

Bicester Transport Modelling

North West Bicester Eco Development Traffic Modelling Technical Note

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Contents

1	Introduction	1
2	Scenario 1: 2012 Base Model.....	5
3	Scenario 2: Reference Case Development (No NW Bicester Except Exemplar)	7
4	Scenario 3: North West Bicester (85 th Percentile Trip Rates).....	10
5	Scenario 4: North West Bicester (85 th Percentile Trip Rates) with South East Peripheral Route	15
6	Scenario 5: North West Bicester (Average Trip Rates).....	16

Tables

Table 1: Journey Time Routes	3
Table 2: Employment Gross Floor Area by Zone (100m ²).....	12
Table 3: Trics Trips Rates (per 100m ² GFA).....	13
Table 4: HGV Trip Totals by Zone (PCUs)	13

Appendices

Appendix A – Hyder Traffic Modelling Brief as Received	
Appendix B – 2012 Base Model Outputs (Supplied on Disc)	
Appendix C – Bicester Proposed Development Uncertainty Log	
Appendix D – Reference Case Model Outputs (Supplied on Disc)	
Appendix E – Additional NW Bicester Proposed Network Details	
Appendix F – NW Bicester 85 th Percentile Trip Rates Model Outputs (Supplied on Disc)	
Appendix G – NW Bicester with SE Peripheral Route 85 th Percentile Trip Rates Model Outputs (Supplied on Disc)	
Appendix H – NW Bicester Average Trip Rates Model Outputs (Supplied on Disc)	

Figures

Figure 1: Junctions where data is required

Figure 2: M40 Junction 10 Pinch Point Scheme Drawing

Figure 3: Reference Case Model Saturn Network Plot (NW Bicester Area)

Figure 4: NW Bicester Saturn Network Plot

Figure 5: Peripheral Routes Assessment Option 5 (Route 3)

1 Introduction

1.1 This technical note details the Saturn modelling work carried out in response to the brief issued by Hyder to WYG as consultants to Oxfordshire County Council (OCC) to undertake transport modelling of the proposed NW Bicester Eco Development Masterplan. The data includes details of the network and matrix development, committed development assumptions, highway assumptions and a data summary for the five model scenarios requested. A copy of the original brief is attached in **Appendix A**.

1.2 The five model scenarios to be tested are:

1. **2012 Base year.** This is the existing Bicester Transport Model base year upon which the peripheral routes assessments were carried out for OCC. (The brief incorrectly states 2013);
2. **Reference Case.** This is the no NW Bicester except Exemplar situation. It includes committed developments as per the All Proposed Growth scenario as used in the Bicester Peripheral Route Assessment but with the trips for NW Bicester removed. The network assumes the removal of the London Road and Charbridge Lane level crossings and the inclusion of the M40 J9 Phase 2 improvement and M40 J10 pinch point schemes;
3. **Full NW Bicester (85thile residential trip rates).** This network includes the full NW Bicester development site and the preliminary NW Bicester highway mitigation. Again, the removal of the London Road and Charbridge Lane level crossings and the inclusion of the M40 J9 Phase 2 improvement and M40 J10 pinch point schemes are assumed in the networks. 85th percentile trip rates as provided as total vehicles generated by the development;
4. **Full NW Bicester with SE peripheral route (85thile residential trip rates).** This network is as scenario 3 above but with the inclusion of the South

East peripheral route as per Option 5 (Route 3) of the Bicester Peripheral Route Assessment; and

5. **Full NW Bicester (average residential trip rates)**. This network is as scenario 3 above but using the average residential trip rates as supplied by Hyder as total vehicles generated by the development.

- 1.3 Please note that the brief stipulated 2031 as the future year for the scenarios. However, the All Proposed Growth (APG) model scenario from the Bicester peripheral routes assessments is not a specific year. This APG forecast scenario has been used as a base for the NW Bicester scenarios to be tested.
- 1.4 For each scenario to be tested, outputs were requested by Hyder for junctions, links and journey times as detailed in the following sections.
- 1.5 Junction Turning Movements - For each junction shown in **Figure 1** the following is provided:
 - Entry flows/ turning movement (actual flows)
 - Queues and delays at junctions
 - Volume/ capacity at junctions
- 1.6 In order to assess the network performance under each scenario, journey times are provided for a selection of routes requested by Hyder as shown in **Table 1**.

Route	Direction	Start	Via	End
1a	Northbound	A34 – Weston-on-the-Green	A41 SW Bypass A4095	A421 – Fringford
1b	Southbound	A421 – Fringford	A4095 SW Bypass A41	A34 – Weston-on-the-Green
2a	Northbound	A34 – Weston-on-the-Green	A41 B4030 Kings End Queens Ave Field Street Buckingham Road	A421 – Fringford
2b	Southbound	A421 – Fringford	Buckingham Road Field Street Queens Ave Kings End B4030 A41	A34 – Weston-on-the-Green
3a	Northbound	A34 – Weston-on-the-Green	A41 SW Bypass	A4095 -Bucknell Road junction
3b	Southbound	A4095 -Bucknell Road junction	SW Bypass A41	A34 – Weston-on-the-Green
4a	Northbound	A34 – Weston-on-the-Green	A41 A4421	A421 – Fringford
4b	Southbound	A421 – Fringford	A4421 A41	A34 – Weston-on-the-Green
5a	Eastbound	A4095 -Bucknell Road junction	A4421 A41	A41 - Near Piddington
5b	Southbound	A41 - Near Piddington	A41 A4421	A4095 -Bucknell Road junction
6a	Northbound	B4100 - Station Approach	Field Street Bucknell Road Bicester Road Ardley Road	Ardley
6b	Southbound	Ardley	Ardley Road Bicester Road Bucknell Road Field Street	B4100 - Station Approach
7a	Northbound	A4095/Bucknell Road junction	A4095 B4100 A43	M40 J10
7b	Southbound	M40 J10	A43 B4100 A4095	A4095/Bucknell Road junction
8a/b	Journey times to establish average speed on Lords Lane/Howes Lane			
9a/b	Journey times to establish average speed through Queens Avenue Shared Surface			

Table 1: Journey Time Routes

- 1.7 Link Flows - Link flow diagrams are provided for the study area encompassed by the junction plan. These diagrams present forecast (demand) flows and volume over capacity ratios.
- 1.8 Conversion of flows to AADT and AAWT was requested by Hyder. The model is only available for AM and PM peak hours. Any conversion of peak hour flows to other periods needs to be carried out by Hyder with agreement on suitable factors with OCC.
- 1.9 Data for additional assessment junctions were subsequently requested. These included:
- Junction 29: Bicester Road/Ardley Road/Middleton Road/Bainton Road in Bucknell (all scenarios);
 - Junction 30: Signalised junction of the development access onto the new A4095 between junction 21 and 22 (all with-North-West-Bicester Scenarios);
 - Junction 31: Signalised junction of the new A4095 with the realigned Lords Lane and development primary route within zone 5 (all with-North-West-Bicester Scenarios);
 - Junction 32: Connection of Peripheral Route Option 5 (Route 3) to the A41 at the northern end (Scenario 4 only); and
 - Junction 33: Connection of Peripheral Route Option 5 (Route 3) to the A41 at the southern end (Scenario 4 only).
- 1.10 Note that the junction previously requested as Assessment Junction 19 (signalised junction of Bucknell Road/New A4095 Link) becomes the priority junction between the revised signalised junction location 31 and the Bucknell Road/Howes Lane junction location 20. See Section 4 for more details of the revised network.

2 Scenario 1: 2012 Base Model

2.1 The Bicester SATURN model was created in 2007 as part of assessing the impact of different levels of housing and employment growth associated with the South East Plan and Structure Plan. The model was developed to enable the appraisal of transport schemes in the Bicester area.

2.2 Matrices were created in the SATURN model for the morning peak, average inter-peak and evening peak periods, using information from roadside interview surveys, journey time surveys, junction counts and a number of household surveys.

2.3 A review of the Bicester model was carried out by Halcrow in early 2013 to determine whether the model was still suitable for use as a 2012 model prior to the town centre changes in Bicester (Technical Note Reference GOXFCC100 11th May 2013). This review looked at the AM and PM peak models using traffic counts only (no journey time surveys were available).

