vectos
microsimulation specialists

Warwickshire County Council

Nuneaton and Bedworth Borough Council
Strategic Transport Assessment: Borough Plan Review
Modelling Report

August 2016

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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 assess the NBBC Borough Plan allocation, ascertain the potential transport impacts and investigate and identify outline mitigation schemes thereof. Highway England have also been involved throughout the process and have contributed to, and reviewed, each iteration of the Strategic Transport Assessment.

1.2 Focus has been placed on identifying the essential infrastructure requirements in the first 5 years of the plan and subsequently grading further infrastructure requirements as the plan period progresses into the later years.

1.3 The allocation strategy has been provided by NBBC along with the assumed trajectory and initial assumptions regarding the site accesses, all of which has been interpreted and included within the microsimulation model scenarios.

1.4 The assumptions, model inclusions, network impact and proposed mitigation measures are all summarised within this report.

Scenario Development

1.5 A set of future year Reference models has been produced taking into account the growth from known committed developments and further generic growth based on TEMPRO[1] forecasts. The networks have been revised to include committed infrastructure. The assessment years of 2022 (i.e. plus 5 years), 2027 (i.e. plus 10 years) and 2031 (i.e. end of Plan) have been prepared.

1.6 A set of Borough Plan scenarios has then been prepared that takes account of the proposed Borough Plan sites and their associated traffic demands. The locations and site access strategies have been provided by NBBC and included in each of the three assessment years. The demands included in each year have been based on the expected development trajectory across the Plan period.

[1] Tempro is a modelling tool designed to allow users to look at the growth in trip ends, using actual and forecast data supplied by the Department for Transport

1.7 The Borough Plan scenarios, with no further network improvements other than those included within the equivalent Reference models have then been used to represent the 'Do Nothing' scenarios and highlight where issues arise on the network. A review of the significant congestion 'hot spots' has been undertaken to focus mitigation on areas of the network where it is most needed. The resulting revised networks have then been used to represent the 'Do Something' scenarios.

1.8 An intermediate scenario has also been reviewed in this study whereby the 'Do Something' scenario's network from the previous assessment year has been carried forward to the later assessment year and used to represent a 'Do Minimum' scenario, the implication being that the improvement schemes included in the earlier year will be in existence in the later year and therefore should be included and used as the starting point for the later year's assessment.

1.9 Through this iterative review, the schemes required to help alleviate the Borough Plan growth included in each assessment year has been highlighted, and in doing so, a picture of when in the Plan period each scheme will be needed has been built up.

Study Objectives

1.10 The objectives of the detailed modelling and assessment are as follows:

- To establish a suitable Nuneaton and Bedworth Wide Area (NBWA) Reference Case model for each of the three assessment years (2022, 2027 and 2031) against which the impact of the NBBC Borough Plan scenarios can be compared;
- To construct the associated trip generation and distribution for the sites contained within the Borough Plan in each of the three assessment years;
- To ensure the access strategies for the Plan sites included in the models are aligned with the initial feasibility reviews carried out by NBBC;
- To ascertain the initial impacts of the allocated growth in terms of model stability and network statistics;
- To identify what network infrastructure improvements are required throughout the first 5 years of the Plan period;
- To assess and prioritise the network infrastructure improvements that will be required throughout the remaining life of the Plan;
- To conclude on a refined set of transport infrastructure measures that will be required to support the Borough Plan submission;

- To provide indicative costs for the resulting package of proposed mitigation measures.

Test Scenarios

1.11 A total of three future years have been reviewed and for each year at least three scenarios have been developed. The model outputs have been extracted and comparisons drawn between the network operation of the various scenario, with and without the inclusion of the Borough Plan demands and/or the inclusion of proposed mitigation measures.

1.12 The scenarios that have been developed are as follows:

- 2022, 2027 and 2031 NBWA Reference Case Models
  Reference Case conditions as per the forecasting process outlined within the associated model forecast report[2]
- 2022 NBBC Borough Plan 'Do Nothing' Scenario
  The NBWA 2022 Reference model with the addition of the 2022 NBBC Plan sites but no network mitigation.
- 2022 NBBC Borough Plan 'Do Something' Scenario
  The 2022 NBWA Reference model with the addition of the 2022 Borough Plan demands and the proposed mitigation package.
- 2027 NBBC Borough Plan 'Do Minimum' Scenario
  The 2027 NBWA Reference model with the addition of the 2027 Borough Plan demands and the 2022 'Do Something' proposed mitigation package.
- 2027 NBBC Borough Plan 'Do Something' Scenario
  The 2027 NBWA Reference model with the addition of the 2027 Borough Plan demands and the revised 2027 mitigation package (i.e. 2022 schemes plus addition schemes).
- 2031 NBBC Borough Plan 'Do Minimum' Scenario
  The 2031 NBWA Reference model with the addition of the 2031 Borough Plan demands and the 2027 'Do Something' proposed mitigation package.
- 2031 NBBC Borough Plan 'Do Something' Scenario
  The 2031 NBWA Reference model with the addition of the 2031 Borough Plan demands and the revised 2031 mitigation package (i.e. 2027 schemes plus addition schemes).

[2] Vectos Microsim, *VM165048.R001 - NBWA Reference Model Development*, July 2016

Stage of Assessments

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

- The Reference Case demands have been forecast ensuring the 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 Plan have been assigned to the model network[3].
- The NBBC Borough Plan demands have been prepared based on the development trajectory, trip rates and distribution.
- The Borough Plan sites have been included in the model with their associated access strategies.
- The traffic impacts of the Borough Plan scenarios have been reviewed against the relevant Reference scenario and mitigation measures developed.
- The resulting 'Do Something' scenarios have then been reviewed to assess their effectiveness on network operation.

Mitigation Overview

Access Strategies

1.14 An appropriate access strategy for each site has been identified through agreement with NBBC (and consultants WYG) and WCC Development Group, and included within the Borough Plan scenarios. The details are discussed later in this report, however, the most notable assumptions, ones that are strategic in nature, are listed below:

- 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.
  It has been assumed that only the link between Higham Lane and The Long Shoot will be open by 2022, however, after this year the full link will be open.
- Delivery of a link between Heath End Road to the west of Nuneaton and the A444 to the south of Nuneaton which would run through the proposed Arbury site and provide

[3] Coventry City Council and North Warwickshire Borough Council Local Plans have not been explicitly included within the NBBC Borough Plan scenarios as they had not been adopted at the time of testing. They have however been accounted for indirectly through the application of TEMPRO growth.

distribution for the trips created from that site whilst also providing a western bypass for traffic looking to avoid the town centre.

It has been assumed that this link would open after 2022 so is only assessed in the 2027 and 2031 assessment years.

- 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'. This is assumed open in all three assessment years.
- A new junction on the A444 has been included in the later assessment years (2027 and 2031) to connect to the Woodlands site to the west of Bedworth. A new roundabout has been included at the location of the current Left-In Left Out junction with Sutherland Drive allowing all movements onto the A444.

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

Mitigation Schedule

1.16 A primary objective of this assessment has been to identify the mitigation measures necessary to ensure that the NBBC Borough Plan can be delivered and that its impact on the surrounding network is minimised.

1.17 In total the delivery of 30 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. In the first 5 years of the Plan period a total of 7 specific junction schemes have been highlighted, with a further 7 by the end of 2027 and then 14 more required by 2031. The 3 schemes promoting sustainable travel are assumed to be incorporated throughout the Plan period.

1.18 The estimated cost of delivering the highlighted schemes is currently £49.33 million at today's (2016) prices. The cost associated with the schemes that have been highlighted as a priority for the first 5 years is £8.76 million (excluding the appropriate element towards the sustainable measures).

Sustainable Measures

1.19 This assessment has revealed that even with an allowance of 15% for mode shift for new sites[4], 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.

1.20 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 £9.2 million of works to be included which will help deliver this mode shift target; this includes the following proposals:

- Sustainable Transport contributions
- Bus Priority enhancements
- Long Shoot to Town Centre Cycle Route

1.21 Appendix C sets out what sustainable transport improvements will be sought through the planning process to support development generally within the Borough. Almost all highway scheme mitigation proposals will also support delivery of pedestrian and cycle infrastructure.

Further Work

1.22 It is anticipated that the Nuneaton Town Centre and A444 schemes in particular will require further amendments before they represent the final strategy for these areas. Separate studies have been undertaken by Warwickshire County Council and are still ongoing with the objective of refining the overall highway strategy. As such, there is a risk that the final delivery costs for these improvements may alter. However, these strategies will also benefit from improvements to pedestrian and cyclist connectivity, public transport initiatives and wider improvements to the public realm and external funding contributions may be identified to meet any shortfall (e.g. Strategic Economic Plan Growth Deal).

1.23 Impacts have been noted at M6 Junction 3, however, it is clear from the modelling that M6 Junction 3 is experiencing high levels of congestion which is likely to get worse in the future, even without the introduction of the Plan growth in the vicinity of this junction. A more focussed study of the cumulative impact (taking into account Coventry City Council's Local Plan once adopted, and the impact of Smart Motorway on the M6 corridor) at this junction

[4] This is a target set by WCC and used in other STAs across the county. It is believed to be realistic and is aligned with the message of promoting sustainable travel.

and the potential for improvements would be advantageous and should be considered in the future. The review of the impact of the Borough Plan does not highlight significant worsening but the Reference conditions, particularly in the AM period, do indicate capacity issues with the current arrangement.

1.24 The access junction included on the A444 to connect to the Woodlands site will benefit from further refinement and a design and feasibility review. This will be the responsibility of the site promotor but may have an impact in the wider network, particularly if a route is provided through the site that allows traffic to bypass M6 Junction 3, for example. The same applies for all site accesses, however, this one is likely to be the significant in terms of strategic impact on the network.

1.25 It should be noted that results from the 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

1.26 The feasibility of the proposed mitigation measures has been assessed at a very high level. There are 30 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.

1.27 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

1.28 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 Borough Plan will likely require at least 30 schemes at a cost of approximately £49.33 million.
- An initial 7 schemes have been identified as priority schemes required during the first 5 years up until 2022 at an estimated cost of £8.76 million.
- Further mitigation has been highlighted as necessary during the period between 2022 and 2027. These schemes are focussed in and around Nuneaton town centre at an estimated additional cost of £17.04 million.
- Finally, 14 more schemes have been identified to mitigate the impact highlighted in the 2031 assessment with the inclusion of the additional 4 years of Plan growth from 2027. An additional 14 schemes were identified at an estimated cost of £14.33 million.
- Allowances have been made for the delivery of £9.2 million of sustainable works to be included to help deliver the mode shift targets.
- The delivery of the proposed schemes in their corresponding assessment year result in a significant improvement in network conditions when compared to the equivalent 'Do Nothing'/'Do Minimum' scenario. In all 3 assessment years the AM conditions are shown to be consistent with the Reference Case levels once the proposed schemes are include. The PM period shows more significant impacts, which is exacerbated in the later years, however, the introduction of the proposed schemes shows considerable benefit and results in network conditions similar to those experienced in the AM period.
- 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. The results presented in this report should therefore be considered as a worst case.

Further Considerations & Recommendations

Further Considerations

1.29 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 Borough 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 (N.B. the majority of schemes fall within Highway land or land under control of the proposed development site) 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 where schemes have been proposed in areas where information regarding the highway extent was limited (such as those near Bedworth).
    - Specific risks where schemes may not meet the required design standards (such as the proposals at Greenmoor Rd/Heath End Rd/College St/Bull Ring or at Coventry Rd Exhall/Blackhorse Rd/Longford Rd/Wilsons Ln).

1.30 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

1.31 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 is 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;

1.32 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.

1.33 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.

1.34 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.

1.35 It should, however, also be noted, that the list of mitigation is not necessarily exhaustive and there is likely to be more localised mitigation highlighted and required as each site carries out their details assessment of impact on the immediate network. The conclusions in this report are not intended to capture all such impacts but rather look at the combined picture and attempt to highlight, and mitigate, the strategic impact of the cumulative Borough Plan demands being assessed in each year.

2 INTRODUCTION

Scope

2.1 Vectos Microsim (VM) has been commissioned by Warwickshire County Council (WCC) and Nuneaton and Bedworth Borough Council (NBBC) to assess the NBBC Borough Plan allocations, 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 of the currently proposed Borough Plan allocations, as provided by NBBC, and seeks to highlight their impact across the Plan period. In doing so a primary objective has been to compile a schedule of network improvement schemes that are most likely required within the first 5 years of the Plan, and then in the subsequent years as the Plan progresses.

2.3 All assessments have made use of WCC's Nuneaton and Bedworth Wide Area (NBWA) Paramics model under various network conditions and with the inclusion of different growth assumptions.

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

Study Tasks

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

i) To establish a suitable 2022, 2027 and 2031 NBWA Reference Case model against which the impact of NBBC's Borough Plan can be compared;

ii) To construct the associated trip generation and distribution for the sites contained within the Borough Plan in each year of assessment;

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;

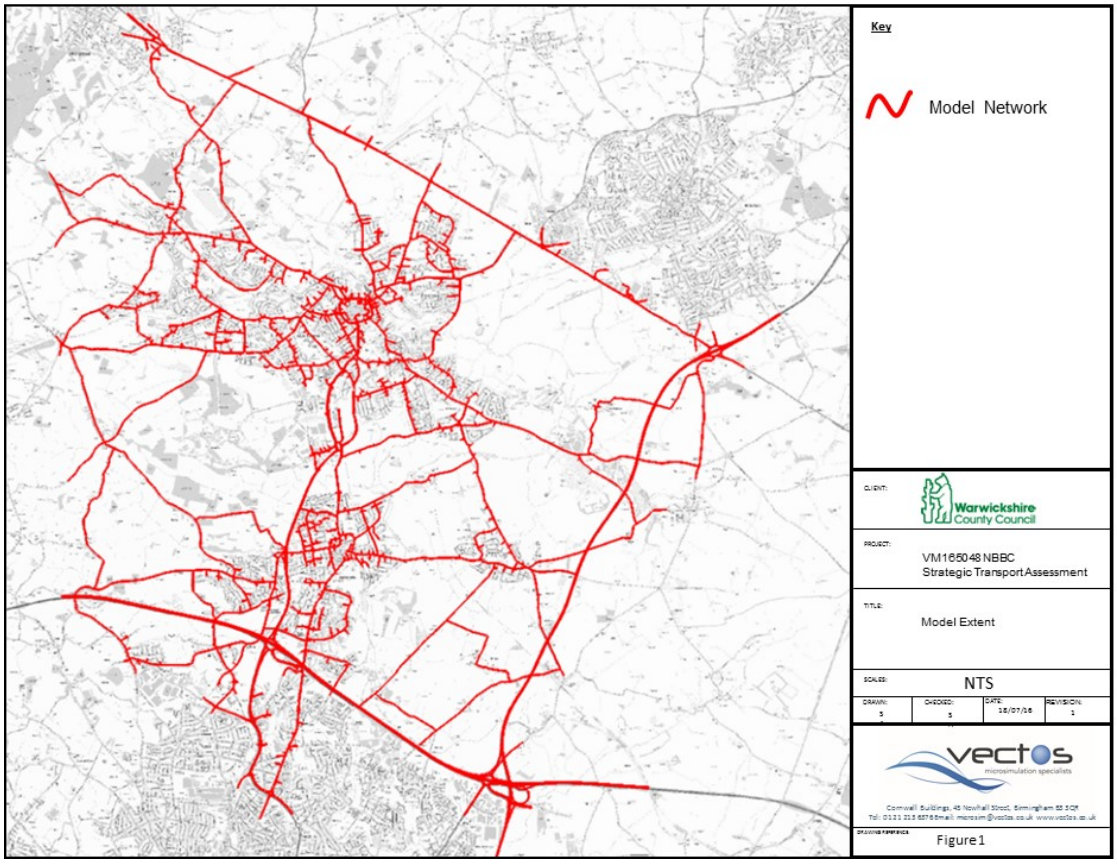
v) To review the relative impact of the mitigated network against the Reference Case/Do Minimum scenario; and

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

Study Area

2.6 The focus of the study area is encompassed within the NBWA Paramics model. An overview of the coverage of this model is provided within Figure 1 below.

Figure 1: Nuneaton and Bedworth Paramics Model Coverage



NBBC Borough Plan Testing

2.7 Testing has focussed on a single allocation option. The locations of the Employment and Housing sites that have been tested within the NBBC Borough Plan scenarios are presented within Figure 2 and Figure 3 below.

Figure 2: Nuneaton & Bedworth Proposed Housing Sites

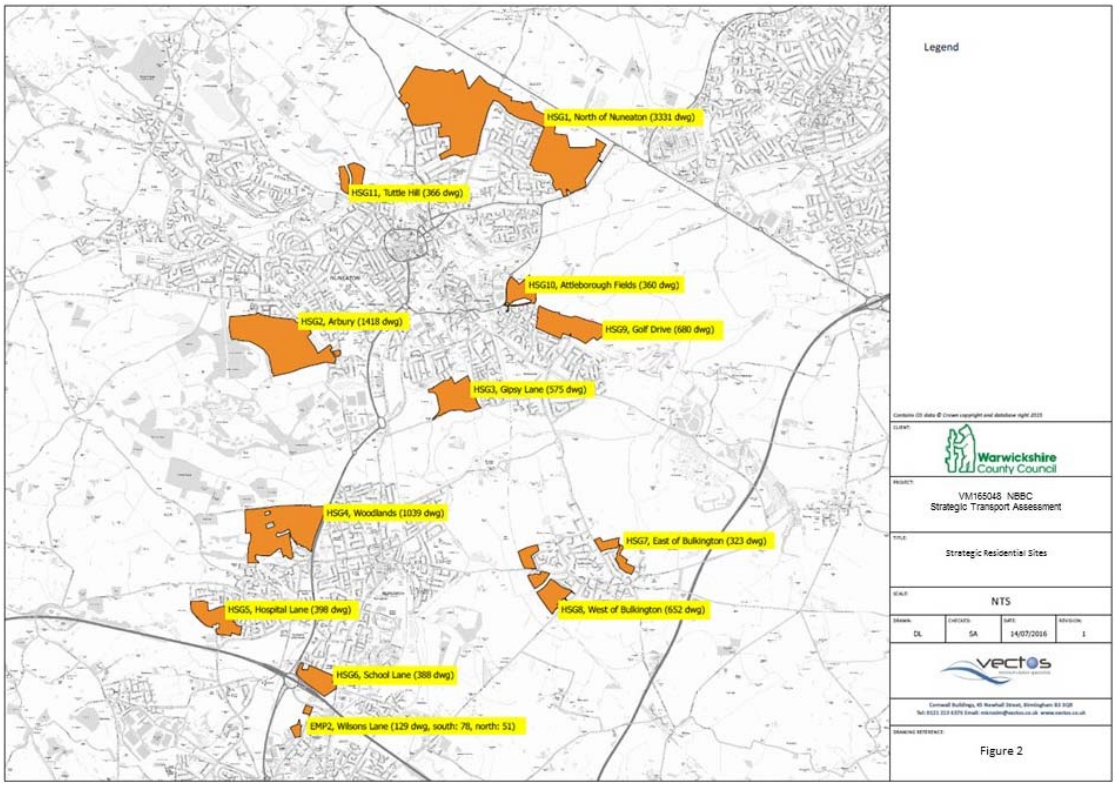


Figure 3: Nuneaton & Bedworth Proposed Employment Sites

Report Structure

2.8 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 from the 2022 assessment.
- **Section 7** – Presents and discusses the modelling results and general findings from the 2027 assessment.
- **Section 8** – Presents and discusses the modelling results and general findings from the 2031 assessment.
- **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 methodology applied in the development of the demands used in the Borough Plan scenarios.

Reference Case Model Development

3.2 The first objective of the study has been to ensure that a suitable Reference Case scenarios were available from which to draw comparisons and assess the Borough 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 and stable reflection of the baseline conditions, and for the purpose of this STA it has been necessary to utilise a 2022, 2027 and 2031 Reference Case model.

3.5 The development of the Reference Case models used throughput this assessment is summarised in VM report, 'NBWA Reference Model Development', July 2016. The primary objective has been to prepare a reference for the interim years of 2022 and 2027 to assist with the objectives of assessing Borough Plan impact in these earlier years.

3.6 It should be noted that the Reference Case models (and subsequent Borough Plan scenarios) include all committed schemes including the junction improvements at A5/The Long Shoot and A5/A47 Dodwells Rd/B4666 Coventry Rd roundabout, and the Road Investment Strategy (RIS1) funded A5 dualling between these two junctions and the M6 Junction 2 to Junction 4 Smart Motorway.

Borough Plan Scenario Development

3.7 The second key objective has been to develop the NBBC Borough Plan scenarios for each of the three assessment years.

3.8 This involved the construction of the trip generation and distribution associated to the sites contained within the proposed Borough Plan. 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 Borough Plan scenario demands to ensure a robust assessment; namely the residual impact of the Hinckley and Bosworth Borough Council's (HBBC) Borough Plan demands that will reach the NBWA model extent.

3.9 At the time of testing it was not possible to ascertain the level, and likely distribution, of trips on the NBWA network relating to either Coventry or North Warwickshire's Local Plan. It is likely that an element of these demands will traverse the NBWA network, however, the necessary detail regarding the location, quantum, phasing and distribution of the neighbouring authority's proposed Plan sites was unavailable or uncertain. Despite this, an element of growth from the surrounding areas has been accounted for through the application of TEMPRO growth which will in effect reflect a general growth that can be associated with the future Plan sites from Coventry and North Warwickshire.

3.10 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 site. Subsequently, and post the initial review of the 'Do Nothing'/'Do Minimum' networks, consideration and inclusion of (further) infrastructure improvements has also been necessary within the 'Do Something' scenarios.

Hinckley and Bosworth Borough Council Borough Plan Demands

3.11 In order that the impact of the Hinckley and Bosworth Borough Council (HBBC) allocation[5] could be included within the NBBC assessment it was essential that demands relating to their developments were included within the NBWA model network.

3.12 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.

3.13 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

[5] See Hinckley & Bosworth Borough Council, *Earl Shilton and Barwell Area Action Plan*, Adopted September 2014

ensure that the outputs from the HNWA model could be converted into demand inputs within the NBWA model.

3.14 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 Sustainable Urban Extension (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 through the application of the NTM[6] adjusted growth factors.

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.

3.15 Following the completion of the aforementioned process Origin-Destination (OD) matrices were produced which translated HBBC SUE trips directly out of the HNWA PARAMICS model

[6] DfT's National Transport Model

into OD pairs within the NBWA PARAMICS model. The trips were assigned to a new matrix level (Matrix Level 7) and a unique 'Car' vehicle type (Vehicle Type 20, 'HBBC').

3.16 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 1: 2031 HBBC SUE Demands (2031)

	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

3.17 In the earlier assessment years the total has been pro-rated based on the assumption that the HBBC demands relate to development completed between 2017 and 2031 at a linear rate. The resulting HBBC demands have therefore been included in the relevant Plan scenarios.

Table 2: 2031 HBBC SUE Demands (2022 & 2027)

Level 7 – HBBC Lights	07:00 – 08:00	08:00 – 09:00	09:00 – 10:00	16:00 – 17:00	17:00 – 18:00	18:00 – 19:00
2022	65	69	43	39	50	52
2027	129	137	85	77	100	104

NBBC Borough Plan Demands

3.18 This STA is focussed on the impact of NBBC's Borough Plan allocation and therefore, the impact of this combination of sites, their location, and the associated development quantum/build-out in each assessment year.

3.19 The location of the proposed site allocations are presented in Figure 2 and Figure 3, split by Housing and Employment sites.

3.20 The trip generation assumptions are outlined in the following section and the resulting development site demands summarised in Tables 9 to 11.

Residential Trip Generation

3.21 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 3. The pre- and post-peak hour 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 4 below.

