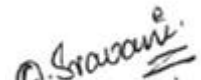
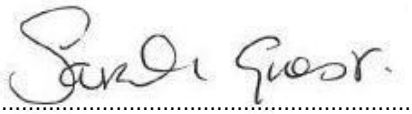
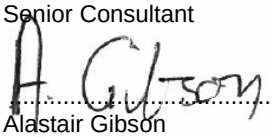
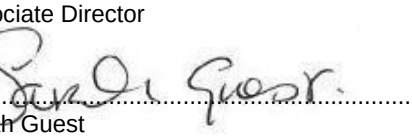
Peddimore Access Modelling

Final Report

Prepared by:		Checked by:	
	Sravani Vuppala Senior Consultant		Sarah Guest Associate Director
Verified by:		Approved by:	
	Alastair Gibson Principal Consultant		Sarah Guest Associate Director

Peddimore Access Modelling

Rev No	Comments	Prepared by	Checked by	Verified by	Approved by	Date
1.0	Final Report	SV	SG	AG	SG	27/06/2014

Colmore Plaza, Colmore Circus Queensway, Birmingham, B4 6AT
Telephone: 0121 262 1900 Website: http://www.aecom.com

Job No 60316941 Reference: 60316941Peddimore Access Modelling Date Created: June 2014

\\ukbhm2fp001\ukbhm2fp001-v1tp\tem\project\bcc - peddimore access modelling\3. execution\tech note\peddimore access modelling - final report rev 1.0.docx

Table of Contents

1 Introduction

1 Introduction

1.1 Overview

Birmingham City Council (BCC) is currently formulating and promoting the Birmingham Development Plan (BDP). The BDP sets out the statutory planning framework that will guide development and regeneration in the period to 2031. It is anticipated that by 2031 Birmingham's population will grow by 150,000. The BDP is being formally consulted on during early 2014 and proposes to release green belt land in the north of the city, specifically in the Sutton Coldfield and Walmley areas, to accommodate around 6,000 residential dwellings and up to 80 hectares of new employment land (known as the Peddimore development). In this context a transport infrastructure plan is being developed to consider necessary interventions to facilitate such development.

This report follows on from work AECOM carried out to assess the impact of the proposed Birmingham Development plan, and particularly the proposed Peddimore development, on the A38/A4097 Minworth roundabout and A38 Tyburn House roundabout, both of which identified the infrastructure improvements required to support the BDP.

1.2 Study Scope

This report details the assessment of the access proposals considered as part of the Peddimore development and draws conclusions on the ability of each of the proposed access options to meet the forecast traffic demands. Two junctions are considered in this report:

- Peddimore Access Option: a new access on the A38 to the north of Minworth Roundabout. Three options have been examined: left-in/out, left-in/out with over bridge and a signalised roundabout
- Water Orton Lane/Kingsbury Road junction: changes to the existing junction have been examined to address existing congestion and mitigate the impact of forecast traffic in future years.

The location of these junctions is shown in Figure 1.

This work considers only the infrastructure required to meet forecast future year demands. Traffic forecasting has been carried out by Phil Jones Associates (PJA), who have been retained by BCC to provide strategic modelling advice and impact assessment in relation to the BDP.

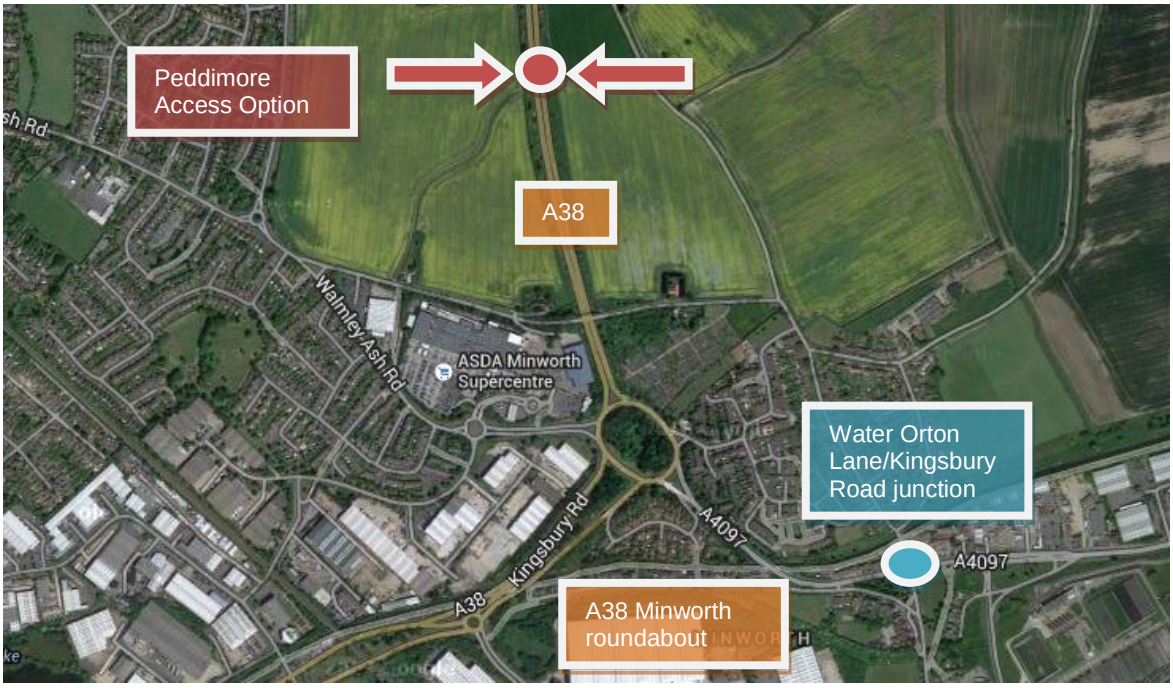


Figure 1: Overview of Peddimore Access modelling

2 Access Option – A38 Peddimore Access

2 Access Option – A38 Peddimore Access

2.1 Scenario Tests

We understand that Birmingham City Council (BCC) commissioned Phil Jones Associates (PJA) to develop access options to accommodate around 6,000 residential dwellings and up to 80 hectares of new employment in the Sutton Coldfield and Walmley area. PJA have proposed three access options which are:

- Scenario 1 - Access to and from the A38 from the Peddimore development via:
  - A left in, left out junction – as an access for the residential development (west of the A38) and
  - A left in left out junction – as an access for the employment development (east of the A38).
- Scenario 2 – Access to and from the A38 from the Peddimore development via:
  - A left in, left out junction - as an access for the residential development (west of the A38) and
  - A left in left out junction – as an access for the employment development (east of the A38).
  - A bridge over the A38 linking the two accesses (to enable all movements to be made) and to allow movements to be made between the development parcels either side of the A38.
- Scenario 3 – Access to and from the A38 from the Peddimore development via a new at-grade signalised roundabout around 400m north of the Minworth roundabout. The new roundabout has four arms, two of which serve the development and the other two serve the A38.

