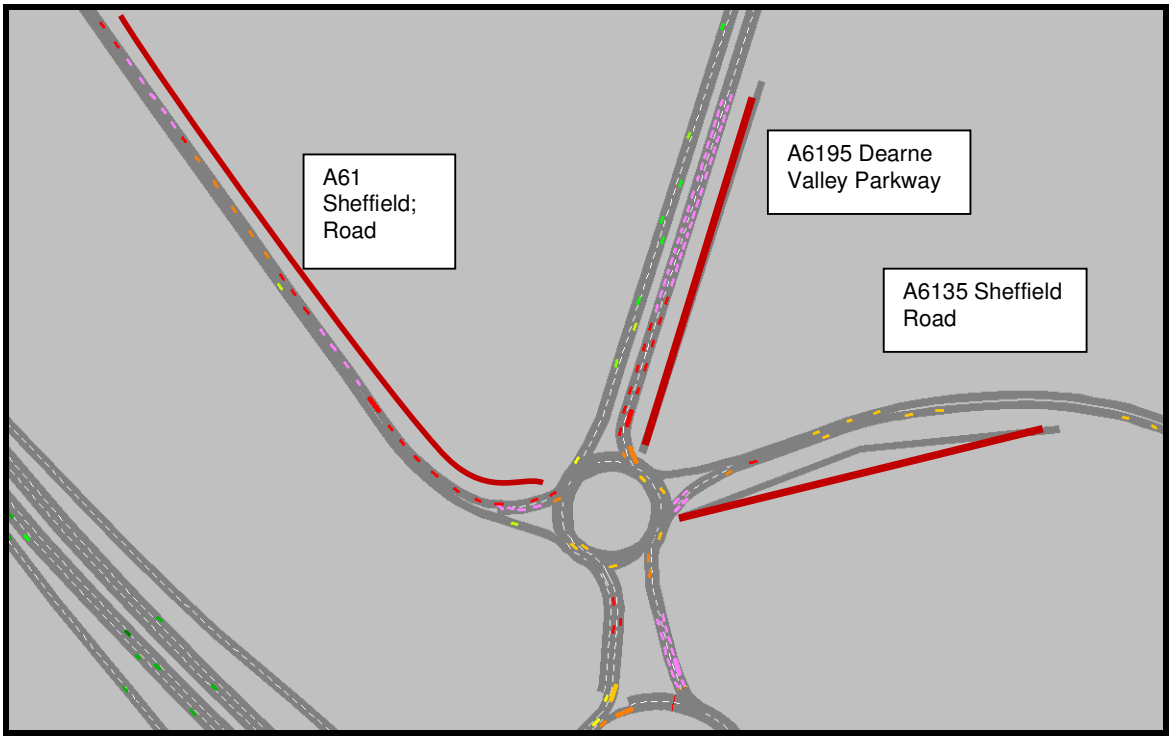
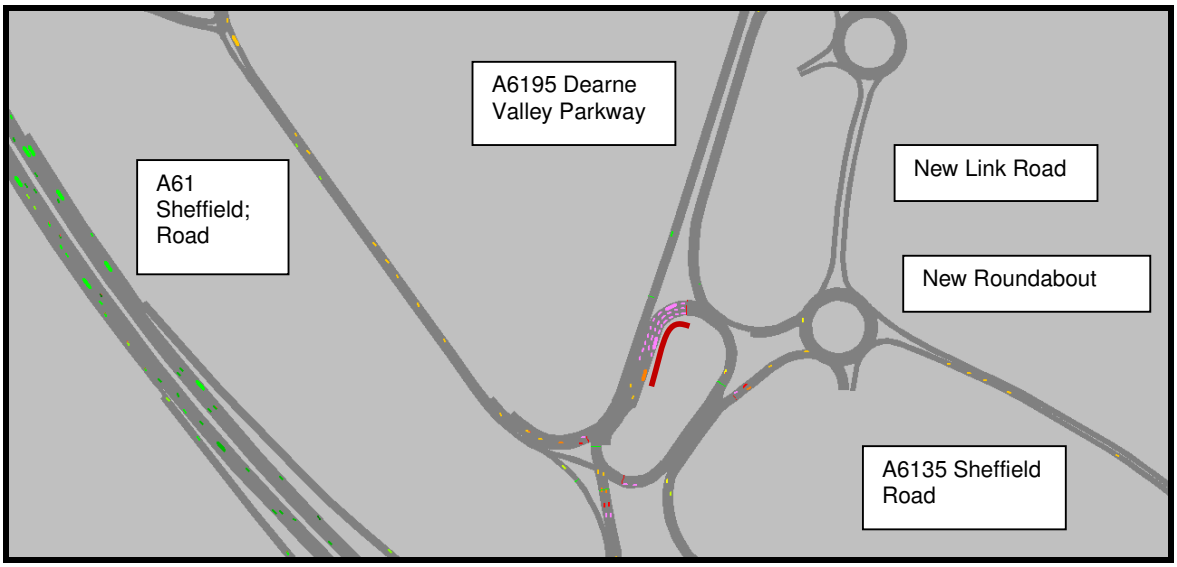


Figure 11: 2019 AM Scheme (Proposed Scheme)



As would be expected, the 2019 reference case model exhibits increased queueing on DVP compared to 2014, with intermittent queueing on the A6135 reaching up to 200 metres. In general, queues are relatively low on the A6135 approach with a good throughput. This in turn explains why journey times as described in subsequent chapters show negative detriment resulting from the signalisation of this arm. Approaches to Junction 36 do not show significant queues in either case.

Figure 12: 2019 PM Reference Case (Existing Layout)

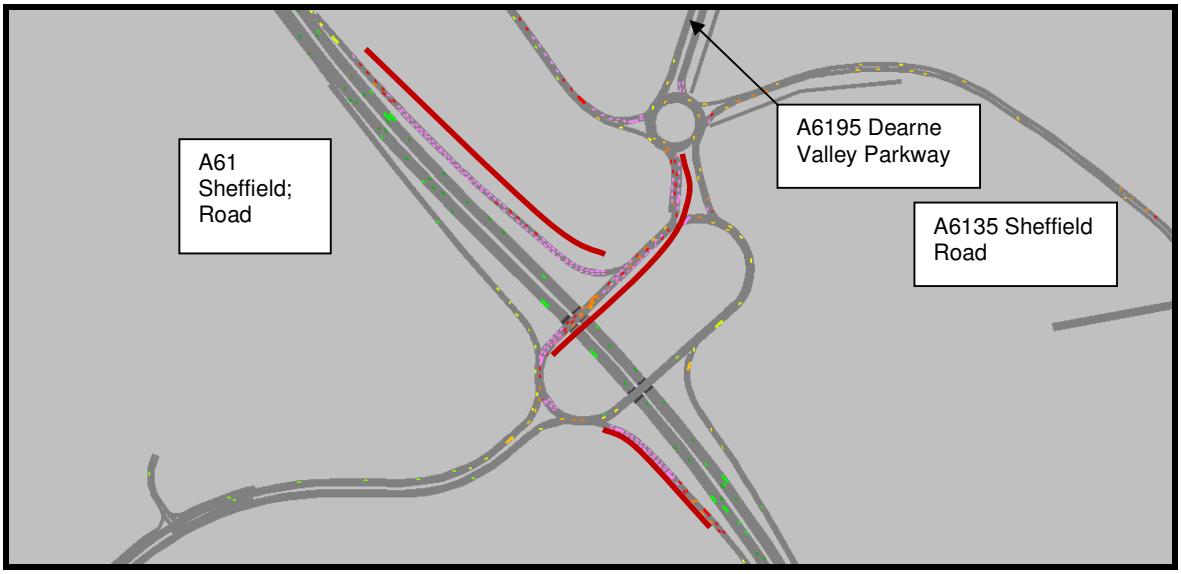
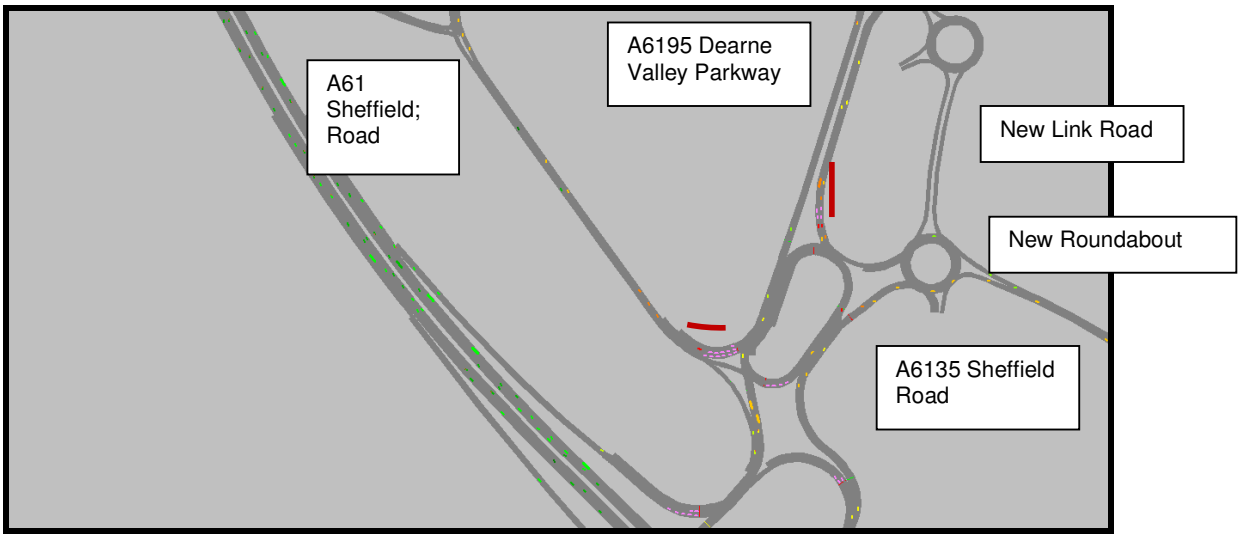