2.4 The report concluded that:

"The validation checks show that the model nearly validates to the criteria set out in DMRB. The most significant issue is the overestimation of modelled flows on the B430. However, the Bicester SATURN model is generally just used for the assessment of traffic impacts within the town/urban fringe. When scheme/developments are expected to have a more strategic impact (i.e. effecting changes on the M40, or to the area surrounding Bicester) then the Central Oxfordshire Transport Model is the most appropriate assessment tool. When considering the validation of the model within the town itself, the DMRB criteria are met."

2.5 As such, it was deemed suitable that the model be taken forward as a basis for the Bicester Peripheral Routes Quantitative Assessment prior to ongoing model revalidation work to bring the model up to a WebTAG compliant validated 2013 base post the Bicester town centre redevelopment.

- 2.6 In order for the model to satisfactorily represent a 2012 base network, the following changes were included:
- Vendee Drive (the south west link road); and
 - M40 Junction 9 phase 1.
- 2.7 The inclusion of these network changes reduced the overall link validation from 86%/84% to 77%/78% within 5.0 GEH for the AM and PM peaks respectively. This would be expected however as the network changes would lead to rerouting particularly in the case of the introduction of Vendee Drive. The reduction in model validation would be unlikely to materially affect the analysis of the peripheral routes as all routes would be compared against the same reference case. Given that a revised 2013 validated base model will be constructed in the near future, revalidation to 2012 was not considered by OCC to be cost or time efficient at this stage. Therefore, this revised 2012 base model was taken forward for analysis of the peripheral route options.
- 2.8 Output data from the model in the forms as requested in Section 1 are given in **Appendix B.**

3 Scenario 2: Reference Case Development (No NW Bicester Except Exemplar)

3.1 To update the 2012 network to the Reference Case, the Option 1 – APG reference case model from the Peripheral Routes Assessment was used. The following changes to the network were included:

- Town centre access improvements;
- Changes implemented as part of the town centre redevelopment;
- Traffic calming and 30mph speed limit on Middleton Stoney Road;
- Changes at the Pingle Drive junction, A41 / Oxford Road (ESSO) junction and along the A41 corridor as part of the mitigation measures from Tesco's move and Bicester Village phase 4;
- Park & ride entrance / exit at the junction of Vendee Drive and the A41;
- A4095 / B4100 junction alterations as part of NW Bicester exemplar site;
- Alterations to the A41 / London Road (Rodney House) junction as part of Graven Hill mitigation;
- M40 Junction 9 phase 2;
- London Road level crossing will be closed permanently to through traffic at points immediately north and south of the current rail level crossing; and
- Removal of the existing level crossing at Charbridge Lane.

3.2 Additionally, accesses to the following new development zones were included:

- North West Bicester Exemplar site;
- Graven Hill (BICESTER 2);

- South West Bicester phase 2 (BICESTER 3);
- Bicester Business Park (BICESTER 4);
- Town centre redevelopment phase 2 (BICESTER 6);
- RAF Bicester (BICESTER 8);
- Bicester Gateway (BICESTER 10);
- North East Bicester Business Park (BICESTER 11) including the care home and business park adjacent to this site with existing planning permission; and
- South East Bicester (BICESTER 12).

3.3 The Option 1 – APG reference case model from the Peripheral Routes Assessment included preliminary NW Bicester highway mitigation. This has been removed from this reference case. The exemplar site has been retained.

3.4 Additionally, as requested by Hyder, the M40 junction 10 pinch point scheme has been included in the reference case network. **Figure 2** shows the Highways Agency scheme drawing used as a basis for network coding.

3.5 As part of the Peripheral Routes Assessment, an uncertainty log was developed detailing the proposed developments in the Bicester area categorised based on the WebTAG criteria. The land use developments that were agreed with OCC to be included in the Peripheral Routes Modelling and hence retained for the reference case scenario matrices are those categorised as near certain and more than likely. The Uncertainty Log compiled is given in **Appendix C**.

3.6 The reference case is based on an assumption of All Proposed Growth. As such, a future year has not been explicitly defined but it has been assumed that all developments that fall within the core scenario are 100% built out. The North West Bicester development has not been included with the exception of the Exemplar site.

- 3.7 Trip rates for each development have been used to convert the development size into a predicted number of vehicle trip ends for use in the AM and PM peak hour matrices. Where data was available, trip rates from the relevant Transport Assessments have been used. Where not available, trip rates have been taken from the TRICS database.
- 3.8 Trip ends have been converted to origin and destination distributions based on the existing pattern of trips in the matrix from a combination of nearby zones/zones with similar demographic characteristics as defined as part of the Bicester Movement Study carried out in 2012/2013.
- 3.9 Due to the scale of development predicted within and around Bicester in the APG scenario and due to the moderate size of the modelled network area, the process of constraining to a Bicester area TEMPro (Trip End Model Presentation Program) factor would result in a significant reduction in traffic in a large number of zones that do not have any predicted committed development occurring in them. This particularly affects the cordon zones which correspond to the M40 if the reduction is applied on a pro rata basis as these zones have the highest number of trips. This reduction was not considered realistic and as such, an alternative methodology for matrix building was used where the matrices consist of the base 2012 traffic plus all of the predicted committed development trips. This was considered a robust estimate of the core growth traffic for the Bicester area modelling.
- 3.10 The resultant reference case matrices were assigned to the Reference Case networks for the AM and PM peak hour periods using the SATURN suite of programs.
- 3.11 A screen shot showing the Saturn network links in the NW Bicester area is presented in **Figure 3**.
- 3.12 Output data from the reference case model are given in **Appendix D**.

4 Scenario 3: North West Bicester (85th Percentile Trip Rates)

4.1 The reference case network as detailed in section 3 above has been updated to include links and junctions representing the NW Bicester development as detailed in the preliminary Masterplan dated 28-10-13 (drawing number 13016(sk)130M).

4.2 As agreed with Hyder, primary routes within the site are coded as 30mph with secondary routes coded as 20mph. These include:

- A new 30 mph single carriageway link replacing Howes Lane from Middleton Stoney Road to Lord's Lane;
- Primary routes internal to the development from
 - Middleton Stoney Road into NW Bicester South;
 - New Howes Lane Road into NW Bicester South; and
 - Lord's Lane Road into NW Bicester North

4.3 Junctions in the network have been coded as follows:

- A revised roundabout junction of Middleton Stoney Road and Howes Lane to incorporate two lanes on approach and exit on Vendee Drive and the new Howes Lane;
- Each site access junction on New Howes Lane and Lord's Lane to be traffic signalised with right turning facilities and toucan crossings;
- Each site access junction on Middleton Stoney Road and Banbury Road to be a priority junction with right turning facilities;
- The junction of Lord's Lane/ New Howes Lane/ Bucknell Road to be a traffic signalised crossroads with bus only movements on the northern arm. Right turning facilities to be provided and crossing facilities; and

- All other internal junctions to the development as priority junctions.

4.4 The following bus only links have been coded as 30mph links:

- North of the eastern Lord's Lane access;
- from the western New Howes Lane access past the commercial development;
- along part of the primary route within zone 1; and
- between the signalised junction of Lord's Lane/ New Howes Lane/ Bucknell Road and the development primary route through to Bucknell Road (N).

4.5 The following link changes have also been incorporated:

- The existing Howes Lane to be closed to through traffic, with only Avonbury Business Park continuing to have access from the eastern end; and
- Bucknell Road traffic heading north to Bucknell Village to be diverted via the development (western access on Lord's Lane);

4.6 Following initial coding of the model, Hyder raised concerns with how traffic would use local routes. As such, further changes to the network were made at their request. The highway network information supplied by Hyder for these revisions are shown in **Appendix E** and include the following:

- Realignment of the new A4095 link to join Bucknell Road at Assessment Junction 19;
- Connection of the new development to Bucknell Road moved closer to Bucknell Village;
- Removal of bus link and realignment of secondary routes in the eastern section of zone 1;
- Removal of bus link in the eastern section of zone 5 (north of Assessment Junction 17);

- Junction 20 (Howes Lanes/Bucknell Road) retained as a priority junction;
- Realignment of the connection between Lords Lane and the new link road;
- The existing Howes Lane to be retained between Assessment Junctions 20 and 21 with a roundabout junction where this link intersects with the northern end of Shakespeare Drive; and
- Traffic calming of Shakespeare Drive to 20mph.