In addition to these scenarios AECOM have developed a further scenario test, Scenario 0, which tests the 2031 future year without the Peddimore development.

BCC have commissioned AECOM to undertake modelling work in TRANSYT to test each of these scenarios in a 2031 future year. The modelling has been undertaken by extending the preferred option model at Minworth roundabout, developed as part of the testing for that junction. The preferred solution for dealing with the impact of Peddimore development at Minworth, assumes that the development traffic arrives from the north on the A38. A drawing showing the recommended solution for Minworth Roundabout is provided in **Appendix A.**

2.2 Information Provided by PJA

PJA have provided the following information to AECOM:

- 2031 flows for all scenarios in a spreadsheet titled ‘Development Scenario v2’.
- HGV percentages for development trips in a spreadsheet titled ‘Development Scenarios HGV %ages’
- A CAD drawing for an at-grade roundabout (Scenario 3) (Dwg no: 1064-02 Rev B). This drawing is shown in **Appendix A**.
- No drawing has been provided for the left in and left out options (Scenario’s 1 and 2).

2.3 Modelling Methodology and Scenarios

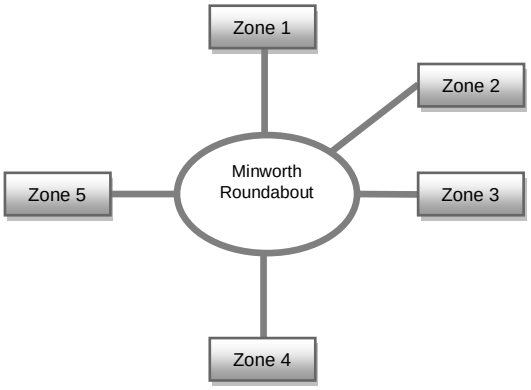
2.3.1 2031 Scenario 0 Flow calculations

This scenario does not include the Peddimore development. PJA have provided 2031 flows (in vehicles) at the Minworth roundabout.

AECOM have made the following assumptions in calculating the 2031 flows in PCUs:

- HGV percentages at the Minworth roundabout have not been provided and therefore AECOM have assumed the same percentages as the 2013 base year (extracted from the manual turning counts dated 19th November 2013).

These calculations are shown in **Appendix B**. The Zones in TRANSYT are shown in **Figure 2** below.



Zone	Approach
1	A38 North
2	Lindridge Drive
3	A4097 Kingsbury Road
4	A38 South
5	Walmley Ash Road

Figure 2: TRANSYT Zone Structure – Scenario 0

2.3.2 2031 Scenario 0 Modelling Results:

The 2031 Scenario 0 flows have been tested in the TRANSYT model for the preferred option at the A38/A4097 Minworth roundabout. The results from the model for each arm are shown in **Table 1** below. Outputs are provided in **Appendix B**.

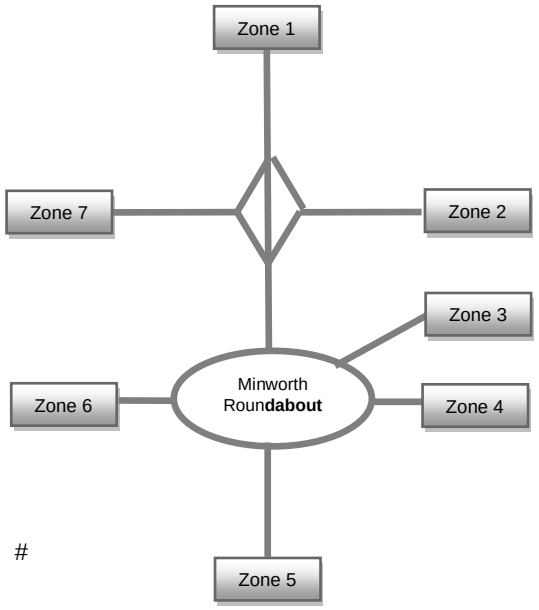
Results		2031 AM		2031 PM	
Arms	Approach	Degree of Sat. (%)	Mean Max Queue (pcu)	Degree of Sat. (%)	Mean Max Queue (pcu)
A	A38 N	71	9	85	11
B	Lindridge Drive	54	1	13	0
C	A4097 Kingsbury Road	87	16	59	13
D	A38 South	51	9	85	18
E	Walmley Ash Road	73	10	71	11

Table 1: 2031 Future Year Model Results for Scenario 0

The results from the model show that the junction operates within capacity on all arms of the roundabout for the preferred option at Minworth roundabout, in both peak periods.

2.4 Scenario 1: Access via Left In, Left Out Junctions to A38

Scenario 1 includes the Peddimore development with access slip roads onto and off the A38 to each site. This scenario assumes two left in and left out junctions on the A38 north of Minworth roundabout, one to provide access for the residential development and the second junction to provide access for the employment development. PJA have provided 2031 flows (in vehicles) and also HGV percentages for development traffic. AECOM have calculated the flows in PCUs based on the Zones in the TRANSYT model. Network results are presented in **Appendix C**. The Zones in TRANSYT are shown in **Figure 3** below.