Figure 13: 2019 PM Scheme (Proposed Scheme)



The 2019 PM reference case exhibits considerable queueing across the network. As can be observed in **Figure 12** queues propagate back from the southern approach to Birdwell Roundabout through the Junction 36 circulatory with traffic blocking through the M1 southbound exit signals. Queues are seen to begin dissipating moving through the peak hour. Queuing also occurs at Westwood Roundabout with queues on all approaches increasing throughout the peak.

The scheme model shows very good throughput, and the queues exhibited in the reference case model are not replicated in the scheme, as highlighted in **Figure 13**. The hamburger roundabout at Westwood also functions well resulting in minimal queuing. However, as was the case in the 2014 model, Maple road is unable to throughput the demand with 469 vehicles unable to enter the model at this location.

2024 Visual Assessment

The operation of Birdwell in the 2024 Reference Case and 2024 Scheme modelling scenarios for the AM and PM peak period are shown below. As noted above, the modelled queuing does vary on all approaches over the course of the modelled hours such that none of the queue lengths shown in the screenshots below are consistently maintained over the entire time period.

Figure 14: 2024 AM Reference Case (Existing Layout)

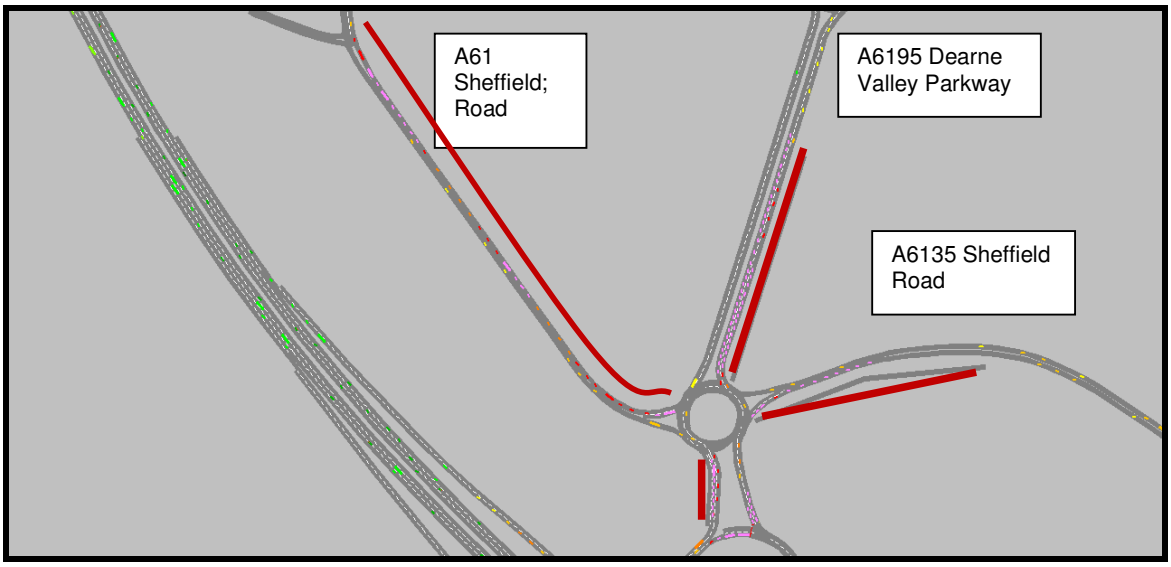
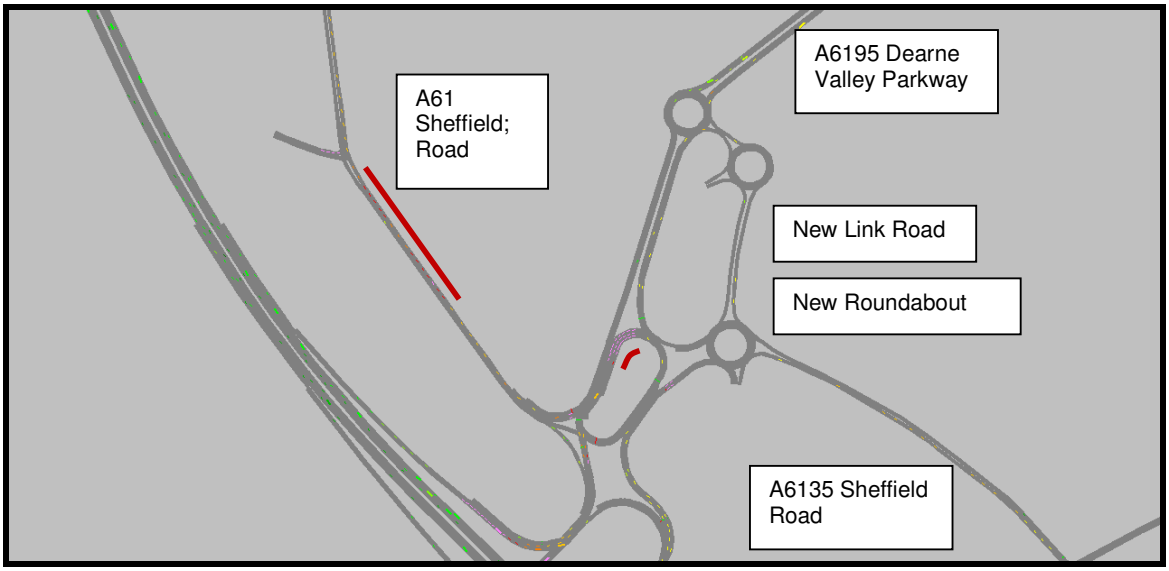


Figure 15: 2024 AM Scheme (Proposed Scheme)



The 2024 reference case shows queuing on all arms of Birdwell Roundabout with queues also propagating back from Junction 36. Queueing on the A6135 is seen to be slowly increasing from the 2014 and 2019 reference cases reaching 100 metres as

observed in **Figure 14**. Westwood Roundabout also exhibits queuing on the A616 arms and A61 south link, propagating back over 200 metres. Queuing at this location does fluctuate throughout the model.

The scheme model exhibits a slow moving queue on Sheffield Road as traffic builds on this arm in 2024 but throughput remains high and is better than observed in the reference case model as exhibited in the journey times as discussed in the following section. Minimal queueing fluctuates on other arms with no major issues observed.

