vectos
microsimulation specialists

Warwickshire County Council

Nuneaton & Bedworth Borough Council
Strategic Transport Assessment
Modelling Report

August 2015

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1 EXECUTIVE SUMMARY

Overview

1.1 Vectos Microsim (VM) has been commissioned by Warwickshire County Council (WCC) and Nuneaton and Bedworth Borough Council (NBBC) to undertake testing of the NBBC Local Plan allocation, ascertain the potential impacts and investigate and identify outline mitigation schemes thereof.

1.2 The allocation strategy that has been assessed is the NBBC Preferred Option (PO), identified through the Local Plan consultation process.

Scenario Development

1.3 Demands assigned within the model represents the sites allocated within the PO. The demands produced as a result of the PO allocation scenario have been subjected to mode shift and peak spreading procedures. Growth within the PO scenario has been capped so as not to exceed the levels of growth predicted by the TEMPRO database, after adjustments for national trends (NTEM Adjusted TEMPRO).

Study Objectives

1.4 The objectives of this stage of detailed modelling and assessment are as follows:

- To establish a suitable 2031 NBWA Reference Case model against which the impact of the NBBC PO scenario can be compared;
- To construct the associated trip generation and distribution for the sites contained within the PO;
- To ascertain the initial impacts of the allocated growth in terms of model stability and network statistics;
- To assess and identify, as far as is practicable, suitable mitigation measures required to facilitate the allocated growth;
- To review the relative impact of the mitigated network against the Reference case;
- To provide indicative costs for the resulting package of proposed mitigation measures.

Test Scenarios

1.5 A total of three model scenarios have been developed and assessed as part of this study. The model outputs have been extracted and comparisons drawn between the network operation of the PO allocation scenario and that of the Reference case scenario.

1.6 The scenarios that have been tested are as follows:

- 2031 NBWA Reference Case (VM155030.M001 - NBWA 2031 Reference)
  Reference Case conditions as per the forecasting process outlined within the associated model forecast report[1] plus the addition of two recent committed developments and their associated schemes.
- 2031 NBBC Preferred Option 'Do Nothing' Scenario (VM155030.M002 - NBBC 2031 PO DN Scenario)
  The 2031 NBWA Reference model with the addition of the NBBC PO allocations sites but no associated network mitigation.
- 2031 NBBC Preferred Option 'Do Something' Scenario (VM155030.M003 - NBBC 2031 PO DS Scenario)
  The 2031 NBWA Reference model with the addition of the NBBC PO allocation sites and the proposed mitigation package.

Stage of Assessments

1.7 A staged approach to addressing the objectives has been adopted as follows:

- The existing 2031 Reference Case has been updated to ensure it reflected the most recent known position i.e. inclusion of the most up to date committed development schedule and associated schemes.
- The demands associated with the delivery of the Hinckley and Bosworth Borough Local Plan have been assigned to the model network.
- The 2031 NBBC Preferred Option allocated sites and the associated access strategies, trip generation and distributions have been included within the model network and the impacts assessed.

[1] VM, *VM155003 R001 - NBWA 2031 Ref Model Development*, March 2015

- The traffic impacts of the 2031 NBBC PO allocations have been reviewed and mitigation measures proposed for the basis of the 2031 NBBC Do Something scenario network.

Mitigation Overview

Access Strategies

1.8 An appropriate access strategy has been identified for inclusion within the model network. The key elements which comprise the access and distribution strategy include:

- Delivery of a link through all of the sites located to the north of Nuneaton which connects Weddington Lane to The Long Shoot, via Higham Lane, providing a secondary route across the north of Nuneaton to the A5 and allowing a comprehensive access strategy to be delivered for all northern sites.
- Delivery of a link between Ansley Road to the west of Nuneaton and the A444 to the south of Nuneaton which would run through the proposed Arbury site and provide distribution for the trips created from that site whilst providing additional relief to the Ansley Road / Arbury Road corridor to the west of Nuneaton.
- Delivery of a link through the employment site located between Gipsy Lane and B4113 Coventry Road to the east of 'Griff Island' which connects Coventry Road and Gipsy Lane and provides additional relief to the 'Griff Island'.

1.9 It is assumed that the access and distribution strategies, pertaining to the delivery of each individual site, are development specific costs and have therefore not been included within the mitigation schedule cost estimates.

Mitigation Schedule

1.10 A primary objective of this Strategic Transport Assessment (STA) has been to identify the mitigation measures necessary to ensure that the NBBC PO can be delivered and that its impact on the surrounding network is minimised.

1.11 In total the delivery of 35 schemes, including significant contributions towards sustainable transport infrastructure, have been identified as likely to meet the objectives of ensuring that the demand assigned to the network is at least partly mitigated and that the overall level of network operation is not significantly affected.

1.12 The estimated cost of delivering of the highlighted schemes is currently £42.63 million.

Sustainable Measures

1.13 The STA has revealed that even with an allowance of 15% for mode shift there is still a need for physical highway mitigation measures to be delivered. Thus it is reasonable to conclude that, although a relatively high target, a 15% mode shift to non-car based uses should be the requisite target.

1.14 Whilst it is up to the individual site promoters to demonstrate the manner in which this 15% can be achieved, allowances have been made within the mitigation schedule for the delivery of over £6 million of works to be included which will help deliver this mode shift target; this includes the following proposals:

- Bermuda Connectivity Project (incl. All Modes Transport Bridge & Bermuda Station parking)
- Sustainable Transport contributions
- Bus Priority enhancements

1.15 Appendix D sets out what sustainable transport improvements will be sought through the planning process to support development generally within the borough.

Further Work

1.16 It is anticipated that the Nuneaton Town Centre schemes proposed within this assessment will require substantial additional amendments before they represent the final strategy for this area. A separate study is being undertaken by Warwickshire County Council to identify an overall highway strategy for the town centre area. Whilst a Do Minimum scenario will be assessed, which could be delivered within the £6.5 million quoted for town centre improvements, there is a risk that the final delivery costs for the town centre improvements required may exceed this amount. However the wider town centre strategy will also benefit from improvements to pedestrian and cyclist connectivity, public transport initiatives and wider improvements to the public realm. As such further external funding contributions may be identified to meet any shortfall (e.g. Strategic Economic Plan Growth Deal).

1.17 Similar to the Nuneaton Town Centre works, just under £11.6 million worth of works are attributed to the improvements along the A444 corridor. Again, a more refined study is required to understand what the implications are of delivering these works as well as a more detailed assessment to identify an optimum solution for the delivery of schemes within this area and the potential benefits that may be accrued from the delivery thereof.

1.18 The mitigation identified for A444 / Newtown Road will benefit from a detailed assessment in a more refined, and focused, model. This junction will become a key strategic junction and is likely to record high levels of demands, particularly with the addition of the large residential development to the west (Woodlands). Further optimisation of the current junction calibration is likely to produce more favourable results on this section of the network (currently showing negative impact in the PM period).

1.19 It should be noted that the results of these more detailed assessments will be likely to yield additional benefits and further reduce the impacts over and above those identified within the rest of this report. Thus, the results presented in this report should be considered as a worst case assessment with the likely scope for impacts to be reduced further through additional optimisation of the proposed mitigation measures.

Risks and Issues

1.20 The feasibility of the proposed mitigation measures has been assessed at a very high level. There are 35 schemes proposed for delivery within the modelling, progressing each scheme through detailed design would be impractical at this stage. Thus, it should be acknowledged that the outline schemes, alongside the associated costs, will be subject to further design, optimisation and assessment throughout the plan period.

1.21 Furthermore, it should not be assumed that the schemes recommended through this study are fixed and will be delivered in the form described within this report. Rather it is intended that the schemes proposed are outline schemes which may change through further optimisation and detailed design that will precede the final delivery.

Conclusions

1.22 Based on the outcome of this assessment it is reasonable to conclude the following:

- That adoption of a 15% mode shift target in isolation will not be sufficient to accommodate the proposed sites and, thus, additional mitigation will be required.
- The initial mitigation schedule that has been identified to accompany the allocation of development as outlined within the NBBC Preferred Option will likely require at least 35 schemes at a cost of approximately £42.63 million.
- Further refinement of the schemes proposed through this study is required, particularly within the Nuneaton Town Centre, A444 corridor south of Nuneaton and at the proposed A444 with Newton Road. Extensive schemes are proposed for these areas in order to accommodate the north / south flow of traffic between Nuneaton and Coventry / M6 attributed to the large development sites situated alongside these key routes.
- The delivery of the proposed schemes result in a general improvement in network conditions in the AM period when compared to the 2031 Reference Case. The impact in the PM period is not fully mitigated but is reduced to levels that are only marginally worse than the Reference Case position. There are a number of specific impacts highlighted in the PM that require further review but these are considered likely to be reduced through refinement of the proposed schemes.

Further Considerations & Recommendations

Further Considerations

1.23 It is recommended that the following risks are considered at the earliest opportunity, although it is acknowledged that the assessment of these risks prior to the adoption of the Local Plan is, in some cases unlikely to be possible.

- The impacts on areas not included within the modelling, however, the considerable coverage of the model and study area are likely to minimise the need for this.
- The impacts of utility and service diversion costs attributed to any one scheme that may not have been considered at this stage (an average cost of service and utility works has simply been assigned to each scheme);
- The impact of land issues or safety audits, not considered in detail within the initial assessment but that may arise during more detailed feasibility and design stages;
- Vertical alignment and gradient issues not considered at this stage; and

- Specific risks pertaining to the delivery of one or more scheme on the network such as:
    - The physical risks to delivering enhancements within the area of Nuneaton inner ring road that are posed by the large number of bridges and the railway track.
    - The risks posed by the proposition of schemes in areas where information regarding the highway extent was limited (such as those near Bedworth).
    - Specific risks where schemes which require a large proportion of the existing highway to be allocated as road space may not be acceptable or may not meet the required design standards (such as the proposals at Greenmoor Rd / Heath End Rd / College St / Bull Ring or at A444 / Newtown Road).

1.24 In addition to the above identified risks, there are a number of assumptions that have been included within the modelling that may require further detailed analysis at an appropriate stage within the assessment period. Some of these have been outlined within the following section.

1.25 Notwithstanding the risks that have been identified previously, it should be acknowledged that a high level feasibility assessment of the proposed schemes has been undertaken and this has not revealed any instances where at least the principles of the schemes proposed within the modelling, cannot be delivered.

Recommendations for Future Assessments

1.26 There are a number of parameters that have been adopted within the modelling that are subject to change; as such it is recommended that the following are considered during any future stages of assessment:

- When the details surrounding the employment sites use classes are established, the assumptions pertaining to the usage of the employment sites (B1, B2, and B8) should be updated accordingly.

- More detailed work surrounding the assumption of a 15% mode shift percentage is required. Specifically further identification and refinement of the elements that can be delivered to assist in achieving this target should be undertaken. In addition to this, once the mitigation strategy is fully determined, sensitivity testing should be considered to ascertain the potential impacts that may be accrued should the 15% not be achieved. Such work is recommended so as to ensure that areas that may require further mitigation, should the mode shift targets drop, can at least be identified.
- The current modelling assessment assumes caps on certain elements of growth. The cap is required to ensure that the demands assigned within the model are considered realistic and to ensure that the model will yield realistic results which, due to the deterministic nature of Paramics, may not occur in the absence of the cap. However, once the site access and mitigation strategies have been fully determined it may be beneficial to undertake a sensitivity test which revisits one or more of the growth assumptions within the modelling.
- Further investigation of the potential benefits of area wide mitigations strategies and the cumulative benefits of the schemes therein is recommended.
- The need for mitigation on the Strategic Road Network will be examined in further detail by Highways England (HE) and WCC once NBBC has approved the Preferred

1.27 The schemes proposed during this phase of testing are those that are most likely to serve a role of strategic importance. The actual quantum of development, site access points and detailed trip rates will be confirmed as the proposed sites move through the planning process, at this stage further assessments should be undertaken which may identify further or alternative mitigation schemes.

1.28 Most of the issues set out previously are unlikely to significantly alter the conclusions of this study with respect of the critical infrastructure requirements. Furthermore, certain elements may be dealt with by each individual site as they come forward and so the onus may be removed from NBBC and WCC to consider these elements further at this stage.

1.29 It should again be noted that the results that are presented herein should be considered as a worst case assessment and there is likely to be scope for the impacts to be further reduced by additional optimisation and more detailed refinement of the proposed mitigation measures.

2 INTRODUCTION

Scope

2.1 Vectos Microsim (VM) has been commissioned by Warwickshire County Council (WCC) and Nuneaton and Bedworth Borough Council (NBBC) to undertake testing of the NBBC Local Plan allocation, ascertain the potential impacts and investigate and identify outline mitigation schemes thereof.

2.2 Following on from previous studies that explored the impact of alternative allocation strategies, this modelling review provides a focussed assessment on the resulting 'Preferred Option' (PO) as provided by NBBC. The assessment has utilised WCC's 2031 Nuneaton & Bedworth Wide Area (NBWA) Paramics model.

2.3 The conclusions are intended to assist consultation on the PO and inform the proposed schemes to be presented within the Infrastructure Development Plan (IDP).

Study Objectives

2.4 The tasks that have been completed as part of this study can be summarised as follows:

i) To establish a suitable 2031 NBWA Reference Case model against which the impact of the NBBC PO scenario can be compared;

ii) To construct the associated trip generation and distribution for the sites contained within the PO;

iii) To ascertain the initial impacts of the allocation growth in terms of model stability and network statistics;

iv) To assess and identify, as far as is practicable, suitable mitigation measures required to facilitate the allocated growth;

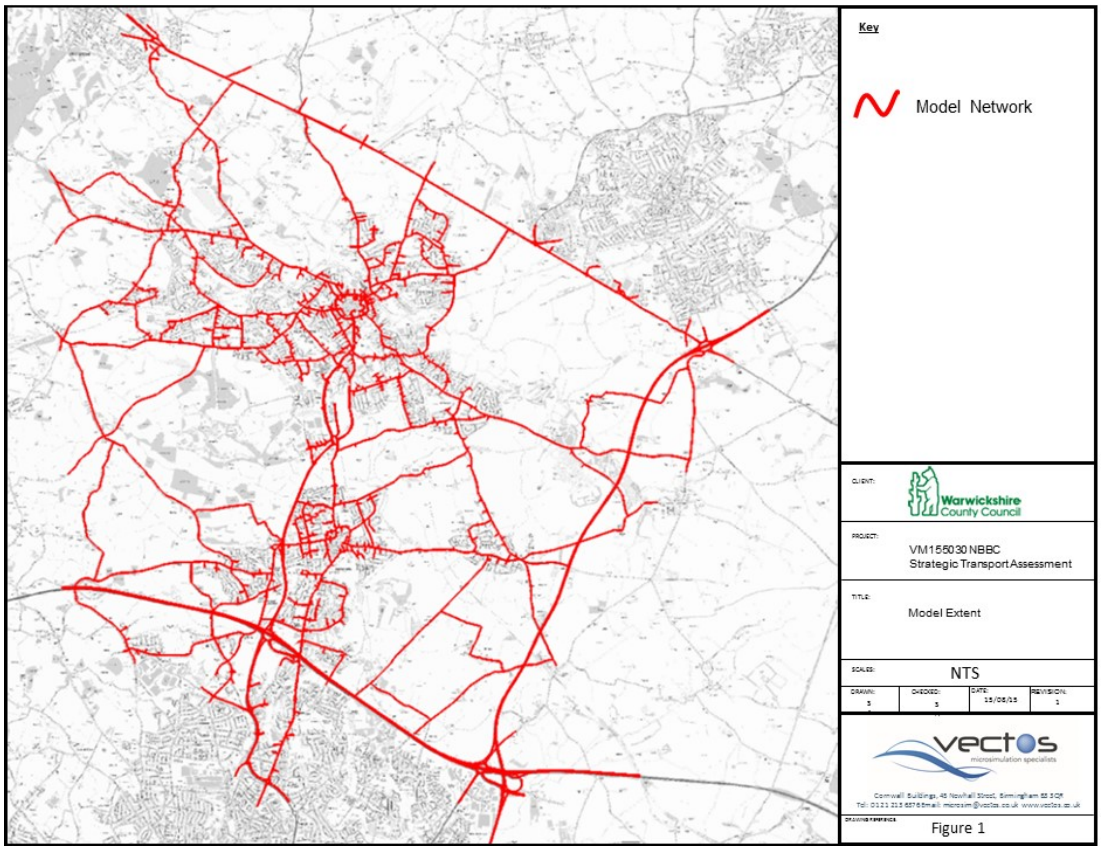
v) To review the relative impact of the mitigated network against the Reference case;

vi) To provide indicative costs for the resulting package of proposed mitigation measure.

Study Area

2.5 The focus of the study area is encompassed within the Nuneaton and Bedworth Wide Area (NBWA) Paramics model. An overview of the coverage of this model is provided within Figure 1 below.

Figure 1: Nuneaton & Bedworth Paramics Model Coverage



NBBC Local Plan Testing

2.6 Testing has focussed on a single preferred allocation option (PO). The locations of the employment and residential sites that have been tested within the NBBC PO scenario are presented within Figure 2 and Figure 3 below.

Figure 2: Nuneaton & Bedworth Allocated Employment Sites

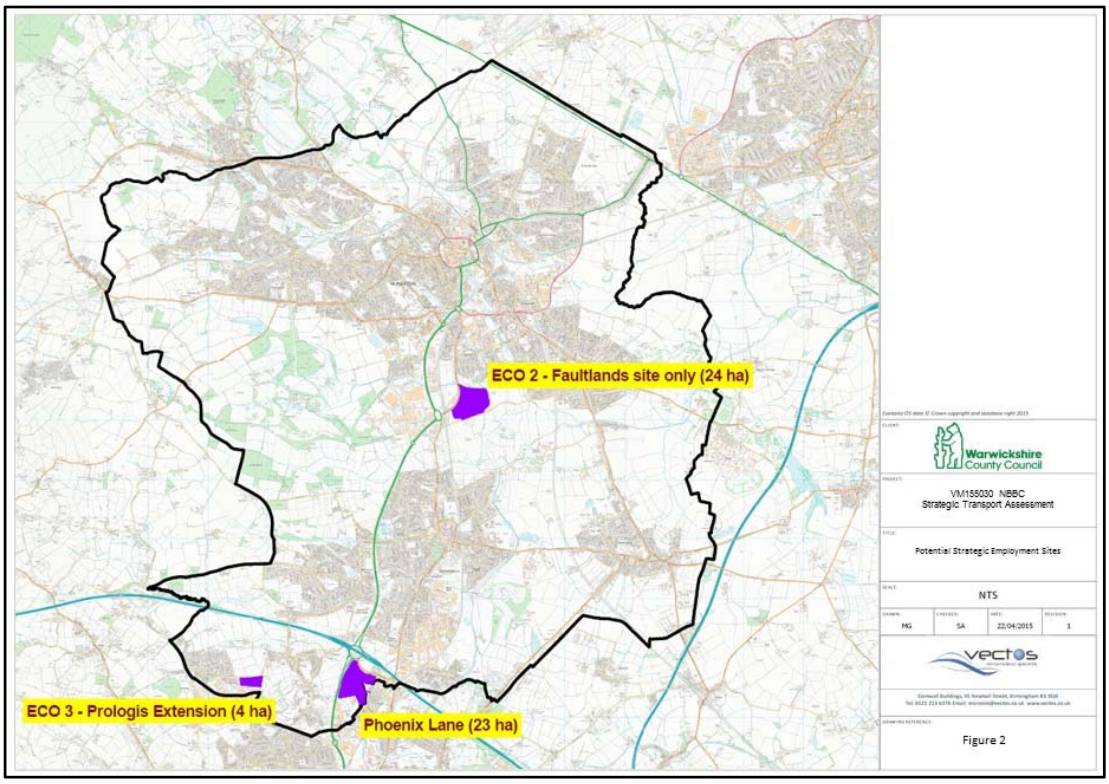
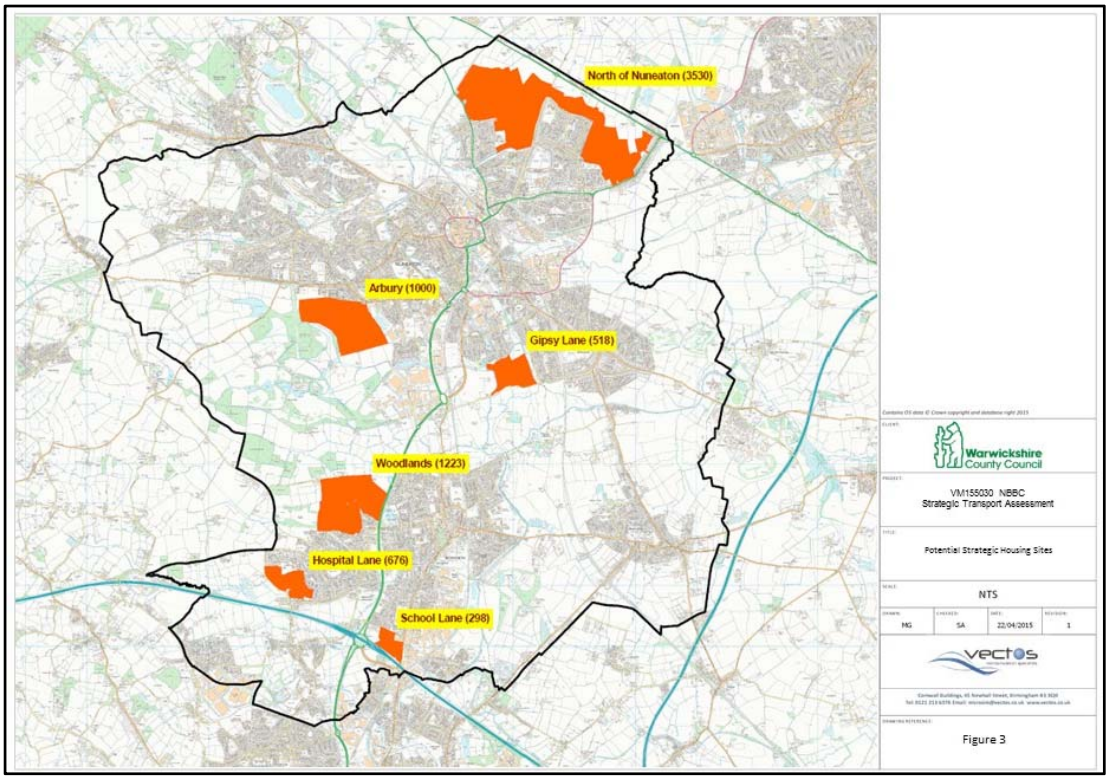


Figure 3: Nuneaton & Bedworth Allocated Residential Sites



Report Structure

2.7 The remainder of this report is set out as follows:

- **Section 3** – Outlines the principles behind the development of the model scenarios.
- **Section 4** – Provides an overview of the assumptions pertaining to the inclusion of site access and proposed mitigation.
- **Section 5** – Documents the methodology for extraction and the presentation methods used to assess the model outputs.
- **Section 6** – Presents and discusses the modelling results and general findings.
- **Section 7** – Presents a summary and conclusions from the modelling work.
- **Section 8** – Outlines any further considerations and recommendations for future stages of assessment.

3 SCENARIO DEVELOPMENT

Overview

3.1 The following section of this report provides details on the assumptions adopted during the development of the model scenarios. It is intended to outline the model updates that have been made to WCCs existing NBWA 2031 Reference model and the methodology applied in the development of the demands used in the PO scenarios.

2031 Reference Case Development

3.2 The first objective of the study has been to ensure that a suitable reference case scenario is available from which to draw comparisons and assess the local plan impact against.

3.3 The term Reference Case refers to the scenario against which all other scenarios are compared. In assessing the implications of any development allocation strategy it is important to keep any variables to a minimum. The differences between scenarios should relate specifically to the development strategy (i.e. growth and the mitigation thereof), other considerations, such as committed developments and network interventions, should be consistent throughout the assessment.

3.4 It is also important that the Reference Case used is an appropriate reflection of the baseline conditions.

3.5 WCC have already developed a Paramics model of the Nuneaton and Bedworth area which was updated in February 2015 to reflect the likely 2031 conditions[2]. However, since the completion of this update two significant developments have been granted planning permission. WCC has requested that these developments be included within the 2031 Reference model that is to be used as the baseline against which the PO is compared.

3.6 Therefore, to ensure that the model was as up to date as possible, the existing 2031 NBWA Reference Case was amended to account for the following:

- Inclusion of the following committed development demands:

[2] VM155003 R001 - NBWA 2031 Ref Model Development 050315

- Bellway Homes, Residential Development (Phase 2), The Long Shoot, Nuneaton (250 additional dwellings) [Zone 725]
- Hydrock / Gladman Developments, Residential Development, Eastboro Way, Nuneaton (300 dwellings) [Zone 726]

- Inclusion of the associated site access and mitigation measures associated with the two new committed developments:
  - Signalised access junction off The Long Shoot into the Bellway site [node 4156].
  - Two signalised cross-roads on Eastboro Way providing access to Camborne Dr to the west and the new development site to the east [node 335z & 468].
  - Dualling of Eastboro Way from south of the southern access to Hydrock development to The Long Shoot / Hinckley Rd junction.
  - New signalised junction at The Long Shoot / Eastboro Way / Hinckley Rd [node 4165x].

- Minor modifications to the model network in order to reflect a more realistic representation of the on-street conditions. This included the following changes:
  - B4111 Mancetter Rd / B4114 Tuttle hill / Camp Hill Rd – Reviewed the turn movements assigned to each lane [node 354z].
  - Donnithorne Ave / Dorlecote Rd – Widened link to reflect the space for one right turning vehicle to wait without holding up the eastbound flow [link 4183y:2290].
  - A444 / Newtown Rd southbound on-slip – Increased ramp length from 125m to 220m to reflect the correct length of the A444 merge section [node 1231].
  - B4114 Lutterworth Rd / Ivanhoe Ave / Leyland Rd – Widened the immediate approach on Leyland Rd to accommodate two vehicles [link 4184z:2196].
  - Higham Ln / Brookdale Rd – Re-coded as a mini-roundabout [node 281ca]
  - M6 Junction 2 – Reviewed the lane allocations on the M6 westbound off-slip, A4600 Hinckley Rd (South) and Hinckley Rd (North) approaches, and also the lane usage rules on the circulatory carriageway.

- Minor modifications to the model network to ensure a satisfactory level of model stability and improve operation. This included the following changes:
    - Donnithorne Avenue – Reduced gap acceptance to reduce instances of blocking whilst vehicles are waiting to turn into side streets [link 4183y:2290 & 2288:2287]
    - B4114 Corporation St / A444 Newtown Rd / Powell Way / Roanne Ringway – Reduced gap acceptance and increased visibility on the Ringway approach [link 29:219yc].
    - Minor revision to the PM green-time on Avenue Rd approach to Coton Arches roundabout [node 2977].
    - B4114 Lutterworth Rd / Ivanhoe Ave / Leyland Rd – Added visibility and reduced gap acceptance [link 4184z:2196].
    - M6 Junction 2 – Reviewed the signal timings and the signal controller offsets.

3.7 The details pertaining to the inclusion of the two additional committed development demands are discussed in the following section.

3.8 The new site access junctions, and the infrastructure improvement schemes associated with the new developments, have been informed by drawings provided by WCC[3].

Reference Case Model Demands

3.9 Demands within WCCs NBWA models have historically been assigned based on a number of different journey purposes. The matrix levels contained within the 2009 Base model and subsequently in the original, and now the updated, 2031 Reference model are outlined as follows:

- Matrix Level 1 – Home-Base Work (HBW) Light Vehicles
- Matrix Level 2 – Home-Based Education (HBE) Light Vehicles
- Matrix Level 3 – Home-Based Other (HBO) Light Vehicles

[3] Travis Baker, *Proposed Vehicular Access Strategy – Traffic Signal Option*, 04/07/13 [Bellway Homes Development Site Access]
Hydrock, *Preliminary Drawing*, 12/05/15 [Hydrock Development 2x Site Access & proposed scheme at The Long Shoot / Eastboro Way / Hinckley Road]

- Matrix Level 4 – Non-Home-Base Other (NHBO) Light Vehicles
- Matrix Level 5 – HGV's
- Matrix Level 6 – Committed Development (Original 2031 Levels) Light Vehicles [2031 models only]
- Matrix Level 7 & 8 – *Spare* [2031 models only]
- Matrix Level 9 – Additional Committed Development (Bellway & Hydrock Developments) [Revised 2031 model only]

3.10 A summary of the hourly demand levels contained within the 2031 Reference models are presented in Table 1 and Table 2 below. The differences relate to the addition of the two new committed developments noted previously. The level of growth on 2009 Base year levels is also summarised.

3.11 The demands and distributions relating to the two newly committed developments have been obtained from the WCC models[4] that were used to inform the respective planning applications.

3.12 In both cases a version of the NBWA model was used so the zoning systems correlate with the zones in the 2031 NBWA Reference model requiring the update. The distribution, and the trip generation, was therefore maintained and assigned to the new zones within the 2031 Reference model that relate to the two developments. The combined demands were assigned to a new matrix level (matrix level) and allocated a unique 'Car' vehicle type (Vehicle Type 23, 'NewComDev').

3.13 One further adjustment was required to avoid the double counting of the Bellway Phase 1 demands. Bellway Phase 1 demands were already included within the previous version of the 2031 NBWA model as part of the Committed Development matrix (matrix level 6), and the new demands extracted from the development assessment model included both phases. As such, the Phase 1 trip generation numbers, for both inbound and outbound trips, were subtracted from the origin and destination totals assigned to the zone that previously reflected the Bellway site (Zone 602). This ensured the same amount was removed from

[4] MID3696 - Sc2 Nun & Bed 2023 w.Dev (DS1) [Bellway Development] & 235442-01 M002 Nun & Bed 2023 The Long Shoot [Hydrock Development]

matrix level 6 as was added within matrix level 9 for Bellway Phase 1 demands, and ensured all the Bellway trips were associated to the same zone and in the same matrix level.

Table 1: 2031 NBWA Reference Case Demands (Original)[5]

Matrix Level	07:00 – 08:00	08:00 – 09:00	09:00 – 10:00	16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
Level 1 - HBW Lights	22,899	24,693	17,349	23,704	25,426	18,981
Level 2 - HBE Lights	658	6,442	1,169	1,676	1133	871
Level 3 - HBO Lights	7,445	7,510	11,058	13,852	13,820	12,864
Level 4 - NHBO Lights	4,176	8,810	5,482	7,283	6,777	4,530
Level 5 - Heavies	2,289	2,957	3,606	2,300	1,611	1,499
Level 6 - Com Dev	3,389	5,778	3,394	5,131	4,231	3,206
Level 7 - Blank	-	-	-	-	-	-
Level 8 - Blank	-	-	-	-	-	-
Level 9 - Blank	-	-	-	-	-	-
TOTAL[6]	**40,856**	**56,190**	**42,059**	**53,947**	**52,998**	**41,951**
Growth from 2009	*15.5%*	*12.5%*	*14.8%*	*18.1%*	*10.6%*	*13.6%*
Periodic Growth from 2009	*14.1%*			*14.1%*		

Table 2: 2031 NBWA Reference Case Demands (Revised)

Matrix Level	07:00 – 08:00	08:00 – 09:00	09:00 – 10:00	16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
Level 1 - HBW Lights	22,899	24,693	17,349	23,704	25,426	18,981
Level 2 - HBE Lights	658	6,442	1,169	1,676	1,133	871
Level 3 - HBO Lights	7,445	7,510	11,058	13,852	13,820	12,864
Level 4 - NHBO Lights	4,176	8,810	5,482	7,283	6,777	4,530
Level 5 - Heavies	2,289	2,957	3,606	2,300	1,611	1,499
Level 6 - Com Dev	3,351	5,722	3,356	5,078	4,194	3,169
Level 7 - Blank	-	-	-	-	-	-
Level 8 - Blank	-	-	-	-	-	-
Level 9 - New Com Dev	234	369	248	350	417	332
TOTAL	**41,051**	**56,502**	**42,269**	**54,244**	**53,377**	**42,245**
Growth from 2009	*16.0%*	*13.2%*	*15.4%*	*18.8%*	*11.4%*	*14.4%*
Periodic Growth from 2009	*14.7%*			*14.8%*		

3.14 It can be seen from the tables above that the demand levels within the revised 2031 NBWA Reference model have increased with the inclusion of the two specific committed developments. Growth from 2009 to 2031 is approximately 14.7% in the AM period and

[5] As outlined within Vectos Microsim, *VM155003 R001 - NBWA 2031 Ref Model Development*, 05/03/15

[6] Minor discrepancies between these totals and those outlined within the model's accompanying report are a result of rounding. The previous report presents the demands as per the development calculations pre-inclusion within the model, whereas the numbers summarised here are taken from the Paramics demand text files and summed.

14.8% in the PM period. Despite the growth being comparable, it is worth note that in 2031 the PM period demands are approximately 7% higher than in the AM period.

2031 Local Plan Scenario Development

3.15 The second key objective was to develop the NBBC local plan scenarios; both the 'Do Nothing' and the 'Do Something' scenario.

3.16 This involved the construction of the trip generation and distribution associated to the sites contained within the Preferred Option. Consideration has also been given to other demands that were not (and should not be) accounted for within the Reference Case but which should form part of the Local Plan scenario demands to ensure a robust assessment; namely the residual impact of the Hinckley and Bosworth Borough Council's (HBBC) Local Plan demands that will reach the NBWA model extent.

3.17 In addition to the demand considerations, it has also been important to ensure that the network has been updated to account for the access strategy for each PO site. Subsequently, and post the initial review of the 'Do Nothing' network, consideration and inclusion of proposed infrastructure improvements has also been necessary within the 'Do Something' scenario.

HBBC Local Plan Demands

3.18 In order that the impact of the HBBC allocation could be included within the NBBC assessment it was essential that demands relating to their developments were included within the NBWA model network.

3.19 To ensure that these demands could be accurately reflected they were extracted directly from the HBBC model that had been used to inform the assessment of the HBBC Core Strategy proposals i.e. the Hinckley and Nuneaton Wide Area (HNWA) Paramics model.

3.20 The extent of the HNWA model is not directly compatible with the NBWA model (in terms of zoning and network coverage) and so, as a result, manual adjustments were required to ensure that the outputs from the HNWA model could be converted into demand inputs within the NBWA model.

3.21 In order for this to be achieved the following methodology was adopted:

i) Trip ends, associated with the HBBC proposed developments, which could be directly translated into the NBWA model were isolated out of the HNWA model.

ii) The proportion of HBBC development trips loading into the NBWA model via the various points along the A5 was identified – this revealed that the majority of trips associated with the HBBC allocated sites that were heading towards Nuneaton are likely to enter the network via Coventry Road and Dodwells Road entry arms to the A5 Dodwells roundabout or the Nuneaton Lane and Wood Lane junctions along the A5.

iii) The zones identified through stage ii) where assigned as the HBBC SUE zones and the respective origin and destination totals associated to the zones (as identified within stage 1) were apportioned out based on the entry and exit proportions calculated for the HBBC SUE trips along the A5.

iv) Zones on the northeast of the model network around M69 Junction 1 were discounted from the process as investigations revealed that almost all HBBC SUE trips that load into the network via Rugby Road and Wolvey Road were bound for the M69 SB, thus these trips are classified as external growth and will be accounted for within the NTEM Forecasting process.

v) HBBC SUE trips which were observed to travel southwards within the HNWA model, exiting via the A444, B4113 and B4114 did not provide a direct HNWA to NBWA zone correlation as the extent of the NBWA model includes a significantly greater degree of model coverage to the south. In this case select link analysis, at these points, was undertaken to identify the likely trip end zones to be associated with these HBBC SUE trips. Education and external zones were discounted from the analysis and then the proportion of trips assigned to each of the remaining zones was calculated. The HBBC SUE trips entering and exiting via these points were then translated into O-D pairs based on these proportions.

3.22 Following the completion of the aforementioned process Origin-Destination (OD) matrices where produced which translated HBBC SUE trips directly out of the HNWA PARAMICS model into OD pairs within the NBWA PARAMICS model. The trips were assigned to Matrix Level 7 and a unique ‘Car’ vehicle type (vehicle type 20, ‘HBBC’)

3.23 Table 3 illustrates the demand totals, associated with the HBBC SUE developments that have been assigned within the 2031 NBWA model across the AM and PM model periods.

Table 3: 2031 HBBC SUE Demands Assigned within the NBWA Model

	07:00 – 08:00	08:00 – 09:00	09:00 – 10:00	16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
Level 7 – HBBC Lights	181	192	119	108	140	145

NBBC Local Plan Demands

3.24 This STA is focussed on the impact of NBBC's Preferred Option and therefore, the impact of this combination of sites, their location, and the associated development quantum.