Zones	Approach
1	A38 North
2	Peddimore Lane
3	Lindridge Drive
4	A4097 Kingsbury Road
5	A38 South
6	Walmley Ash Road
7	Development Access

#

Figure 3: TRANSYT Zone Structure – Scenario 1

2.4.1 2031 Scenario 1 Flow Calculations:

AECOM have made the following assumptions in calculating the 2031 flows in PCUs:

- Flows from Zones 1, 2 and 7 to Zones 3, 4, 5 and 6 have been distributed based on the flows heading into the Minworth roundabout on the A38 North approach and vice versa for flows to Zones 1, 2 and 7 from Zones 3, 4, 5 and 6.
- HGV percentages for the development accesses provided by PJA have been used to calculate the number of HGVs from Zone 2. No HGVs are generated from Zone 7.
- HGV percentages at the Minworth roundabout have not been provided for the 2031 future year therefore AECOM have assumed the same percentages as the 2013 base year (extracted from the manual turning counts dated 19th November 2013).
- It should be noted that due to the left in and left out option, development traffic would need to u-turn either at the M6 Toll/A38 junction, to the north on the A38, or at the Minworth roundabout (depending on which Zone they wish to use for access/egress). To consider this the following calculations have been made:
  - Flows from Zone 1 and some traffic from Zone 2 needs to u-turn at Minworth roundabout to access Zone 7.
  - Similarly flows from Zone 7 to Zones 2, 3, 4, 5 and 6 will need to u-turn at the A38/M6 Toll roundabout. This roundabout is not included in the TRANSYT model, therefore all the u-turning traffic has been added to the flows from Zone 1.
  - In addition, flows from Zones 3, 4, 5 and 6 to Zone 2 will u-turn at the A38/M6 Toll roundabout. These flows have also been added to Zone 1.

Using the assumptions above, AECOM have calculated all the flows using the network to represent the left in and left out scenario at the two accesses on to the A38.

2.4.2 Layout of Left in/Left out:

No drawings of the left in and left out option have been developed. Therefore in order to build the TRANSYT model, AECOM have assumed that the junctions will be built to the standards in:

- DMRB volume 6 section 2 part 5 – TD 40/94 - Figure 6/2 for the lane widths at the give way and
- The visibility standards at the junction based on DMRB volume 6 section 2 part 6 – TD 42/95 – Table 7/1.

2.4.3 2031 Scenario 1 Modelling Results:

The 2031 Scenario 1 flows have been run in the TRANSYT model for the preferred option at the A38/A4097 Minworth roundabout and the left in left out option at the Peddimore development accesses. The results from the model for each arm are shown in **Table 2** below and outputs are provided in **Appendix C**.

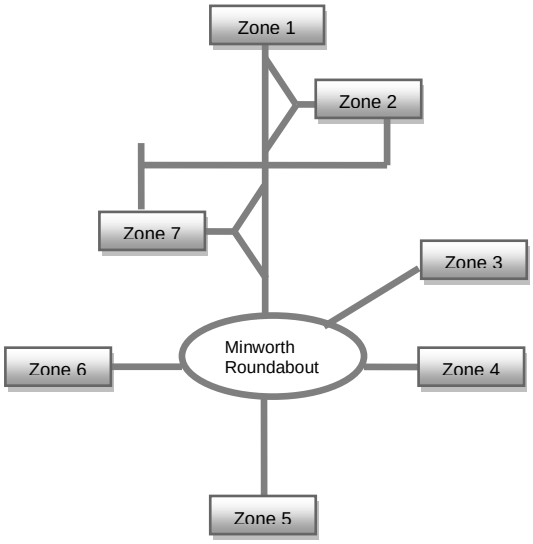
Zone	Approach	2031 AM		2031 PM	
		Degree of Sat. (%)	Mean Max Queue (pcu)	Degree of Sat. (%)	Mean Max Queue (pcu)
1	A38 North	114	147	48	0
2	Peddimore Lane	55	0	172	225
	A38 North at Minworth roundabout	88	19	87	20
3	Lindridge Drive	32	1	7	0
4	A4097 Kingsbury Road	94	22	89	21
5	A38 South	84	17	84	20
6	Walmley Ash Road	106	29	103	36
	A38 South at Peddimore	70	9	92	41
7	Development Access	207	337	97	10

Table 2: 2031 Future Year Model Results for Scenario 1

The results from the model show that the Development access (Zone 7) operates over capacity in the AM peak and that the Peddimore Lane access (Zone 2) operates over capacity in the PM peak. This indicates that roughly half of traffic from the full development would be unable to access the network in the peak periods. Even if the traffic was released from the development accesses, it is AECOM's view that the M6 Toll roundabout junction and the Minworth roundabout (where traffic would be required to U-turn) would be unable to accommodate the development traffic demand.

2.5 Scenario 2: Access via Left In, Left Out Junctions to A38 with Bridge

Scenario 2 includes the Peddimore development with a grade separated, half cloverleaf quadrant junction over the A38. This scenario assumes two left in and left out junctions one for residential development access and the other for employment but these two accesses are linked, with a bridge over the A38. PJA have provided 2031 flows (in vehicles) and also HGV percentages from the development. AECOM have calculated the flows in PCUs based on the Zones in the TRANSYT model and these are shown in **Figure 4** below. Network results are presented in **Appendix D**.



Zone	Approach
1	A38 North
2	Peddimore Lane
3	Lindridge Drive
4	A4097 Kingsbury Road
5	A38 South
6	Walmley Ash Road
7	Development Access

Figure 4: TRANSYT Zone Structure – Scenario 2

2.5.1 2031 Scenario 2 Flow Calculation:

AECOM have made the following assumptions in calculating the 2031 flows in PCUs:

- Flows from Zone 1 and 2 to Zones 3, 4, 5 and 6 have been distributed based on the flows heading into the Minworth roundabout on the A38 North approach. No flows have been distributed to Zone 7 as these will be travelling from Zone 2 due to the bridge between these Zones.
- Flows from Zones 3, 4, 5 and 6 to Zones 1 and 7 have been distributed based on flows exiting the Minworth roundabout along the A38 North approach. No flows have been distributed to Zone 2 as these will be travelling from Zone 7 due to the bridge across these Zones.
- No flows have been distributed from Zone 7 to Zones 2, 3, 4, 5 and 6 as these will be travelling from Zone 2 due to the bridge between these Zones.
- HGV percentages for the development accesses provided by PJA have been used to calculate the number of HGVs from Zone 2. No HGVs have been assumed to be generated from Zone 7.
- HGV percentages at the Minworth roundabout have not been provided for the 2031 future year therefore AECOM have assumed the same percentages as the 2013 base year (extracted from the manual turning counts dated 19th November 2013).