Figure 16: 2024 PM Reference Case (Existing Layout)

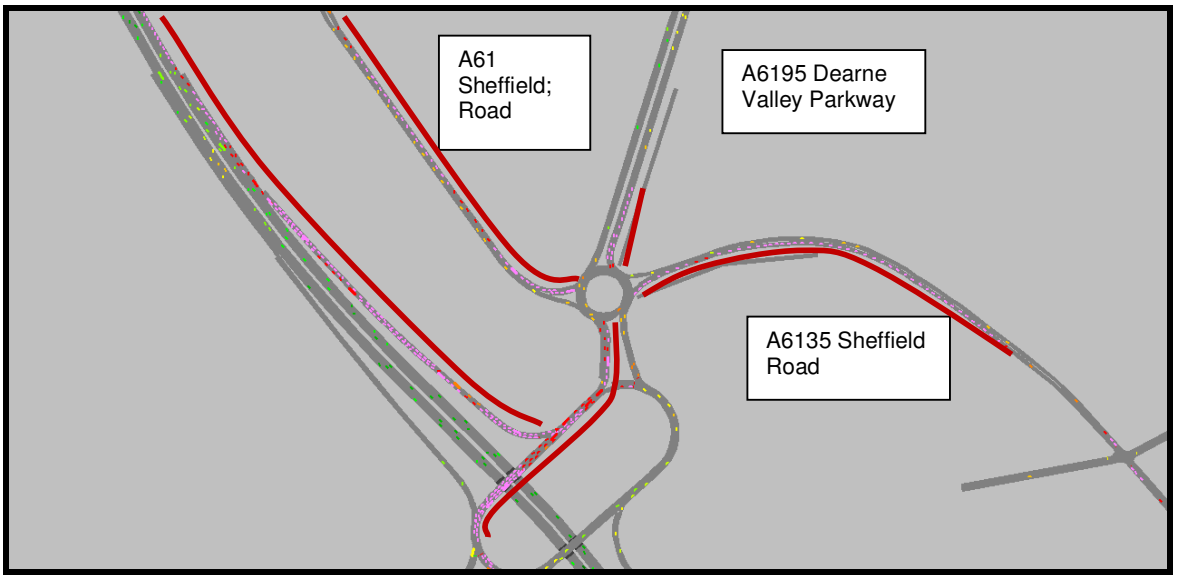
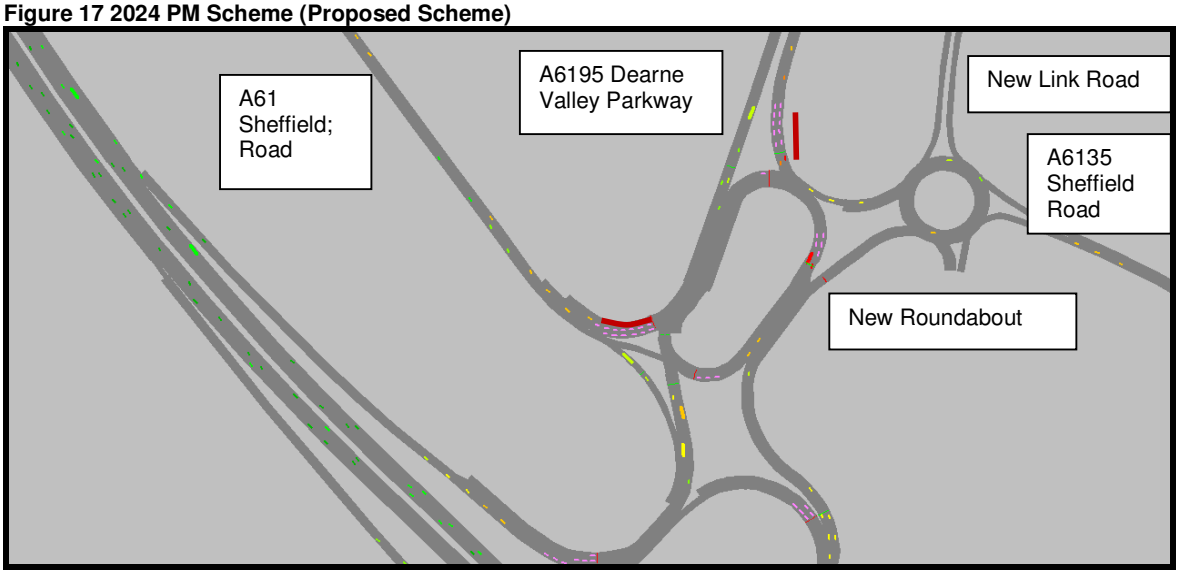


Figure 17 2024 PM Scheme (Proposed Scheme)



Capabilities on project:
Transportation

Queueing continues to worsen in 2024 in comparison to the 2019 reference case; queues begin to propagate down the Junction 36 southbound exit slip onto the mainline. Queueing back through the junction 36 circulatory from Birdwell Roundabout is again observed causing blocking at the southbound off slip signals; queues then propagate back around the circulatory to the A61 eastbound access to Junction 36. Westwood roundabout queues similarly worsen in 2024 compared to 2019.

The gyratory scheme continues to throughput traffic well with no major queuing observed on the approaches. The southbound approach to Junction 36 however exhibits some queuing back towards the Birdwell circulatory; this queue clears each cycle and could potentially be alleviated by adjusting the signal timings. Again as observed in the 2014 and 2024 scheme models throughput at Westwood is good with only small queues observed, however, 553 vehicles were unable to enter the model from Maple Road.

The base models have been calibrated against turning count data at each of the major junctions. Due to congestion, when testing future year traffic growth in the scheme models, some traffic is unable to enter the network. This is a particular issue at Maple road where traffic blocks back across the exit of the approach preventing the release of traffic from the give way. However, few trips originating at Maple Road are destined for Birdwell Gyratory hence the impact on the operation of the proposed Birdwell Gyratory is relatively small. The majority of trips utilising Maple Road are destined for the South, West or M1 Junction 37 which provides a more direct link to the south via the M1 than Junction 36.

Assessment – VISSIM Journey Time Results

Journey Time Results and Comparison Introduction

This section will set out the results from the VISSIM model on terms of the impact upon journey time through the network comparing the base and proposed scenarios.

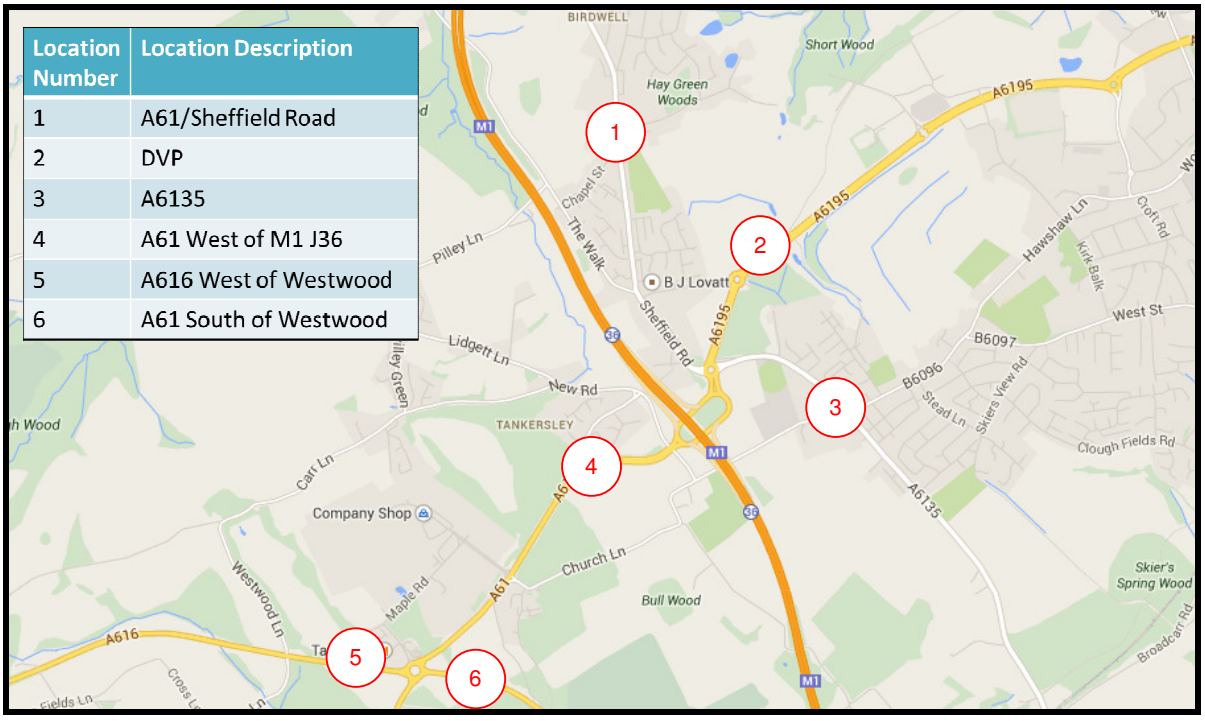
Each model was run with ten random seeds and Journey time and Network Performance data was collected. A diagram highlighting the routes considered is provided in **Appendix C**.