3.25 The location of the proposed site allocations are presented in Figure 3 and Figure 4, split by Employment and Residential sites.

3.26 The trip generation assumptions are outlined in the following section and the resulting development site demands summarised in Table 10.

Residential Trip Generation

3.27 Trip generation for each of the sites has been derived for the peak hours based on trip rates provided by WCC and summarised in Table 4. The shoulder trip rates have been derived through the use of proxy profiling factors that have been used previously in other WCC STA studies. The profiling assumed is presented in Table 5 below.

Table 4: Residential Peak Hour Trip Rates (per Dwelling)

	In	Out	Total
08:00 to 09:00	0.12	0.48	0.60
17:00 to 18:00	0.48	0.12	0.60

Table 5: Residential Trip Profiling Factors

	07-08:00	08-09:00	09-10:00	16-17:00	17-18:00	18-19:00
In	65.10%	100.00%	101.90%	72.60%	100.00%	76.00%
Out	68.50%	100.00%	46.10%	96.40%	100.00%	97.90%

3.28 The resulting hourly trips rates, adopted to produce the development specific matrices, are summarised in Table 6 below.

Table 6: Residential Trip Rates (per Dwelling)

	07-08:00	08-09:00	09-10:00	16-17:00	17-18:00	18-19:00
In	0.078	0.12	0.12	0.35	0.48	0.36
Out	0.33	0.48	0.22	0.12	0.12	0.12
Total	0.41	0.60	0.34	0.46	0.6	0.48

Employment Trip Generation

3.29 Employment has been split into three key classifications; assumptions have been made regarding the proportions of each classification that are likely to come forward. The classifications and proportions thereof have been aggregated to produce a universal employment trip rate.

3.30 The classifications and proportions assumed are similar to those which have been adopted during the Warwick District and Stratford District Strategic Transport Assessments.

3.31 The resultant proportions of each employment type that have been assumed are outlined as follows:

- B1 Use Class – 70%
- B2 Use Class – 16%
- B8 Use Class – 14%

3.32 By considering a larger proportion of B1 usage compared to B2 and B8, these assumptions are likely to lead to a robust trip rate calculation. The trip rates, by classification, were provided by WCC and are presented within Table 7 below.

Table 7: Employment Peak Hour Trip Rates (GFA per 100m^2)

	08:00 – 09:00		17:00 – 18:00	
	In	Out	In	Out
B1	1.30	0.24	0.18	1.11
B2	0.36	0.14	0.07	0.27
B3	0.11	0.07	0.06	0.11

3.33 As with the residential trip generation, the shoulder trip rates have been derived through the use of proxy profiling factors. The profiling assumed is presented in Table 8 below.

Table 8: Employment Trip Profiling Factors

	07-08:00	08-09:00	09-10:00	16-17:00	17-18:00	18-19:00
In	55.60%	100.00%	58.00%	120.30%	100.00%	51.10%
Out	64.70%	100.00%	88.20%	87.30%	100.00%	35.60%

3.34 The peak hour trip rates have been factored by the above shoulder hour factors, as well as the relative proportions of each classification, to produce a single set of universal employment trip rates that have been assigned to all employment sites within the 3 allocation scenarios.

3.35 These resulting employment use trip rates have been summarised within Table 9 below:

Table 9: Employment Trip Rates (GFA per 100m^2)

	07-08:00	08-09:00	09-10:00	16-17:00	17-18:00	18-19:00
In	0.55	0.98	0.57	0.18	0.15	0.07
Out	0.13	0.2	0.18	0.73	0.84	0.3
Total	0.68	1.18	0.75	0.9	0.98	0.37

3.36 The full size of the employment site has been provided by NBBC in hectares. In order to convert the total area into Gross Floor Area (GFA) the assumption of 40% coverage has been applied. This assumption has been applied throughout the Warwick District STA work and is therefore considered an appropriate assumption for this study.

Mode Shift

3.37 For all local plan sites, the trip rates were factored according to the prospective land use percentages as well as an allowance of 15% for mode shift.

3.38 It should be acknowledged that more detailed work will be required to identify the measures that are likely to be needed to support the achievement of a 15% mode shift target. This assumption is in line with assumptions adopted for other comparable borough and local plan assessments in Warwickshire.

3.39 The analysis of the 'Do Nothing' scenario (i.e. NBBC PO demand without mitigation) revealed that even when the 15% assumption is adopted, the NBBC network is unlikely to operate to a satisfactory level.

3.40 An initial assessment of the potential sustainable transport interventions that may be adopted in an attempt to realise this target has been undertaken and these measures have been outlined within Chapter 4 and Appendix D of this Report. Further work on the feasibility and benefits thereof is likely to be necessary to further inform the assumptions that have been adopted within the modelling in respect of mode shift assumptions.

Preferred Option Demands

3.41 The resultant peak period trip generation levels assigned to the model as a result of the Local Plan preferred allocation option are summarised in Table 10.

Table 10: NBBC 2031 Preferred Option Trip Generation

	Type	Quantum	AM 3hr Period		PM 3hr Period	
			In	Out	In	Out
SHS 4 - North of Nuneaton	Resi	3,530 dwellings	961	3091	3580	1060
School Lane	Resi	298 dwellings	81	261	302	89
SHS 1 - Gipsy Lane	Resi	518 dwellings	141	454	525	155
SHS 2 - Arbury	Resi	1,000 dwellings	272	876	1014	300
Woodlands	Resi	1,223 dwellings	333	1071	1240	367
SHS 3 - Hospital Lane	Resi	676 dwellings	184	592	686	203
Resi. Trip Gen Total			***1973***	***6343***	***7349***	***2175***
ECO2 - Bermuda Extension	Employ	24 Ha	1713	413	322	1520
Phoenix Lane	Employ	23 Ha	1642	396	309	1457
ECO3 - Prologis Extension	Employ	4 Ha	286	69	54	253
Employ. Trip Gen Total			***3641***	***878***	***685***	***3230***
TOTAL TRIP GENERATION			**5614**	**7221**	**8034**	**5405**

3.42 The trip generation summarised above includes the assumed 15% discount for model shift.

Trip Distribution

3.43 The distribution for each site has been approximated using CITEware which has recently been updated with 2011 Census data. CITEware runs have been carried out by Peter Brett Associates and take into account the attraction of the other development sites when determining the distribution of a given site.

3.44 The resulting distributions have been applied to the Paramics model zone system and, using the relevant trip generation, development demand matrices created.

Redistribution and Peak Spreading

3.45 In addition to the allowance for mode shift, it was also necessary to make allowances for other influencing factors, namely redistribution and peak spreading effects.

3.46 Latest guidance on forecasting within transport models indicates that growth rates should be corrected to avoid double counting and that this 'correction' should be based on a view as to the plausible overall likely growth within an area, informed by TEMPRO, rather than whether a development, or set of developments, is interpreted as being 'additional'.

3.47 The purpose of this approach is to minimise the potential for over estimation of forecasts which could, in turn, lead to over-engineered solutions to problems that may not necessarily be realistic. Furthermore, if growth within the scenario models is allowed to remain too high there is a chance that one scenario may be discounted on the basis that the demand impacts cannot be satisfactorily accommodated on the network irrespective of the proposed mitigation measures.

3.48 It should be noted that for the purposes of the calculations and comparisons described within the following section any reference to the 2031 Reference Case model refers to the previous version i.e. without the inclusion of the two new committed developments. They are not therefore included in the demand totals summarised in tables and the growth percentages stated. They were added into the 2031 NBBC PO scenario post capping and peak spreading calculations in the same way as the 2031 Reference Case model was updated (as described earlier in this chapter).

Redistribution Methodology

3.49 As part of the forecasting process followed in the creation of the NBWA 2031 Reference model[7], a cap on internal growth was applied which was based on the NTM Adjusted TEMPRO figure for Nuneaton and Bedworth for the period between 2009 to 2028 (AM: 16.16%; PM: 16.92%). Using the equivalent 2009 to 2031 factor was shown to result in an unstable model that frequently gridlocked and what was believed to be overestimated growth levels.

[7] See Vectos Microsim, *VM155003 R001 - NBWA 2031 Ref Model Development 050315,* March 2015

3.50 If the same NTM adjusted TEMPRO factors were to be used to determine the upper limit of growth in the local plan PO scenario then no net increase in overall demands would be created by the inclusion of the allocated sites (as the 2031 Reference Case demands had already reached this limit).

3.51 For this reason a higher cap was applied for internal growth that was based on the 2009 to 2031 NTM Adjusted TEMPRO factor for Nuneaton and Bedworth. The AM and PM NTM adjusted factors represent 19.87% and 20.75% respectively for the 2009 to 2031 period, around 4% higher than the levels in the 2031 Reference Case model.

3.52 Where the level of demand assigned within the model as a result of the local plan was in excess of the TEMPRO predicted levels of internal growth then the net difference is assumed to be the volume of trips that redistribute as a result of the inclusion of the allocated sites.

3.53 The redistribution of trips in response to the inclusion of the local plan development sites was calculated by applying the aforementioned reduction (i.e. the surplus above cap) proportionally across the background demand matrices. This was done by comparing the demand within the Local Plan matrix to the Background matrices. This process ensures that the reduction in trips was targeted to those zones which had the highest level of interaction with the allocation sites.

3.54 The reduction was calculated firstly by Origin–Destination (OD) movements, secondly by OD totals, and finally proportionally across the entire matrix. The purpose of this approach is to ensure that the reductions that are applied are as focussed as possible.

3.55 Following the application of the capping and redistribution procedure, internal growth levels within the model are in line with the NTM adjusted TEMPRO factors for Nuneaton and Bedworth, covering the 2009 to 2031 period, whilst net growth within the model is approximately 16.6% in the AM period and 18.4% in the PM period. The impact of the redistribution procedure is summarised in Table 11 below.

Table 11: TEMPRO Capping Overview

	07-08:00	08-09:00	09-10:00	16-17:00	17-18:00	18-19:00
Base Model Demand (excl. HGV & Edu)	21,431	27,510	20,647	30,509	32,901	23,768
Periodic	69,587			87,178		
Ref Case Demands (excl. HGV & Edu)	25,628	31,893	24,051	36,822	35,973	26,980
Local Plan Demands (NBBC + HBBC)	3,778	5,844	3,470	4,490	5,480	3,710
Periodic	13,092			13,679		
2009 to 2031 Forecast Internal Growth	25,688	32,974	24,749	36,840	39,729	28,701
2009 to 2031 + Local Plan Growth	29,406	37,737	27,521	41,312	41,453	30,690
Reduction	-3,718	-4,763	-2,773	-4,472	-1,724	-1,989
2009 to 2031 + Local Plan Revised	25,688	32,974	24,749	36,840	39,729	28,701
Internal Growth Periodic	83,411			105,270		
Internal Growth (%)	19.9%			20.8%		
Total Demand: 2009 Base Model	35,385	49,931	36,639	45,669	47,900	36,925
Total Demand: 2031 NBBC PO Scenario	41,499	57,881	42,866	54,008	56,811	43,719
Net Growth	16.6%			18.4%		

3.56 It should be noted that the external growth levels assigned within the model was capped at 2022 levels during the forecasting of the 2031 Reference Case to improve model stability. This is explained in more detail within the NBWA 2031 Reference Model Development Report. Since the majority of this additional growth will be dealt with through the application of schemes on the Strategic Road network, in particular the M6 motorway, it is unlikely to affect the mitigation measures proposed as a result of the assignment of the Local Plan demand. Furthermore, the lower external growth levels make it easier to define and attribute the network wide impacts to the inclusion of the Preferred Option sites.

Peak Spreading

3.57 Peak spreading assumptions have been applied after the redistribution process. As peak spreading assumptions had already been applied to the 2031 Reference demands, the application of further peak spreading has been applied only to the growth that could be considered as occurring in addition to the original 2031 Reference demands.

3.58 The peak spreading assumptions applied were initially consistent with those outlined within the 2031 Reference Case model development report and summarised below.

Table 12: Peak Spreading Proportions

07:00 – 08:00	08:00 – 09:00	09:00 – 10:00	16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
34.0%	35.3%	30.8%	50.2%	24.3%	25.5%

3.59 Peak spreading evidence and the derived trend data was based on observed Automatic Traffic Count (ATC) data collected annually at WCC cordon monitoring locations around the modelled area.

3.60 After the application of the above proportions it was apparent that there was a substantial shift in demand within the PM model period. The shift occurred to such an extent that the 16:00 to 17:00 demand levels exceeded those within the 17:00 to 18:00. Whilst there is potential for this situation to occur, the principle of peak spreading is such that vehicles are redistributed away from the most congested peak hour in response to congestion. As a result the PM peak spreading proportions were readjusted within the PM period to ensure that the total demand in the 1600 to 1700 hour did not exceed the level of demand within the 17:00 to 18:00 peak hour.

3.61 In order that this principle could be achieved, 30% of the 16:00 to 17:00 increase was redistributed, proportionally, back across the 17:00 to 18:00 and 18:00 to 19:00 hours. In this way the demands within the 16:00 to 17:00 and 17:00 to 18:00 periods were retained at comparable levels.

3.62 The resultant peak spreading proportions assigned to the PM period are summarised within the following table.

Table 13: Revised PM Peak Spreading Proportions

16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
20.2%	38.9%	40.9%

3.63 As noted above, the peak spreading proportions were applied to the growth that occurs in excess of the levels contained within the 2031 Reference Case since the Reference Case demands have already been subject to peak spreading.

3.64 The specific differences between the two scenarios relates primarily to the inclusion of the demand associated with the PO allocations. If, however, peak spreading assumptions were applied only to those demands then it would result in a disproportionate shift in PO demand away from the traditional peak hour.

3.65 As a result, 50% of the growth that was subjected to peak spreading was associated with the PO demands whilst the remaining 50% was associated with the background matrices. This approach is reasonable given that Committed Development and Forecast growth has already been subjected to peak spreading during the development of the Reference Case, whilst the Education and HGV trips are unlikely to be affected by peak spreading. This also ensured that 50% of the specific PO demands are maintained in the period they were originally developed for and the remaining 50% is spread across the period.

New Committed Developments

3.66 As described earlier in this chapter, two newly committed developments required inclusion in the Local Plan scenario. These demands were included at the end of the process and were not included in any of the calculations outlined above.

3.67 The new committed developments were included in the exact same way, and with the exact same level of demands in both the revised 2031 Reference Case and the 2031 NBBC PO scenarios.

Demand Summary

3.68 A summary of the demands assigned to the model network as a result of the aforementioned NBBC PO demand forecasting is presented within the following table.

Table 14: NBBC 2031 Preferred Option Scenario Demands

Matrix Level	07:00 – 08:00	08:00 – 09:00	09:00 – 10:00	16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
Level 1 - HBW Lights	21,130	22,298	16,406	21,916	24,267	18,195
Level 2 - HBE Lights	658	6,442	1,169	1,676	1,133	871
Level 3 - HBO Lights	6,624	6,396	10,143	12,495	12,929	12,147
Level 4 - NHBO Lights	3,720	7,519	4,986	6,468	6,329	4,278
Level 5 - Heavies	2,289	2,957	3,606	2,300	1,611	1,499
Level 6 - Com Dev	3,602	5,497	3,361	5,075	4,191	3,163
Level 7 – HBBC Local Plan	181	192	119	108	140	145
Level 8 – NBBC Local Plan	4,085	4,852	3,775	4,916	4,525	3,823
Level 9 - New Com Dev	234	369	248	350	417	332
TOTAL	42,523	56,521	43,813	55,305	55,540	44,453

Test Scenarios

3.69 A total of three scenarios have been modelled, the outputs extracted from these scenarios are discussed within the following sections of this report. The scenarios tested are as follows:

- ***2031 NBWA Reference Case***

  The 2031 Reference Case model as described within the original forecasting report plus the additional updates outlined earlier in this chapter.
- ***2031 NBBC Preferred Option 'Do Nothing' Scenario***

  The 2031 NBWA Reference model with revisions to the model demands to include the NBBC PO allocation sites (as described in this chapter) and their access strategy (see Chapter 4), but with no further network improvement schemes.
- ***2031 NBBC Preferred Option 'Do Something' Scenario***

  The same model demands as the 'Do Nothing' but with the addition of a set of focussed and refined infrastructure improvement schemes.

4 DEVELOPMENT ACCESS AND MITIGATION STRATEGY

Introduction

4.1 The modelling assessment process helped to highlight the causes of congestion in various locations across the study area and a number of mitigation schemes were identified to address these issues.

4.2 Initially, via consultation with WCC, appropriate access and distributor strategies were defined for each of the proposed sites, this was done either in isolation or as a cumulative strategy where appropriate.

4.3 The inclusion of the proposed sites and associated access / distributor measures was considered to be reflective of the 2031 NBBC Preferred Option 'Do Nothing' Scenario. This scenario is intended to highlight the network impact that would exist on the network when the developments and access strategies are included but with no other physical transport interventions considered. This scenario is still inclusive of the 15% mode shift assumptions, thus it assumes that sustainable measures will, at least to some extent, have been implemented.

4.4 The 2031 NBBC PO 'Do Nothing' scenario provided the starting point for the derivation of suitable mitigation schemes, an overview of these schemes has been provided towards the end of this chapter.

Development Access Strategy

4.5 Initially, through consultation with WCC, an appropriate access strategy was identified for inclusion within the model network. Where a development was located adjacent to other sites then the access and distribution strategy proposed was considered inclusive of the cumulative needs of all sites within the area rather than considering what the optimum solution for each individual site would be.

4.6 The following section sets out the initial access strategy assumptions. An overview of the sites and their associated access strategy is presented in Figure 4 to Figure 6.

Figure 4: Development Access Strategy: Northern Sites

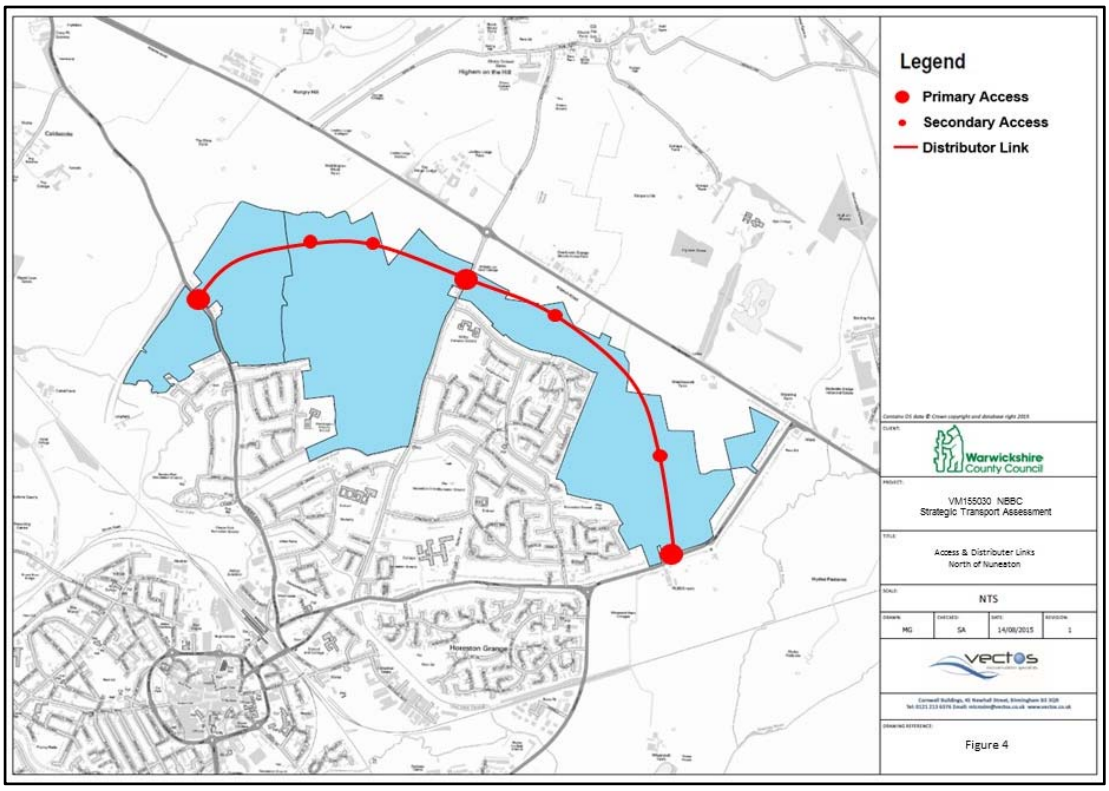


Figure 5: Development Access Strategy: Central Sites

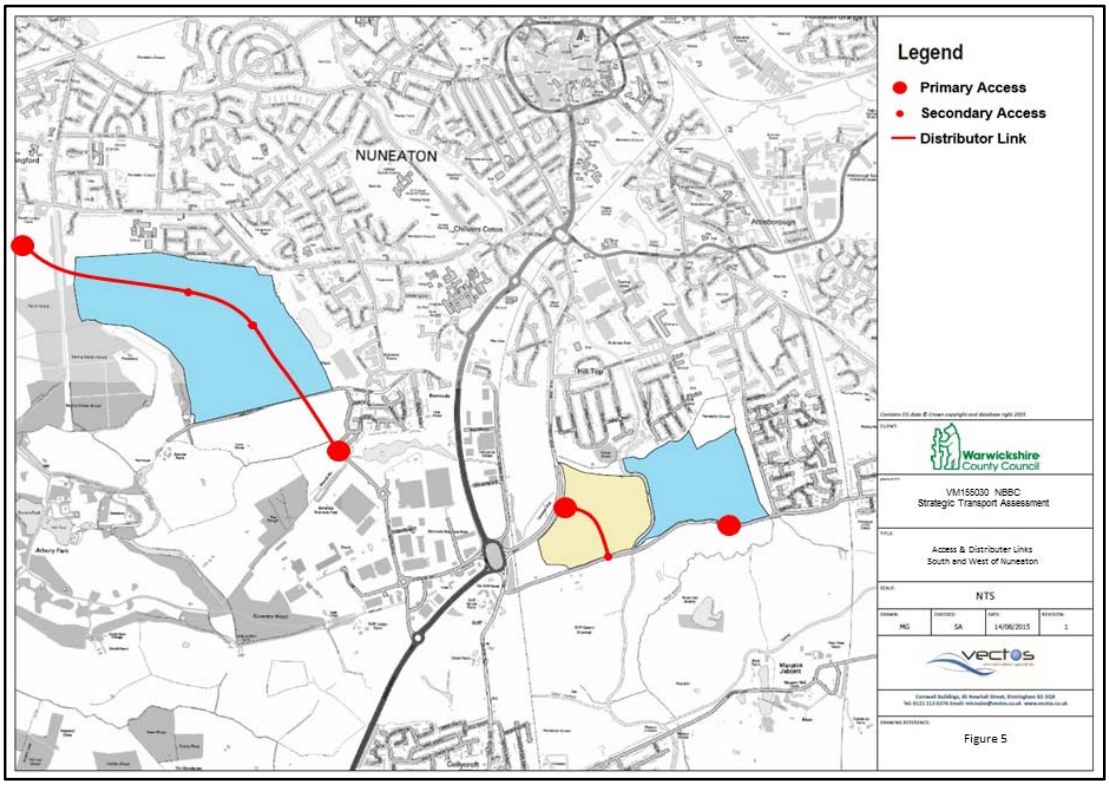
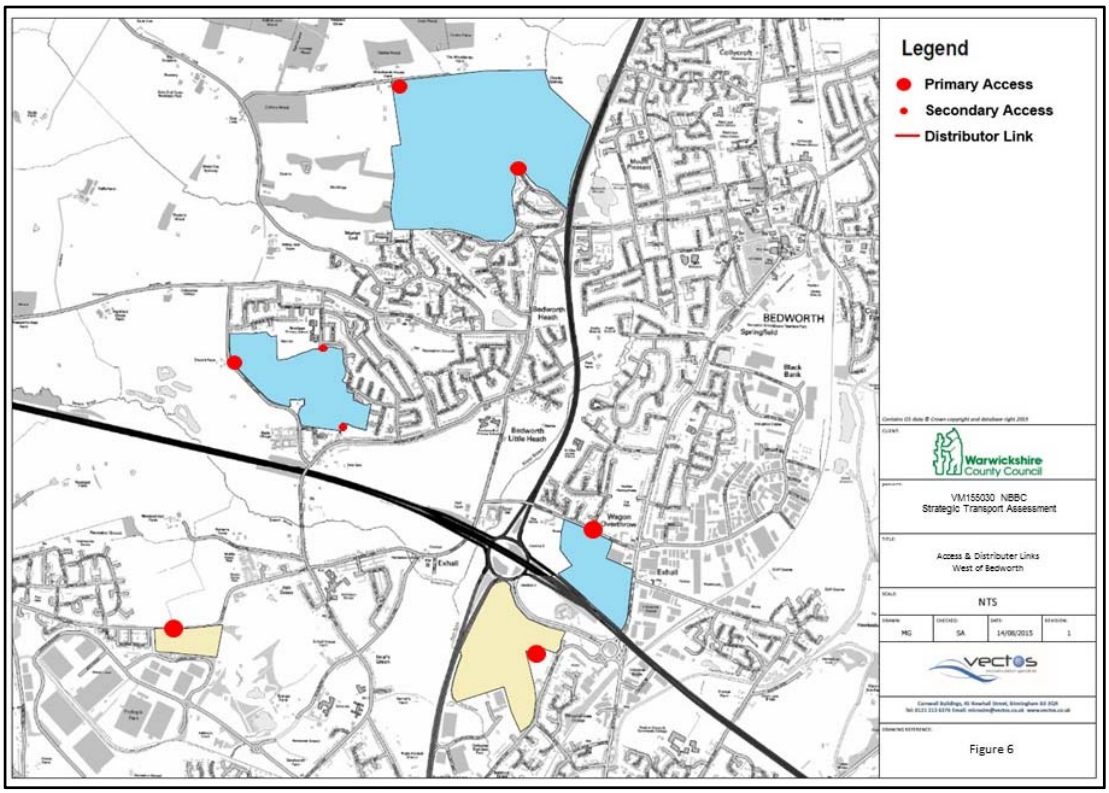


Figure 6: Development Access Strategy: Southern Sites



4.7 It is assumed that the access and distribution strategies, pertaining to the delivery of each individual site, are development specific costs and so the calculation of the costs of delivery have not been included within the mitigation schedule cost estimates.

North Nuneaton

4.8 The developments to the north of Nuneaton have been modelled to include a link through all sites which connects Weddington Lane to The Long Shoot via a junction with Higham Lane. This link relieves pressure on the A5 which is already predicted to become a congested route.

West of Nuneaton

4.9 The access strategy for the development at Arbury assumes that a link through the site which provides access to the development via Astley Lane and Walsingham Drive. Initial investigations revealed that it was unlikely that the development could be served via secondary links through existing residential developments, onto Heath End Road.

4.10 Furthermore, Arbury Lane and Heath End Road are predicted to suffer from severe congestion impacts in the future primarily due to the limited number of alternative routes. Provision of a link through the Arbury development, albeit one which is unlikely to serves as a high capacity alternative, provides the potential to alleviate some of the pressures on the Arbury Lane / Heath End Road corridor by providing additional east to west capacity.

South of Nuneaton

4.11 Two significant development sites are proposed for the land south of Nuneaton, located to the north of Gipsy Lane and to the east of B4113 Coventry Road. Initially it was anticipated that the development in this area would be served by a link through both the residential and employment sites located North of Gipsy Lane. However, WCC indicated that it may not be possible to deliver a link through both sites and so this was not included within the initial phase of testing.

4.12 Following more detailed analysis it became apparent that a link between Gipsy Lane and Coventry Road would be desirable to reduce the need to traverse 'Griff' roundabout when travelling between Gipsy Lane and the Coventry Road on the route in and out of Nuneaton.

4.13 As a result, a new link through the employment site has been assumed that connects Gipsy Lane and Coventry Road. Access onto Coventry road is served via a three arm signalised junction. It has also been assumed that Gipsy Lane could be upgraded to a higher standard of road at least between Griff Island to the west and Marston Lane roundabout to the east.

West of Bedworth

4.14 The development in this area has been assumed to be served via access points on the existing network.

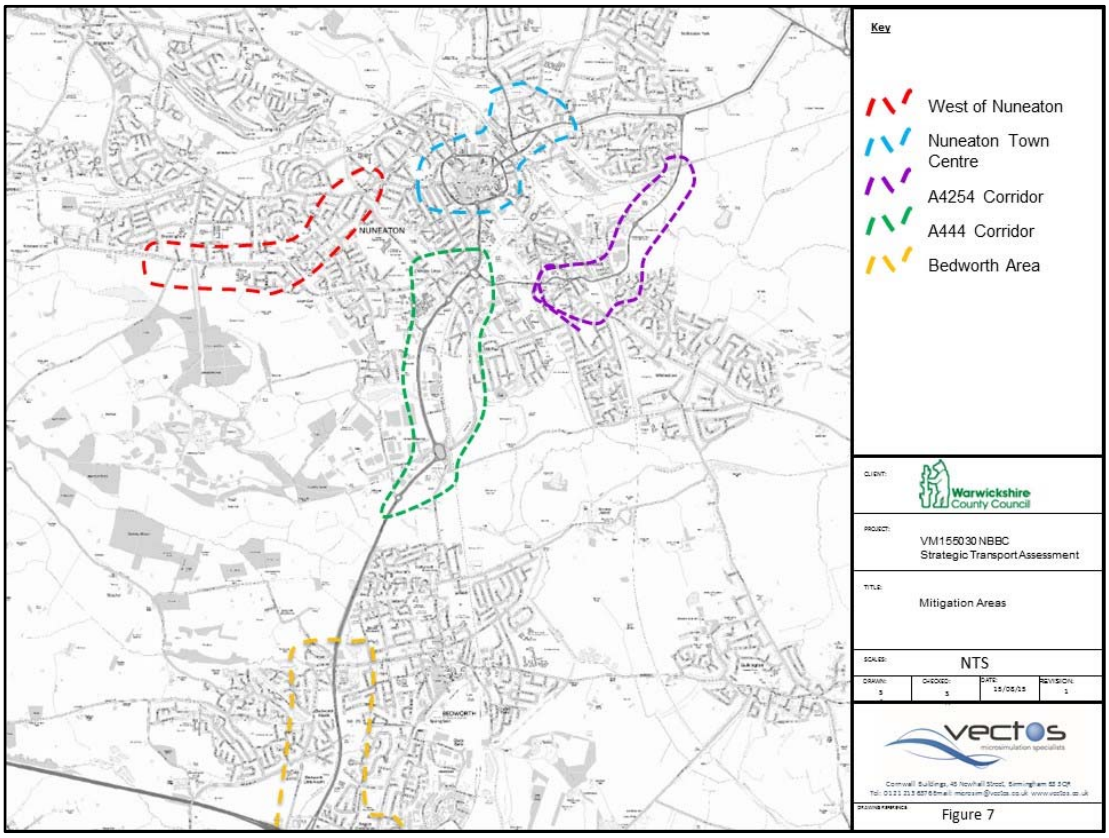
Outline Mitigation Schemes

4.15 The mitigation strategies that were derived as a result of this process can be divided into general broad area strategies as outlined within the Figure 7. The areas identify the corridors or regions where the cumulative impacts of applying mitigation are likely to be of greater overall benefit than the individual schemes.

4.16 Further investigation of the potential benefits of area wide mitigations strategies and the cumulative benefits of the schemes therein is recommended to be undertaken during any, further, detailed testing of the allocation strategy. Furthermore, the schemes proposed during this phase of testing are those that are most likely to serve a role of strategic importance. More localised mitigation measures triggered by specific sites cannot wholly be identified within a strategic level assessment and it is therefore anticipated that such schemes would most likely become apparent as the planning process associated with each individual development site emerges.

4.17 An overview of the broad locations of the various mitigation strategies is provided within Figure 7 below.

Figure 7: Broad Mitigation Areas



Mitigation Prioritisation & Grading

4.18 Each of the mitigation measures included within the models has been identified and categorised based on a review of model performance in conjunction with the results analysis presented within the following sections of this report.

4.19 The categorisation process is intended to provide an indication of the likely level of necessity for inclusion of the scheme. At this stage the grading should be considered as indicative as it is envisaged that further, more detailed testing, will be undertaken during the planning application and detailed design stages. At that stage it is anticipated that a more detailed assessment of the requirement for each mitigation measure will be undertaken and the optimum configuration of the mitigation measures that are proposed will be determined. At this stage the level of assessment has been relatively coarse so it is unlikely that the final set of optimum mitigation measures will have been determined.

4.20 The following provides an overview of the grading system applied to the current mitigation measures.

- **GRADE 1 - Included Essential** – A scheme identified at an early stage of the assessment that has been explicitly included within the modelling and is likely to be essential in maintaining network operation and conditions. Delivery of these schemes will serve a role of strategic importance in the context of maintaining overall network operation levels.
- **GRADE 2A - Included Desirable** - A scheme identified during the initial stages of the assessment that has been included within the modelling. Implementation of the scheme is desirable to ensure maintenance of network operation and conditions. Further investigation may be required to determine whether the scheme is essential. Delivery of these schemes is likely serve a role of strategic importance in the context of maintaining overall network operation levels.
- **GRADE 2B – Desirable** – A scheme identified during the latter stages of the assessment but was not included within the modelling either because it is something that could not be incorporated within the transport model or it was identified during the latter stages of the assessment at which point there was insufficient time to fully determine an appropriate scheme for inclusion within the modelling assessment. Implementation of the scheme is desirable to ensure maintenance of network operation and conditions. Further investigation may be required to determine whether the scheme is essential. Delivery of these schemes is likely serve a role of strategic importance in the context of maintaining overall network operation levels.

- **GRADE 3 - Not Determined** – A scheme identified during the assessment that, where possible, has been included within the modelling. Implementation of the scheme is desirable to ensure maintenance of network operation and conditions. Further investigation may be required to determine whether the scheme is essential. Delivery of these schemes will serve a role of local importance in the context of maintaining the operational levels in the areas of close proximity to the scheme.

4.21 The mitigation schedule, indicative costs and associated grading, is provided within Appendix A along with screenshots of the schemes that have been included within the model (i.e. Scheme Refs. 1 to 26, 33 & 34).

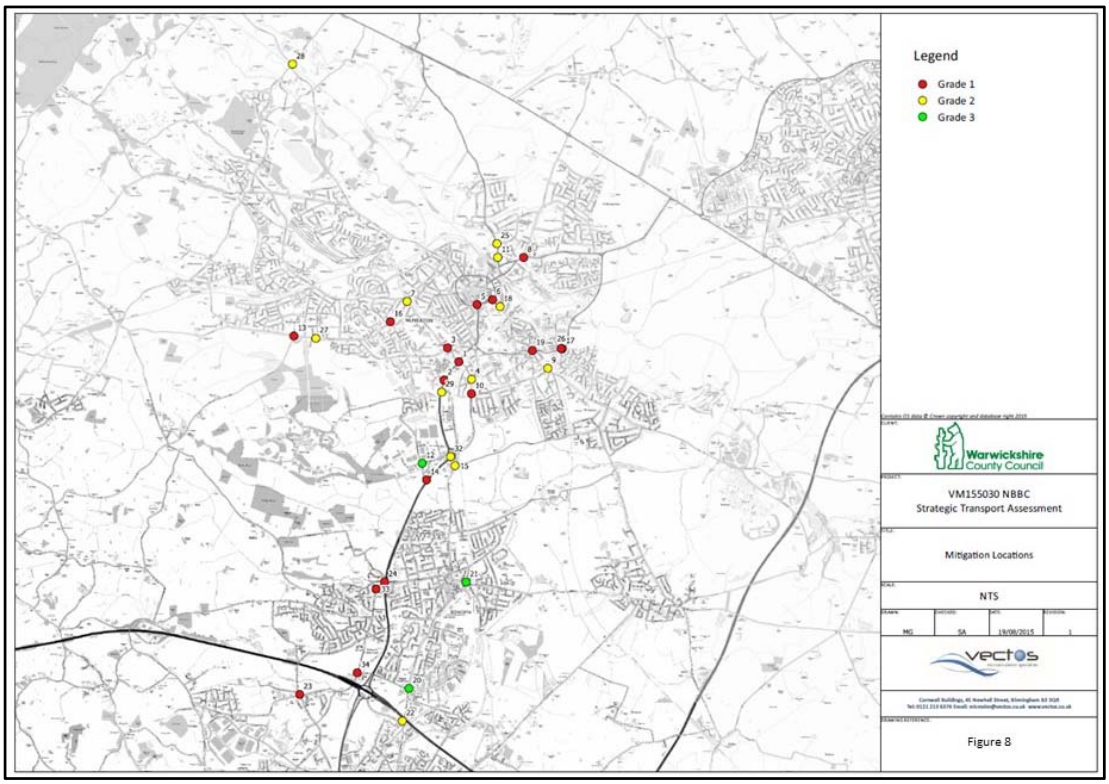
4.22 Table 15 below lists the locations of the proposed schemes and summarises the grade and cost of each.