Using the above, AECOM have calculated flows using the network to represent the left in and left out scenario, with a bridge across the A38 at the development accesses.

2.5.2 Layout of Left in/Left out and bridge across the A38:

No drawings of the left in and left out option have been developed. However, this scenario is similar to Scenario 1, therefore AECOM have used the same TRANSYT model developed for Scenario 1 but have re-run with Scenario 2 flows.

2.5.3 2031 Scenario 2 Modelling Results:

The 2031 Scenario 2 flows have been run in the TRANSYT model for the preferred option at the A38/A4097 Minworth roundabout and left-in, left-out Peddimore development access option with a bridge across A38. The results from the model for each arm are shown in **Table 3** below and the outputs are provided in **Appendix D**.

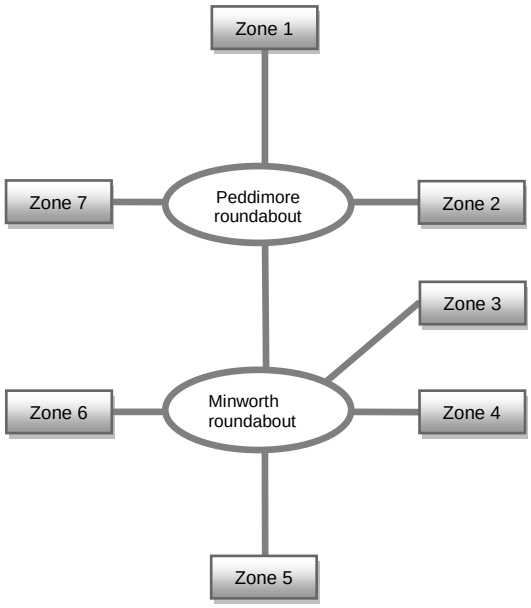
Zones	Approach	2031 AM		2031 PM	
		Degree of Sat. (%)	Mean Max Queue (pcu)	Degree of Sat. (%)	Mean Max Queue (pcu)
1	A38 North	39	0	27	0
2	Peddimore Lane	220	377	210	365
	A38 North at Minworth roundabout	84	16	88	18
3	Lindridge Drive	135	13	31	0
4	A4097 Kingsbury Road	87	19	82	19
5	A38 South	52	10	88	22
6	Walmley Ash Road	101	39	92	21
	A38 South at Peddimore	80	25	79	14
7	Development Access	12	0	15	0

Table 3: 2031 Future Year Model Results for Scenario 2

The results from the model show that the Peddimore Lane access (Zone 2) operates over capacity in both peaks. This indicates that less than half of traffic from the full development would be able to access the network in the peak periods. If the traffic was released from Peddimore Lane it is likely that the A38N approach at Minworth roundabout would be at capacity.

2.6 Scenario 3: : Access via Roundabout to A38

Scenario 3 includes the Peddimore development with an at-grade four arm roundabout on the A38. This scenario assumes that the Peddimore development is accessed via two arms from a roundabout and the remaining two arms are connected to the A38. PJA have provided 2031 flows (in vehicles) and also HGV percentages for development traffic. AECOM have calculated the flows in PCUs based on the Zones utilised in the TRANSYT model and these are shown in **Figure 5** below. Network results are presented in **Appendix E**.



Zone	Approach
1	A38 North
2	Peddimore Lane
3	Lindridge Drive
4	A4097 Kingsbury Road
5	A38 South
6	Walmley Ash Road
7	Development Access

Figure 5: TRANSYT Zone Structure – Scenario 3

2.6.1 *2031 Scenario 3 Flow Calculation:*

AECOM have made the following assumptions in calculating the 2031 flows in PCUs:

- Flows from Zones 1, 2 and 7 to Zones 3, 4, 5 and 6 have been distributed based on the flows heading into Minworth roundabout on the A38 North approach and vice versa for flows to Zones 1, 2 and 7 from Zones 3, 4, 5 and 6.
- HGV percentages for the development accesses provided by PJA have been used to calculate the number of HGVs from Zone 2. No HGVs have been assumed to be generated from Zone 7.
- HGV percentages at the Minworth roundabout have been not provided for the 2031 future year and therefore AECOM have assumed the same percentages as the 2013 base year (extracted from the manual turning counts dated 19th November 2013).

Using the above, AECOM have calculated all the flows using the network to represent the roundabout scenario.

2.6.2 At grade roundabout on the A38:

PJA have developed a sketch plan for this option (shown in CAD drawing no: 1064-02 rev B) for this option. The drawing is included in **Appendix A**. The at-grade roundabout is signalised on all arms. In addition dedicated signalised bus lanes are provided between the two development accesses which cross the central island of the roundabout.

AECOM have calculated geometric parameters from the drawing and revised the TRANSYT model to add the new roundabout to the existing model, which includes the preferred option at the Minworth roundabout.

2.6.3 2031 Scenario 3 Modelling Results:

The 2031 Scenario 3 flows have been run in the TRANSYT model for the preferred option at the A38/A4097 Minworth roundabout with an at-grade signalised roundabout on the A38
The results suggest that the roundabout option will not work within capacity. In the AM peak, severe queues are forecast along the A38 North at the new roundabout and also on the A38N approach to the Minworth roundabout. Queues are noted on the development access arms, which suggest that much of the development traffic will not be able to access the network during the peak periods. In the PM peak, severe queues are noted on the Peddimore Lane entry, on the A38 North (at the Minworth roundabout) and also at the A38 south approach to the Peddimore roundabout. It is noted that even in the PM peak a large portion of development traffic is unable to access the network during the peak period. It is also noted that there are severe queues on the circulatory of the new at grade roundabout in both peaks. This has also has knock on effects on the operation of the Minworth roundabout.