As a result of the gyratory scheme at Birdwell, the distance between journey time markers on some journey time routes has changed. The magnitude of any change has been included in the third column of each journey time table to highlight any significant changes. A positive value indicates an increase in journey time route distance and negative a decrease. Average speed has therefore also been included to provide a second comparator incorporating the change in distance. For the majority of journey time routes the change in distance will have a negligible impact on journey times.

2014 Journey Time Assessment

Summary results for the 2014 Base and Scheme AM and PM models are shown below, and the full results can be found in **Appendix D to F**, although for ease of reference the Journey Time diagram from **Appendix C** can given below:

Figure 18: Journey Time Routes



The results can then be set out as follows.

Table 13: 2014 AM Summary Results Comparison

Start	End	Comparison			Comparison (%)	
		Change in distance between JT markers from Base to Scheme (m)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	**A61 West of M1 J36**	195.8	-158.41	2.7	-35%	72%
A61 West of M1 J36	**A61 South of Westwood**	-3.3	-28.63	3.6	-22%	28%
A61 West of M1 J36	**A616 West of Westwood**	-14.7	-23.7	2.4	-17%	19%
A616 West of Westwood	**A61 West of M1 J36**	-12.4	-58.64	4.9	-34%	50%
A61 South of Westwood	**A61 West of M1 J36**	-30.4	-41.57	3.4	-26%	32%
DVP	**A61 West of M1 J36**	7	-92.62	4.0	-45%	85%
A6135	**A61 West of M1 J36**	18.7	23.7	-1.0	17%	-13%
A61 West of M1 J36	**DVP**	-15.9	7.18	-1.0	9%	-10%

It is evident from the above that the proposed schemes have a positive impact on the network. However some detrimental impact is felt at Birdwell where traffic travelling from the A6135 towards Westwood and from Westwood to Dearne Valley Parkway (DVP) incur journey time increases. The increased delay is not unexpected due to the introduction of signals on these routes. The detrimental impact is offset by positive impacts for traffic travelling through Birdwell from DVP and Sheffield Road towards Westwood, receiving journey time savings of 92.62 and 158.41 seconds per vehicle respectively.

Table 14: 2014 PM Summary Results Comparison

Start	End	Comparison			Comparison (%)	
		Change in distance between JT markers from Base to Scheme (m)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	**A61 West of M1 J36**	195.8	-207.13	4.0	-46%	107%
A61 West of M1 J36	**A61 South of Westwood**	-3.3	-254.2	11.2	-71%	241%
A61 West of M1 J36	**A616 West of Westwood**	-14.7	-237.54	10.4	-68%	206%
A616 West of Westwood	**A61 West of M1 J36**	-12.4	-45.95	5.0	-31%	43%
A61 South of Westwood	**A61 West of M1 J36**	-30.4	-50.97	6.4	-36%	53%
DVP	**A61 West of M1 J36**	7	-36.59	2.4	-26%	36%
A6135	**A61 West of M1 J36**	18.7	-2.98	0.3	-2%	4%
A61 West of M1 J36	**DVP**	-15.9	-5.99	0.5	-6%	5%

The above table indicates benefits throughout the A61 corridor network notably along the A61 stretch of highway through Westwood to and from Junction 36. At Birdwell, large benefits are observed on the Sheffield Road Approach with some small benefits from the south and east. An aggregated time saving across all routes at Birdwell of 253 seconds is incurred with 82% attributed to traffic approaching from Sheffield Road.

2019 Journey Time Assessment

Table 15 and **16** show Journey time comparative results for the AM and PM base and scheme models. A complete set of results is available in **Appendix E**.

Table 15: 2019 AM Summary Results Comparison

Start	End	Comparison			Comparison (%)	
		Change in distance between JT markers from Base to Scheme (m)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	**A61 West of M1 J36**	195.8	-178.02	2.6	-36%	75%
A61 West of M1 J36	**A61 South of Westwood**	-3.3	-30.95	3.7	-23%	30%
A61 West of M1 J36	**A616 West of Westwood**	-14.7	-19.3	1.8	-13%	15%
A616 West of Westwood	**A61 West of M1 J36**	-12.4	-54.51	4.2	-31%	43%
A61 South of Westwood	**A61 West of M1 J36**	-30.4	-40.5	3.0	-24%	30%
DVP	**A61 West of M1 J36**	7	-234.75	5.8	-68%	211%
A6135	**A61 West of M1 J36**	18.7	11.38	-0.4	7%	-5%
A61 West of M1 J36	**DVP**	-15.9	7.09	-1.0	8%	-9%

The 2019 results are broadly similar to the 2014 figures with slight variance on the majority of routes. A large benefit is shown travelling southbound from DVP with a reduction in journey time of 234.75 seconds per vehicle resulting from scheme implementation; this is compared to a reduction of 92.62 seconds in 2014. The 2019 results also show a reduction in the detrimental impact of the scheme for traffic originating from the A6135, journey times increase by 17% as a result of the scheme in 2014 but this is reduced to 7% in 2019.

Table 16: 2019 PM Summary Results Comparison

Start	End	Comparison			Comparison (%)	
		Change in distance between JT markers from Base to Scheme (m)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	**A61 West of M1 J36**	195.8	-350.2	4.7	-58%	168%
A61 West of M1 J36	**A61 South of Westwood**	-3.3	-270.42	8.6	-67%	206%
A61 West of M1 J36	**A616 West of Westwood**	-14.7	-255.72	8.3	-65%	184%
A616 West of Westwood	**A61 West of M1 J36**	-12.4	-53.4	5.3	-33%	49%
A61 South of Westwood	**A61 West of M1 J36**	-30.4	-55.72	6.5	-37%	57%
DVP	**A61 West of M1 J36**	7	-70.88	3.5	-39%	66%
A6135	**A61 West of M1 J36**	18.7	-54.95	2.2	-27%	39%
A61 West of M1 J36	**DVP**	-15.9	-25.91	2.1	-23%	27%

From the above table, notable results from the 2019 PM can be seen on the A6135 and A61 southern approach to Birdwell roundabout with journey time savings of 27 and 23% respectively. This compares to savings of 2 and 6% respectively in 2014. There is a general trend throughout the results of improving journey time benefits compared to 2014; this is seen particularly for traffic approaching from Sheffield Road with a reduction of 58%.

2024 Journey Time Assessment

Comparative journey time results for 2024 cases can be seen in **Table 17** and **Table 18**. Full results are presented in **Appendix F**.

Table 17: 2024 AM Summary Results Comparison

Start	End	Comparison			Comparison (%)	
		Change in distance between JT markers from Base to Scheme (m)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	**A61 West of M1 J36**	195.8	-104.23	1.3	-20%	40%
A61 West of M1 J36	**A61 South of Westwood**	-3.3	-44.01	4.6	-29%	41%
A61 West of M1 J36	**A616 West of Westwood**	-14.7	-24.76	2.0	-16%	18%
A616 West of Westwood	**A61 West of M1 J36**	-12.4	-44.31	3.3	-25%	33%
A61 South of Westwood	**A61 West of M1 J36**	-30.4	-31.71	2.2	-19%	21%
DVP	**A61 West of M1 J36**	7	-305.59	6.1	-73%	270%
A6135	**A61 West of M1 J36**	18.7	6.40	-0.2	4%	-2%
A61 West of M1 J36	**DVP**	-15.9	4.25	-0.6	5%	-6%

It can be seen that the detrimental impact on the A6135 approaching traffic further reduces in 2024 as journey time increases drop to 4% from 7% in 2019 and 17% in 2014. Similar reductions are also observed for traffic approaching from the A61 south as the detrimental impact drops from a 9% increase in journey times in 2014 and 2019 to 5% in 2024.

Results also suggest that benefits incurred in the 2019 model for traffic originating from DVP are retained with a 73% decrease in journey times as a result of the scheme (68% in 2019). However, results for traffic approaching from Sheffield Road indicate journey time benefits begin to reduce in 2024 with a 20% reduction in journey times resulting from the schemes compared to 36% in 2019.