4.7 A screen shot showing the Saturn network links for the NW Bicester development is presented in **Figure 4**.

4.8 Six zones have been included to represent the NW Bicester Development in addition to that already representing the Exemplar site. These zones are numbered 10001-10006 in the model and are shown on **Figure 4**.

4.9 Traffic generation for each of the 6 zones was provided by Hyder in the form of total number of vehicle trips in/out of the zones for the AM and PM peak hours.

4.10 No HGV trips were supplied. To generate HGV matrices, the site area for each zone for the B1 (Office) and B8 (Warehousing) were multiplied by the TRICS trip rates to provide a number of HGV trips by zone. **Tables 2 and 3** below give the Gross Floor Areas by zone and Trics trip rates applied respectively.

Type\Zone	10001	10002	10003	10004	10005	10006	Total
B1		151	41		58		251
B8		363		41			404

Table 2: Employment Gross Floor Area by Zone (100m²)

Trics Rates (per 100m ² GFA)		HGV (Veh)		
		AM	IP	PM
<i>B1 - Office (<10)</i>	<i>Production</i>	0.000	0.026	0.000
	<i>Attraction</i>	0.000	0.026	0.000
<i>B1 - Office (10-50)</i>	<i>Production</i>	0.008	0.020	0.008
	<i>Attraction</i>	0.008	0.019	0.000
<i>B1 - Office (>50)</i>	<i>Production</i>	0.000	0.002	0.000
	<i>Attraction</i>	0.000	0.002	0.000
<i>B8</i>	<i>Production</i>	0.008	0.009	0.011
	<i>Attraction</i>	0.005	0.013	0.007

Table 3: Trics Trips Rates (per 100m² GFA)

4.11 Additionally, a number of buses per zone have been supplied by Hyder and these have been added to the HGV totals as no routing information was supplied. The total HGV trips have been multiplied by a factor of 2 to convert to PCUs. **Table 4** gives the resultant HGV trip totals per zone.

	HGV Trips 85 th percentile					
	AM peak (08:00 to 09:00)			PM Peak (17:00 to 18:00)		
Zone	IN	OUT	TOTAL	IN	OUT	TOTAL
10001	2	4	6	4	2	6
10002	6	10	15	9	10	19
10003	3	5	7	4	3	7
10004	2	5	7	5	3	7
10005	2	4	6	4	2	6
10006	2	4	6	4	2	6
Total	17	31	48	30	22	51

Table 4: HGV Trip Totals by Zone (PCUs)

4.12 Trip ends for Light and Heavy vehicles have been converted to origin and destination distributions based on the existing pattern of trips in the matrix from a combination of nearby zones/zones with similar demographic characteristics as defined as part of the Bicester Movement Study carried out in 2012/2013. This methodology makes a worst case assumption that trips that originate in one NW Bicester zone do not terminate in another. This loads all of the generated trips onto the local highway network.

- 4.13 The NW Bicester 85th Percentile matrices as detailed above were loaded into SATURN output stacked matrices and assigned to the NW Bicester networks for the AM and PM peak hour periods.
- 4.14 Output data from the reference case model are given in **Appendix F**.

5 Scenario 4: North West Bicester (85th Percentile Trip Rates) with South East Peripheral Route

- 5.1 The network produced for Scenario 3 above was updated to include the South East Peripheral Route 3 (Option 5) from the Peripheral Routes Assessment. This route consists of a new link running from the A41 junction with Wendlebury Road east towards Graven Hill and then skirts southwards and round Graven Hill making use of the development site's proposed road to then link back in with the A41 at its junction with the new link road up to the A4421 included as part of the reference case network. The Route 3 corridor is shown on **Figure 5**.
- 5.2 New links for this route were coded as 40mph single carriageway.
- 5.3 The new route joins at the A41/Wendlebury Road with a revised junction layout consisting of a 5 arm roundabout. New roundabout junctions were included to the south and west of Graven Hill as access points to the development. The north-eastern end of the new route ties into the access for Graven Hill onto the A41.
- 5.4 The NW Bicester 85th Percentile matrices as detailed above were loaded into SATURN output stacked matrices and assigned to the NW Bicester with SE Peripheral Route networks for the AM and PM peak hour periods.
- 5.5 Output data from the reference case model are given in **Appendix G**.

6 Scenario 5: North West Bicester (Average Trip Rates)

- 6.1 Average vehicle trip totals based on average trip rates were also supplied by Hyder in addition to the 85th percentil trip totals.
- 6.2 Matrices for the average trip totals for light vehicles were generated in the same way as for the 85th percentile trip totals. HGV matrices were retained. The resultant light vehicle matrices were converted to SATURN matrix format and stacked with the heavy vehicle matrices created previously to create output average trip rate PCU matrices for the AM and PM peak periods.
- 6.3 The matrices were assigned to the NW Bicester networks for the AM and PM peak hour periods. No changes were made to the networks prior to assignment.
- 6.4 Output data from the reference case model are given in **Appendix H**.

FIGURES

Figure 1: Junctions where data is required.