In light of these model tests, AECOM have proposed changes to the roundabout option and this is referred to as Scenario 3a. The following changes are proposed:

- Removing the bus links from the signalised roundabout
- Widening the development approaches and providing longer flares on approach to the junction
- In addition adjustments to the signal timings have been made to minimise queues on the circulatory.

The results from the revised AECOM model (Scenario 3a) are shown in **Table 4** below, outputs are provided in **Appendix E** and the drawing of the revised option is shown in **Appendix A.**

.

Zones	Approach	2031 AM		2031 PM	
		Degree of Sat. (%)	Mean Max Queue (pcu)	Degree of Sat. (%)	Mean Max Queue (pcu)
1	A38 North	104	36	67	11
2	Peddimore Lane	80	5	86	14
	A38 North at Minworth roundabout	100	33	105	47
3	Lindridge Drive	115	9	16	0
4	A4097 Kingsbury Road	65	14	71	16
5	A38 South	63	13	88	23
6	Walmley Ash Road	102	41	93	22
	A38 South at Peddimore	82	22	81	16
7	Development Access	104	32	101	16

Table 4: 2031 Future Year Model Results for Scenario 3a

Table 4 shows that the network still operates over capacity on some of the arms by 2031 in both peak periods but the queues on the approaches are shorter in comparison to the other options and the vast majority of traffic is able to access the network in the peak period. AECOM recommend Scenario 3a, over all other scenarios, since this option is best able to accommodate the forecast demand to 2031.

2.7 Cost Estimate

The cost of the new at grade roundabout on the A38 has been estimated at around **£12.7 million.** The estimated cost for the preferred option at Minworth Roundabout as stated in the Feb 2014 AECOM report was around **£3.1 million.**

Therefore the overall cost estimate for providing access to the Peddimore development is around **£15.8 million**

All these estimates are subject to a number of exclusions and assumptions appropriate to the level of scheme design. Full details of the cost estimates are contained in **Appendix F**. The cost estimates include optimism bias, traffic management measures, preliminary and detailed design costs but are subject to the following standard caveats and exclusions:

- 3rd Party Land acquisition costs and accommodation works costs are excluded.
- Dedication of Land, Land to be passed over to the council as highway is excluded.
- Legal costs are excluded.
- Landscaping design is excluded.
- Statutory Undertakers design fee is excluded.
- Statutory Undertakers diversion and or protection costs are excluded.
- Third Party Ground Investigation costs are excluded. Trial Pits and Geotechnical surveying will be supplied by third parties.
- Traffic Regulation Orders & any associated TRO consultation are excluded.
- Costs of contract documentation for appointment of the preferred contractor are excluded.
- Costs Tendering of the works are excluded.

The full cost estimates can be found in **Appendix F.**

2.8 Conclusion and Recommendations

This section provides the modelling results for various proposed access options considered for the Peddimore development (Scenarios 0, 1, 2 and 3) provided by PJA. The initial options developed by PJA have been refined following testing by AECOM to develop a recommended solution for the A38 Peddimore access junction. AECOM have modified the at-grade roundabout option (Scenario 3) by removing the bus links on the development accesses and also through the circulatory island to create additional capacity at the roundabout (Scenario 3a). This is shown on drawing 60316941-SKE-30-CT-004 in **Appendix A.**

Although option 3a operates with some arms over capacity in 2031 with the full development demand, it operates markedly better than the other access options that have been considered for direct access to the A38 from the proposed Peddimore site.

However, consideration should be given to how much demand should be accommodated on the highway network as junctions elsewhere on the corridor are already at capacity with existing network conditions.

Therefore to enable the growth forecast within the Birmingham Development Plan, improvements should be considered by BCC along the A38 to provide additional capacity and smoother traffic flow. In addition alternative sustainable options should be investigated such as park and ride, improvements to rail services etc to foster modal shift and reduce the demand on the network, especially during peak periods.

3 Kingsbury Road/Water Orton Lane junction

3 Kingsbury Road/Water Orton Lane junction

3.1 Introduction

BCC were concerned about the potential impact of the Peddimore development on the Kingsbury Road/Water Orton Lane junction, which is about 500m east of Minworth Roundabout. This stems from concerns that the traffic waiting to turn right into Water Orton Lane could cause traffic to back up to Minworth roundabout and interfere with its operation should the additional load of traffic from the Peddimore development be realised in full.

AECOM have therefore extended the TRANSYT modelling to include this junction and tested the impact of the 2031 flows at this junction.

3.2 Existing junction operation

The Water Orton Lane / Kingsbury Road junction is a cross roads junction, 500m east of the Minworth roundabout. The Cottage Lane arm operates as one way only with vehicles only able to exit the junction. There is however a contra-flow cycle lane which triggers a stage at the traffic signals if required. No classified counts or queue survey data are available at the Water Orton Lane / Kingsbury Road/Cottage Lane junction from Spectrum.

AECOM undertook a site visit on 25th March 2014 in the AM peak only and made general observations at the junction. Queues were noted along the Kingsbury Road East and West approaches at the junction with minimal queues of around 10 vehicles observed in the right turn lane from the Kingsbury Road West approach. Minimal queues were noted on the Water Orton Lane approach. All queues were observed to clear on each cycle.

BCC have provided the traffic signal specification for the Water Orton Lane/ Kingsbury Road junction. AECOM have incorporated the intergreens from the specification and it is noted that some of the stages are demand dependent. Due to limitations of TRANSYT modelling, AECOM have run the pedestrian stages at the staggered crossing on the Kingsbury Road running in each cycle. Therefore the results from the model at this junction represent a worst case scenario.

Each of the traffic scenarios have been tested with the existing Water Orton Lane junction layout. The results of these tests suggest that the junction will operate over capacity in the 2031 future year and therefore improvements are required at this junction. Tests with improvement options have been undertaken for the worst case scenario to assess whether the development impact can be mitigated.