Table 15: Outline Mitigation Schedule

Ref	Location	Grade	Cost/ Contribution
1	College St / A444 Roundabout	Grade 1	£3,400,000
2	A444 / Eliot Way Roundabout	Grade 1	£2,500,000
3	Greenmoor Rd / Heath End Rd / College St / Bull Ring	Grade 1	£2,500,000
4	College St / Coventry Rd Priority Junction	Grade 2A	£225,000
5	Roanne Ringway / Coton Rd / Vicarage St Roundabout	Grade 1	£6,500,000
6	Church St / Vicarage St Roundabout	Grade 1	
7	Croft Rd / Greenmoor Rd Priority Junction	Grade 2A	£225,000
8	Higham Ln / A47 Old Hinckley Rd Roundabout	Grade 1	£875,000
9	Lutterworth Rd / Leyland Rd / Ivanhoe Ave Priority Junction	Grade 2A	£350,000
10	Donnithorne Ave / Coventry Rd Roundabout	Grade 1	£500,000
11	Weddington Rd / Weddington Terrace Priority Junction	Grade 2A	£350,000
12	Edward St & Edward St / Henry St Mini-Roundabout	Grade 3	£150,000
13	Ansley Rd / Anstley Ln Priority Junction	Grade 1	£225,000
14	A444 / Washingham Drive Roundabout	Grade 1	£1,025,000
15	Coventry Rd / Gipsy Ln Priority Junction	Grade 2A	£500,000
16	Croft Rd / The Raywoods Mini-Roundabout	Grade 1	£225,000
17	A425 / Crownhill Rd Roundabout	Grade 1	£750,000
18	King Edward Rd / Church St Priority Junction	Grade 2A	£150,000
19	A4254 / B4114 Roundabout	Grade 1	£450,000
20	School Rd / B4113 Coventry Rd / Bayton Rd Priority Junction	Grade 3	£875,000
21	Rye Piece Ringway / King St Roundabout	Grade 3	£800,000
22	B4113 / Longford Rd / Bedworth Rd / Wilson Ln Roundabout	Grade 2A	£1,400,000
23	New Rd / Royal Oak Ln / Vicarage Ln / Ash Green Ln Priority Jct	Grade 1	£1,200,000
24	A444 / Newtown Rd & A444 South Facing Slips	Grade 1	£4,200,000
25	A444 Weddington Rd / Shanklin Dr Priority Junction	Grade 2A	£800,000
26	A4254 Eastboro Way NB Corridor	Grade 1	£2,000,000
27	Arbury Rd Works (Church Rd, Westbury Rd, Heath End Rd)	Grade 2B	£1,500,000
28	Woodford Ln / Nuneaton Rd	Grade 2B	£750,000
29	Bermuda Connectivity Project	Grade 2B	£1,500,000
30	Sustainable Transport Contributions	Grade 2B	£2,000,000
31	Bus Priority Enhancements	Grade 3	£2,000,000
32	Griff Roundabout	Grade 2B	£500,000
33	Heath Rd / Newton Rd Priority Junction	Grade 1	£500,000
34	School Ln / Bowling Green Ln Priority Junction	Grade 1	£500,000
35	Long Shoot to Town Centre Cycle Route	Grade 1	£1,200,000
TOTAL COST		**£42,625,000**	

4.23 An overview of the location of the schemes outlined above, and associated grading, is presented in Figure 8 below. Scheme 30 and 31 relate to general improvements that cannot be attributed to a specific section of the network so have not been highlighted in the plot below.

Figure 8: Mitigation Scheme Locations



4.24 In total approximately £42.63 million of transport interventions have been identified as necessary to facilitate the delivery of the NBBC Local Plan aspirations that have been tested as part of this study. Approximately £28.6 million of the schemes identified have been classified as Grade 1 (i.e. essential schemes of strategic significance).

Nuneaton Town Centre Works

4.25 Schemes 5 and 6 (Roanne Ringway / Coton Rd / Vicarage St Roundabout and Church St / Vicarage St Roundabout) have been allocated £6.5 million. These schemes, alongside reconfiguration of the flow of traffic in some areas of the inner ring road, have been classified as Nuneaton Town Centre works.

4.26 It is anticipated that the Nuneaton Town Centre schemes proposed within this assessment will require substantial additional amendments before they represent the final strategy for this area. A separate study is to being undertaken by Warwickshire County Council to this affect in the near future and so it should be noted that there is a risk that identify an overall highway strategy for the town centre area. Whilst a Do Minimum scenario will be assessed, which could be delivered within the £6.5 million quoted for town centre improvements, there is a risk that the final delivery costs for the town centre improvements required may exceed this amount the £6.5 million quoted. However, the wider town centre strategy will also benefit from improvements to pedestrian and cyclist connectivity, public transport initiatives and wider improvements to the public realm. As such further external funding contributions may be identified to meet any shortfall.

A444 Corridor Improvements

4.27 Similar to the Nuneaton Town Centre works it should be noted that there are currently just over £11.6 million worth of works attributed to the improvements along the A444 corridor (Scheme Ref. 1, 2, 14, 24 & 32). Again, a more refined study is required to understand what the implications are of delivering these works as well as a more detailed assessment to identify an optimum solution and the potential benefits that may be accrued from the delivery thereof. This is particularly pertinent given the consideration that the delivery of the schemes in this area is likely to result in benefits for all road users which may outweigh the impacts accrued from the allocation of the Local Plan developments within the area.

4.28 The extensive works envisaged for both Nuneaton town centre and the A444 south of Nuneaton are likely to be necessary to ensure that the north / south movement between developments to the North of Nuneaton and the M6 / Coventry links can be maintained. This is especially important given the location of a considerable amount of development to the north of Nuneaton.

Sustainable Transport Measures

4.29 Some of the analysis presented within the later stages of this report reveals that even with an allowance of 15% for mode shift, there is still a need for physical mitigation measures to be delivered within the area.

4.30 Whilst it is up to the individual site promoters to demonstrate the manner in which this 15% can be achieved, allowances have been made within the mitigation schedule for the delivery of over £6 million of works to be included which will help deliver the mode shift target quoted (Scheme Ref. 29 to 31 & 35).

4.31 It is critical that sustainable transport improvements form part of the mitigation package to support the housing and employment growth proposals within the borough. Such improvements will:

- Contribute towards the delivery of sustainable development within the borough;
- Maximise the number of journeys made by sustainable transport modes from trips generated as a result of new development;
- Reduce the impact of car based travel on the local and strategic highway network; and
- Deliver an integrated approach to transport provision to serve new development;

4.32 Sustainable transport is an all-encompassing term which includes provision of bus services, bus infrastructure, park and ride, access to rail services, walking, cycling and behavioural measures (Smarter Choices).

4.33 Four schemes already identified that are both likely to contribute to the delivery of the mode share targets and have been included within the mitigation schedule thus far are schemes 29 to 31 and 35, listed in Table 15**.** Whilst the schemes have been detailed within Appendix A of this report, a brief overview of what has been identified so far is provided below.

Bermuda Connectivity Project

4.34 The Bermuda Connectivity Project provides a new all vehicle link between Bermuda and St Georges Way using the existing bridge over the A444. Extensive cycle infrastructure and pedestrian facilities and increased parking provision for Bermuda Parkway Station are included within this project.

Sustainable Transport Contributions

4.35 Extensive sustainable travel infrastructure should be constructed to encourage modal shift and thus alleviate pressure on the road network. It is likely that this contribution would be best spent on provision of key cycle routes between housing and employment in Nuneaton and Bedworth. In addition, completion of the existing cycle networks ("Missing Links") and the provision of new cycle infrastructure, linking proposed developments to the existing cycle network, should be a priority.

4.36 Provision of "Missing Links" may involve working closely with NBBC and other land owners in order to provide the shortest routes to key destinations. Routes should include toucan/pedestrian crossings to avoid severance. Bedworth currently has a limited cycle network and funding from developers could be used to improve this situation and also provide attractive routes between Nuneaton and Coventry.

Bus Priority Enhancements

4.37 Additional funds should be set aside to ensure that, where possible, the proposed mitigation schemes can be enhanced to ensure that bus priority measures can be incorporated into the final schemes. Such amendments are necessary due to the significance attributed to the delivery of 15% mode shift as a starting point for the accommodation of the proposed Local Plan sites.

Longshoot to Town Centre Cycle Route

4.38 The involves the addition of a strategic off carriageway cycle route linking the northern housing allocations to the town centre and Hinckley

4.39 Appendix D sets out what sustainable transport improvements will be sought through the planning process to support development generally within the borough.

Risks and Issues

4.40 The feasibility of the proposed mitigation measures has been assessed at a very high level. There are 35 schemes within the modelling proposed for delivery, progressing each scheme through to a detailed design would be impractical at this stage. Thus, it should be acknowledged that the outline schemes, alongside the associated costs, will be subject to further design, optimisation and assessment throughout the plan period.

4.41 Furthermore, it should not be assumed that the schemes recommended through this study are fixed and will be delivered in the form described within this report. Rather it is intended that the schemes proposed are outline schemes which may change through further optimisation and detailed design that will precede the final delivery.

4.42 A number of risks that have been identified during the high level feasibility assessment are summarised as follows:

- The impacts on areas not included within the modelling, however, the considerable coverage of the model and study area are likely to minimise the need for this.
- The impacts of utility and service diversion costs attributed to any one scheme that may not have been considered at this stage (an average cost of service and utility works has simply been assigned to each scheme);
- The impact of land issues or safety audits, not considered in detail within the initial assessment but that may arise during more detailed feasibility and design stages;
- Vertical alignment and gradient issues not considered at this stage; and
- Specific risks pertaining to the delivery of one or more scheme on the network such as:
    - The physical risks to delivering enhancements within the area of Nuneaton inner ring road that are posed by the large number of bridges and the railway track.
    - The risks posed by the proposition of schemes in areas where information regarding the highway extent was limited (such as those near Bedworth).
    - Specific risks where schemes which require a large proportion of the existing highway to be allocated as road space may not be acceptable or may not meet the required design standards (such as the proposals at Greenmoor Rd / Heath End Rd / College St / Bull Ring or at A444 / Newtown Road).

4.43 The risks outlined previously represent those which have been identified through early feasibility assessments and are not exhaustive.

5 RESULT ANALYSIS

Overview

5.1 The following sections of this report are intended to present the results obtained from the detailed testing undertaken using the NBWA Paramics models outlined in earlier sections; namely the 2031 Reference and the two Preferred Option scenarios i.e. with ('Do Something') & without ('Do Nothing') the mitigation measures outlined in Table 15.

5.2 At this stage results analysis is focussed at a strategic level. More detailed analysis will be required as the development proposals are progressed through the planning process, at which stage it is also likely that further refinement of the proposed mitigation measures will also be undertaken.

Model Stability

5.3 Due to the deterministic nature of assignment within Paramics it is possible for vehicles to continue to attempt to enter a network even when congestion has reached such an extent that the network is effectively 'grid-locked'. When a model becomes grid-locked vehicles still continue to be assigned to the network and so delay begins to increase exponentially.

5.4 It should be acknowledged that these issues may be occurring due to a need for mitigation in one or more areas of the model but, if the models do not lock up every time it can be concluded that the problem is not severe enough to cause the network to cease to function. If it is model error / unrealistic driver behaviour causing the issues then these results should be discounted as they cannot be considered realistic.

5.5 It should also be noted that experience with similar sized Paramics networks has highlighted that the level of instability within these models frequently improves as the options are looked at in more detailed. Part of the detailed assessment stage is to look more closely at the impacts of an option and frequently, at this stage, the cause of the grid-lock can be understood and, if necessary, mitigated.

5.6 Model stability has been based on review of 20 runs. Classification of a 'failed' run has been based on a review of the maximum number of vehicles recorded on the network at each minute across the modelled period, and the number of vehicles on the network at the end of the simulation.

5.7 An unusually high number of vehicles noted on the network throughout the simulation, inconsistent with the other model runs, or a run ending with a clearly increasing level of congestion in the later stages, would be reason to consider the specific model run as unstable and exclude it from further analysis.

Number of Runs

5.8 All statistical analysis presented within this report has been based on the full set of successful runs (i.e. the runs that were not classed as 'fails' post the stability review). In a situation where model stability is unsatisfactory, and therefore meaningful model statistics cannot be collected, then no further analysis would be completed and the scenario deemed unfeasible.

Network Statistics

5.9 A number of statistics have been obtained from analysing each individual trip that has occurred within the network. This information is collected by Paramics within the 'Trips-all' file which contains information specific to each individual trip completed within the model period. This information is then aggregated and processed to provide the following comparative statistics:

- **Completed Trips (vehicles)** – The number of completed trips recorded during the model simulation.
- **Trip Completion Rate (%)** – Completed trips as a percentage of the Scenario's total demand levels.
- **Average Journey Time (seconds)** – The average travel time of a completed trip during the model simulation period.
- **Average Journey Speed (mph)** – The average speed travelled by all vehicles that completed a journey during the model simulation period.

5.10 The Completed Trips measurement is not necessarily comparable between scenarios as the demand within each model (i.e. the number of trips actually trying to complete) may differ. As such this value has been used to determine a Trip Completion Rate that represents the completed trips as a percentage of the total demand within the specific model. The resulting statistic is therefore comparable between scenarios.

5.11 The other statistics are average values and can be used to highlight differences in network operation across scenarios, and also the impact the Preferred Option demands or proposed mitigation measures.

Queue Lengths

5.12 A more detailed analysis has been undertaken in the form of queue length analysis. Queue length analysis is intended to provide a more detailed picture of the impacts at specific junctions within the model network.

5.13 At this stage the analysis of queue lengths has been based on the average hourly maximum queue length. Results presented for each junction are based on the worst performing single approach. The hourly maximum from each individual model run has been calculated, and then the average across all runs calculated for each hour. The maximum of these values noted across the AM and PM period is then reported as the maximum periodic average maximum queue length and is reported in vehicles. These values are compared between scenarios to highlight increases or decreases of different magnitudes.

5.14 Queue difference plots have been produced for the NBBC Preferred Option 'Do Something' scenario based on the comparison with the 2031 NBWA Reference Case model. The AM and PM plots are presented within Appendix B of this report. Where a notable queue differences is not experienced at a certain junction the resulting impact plot does not highlight the junction at all.

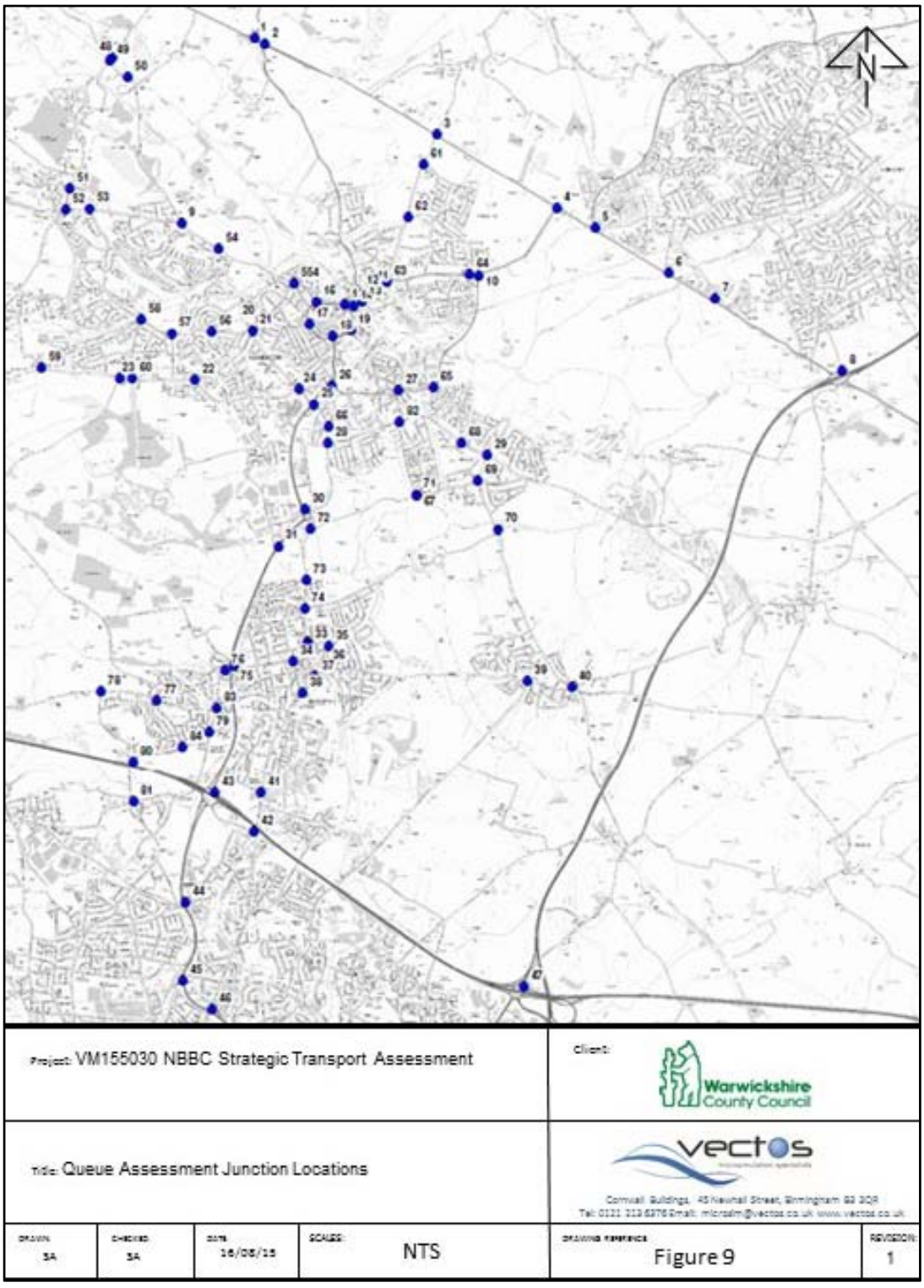
5.15 At this stage these results simply identify areas where further attention is required. A queue length increase of 50 vehicles does not necessarily mean that a scheme will not work, it may indicate that further optimisation of the layout or any signal times are required. Furthermore it may not account for improvements on other arms of the same junction which, when investigated further, may contain additional capacity which could be unlocked to reduce the queue length on the offending approach.

5.16 The classification of differences used within the queue length analysis is summarised as follows:

- **Queue Reduction** (a reduction in the maximum queue length of more than 10 vehicles)
- **Moderate Increase** (an increase in the maximum queue length of between 10 and 25 vehicles)
- **Severe Increase** (an increase in the maximum queue length of between 25 and 50 vehicles)
- **Very Severe Increase** (an increase in the maximum queue length of over 50 vehicles)

5.17 The junctions for which queue lengths have been analysed are illustrated within Figure 9 below.

Figure 9: Queue Assessment Junction Locations



Journey Time (Delay) Analysis

5.18 A further review of the network performance has been undertaken in the form of journey time analysis. The journey time analysis is intended to provide a detailed picture of the impact on specific routes throughout the modelled network.

5.19 The journey time analysis has been based on the average peak hour journey times on a selection of key routes through the model. The journey time on each route in the PO 'Do Something' scenario has been compared to the equivalent times from the Reference Case model. The difference can be attributed to an increase or decreased in delay, and can be used to highlight which routes the inclusion of the development sites impact the most, and to what severity (post inclusion of the mitigation measures).

5.20 The journey time difference plots have been produced for the 2031 NBBC Preferred Option 'Do Something' scenario and are presented in Appendix C of this report.

5.21 At this stage the results identify areas where further attention may be required. However, an increase in delay does not necessarily mean that the mitigation schemes are not beneficial as compared to the PO scenario without the schemes (i.e. the 'Do Nothing') the increase is likely to be significantly less.

5.22 The classification of differences used within the journey time analysis is as follows:

- **Significant Reduction** - a reduction in the journey time by more than 15%;
- **Moderate Reduction** - a reduction in the journey time by between 0% and 15%;
- Moderate Increase - an increase in the journey time by between 0% and 15%;
- **Medium Increase** - an increase in the journey time by between 15% and 25%;
- **Severe Increase** - an increase in the journey time by between 25% and 50%;
- **Very Severe Increase** - an increase in the journey time by more than 50%.

6 NBBC LOCAL PLAN ASSESSMENT

Overview

6.1 The following section of this report presents the results obtained from detailed testing within the Paramics scenarios outlined in Chapter 3 and 4, and using the assessment criteria outlines in Chapter 5.

6.2 The following scenarios have been assessed:

- ***2031 NBWA Reference Case***

  The 2031 Reference Case model as described within the original forecasting report plus the additional updates outlined earlier in this report (see Chapter 3).
- ***2031 NBBC Preferred Option 'Do Nothing' Scenario***

  The 2031 NBWA Reference model with revisions to the model demands to include the NBBC PO allocation sites (as described in Chapter 3) and their access strategy (see Chapter 4), but with no further network improvement schemes.
- ***2031 NBBC Preferred Option 'Do Something' Scenario***

  The same model demands as the 'Do Nothing' but with the addition of a set of focussed and refined infrastructure improvement schemes (as listed in Table 15, Chapter 4).

Model Stability

6.3 An assessment of the level of model stability was undertaken by comparing the number of completed runs against the number of runs assumed to have failed, as outlined earlier within this report.

6.4 The network stability exhibited within the AM and PM simulation runs across the 3 scenarios is illustrated below.

Table 16: Model Stability Statistics

Scenario	Period	Success Rate	Peak (Vehs)		End of Period (Vehs)	
			Max	Ave Max	Max	Ave Max
2031 NBWA Reference Case	AM	95%	12,126	11,320	10,795	9,256
	PM	75%	11,785	10,771	7,250	6,863
2031 NBBC PO 'Do Nothing' Scenario	AM	0%	-	-	-	
	PM	20%	13,960	13,960	10,745	10,745
2031 NBBC PO 'Do Something' Scenario	AM	80%	12,046	11,340	9,261	8,295
	PM	75%	13,122	12,244	10,807	8,954

6.5 Analysis of the previous table reveals that the performance of the Reference Case network demonstrates a reasonably high level of stability in both AM and PM periods. The stability of the model is significantly worsened with the inclusion of the NBBC Local Plan allocations, where it falls to unacceptable levels in both periods, making any model outputs void (this is discussed further in the following section). This issue is resolved with the inclusion of the proposed mitigation measures, with stability returning to levels comparable with the Reference Case, and allowing meaningful outputs to be extracted from the model.

6.6 A summary of the volume of traffic on the network at its peak and at the end of the simulation has also been provided. This provides a high level insight into the comparable levels of congestion across the scenarios. However, it should be remembered that the NBBC PO scenarios include a higher level of demands to start with, so the fact that there may be a higher volume of vehicles on the network at a certain time throughout the simulation is not necessarily an indication that vehicles are being delayed on the network.

6.7 Notwithstanding, it would appear that the residual impact of the PO demands, post inclusion of the mitigation measures, is most prominent in the PM period where the peak number of vehicles on the network, and the number on the network at the end of the period, are noticeably higher than the equivalent levels in the 2031 Reference Case. This is not the case in the AM period.

2031 NBBC Preferred Option 'Do Nothing' Scenario

6.8 The initial analysis of the model stability demonstrates that the results extracted from the 2031 NBBC PO 'Do Nothing' scenario are unlikely to yield reliable comparisons. Primarily this is because the reduction in stability will lead to unrealistic levels of delay and high levels of reassignment which will produce unreliable model outputs.

6.9 A key symptom of a model lock up is continuously increasing numbers of vehicles on the network. This indicates that the model network fails to accommodate the levels of demand that have been assigned. As it fails to clear the assigned demand levels the number of vehicles on the network simply continues to build and consequently delay and queuing levels also increase exponentially.

6.10 Figure 10 and Figure 11 illustrate the average number of vehicles on the network during the AM and PM time periods for both the 2031 Reference Case and the 2031 NBBC PO 'Do Nothing' scenario.

Figure 10: Model Stability: Vehicles on the Network (AM Period)

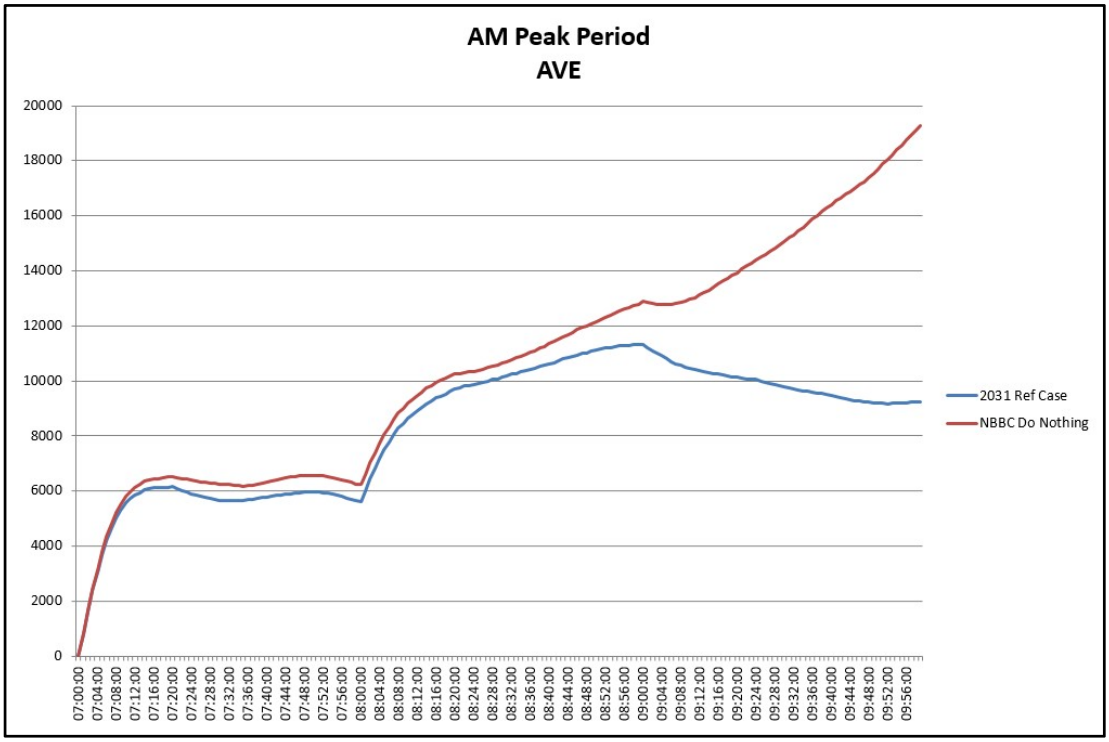
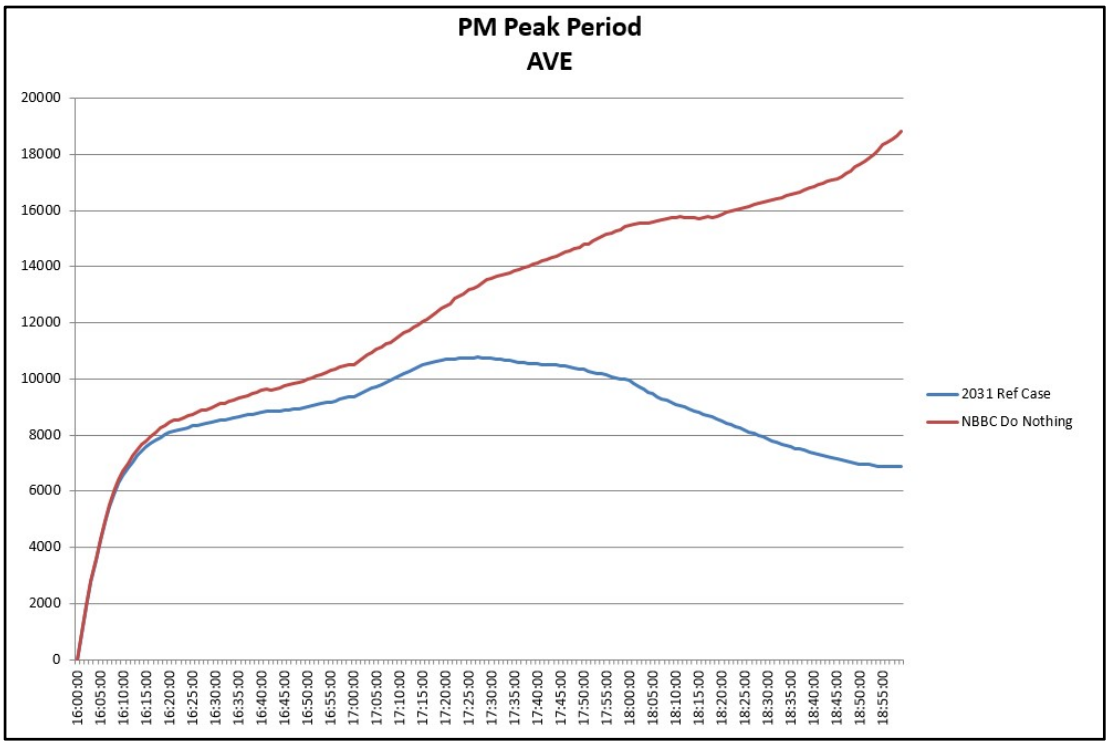


Figure 11: Model Stability: Vehicles on the Network (PM Period)



6.11 Analysis of the figures above reveals that at some point during both AM and PM peak hours the number of vehicles on the 2031 NBBC 'Do Nothing' reaches a sufficiently high level to trigger the failure of the model network at which point the numbers of vehicles begins to increase continuously. As a result of this, aside from the analysis of the impact on average network statistics in the PM period based on the small number of successful runs, the results obtained from the 2031 NBBC PO 'Do Nothing' scenario have been discounted from the further stages of analysis.

6.12 It should also be noted that these severe impacts are observed within the 2031 'Do Nothing' scenario despite the application of a 15% reduction in trip generation levels to account for mode shift. This demonstrates that a 15% mode shift in isolation is unlikely to be sufficient to mitigate the impacts incurred as a result of the assignment of the demand levels associated with the allocated sites.

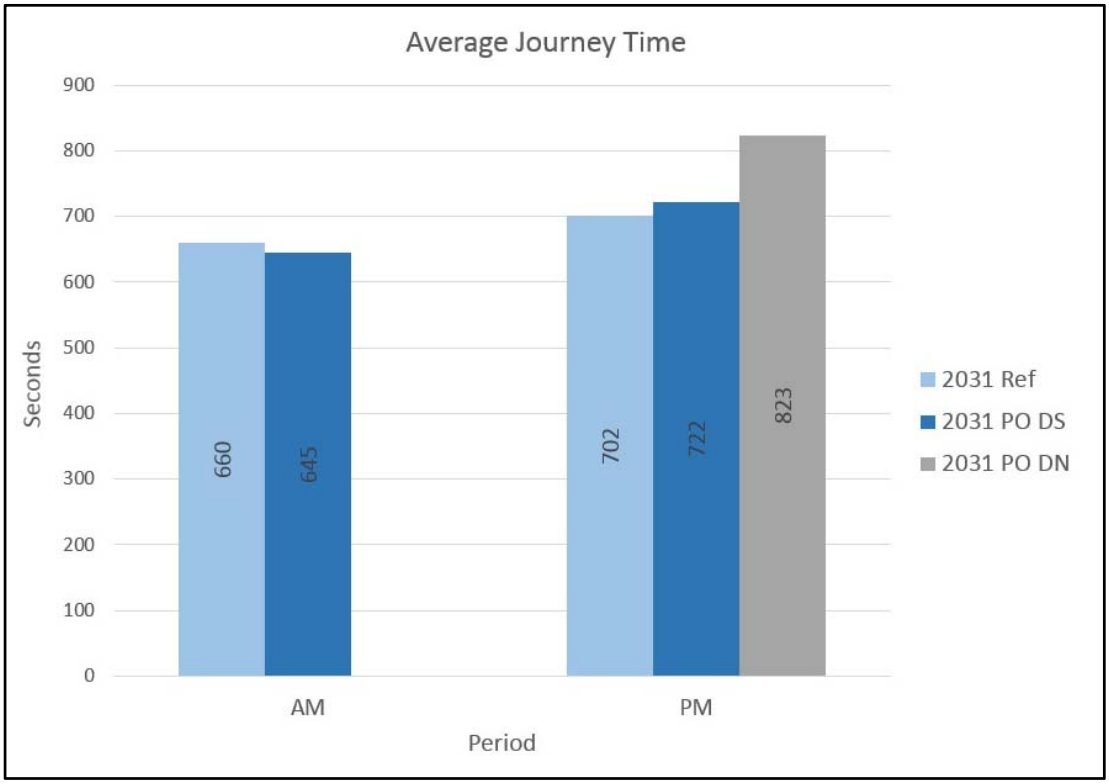
Network Wide Statistics

6.13 The following section presents a comparison between the average network wide statistics obtained from the successful runs of the assessment scenarios.

Average Journey Time

6.14 Analysis of the average journey time recorded in each scenario is presented in the figure below.

Figure 12: Average Journey Time



6.15 The impact on journey times within the 2031 NBBC 'Do Nothing' scenario has only been presented for the PM period as there were no viable runs collected for the AM period. It should also be noted that the value presented for the PM period was extracted from a limited number of runs since the majority of the model runs failed. Furthermore, the analysis of journey times within the PM 'Do Nothing' scenario, when compared to the Reference Case, reveals a 17.2% increase.

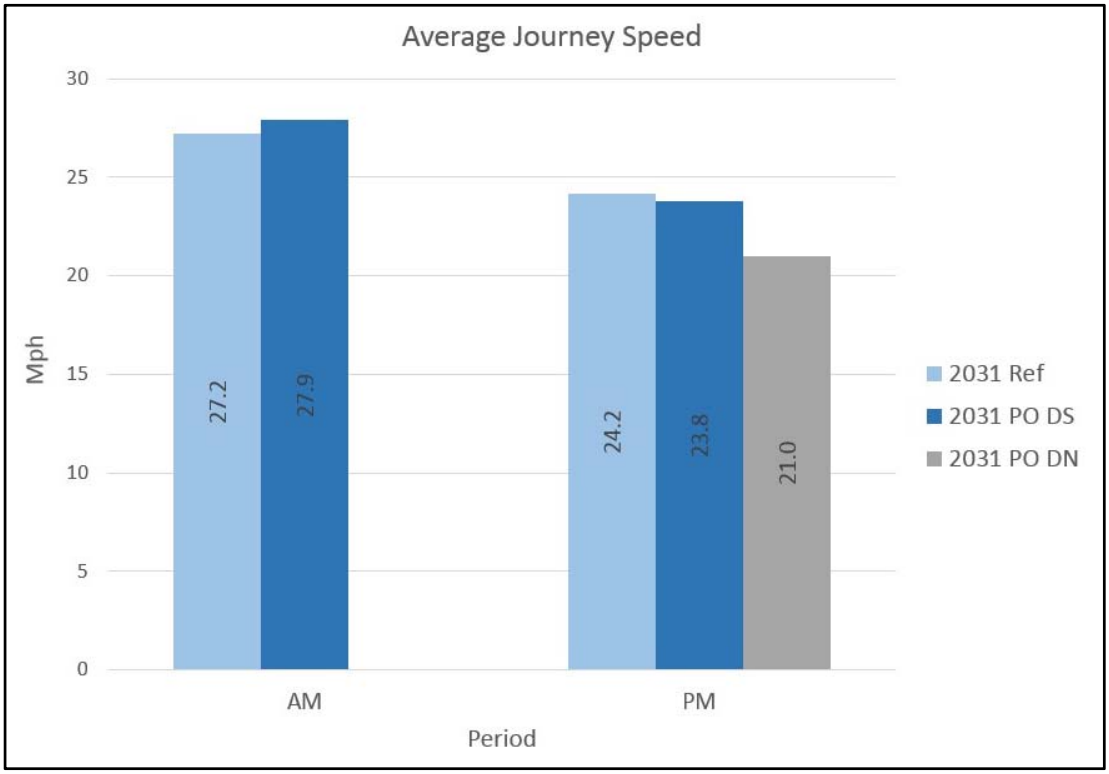
6.16 The inclusion of the mitigation measures, alongside the NBBC allocated sites, results in a reduction (~2.3%) in the average journey times experienced by vehicles travelling within the network during the AM period. There is a small increase in average journey times in the PM period (~2.8%).