Table 3: 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 4: 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%

3.22 The resulting hourly trips rates, adopted to produce the development specific matrices, are summarised in Table 5 below.

Table 5: Residential Trip Rates (per Dwelling)

	07-08:00	08-09:00	09-10:00	16-17:00	17-18:00	18-19:00
In	0.08	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

3.23 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.

3.24 The classifications and proportions assumed are similar to those which have been adopted during the Warwick District and Stratford District Strategic Transport Assessments, both of which have been at examination.

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

- B1 (Business) Use Class – 70%
- B2 (General Industrial) Use Class – 16%
- B8 (Storage and Distribution) Use Class – 14%

3.26 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 6 below.

Table 6: Employment Peak Hour Trip Rates (GFA per 100m²)

	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

3.27 As with the residential trip generation, the pre- and post-peak hour trip rates have been derived through the use of proxy profiling factors. The profiling assumed is presented in Table 7 below.

Table 7: 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%

3.28 The peak hour trip rates have been factored by the above pre- and post-peak 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.

3.29 These resulting employment use trip rates have been summarised within Table 8 below:

Table 8: Employment Trip Rates (GFA per 100m²)

	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

3.30 The total size of the employment sites 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 in STAs carried out by other Local Authorities in Warwickshire, which have been to examination. As such, it has been considered an appropriate assumption for this study also.

Mode Shift

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

3.32 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 District Plan assessments in Warwickshire.

3.33 The analysis of the 'Do Nothing' scenario (i.e. Borough Plan sites without further mitigation) revealed that even when the 15% assumption is adopted, the NBWA network is unlikely to operate to a satisfactory level.

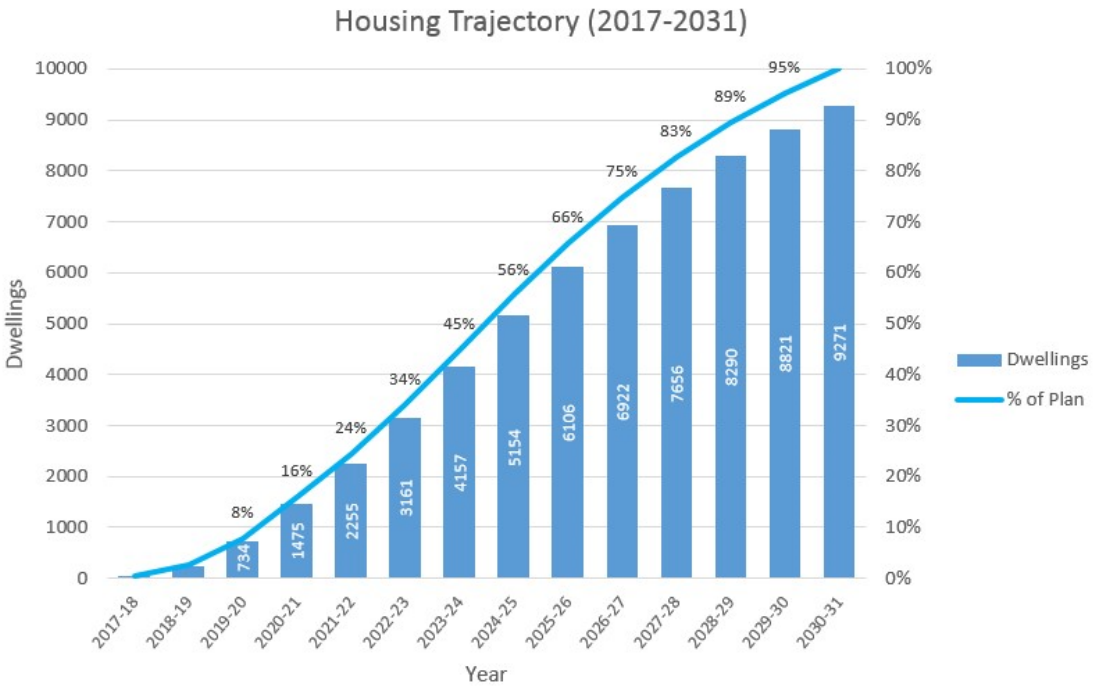
3.34 An initial assessment of the potential sustainable transport interventions that may be adopted in an attempt to realise this target has been undertaken and these measures have been outlined within Chapter 4 and Appendix C of this report. Further work on the feasibility and benefits thereof is likely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

Development Trajectory

3.35 NBBC provided VM with an assumed trajectory for the housing and employment sites across the Plan period from 2017 to 2031. The build-out for each individual site was provided so the proportion of the total trip generation could be determined and included accurately in each of the three assessment years.

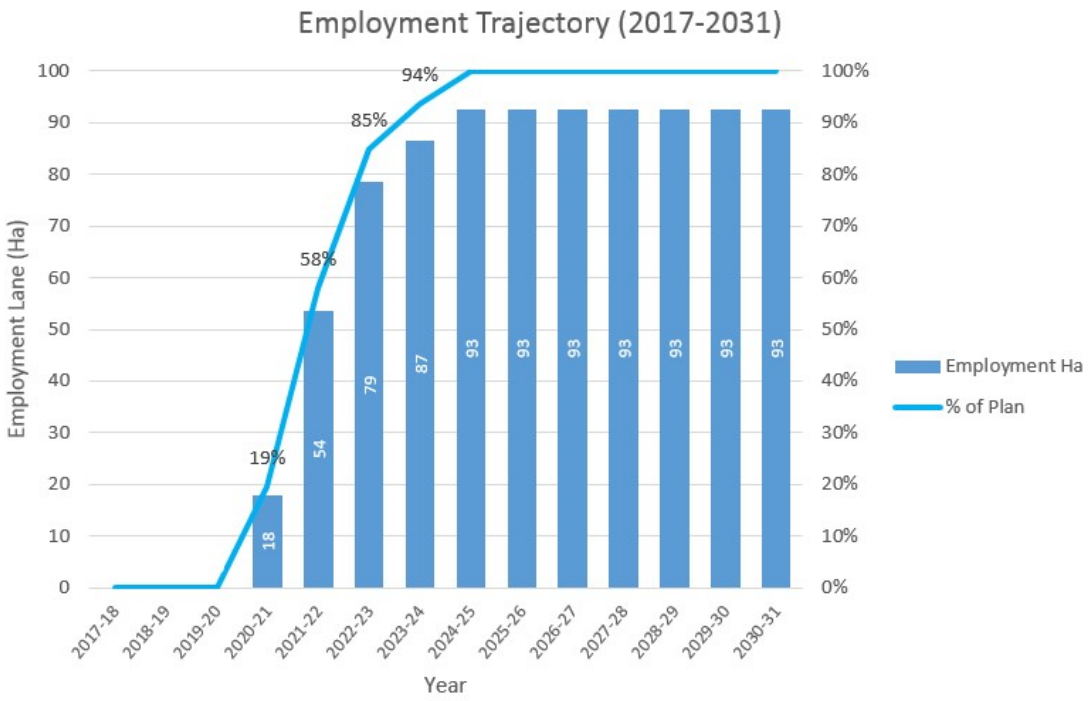
3.36 The proposed Borough Plan housing trajectory across the Plan period is presented in Figure 4 below.

Figure 4: NBBC Borough Plan Housing Trajectory (2017 to 2031)



3.37 It can be seen from the figure above that the anticipated number of dwellings to be completed between 2017 and 2031 is approximately 9,270. By 2022 it is anticipated that 2,255 dwellings will be completed (approximately 24%), 6,922 dwellings by 2027 (75%) and 9,271 dwellings by 2031 (100%).

Figure 5: NBBC Borough Plan Employment Trajectory (2017 to 2031)



3.38 It can be seen from the figure above that the anticipated level of employment land to be built upon between 2017 and 2031 is approximately 93 Hectares. By 2022 it is anticipated that a total of 58% of the sites will be operational. It is assumed that 100% of the employment sites will be fully operational by 2025, therefore the total level of employment traffic will be in both the 2027 and 2031 Borough Plan scenarios.

Borough Plan Demands

3.39 As noted above, the Borough Plan demand assigned to each assessment year has been informed by the development trajectory provided by NBBC which has profiled the build out of each of the specific sites.

3.40 The resultant peak period trip generation levels assigned to the model as a result of the Borough Plan site allocations are summarised in Table 9, 10 and 11 for the three assessment years.

Table 9: NBBC 2022 Borough Plan Trip Generation

	Type	Quantum	AM 3hr Period		PM 3hr Period	
			In	Out	In	Out
HSG1 North of Nuneaton	Resi	767 dwgs	209	672	778	230
HSG6 School Lane	Resi	125 dwgs	34	109	127	38
HSG3 Gipsy Lane	Resi	125 dwgs	34	109	127	38
HSG2 Arbury	Resi	159 dwgs	43	139	161	48
HSG4 Woodlands	Resi	175 dwgs	48	153	178	53
HSG5 Hospital Lane	Resi	125 dwgs	34	109	127	38
EMP2 Wilsons Lane	Resi	129 dwgs	35	113	131	39
HSG7 Land east of Bulkington	Resi	125 dwgs	34	109	127	38
HSG8 Land west of Bulkington	Resi	150 dwgs	41	131	152	45
HSG9 Land off Golf Drive	Resi	25 dwgs	7	22	25	8
HSG10 Attleborough Fields	Resi	175 dwgs	48	153	178	53
HSG11 Tuttle Hill	Resi	175 dwgs	48	153	178	53
Resi. Trip Gen Total			*614*	*1,974*	*2,287*	*677*
EMP4 Coventry Road	Employ	0 Ha	0	0	0	0
EMP1 Faultlands	Employ	15 Ha	1,071	258	202	950
EMP2 Phoenix Way	Employ	15 Ha	1,071	258	202	950
EMP3 Prologis Extension	Employ	5 Ha	357	86	67	317
EMP5 Caldwell Road	Employ	0.6 Ha	43	10	8	38
EMP6 Longford Road	Employ	2 Ha	143	34	27	127
EMP7 Bowling Green Lane	Employ	16 Ha	1,142	275	215	1,013
Employ. Trip Gen Total			*3,826*	*923*	*720*	*3,394*
TOTAL TRIP GENERATION			**4,441**	**2,897**	**3,007**	**4,071**

Table 10: NBBC 2027 Borough Plan Trip Generation

	Type	Quantum	AM 3hr Period		PM 3hr Period	
			In	Out	In	Out
HSG1 North of Nuneaton	Resi	2,017 dwgs	549	1,766	2,046	605
HSG6 School Lane	Resi	388 dwgs	106	340	394	116
HSG3 Gipsy Lane	Resi	375 dwgs	102	328	380	113
HSG2 Arbury	Resi	899 dwgs	245	787	912	270
HSG4 Woodlands	Resi	714 dwgs	194	625	724	214
HSG5 Hospital Lane	Resi	375 dwgs	102	328	380	113
EMP2 Wilsons Lane	Resi	129 dwgs	35	113	131	39
HSG7 Land east of Bulkington	Resi	325 dwgs	89	285	330	98
HSG8 Land west of Bulkington	Resi	550 dwgs	150	482	558	165
HSG9 Land off Golf Drive	Resi	425 dwgs	116	372	431	128
HSG10 Attleborough Fields	Resi	360 dwgs	98	315	365	108
HSG11 Tuttle Hill	Resi	365 dwgs	99	320	370	110
Resi. Trip Gen Total			1,885	6,061	7,021	2,078
EMP4 Coventry Road	Employ	17 Ha	1,214	293	228	1,077
EMP1 Faultlands	Employ	24 Ha	1,713	413	322	1,520
EMP2 Phoenix Way	Employ	18 Ha	1,285	310	242	1,140
EMP3 Prologis Extension	Employ	5 Ha	357	86	67	317
EMP5 Caldwell Road	Employ	0.6 Ha	43	10	8	38
EMP6 Longford Road	Employ	2 Ha	143	34	27	127
EMP7 Bowling Green Lane	Employ	26 Ha	1,856	448	349	1,646
Employ. Trip Gen Total			6,611	1,594	1,244	5,864
TOTAL TRIP GENERATION			8,496	7,655	8,265	7,942

Table 11: NBBC 2031 Borough Plan Trip Generation

	Type	Quantum	AM 3hr Period		PM 3hr Period	
			In	Out	In	Out
HSG1 North of Nuneaton	Resi	3,017 dwgs	822	2,642	3,060	906
HSG6 School Lane	Resi	388 dwgs	106	340	394	116
HSG3 Gipsy Lane	Resi	550 dwgs	150	482	558	165
HSG2 Arbury	Resi	1,418 dwgs	386	1,242	1,438	426
HSG4 Woodlands	Resi	1,039 dwgs	283	910	1,054	312
HSG5 Hospital Lane	Resi	400 dwgs	109	350	406	120
EMP2 Wilsons Lane	Resi	129 dwgs	35	113	131	39
HSG7 Land east of Bulkington	Resi	325 dwgs	89	285	330	98
HSG8 Land west of Bulkington	Resi	600 dwgs	163	525	609	180
HSG9 Land off Golf Drive	Resi	680 dwgs	185	595	690	204
HSG10 Attleborough Fields	Resi	360 dwgs	98	315	365	108
HSG11 Tuttle Hill	Resi	365 dwgs	99	320	370	110
Resi. Trip Gen Total			2,525	8,117	9,403	2,783
EMP4 Coventry Road	Employ	17 Ha	1,214	293	228	1,077
EMP1 Faultlands	Employ	24 Ha	1,713	413	322	1,520
EMP2 Phoenix Way	Employ	18 Ha	1,285	310	242	1,140
EMP3 Prologis Extension	Employ	5 Ha	357	86	67	317
EMP5 Caldwell Road	Employ	0.6 Ha	43	10	8	38
EMP6 Longford Road	Employ	2 Ha	143	34	27	127
EMP7 Bowling Green Lane	Employ	26 Ha	1,856	448	349	1,646
Employ. Trip Gen Total			6,611	1,594	1,244	5,864
TOTAL TRIP GENERATION			9,136	9,711	10,648	8,647

3.41 The trip generation summarised above includes the assumed 15% discount for modal shift.

3.42 It should be noted that the total trip generation listed in the tables above will include a significant element of double counting as many of the outbound trips from one site will be the inbound trips of another, and vice versa. The numbers are therefore indicative only and do not necessarily reconcile with the total Borough Plan demand matrices included in each Borough Plan assessment scenario.

Trip Distribution

3.43 The distribution for each site has been approximated using CITEware[7], which was updated in early 2015 to reflect the new 2011 Census data. CITEware runs have been carried out by

[7] CITEware is a national GIS-derived gravity type model, using census Journey to Work data, OS road information and postcode information.

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.

Redistribution Methodology

3.48 As part of the forecasting process followed in the creation of the Reference models[8], a cap on Internal growth was applied which was based on the adjusted TEMPRO figure for Nuneaton and Bedworth for the period between 2009 and 2031, and subsequently in the development of the 2022 and 2027 Reference Case.

3.49 If the same adjusted TEMPRO factors were to be used to determine the upper limit of growth in the Borough Plan scenarios then no net increase in overall demands would be created by the inclusion of the allocated sites (as the Reference Case demands had already reached this limit).

[8] Vectos Microsim, *VM165048.R001 - NBWA Reference Model Development,* July 2016

3.50 For this reason a higher cap was applied for Internal growth that was based on the 2009 to 2031 TEMPRO factor for Nuneaton and Bedworth where the housing projections were adjusted to account for the sum of the committed developments and the Borough Plan sites.

3.51 This provided a significantly higher cap for Internal growth and ensured that the Borough Plan scenarios contained total demands at levels higher than in their comparable Reference Case model. The TEMPRO adjustment and the resulting Internal growth factors for 2009 to 2031 are summarised in the table below.

Table 12: Household Adjustment (2009 to 2031) for Internal Growth

	AM Period			PM Period		
	Origin	Dest.	Ave	Origin	Dest.	Ave
Original TEMPRO	1.0413	1.1054	1.07335	1.1008	1.0618	1.0813
Adjusted TEMPRO	1.171	1.1311	1.15105	1.1521	1.1794	1.16575
Household Adjustment			***Base HH***	***Future HH***	***Diff***	***Adj.***
TEMPRO Housing assumptions			*51,850*	*55,791*	*3,941*	
Committed Developments 2009-2031				*3,172*		
Borough Plan 2017-2031				*9,271*	*12,443*	*8,502*
TEMPRO Housing assumptions (Adjusted)			*51,850*	*64,293*		

3.52 The AM and PM adjusted factors represent Internal growth of 15.11% and 16.58% respectively for the 2009 to 2031 period. This compared to approximately 6.64% and 7.37% in the Reference Case workings.

3.53 Where the level of demand assigned within the model as a result of the Borough 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.

3.54 The redistribution of trips in response to the inclusion of the Borough 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 Borough 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.

3.55 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.

3.56 The growth in External, Education and HGV traffic remains in line with the levels calculated in the development of the 2031 Reference Case. As with the Reference Case scenarios, the growth factor used for the Internal growth within the 2022 and 2027 Borough Plan scenarios, and therefore in the capping exercise, were based on the assumption of linear growth between 2009 and 2031. As such, the following factors were applied and used to determine the maximum Internal growth against which the specific Borough Plan demands for each year were assessed.

Table 13: Internal Growth Factors

Growth Factor (*from 2009*)	2022		2027		2031	
	AM	PM	AM	PM	AM	PM
Borough Plan	1.089	1.098	1.124	1.136	1.151	1.166
Reference Case	1.039	1.044	1.054	1.060	1.066	1.074

3.57 The impact of the redistribution procedure, and a summary of the resulting net growth in each Borough Plan assessment year is summarised in Table 14, 15 and 16 below.

Table 14: 2022 Borough Plan Internal 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	69,588			87,178		
Ref Case Demands (excl. HGV & Edu)	22,267	28,611	21,472	32,671	33,521	24,806
Borough Plan Demands (NBBC + HBBC)	2,033	3,316	2,024	2,541	2,947	1,627
Periodic	7,373			7,115		
2009 to 2022 Forecast Internal Growth	23,343	29,965	22,490	33,497	36,123	26,096
2009 to 2022 + Borough Plan Growth	24,300	31,927	23,496	35,212	36,468	26,433
Reduction	-957	-1962	-1006	-1715	-345	-336
2009 to 2022 + Borough Plan Revised	23,343	29,965	22,490	33,497	36,123	26,096
Internal Growth Periodic	75,798			95,716		
Internal Growth (%)	8.92%			9.79%		
Total Demand: 2009 Base Model	35,385	49,931	36,639	45,669	47,900	36,925
Total Demand: 2022 Borough Plan	38,930	54,527	40,365	50,427	52,959	40,897
Net Growth	**9.73%**			**10.57%**		

Table 15: 2027 Borough Plan Internal 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		69,588			87,178	
Ref Case Demands (excl. HGV & Edu)	22,545	29,073	21,785	33,451	33,535	25,473
Borough Plan Demands (NBBC + HBBC)	4,574	7,292	4,393	5,598	6,650	4,061
Periodic		16,259			16,309	
2009 to 2027 Forecast Internal Growth	24,079	30,909	23,199	34,646	37,363	26,992
2009 to 2027 + Borough Plan Growth	27,120	36,365	26,178	39,049	40,185	29,534
Reduction	-3,040	-5,455	-2,979	-4,403	-2,822	-2,543
2009 to 2027 + Borough Plan Revised	24,079	30,909	23,199	34,646	37,363	26,992
Internal Growth Periodic		78,187			99,001	
Internal Growth (%)		12.36%			13.56%	
Total Demand: 2009 Base Model	35,385	49,931	36,639	45,669	47,900	36,925
Total Demand: 2027 Borough Plan	40,290	56,297	41,784	52,252	54,890	42,410
Net Growth		**13.46%**			**14.60%**	

Table 16: 2031 Borough Plan Internal 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		69,588			87,178	
Ref Case Demands (excl. HGV & Edu)	22,764	29,450	22,036	33,401	33,476	26,753
Borough Plan Demands (NBBC + HBBC)	5,416	8,518	5,097	6,543	7,873	5,052
Periodic		19,031			19,468	
2009 to 2031 Forecast Internal Growth	24,668	31,665	23,766	35,566	38,354	27,708
2009 to 2031 + Borough Plan Growth	28,180	37,968	27,133	39,944	41,349	31,805
Reduction	-3,512	-6,303	-3,367	-4,379	-2,995	-4,097
2009 to 2031 + Borough Plan Revised	24,668	31,665	23,766	35,566	38,354	27,708
Internal Growth Periodic		80,099			101,628	
Internal Growth (%)		15.10%			16.58%	
Total Demand: 2009 Base Model	35,385	49,931	36,639	45,669	47,900	36,925
Total Demand: 2031 Borough Plan	41,381	57,718	42,924	53,712	56,440	43,624
Net Growth		**16.46%**			**17.84%**	

Peak Spreading

3.58 Peak spreading assumptions have been applied after the redistribution process. As peak spreading assumptions had already been applied to the Reference demands (informed through a review of historical trends in WCC's annual monitor cordon counts), 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.

3.59 The peak spreading assumptions applied were initially consistent with those used when developing the Reference Case models. However, after the application of these proportions it was apparent that there was a substantial shift in demand within the PM model periods to such an extent that the pre-peak demand levels began to exceed the PM peak hour itself. It was also noted that in the AM period the peak hour demands were increasing and reaching levels that were significantly higher than the surrounding hours, therefore increasing the 'peak'.

3.60 Whilst there is potential for these 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 peak spreading proportions applied to the additional growth were adjusted with the objective of ensuring that the total demand in the pre- and post-peak hours did not exceed the level of demand within the peak hour and also to ensure the maximum hourly demand increased at a slower rate than the pre- and post-peak hours.

3.61 As noted above, the peak spreading proportions were applied to the growth that occurs in excess of the levels contained within the Reference Case since the Reference Case demands have already been subject to peak spreading. The specific differences between the two scenarios (i.e. Reference and Borough Plan) relates primarily to the inclusion of the demand associated with the Borough Plan allocations. If, however, peak spreading assumptions were applied only to those demands then it would result in a disproportionate shift in Borough Plan demand away from the traditional peak hour.

3.62 As a result, 50% of the growth that was subjected to peak spreading was associated with the Borough Plan 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 Cases, whilst the Education and HGV trips are unlikely to be affected by peak spreading. As such, none of these elements have been spread further. This method also ensured that at a large proportion of the specific Borough Plan demands are maintained in the period they were originally developed for and not all shifted to the surrounding hours.

Demand Summary

3.63 A summary of the demands assigned to the model network in each assessment year as a result of the aforementioned Borough Plan demand forecasting is presented within the following tables.