Table 18: 2024 PM Summary Results Comparison

Start	End	Comparison			Comparison (%)	
		Change in distance between JT markers from Base to Scheme (m)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	**A61 West of M1 J36**	195.8	-438.62	4.8	-63%	200%
A61 West of M1 J36	**A61 South of Westwood**	-3.3	-14.14	0.2	-4%	4%
A61 West of M1 J36	**A616 West of Westwood**	-14.7	-20.7	0.3	-6%	6%
A616 West of Westwood	**A61 West of M1 J36**	-12.4	-53.63	4.9	-32%	47%
A61 South of Westwood	**A61 West of M1 J36**	-30.4	-64.42	6.5	-39%	62%
DVP	**A61 West of M1 J36**	7	-96.1	3.8	-46%	85%
A6135	**A61 West of M1 J36**	18.7	-191.78	4.2	-56%	130%
A61 West of M1 J36	**DVP**	-15.9	-34.08	2.6	-28%	36%

The 2024 PM results show journey time benefits to all routes. Compared to the 2014 and 2019 cases, journey time savings for Sheffield Road continue to increase reaching 61% compared to 56% and 46% in 2014 and 2019 respectively. Significant benefits can also be seen on the A6135 and A61 southern approach with journey time reductions of 56% and 28%. Journey times also continue to decrease for traffic originating at DVP with savings of 46% with the scheme in place.

Capabilities on project:
Transportation

Summary and Conclusion

This report has been prepared in order to support a planning application for a new road scheme at the A61 Birdwell Roundabout adjacent to junction 36 of the M1, which has been designed and promoted in order to resolve an existing capacity constraint.

Existing Case models have been updated for two operational peaks of the A61 corridor incorporating Westwood Roundabout, M1 Junction 36 and Birdwell roundabout, namely AM and PM. Each peak has been constructed using turning count data taken at M1 Junction 36 in December 2013 and Westwood Roundabout in 2010. The AM and PM models prove to calibrate well against the aforementioned criteria, with all turning counts returning GEH values below 3.

The scheme models have been built based upon the scheme drawings provided for Westwood and Birdwell Roundabouts with an appropriate dualling scheme added for the stretch of A61 carriageway between Junction 36 and Westwood Roundabout. Signal timings for the Westwood scheme have been taken from the Transyt outputs provided by AOne+ in 2012 and from an updated existing LinSig model for Birdwell roundabout and Junction 36.

Considering the updated Westwood Roundabout proposal specifically, we believe that it is sufficiently similar to the modelled proposal to not have a significant impact on the Birdwell Gyratory scheme assessment. The updated scheme is unlikely to greatly affect throughput of traffic to or from the A61 north, whilst the impact of any small change in throughput is not anticipated to cause much change at Birdwell given the distance of Westwood Roundabout to Birdwell Gyratory.

The reference case and scheme matrices were growthed to 2019 and 2024 traffic levels using TEMPRO growth factors to simulate future year testing. The differences on modelled performance between these and the 2014 scenarios has been discussed. All model outputs presented are the average of 10 random seed runs.

The analysis of the modeled journey times indicates that there is good beneficial impact of the Birdwell scheme on traffic in the AM and PM peak periods. The exceptions to this are on the A6135 and A61 approach from the south where some detrimental impact occurs in the AM peak. The detrimental impact of the scheme at these locations is likely caused by the increase in delay resulting from the implementation of signals which provide significant levels of green time to DVP and Sheffield Road to reduce congestion on these arms.

Overall the significant benefits on Sheffield Road, Dearne Valley Parkway and Junction 36 appear to offset any detrimental impact on the A6135 and A61 south. Visual assessment has been carried out in each of the models to support these conclusions.

Capabilities on project:
Transportation

Appendix A - Drawings

DO NOT SCALE

KEY

- PROPOSED RETAINING STRUCTURE
- PROPOSED PAVED AREAS AND FOOTWAYS
- AREA OF NEW CARRIAGEWAY CONSTRUCTION
- PROPOSED VEHICLE RESTRAINT SYSTEM
- PROPOSED PEDESTRIAN GUARD RAIL
- PROPOSED TRAFFIC SIGNAL
- PROPOSED BLOCK PAVING
- PROPOSED TIMBER FENCING
- EXISTING MASONRY PARAPET
- PROPOSED RED COLOURED TACTILE PAVING FOR SIGNALISED CROSSING
- PROPOSED BUFF COLOURED TACTILE PAVING FOR UNCONTROLLED CROSSING
- GRASS CONCRETE MAINTENANCE LAY BY FOR TRAFFIC SIGNALS EQUIPMENT.
- GRASS CONCRETE HARD STANDING FOR TEMPORARY VMS SIGN
- PROPOSED STEPS
- PROPOSED EARTHWORKS SLOPES
- SCHEME EXTENTS
- EXISTING PUBLIC RIGHT OF WAY

DISTANCE BETWEEN LANE DESTINATION TEXT INCREASED TO 68m SO IT IS DISPLAYED WHERE THE 2ND LANE BEGINS.

SCALE 1:1000

SCALE 1:1000

SCALE 1:1000

SCALE 1:500

SCALE 1:1000

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REV	DATE	BY	DESCRIPTION	CHK	APD
B	21/11/2014	ASG	GRASS CONCRETE HARD STANDING ADDED AND ROAD MARKINGS UPDATED	ISM	NGR
A	26/09/2014	JAC	FIRST ISSUE	ISM	NGR

DRAWING STATUS: FOR INFORMATION

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CLIENT: HIGHWAYS AGENCY

PROJECT: A61 WESTWOOD ROUNDABOUT IMPROVEMENTS

TITLE: GENERAL ARRANGEMENT

SCALE @ A1:	CHECKED:	APPROVED:
1:500	ISM	NGR
CAD FILE: 70001618_0000_002	DESIGN DRAWN: ASG - JAC	DATE: 03/09/2014
PROJECT No: 70001618	DRAWING No: 0000_002	REV: B

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P:\70001618 - A61 WESTWOOD ROUNDABOUT IMPROVEMENTS AND DRAWINGS\DETAILED DESIGN DRAWINGS\WIP\GENERAL ARRANGEMENT REVIEWED DWG'S AFTER RSA AND FURTHER REVIEW\70001618_0000_002 GENERAL ARRANGEMENT.DWG 17/12/2014 10:50:03 Gmc, Anlu

ROCKINGHAM ROUNDABOUT

ROUNDABOUT 2

ROUNDABOUT 1

BIRDWELL ROUNDABOUT

A6195 DEARNE VALLEY PARKWAY

Tankersley Common Side

ROCKINGHAM ROW

SHEFFIELD ROAD

A61

MOOR LANE

NEW ROAD

MACNAGHTEN ROAD

TANKERSLEY LANE

GREEN LANE

M1 MOTORWAY SOUTH BOUND

M1 JUNCTION 36

Tonk Top Bridge (FB)

Birdwell Common

Tankersley Common

Tankersley Common

Sports Ground

Hoyland Common

Allotment Gardens

Rockingham Business Park

Highways Depot

Hangsman Stone Bar Farm

Hoyland Common Primary School

Rockingham Community Hall

Drill Hall

Tankersley Garden of Rest

Birdwell Quarry (disused)

Warehouse

Eng Wks

Garage

Obelisk

Shelter

The Old Gate House

El Sub Sta

Hopper

Wood View

Strafford Grove

Lower School Ho

Works

Tank

Queens Keys Inn

Rockingham Arms

Soville Court

Nursery

Depot

Mast

TCB

Rising Track

Stand

Allotment Gardens

Path

Drain

Path (um)

Trees

Posts

Shelter

PH

CBS

Sub Sta

LB

PO

Telephone Kiosk

Stanehurst

Cottages

Junction

Garage

School House

Sunday School

Chapel

Cemetery

Gardens

Works

Tank

Allotment Gardens

Trees

Path

Drain

Posts

Shelter

PH

CBS

Sub Sta

LB

PO

Telephone Kiosk

Stanehurst

Cottages

Junction

Garage

School House

Sunday School

Chapel

Cemetery

Gardens

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Rev.	By	Amendments	Date
A	AJ	Amended layout to include accesss to HCA land from roundabout 2.	08/14