6.17 It seems reasonable to conclude that in both the AM and PM the differences between the average journey times recorded in the 2031 Reference Case and the 2031 NBBC PO 'Do Something' scenario are of a negligible magnitude and is therefore likely to be considered acceptable by road users

Average Journey Speed

6.18 Analysis of the average journey speed recorded in each scenario is presented in the figure below.

Figure 13: Average Journey Speed



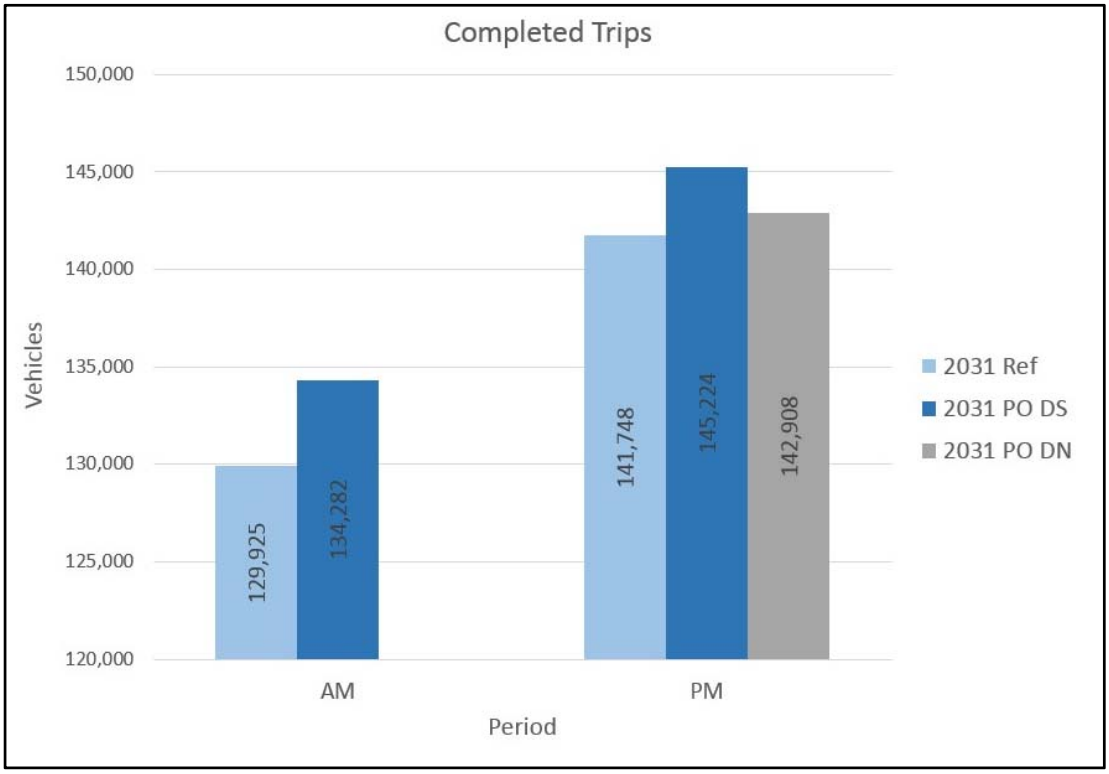
6.19 Analysis of the figure above reveals that the allocation of the NBBC sites and associated mitigation measures results in an increase (~2.6%) in the average speeds achieved during the AM period, and only a small reduction (~1.7%) in the PM period. Contrast this to the 'Do Nothing' scenario, where there is no mitigation for the Local Plan demands, which shows a 13.2% reduction in average speed in the PM period.

6.20 It is clear that the increase in speeds that is achieved, when comparing the Reference Case and 'Do Something' scenarios, during the AM period is greater than the reduction which occurs in the PM period. Again, the marginal impact on network speeds in the PM is unlikely to be of significant concern to the road users.

Completed Trips

6.21 Analysis of the total number of completed trips recorded in each scenario is presented in the figure below.

Figure 14: Completed Trips

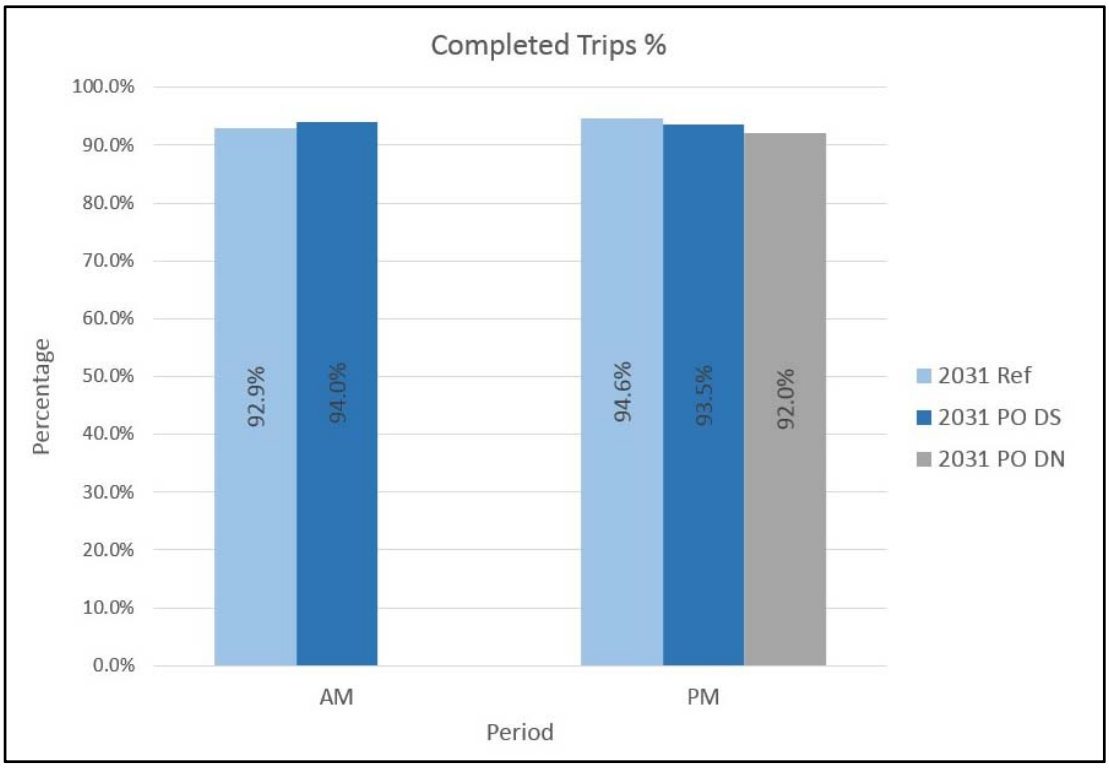


6.22 Analysis of the figure above indicates that there is an increase in completed trips of 3.4% and 2.5%, in the AM and PM periods respectively, when comparing the Reference with the 'Do Something' scenario. Notably, the level of demand assigned within the NBBC PO option is around 2.2% higher in the AM and 3.6% higher in the PM. This indicates that the 2031 NBBC 'Do Something' scenario's network, once the mitigation has been included, is able to entirely accommodate the additional demand created by the allocations within the AM period, as well as accommodating the majority (~70%) of the additional demand created by the allocated sites within the PM period.

6.23 Because of the need for a cut off period it is never possible that 100% of the demand assigned within the model network will be a completed trip by the end of the model period. Some trips will have only just started when the model ends whilst some may be released onto the network later due to congestion effects.

6.24 To understand how much demand is either unreleased or left on the network at the end of the simulation period the number of completed trips has been compared against the total demand levels assigned within the model. This information has been presented in the figure below.

Figure 15: Completed Trips as % of Total Demands



6.25 The figure above illustrates that the number of trips that are completed during the AM model period, as a percentage of the overall demand levels assigned to the network, increases within the NBBC 'Do Something' scenarios.

6.26 Within the PM period the proportion of trips that are completed, as a percentage of the overall demand levels, reduces between when comparing the Reference Case and the NBBC PO 'Do something'. There are however, still almost 3,500 more trips completed within the 'Do Something' scenario than in the Reference Case, 2,300 of which were not able to complete in the 'Do Nothing' scenario. This indicates that the mitigation measures provide additional network capacity that can accommodate higher levels of demand than would otherwise not be facilitated within the existing network.

6.27 The following conclusions can be drawn from the network wide statistics presented, and discussed, above:

- The AM network wide statistics indicate that the 'Do Something' network provides improved throughput (i.e. increased capacity), higher average speeds, and lower delay (average journey times) than the Reference Case, even with the inclusion of Preferred Option sites.
- In the PM period, the average journey times increase and average speeds decrease marginally with the inclusion of the Preferred Option sites and proposed mitigation measures, when compared to Reference Case. However, capacity is shown to increase, and a significant improvement over the 'Do Nothing' position is observed.
- The marginal worsening in the PM period is offset in scale when compared to the benefits highlighted in the AM period and is not far off a 'nil detriment' position.

Maximum Queue Length Analysis

6.28 The following section sets out some initial observations based on the maximum queue length analysis and the differences in queue lengths between the 2031 Reference Case and the 2031 NBBC PO 'Do Something' (DS) scenario.

6.29 The maps which are referred to within the following analysis are presented within Appendix B of this report.

AM Analysis: 2031 Ref v. 2031 PO DS Scenario [MQ 001]

6.30 Analysis of the impacts on AM queuing levels between the 2031 Reference and the 2031 NBBC PO 'Do Something' scenario networks reveals the following:

- 54% of assessed junctions highlight a notable difference in queues (45 out of 84 locations).
- 42% of junctions that highlight a difference in queues are showing a positive reduction in maximum queue lengths (19 out of 45).
- 82% of junctions that highlight a difference in queues are showing either a reduction or a 'moderate increase' (37 out of 45).
- In 67% of instances the magnitude of difference between the queuing levels, compared to the Reference Case is between +/- 15 vehicles. These would likely be disregarded during any detailed statistical analysis.
- No junctions show a 'very severe' increase and only 8 junctions show a 'severe increase' of between 25 to 50 vehicles.
- The junctions showing the 'severe increase' are generally located adjacent to the large residential sites to the north of Nuneaton. The trips exiting these sites in the AM are likely to be contributing to the increased congestion in this area.

PM Analysis: 2031 Ref v. 2031 PO DS Scenario [MQ 002]

6.31 Analysis of the impacts on PM queuing levels between the 2031 Reference and the 2031 NBBC PO 'Do Something' scenario networks reveals the following:

- 58% of assessed junctions highlight a notable difference in queues (49 out of 84 locations).
- 14% of junctions that highlight a difference in queues are showing a positive reduction in maximum queue lengths (7 out of 45), significantly less than in the AM period.
- 63% of junctions that highlight a difference in queues are showing either a reduction or a 'moderate increase' (31 out of 45).
- In 55% of instances the magnitude of difference between the queuing levels, compared to the Reference Case is between +/- 15 vehicles. These would likely be disregarded during any detailed statistical analysis.
- No junctions show a 'very severe' increase and 18 junctions show a 'severe increase' of between 25 to 50 vehicles.

- The junctions showing the 'severe increase' are generally located adjacent to the large residential sites to the north of Nuneaton, in Nuneaton town centre, or at key junctions on the A444 corridor. It has been noted earlier that further review, refinement and optimisation of these schemes is required due to their complexity and their location along key routes likely to be used by the allocation sites. A few specific examples are discussed below:

    - A severe increase in queuing is experienced at Griff Island which is triggered by the increased queuing levels on the St Georges Way approach, currently an un-signalised approach to the junction. It has been acknowledged within the mitigation schedule (Table 15, Scheme Ref. 32) that further amendments to this junction should be considered as part of the wider mitigation strategy.
    - The severe increase recorded at the Roanne Ringway / Coton Rd / Vicarage St Roundabout (Table 15, Scheme Ref. 5) may be mitigated during the more detailed refinement of the Nuneaton Town Centre works.
    - The severe increase recorded at the Donnithorne Avenue / Coventry Road junction (Table 15, Scheme Ref. 10) indicates that further optimisation of the mitigation measures proposed in this area is required.
    - The severe increase recorded at A444 / Newtown Rd is misleading as this junction has completely changed in nature from that included in the Reference Case. The increase in queues occurs on the Newtown Road westbound approach where the junction arrangement has significantly changed to accommodate the addition of the A444 southbound off-slip. There is also significant changes to the junction downstream and the addition of a new signalised junction with Heath Road further to the west. For these reasons an increase in maximum queues (in this case from 5 to 34 vehicles) is understandable. However, further optimisation of these signals should help reduce these queues.

Journey Time (Delay) Analysis

6.32 The following section sets out some initial observations based on the journey time analysis and the differences in times between the 2031 Reference Case and the 2031 NBBC PO 'Do Something' (DS) scenario.

6.33 The maps which are referred to within the following analysis are presented within Appendix C of this report.

AM Analysis: 2031 Ref v. 2031 PO DS Scenario [MD 001]

6.34 The following sections are highlighted as showing an increase in average journey time of more than 50% compared to the Reference Case scenario:

- Both directions on the northern section of Higham Lane.
- Southbound on Greenmoor Road, towards A444 / College St roundabout.
- Northbound on Longford Road on the approach to B4113 / Longford Rd / Bedworth Rd / Wilson Ln roundabout

6.35 In the case of Higham Lane a new junction has been added on this northern section that provides access to the proposed distributor road and the residential developments to the north of Nuneaton.

6.36 The increased journey times on Greenmoor Road has occurred at the expense of the improvements in journey times on the A444 sections approaching the A444 / College St roundabout. This junction has been signalised in as part of the mitigation package (Table 15, Scheme Ref. 1). Further optimisation may be able to minimise the negative impact in Greenmoor Road through balancing of the green times on the other approaches.

6.37 The added delay on Longford Road is partly due to the introduction of the signals on the Longford Road approach to B4113 / Longford Rd / Bedworth Rd / Wilson Ln Roundabout. This has been proposed as part of the mitigation package (Table 15, Scheme Ref. 22). However, a major contributor, and primary reason for the need for this proposed scheme, is the inclusion of the significant demands traveling to the large employment site to the west of Wilson Lane (i.e. Phoenix Lane).

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6.38 The following sections are highlighted as showing an increase in journey times of greater than 50% compared to the Reference Case scenario:

- Westbound on A5 towards A5 / Higham Ln roundabout.
- South-eastbound on B4111 Nuneaton Rd / Woodford junction.
- South-eastbound on Tuttle Hill into Nuneaton town centre.
- South-eastbound on Greenmoor Road / College Street towards A444.
- Eastbound on A4254 towards B4114 / Eastboro Rd / Lutterworth Rd roundabout.
- Westbound on Newtown Road and southbound on Heath Road out of Bedworth
- Northbound on A444 towards M6 Junction 3.

6.39 In the case of the A5 / Higham Lane junction this is due to the significant level of residential trips returning to the proposed development sites on the land north of Nuneaton. However, the other routes into these sites are showing improvements in journey times. It is therefore likely that this delay is unrealistic and can be eliminated with minor improvements to the calibration of the A5 westbound approach in the model. This should be reviewed in any further assessment.

6.40 The excess delay on the Nuneaton Road south-eastbound approach to Woodford Road is a result of its limited capacity. Improvements have been costed and included in the mitigation schedule (Table 15, Scheme Ref. 28), however, no appropriate scheme was able to be developed in time for inclusion within the modelling due partly to the limiting physical constraints at this location (i.e. the rail bridge). A scheme is required, and when developed and included within the modelling, it is likely to resolve the highlighted issue at this location.

6.41 The increase in delay on the Tuttle Hill route into Nuneaton town centre is part of the wider issue of limited capacity on the ring road around Nuneaton. It is anticipated that following further detailed assessment of the town centre improvements, which have been costed in the mitigation schedule, these issues will be alleviated somewhat.

6.42 The increased journey times on Greenmoor Road has occurred for the same reasons as described in the AM section. Again, further optimisation of the signal times at the new junction with A444 may help reduce the increase in journey times.

6.43 The A4252 eastbound route has been shown to become an attractive alternative route to the A5 and to the proposed residential sites north of Nuneaton. Several schemes have been proposed along this corridor including at the A452 / B4114 / Eastboro Way / Lutterworth roundabout, however, land constraints have limited the ability to increase capacity significantly. WCC are aware of currently issues at this junction and have been exploring potential solutions. More focussed review of this corridor within WCC's recently developed Eastboro Way model will be necessary to determine the optimised solution that is hoped to reduce the delay on this section of the network.

6.44 The delay on Newtown westbound route is a direct result of the introduction of all movements at the Newtown Road / A444 junction and the introduction of new signalised junctions. Traffic is attracted to this route now that the ability to join A444 northbound has been added with the addition of the proposed scheme (Table 15, Scheme Ref. 24). The large residential development proposed to the west of Newtown Road (Woodlands) also draws a significant number of trips to this route, managed with the introduction of an additional signalised junction at Woodland Road / Newtown Road (Table 15, Scheme Ref. 33), but which does in turn adds further delay. Further optimisation should be able to balance the delay across the approaches and should be investigated as part of more detail assessment of the Newtown Road schemes.

6.45 The additional delay on the northbound A444 route travelling towards M6 Junction 3 can be attributed partly to the increased volumes circulating Junction 3 that relate to the employment trips exiting the proposed development at Phoenix Lane, via B4113 / Longford Rd / Bedworth Rd / Wilson Ln roundabout. However, delay is also exacerbated on the southern A444 sections within Coventry. It is suggested that a thorough review of a revised signal strategy in this area, taking into account of the signals at the junctions along the section of the A444 preceding M6 Junction 3, and at M6 Junction 3 itself, would improve the journey times in this area.

Conclusion

6.46 Based on the outcome of the modelling assessment the following conclusions have been drawn:

- That adoption of the 15% mode shift assumptions alongside the associated development access strategies, with no mitigation measures, is not likely to be sufficient to ensure that the Local Plan aspirations can be accommodated.
- Further analysis has been undertaken to identify mitigation measures, these are based on the assumption that a 15% is deliverable.
- That there is the potential for betterment to be achieved, within the AM period. When considering the improvements in network conditions that are accrued by the implementation of the Local Plan mitigation schemes, journey times are reduced, mean speeds increased, and a greater volume of traffic is accommodated.
- Within the PM period a review of the preferred option 'Do Something' against the Reference Case indicates that, with further optimisation of the proposed schemes, it is likely that the majority of developmental impacts can be reduced. The network accommodates a greater volume of trips, with limited impact on average journey times and average speeds. Several junctions show notable reductions in maximum queue lengths and several key journey time sections show an improvement, including the A444, A47 and A5.
- Further analysis of the Nuneaton Town Centre works, the schemes proposed along the A444 (especially Griff Island), and the proposed junction at A444 / Newtown Road would be likely to produce an optimised position that would reduce the negative impacts that are currently predicted to occur within the PM period 'Do Something' scenario.

7 SUMMARY & CONCLUSIONS

Overview

7.1 Vectos Microsim have been commissioned by Warwickshire County Council (WCC) and Nuneaton and Bedworth Borough Council (NBBC) to undertake testing of the NBBC Local Plan allocation, ascertain the potential impacts and investigate and identify outline mitigation schemes thereof.

Study Objectives

7.2 The objectives of this stage of detailed modelling and assessment are as follows:

- To establish a suitable 2031 NBWA Reference Case model against which the impact of the NBBC PO scenario can be compared;
- To construct the associated trip generation and distribution for the sites contained within the PO;
- To ascertain the initial impacts of the allocation growth in terms of model stability and network statistics;
- To assess and identify, as far as is practicable, suitable mitigation measures required to facilitate the allocated growth;
- To review the relative impact of the mitigated network against the Reference case;
- To provide indicative costs for the resulting package of proposed mitigation measure.

Stage of Assessments

7.3 A staged approach to addressing the objectives outlined previously has been adopted as follows:

- The exiting 2031 Reference Case has been updated to ensure it reflected the most recent know position i.e. inclusion of the most up to date committed development schedule and associated schemes.
- The demands associated with the delivery of the Hinckley and Bosworth Borough Local Plan have been assigned to the model network.
- The 2031 NBBC Preferred Option allocations and the access and distribution strategies thereof have been included within the model network and the impacts assessed.

- The impacts of the allocation of the NBBC PO allocations have been reviewed and mitigation measures proposed for the basis of the NBBC 2031 PO Do Something scenario network.

Mitigation

Access Strategies

7.4 An appropriate access strategy has been identified for inclusion within the model network. The key elements which comprise the access and distribution strategy include:

- Delivery of link through all of the sites located to the north of Nuneaton which connects Weddington Lane to The Long Shoot, via Higham Lane, providing a secondary route across the north of Nuneaton to the A5 and allowing a comprehensive access strategy to be delivered for all northern sites.
- Delivery of a link between Ansley Road to the west of Nuneaton and the A444 to the south of Nuneaton which would run through the proposed Arbury site and provide distribution for the trips created from that site whilst providing additional relief to the Ansley Road / Arbury Road corridor to the west of Nuneaton.
- Delivery of a link through the employment site located between Gipsy Lane and B4113 Coventry Road to the east of 'Griff Island' which connects Coventry Road and Gipsy lane and provides additional relief to the 'Griff Island'

Mitigation Schedule

7.5 A primary objective of this Strategic Transport Assessment (STA) has been to identify the mitigation measures necessary to ensure that the NBBC PO can be delivered and that its impact on the surrounding network is minimised.

7.6 In total the delivery of 35 schemes, including significant contributions towards sustainable transport infrastructure, have been identified as likely to meet the objectives of ensuring that the demand assigned to the network is at least partly mitigated and that the overall level of network operation is not significantly affected.

7.7 The estimated cost of delivering of the highlighted schemes is currently £42.63 million.

7.8 The following grading system has been applied to the current mitigation measures to classify their importance.

- **GRADE 1 - Included Essential** – A scheme identified at an early stage of the assessment that has been explicitly included within the modelling and is likely to be essential in maintaining network operation and conditions.
- **GRADE 2A - Included Desirable** - A scheme identified during the initial stages of the assessment that has been included within the modelling. Implementation of the scheme is desirable to ensure maintenance of network operation and conditions.
- **GRADE 2B – Desirable** – A scheme identified during the latter stages of the assessment but was not included within the modelling either because it is something that could not be incorporated within the transport model or it was identified during the latter stages of the assessment at which point there was insufficient time to fully determine an appropriate scheme for inclusion within the modelling assessment.
- **GRADE 3 - Not Determined** – A scheme identified during the assessment that, where possible, has been included within the modelling. Implementation of the scheme is desirable to ensure maintenance of network operation and conditions.

7.9 Half of the proposed schemes have been classified as Grade 1 whilst the majority of the remaining schemes have been classified as grade 2. Only 4 schemes have been classified as grade 3 meaning that the majority of the schemes proposed are likely to serve a role of strategic importance.

Sustainable Measures

7.10 The STA has revealed that even with an allowance of 15% for mode shift there is still a need for physical mitigation measures to be delivered within the local area. Thus it is reasonable to conclude that, although a relatively high target, a 15% mode shift to non-car based uses should be the requisite target.

7.11 Whilst it is up to the individual site promoters to demonstrate the manner in which this 15% can be achieved, allowances have been made within the mitigation schedule for the delivery over £6 million of works to be included which will help deliver this mode shift target; this includes the following proposals:

- Bermuda Connectivity Project
- Sustainable Transport contributions
- A47 Longs Shoot to Town Centre cycle route
- Bus Priority enhancements

7.12 Appendix D sets out what sustainable transport improvements will be sought through the planning process to support development generally within the borough.

Further Areas of Assessment

7.13 It is anticipated that the Nuneaton Town Centre schemes proposed within this assessment will require substantial additional amendments before they represent the final strategy for this area. A separate study is being undertaken by Warwickshire County Council to identify an overall highway strategy for the town centre area. Whilst a Do Minimum scenario will be assessed, which could be delivered within the £6.5 million quoted for town centre improvements, there is a risk that the final delivery costs for the town centre improvements required may exceed this amount. However the wider town centre strategy will also benefit from improvements to pedestrian and cyclist connectivity, public transport initiatives and wider improvements to the public realm. As such further external funding contributions may be identified to meet any shortfall (e.g. Strategic Economic Plan Growth Deal

7.14 Similar to the Nuneaton Town Centre works, just under £11.6 million worth of works are attributed to the improvements along the A444 corridor. Again, a more refined study is required to understand what the implications are of delivering these works as well as a more detailed assessment to identify an optimum solution for the delivery of schemes within this area and the potential benefits that may be accrued from the delivery thereof.

7.15 The mitigation identified for A444 / Newtown Road will benefit from a detailed assessment in a more refined, and focused, model. This junction will become a key strategic junction and is likely to record high levels of demands, particularly with the addition of the large residential development to the west (Woodlands). Further optimisation of the current junction calibration is likely to produce more favourable results on this section of the network (currently showing negative impact in the PM period).

7.16 It should be noted that the results of these more detailed assessments will be likely to yield additional benefits and further reduce the impacts over and above those identified within the this report. Thus, the results presented in this report should be considered as a worst case assessment with the likely scope for impacts to be reduced further through additional optimisation of the proposed mitigation measures.

Risks and Issues

7.17 The feasibility of the proposed mitigation measures has been assessed at a very high level. There are 35 schemes within the modelling proposed for delivery, progressing each scheme through to a detailed design would be impractical at this stage. Thus, it should be acknowledged that the outline schemes, alongside the associated costs, will be subject to further design, optimisation and assessment throughout the plan period.

7.18 Furthermore, it should not be assumed that the schemes recommended through this study are fixed and will be delivered in the form described within this report. Rather it is intended that the schemes proposed are outline schemes which may change through further optimisation and detailed design that will precede the final delivery.

7.19 Recommendations that further analysis is required should a significant alteration to the proposals for allocating growth across the borough be proposed remains valid. However, minor revisions are unlikely to incur a change in the strategic interventions that have been proposed through the STA work already completed. Therefore it should be recognised that it is highly unlikely that recommendations of this nature would need to be address through further modelling and analysis in advance of the Local Plan submission.

7.20 The risks identified thus far represent those which have been acknowledged through early feasibility assessments and are not exhaustive. Further, more detailed assessments will be required to ensure all risks are identified.

Scenario Testing

7.21 The following scenarios have been assessed:

- ***2031 NBWA Reference Case***

  The 2031 Reference Case model as described within the original forecasting report plus the additional updates outlined earlier in this report (see Chapter 3).

- ***2031 NBBC Preferred Option 'Do Nothing' Scenario***

  The 2031 NBWA Reference model with revisions to the model demands to include the NBBC PO allocation sites (as described in Chapter 3) and their access strategy (see Chapter 4), but with no further network improvement schemes.

- ***2031 NBBC Preferred Option 'Do Something' Scenario***

  The same model demands as the 'Do Nothing' but with the addition of a set of focussed and refined infrastructure improvement schemes (as listed in Table 15, Chapter 4).

Initial Findings

7.22 The analysis of the NBBC 2031 PO 'Do Nothing' network operation revealed that the network could not accommodate the additional demand levels assigned to the network as a result of the allocated sites, in spite of the adoption of the 15% model shift assumptions and the inclusion of a comprehensive access strategy.

7.23 The analysis of the NBBC 2031 PO 'Do Something' network operation, when compared to the 2031 Reference Case, revealed that during the AM period the identified mitigation measures have the potential to achieve betterment. The 'Do Something' model network is predicted to accommodate a larger volume of trips which spend less time on the network (shorter journey times and higher speed) with a greater proportion of them having completed their entire journey within the model period.

7.24 Within the PM period the difference between the NBBC 2031 PO 'Do Something' network conditions and those observed in the 2031 Reference Case indicates that, although the 'Do Something' network is able to accommodate a greater level of demand, the average journey times experienced by vehicles travelling on that network is marginally higher than the level observed within the 2031 Reference Case (+2.8%), and the proportion of trips that are completed within the peak period is slightly lower (-1.1%).

7.25 Furthermore, within the AM 'Do Something' network there are a significant number of areas where the journey times on key routes are shown to fall when compared to the Reference Case network, and there appears to be only a limited number of instances where the levels of queuing experienced at junctions is likely to increase. There are also a significant proportion of junctions (42% of those assessed) whereby queuing levels are shown to decrease when compared to the Reference Case.

7.26 Within the PM the propensity for reduced journey times on key routes in the 'Do Something' network, when compared to the 2028 Ref Case network, is lower than in the AM period. There are still a lot of sections showing a positive impact in journey times, or a nominal increase, but there are several sections where journey times worsen. It is likely that several of these will be mitigated further through the refinement of the proposed schemes. In terms of queues, the majority of assessed junctions (63%) show a notable improvement or only marginal worsening when the 'Do Something' network is compared to the Reference Case.

7.27 The scope and need for mitigation on the Strategic Road Network will be examined jointly by Highways England (HE) and WCC once NBBC has approved the Preferred Option. HE's proposal for Smart Motorways on the M6 may also have an impact on the operation of the M6 junctions and should therefore be considered once preliminary design is underway.

Conclusions

7.28 Based on the outcome of this Strategic Transport Assessment it is reasonable to conclude the following:

- That adoption of a 15% mode shift target in isolation will not be sufficient to accommodate the proposed sites and, thus, additional mitigation will be required.
- The initial mitigation schedule that has been identified to accompany the allocation of development as outlined within the NBBC Preferred Option will likely require at least 35 schemes at a cost of approximately £42.63 million.
- Further refinement of the schemes proposed through this study is required, particularly within the Nuneaton Town Centre, A444 corridor south of Nuneaton and at the proposed A444 with Newton Road. Extensive schemes are proposed for these areas in order to accommodate the north / south flow of traffic between Nuneaton and Coventry / M6 attributed to the large development sites situated alongside these key routes.
- The delivery of the proposed schemes show a general improvement in network conditions in the AM period when compared to the 2031 Reference Case. The impact in the PM period is not fully mitigated but is reduced to levels that are only marginally worse than the Reference Case position. There are a number of specific impacts highlighted in the PM that require further review but are likely to be reduced through refinement of the proposed schemes.

8 FURTHER CONSIDERATIONS & RECOMMENDATIONS

Further Considerations

8.1 It is recommended that the following risks are considered at the earliest opportunity although it is acknowledged that the assessment of these risks prior to the adoption of the Local Plan is, in some cases unlikely to be possible.

- The impacts on areas not included within the modelling, however, the considerable coverage of the model and study area are likely to minimise the need for this.
- The impacts of utility and service diversion costs attributed to any one scheme that may not have been considered at this stage (an average cost of service and utility works has simply been assigned to each scheme);
- The impact of land issues or safety audits, not considered in detail within the initial assessment but that may arise during more detailed feasibility and design stages;
- Vertical alignment and gradient issues not considered at this stage; and
- Specific risks pertaining to the delivery of one or more scheme on the network such as:
    - The physical risks to delivering enhancements within the area of Nuneaton inner ring road that are posed by the large number of bridges and the railway track.
    - The risks posed by the proposition of schemes in areas where information regarding the highway extent was limited (such as those near Bedworth).
    - Specific risks where schemes which require a large proportion of the existing highway to be allocated as road space may not be acceptable or may not meet the required design standards.

8.2 In addition to the above identified risks, there are a number of assumptions that have been included within the modelling that may require further detailed analysis at an appropriate stage within the assessment period.

8.3 It should be acknowledged that a high level feasibility assessment of the proposed schemes has been undertaken and this has not revealed any instances where at least the principles of the schemes proposed within the modelling, cannot be delivered.

Recommendations for Future Assessments

8.4 There are a number of parameters that have been adopted within the modelling that are subject to change; as such it is recommended that the following are considered during any future stages of assessment:

- When the details surrounding the employment sites use classes are established, assumptions pertaining to the usage of the employment sites (B1, B2, and B8) should be updated accordingly.
- More detailed work surrounding the assumption of a 15% mode shift percentage is required. Specifically further identification and refinement of the elements that can be delivered to assist in achieving this target should be undertaken. In addition to this, once the mitigation strategy is fully determined, sensitivity testing should be considered to ascertain the potential impacts that may be accrued should the 15% not be achieved. Such work is recommended so as to ensure that areas that may require further mitigation, should the mode shift targets drop, can at least be identified.
- The current modelling assessment assumes caps on certain elements of growth. The instability contained within the Reference Case demonstrates why this cap is required; however, once the site access and mitigation strategies have been fully determined it may be beneficial to undertake a sensitivity test.
- Further investigation of the potential benefits of area wide mitigations strategies and the cumulative benefits of the schemes therein is recommended.
- The need for mitigation on the Strategic Road Network will be examined in further detail by Highways England (HE) and WCC once NBBC has approved the Preferred

8.5 The schemes proposed during this phase of testing are those that are most likely to serve a role of strategic importance. The actual quantum of development, site access points and detailed trip rates will be confirmed as the proposed sites work through the planning process, at this stage further assessments should be undertaken which may identify further or alternative mitigation schemes.

8.6 Most of the issues set out previously are unlikely to significantly alter the conclusions of this study with respect of the critical infrastructure requirements. Furthermore, certain elements may be dealt with by each individual site as they come forward and so the onus may be removed from NBBC and WCC to consider these elements further at this stage.

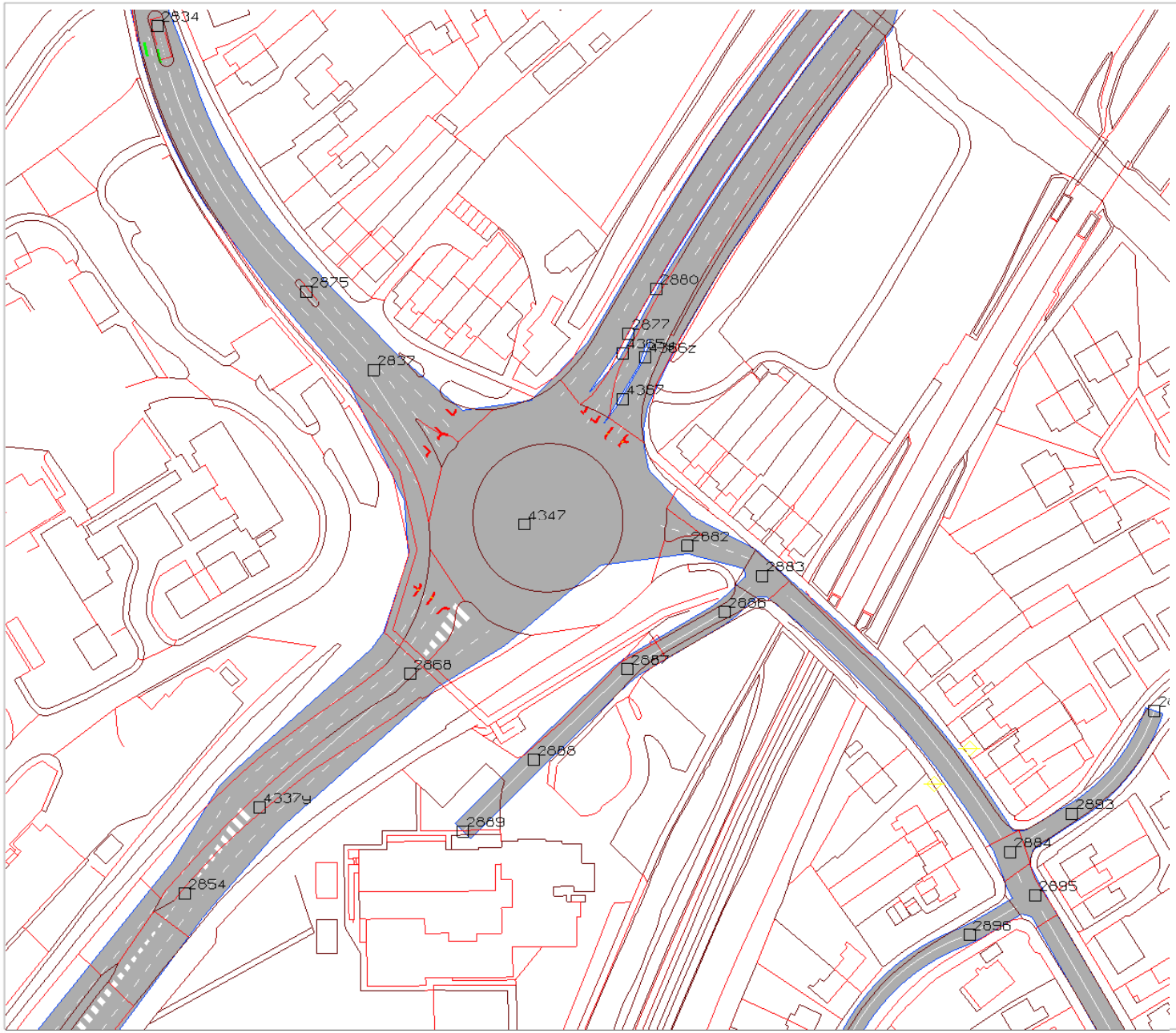
8.7 It should also be noted that the results that are presented herein should be considered as a worst case assessment and there is likely to be scope for the impacts to be further reduced by additional optimisation and more detailed refinement of the proposed mitigation measures.