Table 17: NBBC 2022 Borough Plan 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	20,601	21,845	15,892	20,782	23,221	17,213
Level 2 - HBE Lights	649	6,371	1,156	1,658	1,121	861
Level 3 - HBO Lights	6,628	5,939	9,646	12,140	11,726	11,230
Level 4 - NHBO Lights	3,738	7,019	4,803	6,351	5,740	3,969
Level 5 - Heavies	2,262	2,923	3,564	2,272	1,591	1,481
Level 6 - Com Dev	3,275	6,419	3,611	4,676	5,350	5,764
Level 7 – HBBC Borough Plan	65	68	42	39	50	52
Level 8 – NBBC Borough Plan	2,299	2,573	2,383	2,510	1,626	2,865
TOTAL	39,517	53,158	41,098	50,426	50,424	43,435

Table 18: NBBC 2027 Borough Plan 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	19,967	20,792	15,667	20,319	22,519	16,945
Level 2 - HBE Lights	657	6,422	1,167	1,675	1,132	870
Level 3 - HBO Lights	6,279	5,188	9,140	11,478	11,094	10,619
Level 4 - NHBO Lights	3,554	6,158	4,553	5,989	5,434	3,759
Level 5 - Heavies	2,355	3,042	3,707	2,366	1,658	1,543
Level 6 - Com Dev	3,250	6,443	3,611	4,810	5,079	5,900
Level 7 – HBBC Borough Plan	129	137	85	77	100	104
Level 8 – NBBC Borough Plan	4,912	6,256	4,858	5,536	5,240	5,311
TOTAL	41,103	54,439	42,788	52,252	52,255	45,051

Table 19: NBBC 2031 Borough Plan 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	20,192	20,900	15,948	20,620	22,760	17,181
Level 2 - HBE Lights	659	6,464	1,172	1,685	1,138	875
Level 3 - HBO Lights	6,300	5,062	9,247	11,724	11,249	10,228
Level 4 - NHBO Lights	3,580	5,994	4,586	6,099	5,504	3,652
Level 5 - Heavies	2,424	3,131	3,817	2,439	1,709	1,590
Level 6 - Com Dev	3,228	6,466	3,611	4,579	4,831	6,378
Level 7 – HBBC Borough Plan	181	192	119	108	140	145
Level 8 – NBBC Borough Plan	5,811	7,249	5,649	6,457	6,386	6,313
TOTAL	42,376	55,459	44,150	53,711	53,717	46,362

Test Scenarios

3.64 A total of 9 scenarios have been modelled capturing various conditions over the three assessment years, namely, 2022 (+ 5 years), 2027 (+ 10 years) and 2031 (end of Plan). The outputs extracted from these scenarios are discussed in later chapters, focussing on one assessment year at a time to build up a picture of the likely impact and the necessary infrastructure required to accommodate the Borough Plan demands.

3.65 The scenarios are summarised as follows;

- ***2022, 2027 and 2031 NBWA Reference Case Models***
  Reference Case conditions as per the forecasting process outlined within the associated model forecast report[9]
- ***2022 NBBC Borough Plan 'Do Nothing' Scenario***
  The NBWA 2022 Reference model with the addition of the 2022 NBBC Plan sites but no network mitigation.
- ***2022 NBBC Borough Plan 'Do Something' Scenario***
  The 2022 NBWA Reference model with the addition of the 2022 Borough Plan demands and the proposed mitigation package.
- ***2027 NBBC Borough Plan 'Do Minimum' Scenario***
  The 2027 NBWA Reference model with the addition of the 2027 Borough Plan demands and the 2022 'Do Something' proposed mitigation package.
- ***2027 NBBC Borough Plan 'Do Something' Scenario***
  The 2027 NBWA Reference model with the addition of the 2027 Borough Plan demands and the revised 2027 mitigation package (i.e. 2022 schemes plus addition schemes).
- ***2031 NBBC Borough Plan 'Do Minimum' Scenario***
  The 2031 NBWA Reference model with the addition of the 2031 Borough Plan demands and the 2027 'Do Something' proposed mitigation package.
- ***2031 NBBC Borough Plan 'Do Something' Scenario***
  The 2031 NBWA Reference model with the addition of the 2031 Borough Plan demands and the revised 2031 mitigation package (i.e. 2027 schemes plus addition schemes).

[9] Vectos Microsim, *VM165048.R001 - NBWA Reference Model Development*, July 2016

4 DEVELOPMENT ACCESS AND MITIGATION STRATEGY

Introduction

4.1 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. Latterly, following more detailed review and surveys by NBBC and their consultants WYG, the access arrangements and assumptions were refined further.

4.2 The inclusion of the proposed sites, their associated demands, and the revised access/distributor arrangements in the Reference Case networks provides us with the Borough Plan 'Do Nothing' (DN) scenarios for each assessment year. As discussed later in this chapter, there are various access assumptions that differ between the assessment years so there are slight differences between the various DN networks.

4.3 The DN scenarios are intended to highlight the network impact that the Borough Plan will have on the existing network, in each year of assessment, when the developments and access strategies are included but with no other physical transport interventions are considered. However it should be noted that these scenarios are still inclusive of the 15% mode shift assumptions applied to the Borough Plan demands, thus it does assumes that sustainable measures will, at least to some extent, have been implemented.

4.4 An objective of this study has been to assess the likely network improvements that will be necessary in order to accommodate the proposed Borough Plan sites and priorities these improvements throughout the life of the Plan period. As such, the initial DN scenario, focussed on 2022, and representing the position 5 years into the Plan, provides the starting point for the derivation of suitable mitigation schemes. The schemes highlighted as needed by 2022 are therefore the most important and should be prioritised.

4.5 As schemes have been highlighted and included within the 2022 Borough Plan DN scenario a 2022 'Do Something' (DS) scenario has been created. This DS scenario has then been taken forward as the 2027 'Do Minimum' network in which to assess the 2027 Borough Plan demands. This process has continued whereby the impact is assessed, the necessary mitigation is incorporated and then the higher demands tested in the later years. The result has been a list of improvement schemes that have been assigned a year in which they must be included in order to maximise the network operation and enable the Borough Plan demands to be accommodated as we move through the Plan period.

4.6 An overview of the access strategy included in all the Borough Plan scenarios is outlined in the following section. A summary of the mitigation has also been provided in this chapter, however, the details pertaining to their development and the trigger for their inclusion is provided in subsequent chapter, which focus on each assessment year in turn.

Development Access Strategy

4.7 The following section sets out the access strategy assumptions that were provided by NBBC and refined through consultation between NBBC and their technical consultants (WYG), WCC and VM. An overview of the sites and their associated access strategy is presented in Figure 6 to Figure 10.

4.8 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.

4.9 It is also important to note that they are indicative and the location of accesses, the number of access points and the specifics of the junction size and operation will require detailed design and assessment by the individual site promoters at a later date. The sole purpose is to ensure the appropriate demands are loaded onto the local network and an assessment of the strategic implications can be assessed. NBBC have conducted initial feasibility reviews of potential accesses to each site so it is also intended that the modelling is aligned with their findings.

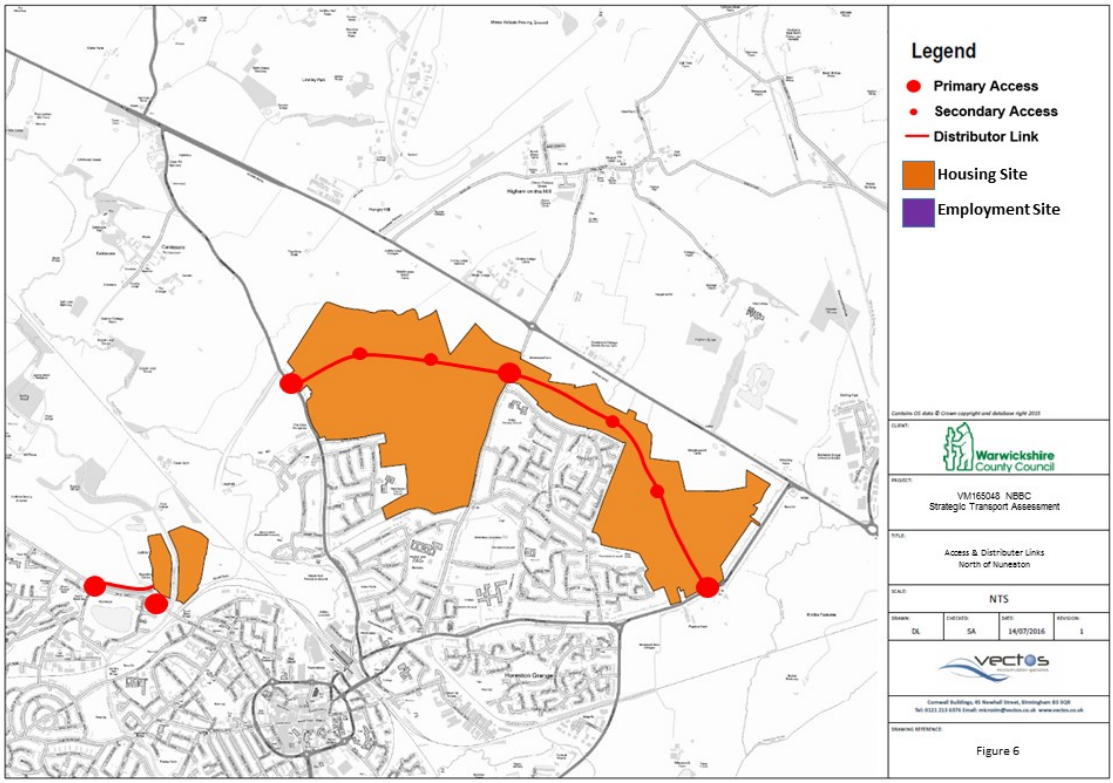
Sites to the North of Nuneaton

4.10 The development sites 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 (see Figure 6 below).

4.11 It is assumed that this link will be fully operation by 2027 and is therefore included in the 2027 and 2031 assessments. It is not included in full the 2022 assessment as the level of development completed in this area, as defined in the Borough Plan trajectory, is less likely to trigger the necessity for the full link road. Instead, in 2022 only, the link connecting Higham Lane and The Long Shoot is open. The link joining Higham Lane to Weddington Lane only provides access to the sites in this area and does not provide a through route to other traffic.

4.12 The site to the north of B4114 Tuttle Hill (i.e. HSG11 Tuttle Hill) has been modelled with two access points. The first utilises the existing access to the west of the canal and the second proposes the use of the existing signalised junction with Arrow Road, with a connecting road to the site.

Figure 6: Development Access Strategy: North of Nuneaton Sites



Sites to the West of Nuneaton

4.13 The access strategy for the large housing site to the west of Nuneaton (i.e. HSG2 Arbury) assumes a link road through the site that connects Heath End Road and A444 via Walsingham Drive (see Figure 7). It is assumed that this link is only completed in the later assessment years of 2027 and 2031. In 2022 access to the Arbury site is only available from the north via Heath End Road (or the existing residential streets in this area), or from the east via Bermuda Road; no link through to the A444 is included.

4.14 The Arbury development is significant in size with approximately 900 dwellings to be built by 2027 and more than 1,400 dwellings assumed by 2031. It is also noted that in the future Arbury Road (B4102) and Heath End Road (B4112) will suffer from worsening congestions primarily due to the limited number of alternative routes when travelling between the west and south of Nuneaton, via the town centre.

4.15 The future conditions coupled with the significant levels of additional traffic associated with a development of this size has led to the decision to include a link through the Arbury site. However, by 2022 only 169 dwellings are predicted at Arbury so the link road has not been considered essential at this point in time.

Sites to the South of Nuneaton

4.16 Three significant development sites (EMP4 Coventry Road, EMP1 Faultlands and HSG3 Gipsy Lane) are proposed for land to the south of Nuneaton, located to the north of Gipsy Lane and to the east of the A444 (see Figure 7). Initially it was anticipated that the development in this area would be served by a connecting link through all three sites. However, WCC indicated that it may not be possible to deliver such a link and so this was not included within the initial phase of testing.

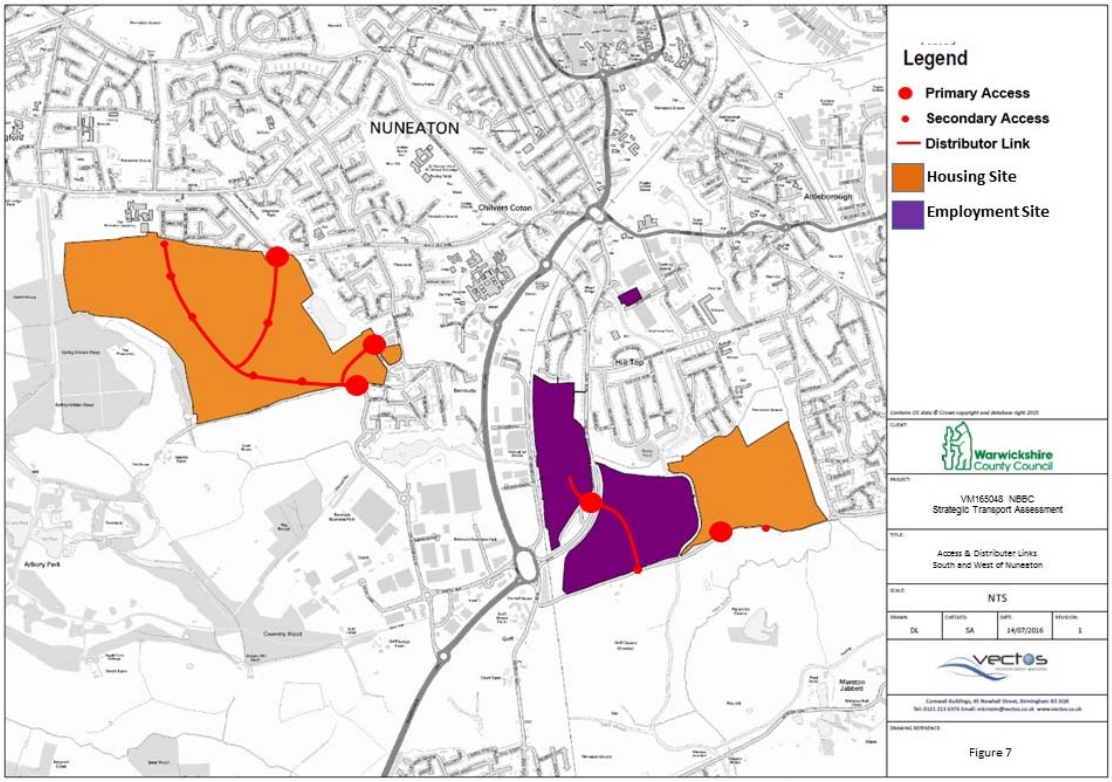
4.17 Following more detailed analysis and input by WCC and NBBC it became apparent that a desirable alternative would be for a link through the Faultlands site that connected Gipsy Lane and Coventry Road. The objective being to reduce the need for the new development traffic to traverse 'Griff' roundabout when travelling between Gipsy Lane and the Coventry Road by providing a suitable alternative.

4.18 The Faultlands site represents 24 hectares of employment land which has been assumed to be fully operational by 2023. Additionally, the Coventry Road employment site, which is located adjacent to the Faultlands site, is also one of the largest allocations in the Plan. It was therefore necessary for the site access strategy to account for this significant increase in pressures in this area in order to enable the development traffic to enter and exit the sites and minimise the impact on the congested local network.

4.19 As a result, the new link through the Faultlands site has been assumed in all three assessment years to connect Gipsy Lane and Coventry Road. Access onto Coventry Road is served via a four arm signalised junction that provides access into both Faultlands and Coventry Road employment sites and the connection to the proposed link road.

4.20 Due to this high concentration of development in this area it has been highlighted by WCC that Gipsy Lane should be considered for upgrading to a higher standard of road between Griff Island to the west and Marston Lane roundabout to the east.

Figure 7: Development Access Strategy: West and South of Nuneaton Sites



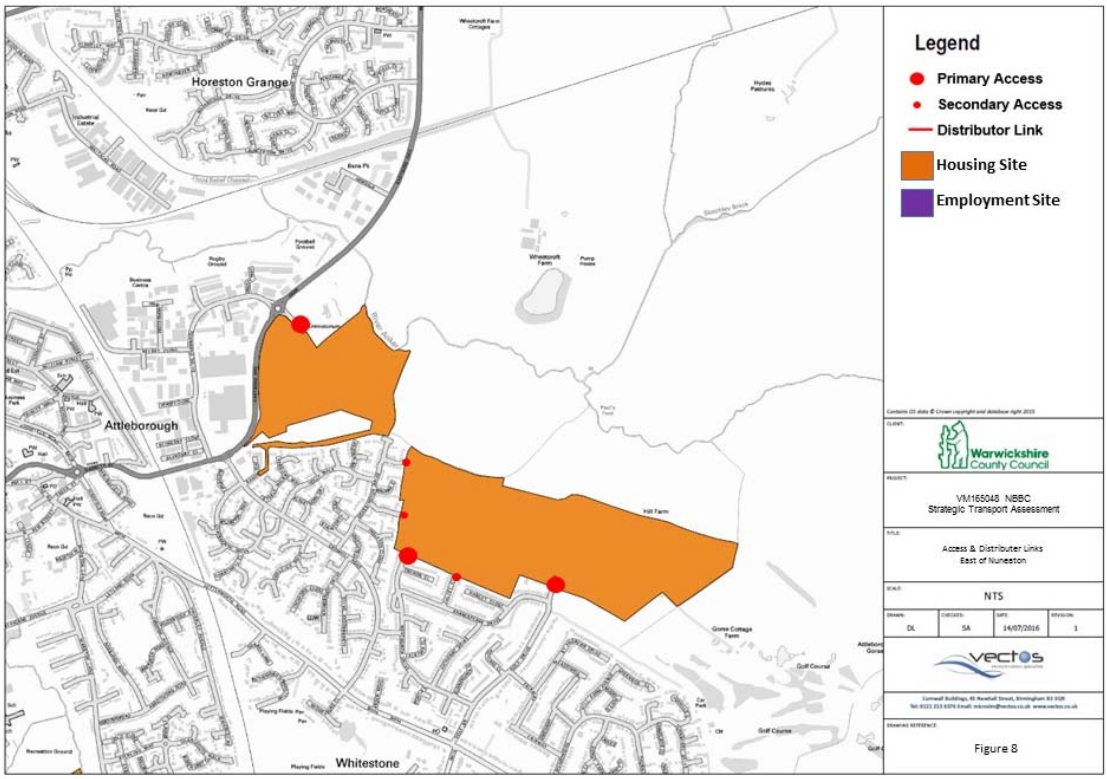
Sites to the East of Nuneaton

4.21 Two large residential sites have been included to the east of Nuneaton, namely Attleborough Fields (HSG10) and Land off Golf Drive (HSG9) (see Figure 8 below).

4.22 The primary access to Attleborough Fields is from the Eastboro Way/Townsend Drive roundabout. The Golf Drive site has been assumed to be served by the existing streets to the north of Crowhill Road.

4.23 The same access strategy has been included in each of the three assessment years.

Figure 8: Development Access Strategy: East of Nuneaton Sites



Sites to the West and South of Bedworth

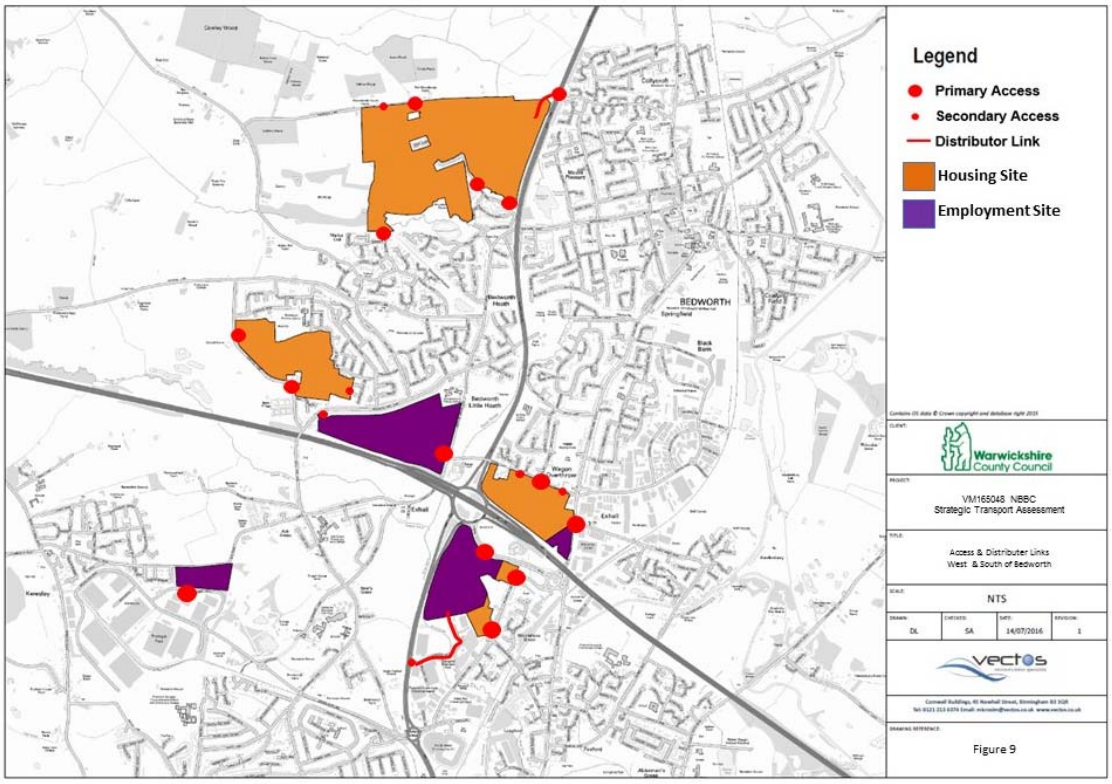
4.24 A total of four residential sites (i.e. HSG4 Woodlands, HSG5 Hospital Lane, HSG6 School Lane and EMP2 Wilsons Lane) and four employment sites (i.e. EMP7 Bowling Green Lane, EMP6 Longford Road, EMP2 Phoenix Way and EMP3 Prologis Extension) have been highlighted around Bedworth and in close proximity to M6 Junction 3 (see Figure 9 below).

4.25 In the majority of cases the assumption has been made that the sites will be served by access junctions off the existing roads surrounding the sites. Due to the size of the sites several access points have been included within the modelling.

4.26 The largest of the housing sites in this area, Woodlands, has been serviced by various junctions off Woodlands Road and Bedworth Lane, and also via the residential streets to the south of the site. However, in the 2027 and 2031 assessments an additional primary access has been included to the north of the site via a new junction on the A444. This junction was initially suggested as part of a previous planning application, and taking into consideration the level of development and its trajectory (i.e. approximately 1000 dwellings, with almost 70% complete by 2027) it was deemed an appropriate addition in the later years.

4.27 This junction has been included at the location where the exiting Left-In Left-Out with Sutherland Drive on the southbound A444 is located, creating a new four arm all movement roundabout. The details of such a junction will need to be reviewed at a later date.

Figure 9: Development Access Strategy: Bedworth Sites



4.28 Two large employment sites have been included adjacent to M6 Junction 3, Bowling Green Lane to the north-west and Phoenix Way to the south-east. Both sites have been assumed to be accessed via one primary access junction. In the case of the Bowling Green Lane site this has been via a new junction at the existing priority junction with Bowling Green Lane/School Lane. In the case of the Phoenix Way site the access has been assumed to be via a new Left-In Left-out onto the B4113 approach to M6 Junction 3.

4.29 Alternative secondary access points were also discussed and included within the modelling but the details will need to be reviewed further at a later date. Consideration was given to utilising the existing Left-In Left-out on the southbound A444 to the west of the Phoenix Way site and providing a link to the south of the site. The intention would be to reduce the impact on Junction 3 by removing the outbound trips travelling southbound from the site, however, general concerns have been raised so details will need to be reviewed at a later date if the site promotors are keen to explore this option.