BARNSLEY
Metropolitan Borough Council

Project

A61 BIRDWELL
JUNCTION IMPROVEMENT

Drawing title

GENERAL
ARRANGEMENT

Scale	Drawn	Checked	Date
1:1000	AJ		20/06/2014

Drawing No.	Revision	File
HD/A61.69.1/GA/1	A	A61.69.1

D. Pownall, BEng, CEng, MICE, FCIHT.
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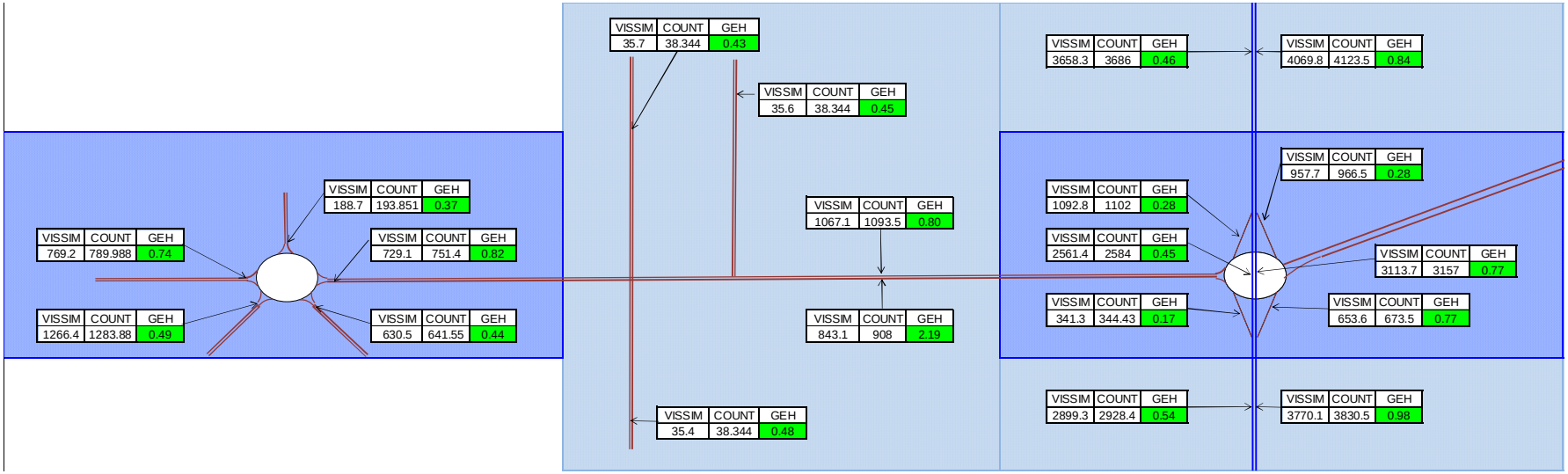
COMPUTER FILE

Capabilities on project:
Transportation

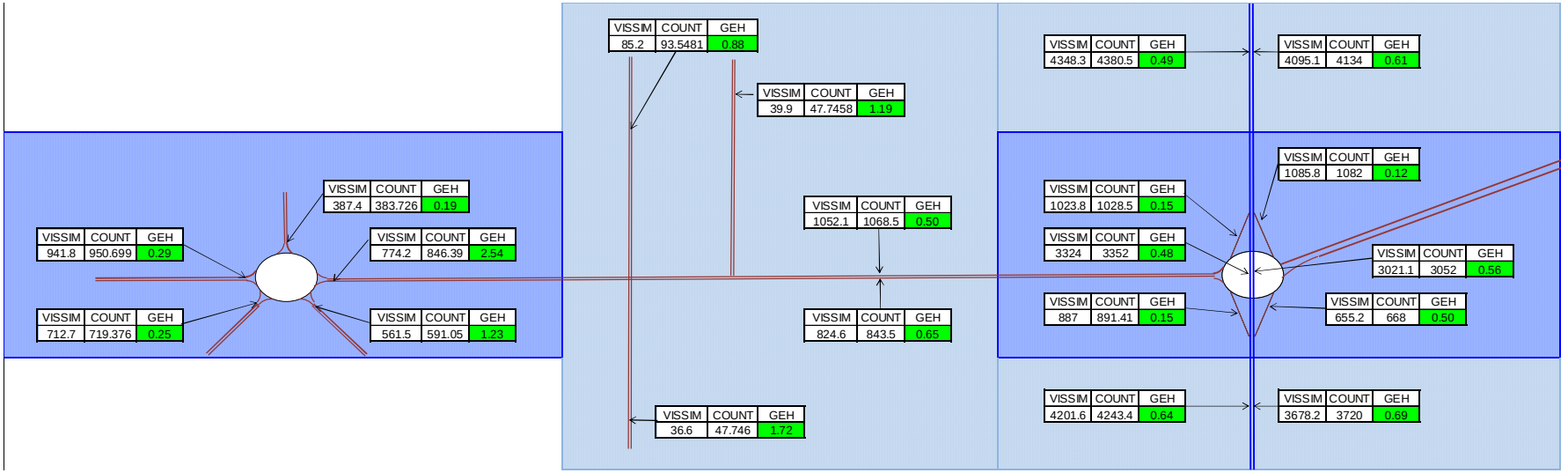
Appendix B - Calibration Data

Appendix B: Calibration Data

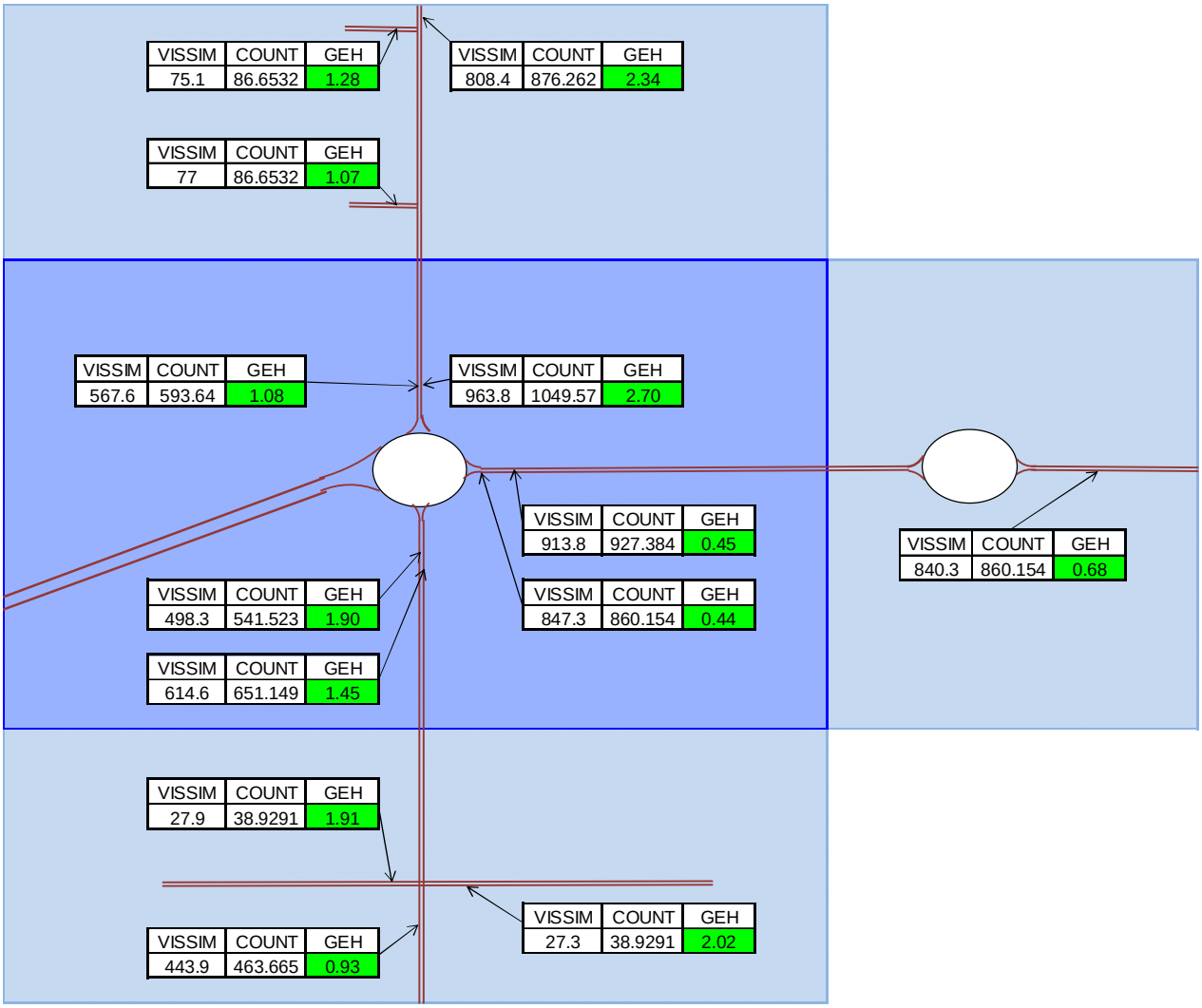
AM – Westwood Roundabout and M1 Junction 36