Appendix A

Mitigation Schedule

Mitigation Schemes Overview:

Reference	Location	Description	Notes	Grade	Feasibility Comments	Final Scheme Costs
1	College Street / A444 Roundabout	Reconfiguration to signals, College St W becomes WB only so no access to A444 provided from the West of the junction. Widening of the remaining 3 approaches and provision of two lane exit length along College Street NB		Grade 1	Requires College St East to become one-way. Limited road space on B4112 NB could become an issue	£3,400,000
2	A444 / Eliot Way Roundabout	Reconfigurtaion of existing roundabout into signalised junction. Left turn slip from Eliot Way to A444NB .		Grade 1	Garage Access needs to be considered in final scheme design	£2,500,000
3	Greenmoor Road / Heath End Road / College Street / Bull Ring	Reconfiguration of northern mini-roundabout to a signalised junction, southern proity junction between Bull Ring and College Street recfonfigured into a roundabout	Links in to A444 signalisation strategy and, specifically, provides synergy with the proposed College St/ A444 works	Grade 1	Limited road space on College Street between ped crossing and Bull Ring Junction could inhibit delivery of two lanes NB. Sinals required not mini roundabout due to inability to deliver within existing capacity	£2,500,000
4	College Street / Coventry Road Priority Junction	Reconfiguration of priority junction into a roundabout	Provides synergy with the proposed College St / A444 works	Grade 2A		£225,000
5	Roanne Ringway / Coton Road / Vicarage St Roundabout	Widening of circulating carriageway, provision of two lane exit along Roanne Ringway which extends to the A444/Queen's Road Junction. Two lane exit flare on Vicarage St EB quickly narrowing to single lane due to bridge width	Part of wider town centre works requiring further investigation before optimum strategy canbe determined - Needs to fit in with town centre regeneration	Grade 1	Road space on Vicarage Rd EB could be an issue due to the bridge. The final schem is most likely going to require the delivery of signals at this junction.	£6,500,000
6	Church Street / Vicarage Street Roundabout	Widening of circulating carriageway, provision of two lane exit along Vicarage St NB which maintains Vicarage St as two lanes NB to the Back St junction		Grade 1	Road space on Vicarage Rd EB could be an issue due to the bridge. The final schem is most likely going to require the delivery of signals at this junction.	
7	Croft Road / Greenmoor Road Priority Junction	Reconfiguration of priority junction to small roundabout		Grade 2A		£225,000
8	Higham Lane / A47 Old Hinckley Road Roundabout	Expansion of existing roundabout, where possible introdution of two lanes. Provision of short two lane exit flare for A47 SWB. Introduction of signal control.	Potential for signalised junction to be delivered instead of signalised roundabout.	Grade 1	Could be a signalised priority junction rather than roundabout	£875,000
9	Lutterworth Road / Leyland Road / Ivanhoe Ave Priority Junction	Introduction of right turn bay from Lutterworth SB to Leyland Rd/Wanhoe Drive	More substantial works could be desirable, inlcuding the provision of signals pending further, more detailed, investigation	Grade 2A	Potential need for signal control to be introduced	£350,000
10	Donnithorne Ave / Coventry Road Roundabout	Reconfiguration from mini-roundabout to signalised junction	Junction is likely to come under increased pressure due to proximity of employment (Faultlands) and resi sites (Gypsy Lane) using this route as an alternative to the A444	Grade 1		£500,000
11	Weddington Road / Weddington Terrace Priority Junction	Right Turn Bay from Weddington Road SB to Weddington Terrace	Increased SB flow due to northern developments triggers need for right-turn bay	Grade 2A		£350,000
12	Edward Street & Edward Street / Henry Street Mini-Roundabout	Speed Reduction from 30 mph to 20 mph & Reconfiguration from roundabout to priority junction, left turn from Edward St NB to Henry Street EB banned.	Banning of Right trun to prevent re-assignment from A444 to Greenmoor Road via Bull Ring	Grade 3	Right turn ban may not be nescsary, further investigation required.	£150,000
13	Ansley Road / Anstley Lane Priority Junction	Reconfiguration of existing priority junction into a roundabout	Necessary to accommodate development trips (Arbury) and through trips coming from the new link which is served off Astley Lane	Grade 1	Final scheme may require signal control -housing area just west requires access	£225,000
14	A444 / Washingham Drive Roundabout	Widening of circulatory and approaches plus two lane NB exit flare and two lanes SB on Washingham Drive between St David's way & A444		Grade 1	Final scheme may require signal control	£1,025,000
15	Coventry Road / Gipsy Lane Priority Junction	Reduced to 40 mph between Griff and Gipsy Lane, provision of two lanes in both directions between Griff and the newly signalised Gipsy Lane junction		Grade 2A		£500,000
16	Croft Road / The Raywoods Mini-Roundabout	Widening of circulating carriageway of roundabout		Grade 1	Final scheme may require signal control	£225,000
17	A425 / Crowhill Road Roundabout	Widening of mini roundabout carriageway & approaches	Part of wider A452 works, promoting as an alternative route avoiding the town centre.	Grade 1		£750,000
18	King Edward Rd / Church St Priority Junction	Right Turn banned to reduce rat-run propensity		Grade 2A		£150,000
19	A4254 / B4114 Roundabout	Widening of circulating carriageway, provision of three lane entry flare from A4254 WB, two lane exit flares along A4254 WB exit and B4114 NB exit.	Part of wider A452 works, promoting as an alternative route avoiding the town centre. Would benefit from more significant capacity improvements.	Grade 1	Final scheme may require signal control	£450,000
20	School Road / B4113 Coventry Road / Bayton Road Priority Junction	Provision of two lane SB exit flare & optimisation of signals	Need for schemes possibly could be superseeded pending further refinement and optimisation of the A444 / Newtown schemes (i.e. Scheme Ref. 24, all moevement access to the A444 from Newtown Road)	Grade 3	Unlikley to be feasible - detailed design work required	£875,000
21	Rye Piece Ringway / King Street Roundabout	Reconfiguration from small roundbaout to signalised junction		Grade 3		£800,000
22	B4113 / Longford Rd / Bedworth Rd / Wilson Ln Roundabout	Signalisation of the Bedworth Road NB approach to roundabout and adjacent circulatory carriageway.	Works likely to be required to accommodate the additional traffic generated by the porposed employment site (Phoenix Lane) and resi site (School Ln) in the vicinity of this roundabout. The signals are intended to provide gaps for the Bedworth Road traffic to enter the roundabout and minimise the queues that were witnessed on this aproach.	Grade 2A		£1,400,000
23	New Rd / Royal Oak Ln / Vicarage Ln / Ash Green Ln Priority Junction	Widening and signalisation of the existing priority junction.	The increase in demands through this junction as a result of the prosed employment sites to the south-west (e.g. Prologis extension) and residential to the north (Hospital Lane & Woodlands) can not be accommodate effectively by the junction in its current configuration.	Grade 1		£1,200,000
24	A444 / Newtown Rd & A444 south facing slips	Addition of southbound off-slip, creating a new signalised (eastern) junction on Newtown Road. Additionallym a new signalised junction on the A444 northbound carriageway to enable a modified version of the exisitng slip to become two-way and allow traffic to join the A444 NB.	Potential to remove stress from M6 Junction 3 and provide an alternative access point to the local roads, to join the A444 northbound, and to / from the proposed residential site to the west (i.e. Woodlands).	Grade 1		£4,200,000
25	A444 Weddington Rd / Shanklin Dr Priority Junction	Signalisation of the existing priority junction.	Issues with right-turning traffic casuing queueing on the northbound approach are eliminated with the scheme.	Grade 2A		£800,000
26	A4254 Eastboro Way NB Corridor (between Crownhill Rd & Townsend Dr)	Widening on the northbound section of Eastboro Way between Crownhill Road and Townsend Drive.	Part of wider A452 works, promoting as an alternative route avoiding the town centre. Increased traffic volumes using this route to bypass Nuneaton town centre was shown to result in significant queues that blocked back to A444 Coton Arches and also prevented traffic from exiting the industrial estate to the west.	Grade 1		£2,000,000
27	Arbury Road Works (Church Road, Westbury Road, Heath End Road)	Works are likely to be required to improve the flow of traffic along Arbury Road, in particular issues exiting from side roads onto Arbury Road are likely to indicate the need for at least on signalised junction with widening a flares potentially also being considered		Grade 2B	Limited croad space could inhibit the delivery of further capacity enhancements	£1,500,000
28	Woodford Lane / Nuneaton Road	Current configuration of junction layout has limited capacity, severe queues likely to occur without interventon. Signals are likely to represent optimum solutions		Grade 2B	Scheme delivery likely to be impeded by the railway bridge.	£750,000
29	Bermuda Sustainable / All Modes Transport Bridge	WCC has aspirations to open the currently disused (except pedestrian use) bridge over the A444 at Bermuda. WCC are currently investigating the benefits of this for use by either sustainable modes or all modes to serve Bermuda Station and open up alternative routes to and from existing and proposed housing and employment.		Grade 2B		£1,000,000
	Bermuda Station Parking	Housing around Arbury and Gypsy Lane areas will generate increased demand for parking at Bermuda Station, additionally the extra demands placed on the highway network as a result of Borough Plan growth are likely to result in commuters switching modes thus further increasing demand for parking at the station.		Grade 2B		£500,000
30	Sustainable Transport Contributions	Extensive sustainable travel infrastructure should be constructed to encourage modal shift and thus alleviate pressure on the road network. It is likely that this contribution would be best spent on provision of key cycle routes between housing and employment in Nuneaton and Bedworth. In addition, completion of the existing cycle networks - this has been termed "Missing Links" and provision of new cycle infrastructure linking proposed developments to the existing cycle network. Provision of "Missing Links" may involve working closely with NBBC and other land owners in order to provide the shortest routes to key destinations. Routes should include toucan/pedestrian crossings to avoid severance. Bedworth currently has limited provision of cycle network and funding from developers could be used to improve this situation in addition to a route from Nuneaton to Coventry. Sustainable travel infrastructure could also encompass bus priority schemes especially where signalised junctions are proposed.		Grade 1		£2,000,000
31	Bus Priority Enhancements	Additional funds should be set aside to ensure that, where possible, the proposed mitigation schemes can be enhanced to ensure that bus priority measures can be incorporated into the final schemes. Such amendments are nescessary due to the signifcance attributed to the delivery of 15% mode shift as a startingpoint for teh accomodation of the proposed Core Strategy sites.		Grade 1		£2,000,000
32	Griff Roundabout	Optimisation of existing signal control likely to be required alongside potential signalistion of currently unsignalised approaches	Potentially triggered by proximate development.	Grade 2B		£500,000
33	Heath Road / Newtown Road	Signalisation of the existing priority junction.	Providing signalised access to Woodlands development site via Heath Road. To be co-ordinated with the proposed signalised junctions at A444 / Newtown Road (Scheme Ref. 24)	Grade 1		£500,000
34	School Lane / Bowling Green Lane	Signalisation of the existing priority junction.	Increase in demand using this route (westboundon School Lne in particular) due to the School Lane and Phoenix Lane developments.	Grade 1		£500,000
35	Long Shoot to Town Centre Cycle Route	Involves the addition of a strategic off carriageway cycle route linking the northern housing allocations to the town centre and Hinckley		Grade 1		£1,200,000
					Total	**£42,625,000**



Proposed: Signalised Junction
(College St. exit Only)

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

College Street Roundabout

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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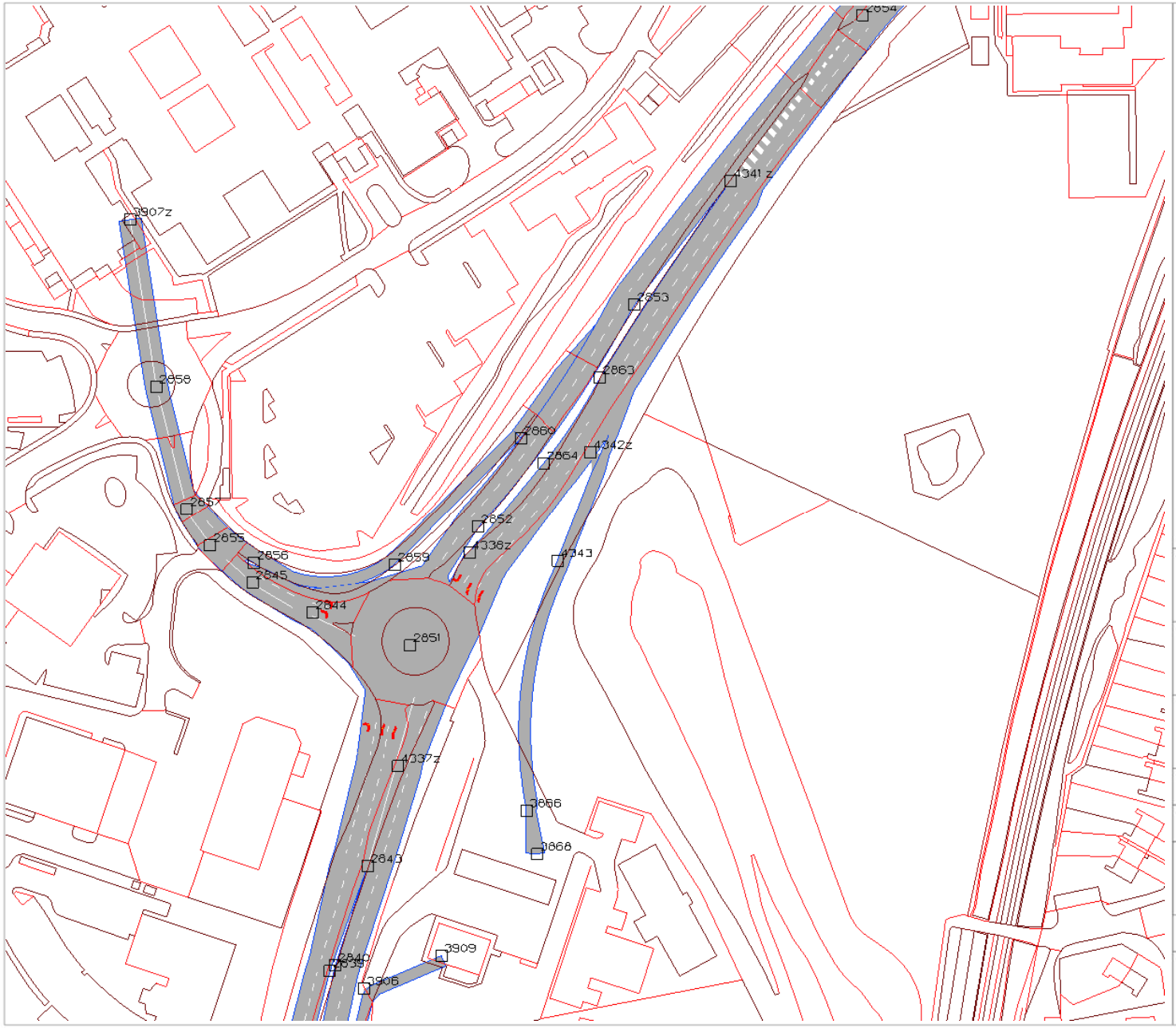
DRAWING REFERENCE:

Ref 01



Proposed: Signalised Junction

CLIENT: Warwickshire County Council

PROJECT: VM155030 NBBC Strategic Transport Assessment

TITLE: A444 / Eliot Way Roundabout

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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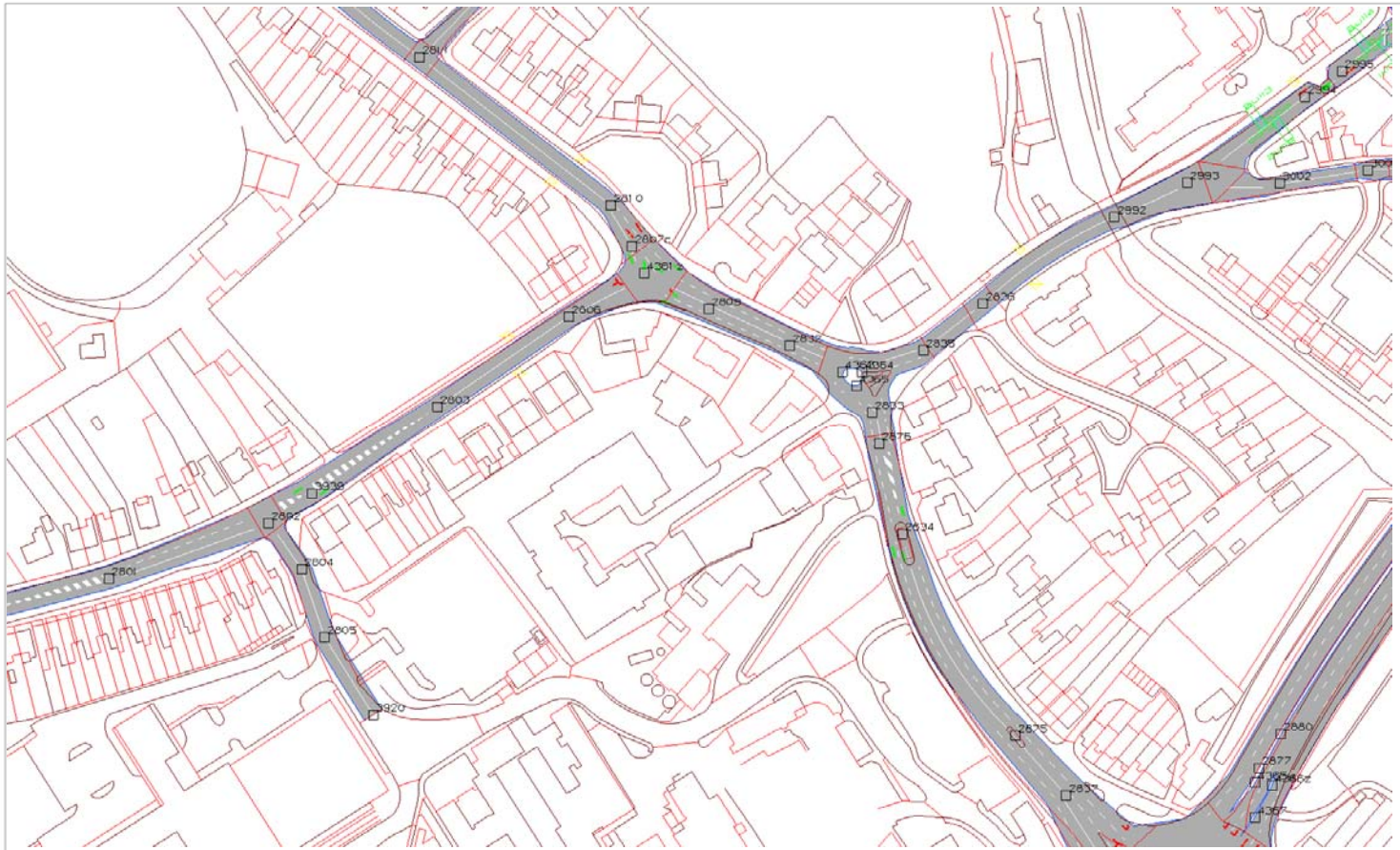
DRAWING REFERENCE: Ref 02



Proposed: Signalised Junction at Greenmoor / Heath End

Roundabout at College St / Bull Ring

+ widening on section between the junctions

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Greenmoor Rd / Heath End Rd / College St / Bull Ring

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

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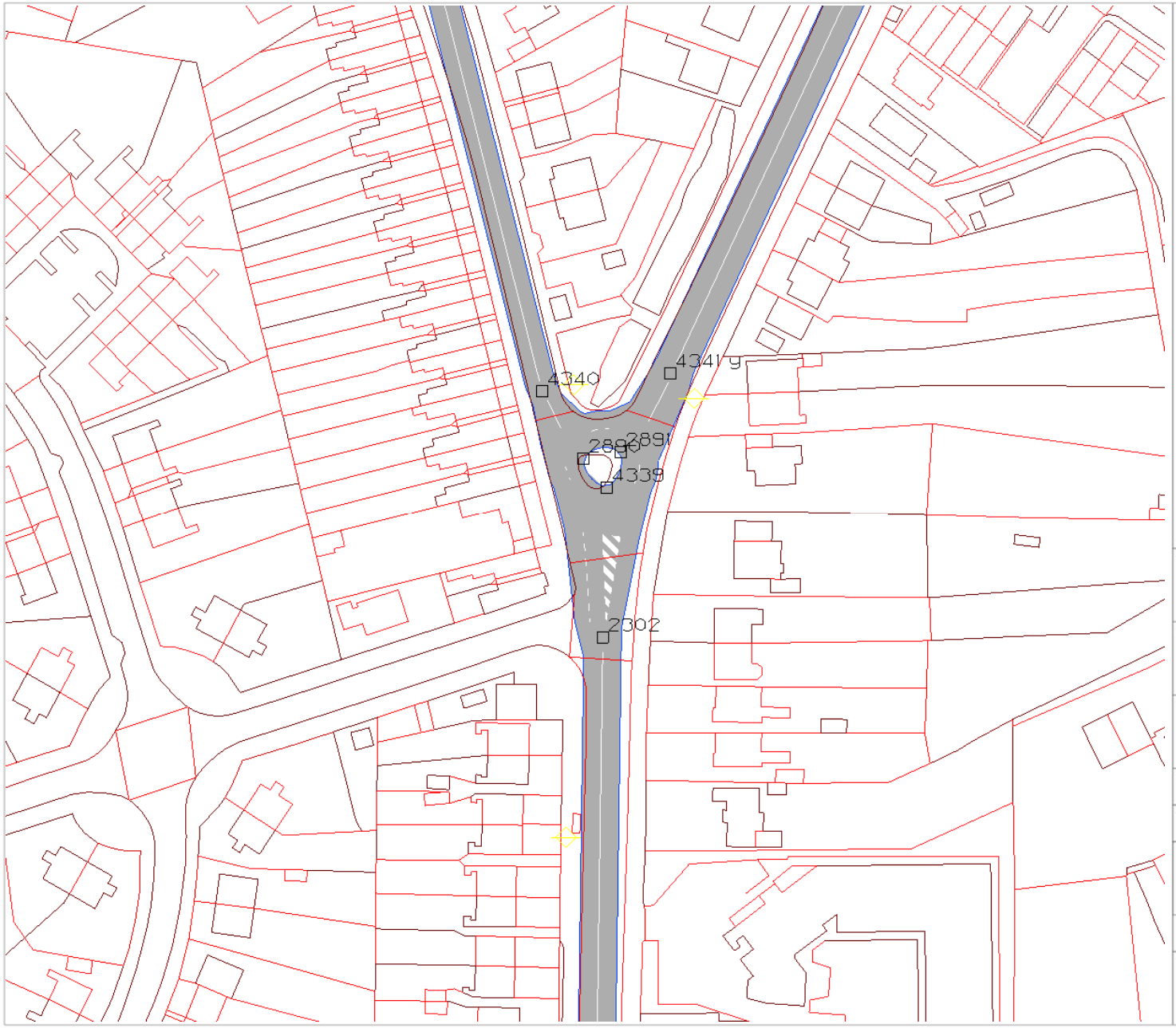

Proposed: Revise priorities with addition of Roundabout

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

College Street / Coventry Road
Priority Junction

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

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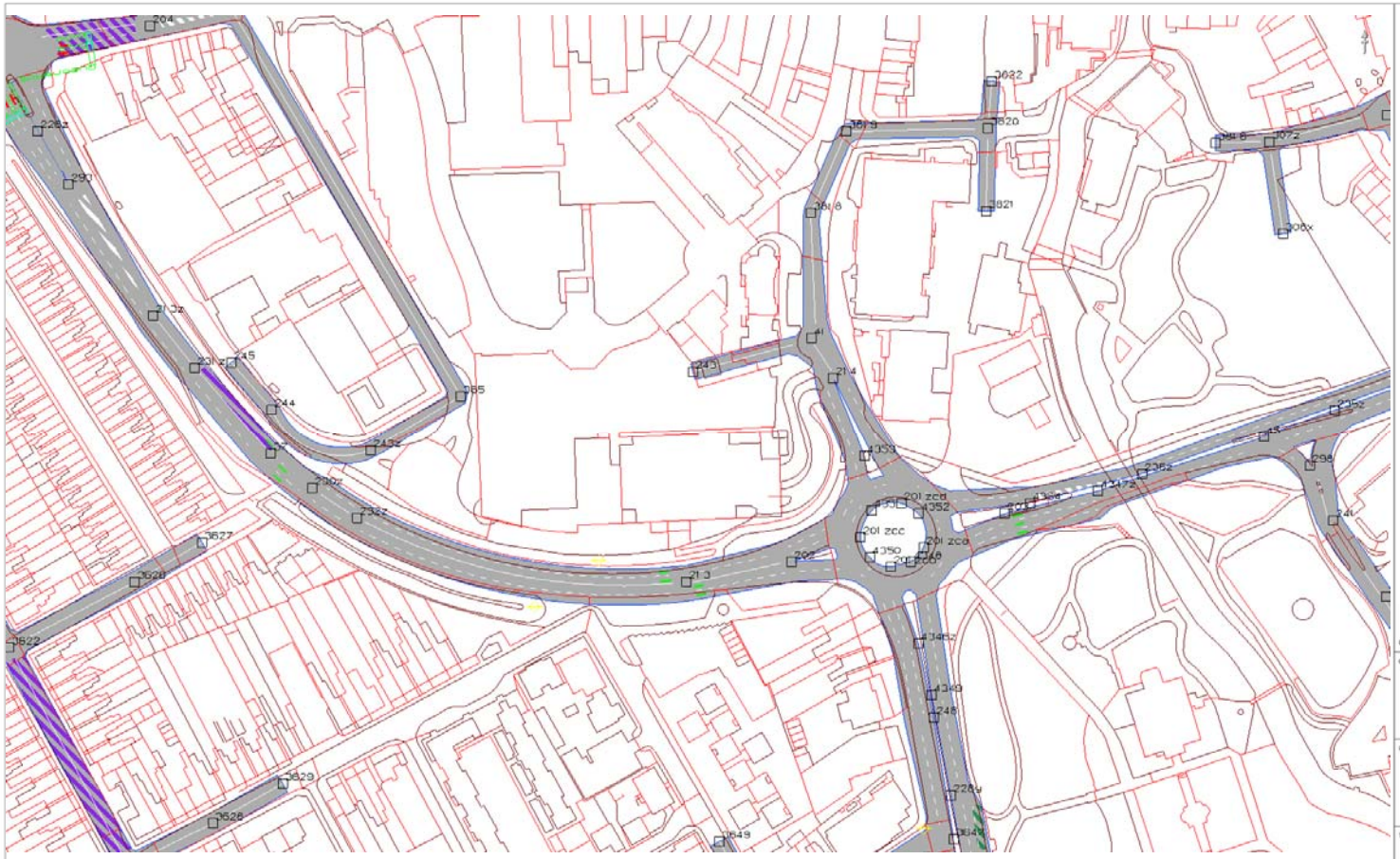

Proposed: Widening to two lanes NWB on Ringway

Two lane exits from roundabout onto Ringway and Vicarage St

Increased third lane flare length on Vicarage St WB approach

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Coton Road / Vicarage Street Roundabout

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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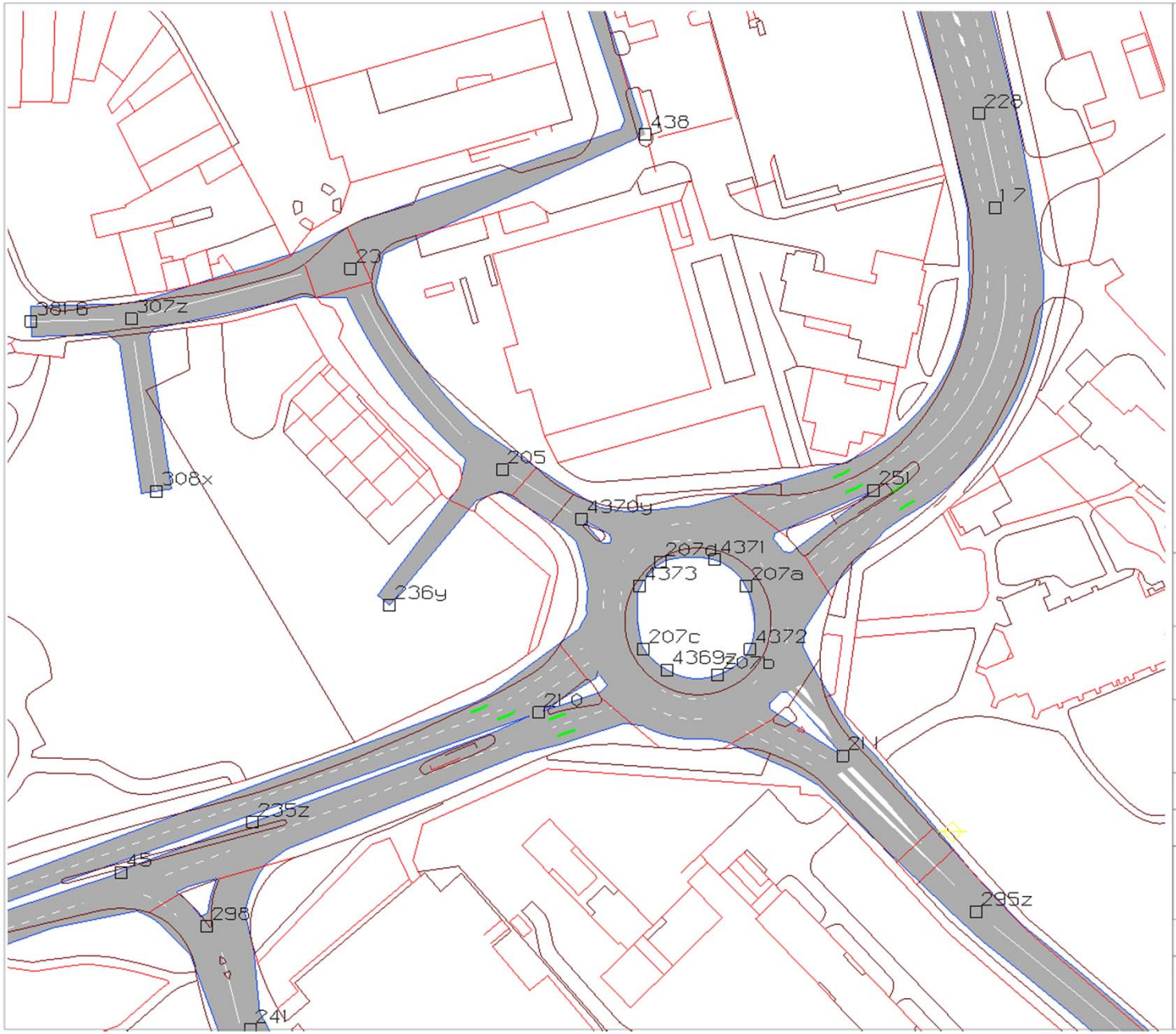
DRAWING REFERENCE:

Ref 05



Proposed: Widening of circulatory carriageway

Addition of third lane flare on both Vicarage St and B4114 approaches

CLIENT: Warwickshire County Council

PROJECT: VM155030 NBBC Strategic Transport Assessment

TITLE: Church Street / Vicarage Street Roundabout

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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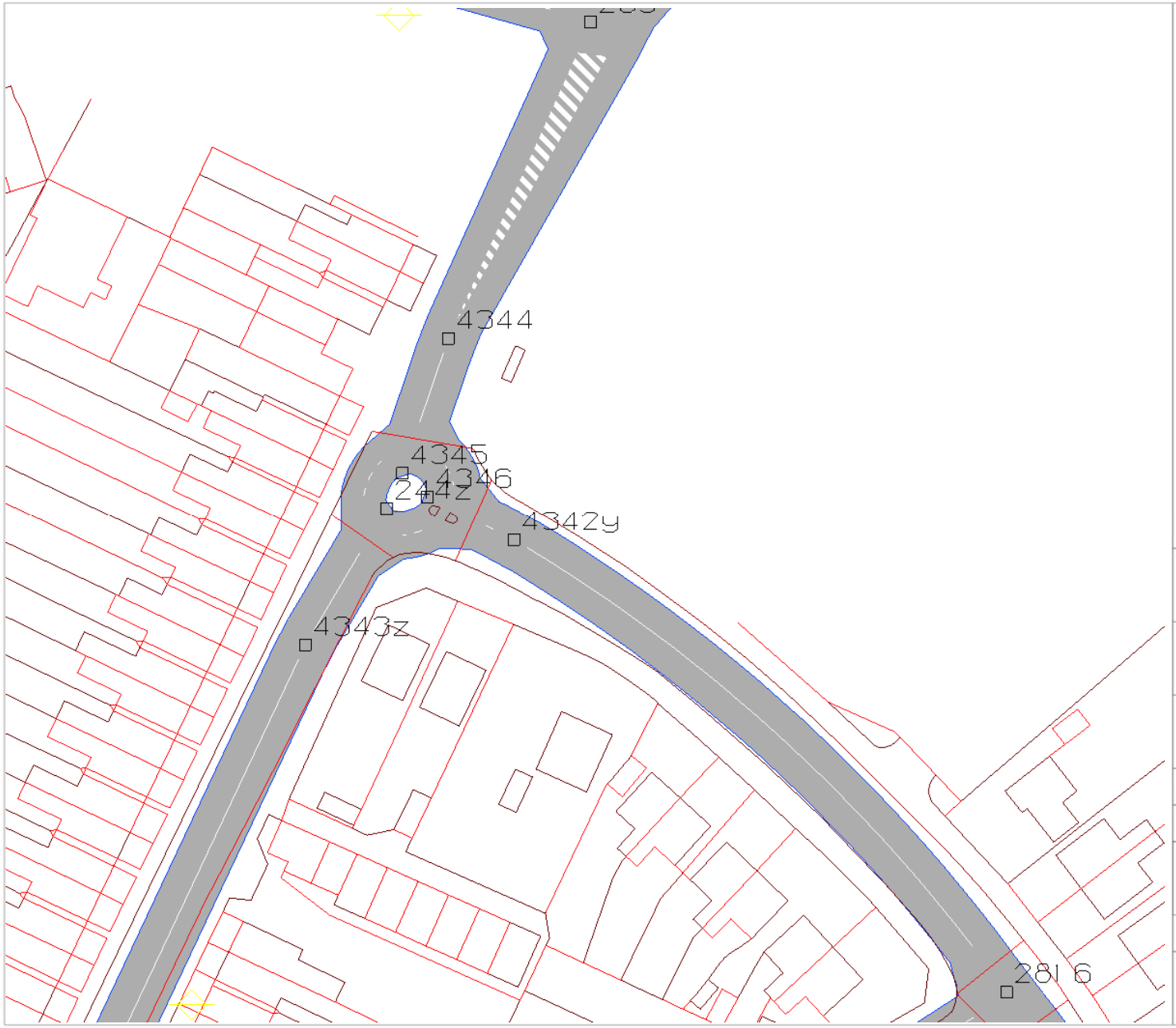
DRAWING REFERENCE: Ref 06



Proposed: Mini-Roundabout

CLIENT: Warwickshire County Council

PROJECT: VM155030 NBBC
Strategic Transport Assessment

TITLE: Croft Road / Greenmoor Road
Priority Junction

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
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DRAWING REFERENCE: Ref 07

Proposed: Signalised Roundabout

Two lane WB exit & second lane flare on WB approach

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Higham Lane / A47 Old Hinckley Road Roundabout