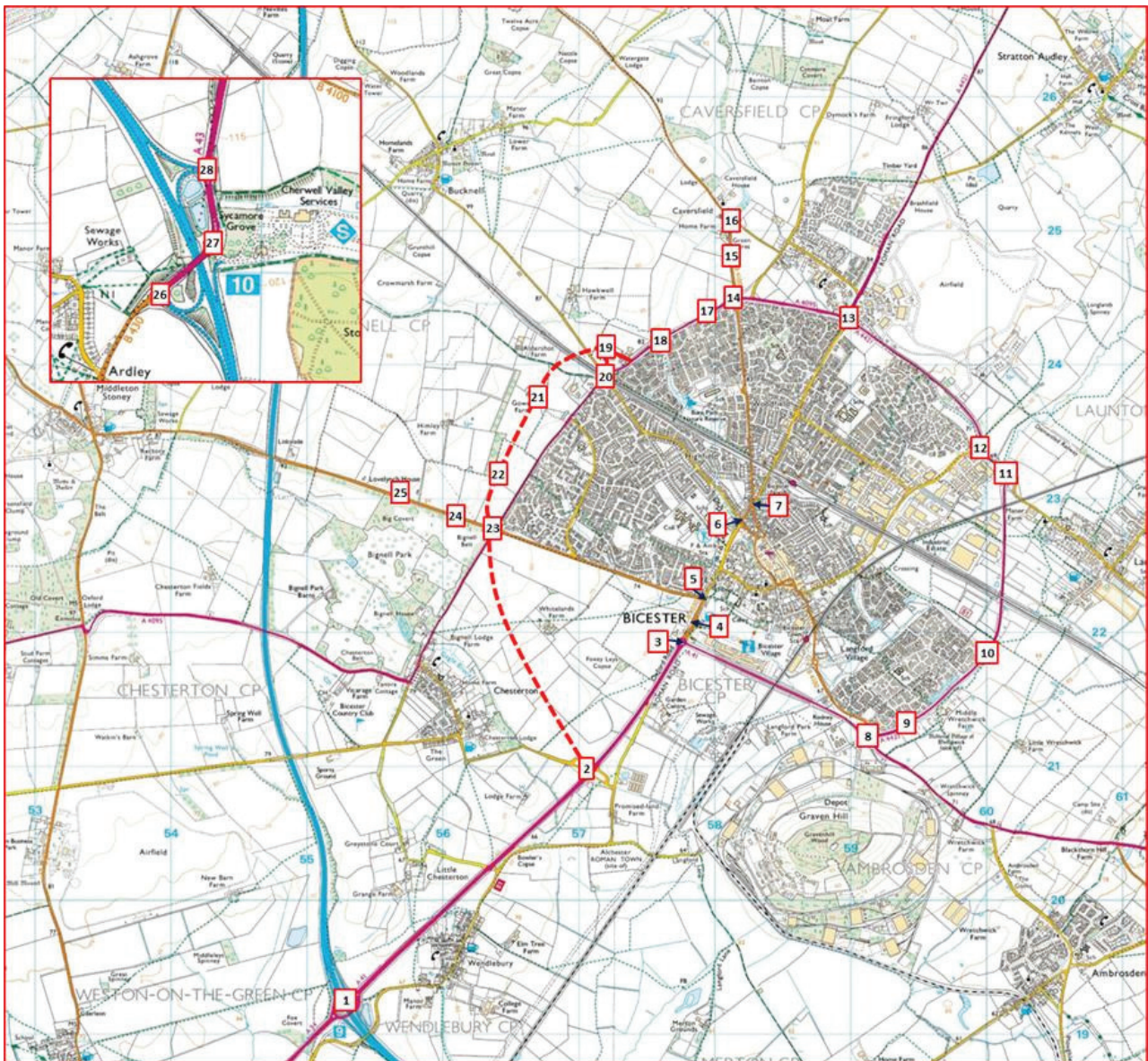


Figure 2: M40 Junction 10 Pinch Point Scheme Drawing

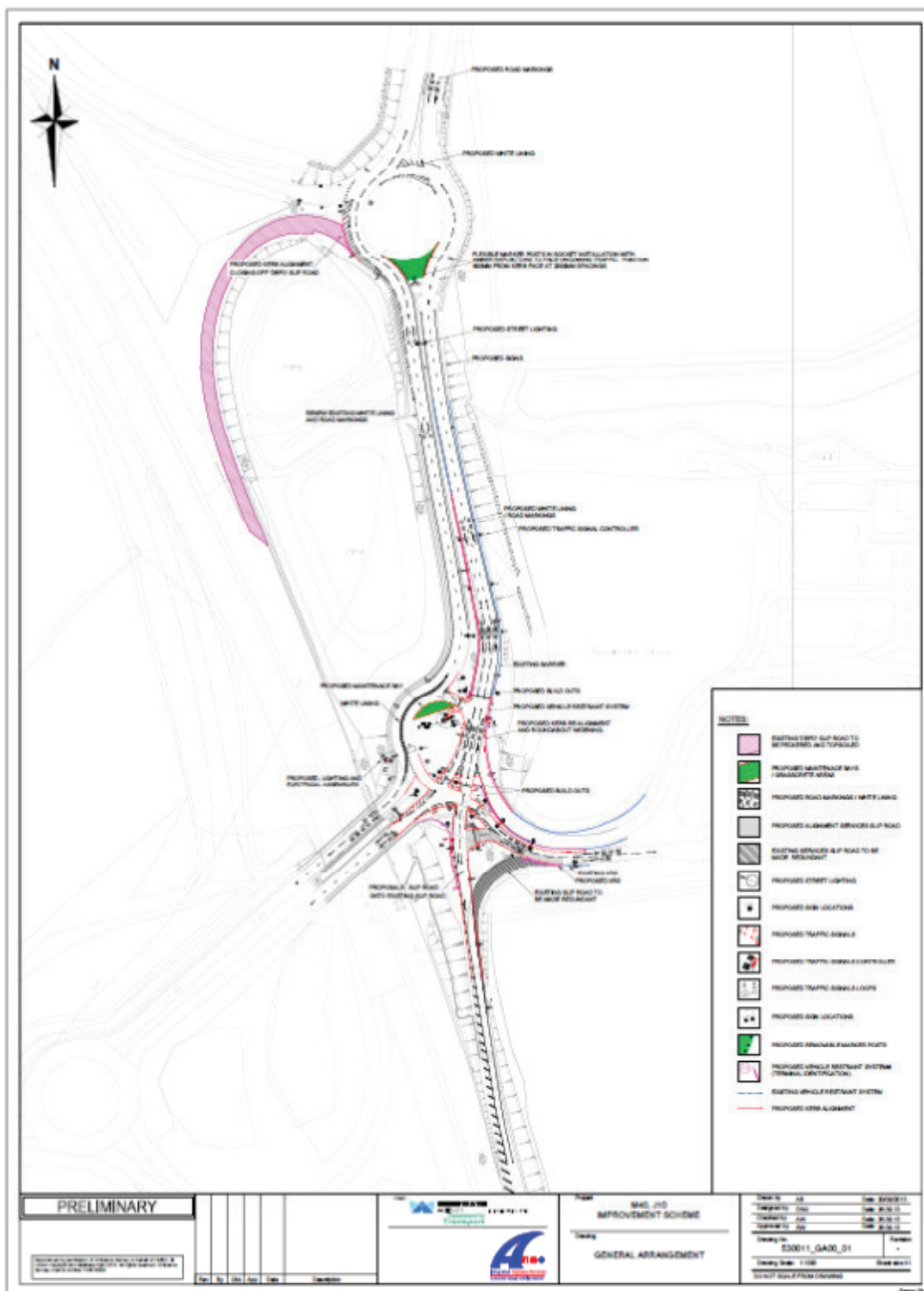




Figure 3: Reference Case Model Saturn Network Plot (NW Bicester Area)