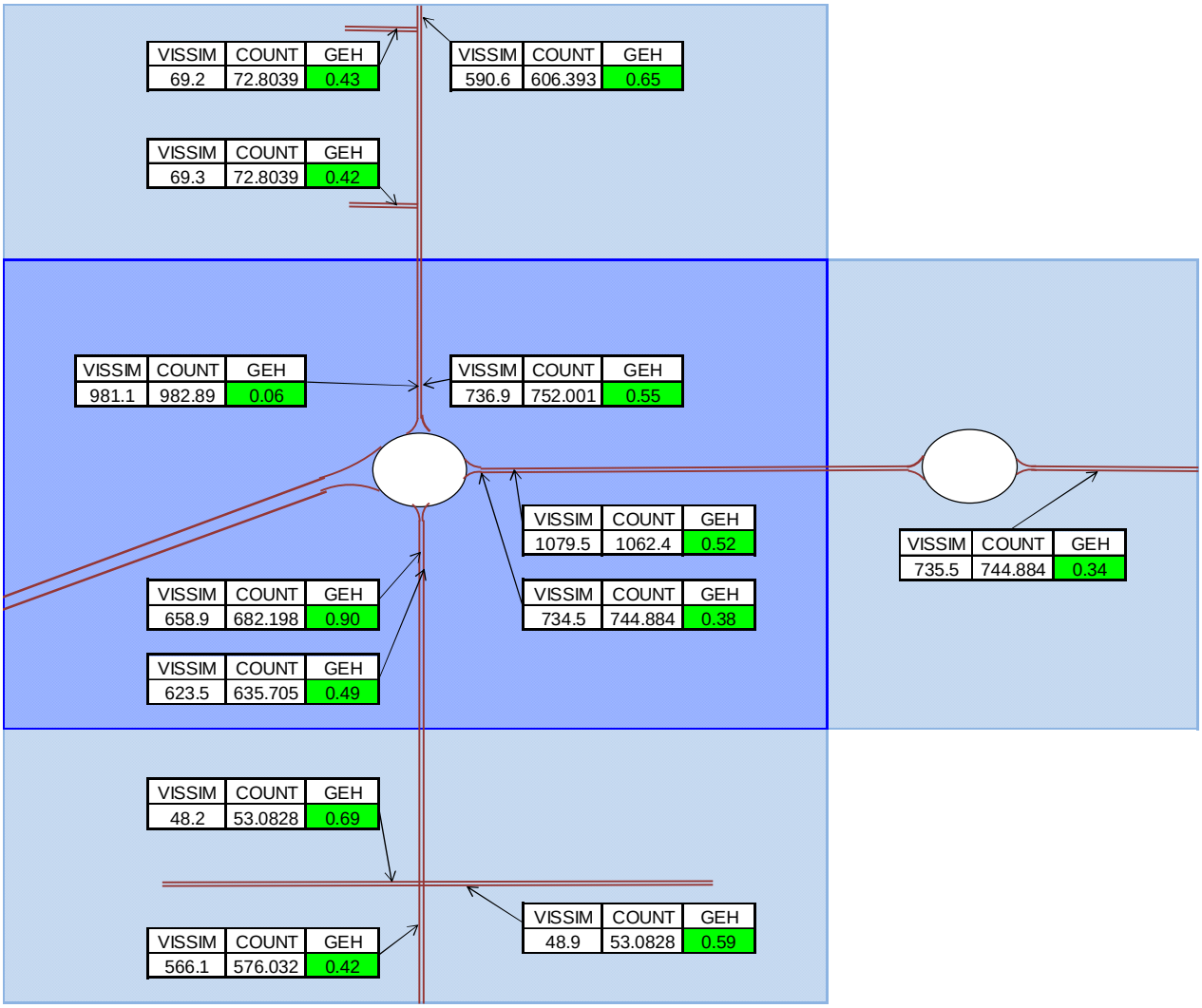
PM – Westwood Roundabout and M1 Junction 36



AM – Birdwell Roundabout



PM – Birdwell Roundabout

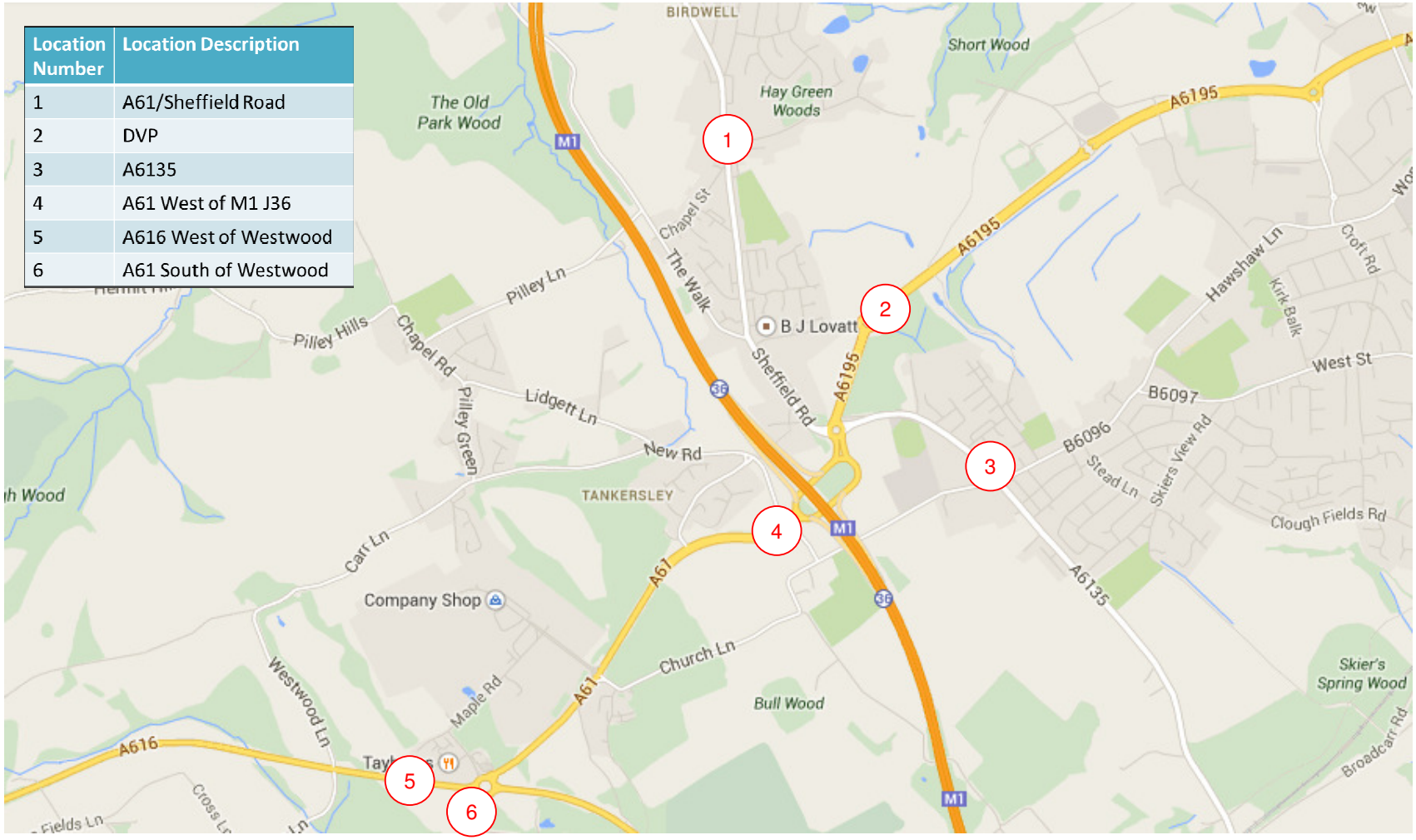


Capabilities on project:
Transportation

Appendix C – Journey Time Route Diagram

Appendix C: Journey Time Locations

Location Number	Location Description
1	A61/Sheffield Road
2	DVP
3	A6135
4	A61 West of M1 J36
5	A616 West of Westwood
6	A61 South of Westwood