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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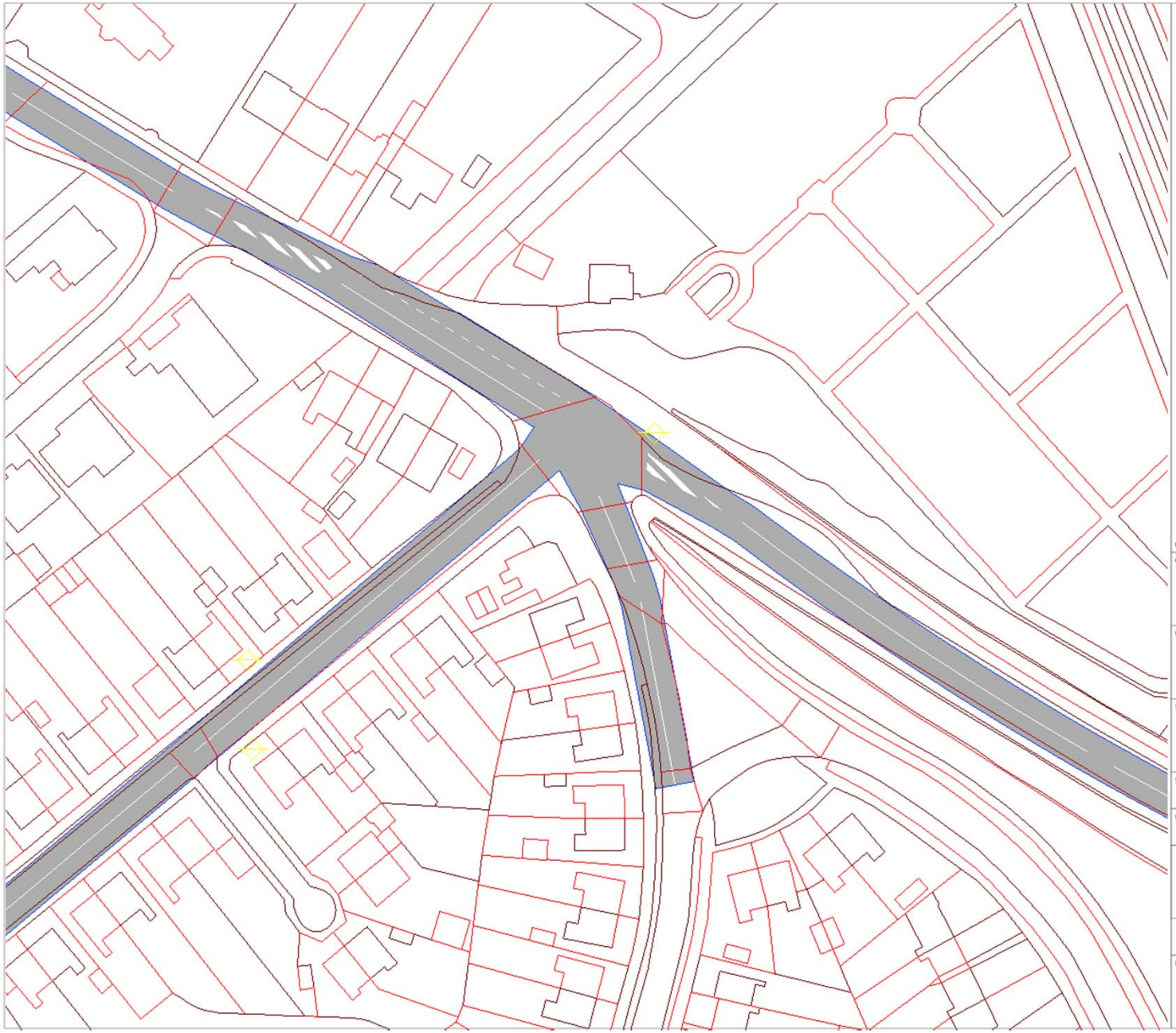
DRAWING REFERENCE:

Ref 08



Additional lane for right-turn channel on Lutterworth Rd SEB approach

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Lutterworth Rd / Leyland Rd Priority Junction

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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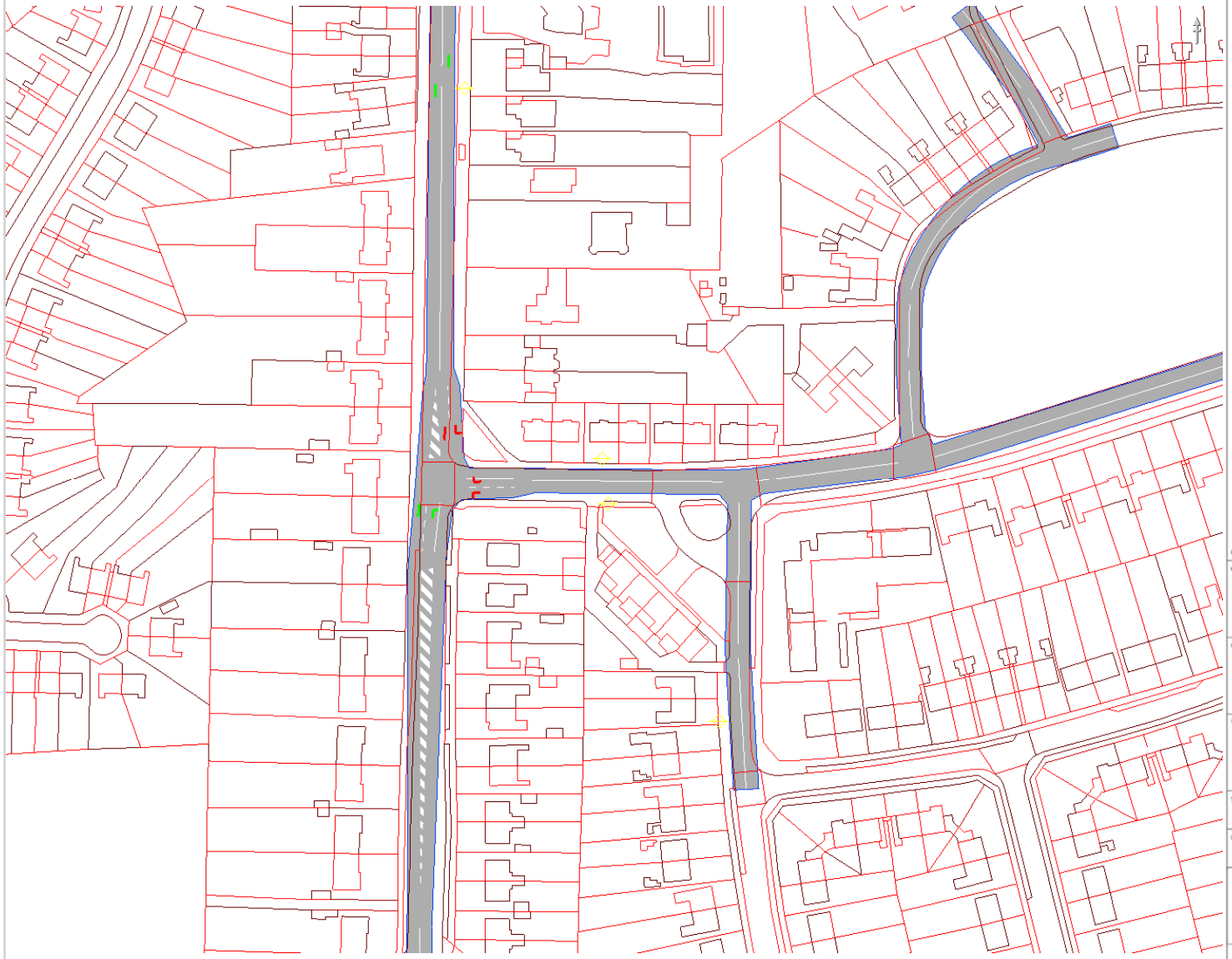

Proposed: Signalised T-Junction

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Donnithorne Ave / Coventry Road Roundabout

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

Ref 10

Proposed: Addition of right-turn channel on Weddington Road SB approach

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Weddington Road / Weddington Terrace Junction

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

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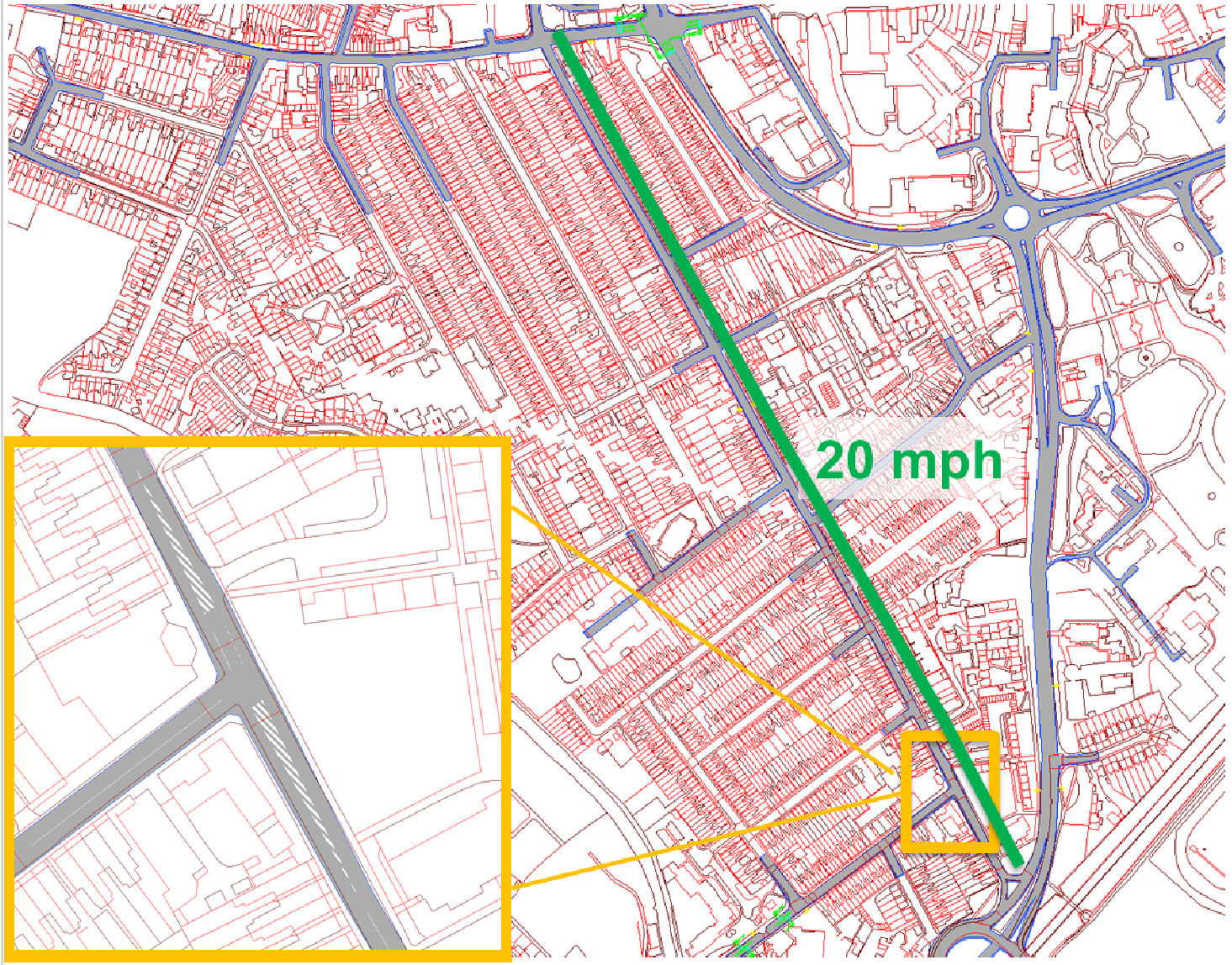

Proposed:Reduced speed to 20mph along Edward Street

Replace Edward St / Henry St mini-roundabout with priority T junction

CLIENT: Warwickshire County Council

PROJECT: VM155030 NBBC Strategic Transport Assessment

TITLE: Edward Street & Edward Street / Henry Street

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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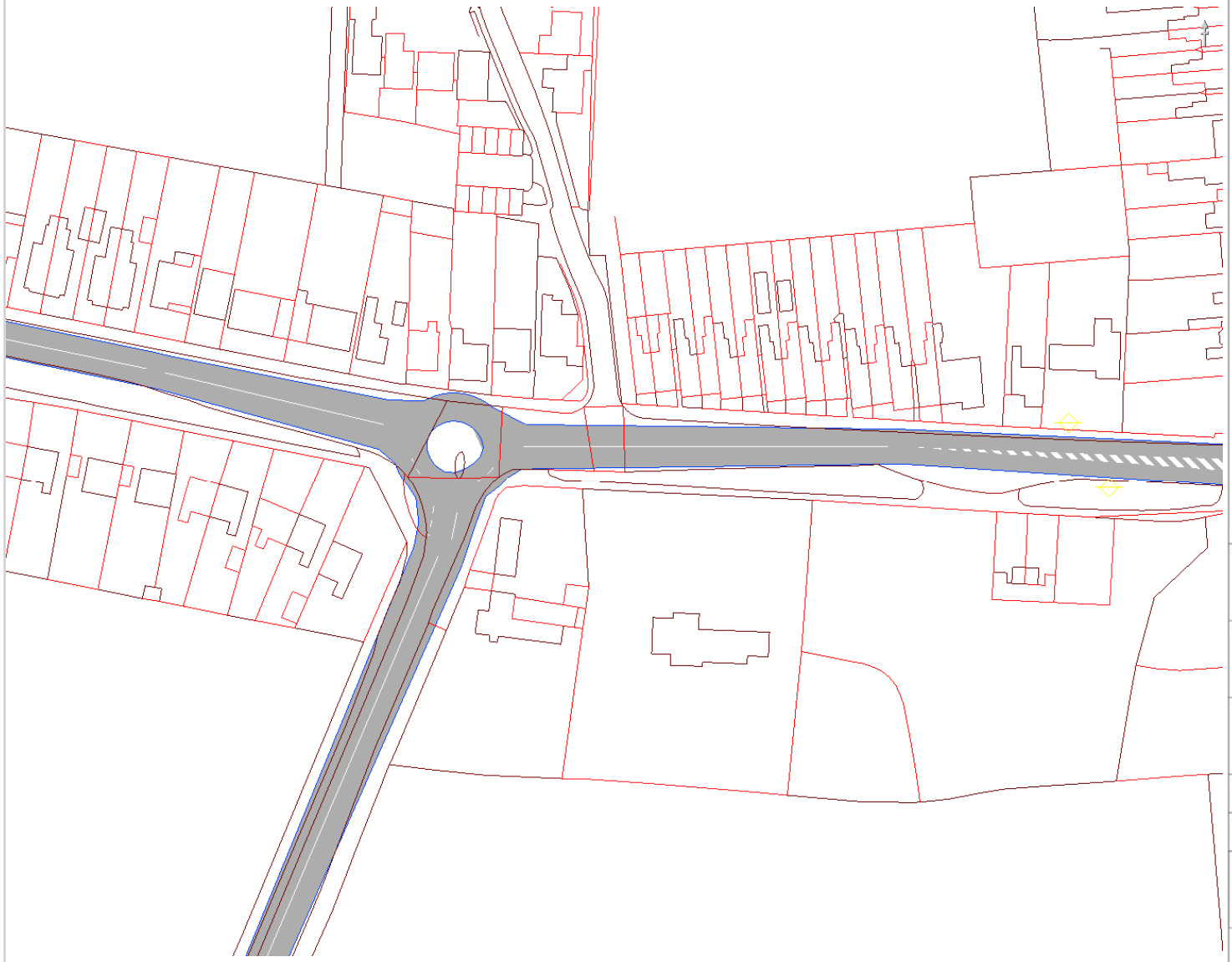
DRAWING REFERENCE: Ref 12



Proposed: Mini-Roundabout

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Ansley Road / Astley Lane Priority Junction

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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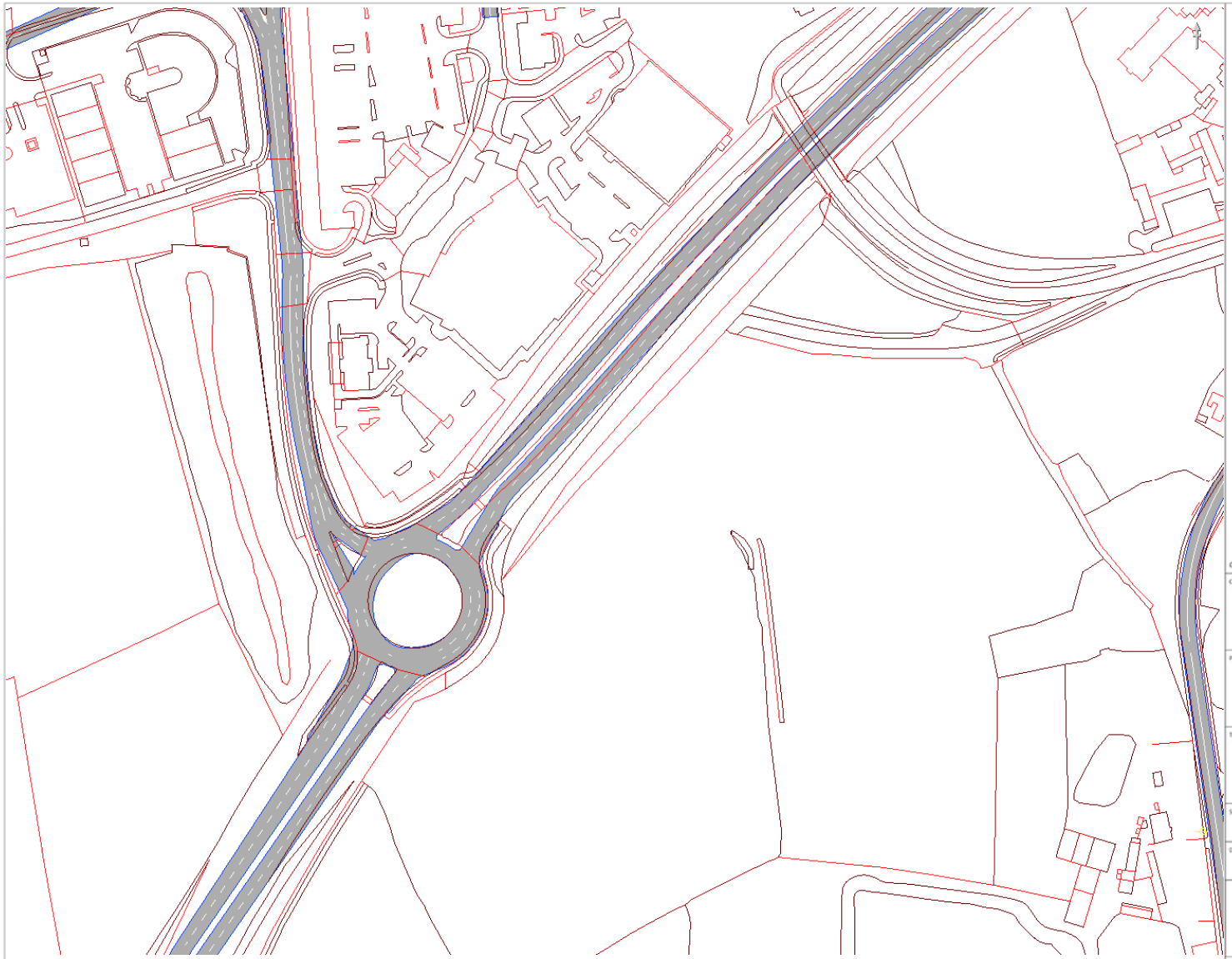

Proposed: Additional third lane flare on Washingham Dr and A444 NB approaches

Widening of circulatory carriageway to three lanes

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

A444 / Washingham Drive Roundabout

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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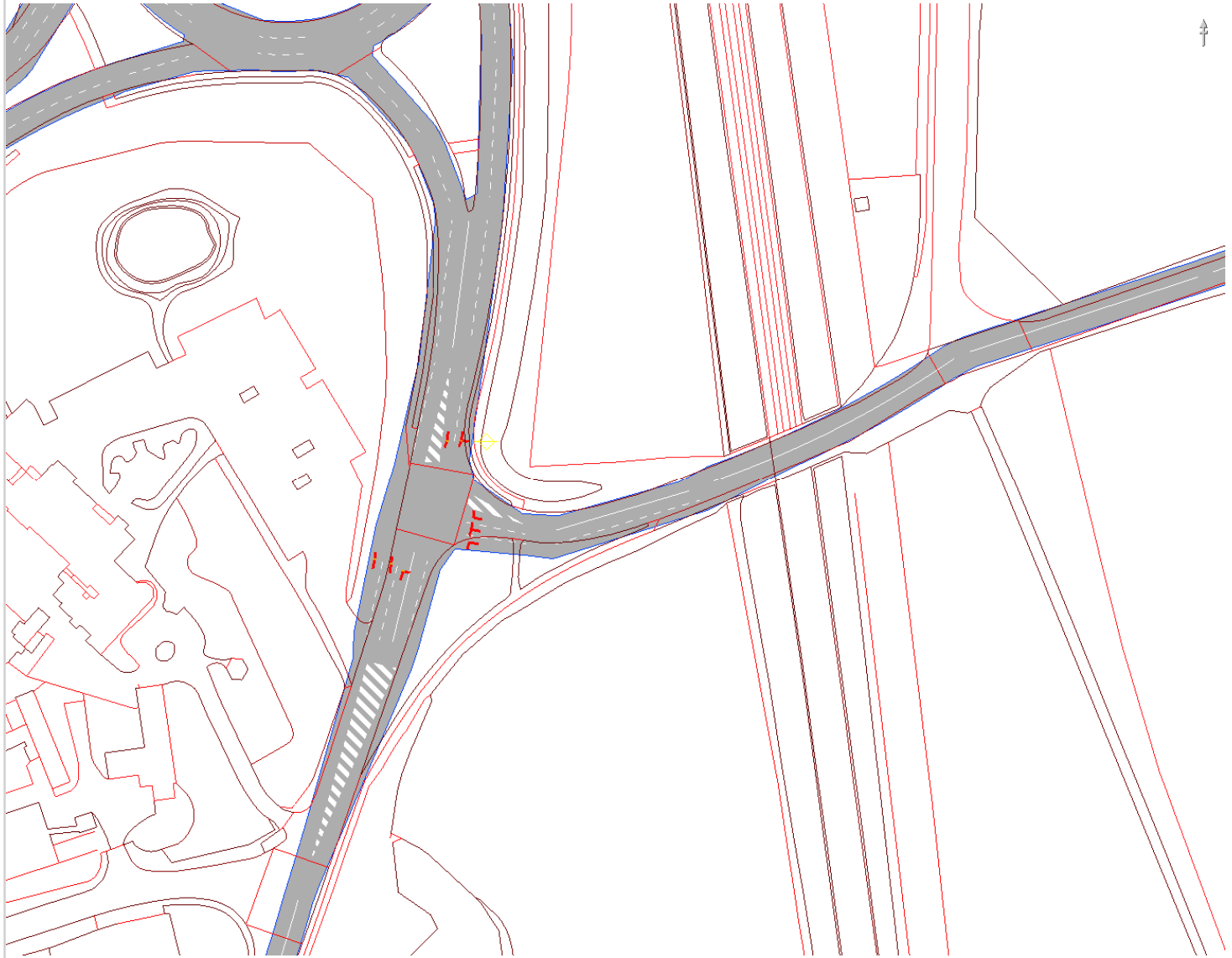

Proposed: Signalisation and widening

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Coventry Road / Gipsy Lane Priority Junction

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

Ref 15

Proposed: Widening to provide two lane circulatory carriageway

Addition of a second lane flare on the western and southern approaches

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Croft Road / The Raywoods Mini-Roundabout

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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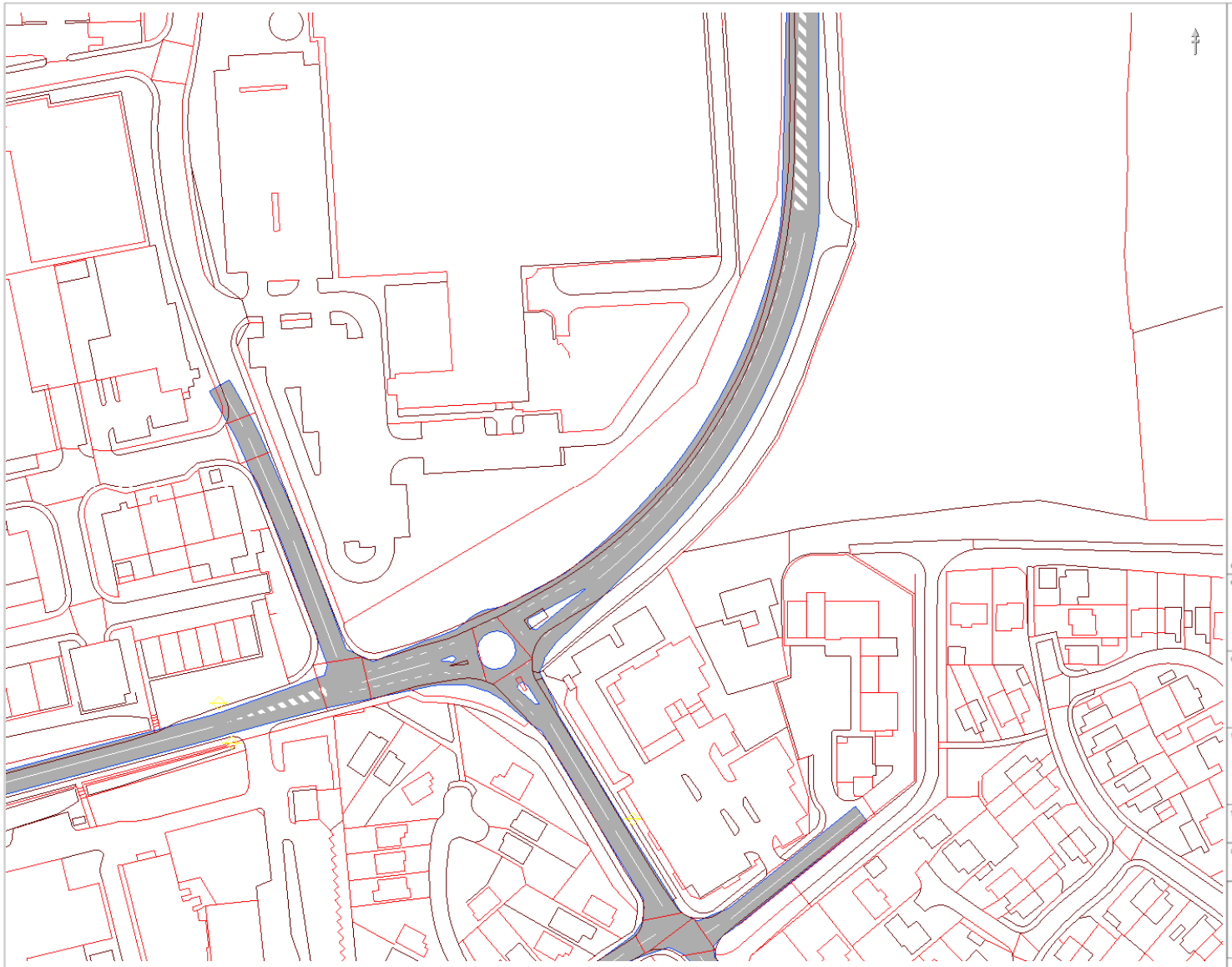
DRAWING REFERENCE:

Ref 16



Proposed: Larger central island

Additional second lane flare on eastern and southern approaches

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

A425 / Crownhill Road Roundabout

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

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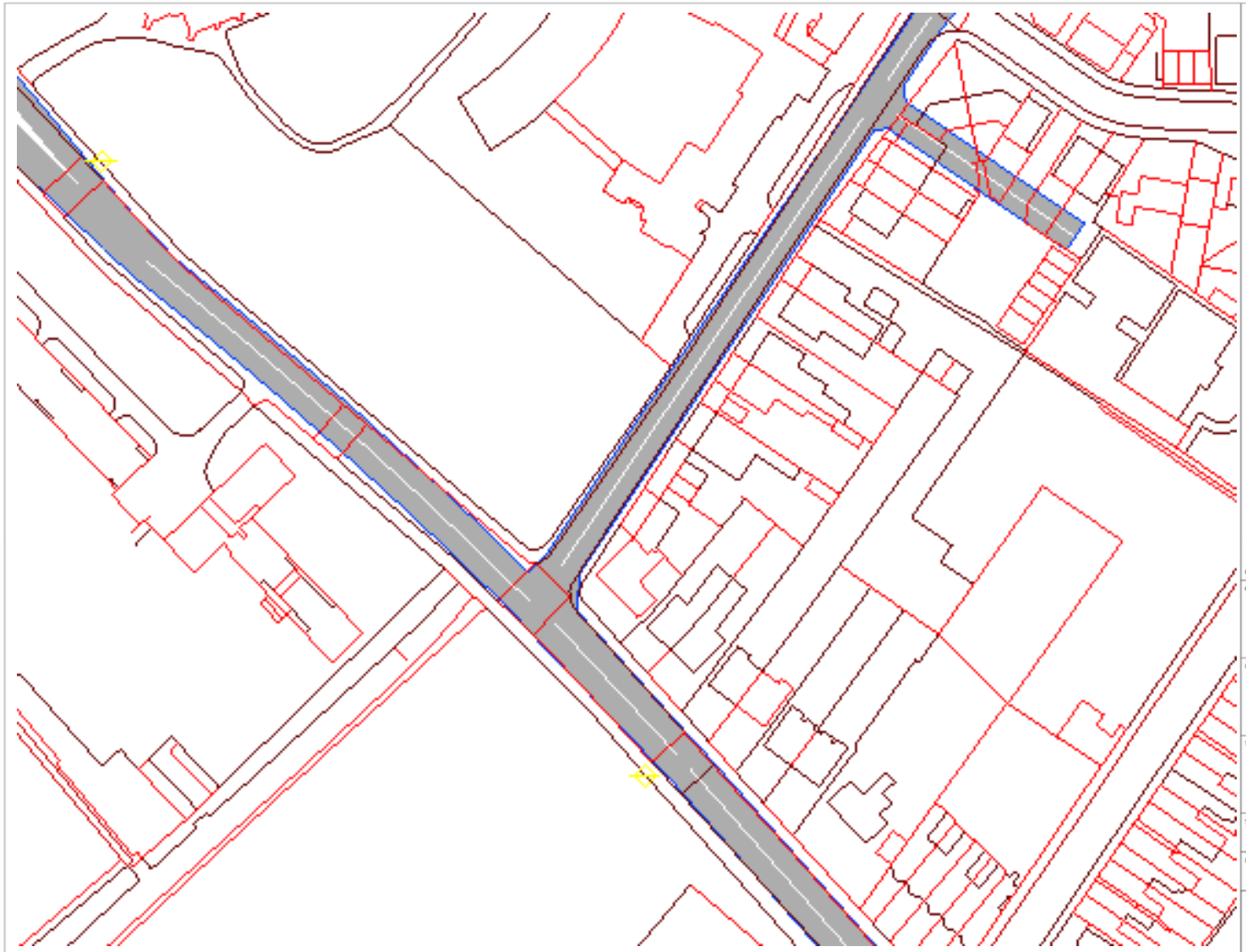

Proposed: Ban right-turn from King Edward road

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

King Edward Rd / Church St Priority Junction

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
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DRAWING REFERENCE:

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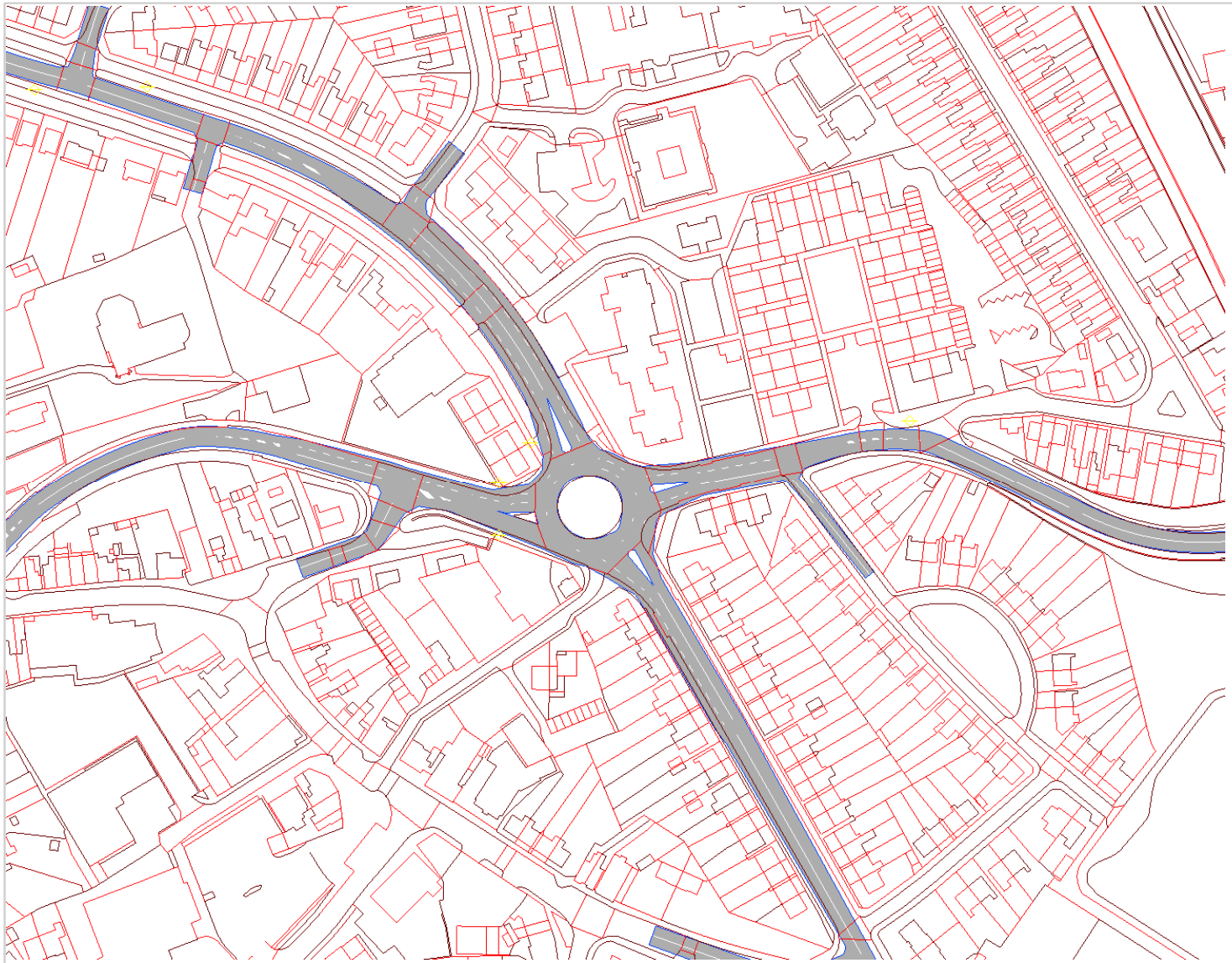

Proposed: Widening of sections of the circulatory carriageway to three lanes

Addition of third lane flare on A4254 EB approach

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

A4254 / B4114 Roundabout

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
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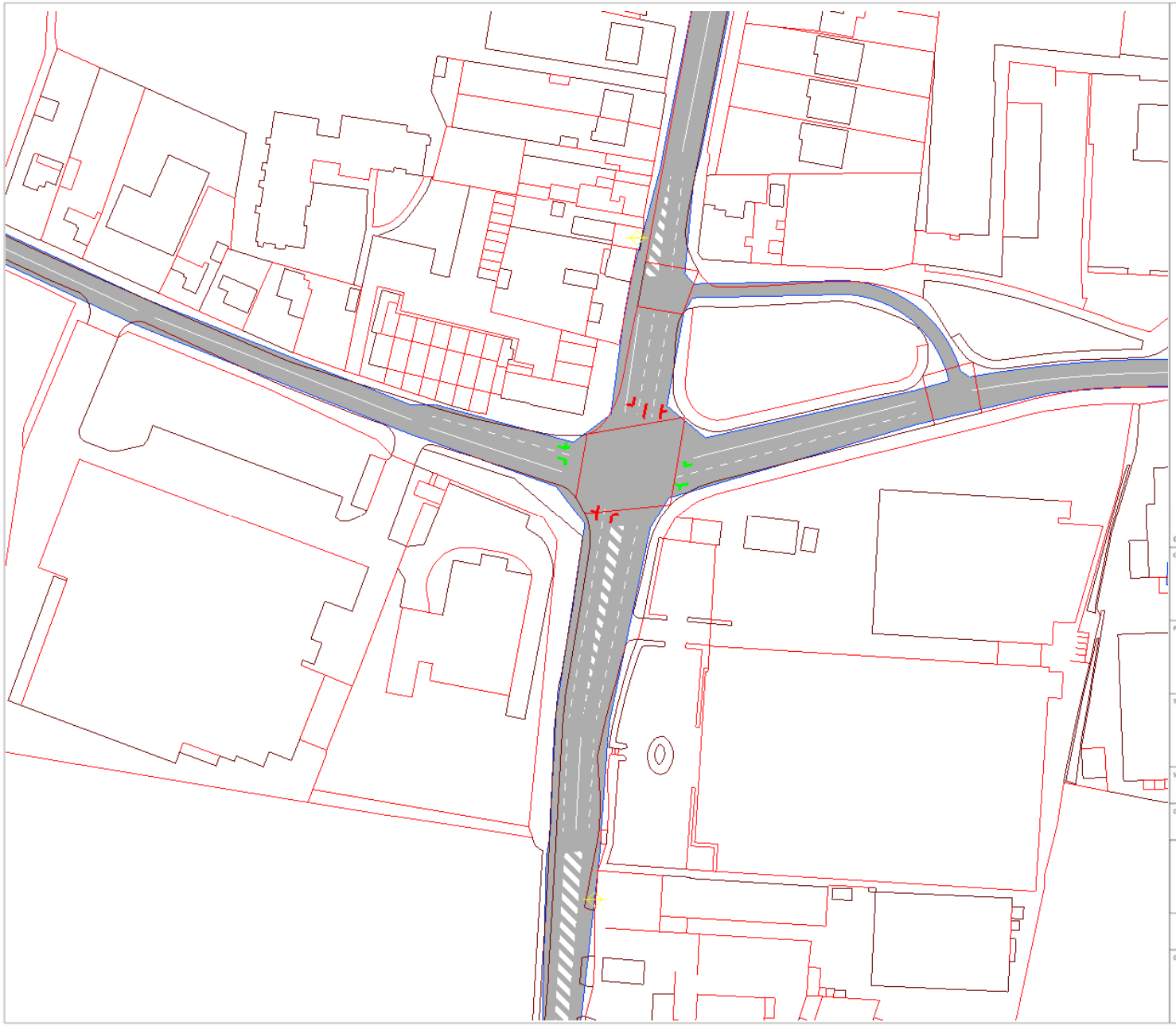