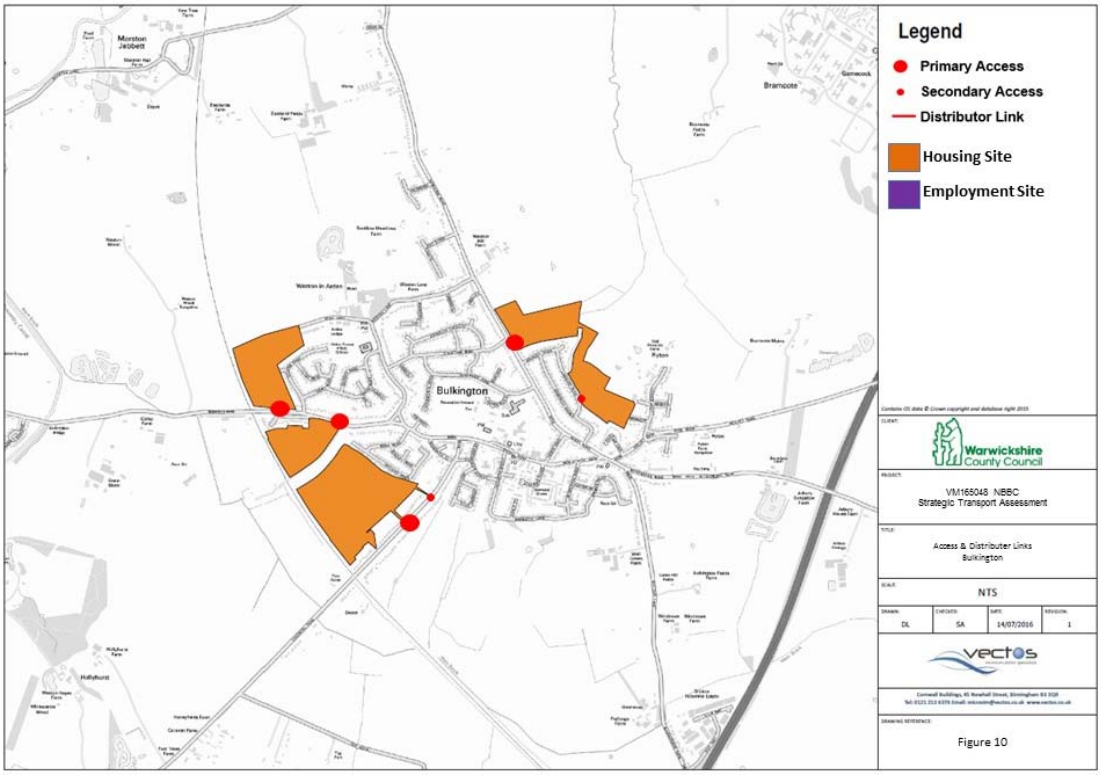
4.30 Due to this high concentration of development in this area it is suggested that School Lane should be considered for upgrading to a higher standard of road to accommodate the increased demands (including HGVs) and promote its use.

Sites to the East of Bedworth

4.31 Two housing sites have been identified to the east of Bedworth in Bulkington (HSG7 Land East of Bulkington and HSG8 Land West of Bulkington, see Figure 10 below). A total of 925 dwellings have been assumed across the two sites by 2031.

4.32 Access junctions to the Land West of Bulkington have been provided via B4109 Coventry Road for the southern section, and via B4029 Bedworth Road for the northern and central sections. The Land to the East of Bulkington is served by a primary access via a new junction with B4112 Nuneaton Road/Cleveland Road and by a secondary access via the existing residential streets.

Figure 10: Development Access Strategy: Bulkington Sites



Outline Mitigation Schemes

4.33 The mitigation that has been identified through the strategic assessment can be divided into general broad area strategies as outlined within the Figure 11. The areas identify the

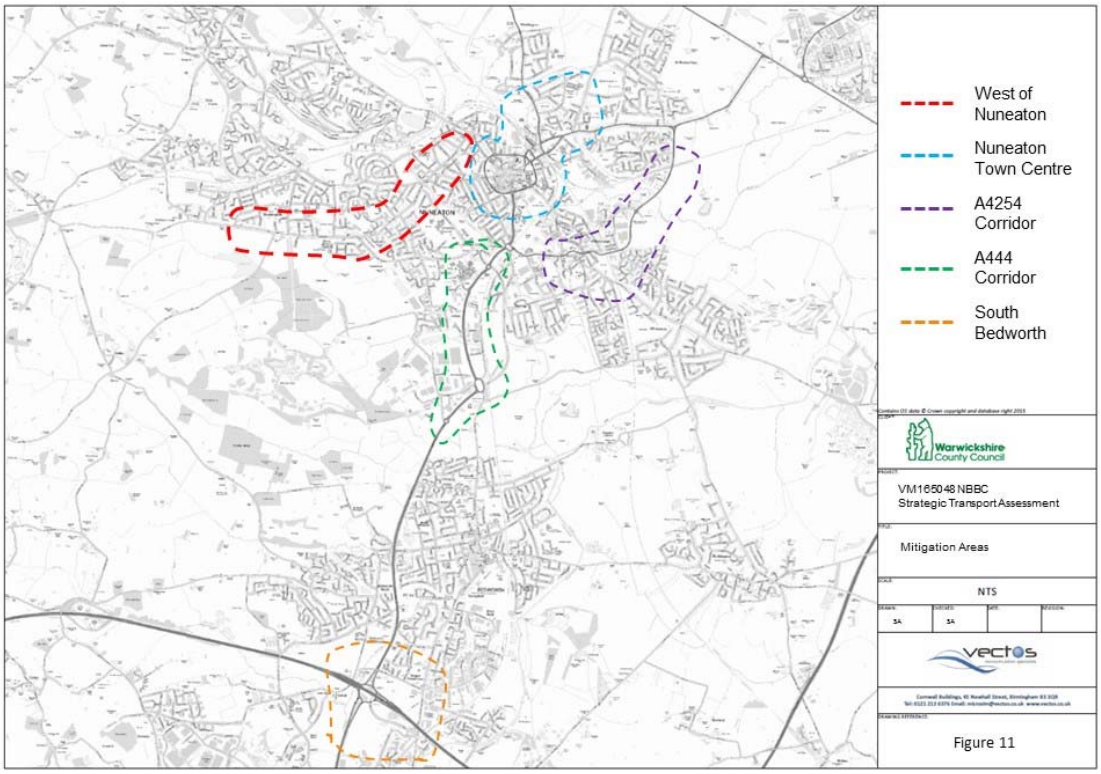
corridors or regions where the cumulative impacts of applying mitigation are likely to be of greater overall benefit than the individual schemes.

4.34 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, or contribute to an area strategy that, when combined, serves an important strategic role.

4.35 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. Additionally, refinement of the appropriate access junctions in terms of operational arrangement and resulting capacity will also need to be assessed at this later stage.

4.36 An overview of the broad locations of the various mitigation strategies is provided within Figure 11 below.

Figure 11: Broad Mitigation Areas



Mitigation Identification and Prioritisation

4.37 The following objectives relating to network mitigation have been prioritised as part of this study:

- To identify what network infrastructure improvements are required throughout the first 5 years of the Plan period;
- To assess and prioritise the network infrastructure improvements that will be required throughout the remaining life of the Plan;
- To conclude on a refined set of transport infrastructure measures that will be required to support the Borough Plan submission;

4.38 As noted previously, in order to meet these objectives a tiered approach to the Borough Plan impact assessment has been followed.

4.39 The Borough Plan demands associated with the +5 years position (2022) have been assessed in order to determine where the issues on the network arise and then to drive the development of infrastructure improvements that will mitigation such issues. This has enabled the identification of the most critical schemes that will be required in the early years of the Plan period.

4.40 The Borough Plan has then been assessed (with the inclusion of the early mitigation identified through the 2022 review) with the higher demands associated with the +10 years position (i.e. 2027). Again, the resulting impact has been highlighted and further critical mitigation developed and then assessed. The additional schemes derived through the 2027 assessments have then been categorised as being the second tier of improvements that will be required during the +5 to 10 year period of the plan.

4.41 The final stage has been to assess the full level of Borough Plan demand on the partially mitigated network (i.e. with the inclusion of the mitigation identified as critical during the first 10 years) to ascertain what additional mitigation is necessary in the later years of the Plan between 2027 and 2031.

4.42 The final list of schemes included in the 2031 ‘Do Something’ scenario therefore represents the full set of infrastructure measures deemed to be necessary throughout the life of the plan and the assessment year in which they were identified as necessary indicated the priority for these schemes to be implemented.

4.43 The final schedule of mitigation, and the prioritisation of the schemes within it, is not necessarily exhaustive or immovable. It is envisaged that further, more detailed testing, will be undertaken during the planning application and detailed design stages that will be completed for the individual site. At that stage additional localised mitigation measures may be highlighted and certain schemes identified in this study may be re-configured or optimised, which may of course have a knock on effect and alter impacts elsewhere on the network.

4.44 However, the locations highlighted for mitigation, the general areas/corridors where improvements have been focussed, and the prioritisation of what has been identified provides a comprehensive picture of where and when the network will require improvements as a result of the NBBC Borough Plan allocations being assessed in this STA.

4.45 The mitigation schedule with the scheme details and indicative cost is provided within Appendix A along with screenshots of the schemes that have been included within the modelling.

4.46 Table 20 below lists the locations of the proposed schemes, the year by which they are required, and an indicative cost of each scheme.

4.47 The costs provided in Table 20 are based on 2016 prices, however, as these schemes are proposed to come forward at various points throughout the Plan period the costs, once inflation is taken into account, will increase.

4.48 To provide a worst case total cost, these costs have also been adjusted for an assumed 6% inflation per year, with the schemes being assumed to be built in the final year of the period in which they have been highlighted as required i.e. 2022, 2027 or 2031. The adjusted costs are provided in Appendix A.

Table 20: Outline Mitigation Schedule

Ref	Location	Priority Year	Cost
1	College Street/A444	2022	£4,070,000
2	College Street/Bull Ring	2022	£1,120,000
3	Greenmoor Road/Heath End Road	2022	
4	A4254 Eastboro Way/Crowhill Road	2022	£1,210,000
5	A4254 Eastboro Way/B4114 Lutterworth Road	2022	£730,000
6	B4113/Longford Road/Bedworth Road/Wilsons Lane	2022	£190,000
7	Bermuda Connectivity Project	2022	£1,440,000[+]
8	Roanne Ringway/Coton Road/Vicarage Street	2027	£990,000
9	Church Street/Vicarage Street	2027	£810,000
10	Back Street/Leicester Road Gyratory incl. Bond Street & Regent Street	2027	£13,500,000
11	Trent Road/Leicester Road/Weddington Lane	2027	£650,000
12	Corporation Street/Newtown Road/Powell Way/Roanne Ringway	2027	£520,000
13	Roanne Ringway/Queens Road	2027	£450,000
14	Croft Road/Greenmoor Road Priority	2027	£120,000
15	Higham Lane/A47 Old Hinckley Road	2031	£750,000
16	A4254 Eastboro Way/Townsend Drive	2031	£1,920,000
17	Donnithorne Avenue/Coventry Road	2031	£440,000
18	Weddington Road/Weddington Terrace	2031	£210,000
19	Ansley Road/Anstley Lane	2031	£250,000
20	A444/Walsingham Drive	2031	£1,650,000
21	Coventry Road/Gipsy Lane	2031	£760,000
22	B4113 Coventry Road Exhall/Bayton Road/Coventry Road/School Lane	2031	£780,000
23	A444 Weddington Road/Shanklin Drive	2031	£500,000
24	A4254 Eastboro Way NB Corridor (between Crowhill Rd & Townsend Dr)	2031	£5,760,000
25	Arbury Road/Heath End Road	2031	£310,000
26	Coventry Road Exhall/Blackhorse Road/Longford Road/Wilsons Lane	2031	£680,000
27	Church Lane/Bowling Green Lane/School Lane	2031	£320,000
28	Sustainable Transport Contributions	-	£3,000,000
29	Bus Priority Enhancements	-	£5,000,000
30	The Long Shoot to Town Centre Cycle Route	-	£1,200,000
TOTAL COST		**£49,330,000**	

N.B.: Costs are rounded to the nearest £10,000 and based on 2016 prices.

[+] *Contribution only to the total costs*

4.49 An overview of the location of the schemes outlined above, and associated latest delivery year, is presented in Figure 12 below. Schemes 28, 29 and 30 relate to general improvements that cannot be attributed to a specific section of the network so have not been highlighted in this figure.

Figure 12: Mitigation Scheme Locations

4.50 In total approximately £49.33 million of transport interventions have been identified as necessary to facilitate the delivery of the NBBC Borough Plan aspirations that have been tested as part of this study. Approximately £8.76 million of the schemes identified have been classified as required within the first 5 years of the Plan, with a further £17.04 million between 2022 and 2027 and £14.33 million between 2027 and 2031.

4.51 The cost of the sustainable transport measures have not been associated to any specific period but rather assumed that the appropriate levels will be incorporated throughout the Plan period to help meet the mode shift targets.

West of Nuneaton

4.52 Various schemes have been introduced along the B4102 corridor (i.e. Schemes 14, 19 and 25). These schemes have been added to alleviate the congestion highlighted on this corridor, which is a primary route from the west into Nuneaton Town Centre and beyond. There are also pressures added to this corridor from the large housing development to the south of Heath End Road (i.e. HSG2 Arbury).

4.53 Opportunity for capacity improvements along this corridor is limited as with the majority of the corridor is lined with houses. As such, only relatively modest improvements on the

corridor itself have been possible. However, several of the larger, more strategic, improvements that have been identified deal directly with the issues along this corridor through the provision of either alternative routes to reduce demands on the corridor (e.g. Scheme 7 – Bermuda Connectivity Project), or through improving the capacity at key 'pinch points' downstream of the corridor (e.g. Schemes 8 to 13 – town centre improvements).

4.54 The Bermuda Connectivity Project provides a new all vehicle link between Bermuda and St. Georges Way using the existing bridge over the A444. This provides an alternative route when travelling between the west of Nuneaton and the A444 and will alleviate pressures on Heath End Road, College Street and at the A444/College Street junction.

Nuneaton Town Centre Works

4.55 Schemes 8 to 13 represent improvements to junctions in Nuneaton town centre and the reconfiguration of the flow of traffic on the inner ring road. A separate study has previously been undertaken by WCC where many of these schemes were assessed as part of a town centre improvement strategy, with the economic assessment being submitted to the Coventry and Warwickshire Local Enterprise Partnership (CWLEP) for inclusion in the Strategic Economic Plan (SEP) bid for investment from the Local Growth Fund.

4.56 The inclusions within this STA build upon the previous studies and have been refined further to mitigate the specific issues identified through the Borough Plan assessments. However, it is still possible that in combination this evolving town centre strategy may attract further external funding contributions as it is likely to benefit from improvements to pedestrian and cyclist connectivity, public transport initiatives, improvements to the public realm and provide economic regeneration of the area.

A4254 Corridor Improvements

4.57 Various schemes (Schemes 4, 5, 16 and 24) have been proposed for the A4254 Eastboro Way corridor to alleviate congestion highlighted through the Borough Plan testing and to provide the additional capacity on this route to accommodate traffic looking to avoid the town centre when travelling between the A444 south and north of Nuneaton.

4.58 This corridor has a committed scheme schedule for the A47 The Long Shoot/Eastboro Way junction, two new signalised junctions planned for the northern end of Eastboro Way for access to a new development site, and recent improvements at A444 Coton Arches at the western end of the corridor. The proposed mitigation focusses on the sections between

these recent improvements and is intended to increase the capacity and maximise the throughput via this corridor.

A444 Corridor Improvements

4.59 Similar to the Nuneaton town centre works, a recent study was carried out by WCC focussing on improvements on the sections of the A444 south of Coton Arches. The schemes that were developed and assessed as part of these previous studies have been included as mitigation within this assessment (i.e. Schemes 1, 2 and 3) in order to deal with the increasing demands witnessed along the A444 corridor and to alleviate congestion along the Heath End Road corridor.

4.60 The concentration of Borough Plan sites adjacent to this section of the A444 (e.g. Arbury, Faultlands and Coventry Road) are also seen to contribute to the added pressures and the need for capacity improvements along the A444. The proposed schemes are therefore also intended to provide sufficient improvements to allow access to this strategic route from the surrounding areas.

4.61 The A444 works are also necessary to ensure that the north/south movement between Nuneaton and the M6/Coventry links can be served without significant delay. This is especially important given the location of a considerable amount of development to the north of Nuneaton and adjacent to M6 Junction 3.

4.62 It should also be noted that the proposed Bermuda Connectivity Project will also relive some pressures from the A444 corridor by removing some traffic destined for the west of Nuneaton at Griff Island and before it reaches the junctions further north (e.g. A444/College Street and Coton Arches) which they previously would have traversed.

Bedworth Improvements

4.63 Several schemes have been included on the local junctions adjacent to M6 Junction 3, south of Bedworth (Schemes 6, 22, 26 and 27).

4.64 There is a high concentration of Borough Plan sites in the area surrounding Junction 3 as well as an increased demand at this junction itself. As demands have increased alternative routes that bypass Junction 3 have become more congested with traffic seen to avoid Junction 3 in preference for the local roads when travelling between Coventry and Bedworth (e.g. via Church Lane-Bowling Green Lane-School Lane to the west, or Foleshill Road-Longford Road-Coventry Road Exhall to the east).

4.65 As such, improvements at key junctions along these routes have been highlighted for improvement in order to accommodate the additional demand and to minimise the delay on these routes.

Sustainable Transport Measures

4.66 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 modelled area.

4.67 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 £9.2 million of works to be included which will help deliver the mode shift target quoted (Schemes 28, 29 and 30).

4.68 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;

4.69 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).

4.70 A brief overview of the sustainable transport measures that have been identified is provided below.

<u>Sustainable Transport Contributions</u>

4.71 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.

4.72 Provision of "Missing Links" may involve working closely with NBBC, WCC 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

4.73 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 Borough Plan sites.

The Long Shoot to Town Centre Cycle Route

4.74 This involves the addition of a strategic off carriageway cycle route linking the northern housing allocations to the town centre and Hinckley.

4.75 Appendix C sets out what sustainable transport improvements will be sought through the planning process to support development generally within the Borough.

Risks and Issues

4.76 The feasibility of the proposed mitigation measures has been assessed at a very high level. There are 30 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, and associated costs, will be subject to further design, optimisation and assessment throughout the Plan period.

4.77 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.

4.78 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 that schemes have been proposed in areas where information regarding the highway extent was limited (such as those near Bedworth).
    - Specific risks where schemes may not meet the required design standards (such as the proposals at Greenmoor Rd/Heath End Rd and College St/Bull Ring).

4.79 The risks outlined above 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 present the results obtained from the detailed testing undertaken using the NBWA Paramics model scenarios outlined in earlier sections; namely the 2022, 2027 and 2031 Reference models and the equivalent Borough Plan scenarios, with and without the inclusion of the mitigation measures outlined in Table 20.

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:

- **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 A measurement of completed trips would not necessarily be 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 Borough Plan 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 Borough Plan scenarios (Do Nothing/Do Min and Do Something) based on the comparison with the relevant 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.

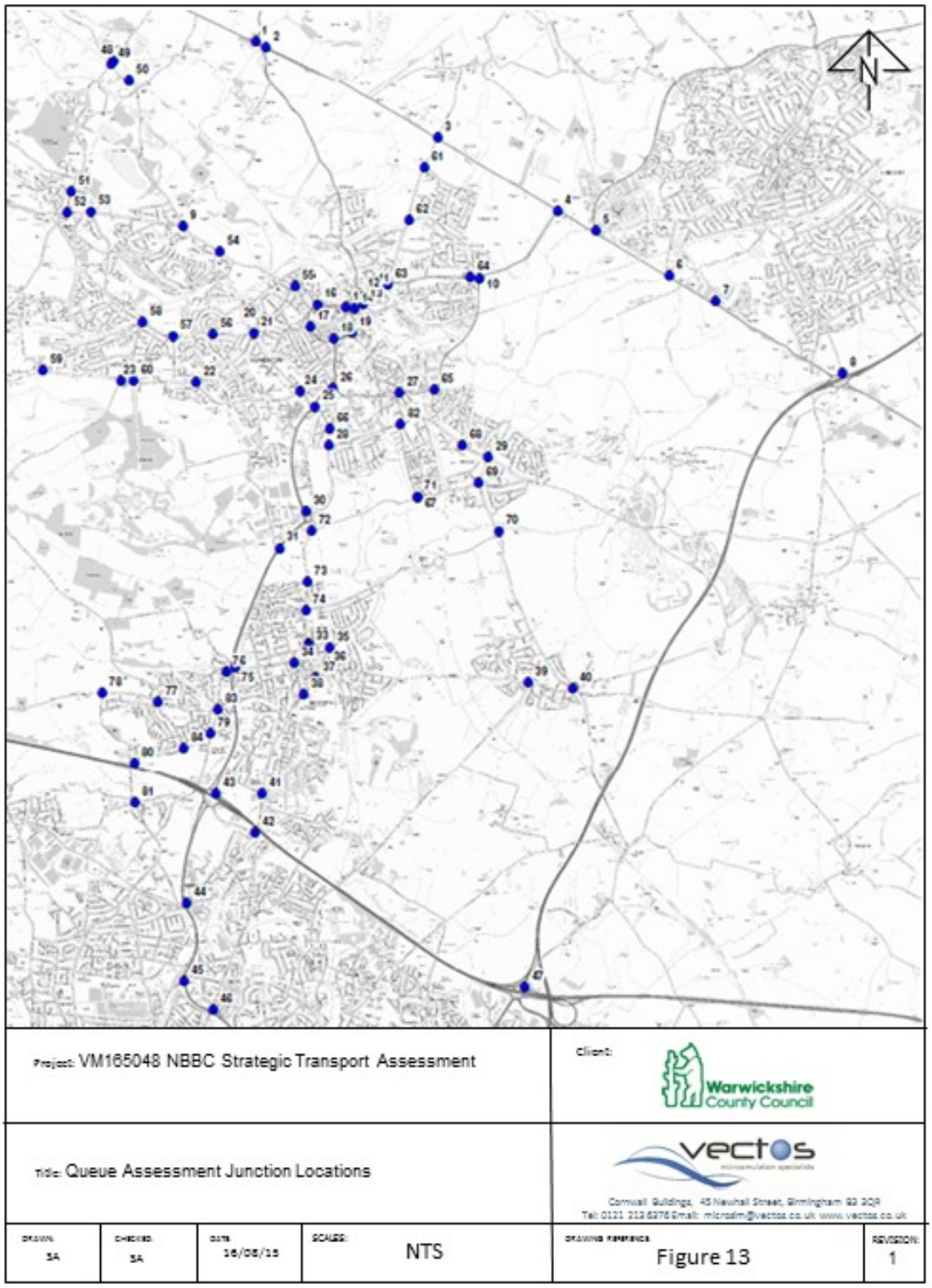
5.15 At this stage these results simply identify areas where further attention is required. A queue length increase of 50 vehicles does not necessarily mean that a scheme will not work, it may indicate that further optimisation of the layout or any signal times are required. Furthermore it may not account 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 13 below.

Figure 13: Queue Assessment Junction Locations



6 BOROUGH PLAN ASSESSMENT - 2022

Overview

6.1 The following section of this report presents the results obtained from detailed testing within the 2022 Paramics scenarios outlined in Chapter 3, and using the assessment criteria outlined in Chapter 5.

2022 Modelled Scenarios

6.2 The following scenarios have been assessed:

- ***2022 NBWA Reference Case***
  The 2022 Reference Case model as described within the forecasting report.
- ***2022 NBBC Borough Plan 'Do Nothing' Scenario (DN)***
  The 2022 NBWA Reference Case model with revisions to the model demands to include the 2022 level of Borough Plan growth (as described in Chapter 3) and their access strategy (as described in Chapter 4), but with no further network improvement schemes.
- ***2022 NBBC Borough Plan 'Do Something' Scenario (DS)***
  The same model demands as the 'Do Nothing' but with the addition of a set of focussed infrastructure improvement schemes.

2022 Mitigation Schemes

6.3 The schemes that have been highlighted as necessary during the first 5 years of the NBBC Plan period (i.e. by 2022) have emerged from an assessment of the 2022 Borough Plan DN scenario against the 2022 Reference Case. The schemes highlighted during the 2022 assessment, and therefore included in the 2022 DS scenario, are summarised in the table below and presented in Figure 14.

6.4 The overarching strategy behind the introduction of these schemes is summarised in Chapter 4. Details regarding the reasons for the introduction of these schemes are given later in this chapter via an analysis of the modelling outputs.