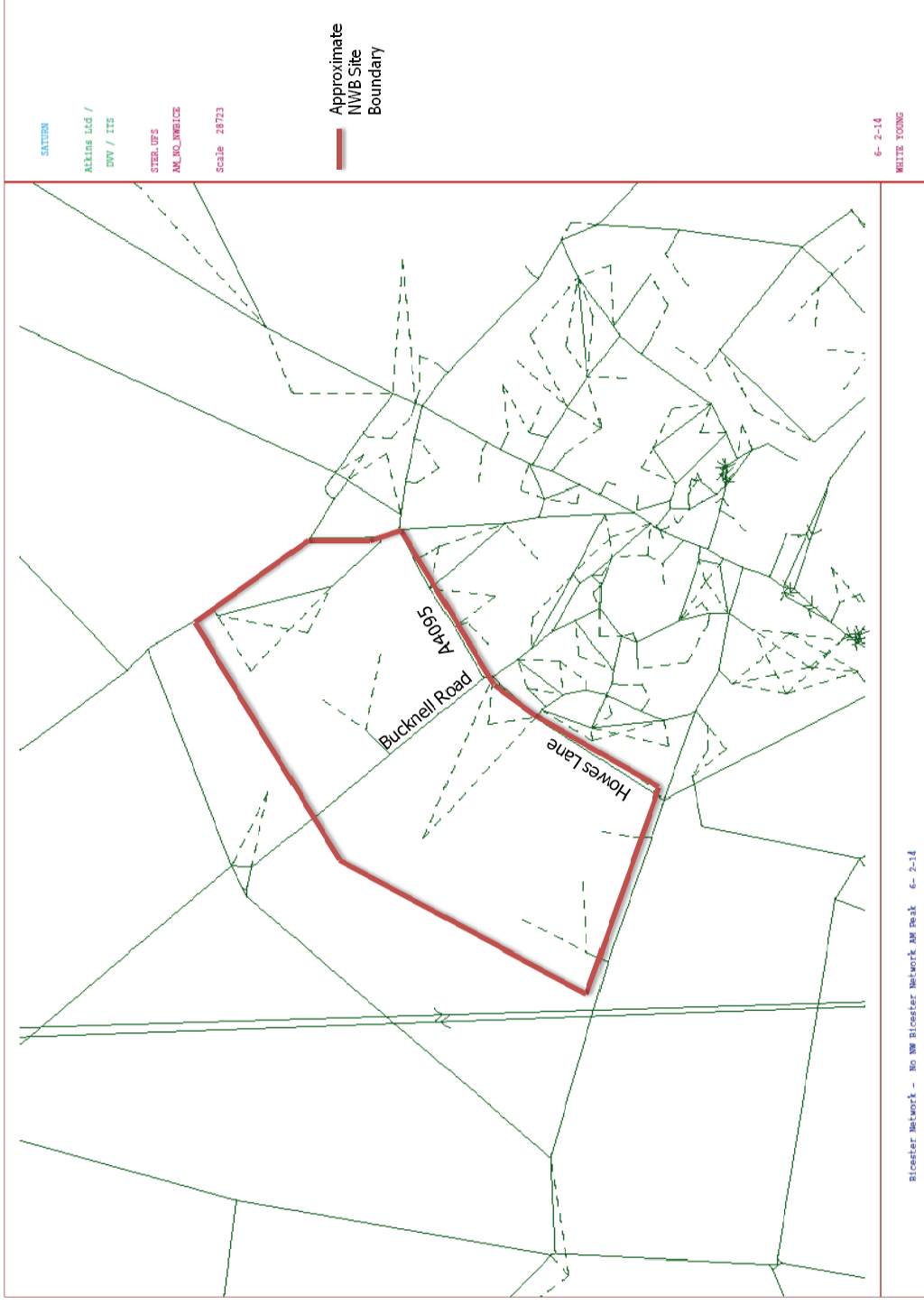




Figure 4: NW Bicester Saturn Network Plot

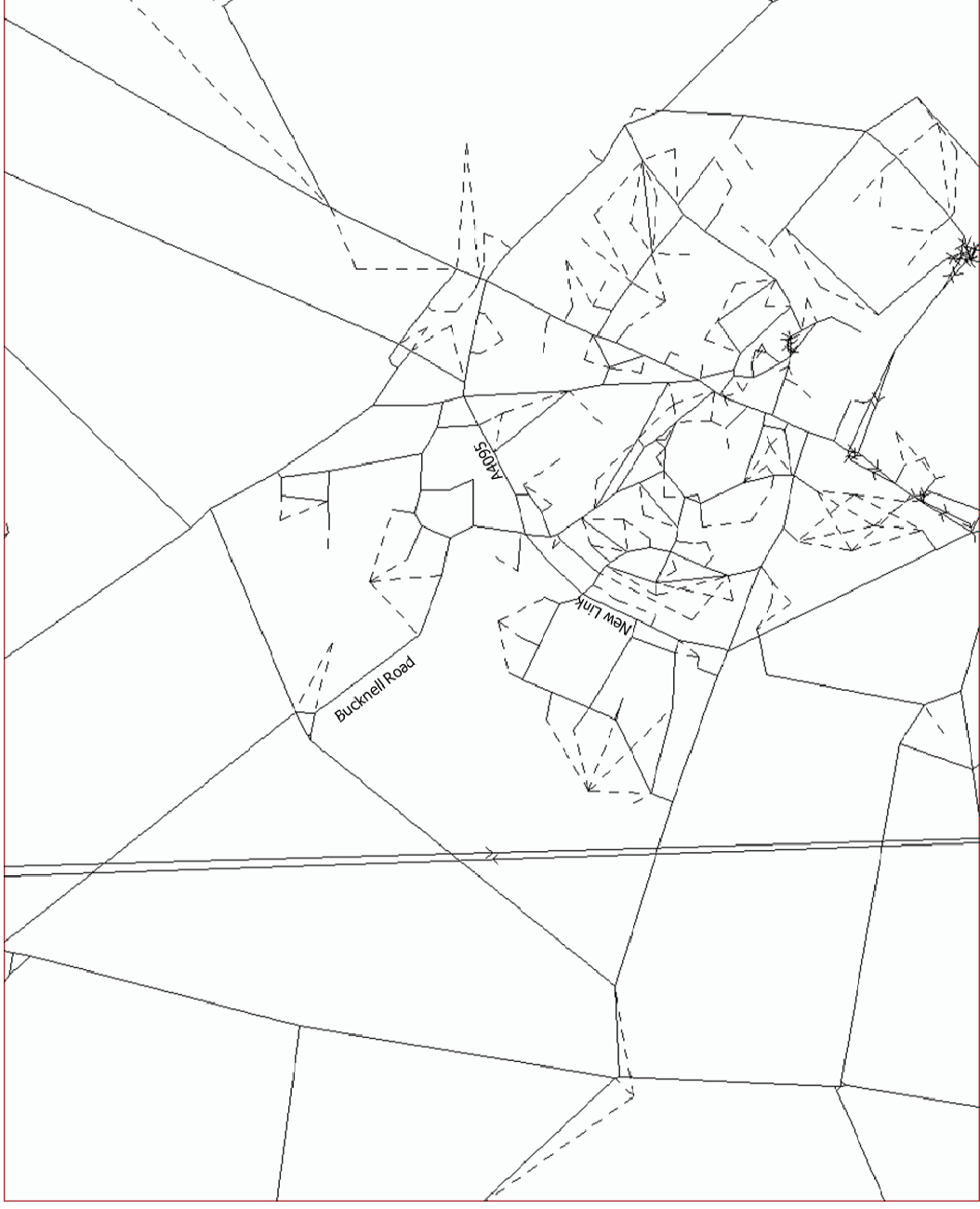
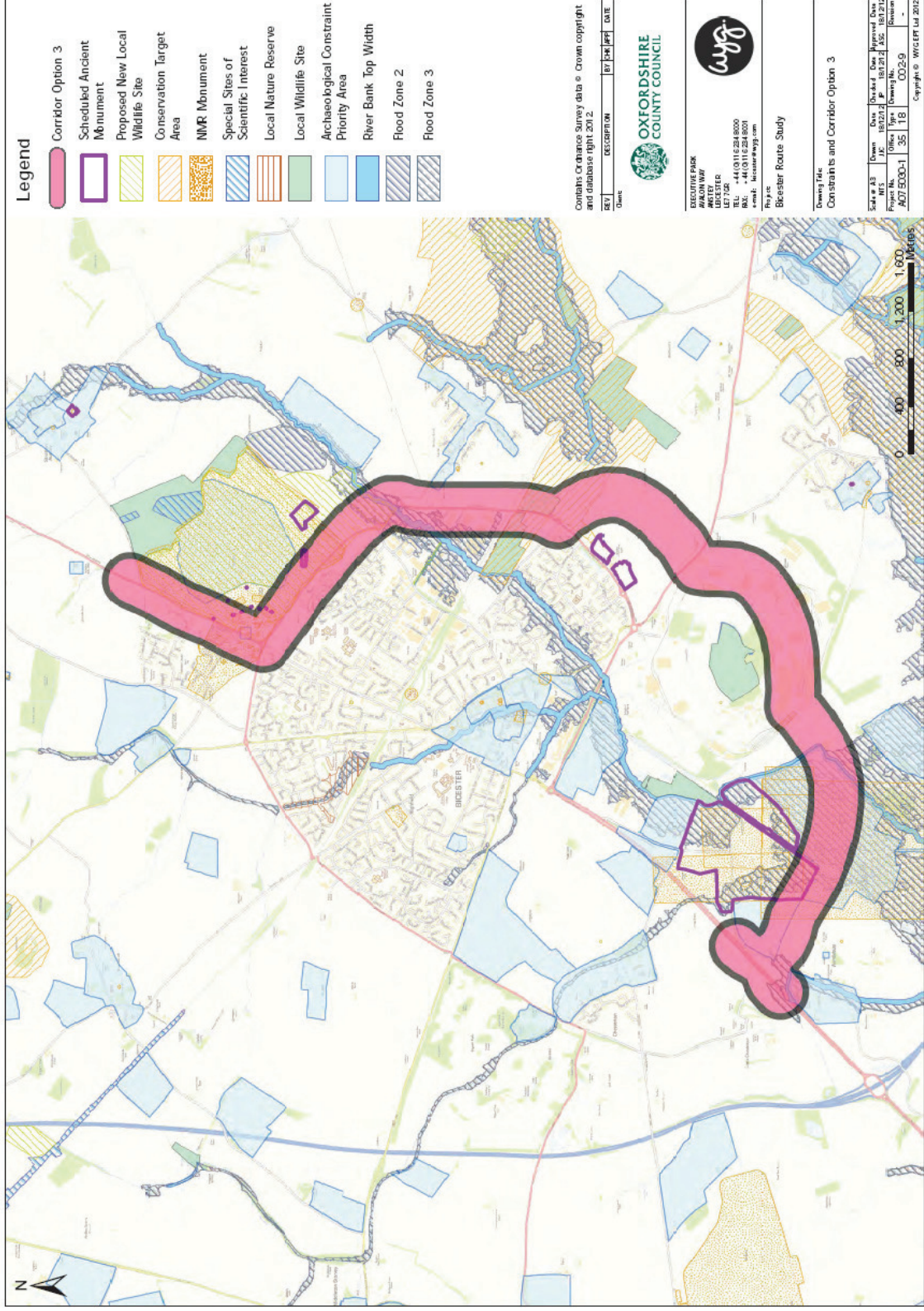




Figure 5: Peripheral Routes Assessment Option 5 (Route 3)



Appendix A – Hyder Traffic Modelling Brief as Received



NW Bicester Eco development Masterplan

Traffic Modelling Brief



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NW Bicester Eco development Masterplan

Traffic Modelling Brief

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This report has been prepared for in accordance with the terms and conditions of appointment for NW Bicester Masterplan dated April 2013. Hyder Consulting (UK) Limited (2212959) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.