Proposed:

Signalisation

Addition of third lane on SB approach

CLIENT: Warwickshire County Council

PROJECT: VM155030 NBBC Strategic Transport Assessment

TITLE: School Road / B4113 Coventry Road / Bayton Road

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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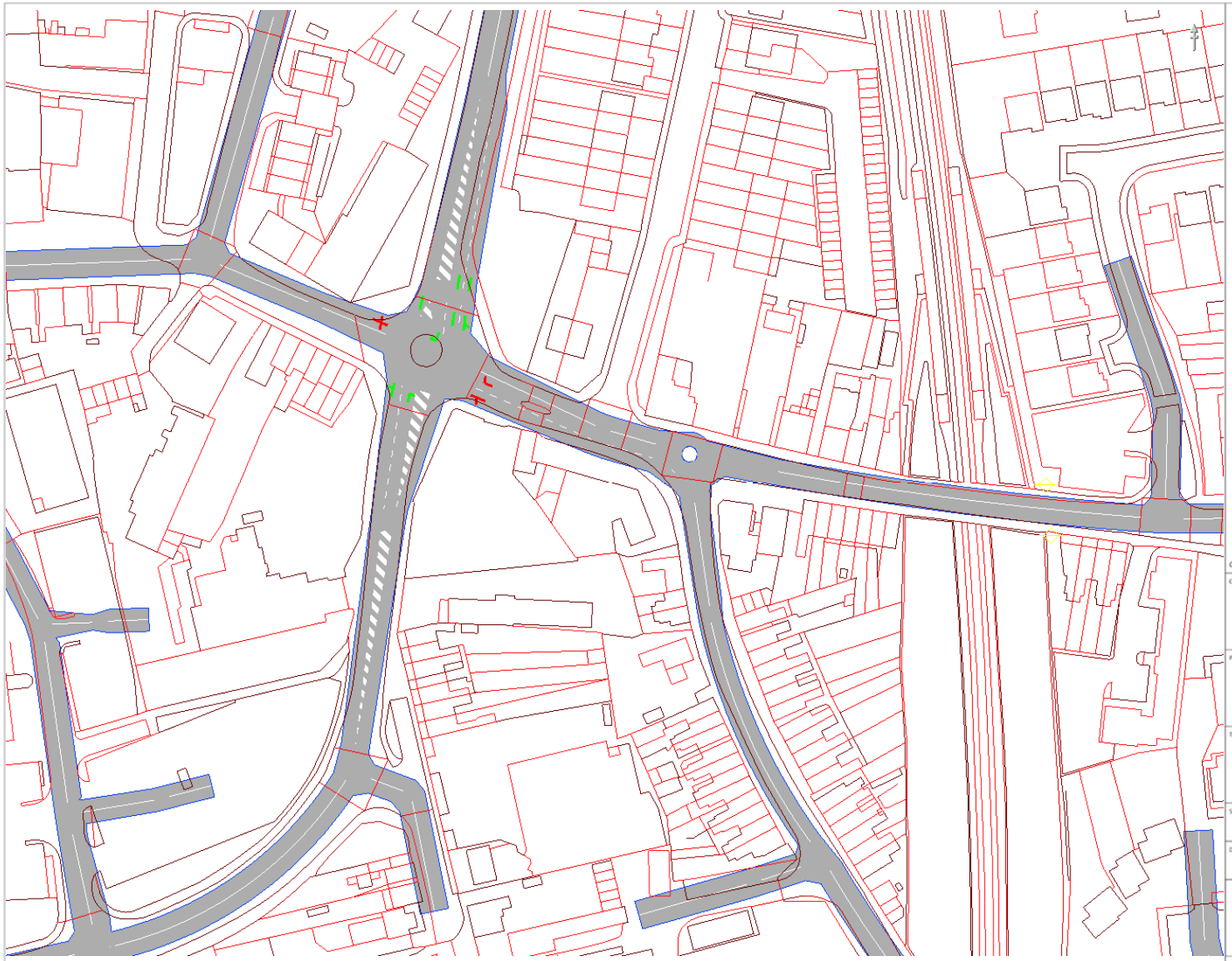
DRAWING REFERENCE: Ref 20



Proposed:

4-arm signalised junction

Widening on NB, SB & WB approaches to two lanes

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Rye Piece Ringway / King Street Roundabout

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

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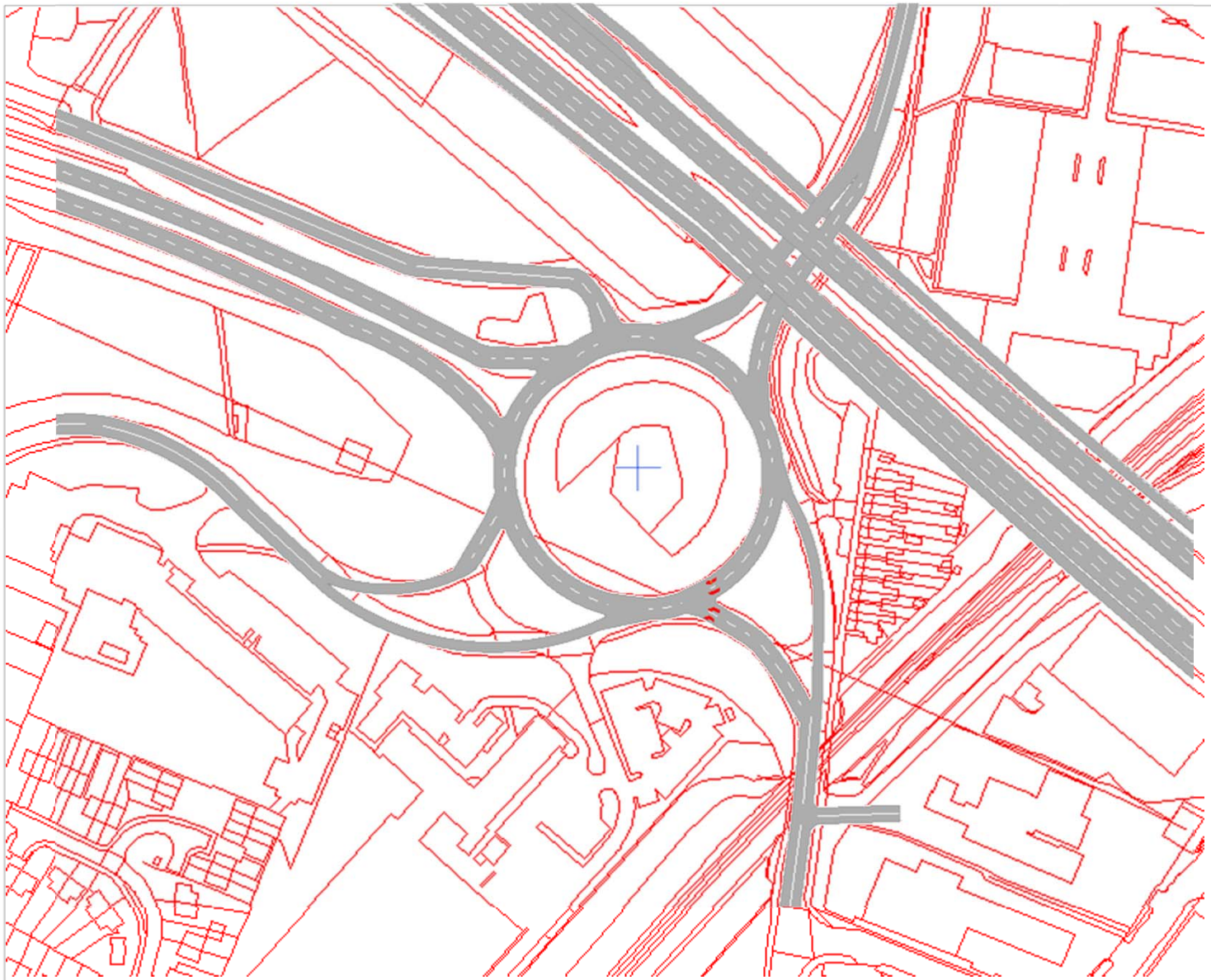

Proposed: Signals on Bedworth Rd approach & adjacent circulatory

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

B4113 / Longford Rd / Bedworth Rd / Wilson Ln Roundabout

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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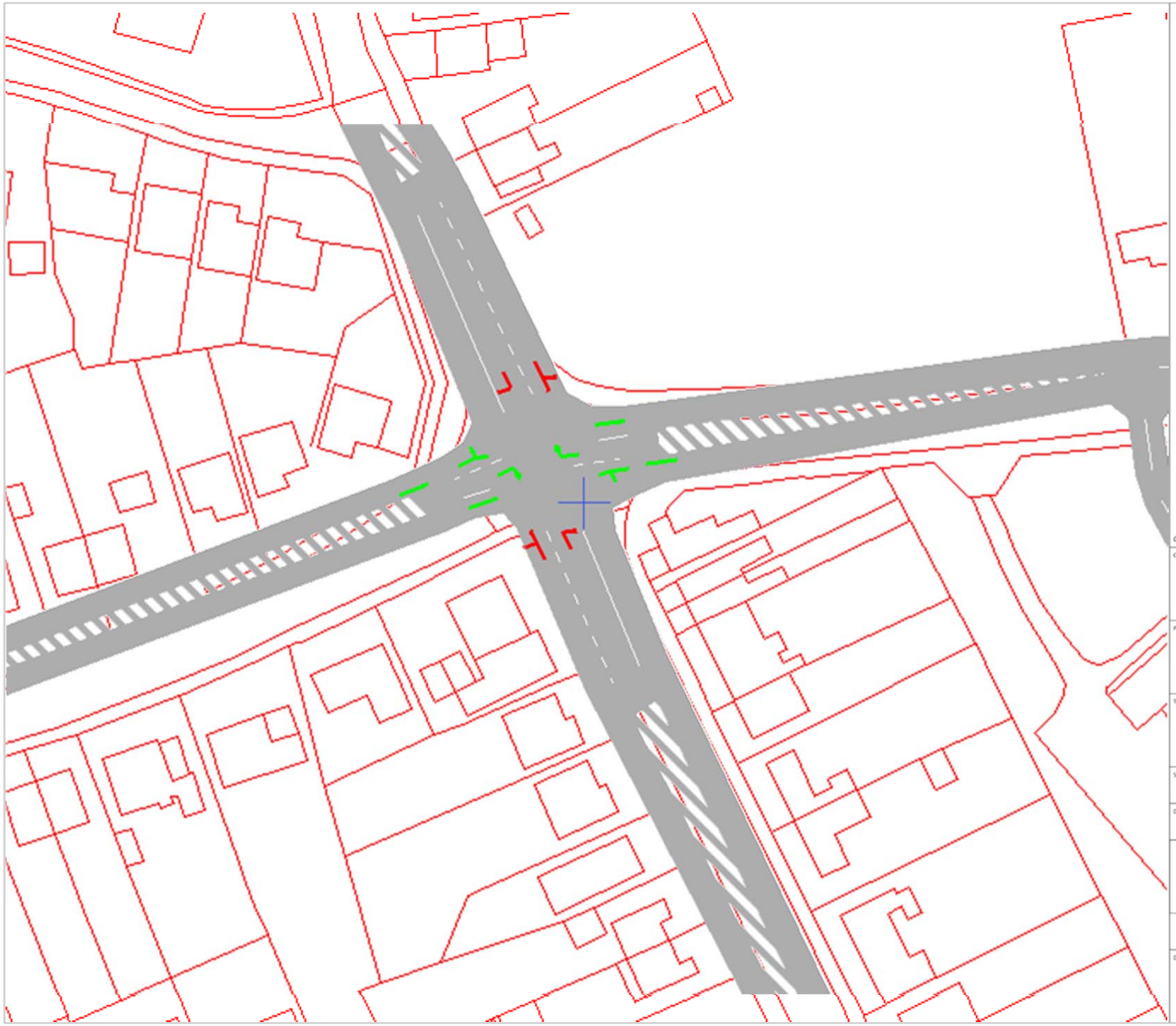

Proposed: Signalisation and widening

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

New Rd / Royal Oak Ln / Vicarage Ln / Ash Green Ln

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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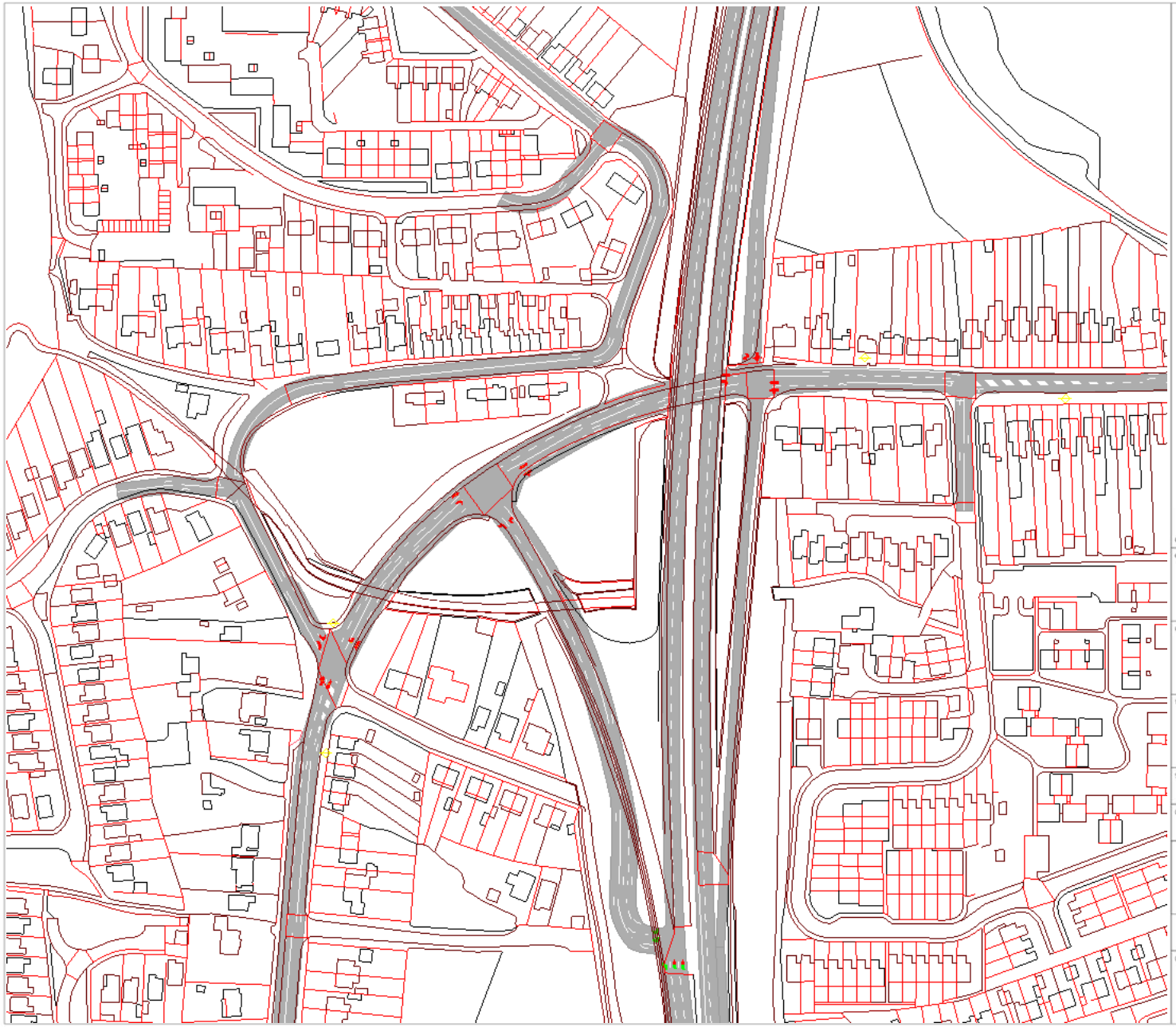

Proposed: Addition of SB off-slip, creating a new signalised (eastern) junction, plus a new signalised junction on the A444 NB and utilising the western slip for two-way movements

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

A444 / Newtown Rd

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

Ref 24

Proposed: Signalisation

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

A444 Weddington Rd / Shanklin Dr

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

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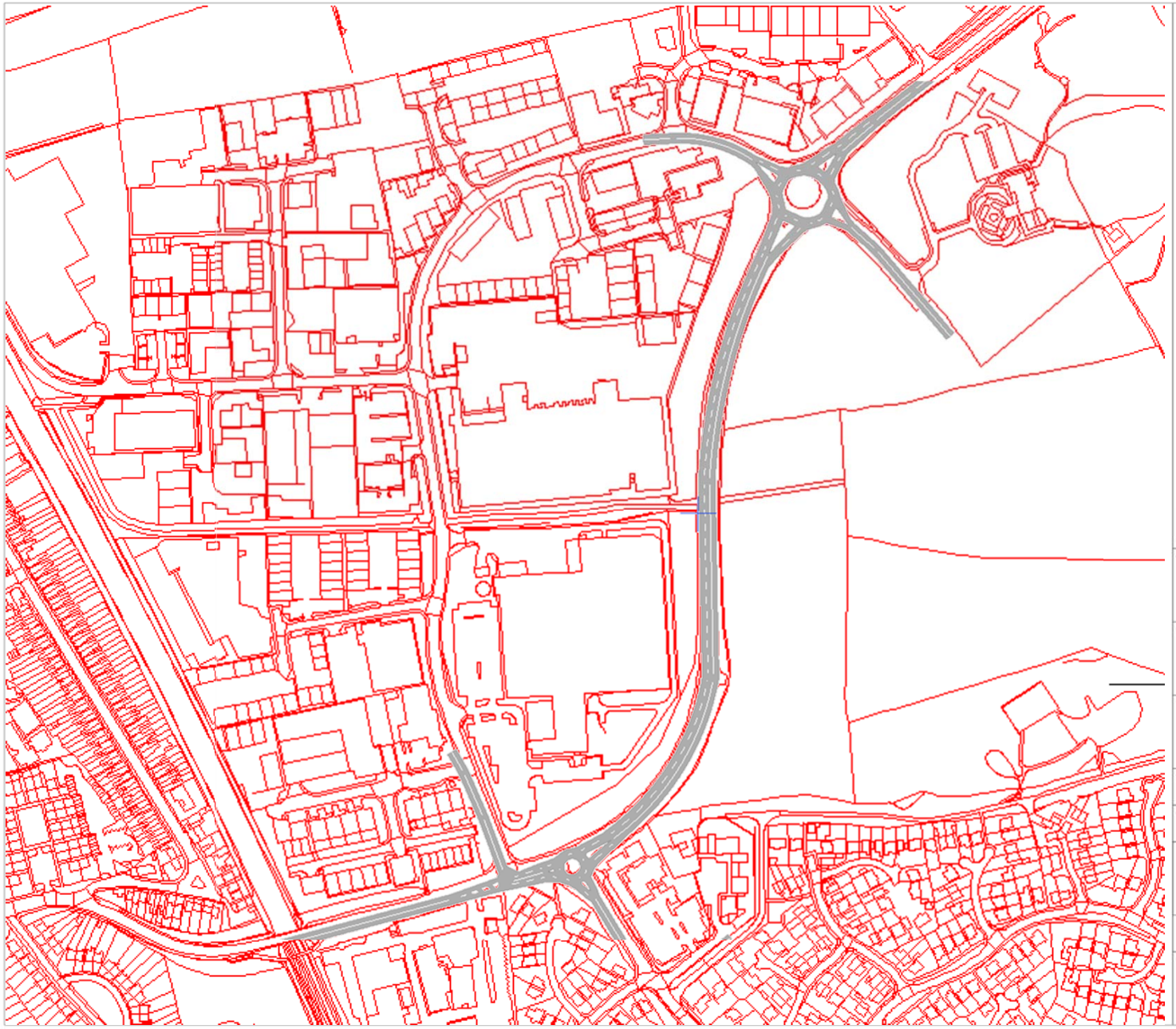

Proposed: NB widening

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

A4254 Eastboro Way NB Corridor
(between Crownhill Rd & Townsend Dr)

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

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DRAWING REFERENCE:

Ref 26

Proposed: Signals at Heath Rd / Newton Rd

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

Heath Rd / Newton Rd Signals

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
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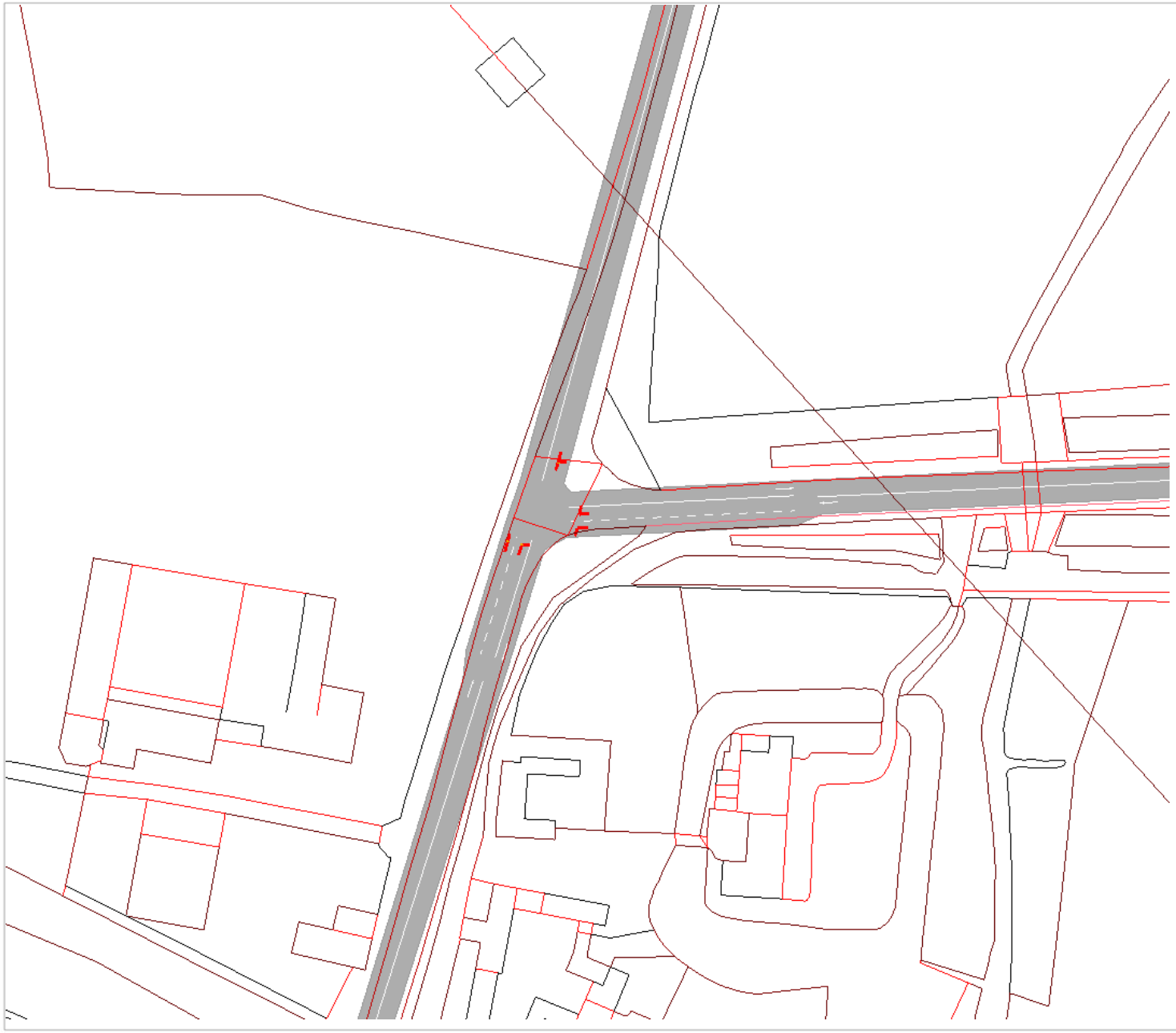
DRAWING REFERENCE:

Ref 33



Proposed: Signals at School Ln / Bowling Green

CLIENT:

Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

School Ln / Bowling Green Ln Signals

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	22/04/2015	1

vectos microsimulation specialists

Cornwall Buildings, 45 Newhall Street, Birmingham B3 3QR
Tel: 0121 213 6376 Email: microsim@vectos.co.uk www.vectos.co.uk

DRAWING REFERENCE:

Ref 34

Appendix B

Queue Analysis Plots

Legend

- less than -10 vehicles
- between +10 and +25
- between +25 and +50
- greater than +50

CLIENT: Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

2031 Reference Vs STA PO DS Scenario
AM 07:00 - 10:00
Average Maximum Queue

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	13/08/2015	1

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DRAWING REFERENCE: MQ 001

Legend

- less than -10 vehicles
- between +10 and +25
- between +25 and +50
- greater than +50

CLIENT: Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

2031 Reference Vs STA PO DS Scenario
PM 16:00 - 19:00
Average Maximum Queue

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	13/08/2015	1

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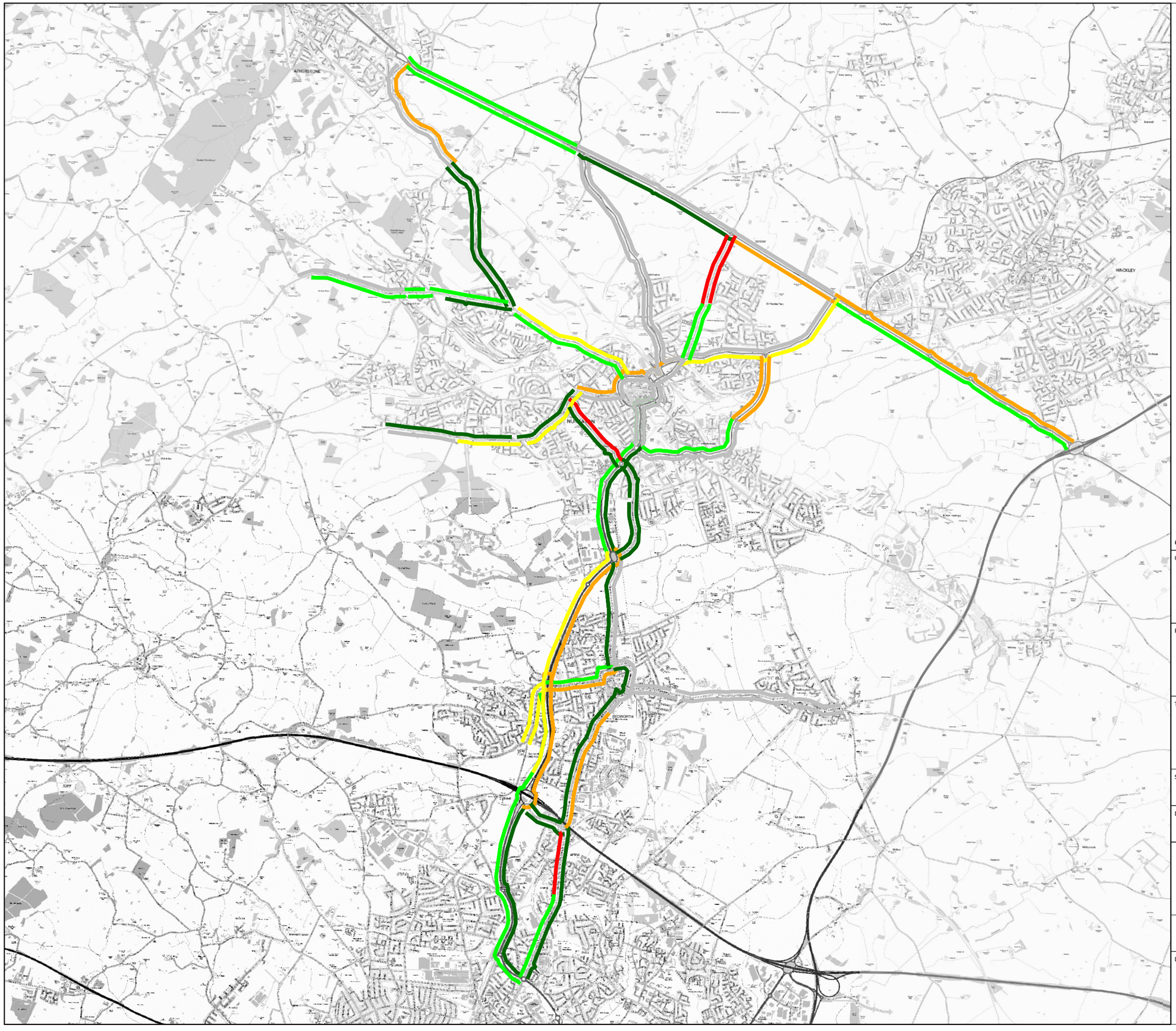
DRAWING REFERENCE: MQ 002

APPENDIX C

Journey Time Analysis Plots



Legend

- >15% reduction
- between 0% and 15% reduction
- between 0% and 15% increase
- between 15% and 25% increase
- between 25% and 50% increase
- > 50% increase

CLIENT: Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

2031 Reference Vs STA PO DS Scenario
AM 08:00 - 09:00
Percentage Difference Mean Delay

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	14/08/2015	1

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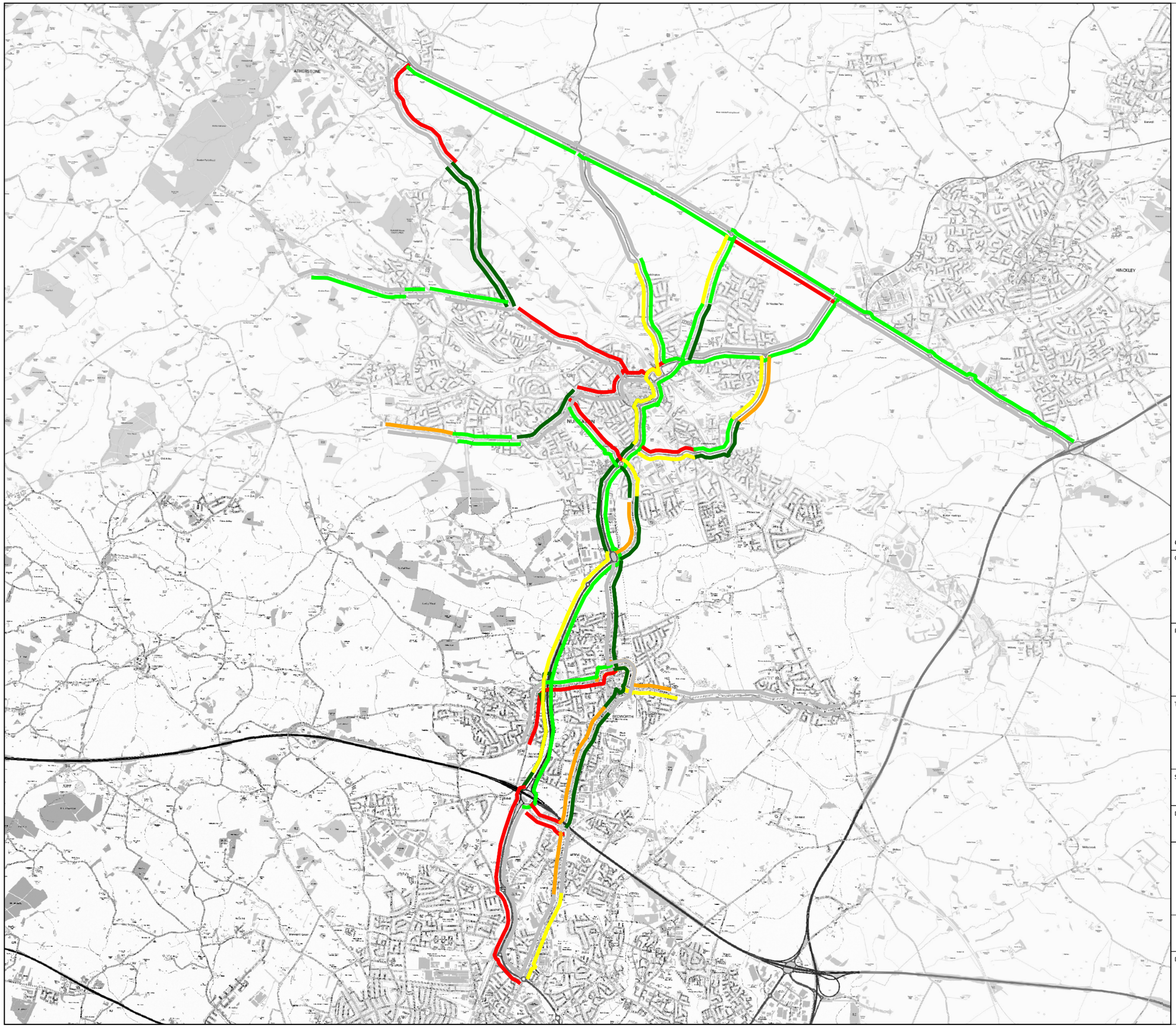
DRAWING REFERENCE:

MD 001



Legend

- >15% reduction
- between 0% and 15% reduction
- between 0% and 15% increase
- between 25% and 50% increase
- > 50% increase

CLIENT: Warwickshire County Council

PROJECT:

VM155030 NBBC
Strategic Transport Assessment

TITLE:

2031 Reference Vs STA PO DS Scenario
PM 17:00 - 18:00
Percentage Difference Mean Delay

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
MG	SA	14/08/2015	1

vectos microsimulation specialists

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DRAWING REFERENCE: MD 002

APPENDIX D

Sustainable Transport Technical Note

Nuneaton and Bedworth Borough Council
Borough Plan 2011-2031

Sustainable Transport Strategy

Strategic Transport Assessment Addendum
Warwickshire County Council

August 2015

Warwickshire County Council

Contents

1. Background

As part of the previous Strategic Transport Assessment (STA) work undertaken by the County Council to inform the development of the Nuneaton and Bedworth Borough Plan, a technical note was prepared in relation to the role of sustainable transport in supporting the delivery of housing and employment growth. A more detailed Sustainable Transport Strategy was subsequently requested by the Borough Council to demonstrate how the 15% mode shift target referred to within the STA work could be delivered. This addendum to the STA aims to provide that further detail regarding how improvements to walking, cycling and public transport will complement the wider transport strategy set out within the STA. As part of this piece of work, an Infrastructure Delivery Plan (IDP) specifically covering sustainable transport measures has been prepared. It is envisaged that this will be incorporated into the wider Borough Plan IDP.

This piece of evidence in support of the Borough Plan should be treated as a working document, designed to both inform the preparation and delivery of the plan. The current review of the cycle network within the Borough along with the emerging Sustainable Transport Strategy for the A5 corridor will be used to inform the ongoing development of this strategy.

Sustainable transport improvements are an essential part of the overall mitigation package to support the housing and employment growth proposals within the Borough Plan. This approach is consistent with the County Council's Local Transport Plan (2011-2026) Land Use and Transportation Strategy, which aims to encourage new development to come forward in a sustainable way by reducing the need to travel and better integrating land use and transport. The vision of the Land Use and Transportation Strategy is 'to encourage new development which is accessible, safe, sustainable and integrated with the transport network, including modes other than the car'.