6.5 In total 7 schemes have been identified as required by 2022 at a cost of £8.76 million.

Table 21: 2022 Mitigation Schedule

Ref	Location	Existing	Proposed	Cost
1	College St/A444	Roundabout	Signalised crossroads with widening on approaches & exits.	£4,070,000
2	College St/Bull Ring	Priority junction	Roundabout with significant widening on approaches.	£1,120,000
3	Greenmoor Rd/Heath End Rd	Mini-roundabout	Signalised junction with widening on approaches.	
4	A425/Crowhill Rd	Mini-roundabout	Signalised T junction. Widening on all approaches and EB exit.	£1,210,000
5	A4254/B4114/Eastboro Way	Roundabout	Widening on west, east and southern approaches to extend the two lane approaches.	£730,000
6	B4113/Longford Rd/Bedworth Rd/Wilsons Ln	Roundabout	Addition of signals on the B4113 Bedworth Rd approach/circulatory.	£190,000
7	Bermuda Connectivity Project	Closed Route	Opened route from St Georges Way to Bermuda Rd connecting A444 Griff to Heath End Rd.	£1,440,000[+]
TOTAL COST				**£8,760,000**

N.B.: Costs are rounded to the nearest £10,000 and based on 2016 prices.

[+] *Contribution only to the total costs*

Figure 14: 2022 Mitigation Scheme Locations

2022 Results Analysis

Model Stability

6.6 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.

6.7 The network stability exhibited within the AM and PM period for each of the three 2022 scenarios is illustrated below.

Table 22: Model Stability Statistics (2022)

Scenario	Period	Success Rate	Peak (Vehs)		End of Period (Vehs)	
			Max	Ave Max	Max	Ave Max
2022 NBWA Reference Case	AM	95%	10,065	9,478	7,340	6,518
	PM	100%	9,467	9,015	6,249	5,988
2022 NBBC Borough Plan 'Do Nothing' Scenario	AM	80%	10,359	9,883	8,642	7,851
	PM	95%	9,836	9,493	7,444	7,078
2022 NBBC Borough Plan 'Do Something' Scenario	AM	95%	9,467	9,301	8,168	7,460
	PM	100%	9,785	9,404	7,183	6,955

6.8 Analysis of the previous table reveals that the 2022 Reference Case network demonstrates a high level of stability in both AM and PM periods. The stability of the model is marginally worsened with the inclusion of the 2022 demands from the Borough Plan allocations, however, stability is still at an acceptable level. With the inclusion of the proposed mitigation measures, the stability returns to levels comparable with the Reference Case.

6.9 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 Borough Plan 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.

6.10 Notwithstanding, it would appear that the residual impact of the Borough Plan demands, post inclusion of the mitigation measures, is reduced by the inclusion of the proposed mitigation and that the maximum levels observed through the simulation period are comparable with the Reference Case.

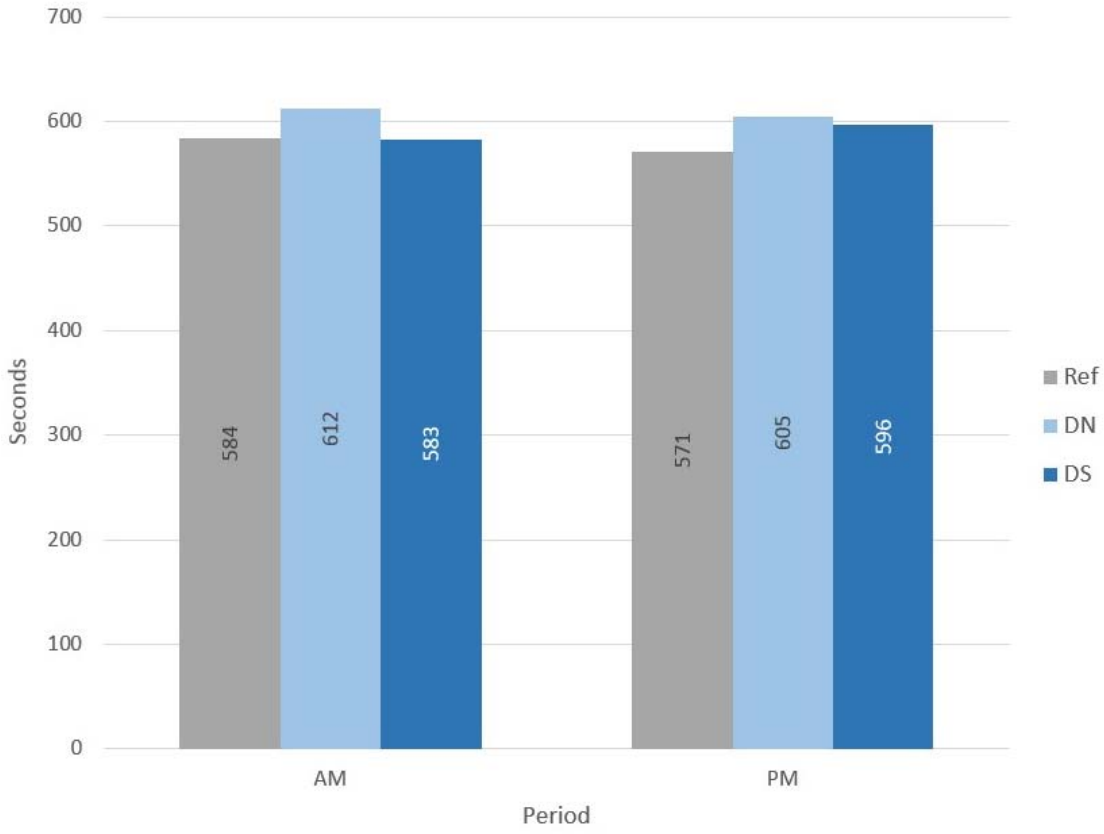
Network Wide Statistics

6.11 The following section presents a comparison between the average network wide statistics obtained from the successful runs of the 2022 assessment scenarios.

Average Journey Time

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

Figure 15: Average Journey Time (2022)



6.13 It can be seen that with the inclusion of the 2022 level of Borough Plan growth that the journey times in both the AM and PM periods increase by approximately 30 seconds, and increase of 5 and 6% respectively.

6.14 The inclusion of the proposed mitigation measures, with the Borough Plan growth still included, results in a notable reduction in the average journey time when compared to the DN scenario (i.e. AM: 4.7%; PM: 1.5%) particularly in the AM period.

6.15 The DS average journey times, with the inclusion of the mitigation, are shown to fall to levels in line with the AM Reference Case, however, in the PM, they are improved when compared to the DN but are still approximately 4.4% higher than in the reference Case.

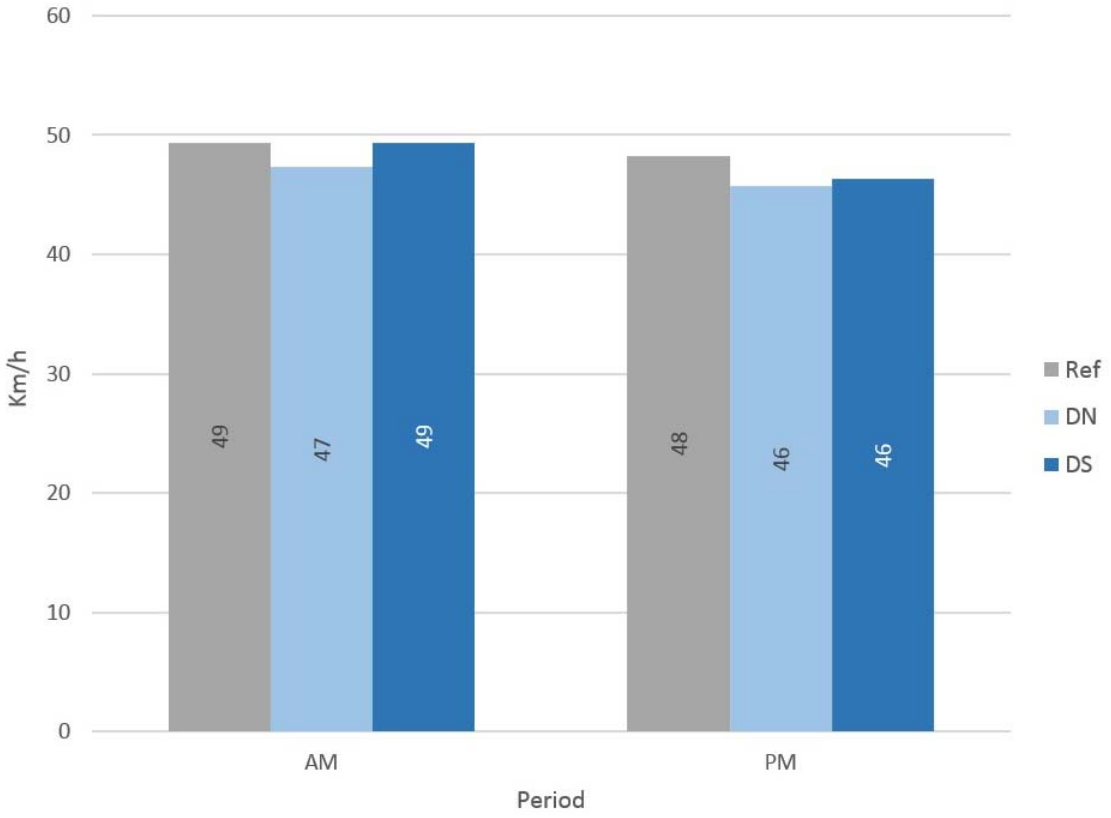
6.16 It is reasonable to conclude that the introduction of the proposed 2022 mitigation measures does show a benefit in terms of journey times and that the resulting times are not significantly different from the conditions that would be experienced if the Borough Plan did not come forward (i.e. the Reference Case).

6.17 It is also worth noting that the average journey times in the 2022 Borough Plan DS scenario are at similar levels in both the AM and PM, indicating that the conditions felt on the network by road users will be comparable in both the morning and evening peak periods.

Average Journey Speed

6.18 Analysis of the average journey speed recorded in each 2022 scenarios is presented in the figure below.

Figure 16: Average Journey Speed (2022)



6.19 Analysis of the figure above reveals that the allocation of the NBBC sites and the associated 2022 level of demands has a negative impact on the average speeds experienced on the network. In both the AM and PM period the speeds drop by approximately 2 km/h.

6.20 The introduction of the mitigation measures into the 2022 Borough Plan DS scenario is shown to bring the average speeds in the AM back up to levels consistent with the Reference model. The inclusion of the schemes in the PM does not have such a noticeable impact on speeds.

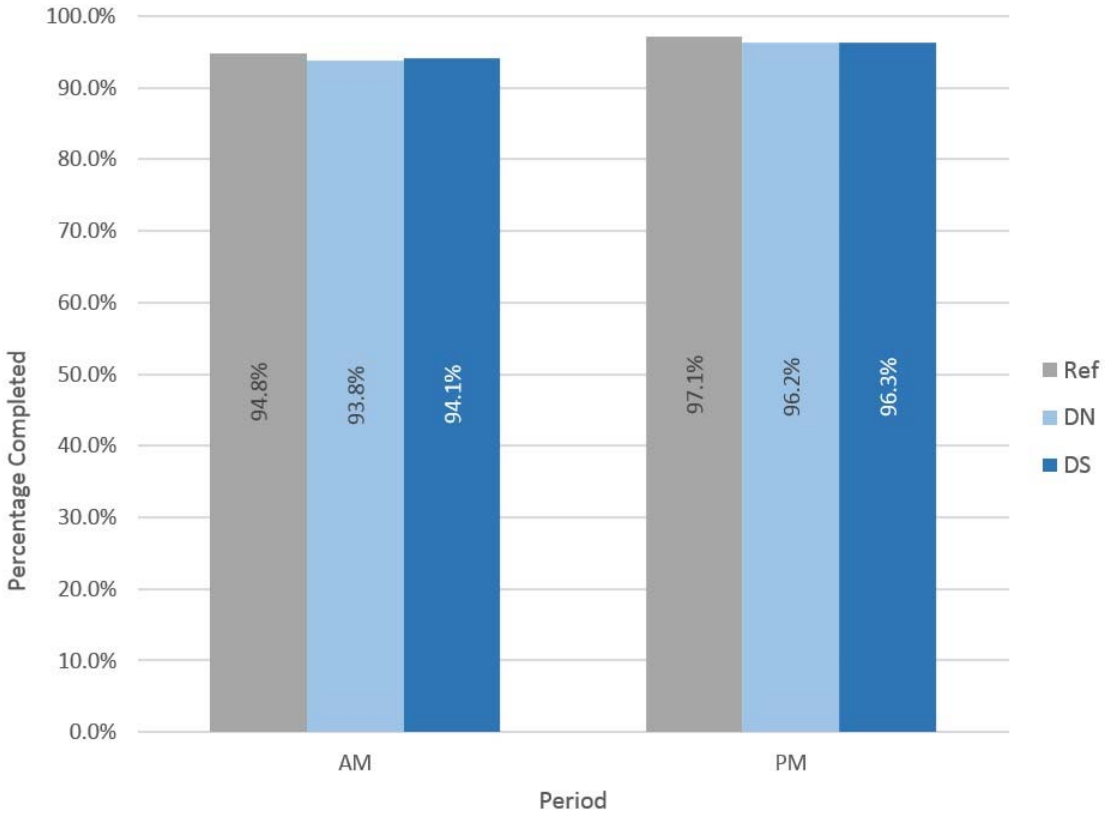
6.21 Overall the speeds remain relatively unchanged in 2022 when the Borough Plan demands are included. The proposed schemes clearly mitigate much of the Borough Plan impact in the AM and some of the impact in the PM when the average speeds are used as an indicator.

Completed Trips

6.22 Analysis of the percentage of completed trips recorded in each scenario is presented in the figure below. Because of the need for a cut off period it is never possible for 100% of the demand assigned within the model to have completed their 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.

6.23 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.

Figure 17: Completed Trips as % of Total Demands (2022)



6.24 The figure above illustrates that the percentage of trips that are completed during the AM and PM period falls against the Reference levels when the 2022 Borough Plan demands are included and the network is left unchanged. The inclusion of the focussed mitigation helps lift this percentage somewhat.

6.25 The reduction does not appear to be significant in size which is an indicator that the network is not experiencing significant issues that result in major congestion, however, the proposed schemes are shown to improve throughput when compared to the DN and therefore enable a higher number of the trips to be completed during the modelled periods.

6.26 The following conclusions can be drawn from the 2022 network wide statistics presented, and discussed, above:

- The AM network wide statistics indicate that the 'Do Something' network provides delay (average journey times), speeds and throughput (completed trips) that are comparable to those experienced in the 2022 Reference Case, even with the addition of the Borough Plan growth.
- In the PM period, the average journey times, speeds and throughput are shown to worsen slightly when compared to the Reference Case. However, levels are very similar

to those experienced in the AM and are unlikely to be represent significant impacts to the road users. The proposed schemes are shown to improve the conditions when compared to the 'Do Nothing' scenario, so clearly do mitigate some of the issues created by the Borough Plan demands.

Maximum Queue Length Analysis – 2022 'Do Nothing' Scenario

6.27 The following section sets out some initial observations based on the maximum queue length analysis and the differences in queue lengths between the 2022 Reference Case (Ref) and the 2022 NBBC Borough Plan 'Do Nothing' (DN) scenario.

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

AM Analysis: 2022 DN v. 2022 Ref Scenario [MQ 001]

6.29 Analysis of the impacts on AM queuing levels between the 2022 Reference and the 2022 NBBC Borough Plan 'Do Nothing' scenario networks reveals the following:

- 15% of assessed junctions highlight a notable increase in queues (13 out of 84 locations);
- 92% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (12 out of 13);
- No junctions show a 'very severe' increase and only 1 junction shows a 'severe' increase of between 25 to 50 vehicles; and
- The junction showing the 'severe' impact is the B4113 Coventry Road Exhall/Bayton Road/Coventry Road/School Lane (Junction 41) and occurs on the Coventry Road Exhall southbound approach.

PM Analysis: 2022 DN v. 2022 Ref Scenario [MQ 002]

6.30 Analysis of the impacts on PM queuing levels between the 2022 Reference and the 2022 NBBC Borough Plan 'Do Nothing' scenario networks reveals the following:

- 10% of assessed junctions highlight a notable increase in queues (8 out of 84 locations);
- 100% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (8 out of 8); and
- No junctions show a 'severe' or 'very severe' increase in queues.

6.31 It is clear from this analysis that the inclusion of the 2022 level of Borough Plan growth highlights relatively moderate impacts on queuing across the network. This is in line with the impact noted through the assessment of the network wide statistics.

6.32 The junctions that have been highlighted as experiencing a 'moderate' increase in queues when compared to the 2022 Reference Case in both the AM and PM period appear to centre around the A444 south of Nuneaton town centre, on the southern sections of the A4254 Eastboro Way and at junctions along the Coventry Road Exhall/Longford Road corridor adjacent to M6 Junction 3.

6.33 The DN model has been observed and the outputs reviewed in order to develop a set of proposed schemes that will assist in mitigating the issues witnessed across the two periods. The resulting schemes, as outlined in Table 21 have been developed and included in the 2022 NBBC Borough Plan 'Do Something' scenario.

Maximum Queue Length Analysis – 2022 'Do Something' Scenario

6.34 The following section sets out some initial observations based on the maximum queue length analysis and the differences in queue lengths between the 2022 Reference Case (Ref) and the 2022 NBBC Borough Plan 'Do Something' (DS) scenario. The DS model includes the 2022 level of Borough Plan growth and the 7 schemes outlined in Table 21.

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

AM Analysis: 2022 DS v. 2022 Ref Scenario [MQ 003]

6.36 Analysis of the impacts on AM queuing levels between the 2022 Reference and the 2022 NBBC Borough Plan 'Do Something' scenario networks reveals the following:

- Only 7% of assessed junctions highlight a notable increase in queues (6 out of 84 locations), down from 15% in the DN scenario;
- 11% of assessed junctions highlight a notable reduction in queues (9 out of 84 locations). Many of these are located around the west and south of Nuneaton at locations where the mitigation has a direct impact in routing and capacity;
- 83% of the junctions that still highlight a notable increase in queues are showing a 'moderate increase' (5 out of 6);

- In 96% of instances the magnitude of difference between the queuing levels on an assessed approach, compared to the Reference Case equivalent is between +/- 15 vehicles. These would likely be disregarded during any detailed statistical analysis;
- No junctions show a 'very severe' increase and only 1 junction shows a 'severe' increase of between 25 to 50 vehicles; and
- The junction showing the 'severe' impact is the B4113/Longford Rd/Bedworth Rd/Wilsons Ln (Junction 42) and occurs on the Bedworth Road northbound approach. It is worth noting that this junction actually includes mitigation as part of the proposed schedule of 2022 schemes, however, the proposed scheme has introduced additional delay on this northbound approach (through the introduction of signals) in order to balance queues on other approaches and improve the overall performance of the Coventry Road corridor to the north.

PM Analysis: 2022 DS v. 2022 Ref Scenario [MQ 004]

6.37 Analysis of the impacts on PM queuing levels between the 2022 Reference and the 2022 NBBC Borough Plan 'Do Something' scenario networks reveals the following:

- 10% of assessed junctions continue to highlight a notable increase in queues (8 out of 84 locations);
- 4% of assessed junctions highlight a notable reduction in queues (3 out of 84 locations). The reductions are seen at the A444 junctions south of Nuneaton where mitigation has either been directly added or where mitigation elsewhere has help lower demand at these locations;
- 100% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (8 out of 8);
- In 98% of instances the magnitude of difference between the queuing levels on an assessed approach, compared to the Reference Case equivalent is between +/- 15 vehicles. These would likely be disregarded during any detailed statistical analysis; and
- No junctions show a 'severe' or 'very severe' increase in queues.

2022 Assessment Conclusions

6.38 Based on the outcome of the 2022 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 Borough Plan aspirations can be accommodated without detrimental impact in the surrounding network;

- The analysis of the network wide statistics, when comparing the 2022 NBBC Borough Plan DN scenario with the 2022 Reference Case, indicates moderate impacts on average journey times and speeds;
- The analysis of queue impacts, when comparing the 2022 NBBC Borough Plan DN scenario with the 2022 Reference Case, indicates moderate impacts at a variety of junctions, with a concentration of increases in queues observed at junctions immediately south of Nuneaton town centre, most notably on the A444 and A452;
- Further analysis has been undertaken to identify mitigation measures to alleviate the pressures highlighted through the DN analysis. A total of 7 schemes have been identified at a cost of £9.5 million (see Table 21 and Figure 14). These schemes are considered to be required throughout the first 5 years of the Plan period;
- An assessment of the 2022 NBBC Borough Plan DS, including the proposed 2022 mitigation schemes, highlights an improvement in average journey times and speeds, which brings these statistics up to a level comparable with the Reference case in the AM period, and reasonably close in the PM; and
- The introduction of the mitigation schemes are shown to improve the queue impact at the junctions where issues were highlighted in the DN scenario and also improve conditions at several junctions to a point that indicated betterment over the Reference case.

7 BOROUGH PLAN ASSESSMENT - 2027

Overview

7.1 The following section of this report presents the results obtained from detailed testing within the 2027 Paramics scenarios outlined in Chapter 3, and using the assessment criteria outlined in Chapter 5.

2027 Modelled Scenarios

7.2 The following scenarios have been assessed:

- ***2027 NBWA Reference Case***
  The 2027 Reference Case model as described within the forecasting report.
- ***2027 NBBC Borough Plan 'Do Minimum' Scenario (DM)***
  The 2027 NBWA Reference model with the addition of the 2027 Borough Plan demands and the 2022 'Do Something' proposed mitigation package.
- ***2027 NBBC Borough Plan 'Do Something' Scenario (DS)***
  The 2027 Borough Plan demands with the addition of a set of focussed infrastructure improvement schemes; including the schemes identified during the 2022 DS testing and a set of additional schemes identified as necessary between 2022 and 2027 through the 2027 assessment outlined in this chapter.

2027 Mitigation Schemes

7.3 The schemes that were identified as necessary during the first 5 years of the NBBC Plan period (i.e. by 2022) are assumed to be included within the 2027 'Do Minimum' scenario, which has been compared against the 2027 Reference Case to ascertain what additional impacts are likely to arise with the inclusion of the 2027 level of Borough Plan growth.

7.4 Following this review an additional set of mitigation schemes has been identified and included within the 2027 'Do Something' assessment, in combination with the schemes identified during the 2022 review. The 2027 schemes are summarised in Table 23 below and presented in Figure 18.

7.5 The analysis that led to the development of the 2022 schemes has been outlined in Chapter 6 and the overarching strategy behind the introduction of these schemes is summarised in Chapter 4. The identification of the additional schemes by 2027 are given in this chapter via an analysis of the modelling outputs.

7.6 In total 7 additional schemes have been identified as being required between the years of 2022 and 2027 at a cost of approximately £17 million.

Table 23: 2027 Mitigation Schedule

Ref	Location	Existing	Proposed	Cost
8	Roanne Ringway/Coton Rd/Vicarage St	Roundabout	Widening to accommodate two lane exit onto Vicarage St and a two lane section to Church St Rdbt. Reducing exit into Coton Rd (north) to one lane.	£990,000
9	Church St/Vicarage St	Roundabout	Widening for third lane on southern approach and SW circulatory carriageway. Widening of Vicarage St NEB exit and continuing the two lanes to join the approach to Wheat St junction.	£810,000
10	A444 Back St/Leicester Rd Gyratory incl. Bond St, Regent St & Back St	One-way Gyratory	New junctions at Leicester Rd/Vicarage St/Back St (4-arm roundabout) and Leicester Rd/Regent St (LiLo from Regent St only). Back St widened to accommodate a two lane SB section. Closure of Bond St to vehicular traffic.	£1,3500,000
11	Trent Rd/Leicester Rd/Weddington Ln	Priority junction	Reconfiguration of Trent Rd to LiLo. Reduced stacking from Leicester Rd to Weddington Ln from two to one lane.	£650,000
12	Corporation St/Newtown Rd/Powell Way/Roanne Ringway	Roundabout	Addition of dedicated slip for flow from Corporation St to Newtown Rd (east) with extended merge section on Newtown Rd.	£520,000
13	Roanne Ringway/Queens Rd	Signalised Crossroads	Increased two lane merge section on NB exit onto Roanne Ringway (north).	£450,000
14	Croft Rd/Greenmoor Rd Priority	Priority junction	Widening on NB approach to accommodate right turners into Greenmoor Rd.	£120,000
TOTAL COST				**£17,040,000**

N.B.: Costs are rounded to the nearest £10,000 and based on 2016 prices.