CONTENTS

1	Introduction	1
1.1	NW Bicester Masterplan	1
1.2	Development Zones	1
1.3	Transport Network	3
1.4	Model Use	3
1.5	Scenarios for Testing	3
1.6	Traffic Generation	4
1.7	Outputs required	4
1.8	Timetable	7

1 Introduction

This note provides a Brief for issue to White Young Green as consultants to Oxfordshire County Council to undertake transport modelling of the proposed NW Bicester Eco Development Masterplan.

1.1 NW Bicester Masterplan

The quantum of development for the Masterplan is set out below (as at 23rd January 2014)

Residential – Privately Owned	3966	units
Residential – Affordable Housing *	1700	units
Residential – Care Home	253	beds
Children’s Nursery	200	children
Primary School	1680	pupils
Secondary School	1500	pupils
B1 Office Business Park / Eco Business Centre	25074	sqm
B2/B8 Industrial Units/Storage and Distribution	41104	sqm
Local Shops	3700	sqm
Community Hall/Multi Faith Centre	3450	sqm
Health Centre	1320	sqm

A copy of the latest masterplan is provided separately for reference (13016(sk)130L. It is assumed that the Exemplar site is included separately in the model as a commitment.

1.2 Development Zones

The masterplan has been sub-divided into seven development zones. The zones are shown in Figures 1 and 2 for the south and north of the railway together with the access points to and from the highway network shown as yellow arrows.

It is requested that the zones are incorporated into the model with the assumption that the inbound and outbound trips for each zones are treated as to and from the highway network. This is a worse case as there is no reduction made for the traffic movements between the internal zones.

Figure 1: Development Zones – South

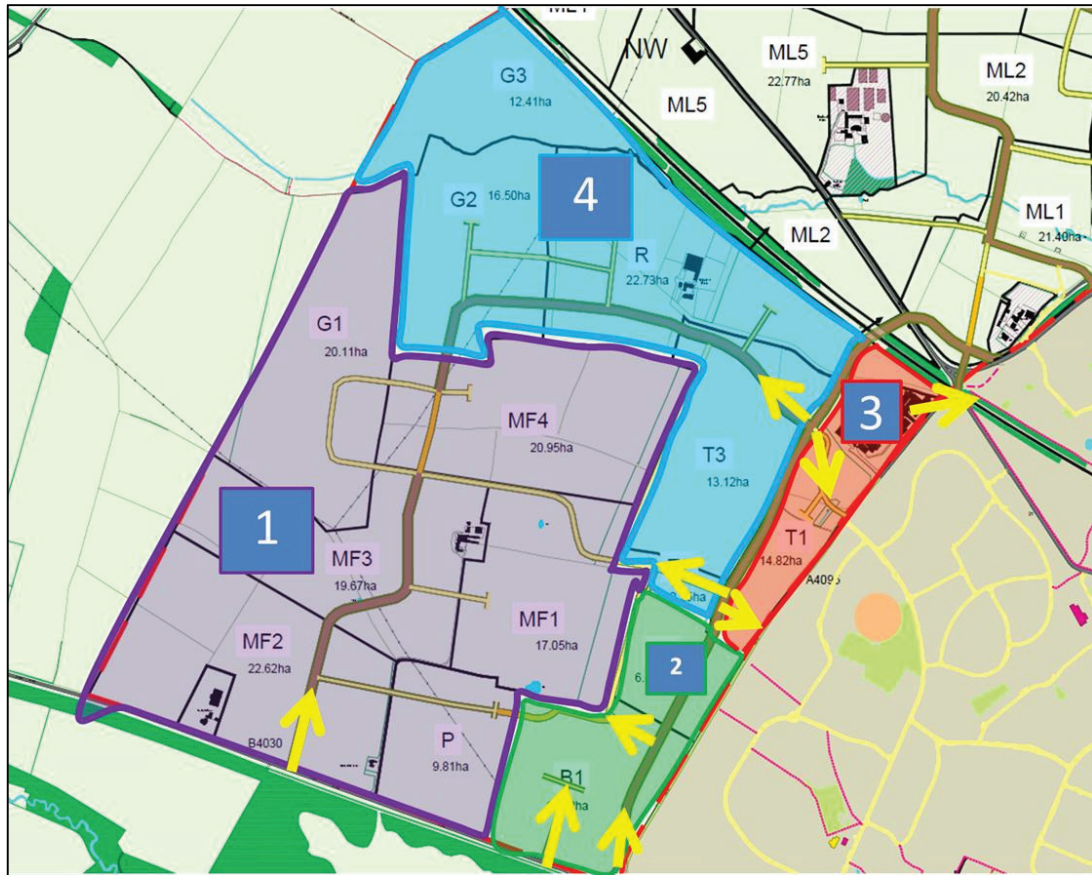
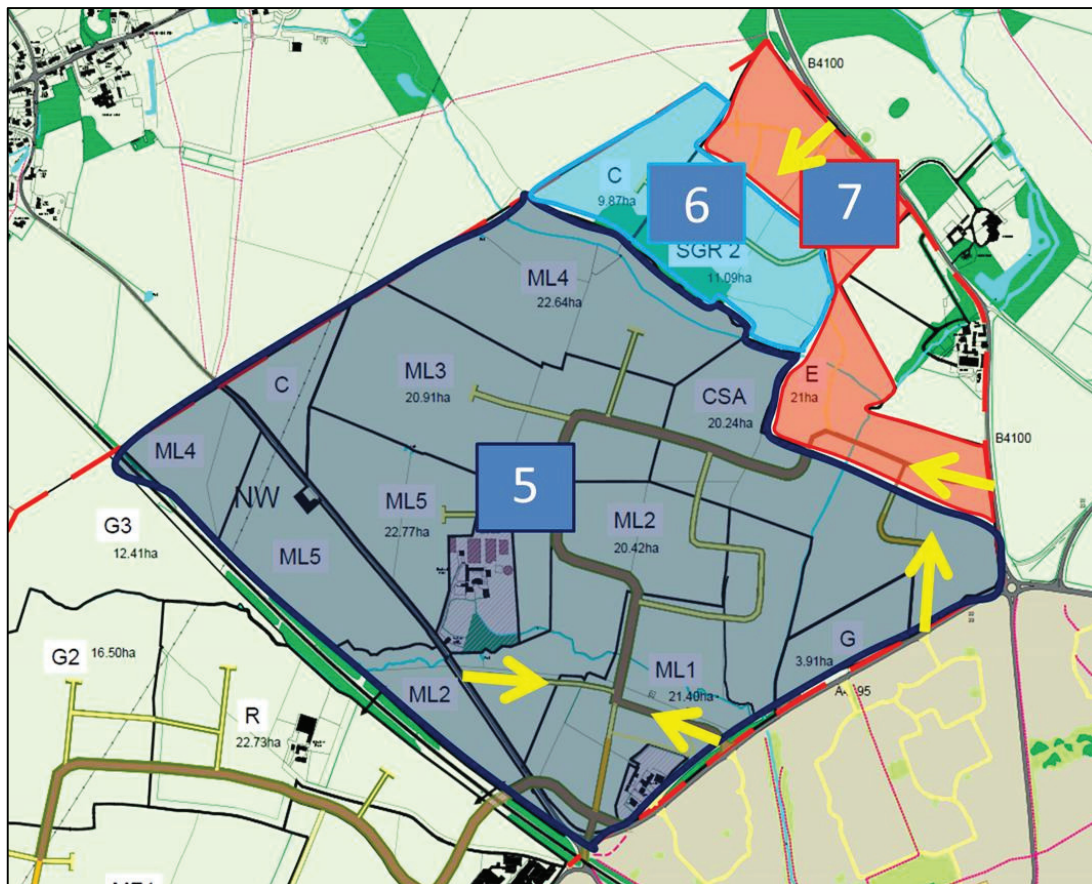