Capabilities on project:
Transportation

Appendix D –Journey Time Results 2014

Appendix D: 2014 Journey Time Results

AM		2014 Base			2014 Scheme			Comparison			Comparison (%)	
Start	End	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	JT Distance change between Base and Scheme (M)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	A61 West of M1 J36	1696.4	450.3	3.8	1892.2	291.89	6.5	195.8	-158.41	2.7	-35%	72%
A61 West of M1 J36	A61 South of Westwood	1669.1	129.63	12.9	1665.8	101	16.5	-3.3	-28.63	3.6	-22%	28%
A61 West of M1 J36	A616 West of Westwood	1775.3	141.86	12.5	1760.6	118.16	14.9	-14.7	-23.7	2.4	-17%	19%
A616 West of Westwood	A61 West of M1 J36	1733.7	174.17	10.0	1721.3	115.53	14.9	-12.4	-58.64	4.9	-34%	50%
A61 South of Westwood	A61 West of M1 J36	1704.1	161.17	10.6	1673.7	119.6	14.0	-30.4	-41.57	3.4	-26%	32%
DVP	A61 West of M1 J36	951.8	203.8	4.7	958.8	111.18	8.6	7	-92.62	4.0	-45%	85%
A6135	A61 West of M1 J36	1127.3	142.45	7.9	1146	166.15	6.9	18.7	23.7	-1.0	17%	-13%
A61 West of M1 J36	DVP	872.8	82.55	10.6	856.9	89.73	9.5	-15.9	7.18	-1.0	9%	-10%

PM		2014 Base			2014 Scheme			Comparison			Comparison (%)	
Start	End	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	JT Distance change between Base and Scheme (M)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	A61 West of M1 J36	1696.4	448.93	3.8	1892.2	241.8	7.8	195.8	-207.13	4.0	-46%	107%
A61 West of M1 J36	A61 South of Westwood	1669.1	359.32	4.6	1665.8	105.12	15.8	-3.3	-254.2	11.2	-71%	241%
A61 West of M1 J36	A616 West of Westwood	1775.3	351.32	5.1	1760.6	113.78	15.5	-14.7	-237.54	10.4	-68%	206%
A616 West of Westwood	A61 West of M1 J36	1733.7	149.49	11.6	1721.3	103.54	16.6	-12.4	-45.95	5.0	-31%	43%
A61 South of Westwood	A61 West of M1 J36	1704.1	141.59	12.0	1673.7	90.62	18.5	-30.4	-50.97	6.4	-36%	53%
DVP	A61 West of M1 J36	951.8	141.4	6.7	958.8	104.81	9.1	7	-36.59	2.4	-26%	36%
A6135	A61 West of M1 J36	1127.3	149.45	7.5	1146	146.47	7.8	18.7	-2.98	0.3	-2%	4%
A61 West of M1 J36	DVP	872.8	92.22	9.5	856.9	86.23	9.9	-15.9	-5.99	0.5	-6%	5%

Capabilities on project:
Transportation

Appendix E –Journey Time Results 2019

Appendix E: 2019 Journey Time Results

AM		2019 Base			2019 Scheme			Comparison			Comparison (%)	
Start	End	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	A61 West of M1 J36	1696.4	476.98	3.6	1892.2	313.8	6.0	195.8	-163.18	2.5	-34%	70%
A61 West of M1 J36	A61 South of Westwood	1669.1	136.66	12.2	1665.8	102.26	16.3	-3.3	-34.4	4.1	-25%	33%
A61 West of M1 J36	A616 West of Westwood	1775.3	147.24	12.1	1760.6	119.57	14.7	-14.7	-27.67	2.7	-19%	22%
A616 West of Westwood	A61 West of M1 J36	1733.7	175.17	9.9	1721.3	126.92	13.6	-12.4	-48.25	3.7	-28%	37%
A61 South of Westwood	A61 West of M1 J36	1704.1	167.45	10.2	1673.7	124.02	13.5	-30.4	-43.43	3.3	-26%	33%
DVP	A61 West of M1 J36	951.8	345.62	2.8	958.8	112.04	8.6	7	-233.58	5.8	-68%	211%
A6135	A61 West of M1 J36	1127.3	156.44	7.2	1146	167.29	6.9	18.7	10.85	-0.4	7%	-5%
A61 West of M1 J36	DVP	872.8	84.15	10.4	856.9	91.41	9.4	-15.9	7.26	-1.0	9%	-10%

PM		2019 Base			2019 Scheme			Comparison			Comparison (%)	
Start	End	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	A61 West of M1 J36	1696.4	574.14	3.0	1892.2	249.84	7.6	195.8	-324.3	4.6	-56%	156%
A61 West of M1 J36	A61 South of Westwood	1669.1	386.27	4.3	1665.8	118.04	14.1	-3.3	-268.23	9.8	-69%	227%
A61 West of M1 J36	A616 West of Westwood	1775.3	382.12	4.6	1760.6	126	14.0	-14.7	-256.12	9.3	-67%	201%
A616 West of Westwood	A61 West of M1 J36	1733.7	161.45	10.7	1721.3	107.35	16.0	-12.4	-54.1	5.3	-34%	49%
A61 South of Westwood	A61 West of M1 J36	1704.1	148.63	11.5	1673.7	93.2	18.0	-30.4	-55.43	6.5	-37%	57%
DVP	A61 West of M1 J36	951.8	150.4	6.3	958.8	108.05	8.9	7	-42.35	2.5	-28%	40%
A6135	A61 West of M1 J36	1127.3	181.26	6.2	1146	148.27	7.7	18.7	-32.99	1.5	-18%	24%
A61 West of M1 J36	DVP	872.8	112.88	7.7	856.9	87.05	9.8	-15.9	-25.83	2.1	-23%	27%

Capabilities on project:
Transportation

Appendix F –Journey Time Results 2024

Appendix F: 2024 Journey Time Results

AM		2024 Base			2024 Scheme			Comparison			Comparison (%)	
Start	End	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	A61 West of M1 J36	1696.4	510.23	3.3	1892.2	412.59	4.6	195.8	-97.64	1.3	-19%	38%
A61 West of M1 J36	A61 South of Westwood	1669.1	158.88	10.5	1665.8	104.34	16.0	-3.3	-54.54	5.5	-34%	52%
A61 West of M1 J36	A616 West of Westwood	1775.3	166.81	10.6	1760.6	121.89	14.4	-14.7	-44.92	3.8	-27%	36%
A616 West of Westwood	A61 West of M1 J36	1733.7	175	9.9	1721.3	136.99	12.6	-12.4	-38.01	2.7	-22%	27%
A61 South of Westwood	A61 West of M1 J36	1704.1	168.75	10.1	1673.7	132.05	12.7	-30.4	-36.7	2.6	-22%	26%
DVP	A61 West of M1 J36	951.8	376.76	2.5	958.8	112.84	8.5	7	-263.92	6.0	-70%	236%
A6135	A61 West of M1 J36	1127.3	161.77	7.0	1146	166.52	6.9	18.7	4.75	-0.1	3%	-1%
A61 West of M1 J36	DVP	872.8	87.48	10.0	856.9	92.1	9.3	-15.9	4.62	-0.7	5%	-7%

PM		2024 Base			2024 Scheme			Comparison			Comparison (%)	
Start	End	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Distance (M)	Average JT (Secs)	Average Speed (M/Sec)	Average JT (Secs)	Average Speed (M/Sec)
A61/Sheffield Road	A61 West of M1 J36	1696.4	655.43	2.6	1892.2	258.05	7.3	195.8	-397.38	4.7	-61%	183%
A61 West of M1 J36	A61 South of Westwood	1669.1	265.87	6.3	1665.8	205.22	8.1	-3.3	-60.65	1.8	-23%	29%
A61 West of M1 J36	A616 West of Westwood	1775.3	262.91	6.8	1760.6	195.17	9.0	-14.7	-67.74	2.3	-26%	34%
A616 West of Westwood	A61 West of M1 J36	1733.7	169.11	10.3	1721.3	114.57	15.0	-12.4	-54.54	4.8	-32%	47%
A61 South of Westwood	A61 West of M1 J36	1704.1	166.29	10.2	1673.7	99.09	16.9	-30.4	-67.2	6.6	-40%	65%
DVP	A61 West of M1 J36	951.8	163.32	5.8	958.8	113.45	8.5	7	-49.87	2.6	-31%	45%
A6135	A61 West of M1 J36	1127.3	295.15	3.8	1146	152.64	7.5	18.7	-142.51	3.7	-48%	97%
A61 West of M1 J36	DVP	872.8	134.1	6.5	856.9	88.02	9.7	-15.9	-46.08	3.2	-34%	50%