Improvements to walking, cycling and public transport are an important element of the development process because they:

- Contribute towards the delivery of sustainable development;
- Reduce the impact of car based travel on the local and strategic highway network, by maximising the number of journeys made by such modes from trips generated as a result of new development; and
- Help deliver an integrated approach to transport provision.

Sustainable transport is an umbrella term which includes the provision of bus services, bus infrastructure, park and ride, access to rail services, walking, cycling and behavioural measures (also referred to as 'Smarter Choices'). This strategy sets out what sustainable transport improvements will be sought through the planning process to support development generally within the Borough. Details of other planned improvements to sustainable transport within the Borough which will be complementary to those measures secured through the planning process are also provided, given that these will also contribute towards the modal shift targets within the plan.

2. Public Transport

Introduction

Public transport has an important role to play in supporting housing and employment growth by providing genuine travel choice to residents and employees. This in turn can help mitigate the overall impact of development on the highway network by reducing the number of car trips generated as a result of development.

Improvements to public transport can include service enhancements and investment in infrastructure. Further details of the following are set out below:

- Bus Services;
- Bus Infrastructure;
- Park and Ride; and
- Access to Rail.

Bus Services

Background

Nuneaton and Bedworth Borough has a comprehensive, well-developed and generally well-used bus network which provides a solid foundation on which to build. A significant number of bus services across the Borough are provided on a commercial basis by Stagecoach Midlands, Arriva Midlands and Travel Coventry. A number of other services are provided by these and other operators on either a partially or fully subsidised basis.

The overall bus strategy to support the Borough Plan will be to secure new and/or improved service proposals which:

- Strengthen strategic bus connectivity in the North-South corridor between Leicester, Hinckley, Atherstone, Nuneaton, Bedworth and Coventry;
- Support or enhance existing town service networks, including cross-town connections;
- Provide good access to key destinations such as railway stations, medical care facilities, education/training facilities and significant existing and proposed employment sites both within the Borough and near to it (e.g. MIRA, Birch Coppice); and
- Improve links to adjacent towns and villages.

Developers will be encouraged to work with the County Council and local bus operators to prepare proposals which will meet these aspirations, and contribute towards the mode share targets for sustainable travel as part of an overall mitigation strategy for their development.

General Requirements

Developers will be required to provide financial contributions towards the provision of bus services or arrange to contract services directly with an operator as part of all significant new development within the Borough. This will generally take the form of either enhancement to existing bus services which fall within 400m walking distance of the site, or for larger sites the provision of new standalone bus services which deliver direct access to the development in question. Contributions will be sought for a minimum of five year period, net of fare box revenue. Alternatively, developers may wish to contract new or enhanced bus services directly with an operator rather than pay a contribution. Such requirements will be agreed as part of the planning process and conditioned accordingly.

New or enhanced bus services should provide a minimum of a 15 minute frequency serving the development between 0630–1900 from Monday to Saturday, with a 30 minute frequency in evenings and on Sundays. Developers will be required to either contribute towards a marketing budget or work with service providers to ensure new bus services are well publicised. The County Council will also encourage developers to consider ticketing offers/low fares when new bus services are introduced.

The concentration of large scale development proposed in certain areas of the Borough should facilitate the conditions required to support the introduction of new and/or enhanced services that stand a reasonable chance of becoming commercially viable over time. In certain circumstances, new infrastructure may be needed to help facilitate the conditions necessary to allow buses to move into and through new development sites so they are not forced to make complicated and unattractive diversions.

Build Rate

Bus services should be in place from the time of first occupation to ensure new residents perceive the service as a viable alternative to the private car, and so it becomes ingrained as part of the culture of the new development. If bus services are only introduced at a later point post-construction, it is highly likely that residents would have already developed travel patterns using alternative means of transport (typically the private car).

Type of Occupancy

In order to enable the potential for future commercial viability of any new bus service it is essential to ensure there is a mix of housing types across the development. Routes serving developments purely focused on high-end executive housing are unlikely to ever achieve commerciality.

Internal Road Network

Not only must this be suitable for the long term operation of bus services, it must enable penetration of the development from the outset. Where there is phased construction of the road network or there are temporary roads in place, consideration needs to be made to allow buses to traverse the development and turn around

safely. It is not advisable for a local authority to tender a bus service that requires smaller vehicles for initial phases of the development, as the need of two different vehicle types would dramatically increase the costs. The positioning of any traffic calming measures must take into consideration the risk they pose to buses, and the additional road space buses require negotiating them. Therefore, it is essential that Developers factor in the dimensions of the vehicles to be used over the life of the service within their plans.

Connectivity between Individual Developments

In some areas, piecemeal construction by multiple different developers has resulted in a warren of side-streets and cul-de-sacs that are impenetrable to public transport. In order to avoid this it is advisable that the Local Planning Authority encourages a lead Developer to submit an outline planning application for a significant area, including details of the main highway infrastructure; this Developer would then work with others to submit individual applications detailing the reserved matters for different phases of the site.

Highway considerations in new developments to support bus services

In order to ensure that buses effectively penetrate all key development sites, it is strongly advised that the following highway infrastructure be considered for inclusion in any future highway development control related discussions between NBBC officers, WCC officers and respective developers:

1. The width of the main distributor road within the development site is sufficient to cater for two-way bus movement in order to allow effective penetration of the site.

2. The distributor road is provided within each separate development for the purpose of the following:

    - Ensuring that all households within the individual development are within 400 metres of a bus stop; and
    - Enable a highway link connecting all the separate developments to each other and also the adjoining local highway network.

3. The distributor road in each individual development has a minimum width of 6.75 metres and can effectively cater for bus turning movements in order to complement flexible bus routing options.

4. Highway links are in place providing connectivity between each individual development and nearby junctions on the A5 for the purpose of enhancing access to the MIRA site, and also potentially enhance bus connectivity with nearby Sustainable Urban Extensions and major developments in Leicestershire, e.g. Hinckley town centre, Barwell SUE, Earl Shilton SUE, Magna Park and Lubbesthorpe SUE.

5. The design and construction of a proposed new 1 km highway link should be considered providing connectivity between the eastern section of the overall major new development site to the North of Nuneaton and the A5 in order to

further enhance links to MIRA. It is estimated that this new highway link could cost up to £1.6m and Developers would be asked to meet costs.

6. Consideration to be given towards the design and construction of a spine road to penetrate the north eastern section of the area of major development to the North of Nuneaton, in order to complement future flexibility in respect of bus routing.

7. '*Flexibility is key'*, not least in that it is difficult to predict how the overall development in this area will come forward given the numerous separate developments.

8. Consideration to be given towards the design and construction of a large roundabout in the north eastern section of area of the major development to the North of Nuneaton in order to enhance the flexibility of bus routing and also turning movements.

The County Council is aware that the Borough Council is working towards developing a Masterplan for all the Strategic Sites contained within the Borough Plan. With this in mind it is recommended that:

- Any Masterplans developed by the Borough Council associated with Strategic Sites consider the sustainable transport principles and proposals contained within this strategy; and
- The development of any Masterplans includes representatives from the County Council to help inform the key transport and access issues, including matters relating to sustainable travel.

Bus service provision considerations for new developments

Diversion of Existing Bus Services

Opportunities to divert existing bus services are dependent on the size and location of any new development, with the length (in terms of time as well as physical mileage) of any detour being a limiting factor. Bus operators will be reluctant to re-route profitable commercial services away from main corridors in order to serve new housing if there is a possibility of loss of patronage (thus revenue) from existing customers. Developers should be encouraged to seek feedback from bus operators prior to submitting planning applications, and this input should be reflected in their plans. Likewise, the Local Planning Authority should also seek the views of bus operators and Local Transport Authorities prior to granting of consent.

Creation of New Bus Services

While there are three clear radial corridors to the area of major growth to the North of Nuneaton, only one (The Long Shoot) offers existing frequent bus services. These run between Nuneaton and Leicester, via Hinckley. They are inter-urban in nature, and therefore it may not be appropriate to divert commercial bus services into the proposed new developments unless the deviation and/or additional time taken are minimal.

The lack of permeability on the existing urban edge, between the existing development and that proposed, adds a further significant impediment to developing the existing bus network to serve the proposed development areas. It will not be possible to extend existing town services directly into adjoining land. In the absence of potential pedestrian links, it will also be impossible for existing residents to walk through to new bus services provided within the new development, or for new residents to take advantage of currently provided services.

It therefore needs to be considered that the new development must sustain its own dedicated bus services to a great extent. These will need to be specified to maximise their efficiency, and the potential population draw along the route as a whole, to support the highest possible level of service with a critical mass of patronage. This sets up the positive conditions where a relatively attractive service supports high levels of use, and vice versa. Excellent master planning of the North of Nuneaton Urban Extension will be crucial to achieving these objectives.

Cost Profile

Staggered funding of new or existing bus services to serve a new development makes allowance for the initial cost of introducing or diverting bus services (e.g. capital expenditure on vehicles, increasing the number of vehicles operating on route and additional staff costs) as well as the initial low on-bus revenue. It is anticipated that the cost reduces over the life of construction (as occupancy, and potentially on-bus revenue increase), with the aim of achieving commerciality at a point in the future.

Vehicle Specification

It is important to ensure high quality of operation. On board Wi-Fi is fast becoming a feature across bus fleets, as is leather seats and audio-visual announcements. The County Council understands that bus operators would be pleased to offer this as an option for the new developments, where appropriate. The mention of low-floor buses as part of vehicle specification is superfluous, as all buses will be legally required to be of DDA compliant design prior to the suggested first phase of construction in 2018. If an initial contract specified new or nearly-new vehicles, then any subsequent extension or re-tender should also make provision for the retention of existing vehicles.

Proposed Bus Service Improvements: Area-wide

The table below summarises the potential new or improved bus services which could support/mitigate the principal areas of growth across the Borough as promoted in the Borough Plan (excluding the sites to the north of Nuneaton which are detailed later). It is envisaged that these improvements will be secured on a site by site basis through the development control process.

Growth Area	Existing Bus Service Provision	Proposed Bus Service Provision	Other Improvements
Sites to the west of Nuneaton (housing)	Service 10: Nuneaton – Grove Farm – Hinckley (2 buses per hour) Service 17: Arley/Ansley – Nuneaton via Stockingford (Hourly) Service 18: Arley/Ansley –Nuneaton via Galley Common (Hourly)	Frequency/route amendments to Service 10/10A (Hinckley to Nuneaton and Grove Farm) and Service 18 (Nuneaton to Arley and Ansley). Diversion of existing Service 17 to serve the major development.	
Land at Arbury Estate (housing)	Service 9: Stockingford – Nuneaton Town Centre (4 buses per hour) Service 17: Arley/Ansley – Nuneaton via Stockingford (Hourly)	Provision of new bespoke services linking to Nuneaton, Bermuda Park rail station, Bedworth and Coventry, unless existing Services 55, 78A and 79 can be extended/retimed to serve this area. Diversion of existing Service 9 to serve the major development.	
Land off Gipsy Lane (housing)	Service 7: Whitestone – Nuneaton Town Centre (2 buses per hour) Service 56: Coventry – Ash Green – Bedworth – Bulkington – Nuneaton (2 buses per hour) Service 74: Coventry - Wolvey – Nuneaton (5 buses per day)	Extension of Service 7 (Nuneaton to Whitestone) to serve this area.	Provision of good pedestrian/cycle connectivity to Bermuda Park rail station should be secured as part of development in this area.

Land in the vicinity of Bermuda/Griff (employment)	Service 48: Coventry – Bedworth – Nuneaton – Atherstone – Leicester (6 buses per hour) Service 55: Coventry – Keresley – Ash Green – Bedworth -Nuneaton (2 buses per hour) Service 78: University Hospital – Bedworth – Nuneaton (Hourly) Service 79: Ash Green – Bedworth – Nuneaton (5 buses per day)	Frequency/route amendments to Services 55, 78A and 79.	Good pedestrian access from these development sites should be provided to maximise access to key strategic bus services such as the 48 to encourage the use of bus for longer distance trips in the North-South Corridor. Provision of good pedestrian/cycle connectivity to Bermuda Park rail station.
Land at Goodyers End and Hawkesbury (housing)	Service 55: Coventry – Keresley – Ash Green – Bedworth -Nuneaton (2 buses per hour) Service 56: Coventry – Ash Green – Bedworth – Bulkington – Nuneaton (2 buses per hour) Service 57: Coventry – Ash Green – Nuneaton (2 buses per hour) Service 79: Ash Green – Bedworth – Nuneaton (5 buses per day)	Frequency/route amendments to Services 55/79 and 78/78A respectively.	

Proposed Bus Service Improvements: North Nuneaton

The table below provides details of the suggested bus service specification to serve the proposed major residential growth in North Nuneaton, including details of costs (net of estimated fare box revenue). These proposals have been informed by discussions with the two principal bus operators within the Borough.

<table>
<tr><td colspan="2">Proposed bus service specification to serve major residential development in North Nuneaton</td></tr>
<tr><td colspan="2">1) Potential Diversion of Existing Bus Services:</td></tr>
<tr><td>Route No</td><td>Proposal</td></tr>
<tr><td>Service 3</td><td>Potential diversion of route on Weddington Road to serve the Lower Farm and Top Farm individual developments.</td></tr>
<tr><td>Service 55</td><td>Extending the existing bus route from Horeston Grange to serve the south eastern area of the overall development site.</td></tr>
<tr><td>Service 10</td><td>If effective highway links are put in place the bus route could be considered for diversion off Long Shoot to serve the south eastern section of overall development site.</td></tr>
<tr><td colspan="2">2) Potential Creation of a Standalone Bus Service(s):
Potential standalone bus service to serve Davidson’s site (situated south of Lower Farm and already received planning permission), Lower Farm, Top Farm and also possibly the Prologis development; and
Potential standalone bus service to serve Calendar Farm development and possibly also Meadowcroft Farm to the east</td></tr>
<tr><td colspan="2">3) Potential Vehicle Specification: Low floor single deck vehicles < 5 years old.</td></tr>
<tr><td colspan="2">4) Potential Funding Arrangements:
WCC to tender any new or diverted sections of bus services that require financial support in consideration of the competition in the commercial bus market on the A47 corridor;
Tender cost options could include a potential staggered approach over 5 years for the purpose of aiming to ensure sustainability at the end of the term; and
Potential Pooling approaching where each development site application associated with the area of major development allocates funding into a single pot to cover the provision of bus services serving the overall site.</td></tr>
<tr><td colspan="2">5) Projected cost of providing the potential combined new/enhanced bus service(s) net of fare box ticket revenue:

<table><tr><td colspan="2">Cost Projections (Minus Fare Revenue)</td></tr><tr><td>Projected Cost for Diverting Services over 5 Years

<u>Lower Farm, Top Farm and also possibly the Prologis Development</u>
Route to Lower Farm is Extended into Top Farm, through to Higham Lane, and dependent on the efficiency of a bus route through this area allowing for a round-trip to the town</td><td></td></tr></table></td></tr>
</table>

centre to be achieved within 50 minutes, then additional pump-priming funding should be sought with a view to providing 2 additional buses, at £150K per annum each, over 5-6 years, with a view to providing a 15-minute frequency service. Year 1 Year 2 Year 3 Year 4 Year 5 Sub Total	 £250,000 £220,000 £190,000 £160,000 £130,000 £950,000
Projected Cost for Providing new Bus Service(s) over 5 Years:- <u>Calendar Farm development and possibly also Meadowcroft Farm to the east</u> Developer contributions should be sought to pump-prime such a service, based on a full cost of £150K/annum index-linked, on a straight line degression to account for revenue generation. This is likely to warrant a requirement for about £850,000 in pump-priming funding over the period of support, with two years at close to full cost. Year 1 (80% of total contribution) Year 2 (assuming 10% reduction due to increased revenue) Year 3 (assuming a further 10% increase in revenue) Year 4 (assuming a further 10% increase in revenue) Year 5 (assuming a further 10% increase in revenue) Sub Total	 £140,000 £130,000 £120,000 £110,000 £100,000 £600,000
Total Contribution	£1,550,000
Cost per Dwelling (3,000 in total)	£516.66

Bus Infrastructure

The principal areas of infrastructure associated with bus service improvements are bus stops, flags, shelters, laybys, information and priority measures.

Bus Stops, Flags, Shelters, Laybys and Information

In relation to bus stops, the County Council would expect these to be well located in relation to the surrounding development (for example in terms of local service

centres and schools), with a maximum walk distance of no more than 400m from any point within the development. In most cases bus stop poles with flags and timetable cases should be sufficient. The location of the bus stops should be agreed prior to the construction of each development site in order to ensure that potential occupiers are aware of their location. The bus stops should be provided with raised kerbs in order to complement the fleet of low floor buses operating in Nuneaton, bus stop poles (with bus flag and timetable case attached) and also a bus stop clearway marking box.

At key bus stops, consideration should be given to providing a bus shelter. A commuted sum will be required for a period of five years to cover the maintenance costs of each shelter provided. Bus stop laybys are generally not required unless it is necessary for a vehicle to wait for some time at a particular point in its journey (for example at the beginning or end of a route).

The County Council will not generally require Real Time Information (RTI) to be provided at bus stops and within bus shelters. However, liaison with site promoters will be undertaken to discuss the possible provision of supporting underground infrastructure, should RTI be pursued at some point in the future.

The advent of smartphone means that residents of these developments can enjoy the benefits of real time information through use of specific apps.

Consideration should be given towards promoting a town-wide approach to bus flags in Nuneaton by allocating developer funding towards replacing certain bus flags around the town to ensure a consistent and uniformed appearance.

Bus Priority/Connectivity Improvements

Existing bus priority provision within the Borough is currently limited to a bus lane within Bedworth town centre on Mill Street and a bus gate on Abbey Street in Nuneaton. The following bus priority/connectivity improvements are proposed to help support and mitigate the impact of growth on the Borough:

Nuneaton Town Centre

The County Council is currently considering a number of potential enhancements to the Ring Road in Nuneaton town centre. As part of these improvements, opportunities will be sought to make better provision for buses in terms of bus priority and access to the bus and rail stations. As part of these proposals (and possibly in conjunction with the proposed redevelopment of the bus station), further consideration will be given to the provision of a dedicated bus bridge onto Bond Gate.

Bermuda Connectivity Project

An existing bridge over the A444 near Bermuda which is currently only available for use by pedestrians and cyclists is proposed to be opened up for use by all modes. This has potential to improve bus access to Bermuda Village, the forthcoming Bermuda Park rail station on St Georges Way and West Nuneaton generally. The

scheme is currently under development and will be subject to public consultation in June 2015.

Development in West and South West Nuneaton

As part of the proposals for housing and employment development in the Heath End/Arbury/Bermuda area in west and south west Nuneaton, the County Council would support proposals for dedicated bus provision/priority to improve connectivity for public transport between the B4102 Arbury Road/B4112 Heath End Road and the A444 near Griff/Bermuda.

Other Areas

Further opportunities for bus priority provision elsewhere within the Borough will be sought as a result of new development, particularly at key junctions on important bus routes. Bus priority measures will be essential to support park and ride should such proposals come forward (see below)

Park and Ride

The County Council has previously highlighted the opportunity for some form of either formal or informal Park and Ride in the vicinity of Griff/Bermuda to be delivered as a result of development in the area. Stagecoach Midlands have indicated a strong interest in serving such a facility in terms of linking with their high frequency services in the North-South corridor. As indicated above, such a facility would benefit from targeted bus priority measures.

It is anticipated that any Park and Ride facility provided within the Borough would be owned and operated in perpetuity by the Borough Council as an off-street car park, given that as an Authority it controls a number of the off-street car parks locally and sets the parking charges therein. Any costs associated with the subsidy and operation above and beyond the funding provided by developers towards the bus services associated with the Park and Ride facility would also need to be met by the Borough Council.

It is suggested that further work is carried out by the Borough Council to understand some of the more detailed aspects of the proposals for Park and Ride, such as demand forecasting (including town centre parking charge sensitivity testing), likely construction and site operating costs, bus subsidy costs and consideration of operational issues.

Access to Rail

The principal access points to the rail network for those living or working in the Borough are Nuneaton and Coventry. These stations benefit from long distance express and semi-fast services on the West Coast Main Line between London, the West Midlands, the North West and Scotland. Nuneaton is also served by Cross Country services between Birmingham, Leicester and Stansted Airport.

Bedworth station is located on the Nuneaton to Coventry line, which is currently served by an hourly shuttle service. The forthcoming new stations at Bermuda Park and the Ricoh Arena, which are in the process of being constructed as part of the NUCKLE 1.1 project, will improve access to areas located near this line which have a high concentration of existing and proposed employment facilities. Platform extensions at Bedworth are also due to be built shortly as part of NUCKLE 1.1.

Funding for NUCKLE 1.2 has recently been secured as part of the Coventry and Warwickshire Local Growth Deal. This will deliver a new bay platform at Coventry along with the track and signalling work to allow train frequencies between Nuneaton and Coventry to be increased from hourly to half-hourly. Phase 3 of the NUCKLE project, which aims to reinstate through rail services between the East Midlands, Nuneaton, Coventry and Leamington Spa, is in the early stages of development.

The County Council is considering opportunities to provide improved access to Nuneaton rail station as part of the town centre schemes which are currently in the process of being developed (see earlier). The intention is to provide better facilities for pedestrians and cyclists along with improved integration for buses and taxis. Network Rail has recently agreed to carry out a study to consider the feasibility of providing a pedestrian/cycle access to the rail station from Weddington Terrace.

3. Walking and Cycling

Introduction

It is important that high quality pedestrian and cycle routes are provided to and within all significant development sites which come forward across the Borough.

The cycle network within the Nuneaton and Bedworth area is reasonably well developed (see **Appendix B**) in some areas, although there are a number of missing links which the County Council would like to see come forward to add to/reinforce the overall network. The County Council and Sustrans carried out a review of the Nuneaton and Bedworth cycle network in 2015 in order to produce a new cycle network development plan. The proposed Borough Plan housing and employment allocations formed a key input to this review. Views have also been sought from the Nuneaton Cycle Forum (which the County Council attends) regarding the cycle network review.

Internal provision for pedestrians and cyclists within development sites should deliver good access to local service centres, schools and open spaces/play areas. The County Council's preference is that cyclists should generally be accommodated on suitably designed streets within new residential developments, rather than shared use footway/cycleways adjacent to the carriageway, although cycle facilities which are segregated from traffic may be required on main spine roads. This should be complemented by traffic-free shared pedestrian/cycle routes where they provide attractive or more direct alternatives to the road network. Routes should also be provided as part of new 'green' corridors, with suitable links to them from within the development. Good connections to the external pedestrian and cycle network are also important.

In terms of other pedestrian and cycle infrastructure, crossing facilities should be considered where flows justify such provision. Toucan crossings may be required on key cycle routes. Pedestrian/cycle signage should also be considered, particularly in terms of links to important local facilities such as public transport interchanges and the National Cycle Network. The County Council would expect to see good quality cycle parking provided at local service centres, schools and open spaces/play areas within development sites.

Proposed Improvements to Walking and Cycling Facilities

The following schemes would deliver a number of strategic and local missing links within the cycle network, and therefore allow more seamless journeys to be made by bike:

- Nuneaton – Bedworth – Coventry;
- Nuneaton – Hartshill via Whittleford Park;
- Nuneaton – Camp Hill;
- Nuneaton – Hinckley via The Longshoot;
- West Nuneaton – Bermuda / Town Centre;
- The Long Shoot – Bermuda;

- A5 Corridor (Nuneaton/Hinckley – MIRA – Mancetter – Atherstone – Birch Coppice – Tamworth).

The above schemes are initial ideas and should not be considered as an exhaustive list. This will be further refined once the cycle network review within the Nuneaton and Bedworth area has been completed.

The County Council will seek contributions towards these improvements as a result of development across the Borough.

4. Smarter Choices

In order to reinforce the investment in public transport, walking and cycling proposed in this strategy, the County Council would expect to see the parallel deployment of the following behavioural and other ‘Smarter Choices’ measures secured through the planning process to help deliver sustainable growth across the Borough:

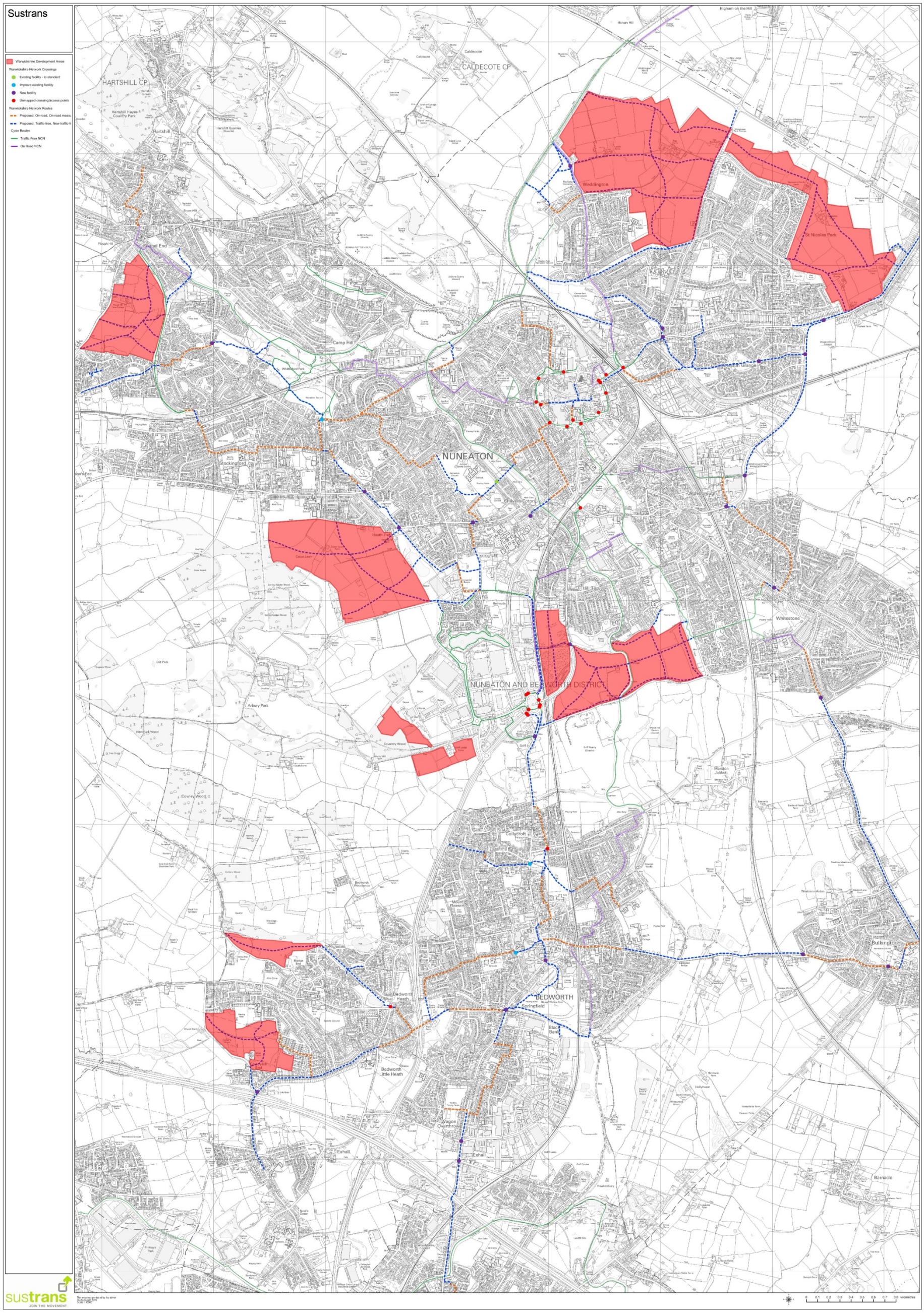
- Workplace Travel Plans (in respect of sites generating in excess of 100 jobs);
- Sustainable Travel Packs for new residents;
- Personalised travel planning (i.e. specifically tailored to the needs of the individual);
- Travel awareness campaigns;
- Public transport information and marketing;
- Car clubs;
- Car sharing schemes;
- Provision of Electric Vehicle charging points at key locations within development sites; and
- Use of teleworking, teleconferencing and home shopping.

The County Council will continue to work with existing employers, transport providers, the Borough Council and organisations such as Job Centre Plus and local Further Education institutions to encourage and facilitate bespoke solutions to addressing transport issues and needs, in order to improve access to training and employment opportunities across the Nuneaton and Bedworth area.

5. Sustainable Transport Infrastructure Delivery Plan

An Infrastructure Delivery Plan which captures the Sustainable Transport requirements detailed in this strategy is provided in **Appendix C**. This should be treated as an addendum to the advice contained in the County Council's previous Strategic Transport Assessment and the Borough Council's emerging IDP. It should also be treated as a 'live' document, which will evolve as further opportunities arise across the sub region through the Local Growth Deal or due to changes on the trunk road network within the Borough. The expectation is that this will feed directly into NBBC's IDP associated with the Borough Plan.

Appendix A - Nuneaton and Bedworth Cycle Network Plan



Appendix B - Sustainable Transport Infrastructure Delivery Plan

IDP Project Reference	IDP Project Name	Area/Site Association	Scheme Details	Delivery Period	Capital Cost	Funding Source	Responsible Agency
Cycling							
	Highway Improvement Schemes and Development Site Masterplans – Cycle Facilities	Borough-wide	Cycle infrastructure improvements to be incorporated into all IDP and other highway improvements, along with individual development site Masterplans.	Whole plan	N/A	S38/S278	Developers WCC Highways England
	Cycle Coventry and Warwickshire: Nuneaton – Bedworth – Coventry Strategic Cycle Route	North Nuneaton Arbury Gipsy Lane Bermuda Extensions 1 and 2 Goodyers End Hawkesbury	Provision of dedicated cycle infrastructure on B4113 Coventry Road between Bermuda Park, Bedworth and Coventry, with connections to existing cycle network, key employment sites and residential areas.	Tbc	£2m	S106/CIL WCC LEP Local Growth Deal	Developers WCC
	Nuneaton – Hartshill via Whittleford Park Cycle Route	West Nuneaton	Provision of dedicated cycle infrastructure linking West Nuneaton to the town centre via Whittleford Park.	Tbc	Tbc	S106/CIL WCC	Developers WCC
	Nuneaton – Camp Hill Cycle Route	West Nuneaton	Completion of missing links in existing cycling provision between Camp Hill and the town centre.	Tbc	Tbc	S106/CIL WCC	Developers WCC
	North Nuneaton Cycle Connectivity	North Nuneaton West Nuneaton	Provision of a dedicated cycle link from B4114 Tuttle Hill to Weddington via Stoney Road and a crossing of the River Anker.	Tbc	Tbc	S106/CIL WCC	Developers WCC
	Nuneaton – Hinckley (via The Longshoot) Cycle Route	North Nuneaton	Provision of dedicated cycle infrastructure between A5 and town centre, via The Long Shoot and Horeston Grange open space.	Tbc	£1.4m	S106/CIL WCC	Developers WCC
	West Nuneaton – Bermuda / Town Centre Cycle Route	West Nuneaton Arbury Bermuda Extensions 1 and 2 Gipsy Lane	Provision of dedicated cycle links from West Nuneaton to Bermuda Park and Nuneaton town centre.	Tbc	Tbc	S106/CIL WCC	Developers WCC
	The Long Shoot to Bermuda	North Nuneaton Gipsy Lane Bermuda Extensions 1 and 2	Provision of dedicated cycle infrastructure between The Long Shoot and Bermuda via Eastboro Way.	Tbc	Tbc	S106/CIL WCC	
	A5 Corridor Cycle Improvements	North Nuneaton	Extension of the Nuneaton/Hinckley to MIRA cycle route in order to link to Mancetter, Atherstone, Birch Coppice and Tamworth.	Tbc	Tbc	S106/CIL WCC Highways England	Developers Highways England WCC
Walking							
	Highway Improvement Schemes and Development Site Masterplans – Pedestrian Facilities	Borough-wide	Pedestrian infrastructure improvements to be incorporated into all IDP and other highway improvements, along with individual development site Masterplans.	Whole plan	N/A	S38/S278	Developers WCC Highways England

	Cycling Improvement Schemes – Pedestrian Facilities	Borough-wide	Improvements for pedestrians will be incorporated in all shared use and segregated foot/cycleway facilities.	Whole plan		S38/S278	Developers WCC Highways England
	Bermuda Connectivity Project – Pedestrian Facilities	West Nuneaton Arbury Bermuda Extensions 1 and 2 Gipsy Lane	The Bermuda Connectivity Project will deliver benefits for pedestrians in terms of improved access to parts of West Nuneaton, the George Eliot Hospital, Bermuda Rail Station and the employment areas around Bermuda.	2017/18	£3.7m	WCC Capital Growth Fund LEP Growing Places Fund	WCC
	A444/Walsingham Drive Pedestrian Improvements	Arbury Bermuda Extensions 1 and 2 Gipsy Lane	**Provision of a new footway alongside the A444 in the vicinity of Walsingham Drive.**	**Tbc**	**£0.5m + land acquisition costs**	**S106/CIL**	**WCC**
Public Transport - Rail							
	NUCKLE 1.1: Nuneaton – Bedworth – Coventry Heavy Rail Improvements	Borough-wide	Provision of new stations at Ricoh Arena and Bermuda Park and platform extensions at Bedworth Station	2015/16	£15m	DfT Major Scheme Funding	WCC CCC Centro DfT Network Rail Train Operators
	NUCKLE 1.2: Nuneaton – Bedworth – Coventry Heavy Rail Improvements	Borough-wide	Provision of bay platform at Coventry along with track and signalling works to enable the introduction of a half-hourly train service between Coventry, Bedworth and Nuneaton.	2017/18	£15m	DfT LEP Local Growth Deal	WCC CCC Centro DfT Network Rail Train Operators
	NUCKLE 3: Coventry – East Midlands Heavy Rail Improvements	Borough-wide	Provision of a dive-under at Nuneaton along with associated track and signalling works to allow through passenger services to be reinstated between Coventry and the East Midlands.	2020/21	£19.5	LEP Local Growth Deal	WCC DfT Network Rail Train Operators
	Nuneaton Rail Station Access and Interchange Improvements	Borough-wide	Provision of improved access to Nuneaton rail station, along with better interchange facilities for pedestrians, cyclists, buses and taxis. This may (subject to the outcome of a feasibility study by Network Rail) include the provision of a new pedestrian/cycle access to the rail station from Weddington Terrace.				WCC Network Rail Train and Bus Operators
	Bermuda Connectivity Project – Access to Bermuda Rail Station	West Nuneaton Arbury Bermuda Extensions 1 and 2 Gipsy Lane	The Bermuda Connectivity Project will deliver benefits for pedestrians and cyclists in terms of improved access from parts of West Nuneaton to Bermuda Rail Station.	2017/18	£3.7m	WCC Capital Growth Fund LEP Growing Places Fund	WCC
Public Transport - Bus							
	Highway Improvement Schemes and Development Site	Borough-wide	Bus infrastructure improvements to be incorporated into all IDP and other highway improvements, along	Whole plan	N/A	S38/S278	Developers WCC

	Masterplans – Bus Facilities		with individual development site Masterplans.				Highways England
	Nuneaton Rail and Bus Station Connectivity Improvements	Borough-wide	Improved signage, information, surfacing, lighting and pedestrian crossing facilities between Nuneaton rail and bus stations.			WCC	Developers WCC NBBC Rail industry
	Nuneaton Bus Station Reconfiguration	Borough-wide	Reconfiguration of the bus station will be necessary as part of the proposed redevelopment of this area of the town centre. The cost of the reconfiguration works will be met as part of the overall site redevelopment.		N/A	Developers WCC NBBC	Developers WCC NBBC Bus Operators
	Nuneaton Bus Bridge	Borough-wide	Provision of a new bus-only bridge between the bus station and Bond Gate (possibly in conjunction with the reconfiguration of the bus station – see above)			Developers WCC NBBC	Developers WCC NBBC Bus Operators
	Nuneaton Town Centre Bus Priority	Borough-wide	Opportunities to deliver bus priority measures will be considered as part of the improvements to the Ring Road and other roads within the town centre.	Whole plan		Developers WCC	
	Bermuda Connectivity Project – Improved Access for Bus Services to/from West Nuneaton	West Nuneaton Arbury Bermuda Extensions 1 and 2 Gipsy Lane	The Bermuda Connectivity Project will deliver benefits for bus users in terms of improved access to/from parts of West Nuneaton.	2017/18	£3.7m	WCC Capital Growth Fund LEP Growing Places Fund	WCC