Figure 2: Development Zones – North



1.3 Transport Network

The masterplan development will include the provision of the following transport infrastructure which should be included in the model:

- A revised roundabout junction of Middleton Stoney Road and Howes Lane to incorporate two lanes on approach and exit on Vendee Drive and the new Howes Lane;
- A new 30 mph single carriageway link replacing Howes Lane from Middleton Stoney Road to Lord's Lane;
- A new underpass of the railway to the north of the existing;
- Existing Howes Lane to be closed to through traffic, with only Avonbury Business Park continuing to have access from the eastern end;
- Each site access junction on New Howes Lane and Lord's Lane to be traffic signalised with right turning facilities and toucan crossings;
- Each site access junction on Middleton Stoney Road and Banbury Road to be a priority junction with right turning facilities;
- The junction of Lord's Lane/ New Howes Lane/ Bucknell Road to be a traffic signalised crossroads with bus only movements on the northern arm. Right turning facilities to be provided and crossing facilities;
- Bucknell Road traffic heading north to Bucknell Village to be diverted via the development (western access on Lord's Lane);
- A number of bus only links are to be provided:
 - north of the eastern Lord's Lane access;
 - from the western New Howes Lane access past the commercial development; and
 - along part of the primary route within Zone 1.

1.4 Model Use

The Bicester Saturn Model will be utilised for the work, as developed to test the peripheral routes. It is recognised that this is being used prior to additional validation work being undertaken following the town centre development.

1.5 Scenarios for Testing

It is requested that the following assessment scenarios are undertaken, each for the AM and PM peak hour:

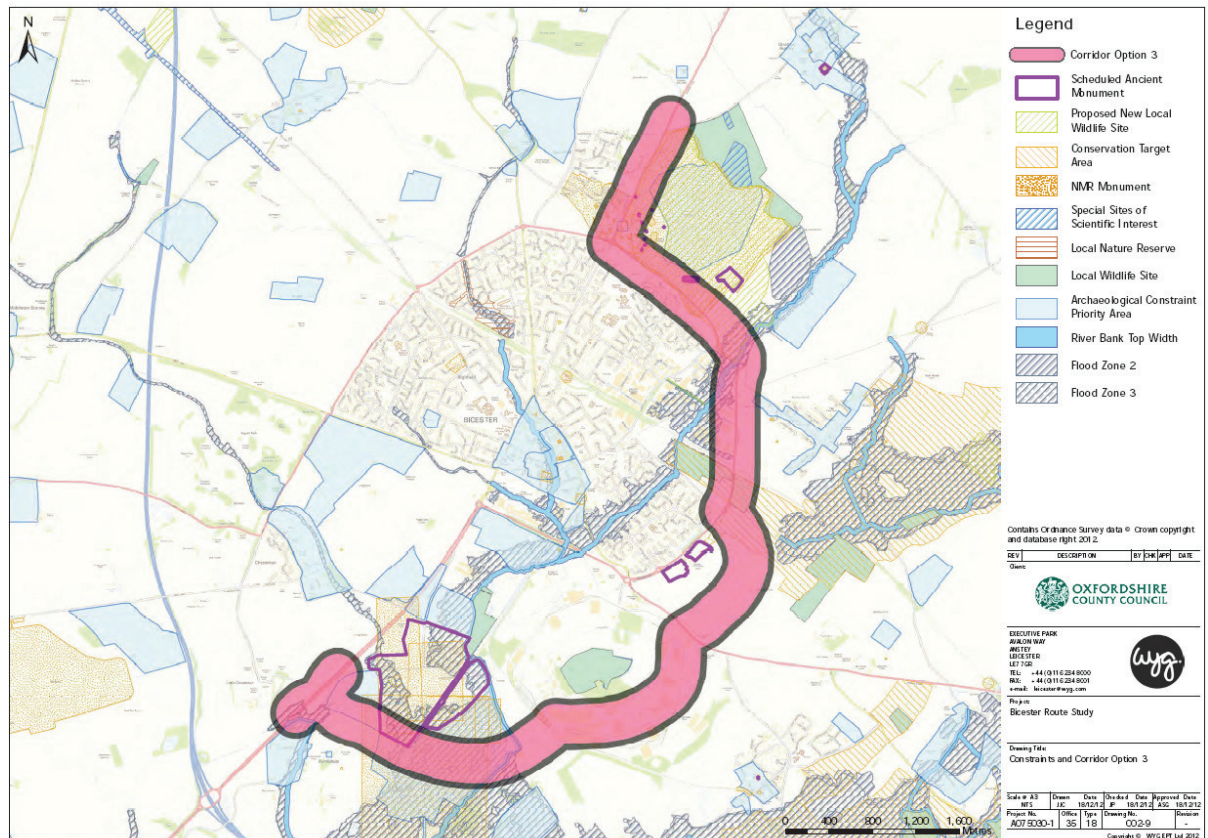
- 1 2013 Base year**
- 2 2031 Reference Case - no NW Bicester except Exemplar.** Include committed developments. Assume removal of both level crossings, J9 Phase 2 and J10 pinch point scheme. This is the 'No Development' reference case;
- 3 2031 Full NW Bicester (85%ile residential trip rates) + preliminary NWB highway mitigation + removal of both level crossings, J9 Phase 2, J10 pinch point**
- 4 2031 Full NW Bicester with SE peripheral route (85%ile residential trip rates) + preliminary NWB highway mitigation + removal of both level crossings, J9 Phase 2, J10 pinch point + SE peripheral route**

5 2031 Full NW Bicester (average residential trip rates) + preliminary NWB highway mitigation + removal of both level crossings, J9 Phase 2, J10 pinch point scheme

Of the scenarios, **Scenario 3** followed by Scenario 4 are the priorities for progressing the masterplan work and therefore we would like this provided as the first output.

It is noted that there are two options that perform well in transport terms for a SE peripheral route. It is requested that Option 5 (Route 3) is used as this is said to perform best using TUBA compared to the reference case (draft Bicester Peripheral Route Quantitative Assessment Report).

SE Peripheral Route Option 5



1.6 Traffic Generation

Hyder will provide a matrix of in and outbound vehicle trips for the AM and PM peak and 85%ile and average trip rates for each of the development zones. The vehicle trips will be manually entered for each of the zones and scenarios rather than trip rates being used within the model.