3.3 Improvement Options

Two improvement options have been considered at this junction and the drawings are provided in **Appendix A,** they are;

1. Widening to provide two lanes along the Kingsbury Road East and West approaches, with the staggered crossing converted to a straight crossing on the Kingsbury Road East approach. The scheme is shown in **AECOM drawing 60316941-SKE-30 CT-002.**

2. We have also considered whether the Water Orton Lane right turn should be restricted to vehicles needing to access the village green area only, with a closure on Water Orton Lane. Vehicles wishing to access the remainder of Water Orton Lane and the route to Castle Vale would be diverted to a revised junction with Minworth Parkway (around 100m), to the east of the Water Orton Lane junction. The scheme is shown in **AECOM drawing 60316941-SKE-30 CT-003.**

3.4 Modelling Scenarios

3.4.1 Scenario A: Base Year assessment

In this scenario the existing TRANSYT model for the Minworth Preferred Option has been extended to include the existing layout at the Water Orton Lane/ Kingsbury Road/ Cottage Lane junction. This model has been developed to help us to understand the validation of the Water Orton Lane / Kingsbury Road / Cottage Lane junction in the base year scenario so that future year results can be understood.

AECOM have made the following assumptions in calculating the 2013 flows in PCUs:

- Flows from Zones 1, 2, 6 and 7 to Zones 3, 4 and 5 have been distributed based on the flows heading into the Water Orton Lane/Kingsbury Road/ Cottage Lane junction on the Kingsbury Road West approach and vice versa for flows to Zones 1, 2, 6 and 7 from Zones 3, 4 and 5.
- It should be noted that Zone 3 has no entry and exit vehicle flows in the modelling.
- 2013 HGV percentages at the Minworth roundabout have been extracted from the manual turning counts dated 19th November 2013.
- No classified counts are available at the Water Orton Lane / Kingsbury Road/ Cottage Lane junction from the Spectrum database. Therefore AECOM have assumed that no HGV movements are present on Water Orton Lane at this junction and all HGVs shown as travelling to and from Kingsbury Road at the Minworth roundabout continued through this junction (i.e. along Kingsbury Road).

These calculations are shown in **Appendix G**. The Zones in TRANSYT for Scenario A are shown in **Figure 6** below.

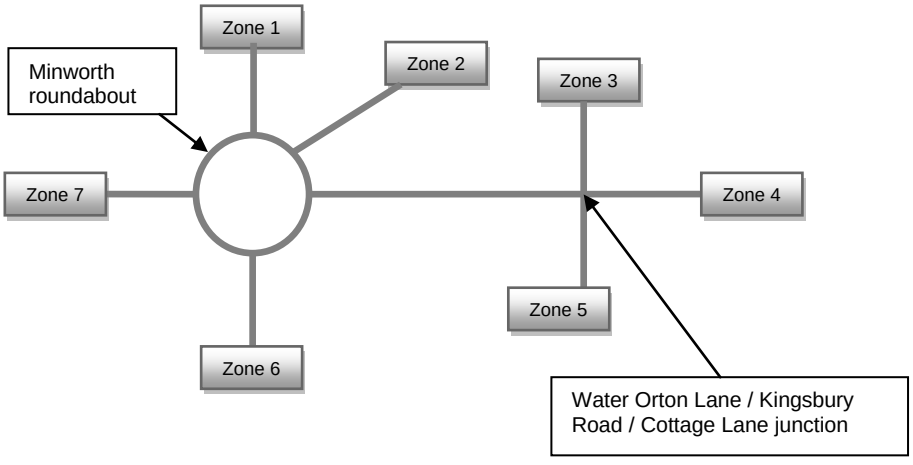
3.4.2 Scenario B: Future Year Baseline Assessment

In this scenario the existing TRANSYT model for the Minworth Preferred Option model has been extended to include the existing layout at the Water Orton Lane/ Kingsbury Road/ Cottage Lane junction.

AECOM have made the following assumptions in calculating the 2031 flows in PCUs:

- 2031 flows provided by PJA are distributed in the same manner as the Scenario A flows from each zones for cars.
- It is noted that the growth factor used by PJA is 1.2965 for the 2031 future year. Therefore this factor has been applied to the 2013 HGVs calculated by AECOM in Scenario A to obtain 2031 HGV flows.

These calculations are shown in **Appendix H**. The Zones in TRANSYT for Scenario B are shown in **Figure 6** below.



Zone	Approach
1	A38 North
2	Lindridge Drive
3	Cottage Lane
4	A4097 Kingsbury Road
5	Water Orton Lane
6	A38 South
7	Walmley Ash Road

Figure 6: TRANSYT Zone Structure – Scenario A and B

3.4.3 Scenario C: Future Year with Development

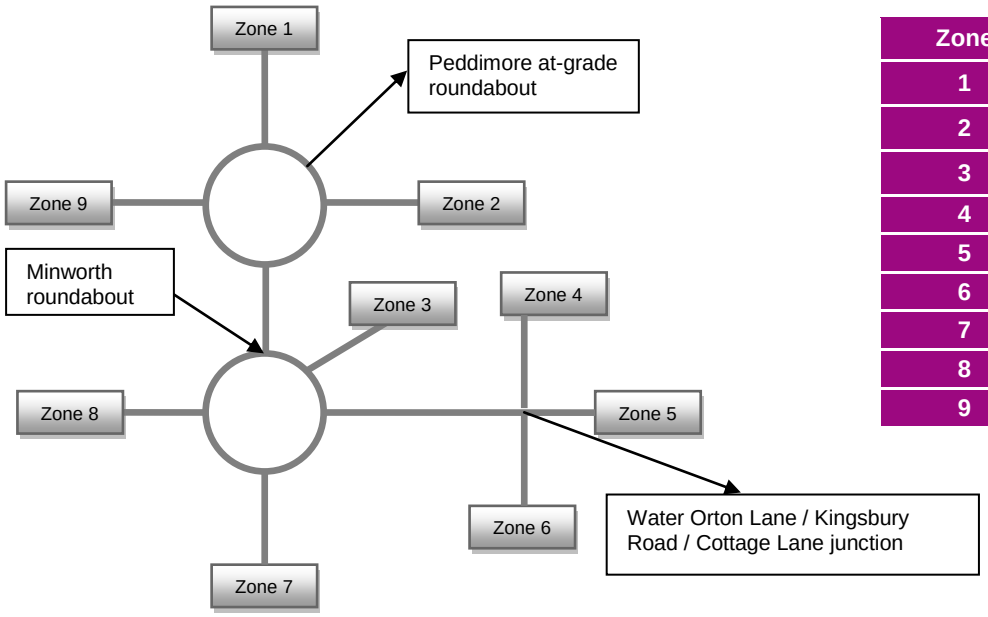
In this scenario the scenario 3a TRANSYT model (including the recommended solution for the Peddimore access on the A38 - a four arm signalised roundabout - and the Minworth preferred option) has been extended to include the Water Orton Lane/ Kingsbury Road/ Cottage Lane junction. The scheme is shown in AECOM drawing 60316941-SKE-30 CT-004.