Figure 18: 2027 Mitigation Scheme Locations

7.7 It can be seen from the figure above that the proposed mitigation to come forward between 2022 and 2027 are located in and around Nuneaton Town Centre. This is the area that has started to show issues in the 2027 analysis and is intended to mitigate the major issues resulting from the inclusion of the additional Borough Plan demands.

2027 Results Analysis

Model Stability

7.8 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.

7.9 The network stability exhibited within the AM and PM period for each of the three 2027 scenarios is illustrated below.

Table 24: Model Stability Statistics (2027)

Scenario	Period	Success Rate	Peak (Vehs)		End of Period (Vehs)	
			Max	Ave Max	Max	Ave Max
2027 NBWA Reference Case	AM	90%	10,597	10,219	8,245	7,368
	PM	100%	9,384	9,139	6,416	6,057
2027 NBBC Borough Plan 'Do Minimum' Scenario	AM	85%	11,051	10,466	9,472	8,878
	PM	90%	10,940	10,494	8,742	8,060
2027 NBBC Borough Plan 'Do Something' Scenario	AM	90%	10,747	10,079	9,333	8,573
	PM	85%	10,428	10,093	7,530	7,267

7.10 Analysis of the previous table reveals that the 2027 Reference Case network demonstrates a high level of stability in both AM and PM periods. The stability of the model is marginally worsened with the inclusion of the 2027 demands from the Borough Plan allocations on the 'Do Minimum' network, however, stability is still at an acceptable level. With the inclusion of the additional mitigation measures, the stability remains at comparable levels but shows statistics indicating a less congested network both during, and at the end of, the simulation period.

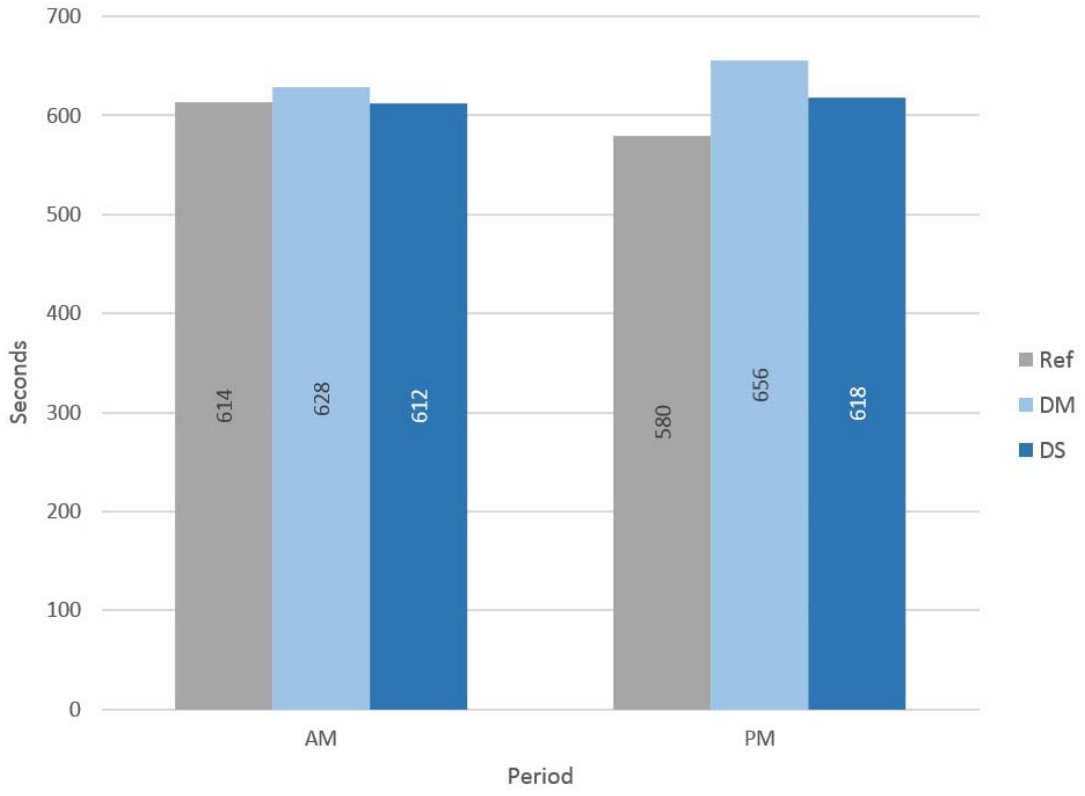
Network Wide Statistics

7.11 The following section presents a comparison between the average network wide statistics obtained from the successful runs of the 2027 assessment scenarios.

Average Journey Time

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

Figure 19: Average Journey Time (2027)



7.13 It can be seen that with the inclusion of the 2027 level of Borough Plan growth that the journey times on the 'Do Minimum' network in both the AM and PM periods increase by 14 and 76 seconds respectively. The PM impact is significantly higher, representing an approximate increase in average journey times on the network of 13%.

7.14 The inclusion of the additional mitigation measures developed to alleviate these additional pressures (i.e. the 2027 DS scenario) indicate a reduction in journey times to levels far closer to the 2027 Reference levels. In the AM period journey times are shown to be unaffected despite the inclusion of the large Borough Plan sites, and in the PM period the increase over the Reference drops to just 6.5% above the Reference levels.

7.15 Again, it is worth note that the average delay observed in the 2027 DS scenario, with the inclusion of the 2027 level of Borough Plan growth and the full set of proposed mitigation measures, is consistent in both the AM and PM period. The increase in journey times when compared to the 2022 DS levels shows an increase of 5% in the AM and 4% in the PM which, considering the increase in Borough Plan development, seems relatively modest.

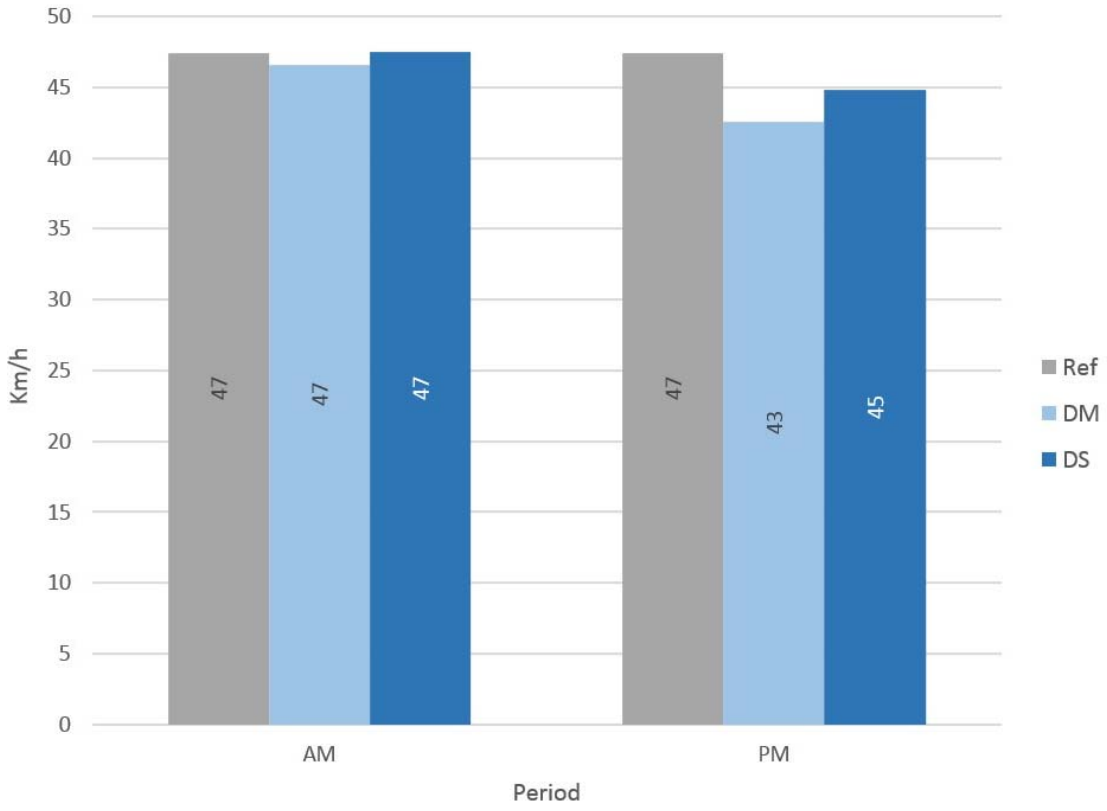
7.16 It is reasonable to conclude that the introduction of the additional 2027 mitigation measures shows a benefit in terms of journey times, most notably in the PM period, and that the

resulting times are not significantly different from the conditions that would be experienced if the Borough Plan did not come forward (i.e. in the 2027 Reference Case).

Average Journey Speed

7.17 Analysis of the average journey speed recorded in each 2027 scenarios is presented in the figure below.

Figure 20: Average Journey Speed (2027)



7.18 Analysis of the figure above reveals that the allocation of the NBBC sites and the associated 2027 level of demands has a negative impact on the average speeds experienced on the network. The PM speeds show the largest reduction where the speeds drop by approximately 4 km/h.

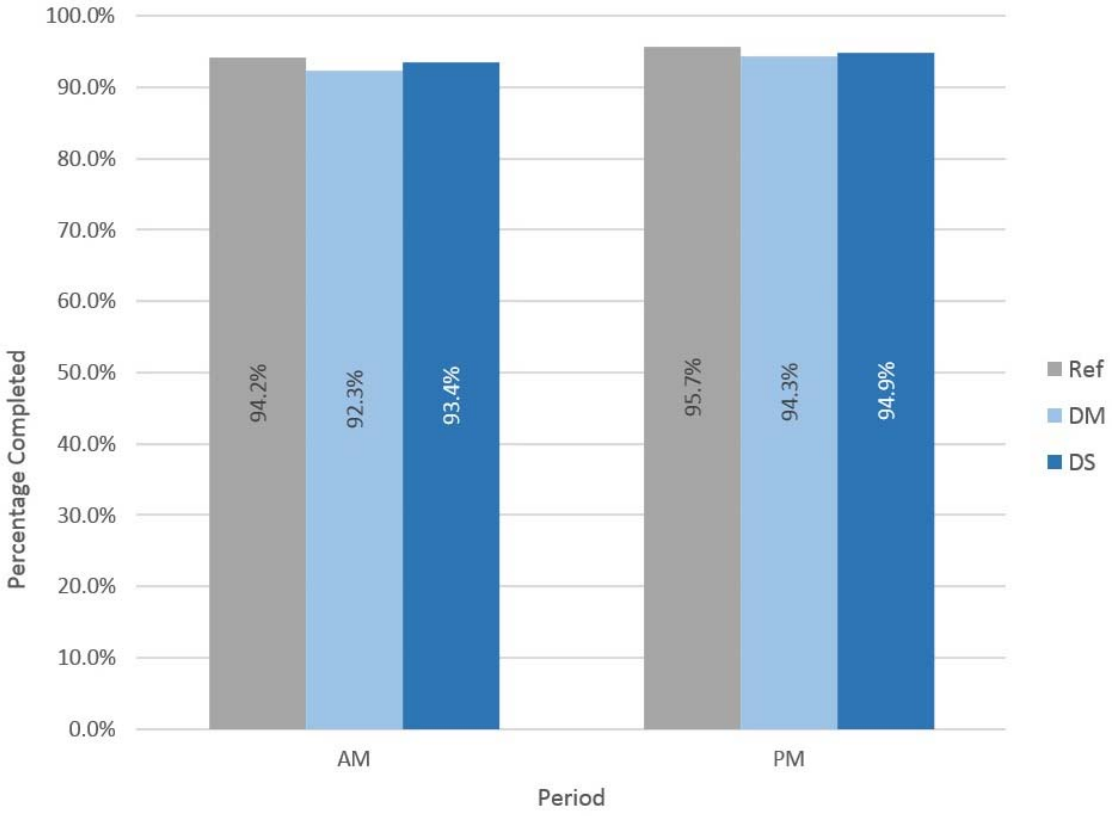
7.19 The introduction of the mitigation measures into the 2027 Borough Plan DS scenario is shown to increase average speeds and bring them back up to levels similar to the Reference model.

7.20 Overall the speeds remain relatively unaffected in 2027 when the Borough Plan demands are included and the full set of mitigation. The proposed schemes clearly mitigate much of the Borough Plan impact in the PM where the impact on the average speeds was most visible.

Completed Trips

7.21 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.

Figure 21: Completed Trips as % of Total Demands (2027)



7.22 The figure above illustrates that the percentage of trips that are completed during the AM and PM period falls against the Reference levels when the 2027 Borough Plan demands are included and the network is left with only the 2022 mitigation schemes included. The inclusion of the additional mitigation helps lift this percentage somewhat and brings them more in line with the Reference scenario.

7.23 The reduction does not appear to be significant in size which is an indicator that the network is not experiencing significant issues that result in major congestion, however, the proposed schemes are shown to improve throughput when compared to the DM and therefore enable a higher number of the trips to be completed during the modelled periods. The introduction of the additional mitigation, when these percentages are converted to vehicle numbers, actually represents an additional 1,605 completed trips in the AM period and 966 in the PM period.

7.24 The following conclusions can be drawn from the 2027 network wide statistics presented, and discussed, above:

- The AM network wide statistics indicate that the 'Do Something' network provides delay (average journey times), speeds and throughput (completed trips) that are comparable to those experienced in the 2027 Reference Case, even with the addition of the Borough Plan growth.
- In the PM period, the average journey times, speeds and throughput are shown to worsen slightly when compared to the Reference Case. However, levels are very similar to those experienced in the AM and are unlikely to be represent significant impacts to the road users. The proposed schemes are shown to significantly improve the conditions when compared to the 'Do Minimum' scenario, so clearly do mitigate much of the issues created by the Borough Plan demands between 2022 and 2027.

Maximum Queue Length Analysis – 2027 'Do Minimum' Scenario

7.25 The following section sets out some initial observations based on the maximum queue length analysis and the differences in queue lengths between the 2027 Reference Case (Ref) and the 2027 NBBC Borough Plan 'Do Minimum' (DM) scenario.

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

AM Analysis: 2027 DM v. 2027 Ref Scenario [MQ 005]

7.27 Analysis of the impacts on AM queuing levels between the 2027 Reference and the 2027 NBBC Borough Plan 'Do Minimum' scenario networks reveals the following:

- 19% of assessed junctions highlight a notable increase in queues (16 out of 84 locations);
- 81% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (13 out of 16) and 19% as 'severe' (3 out of 16);
- No junctions show a 'very severe' increase and 3 junctions shows a 'severe' increase of 25 to 50 vehicles; and
- The junctions showing the 'severe' impact are;
    - Higham Lane/A47 Old Hinckley Road (Junction 63)
    - Arbury Road/Heath End Road (Junction 22)

- A444/Judd Lane/Phoenix Way/Winding House Lane (Junction 44)

7.28 The above impacts have been investigated and in terms of the Higham Lane and Heath End Road junctions the impact experienced at these locations is a direct consequence of the operation of the Nuneaton town centre and the congestion getting into, and through, the town. Mitigation has been proposed that intends to improve circulation and capacity in Nuneaton town centre.

7.29 The impact being flagged as a 'severe' at A444/Judd Lane/Phoenix Way/Winding House Lane relates to the queues on the A444 southern approach i.e. traffic from Coventry. The maximum queue is shown to increase by 33 vehicles from 47 to 80 vehicles. No other approach shows an increase. It is likely that this signalised junction could be optimised to balance the queues and reduce the queues on the southern approach. As such, no specific mitigation has been proposed at this location to mitigate the increased queues.

PM Analysis: 2027 DM v. 2027 Ref Scenario [MQ 006]

7.30 Analysis of the impacts on PM queuing levels between the 2027 Reference and the 2027 NBBC Borough Plan 'Do Minimum' scenario networks reveals the following:

- The PM period highlights more impact from the Borough Plan growth than the AM period;
- 36% of assessed junctions highlight a notable increase in queues (30 out of 84 locations);
- 70% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (21 out of 29) and 30% as 'severe' (9 out of 29);
- No junctions show a 'very severe' increase and 9 junctions shows a 'severe' increase of 25 to 50 vehicles; and
- The junctions showing the 'severe' impact are;
    - Corporation Street/Newtown Road/Powell Way/Roanne Ringway (Junction 16)
    - Roanne Ringway/Coton Road/Vicarage Street (Junction 18)
    - Church Street/Vicarage Street (Junction 19)
    - Croft Road/Greenmoor Road Priority (Junction 21)
    - Arbury Road/Heath End Road (Junction 22)
    - A444/Walsingham Drive (Junction 31)
    - B4113 Coventry Road Exhall/Bayton Road/Coventry Road/School Lane (Junction 41)

- B4114 Tuttle Hill/Corporation Street/Manor Court Road (Junction 55)
- Smorrall Lane/Astley Lane/Dark Lane (Junction 77)

7.31 Junction 16, 18, 19, 21, 22 and 55 are all located in and around Nuneaton town centre and reflect junctions where capacity issues are causing increased queueing.

7.32 The junctions that have been highlighted as experiencing a 'severe' increase in queues when compared to the 2027 Reference Case in both the AM and PM period appear to centre around Nuneaton town centre and the corridors that rely on passing through the town centre.

7.33 A set of proposed schemes that will assist in mitigating the issues witnessed across the two periods has been developed, with a focus on Nuneaton Town centre. The resulting schemes, as outlined in Table 23 have been developed and included in the 2027 NBBC Borough Plan 'Do Something' scenario.

Maximum Queue Length Analysis – 2027 'Do Something' Scenario

7.34 The following section sets out initial observations based on the maximum queue length analysis and the differences in queue lengths between the 2027 Reference Case (Ref) and the 2027 NBBC Borough Plan 'Do Something' (DS) scenario. The DS model includes the 2027 level of Borough Plan growth, the 7 schemes identified during the 2022 assessments (see Table 21) and the 7 additional schemes outlined in Table 23, which have been identified as necessary to accommodate the addition 5 years of Borough Plan growth between 2022 and 2027.

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

<u>AM Analysis: 2027 DS v. 2027 Ref Scenario [MQ 007]</u>

7.36 Analysis of the impacts on AM queuing levels between the 2027 Reference and the 2027 NBBC Borough Plan 'Do Something' scenario networks reveals the following:

- 14% of assessed junctions still highlight a notable increase in queues after the inclusion of the additional mitigation schemes (12 out of 84 locations), down from 19% in the DM scenario;
- 92% of the junctions that still highlight a notable increase in queues are showing only a 'moderate increase' (11 out of 12);

- 17% of assessed junctions highlight a notable reduction in queues (14 out of 84 locations). The majority of these junctions are located in and around Nuneaton town centre where the additional mitigation has been included;
- In 92% of instances the magnitude of difference between the queuing levels on an assessed approach, compared to the Reference Case equivalent is between +/- 15 vehicles. These would likely be disregarded during any detailed statistical analysis;
- No junctions show a 'very severe' increase and only 1 junction shows a 'severe' increase of between 25 to 50 vehicles; and
- The sole junction showing the 'severe' impact is the A444/Judd Lane/Phoenix Way/Winding House Lane (Junction 44) and occurs on the A444 northbound approach. As noted previously, this is still only occurring on this northbound route and the other approaches remain unchanged. It is therefore likely that optimisation of the signals will help balance the queues and reduce the queues on the southern approach.

PM Analysis: 2027 DS v. 2027 Ref Scenario [MQ 008]

7.37 Analysis of the impacts on PM queuing levels between the 2027 Reference and the 2027 NBBC Borough Plan 'Do Something' scenario networks reveals the following:

- 23% of assessed junctions continue to highlight a notable increase in queues (19 out of 84 locations). This is down from 36% in the DM scenario;
- 10% of junctions highlight a notable reduction in queues (8 out of 84 locations). The reductions are seen in and around Nuneaton town centre and correlate with where mitigation has been added;
- 79% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (15 out of 19, previously 21 out of 30 in the DM) and 21% as 'severe' (4 out of 19, previously 9 out of 30 in the DM);
- In 92% of instances the magnitude of difference between the queuing levels on an assessed approach, compared to the Reference Case equivalent is between +/- 15 vehicles. These would likely be disregarded during any detailed statistical analysis;
- No junctions show a 'very severe' increase and only 4 junctions show a 'severe' increase in queues (down from 9 in the DM); and
- The remaining 'severe' impacts are found at;
    - B4113 Coventry Road Exhall/Bayton Road/Coventry Road/School Lane (Junction 41)
    - Smorrall Lane/Astley Lane/Dark Lane (Junction 77)

- M6 Junction 2 (Junction 47)
- Coventry Road/Gipsy Lane (Junction 72)

7.38 In each of the above cases the increase in queues appears on a single approach and, in the case of the signalised junctions (i.e. Junction 41 and 47) optimisation is likely to help balance the queues. Additionally, the issues are not seen in both the AM and PM and have therefore not been prioritised as part of the 2027 mitigation schedule. However, if the issues are seen to be exacerbated in the 2031 assessment then suitable mitigation will be considered.

2027 Assessment Conclusions

7.39 Based on the outcome of the 2027 modelling assessment the following conclusions have been drawn:

- That adoption of the 15% mode shift assumptions alongside the associated development access strategies, with no additional mitigation measures above those proposed for the first 5 years of the Plan, is not likely to be sufficient to ensure that the Borough Plan aspirations can be accommodated without detrimental impact in the surrounding network;
- The analysis of the network wide statistics, when comparing the 2027 NBBC Borough Plan DM scenario with the 2027 Reference Case, indicates impacts on average journey times and speeds, most notably in the PM period;
- The analysis of queue impacts, when comparing the 2027 NBBC Borough Plan DM scenario with the 2027 Reference Case, indicates moderate impacts at a variety of junctions, with a concentration of increases in queues observed at junctions in the centre of Nuneaton or at junctions that lie on primary corridors into the town centre;
- Further analysis has been undertaken to identify mitigation measures to alleviate the pressures highlighted through the DM analysis. A total of 7 schemes have been identified at a cost of £17 million (see Table 23 and Figure 18). These schemes are considered to be required throughout the second 5 years of the Plan period, between 2022 and 2027 and should follow on from the mitigation identified as critical throughout the first 5 years of the Plan;
- An assessment of the 2027 NBBC Borough Plan DS, including the full set of 2022 and 2027 mitigation schemes, highlights an improvement in average journey times and speeds, which brings these statistics up to a level comparable with the Reference case in the AM period, and reasonably close in the PM; and

- The introduction of the mitigation schemes are shown to improve the queue impact at the junctions where issues were highlighted in the DM scenario and also improve conditions at several junctions to a point that indicated betterment over the Reference case. Very few junctions remain that indicate a 'severe' impact in queues once the full set of mitigation is included.

8 BOROUGH PLAN ASSESSMENT - 2031

Overview

8.1 The following section of this report presents the results obtained from detailed testing within the 2031 Paramics scenarios outlined in Chapter 3, and using the assessment criteria outlined in Chapter 5.