1.7 Outputs required

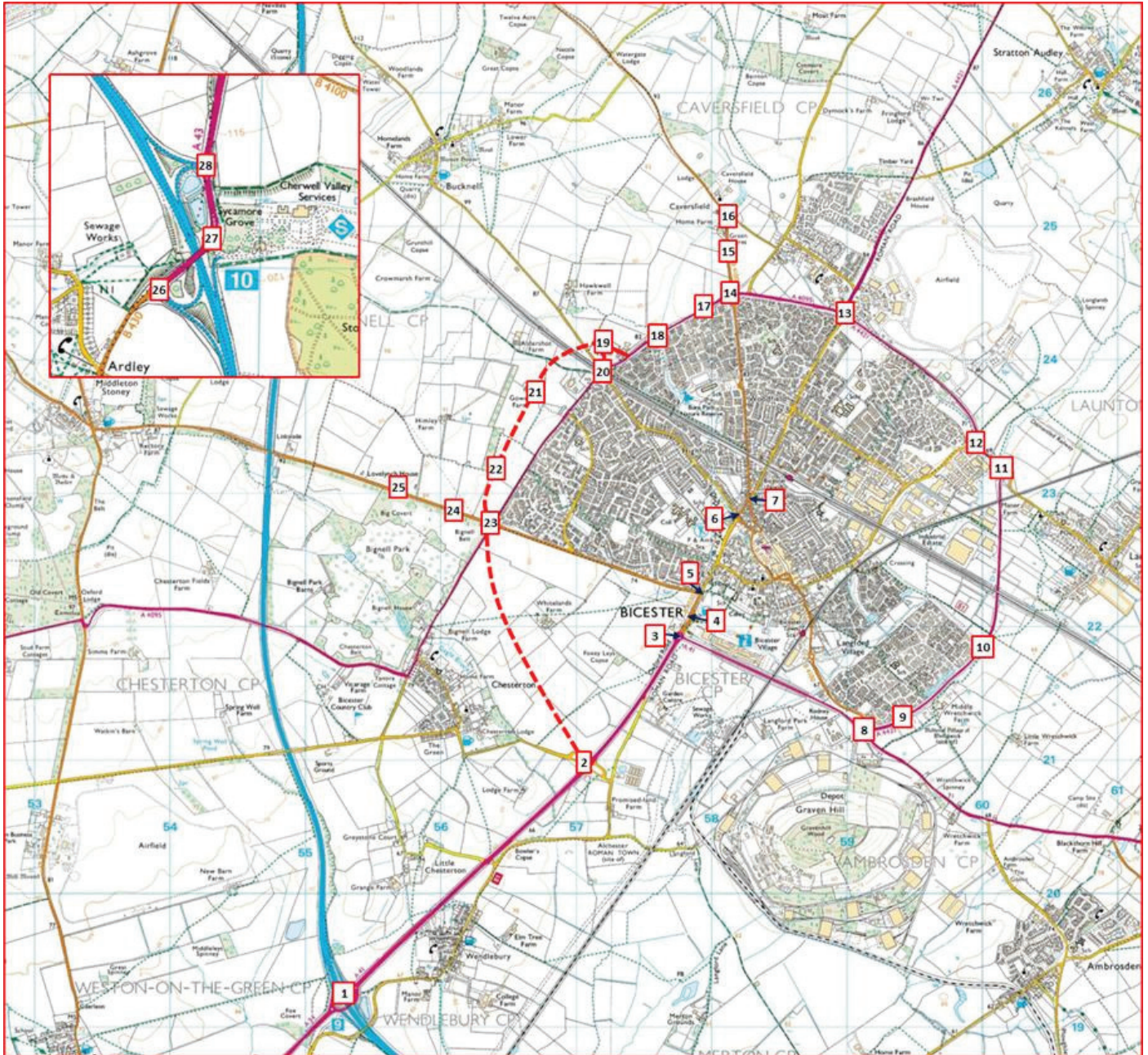
For each scenario, Hyder are seeking a short technical note summarising what the scenario includes in terms of network and matrix development, committed development assumptions, highway assumptions, and a data summary. The following data outputs are required as set out below.

Junction Turning Movements

For each junction shown on the below figure the following is required:

- Entry flows/ turning movement (actual flows)
- Queues and delays at junctions
- Volume/ capacity at junctions

Figure 3: Junctions



Journey Time

In order to assess the network performance under each scenario, journey times should be calculated for a selection of routes as shown in Table 1.

Table 1 – Journey Time Routes

Route	Direction	Start	Via	End
1a	Northbound	A34 – Weston-on-the-Green	A41	A421 – Fringford
			SW Bypass	
			A4095	
1b	Southbound	A421 – Fringford	A4095	A34 – Weston-on-the-Green
			SW Bypass	
			A41	
2a	Northbound	A34 – Weston-on-the-Green	A41	A421 – Fringford
			B4030	
			Kings End	
			Queens Ave	
			Field Street	
			Buckingham Road	
2b	Southbound	A421 – Fringford	Buckingham Road	A34 – Weston-on-the-Green
			Field Street	
			Queens Ave	
			Kings End	
			B4030	
			A41	
3a	Northbound	A34 – Weston-on-the-Green	A41 SW Bypass	A4095 -Bucknell Road junction
3b	Southbound	A4095 -Bucknell Road junction	SW Bypass A41	A34 – Weston-on-the-Green
4a	Northbound	A34 – Weston-on-the-Green	A41 A4421	A421 – Fringford
4b	Southbound	A421 – Fringford	A4421 A41	A34 – Weston-on-the-Green
5a	Eastbound	A4095 -Bucknell Road junction	A4421 A41	A41 - Near Piddington
5b	Southbound	A41 - Near Piddington	A41 A4421	A4095 -Bucknell Road junction
6a	Northbound	B4100 - Station Approach	Field Street	Ardley
			Bucknell Road	
			Bicester Road	
			Ardley Road	
6b	Southbound	Ardley	Ardley Road	B4100 - Station Approach
			Bicester Road	
			Bucknell Road	
			Field Street	
7a	Northbound	A4095/Bucknell Road junction	A4095	M40 J10
			B4100	
			A43	
7b	Southbound	M40 J10	A43	A4095/Bucknell Road junction
			B4100	
			A4095	
8a/b	Journey times to establish average speed on Lords Lane/Howes Lane			
9a/b	Journey times to establish average speed through Queens Avenue Shared Surface			

Link Flows

A link flow diagram is required for the study area encompassed by the junction plan. These should be presented as forecast flows and as volume to capacity ratios.

Link flows are needed as AM and PM peak hour flows, as well as 24 hour AADT and 6 hour and 18 hour AAWT (to be confirmed as to exact locations and format).

1.8 Timetable

The timetable for the modelling is set out below (subject to confirmation):

- Commissioning of modelling by end of Friday 24th January;
- Outputs for Scenario 3 by **Friday 31st January**;
- All outputs by 14th February.

Appendix B – 2012 Base Model Outputs (Supplied Electronically)

Appendix C – Bicester Proposed Development Uncertainty Log

Input	Uncertainty	Comments
393 house/2,900sqm employment development at NW Bicester exemplar	Near certain	Site approved and S106 signed. Expecting to implement by the end of 2013.
4,607 house/25.5Ha employment development at NW Bicester Masterplan	Near certain	Site accepted by central government for eco-development. Is in the emerging Local Plan as BICESTER 1. Masterplan to be submitted for SPD in Spring 2014.
Additional 1,000 houses on NW Bicester Masterplan	More than likely	This is additional housing numbers than Cherwell District Council have previously discussed but can be fitted within the red line boundary of the Masterplan site
1,900 house/104,000 sqm employment development at Graven Hill	Near certain	BICESTER 2 in the proposed Local Plan. Approved subject to S106
1,631 house development at SW Bicester	Near certain	Under construction.
720 house development at SW Bicester	More than likely	Site identified in emerging Local Plan as BICESTER 3. Application going to Planning Committee imminently
Additional 100 houses at SW Bicester	More than likely	Currently being considered
46,200 sqm employment development at Bicester Business Park, including relocation of Tesco store	More than likely	Outline permission granted in 2010. Identified in the proposed Local Plan as BICESTER 4.
Town centre redevelopment phase 1	Certain	Has just opened, including superstore, cinema and smaller retail units
Town centre redevelopment phase 2	Reasonably foreseeable	Proposed in the emerging Local Plan as BICESTER 6. CDC considering now that phase 1 is open.
RAF Bicester	Near certain	In the Local Plan as BICESTER 8. Plans being drawn up.
19,800 sqm employment at Bicester Gateway	More than likely	Identified in the proposed Local Plan submission as BICESTER 10.
26,400 sqm employment development at NE Bicester Business Park	More than likely	Identified in the proposed Local Plan submission document as BICESTER 11.

800 houses / 64,812 sqm employment development at SE Bicester	More than likely	Identified in the emerging Local Plan as BICESTER 12.
Bicester Village phase 4	Near certain	Approval subject to S106
Caversfield, Fringford Lane	Near Certain	200 dwellings
RAF Bicester (new houses in Caversfield)	Certain	Under construction

Appendix D – Reference Case Model Outputs (Supplied Electronically)

Appendix E – Additional NW Bicester Proposed Network Details