This option represents the worst case scenario, and mitigation tests have therefore been undertaken to assess the options for improved junction layouts at the Water Orton Lane/ Kingsbury Road/ Cottage Lane junction.

AECOM have made the following assumptions in calculating the 2031 flows in PCUs:

- Flows from Zones 1, 2 and 9 to Zones 3, 7, 8 and the link joining to the Water Orton Lane junction have been distributed based on the flows heading into Minworth roundabout on the A38 North approach. Flows from zones 1, 2, 9 to Zones 4, 5 and 6 have been distributed based on the flows heading into the Water Orton Lane junction from the Kingsbury Road West approach at the junction.
- A similar approach has been adopted for flows to Zones 1, 2 and 9 from Zones 3, 7, 8 and link joining the Water Orton Lane.
- HGV percentages for the development accesses as provided by PJA have been used to calculate the number of HGVs from Zone 2. No HGVs have been assumed to be generated from Zone 7.
- HGV percentages at the Minworth roundabout have been not provided for the 2031 future year and therefore AECOM have assumed the same percentages as the 2013 base year (extracted from the manual turning counts dated 19th November 2013).
- No classified counts are available at the Water Orton Lane / Kingsbury Road/ Cottage Lane junction from the Spectrum database. Therefore AECOM have assumed that no HGV movements are present on Water Orton Lane at this junction and all HGVs shown as travelling to and from Kingsbury Road at the Minworth roundabout continued through this junction (i.e. along Kingsbury Road).

Based on the assumptions above, AECOM have calculated all the flows using the network to represent the scenario with the preferred Minworth roundabout option and either the existing or proposed layout at the Water Orton Lane junction. These calculations are shown in **Appendix I**. The Zones in TRANSYT for Scenario C are shown in **Figure 7**.



Zone	Approach
1	A38 North
2	Peddimore Lane
3	Lindridge Drive
4	Cottage Lane
5	A4097 Kingsbury Road
6	Water Orton Lane
7	A38 South
8	Walmley Ash Road
9	Development Access

Figure 7: TRANSYT Zone Structure – Scenario C

3.5 Modelling Results

3.5.1 Scenario A – 2013 Results

The 2013 Scenario A flows have been run in the Scenario A TRANSYT model. The results from the modelling for each arm at the Kingsbury Road/Water Orton Lane junction are shown in **Table 5** below, the network results in are for the wider model and the full outputs, including the result for all other zones and links in the model are provided in **Appendix G**.

Results		2013 AM		2013 PM	
Zone	Approach	Degree of Sat. (%)	Mean Max Queue (pcu)	Degree of Sat. (%)	Mean Max Queue (pcu)
	A4097 Kingsbury Road West at Water Orton Lane	65	8	52	4
3	Cottage Lane	0	0	0	0
4	A4097 Kingsbury Road	63	13	71	16
5	Water Orton Lane	57	6	69	7
	A4097 Kingsbury Road at Minworth roundabout	50	10	75	15
Overall Network Performance Index (unweighted) (£ per hr)		797.67		630.94	
Overall Network average speed (kph)		31.78		30.42	
Total network delay (pcu-hr/hr)		42.49		46.55	

Table 5: 2013 Future Year Model Results for Scenario A

The results from the model show that the modelled queues at the Water Orton Lane / Kingsbury Road/ Cottage Lane junction broadly correlate with the observed queues at the junction and show that the junction operates within capacity in both peak periods with 2013 flows. This suggests that the model is suitable for future year testing.

3.5.2 *Scenario B 2031Modelling Results:*

The 2031 Scenario B flows have been run in the Scenario B TRANSYT model. The results from the modelling for each arm at the Kingsbury Road/Water Orton Lane junction only are shown in **Table 6** below, the network results are for the wider model and the full outputs, including the result for all other zones and links in the model are provided in **Appendix H**.

Results		2031 AM		2031 PM	
Zone	Approach	Degree of Sat. (%)	Mean Max Queue (pcu)	Degree of Sat. (%)	Mean Max Queue (pcu)
	A4097 Kingsbury Road West at Water Orton Lane	81	14	65	8
3	Cottage Lane	0	0	0	0
4	A4097 Kingsbury Road East	80	20	92	31
5	Water Orton Lane	81	9	100	18
Network Performance Index (unweighted) (£ per hr)		1382.09		1,680.40	
Network average speed (kph)		28.79		25.36	
Total network delay (pcu-hr/hr)		69.53		88.71	

Table 6: 2031 Future Year Model Results for Scenario B

The results show that the Water Orton Lane/ Kingsbury Road/ Cottage Lane junction operates over capacity in the PM peak and queues on the Kingsbury Road East approach nearly extend to the Minworth Parkway junction which is 100m (around 18pcus) east of this junction.

3.5.3 *2031 Scenario C Modelling Results:*

The 2031 Scenario C flows have been run in the Scenario C TRANSYT model. The results from the modelling for each arm at the Kingsbury Road/Water Orton Lane junction are shown in **Table 7** below, the network results are for the wider model and the full outputs, including the result for all other zones and links in the model are provided in **Appendix I**.