2031 Modelled Scenarios

8.2 The following scenarios have been assessed:

- ***2031 NBWA Reference Case***
  The 2031 Reference Case model as described within the forecasting report.
- ***2031 NBBC Borough Plan 'Do Minimum' Scenario (DM)***
  The 2031 NBWA Reference model with the addition of the 2031 Borough Plan demands and the 2027 'Do Something' proposed mitigation packages (i.e. all schemes highlighted though the 2022 and 2027 assessments.
- ***2031 NBBC Borough Plan 'Do Something' Scenario (DS)***
  The 2031 Borough Plan demands with the addition of a set of focussed infrastructure improvement schemes; including the schemes identified during the 2022 and 2027 DS testing and a set of further additional schemes identified as necessary between 2027 and 2031 through the 2031 assessment outlined in this chapter.

2031 Mitigation Schemes

8.3 The schemes that were identified as necessary during the first 10 years of the NBBC Plan period (i.e. by 2027) are assumed to be included within the 2031 'Do Minimum' scenario, which has been compared against the 2031 Reference Case to ascertain what additional impacts are likely to arise with the inclusion of the 2031 level of Borough Plan growth.

8.4 Following this review an additional set of mitigation schemes has been identified and included within the 2031 'Do Something' assessment, in combination with the schemes identified during the 2022 and 2027 reviews. The 2031 schemes are summarised in Table 25 below and presented in Figure 22.

8.5 The analysis that led to the development of the 2022 and 2027 schemes has been outlined in Chapter 6 and Chapter 7 respectively, and the overarching strategy behind the introduction

of these schemes is summarised in Chapter 4. The identification of the additional schemes by 2031 are given in this chapter via an analysis of the modelling outputs.

8.6 In total 13 additional schemes have been identified as being required between the years of 2027 and 2031 at a cost of approximately £14.33 million.

Table 25: 2031 Mitigation Schedule

Ref	Location	Existing	Proposed	Cost
15	Higham Ln/A47 Old Hinckley Rd	Mini-roundabout	Signalisation and widening on Higham Lane and Hinckley Rd (east) approach and on Hinckley Rd (west) exit.	£750,000
16	A4254 Eastboro Way/Townsend Dr	Roundabout	Signalised crossroads.	£1,920,000
17	Donnithorne Ave/Coventry Rd	Mini-roundabout	Signalised T junction. Widening on southern approach.	£440,000
18	Weddington Rd/Weddington Tr	Priority junction	Addition of second lane on northern approach for right turns into Weddington Terrace.	£210,000
19	Ansley Rd/Anstley Ln	Priority junction	Mini-roundabout with minor widening on the eastern approach.	£250,000
20	A444/Walsingham Dr	Roundabout	Addition of 3rd lane flare on all approaches, widening on circulatory to 3 lanes. Widening full length of Walsingham Dr approach from St David's Way Rdbt.	£1,650,000
21	Coventry Rd/Gipsy Ln	Priority junction	Signalisation and significant widening. Southern and eastern approach widened to accommodate 3rd lane on immediate approach. Northern approach widened to accommodate 2 lanes. NB exit widened to accommodate 2 lane exit.	£760,000
22	B4113 Coventry Rd Exhall/Bayton Rd/Coventry Rd/School Ln	Signalised Crossroads	Widening of northern approach (2 to 3 lanes) and southern exit (1 to 2 lanes) to allow two lane SB movement on Coventry Road	£780,000

23	A444 Weddington Rd/Shanklin Dr	Priority junction	Signalisation. Addition of long two lane section on NB approach to accommodate right turners into Shanklin Dr.	£500,000
24	A4254 Eastboro Way NB Corridor (between Crowhill Rd & Townsend Dr)	Single lane carriageway	Addition of second lane in NB direction from Crowhill to Camborne Dr, joining the two lane exits and two lane approaches introduced by Scheme 4 & 16, and the widening at the north of Eastboro Way.	£5,760,000
25	Arbury Rd/Heath End Rd	Mini-roundabout	Signalised T junction. Widening on western approach to accommodate a second lane for right turners into Heath End Rd.	£310,000
26	Coventry Rd Exhall/Blackhorse Rd/Longford Rd/Wilsons Ln	Signalised Crossroads	Addition of second lane on the SB approach to accommodate the right turners into Wilsons Ln.	£680,000
27	Church Ln/Bowling Green Ln/School Ln	Priority junction	Roundabout with two lane approach from School Ln.	£320,000
TOTAL COST				**£14,330,000**

N.B.: Costs are rounded to the nearest £10,000 and based on 2016 prices.

Figure 22: 2031 Mitigation Scheme Locations

8.7 It can be seen from the figure above that the proposed mitigation schemes identified as required between 2027 and 2031 are located on the main routes in and out of Nuneaton town centre and at the junctions adjacent to M6 Junction 3.

8.8 Some of these locations had started to show issues in the 2027 analysis (e.g. location 15, 21 and 22) and some have become necessary to consolidate the strategy developed in the earlier years and complete the corridor enhancements on the key routes within the area.

2031 Results Analysis

Model Stability

8.9 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.

8.10 The network stability exhibited within the AM and PM period for each of the three 2031 scenarios is illustrated below.

Table 26: Model Stability Statistics (2031)

Scenario	Period	Success Rate	Peak (Vehs)		End of Period (Vehs)	
			Max	Ave Max	Max	Ave Max
2031 NBWA Reference Case	AM	75%	11,755	10,856	10,664	9,148
	PM	95%	9,605	9,206	7,035	6,382
2031 NBBC Borough Plan 'Do Minimum' Scenario	AM	65%	11,473	11,123	11,159	10,300
	PM	65%	11,658	11,503	11,140	9,789
2031 NBBC Borough Plan 'Do Something' Scenario	AM	80%	11,617	11,238	10,634	9,595
	PM	90%	10,955	10,648	8,360	7,823

8.11 Analysis of the previous table reveals that the 2031 Reference Case network demonstrates a reduced level of stability in the AM period compared to the PM period. The stability of the model is significantly worsened with the inclusion of the 2031 demands from the Borough Plan allocations on the 'Do Minimum' network. The level of stability is considered to be on the boundary of acceptability, however, it does still provide sufficient 'successful' runs against which to draw comparisons with the Reference model.

8.12 With the inclusion of the additional mitigation measures identified during the 2031 assessment, the stability improves to levels comparable with the Reference Case. As expected, the statistics from the DS scenario indicate more traffic on the network than in the

Reference as the Borough Plan growth is included. They also indicate that the traffic is clearing over the period and that the levels on the network at the peak and at the end of the simulation are significantly improved with the inclusion of the additional 2031 mitigation schemes.

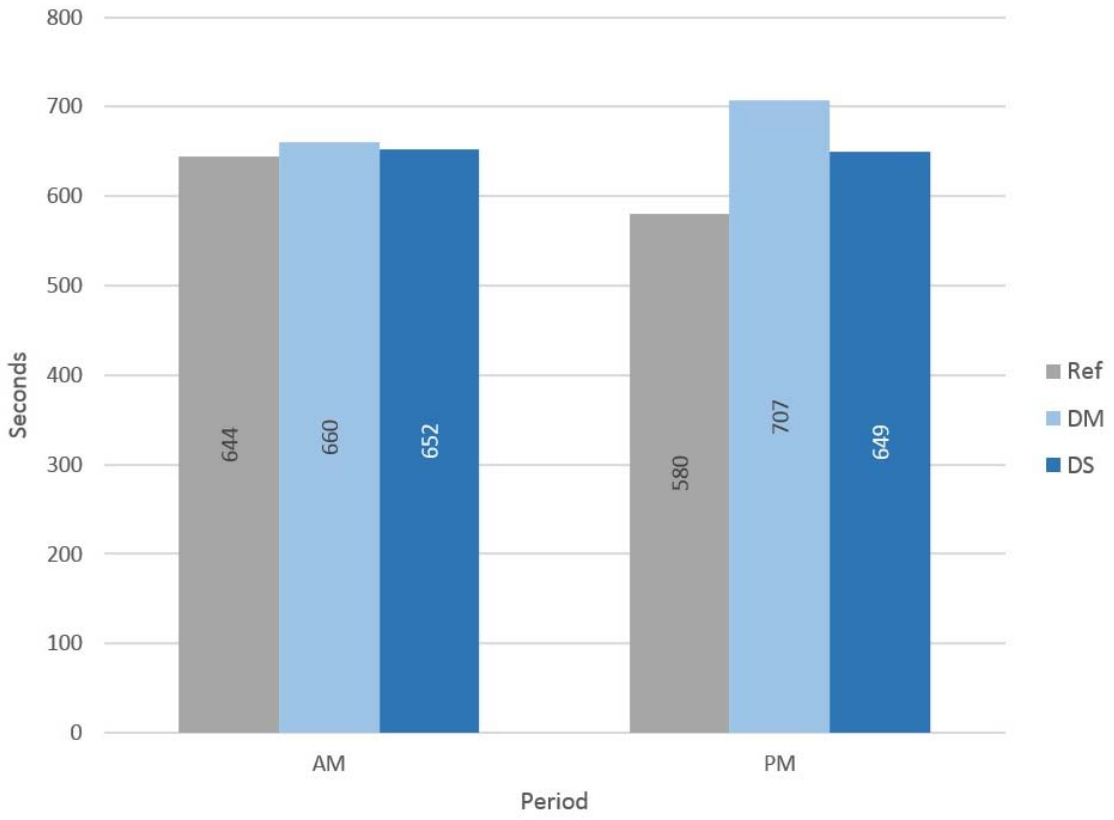
Network Wide Statistics

8.13 The following section presents a comparison between the average network wide statistics obtained from the successful runs of the 2031 assessment scenarios.

Average Journey Time

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

Figure 23: Average Journey Time (2031)



8.15 It can be seen that with the inclusion of the 2031 level of Borough Plan growth that the journey times on the 'Do Minimum' network in the AM and PM periods increase by 16 and 127 seconds respectively. The PM impact is significantly higher, representing an approximate increase in average journey times on the network of 22%.

8.16 The inclusion of the additional mitigation measures developed to alleviate these additional pressures (i.e. the 2031 DS scenario) indicate a reduction in journey times to levels closer to the 2031 Reference levels. In the AM period journey times are shown to be relatively unaffected despite the inclusion of the large sites, and in the PM period the increase over the Reference drops by 58 seconds.

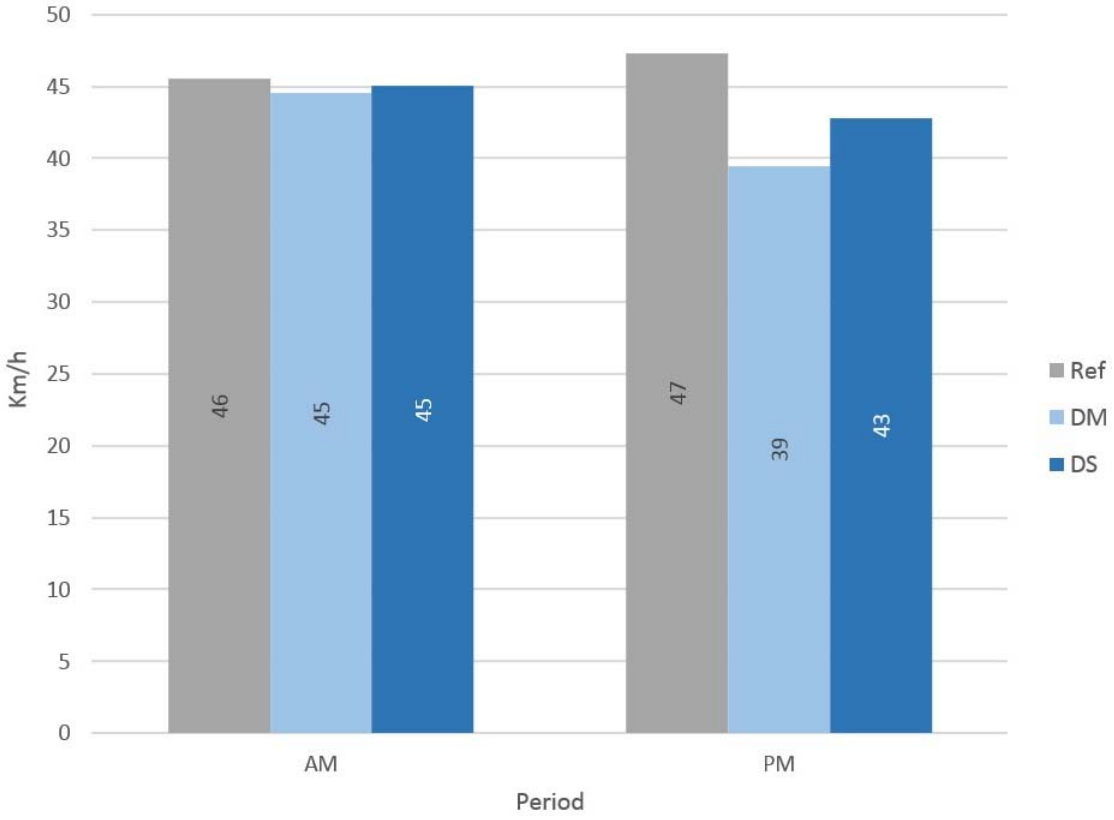
8.17 Again, it is worth noting that the average delay observed in the 2031 DS scenario, with the inclusion of the 2031 level of Borough Plan growth and the full set of proposed mitigation measures, is consistent in both the AM and PM period. The increase in journey times when compared to the 2027 DS levels shows an increase of 6% in the AM and 5% in the PM which, considering the increase in Borough Plan development, seems relatively modest.

8.18 It is reasonable to conclude that the introduction of the additional 2031 mitigation measures shows a benefit in terms of journey times, most notably in the PM period. In the AM period the resulting times are in line with the conditions that would be experienced if the Borough Plan did not come forward (i.e. in the 2031 Reference Case). In the PM there is a 12% increase against the Reference, however, they are comparable with the AM period and only 5% higher than in the 2027 DS scenario, 4 years earlier.

Average Journey Speed

8.19 Analysis of the average journey speed recorded in each 2031 scenarios is presented in the figure below.

Figure 24: Average Journey Speed (2031)



8.20 Analysis of the figure above reveals that the allocation of the NBBC sites and the associated 2031 level of demands has a negative impact on the average speeds experienced on the network. The PM speeds show the largest reduction where the speeds drop by approximately 8 km/h without the introduction of any additional mitigation.

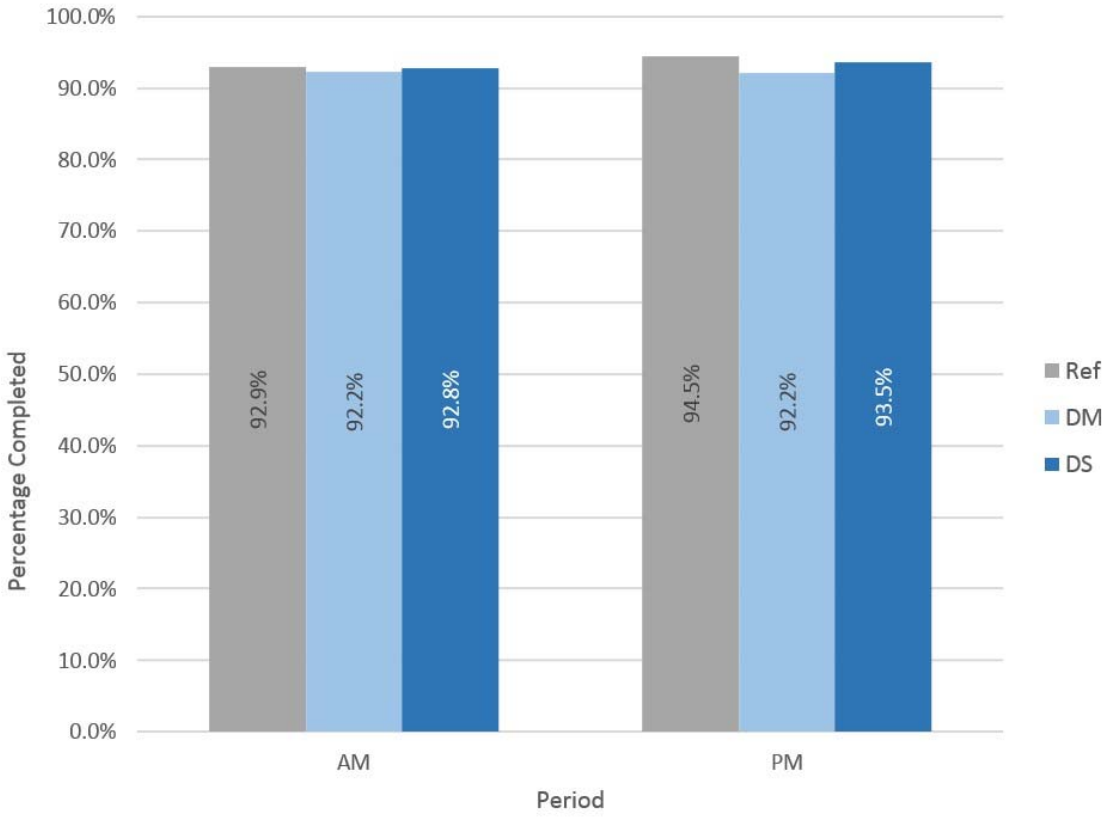
8.21 The introduction of the mitigation measures into the 2031 Borough Plan DS scenario is shown to increase average speeds and bring them back up to levels much closer to the Reference model.

8.22 Overall the speeds remain relatively unaffected in 2031 when the Borough Plan demands are included and the full set of mitigation in place. The proposed schemes clearly mitigate much of the Borough Plan impact in the PM where the impact on the average speeds was most visible.

Completed Trips

8.23 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.

Figure 25: Completed Trips as % of Total Demands (2031)



8.24 The figure above illustrates that the percentage of trips that are completed during the AM and PM period falls against the Reference levels when the 2031 Borough Plan demands are included and the network is left with only the 2022 and 2027 mitigation schemes included.

8.25 The inclusion of the additional mitigation helps lift this percentage somewhat and brings them more in line with the Reference scenario.

8.26 The proposed additional mitigation schemes are shown to improve throughput when compared to the DM and therefore enable a higher number of the trips to be completed during the modelled periods. The introduction of the additional mitigation, when these percentages are converted to vehicle numbers, represents an additional 851 completed trips in the AM period and 2,126 in the PM period.

8.27 The following conclusions can be drawn from the 2031 network wide statistics presented, and discussed, above:

- The AM network wide statistics indicate that the 'Do Something' network provides delay (average journey times), speeds and throughput (completed trips) that are comparable

to those experienced in the 2031 Reference Case, even with the addition of the Borough Plan growth.

- In the PM period, the average journey times, speeds and throughput are shown to worsen slightly when compared to the Reference Case. However, levels are very similar to those experienced in the AM and are unlikely to be represent significant impacts to the road users. The proposed schemes are shown to significantly improve the conditions when compared to the 'Do Minimum' scenario, so clearly do mitigate much of the issues created by the Borough Plan demands between 2027 and 2031.

Maximum Queue Length Analysis – 2031 'Do Minimum' Scenario

8.28 The following section sets out initial observations based on the maximum queue length analysis and the differences in queue lengths between the 2031 Reference Case (Ref) and the 2031 NBBC Borough Plan 'Do Minimum' (DM) scenario.

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

AM Analysis: 2031 DM v. 2031 Ref Scenario [MQ 009]

8.30 Analysis of the impacts on AM queuing levels between the 2031 Reference and the 2031 NBBC Borough Plan 'Do Minimum' scenario networks reveals the following:

- 23% of assessed junctions highlight a notable increase in queues (19 out of 84 locations);
- 74% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (14 out of 19) and 26% as 'severe' (5 out of 19);
- No junctions show a 'very severe' increase and 5 junctions shows a 'severe' increase of 25 to 50 vehicles; and
- The junctions showing the 'severe' impact are;
    - A4254/B4114/Eastboro Way (Junction 27)
    - Leicester Road/Rye Piece Ringway (Junction 32)
    - A444/Judd Lane/Phoenix Way/Winding House Lane (Junction 44)
    - Higham Lane/A47 Old Hinckley Road (Junction 63)
    - A444/Newtown Road (Junction 76)

8.31 The above issues have been investigated and a review of potential mitigation carried out with the objective of limiting the impacts at these junctions.

8.32 A mitigation scheme was already proposed for Junction 27 as part of the 2022 mitigation schedule, however, further improvements to the A4254 Eastboro Way corridor have been proposed to help alleviate pressure on this route elsewhere.

8.33 The issues at Junction 32 and 76 are partially due to the higher demands looking to route through Bedworth and avoid busier sections of the A444 e.g. Griff Island and A444/Walsingham Drive. As such, improvements at these A444 locations have been tested to provide the additional capacity on the main A444 route and draw traffic from the local routes where the junctions have highlighted increased queueing.

8.34 A new junction has been proposed at Higham Lane/A47 Old Hinckley Road to mitigate the queueing highlighted in the 2031 assessment (and to a lesser extent in the 2027 assessment).

8.35 As noted in the 2027 assessment, the increase in queues at Junction 44 (i.e. A444/Judd Ln/Phoenix Way/Winding House Ln) only occurs on the southern approach and likely to be able to be balanced through optimisation of the existing signal timings. No scheme has been proposed at this time.

PM Analysis: 2031 DM v. 2031 Ref Scenario [MQ 010]

8.36 Analysis of the impacts on PM queuing levels between the 2031 Reference and the 2031 NBBC Borough Plan 'Do Minimum' scenario networks reveals the following:

- The PM period highlights significantly more impact in terms of increased congestion than in the AM period;
- 44% of assessed junctions highlight a notable increase in queues (37 out of 84 locations);
- 54% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (20 out of 37), 35% as 'severe' (13 out of 37) and 11% as 'very severe' (4 out of 37);
- The junctions showing the 'severe' impact are;
    - Roanne Ringway/Coton Road/Vicarage Street (Junction 19)
    - Arbury Road/Heath End Road (Junction 22)

- Donnithorne Avenue/Coventry Road (Junction 28)
- B4114 Lutterworth Road/Golf Drive/Bulkington Lane (Junction 29)
- A444/Walsingham Drive (Junction 31)
- Leicester Road/Rye Piece Ringway (Junction 32)
- B4113/Longford Road/Bedworth Road/Wilsons Lane (Junction 42)
- A444/Judd Lane/Phoenix Way/Winding House Lane (Junction 44)
- M6 Junction 2 (Junction 47)
- Coventry Road/Gipsy Lane (Junction 72)
- A444/Newtown Road (Junction 76)
- Smorrall Lane/Astley Lane/Dark Lane (Junction 77)
- Heath Road/Smarts Road/Bowling Green Lane/Goodyers End Lane (Junction 79)

- The junctions showing the 'very severe' impact are;

  - B4113 Coventry Road Exhall/Bayton Road/Coventry Road/School Lane (Junction 41)
  - M6 Junction 3 (Junction 43)
  - A444/Holbrook Way (Junction 45)
  - A444/Foleshill Road (Junction 46)

8.37 Of the junctions highlighted as showing a 'severe' or 'very severe' impact, Junctions 17, 22, 31, 41 and 72 have all been assigned an improvement scheme in the 2031 DS assessment. Junction 42 was allocated a scheme in the 2022 assessment and Junction 19 during the 2027 assessment.

8.38 Some of the remaining junctions were also highlighted in the AM period and schemes have been proposed at junctions elsewhere on the network to promote the use of alternative routes away from these junction e.g. Junction 76 and Junction 32.

8.39 Junction 44 has been discussed previously and is likely to be improved through the optimisation of the signal times. Junction 47 impact is only highlighted in the PM and only on the one approach (i.e. A46 approach) so there is also potential for optimisation of the signal times without expensive mitigation.

8.40 No scheme has been proposed at M6 Junction 3 at present. There are issues at this junction in the Reference models without the inclusion of the Borough Plan demands and it is advised

that in the future a study looks at more detail at this strategic junction. However, from the assessments outlined in this report the impact of NBBC Borough Plan at M6 Junction 3 is only highlighted as 'severe' in the 2031 DM PM scenario and in no other assessment year or period. It should be noted that despite the indication of a 'very severe' impact, the absolute lengths of queues are still significantly shorter than those recorded in the AM period, although those queues are not flagged up as the increase, with the inclusion of the Borough Plan demands, is relatively small. A more detailed analysis of the 2031 demands and queues at this junction in each scenario has been provided later in this chapter to clarify these observations.