Zones	Approach	2031 AM		2031 PM	
		Degree of Sat. (%)	Mean Max Queue (pcu)	Degree of Sat. (%)	Mean Max Queue (pcu)
	A4097 Kingsbury Road West at Water Orton Lane	78	21	76	16
4	Cottage Lane	0	0	0	0
5	A4097 Kingsbury Road East	87	25	101	57
6	Water Orton Lane	85	10	102	18
	A4097 Kingsbury Road at Minworth roundabout	101	35	89	23
Network Performance Index (unweighted) (£ per hr)		3821.37		4202.12	
Network average speed (kph)		19.5		18.78	
Total network delay (pcu-hr/hr)		213.96		236.1	

Table 7: 2031 Future Year Model Results for Scenario C – Existing Layout at Water Orton Lane

The 2031 Scenario C TRANSYT has also been revised to include the proposed Option 1 layout at the Water Orton Lane/ Kingsbury Road/ Cottage Lane junction. The results from the modelling for each arm at the Kingsbury Road/Water Orton Lane

junction are shown in **Table 8** below. As before, the network results are for the wider model and the full outputs, including the result for all other zones and links in the model are provided in **Appendix I**.

Zones	Approach	2031 AM		2031 PM	
		Degree of Sat. (%)	Mean Max Queue (pcu)	Degree of Sat. (%)	Mean Max Queue (pcu)
	A4097 Kingsbury Road West at Water Orton Lane	83	16	86	15
4	Cottage Lane	0	0	0	0
5	A4097 Kingsbury Road East	57	10	77	16
6	Water Orton Lane	85	10	70	8
	A4097 Kingsbury Road at Minworth roundabout	82	20	90	26
Network Performance Index (unweighted) (£ per hr)		3944.45		3411.58	
Network average speed (kph)		19.24		21.54	
Total network delay (pcu-hr/hr)		218.42		188.27	

Table 8: 2031 Future Year Model Results for Scenario C – Proposed Layout (Option1) at Water Orton Lane

Table 7 shows that the model forecasts that the Kingsbury Road/Water Orton Lane junction will operates over capacity in 2031 with the proposed roundabout access in place for the Peddimore development. To mitigate these issues, improvements are required.

Option 1 for the Kingsbury Road/Water Orton Lane junction has been tested the Scenario C model and the results reported in **Table 8** above. This shows that the proposed improvements of two lanes along the Kingsbury Road East and West approaches, with the staggered crossing converted to a straight crossing on the Kingsbury Road East approach, delivers benefits to the junction and brings the capacity and queues back to acceptable levels. As this option works, Option 2 has not been tested in the model.

3.6 Water Orton Lane/Kingsbury Road Results and Conclusion

Modelling has been undertaken to test the Water Orton Lane / Kingsbury Road junction with forecast flows for 2031, with and without development at Peddimore. The modelling results forecast that in all scenarios the junction will operate over capacity, with queuing. These queues may impact on adjacent junctions.

AECOM have developed a proposed improvement option for the Water Orton Lane / Kingsbury Road junction, which includes widening to provide two lanes along the Kingsbury Road East and West approaches, with the existing staggered pedestrian crossing converted to a straight over crossing on the Kingsbury Road East approach. The scheme is shown in **AECOM drawing 60316941-SKE-30 CT-002.** This option has been tested in conjunction with the scenario 3a access arrangements and forecast 2031 development flows. The results of this modelling suggest that this option will provide sufficient capacity to mitigate the impact of the development.

AECOM therefore recommend that the Option 1 improvements at the Water Orton Lane / Kingsbury Road junction be recommended as part of the infrastructure requirements for the Peddimore development.

3.7 Water Orton Lane/Kingsbury Road Cost Estimate

The cost of the Option 1 Water Orton/Lane/Kingsbury Road improvement scheme, shown on drawing AECOM drawing **60316941-SKE-30 CT-002** in **Appendix A** has been estimated at around **£0.6 million.** The full cost estimate can be found in **Appendix F**.

This estimate is subject to a number of exclusions and assumptions appropriate to the level of scheme design. Full details of the cost estimates are contained in **Appendix F**. The cost estimates include optimism bias, traffic management measures, preliminary and detailed design costs but are subject to the following standard caveats and exclusions:

- 3rd Party Land acquisition costs and accommodation works costs are excluded.
- Dedication of Land, Land to be passed over to the council as highway is excluded.
- Legal costs are excluded.
- Landscaping design is excluded.
- Statutory Undertakers design fee is excluded.
- Statutory Undertakers diversion and or protection costs are excluded.
- Third Party Ground Investigation costs are excluded. Trial Pits and Geotechnical surveying will be supplied by third parties.
- Traffic Regulation Orders & any associated TRO consultation are excluded.
- Costs of contract documentation for appointment of the preferred contractor are excluded.
- Costs Tendering of the works are excluded.

.

4 Summary & Recommendation

4 Summary & Recommendation

4.1 Summary

This report has summarised the testing carried out to determine the infrastructure required in order to accommodate the proposed employment and residential development at Peddimore. This has built on the work previously completed to develop the preferred option at the A38 Minworth roundabout reported in AECOM's previous work.

Testing was carried out on three Options for providing direct access to the Peddimore development from the A38 north of Minworth roundabout. This included left in/left out access arrangements, with and without an overbridge, and an at grade roundabout. The initial options were provided by PJA for AECOM to test.

The testing demonstrated that a modified signalised at grade roundabout provides the best solution for accessing the Peddimore development, the drawing for this is included in **Appendix A**. The costs for this have been estimated at around **£12.7 million.**

AECOM were also requested to test the impact at the Kingsbury Road/Water Orton Lane junction. This test showed that the existing junction layout could not accommodate all of the anticipated development traffic, therefore improvements were required. Option 1 was tested and the modelling forecast that it should be able to deliver improvements accommodate the forecast 2031 traffic . The drawing for this is shown in **Appendix A**. The cost for this improvement has been estimated at around **£0.6 million.**

4.2 Recommendation

AECOM recommend that the infrastructure requirements to accommodate the Peddimore development should consist of the following elements.

Infrastructure	Drawing Number (Appendix A)	Cost Estimate (Appendix F)
Minworth roundabout Improvements		**£ 3,123,057.23**
Peddimore Signalised at Grade roundabout Option 3a		**£12,707,517**
Kingsbury Road/Water Orton lane improvement Option 1		**£ 628,661.8**
Total		**£16,459,236.03**

The option presents a significant increase in capacity at these junctions, which must also be matched by increases in capacity at the downstream junctions on the A38 if the benefits of the scheme are to be fully realised.