8.41 A set of proposed schemes that will best assist in mitigating the issues across the two 2031 periods is presented, with a focus on the priority locations and routes, and taking cognisance of the available land and the feasibility of preparing a scheme at a cost in line with the level of impact that can be attributed to NBBC's Borough Plan. The most significant impacts are highlighted in the PM period, where stability, average journey times and the impact in queueing across the network are most significant. As such, the schemes proposed for introduction in these later years of the Plan period (i.e. between 2027 and 2031) are primarily designed to mitigate the issues in the PM.

8.42 The resulting schemes, as outlined in Table 25 have been developed and included in the 2031 NBBC Borough Plan 'Do Something' scenario.

Maximum Queue Length Analysis – 2031 'Do Something' Scenario

8.43 The following section sets out initial observations based on the maximum queue length analysis and the differences in queue lengths between the 2031 Reference Case (Ref) and the 2031 NBBC Borough Plan 'Do Something' (DS) scenario. The DS model includes the 2031 level of Borough Plan growth, the schemes identified during the 2022 and 2027 (see Table 21 and Table 23), and an additional 13 schemes identified as necessary to accommodate the addition years of Borough Plan growth between 2027 and 2031.

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

AM Analysis: 2031 DS v. 2031 Ref Scenario [MQ 011]

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

- Overall the queueing impact appears to remain relatively consistent with the DM scenario. Queue impacts appear to be reduced within Nuneaton town centre as alternative routes are promoted by the new mitigation schemes e.g. improvements on Eastboro Way (Scheme 16 and 24);
- 27% of assessed junctions highlight a notable increase in queues (23 out of 84 locations);
- 74% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (17 out of 23) and 26% as 'severe' (6 out of 23).
- No junctions show a 'very severe' increase and 6 junctions shows a 'severe' increase of 25 to 50 vehicles;
- 18% of assessed junctions highlight a positive reduction in queues (15 out of 84 locations). The majority of these junctions are located in and around Nuneaton town centre;
- In 87% of instances the magnitude of difference between the queuing levels on an assessed approach, compared to the Reference Case equivalent is between +/- 15 vehicles. These would likely be disregarded during any detailed statistical analysis; and
- The junctions that are showing the 'severe' impact are;
    - Leicester Road/Rye Piece Ringway (Junction 32)
    - B4113/Longford Rd/Bedworth Rd/Wilsons Ln (Junction 42)
    - A444/Judd Lane/Phoenix Way/Winding House Lane (Junction 44)
    - Higham Lane/St. Nicolas Park Drive (Junction 62)
    - Higham Lane/A47 Old Hinckley Road (Junction 63)
    - Nuneaton Road/Marston Lane/Leicester Road (Junction 74)

8.46 It has not been possible to mitigate all impact in the 2031 Borough Plan DS scenario, however, mitigation has been prioritised with the PM period in mind as this is where the most significant impact were observed. The additional schemes in addition to the schemes proposed in the earlier stages of the Plan period still indicate a level of network operation comparable to the 2031 Reference Case.

8.47 Of the 6 locations where 'severe' impacts are still shown, two of the junctions have a mitigation scheme proposed (e.g. Junction 42 and Junction 63) and should be able to be optimised further to reduce the queue imbalance on approaches. Additionally, Junction 44 has been discussed previously and it is suggested that signal optimisation should improve

conditions at this junction. Of the remaining three locations, all represent relatively minor junctions, either a priority junction (Junction 74) or mini-roundabouts (Junction 62 and Junction 32), and in all cases the it is only the one arm showing an increase in maximum queues and it is by a magnitude of 30 vehicles or less i.e. borderline 'severe'.

PM Analysis: 2031 DS v. 2031 Ref Scenario [MQ 012]

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

- 37% of assessed junctions continue to highlight a notable increase in queues (31 out of 84 locations). This is down from 44% in the DM scenario;
- 6% of junctions highlight a notable reduction in queues (5 out of 84 locations). The reductions are seen at junctions to the south of Nuneaton town centre;
- 68% of the junctions that highlight a notable increase in queues are showing a 'moderate increase' (21 out of 31, previously 20 out of 37 in the DM) and 32% indicate a 'severe' increase (10 out of 31, previously 13 out of 37 in the DM);
- In 89% of instances the magnitude of difference between the queuing levels on an assessed approach, compared to the Reference Case equivalent is between +/- 15 vehicles. These would likely be disregarded during any detailed statistical analysis.
- No junctions show a 'very severe' increase (down from 4 in the DM); and
- The junctions showing the 'severe' impact are;
    - B4102 Queens Road/Beaumont Road/Manor Court Road (Junction 20)
    - Arbury Road/Heath End Road (Junction 22)
    - A4254/B4114/Eastboro Way (Junction 27)
    - Leicester Road/Rye Piece Ringway (Junction 32)
    - B4113 Coventry Road Exhall/Bayton Road/Coventry Road/School Lane (Junction 41)
    - M6 Junction 3 (Junction 43)
    - A444/Holbrook Way (Junction 45)
    - M6 Junction 2 (Junction 47)
    - Higham Lane/A47 Old Hinckley Road (Junction 63)
    - Smorrall Lane/Hospital Lane (Junction 78)

8.49 Several of the junctions highlighting a 'severe' impact have been reclassified from a 'very severe' impact in the DM scenario (e.g. Junction 41, 43 and 45).

8.50 Similarly, the inclusion of the additional mitigation has reduced queues at various junctions from a 'severe' classification to a 'moderate' classification. This occurs at junctions where specific mitigation has been proposed e.g. Junction 28, 31 and 72.

8.51 The impact on queues at M6 Junction 2 (Junction 47) has been highlighted on the A46 approach. As noted before, it is highly likely that improvements can be made at this location through the revision of the signal times and further optimisation to balance queues and provide additional gaps for vehicles on this approach. It is noted that this approach is the only approach at M6 Junction 2 that isn't signalised so there is possibly an opportunity for signalisation to be considered at a later date, and investigated through a separate study.

8.52 There has also been a residual 'severe' impact left at M6 Junction 3, reclassified from 'very severe' in the DM scenario. The approach showing the increase in maximum queue lengths in the DS scenario is the B4113 approach, where an increase of 28 vehicles is recorded. As noted previously, the actual length of the queues are significantly longer in the AM period, however, the increase over and above those recorded in the Reference Case is classified as 'moderate'. Further details pertaining to the operation and Borough Plan impact at M6 Junction 3 is provided in the following section.

8.53 The remaining 'severe' impacts are spread out across the network and do not necessarily match the locations highlighted in the AM period. There are also instances where the impact is shown to occur at a junction that has been revised with a new scheme (e.g. Junction 63 and 41). There has therefore been little scope to improve these junctions further and limited reason, on balance, for doing so as a priority.

Strategic Road Network Review

A5 Corridor

8.54 The impact assessment outlined within this report has highlighted no 'severe' residual impact on the A5 junctions once the inclusion of the proposed mitigation has been included (i.e. based on the 'Do Something' queue analysis (see MQ003, MQ004, MQ007, MQ008, MQ011 and MQ012 in Appendix B). Additionally, no mitigation has been propose on any junction along this corridor.

8.55 The Reference models include the new schemes at A5/A47 Dodwells Rd/B4666 Coventry Rd roundabout and the now funded dualling between these two junctions. There has also been significant capacity improvements in recent years at junctions on the A5, northwest of The

Long Shoot relating to the MIRA site. As such, there does appear to be capacity to accommodate elements of NBBC Borough Plan when considered in conjunction with the proposed improvements on the other corridors throughout the modelled area.

8.56 It should, however, be noted that this does not guarantee that there will be no impact, or the need for mitigation, on this corridor before 2031, rather that it is just not highlighted though this assessment of the NBBC Borough Plan.

8.57 The focussed impact from specific sites will still require detailed assessment to determine whether their site has a discernible impact on the A5 junctions, and the decision as to whether mitigation is required will be subject to Highways England and WCC review, as with all the sites when they reach planning stages. Additionally, there is also the potential for revised conclusions once neighbouring authorities adopt their Local Plans (e.g. North Warwickshire and Tamworth) as this may impact the level of growth and the trip patterns along the A5 corridor. It is therefore suggested that a cumulative impact assessment may be necessary at specific junctions once these Local Plans are adopted.

M6 Junction 3

8.58 The residual impact at M6 Junction 3 (based on queue analysis), post inclusion of the proposed mitigation elsewhere on the network, has highlighted few new issues as a direct result of the inclusion of the NBBC Borough Plan sites. However, it has been noted that the level of congestion at Junction 3, particularly in the AM period, is significant with or without the Borough Plan growth.

8.59 It is also noted that due to the proximity of this junction to Coventry, and its strategic nature, it is also likely to attract demands from sites in Coventry's Local Plan sites once adopted. Similarly, the wider effects of the Smart Motorway and its potential draw of traffic to this area are yet to be known. As such, it is clear that the issues at M6 Junction 3 are likely to continue in the future and at some stage consideration of capacity improvements will be needed.

8.60 Any future review of this junction should therefore consider the cumulative impact of the various sources of growth at the junction (e.g. background growth and growth from the NBBC and CCC adopted Plans) once it becomes more clear. This may lead to the need for mitigation, which may require a partial contribution to a scheme in the Infrastructure Delivery Plan.

8.61 Notwithstanding the above, a review of the demands and queues observed at M6 Junction 3 within the model scenarios developed as part of the NBBC STA are presented in Appendix D, and the 2031 analysis discussed below.

8.62 The total demands for the three AM and three PM hours have been presented in Table 27 and Table 28 respectively for the 2031 Reference Case and the 2031 Borough Plan 'Do Something' scenario. The Borough Plan demands have also been isolated and presented to give an indication of the Borough Plan demands that traverse the junction in 2031.

8.63 The nature of the model and the ability for traffic to dynamically re-route through the network ensures that the Borough Plan demands are not simply added directly onto the Reference Case levels. Additionally, the forecasting method also means that some background traffic is redistributed by the Borough Plan demands onto the local roads. For these reasons the net impact on demands is not necessarily equal to the Borough Plan demands.

Table 27: 2031 M6 Junction 3 Demands (AM Period: 07:00-10:00)

2031 NBWA Reference Case					
	A444 North	**M6 East**	**B4113**	**A444 South**	**M6 West**
A444 North	2	2,440	1,216	2,640	1,182
M6 East	696	0	554	1,240	252
B4113	698	830	0	538	414
A444 South	1,884	2,084	338	50	800
M6 West	890	1,394	448	1,184	0
2031 NBBC Borough Plan 'Do Something' Scenario					
	A444 North	**M6 East**	**B4113**	**A444 South**	**M6 West**
A444 North	0	2,752	1,410	3,300	1,088
M6 East	796	0	778	1,356	248
B4113	906	826	12	558	392
A444 South	2,068	2,050	378	268	758
M6 West	822	1,486	470	1,174	0
2031 NBBC Borough Plan 'Do Something' Scenario – Borough Plan Only					
	A444 North	**M6 East**	**B4113**	**A444 South**	**M6 West**
A444 North	0	844	442	1,184	124
M6 East	218	0	284	208	0
B4113	342	164	12	150	56
A444 South	450	52	52	232	24
M6 West	120	0	114	122	0

Table 28: 2031 M6 Junction 3 Demands (PM Period: 16:00-19:00)

2031 NBWA Reference Case					
	A444 North	**M6 East**	**B4113**	**A444 South**	**M6 West**
A444 North	0	920	866	2,050	796
M6 East	2,178	0	1,184	2,474	240
B4113	858	544	0	634	356
A444 South	3,016	1,360	394	68	1,014
M6 West	1,180	1,322	350	920	0
2031 NBBC Borough Plan 'Do Something' Scenario					
	A444 North	**M6 East**	**B4113**	**A444 South**	**M6 West**
A444 North	0	1,172	1,140	2,196	782
M6 East	2,406	0	1,328	2,372	272
B4113	1,432	624	44	790	446
A444 South	3,692	1,410	520	86	952
M6 West	1,204	1,286	336	898	0
2031 NBBC Borough Plan 'Do Something' Scenario – Borough Plan Only					
	A444 North	**M6 East**	**B4113**	**A444 South**	**M6 West**
A444 North	0	418	346	356	72
M6 East	636	0	326	58	0
B4113	608	146	44	282	146
A444 South	974	114	128	36	110
M6 West	178	0	24	10	0

8.64 The average hourly maximum queue recorded across the three AM and three PM hours have been presented in Figure 26 and Figure 27 below, comparing the 2031 Reference and the 2031 Borough Plan 'Do Something' scenarios.

Figure 26: Average Hourly Maximum Queue Length (AM Period: 07:00-10:00)

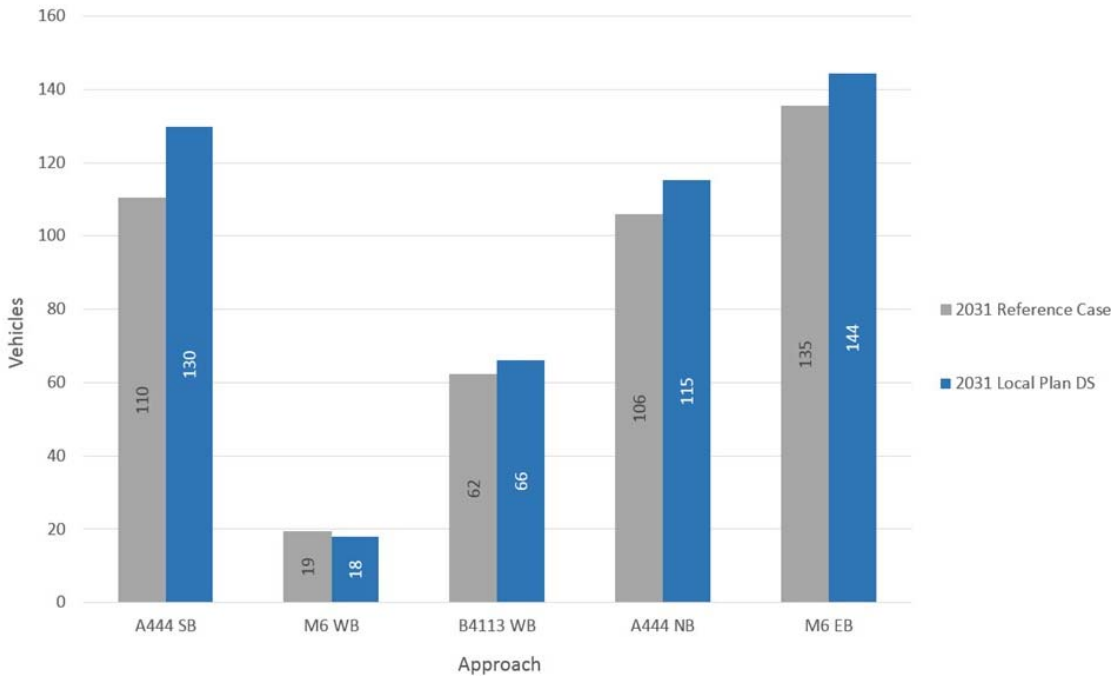
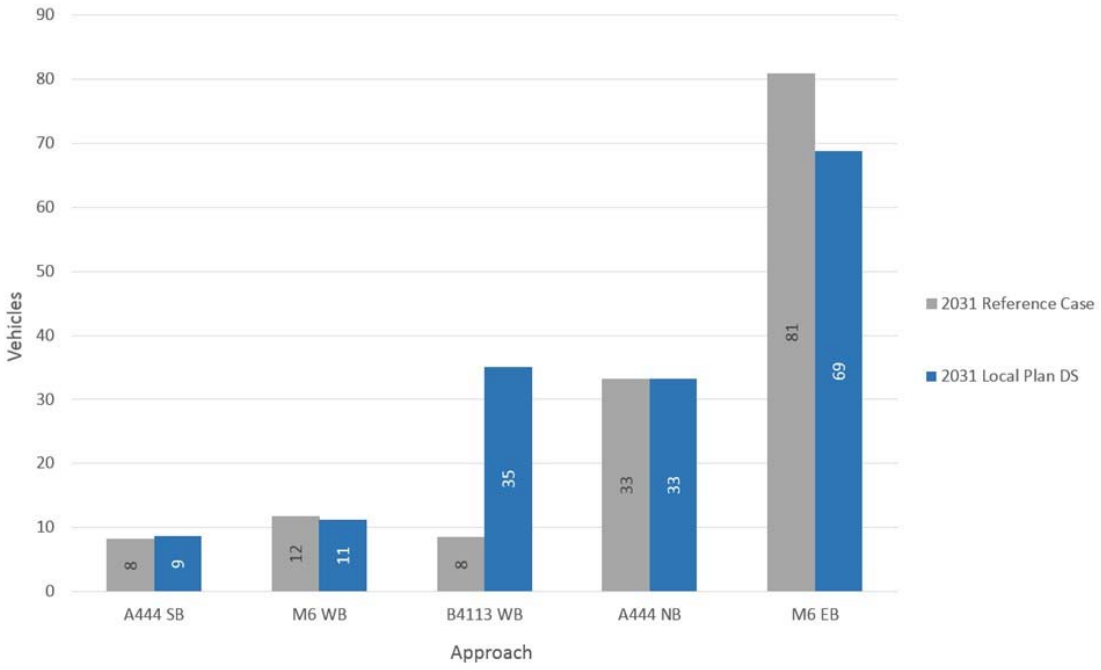


Figure 27: Average Hourly Maximum Queue Length (PM Period: 16:00-19:00)



8.65 It can be seen from the figures above that the queue lengths in general are significantly longer in the AM period than in the PM period. However, the impact of the Borough Plan demands are relatively minor in terms of increases in the queue lengths. This does however highlight the issues that are likely to exist at this junction in 2031 even without the inclusion of NBBC Borough Plan demands.

8.66 In the PM period the queue lengths are significantly shorter and remain reasonable consistent in across the two scenarios. The B4113 approach shows an increase of 27 vehicles which has been categorised as a 'severe' impact in the queue analysis. Given the level of queuing observed in the 2031 Reference this increase is not sufficient to trigger the need for the development of a new scheme as part of the NBBC STA testing.

8.67 As noted earlier in this report, it is advised that a separate study, if required, be carried out to explore potential capacity improvements at M6 Junction 3, but as part of the NBBC STA the need for such a study has not been necessary based on the Borough Plan impact. However, the impacts may become more pronounced once the cumulative impact of both Coventry City Council (CCC) and NBBC's Plans are considered.

8.68 Due to the uncertainty surrounding CCC's allocations at the time of undertaking this assessment, and the objective of determining NBBC's Borough Plan impact on the network in isolation, the level of Coventry growth and its assignment across the NBWA network was not

specifically incorporated, but rather accounted for more generally through the external growth informed by TEMPRO.

2031 Assessment Conclusions

8.69 Based on the outcome of the 2031 modelling assessment the following conclusions have been drawn:

- That adoption of the 15% mode shift assumptions alongside the associated development access strategies, with no additional mitigation measures above those proposed for the first 10 years of the Plan, is not likely to be sufficient to ensure that the Borough Plan aspirations can be accommodated without detrimental impact in the surrounding network;
- The analysis of the network wide statistics, when comparing the 2031 NBBC Borough Plan DM scenario with the 2031 Reference Case, indicates significant impacts on average journey times and speeds, most pronounced in the PM period;
- The analysis of queue impacts, when comparing the 2031 NBBC Borough Plan DM scenario with the 2031 Reference Case, indicates a large number of junctions showing 'severe' and 'very severe' impacts, the majority being identified in the PM period;
- Further analysis has been undertaken to identify mitigation measures to alleviate the pressures highlighted through the DM analysis. A total of 13 schemes have been identified at a cost of £14.3 million (see Table 25 and Figure 22). These schemes are considered to be required throughout the last 4 years of the Plan period, between 2027 and 2031 and should follow on from the mitigation identified as a priority during the period up until 2027;
- An assessment of the 2031 NBBC Borough Plan DS, including the full set of 2022, 2027 and 2031 mitigation schemes, highlights an improvement in average journey times and speeds, which brings these statistics up to a level comparable with the Reference case in the AM period, and significantly closer in the PM than the levels observed in the DM scenario; and
- The introduction of the mitigation schemes are shown to improve the queue impact at many of the junctions where issues were highlighted in the DM scenario and also improve conditions at several junctions to a point that indicates betterment over the Reference case. Of the remaining junctions that indicate a 'severe' impact in queues it is likely that improvements can be made through optimisation of the exiting junction, or the proposed mitigation scheme, if one has been proposed. As such, specific mitigation

at these junctions has not been deemed as critical as those identified throughout this study.

9 SUMMARY & CONCLUSIONS

Overview

9.1 Vectos Microsim (VM) has been commissioned by Warwickshire County Council (WCC) and Nuneaton and Bedworth Borough Council (NBBC) to assess the NBBC Borough Plan allocation, ascertain the potential transport impacts and investigate and identify outline mitigation schemes thereof. Highway England have also been involved throughout the process and have contributed to, and reviewed, each iteration of the Strategic Transport Assessment.

9.2 Focus has been placed on identifying the essential infrastructure requirements in the first 5 years of the plan and subsequently grading further infrastructure requirements as the plan period progresses into the later years.

Study Objectives

9.3 The objectives of this modelling assessment were as follows:

- To establish a suitable Nuneaton and Bedworth Wide Area (NBWA) Reference Case model for each of the three assessment years (2022, 2027 and 2031) against which the impact of the NBBC Borough Plan scenarios can be compared;
- To construct the associated trip generation and distribution for the sites contained within the Borough Plan in each of the three assessment years;
- To ensure the access strategies for the Plan sites included in the models are aligned with the initial feasibility reviews carried out by NBBC;
- To ascertain the initial impacts of the allocated growth in terms of model stability and network statistics;
- To identify what network infrastructure improvements are required throughout the first 5 years of the Plan period;
- To assess and prioritise the network infrastructure improvements that will be required throughout the remaining life of the Plan;
- To conclude on a refined set of transport infrastructure measures that will be required to support the Borough Plan submission; and
- To provide indicative costs for the resulting package of proposed mitigation measures.

Stage of Assessments

9.4 A staged approach to addressing the objectives was adopted, summarised as follows:

- The Reference Case demands were forecast ensuring the 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 Plan were assigned to the model network;
- The NBBC Borough Plan demands were prepared for each assessment year (i.e. 2022, 2027 and 2031) based on the development trajectory, trip generation and distribution;
- The Borough Plan sites were included in the model with their associated access strategies;
- The traffic impacts of the Borough Plan scenarios were reviewed against the relevant Reference scenario and mitigation measures developed; and
- The resulting 'Do Something' scenarios were then reviewed to assess their effectiveness on network operation.

Network Mitigation

Access Strategies

9.5 An appropriate access strategy for each site was identified through agreement with NBBC and WCC Development Group and included within the Borough Plan scenarios. The key elements which comprise the access and distribution strategy include:

- Delivery of a link through all the sites located to the north of Nuneaton which connects Weddington Lane to The Long Shoot, via Higham Lane. The link between Higham Lane and The Long Shoot has been assumed to be open by 2022, with the remaining link completed by 2027.
- Delivery of a link between Heath End Road to the west of Nuneaton and the A444 to the south of Nuneaton, running through the proposed Arbury site. It has been assumed that this link would open after 2022 but before 2027.
- Delivery of a link through the proposed employment site located between Gipsy Lane and B4113 Coventry Road to the east of 'Griff Island', which connects Coventry Road and Gipsy Lane. This is assumed to be open by 2022.

- Delivery of a new junction on the A444 by 2027 to provide direct access to the proposed Woodlands site to the west of Bedworth and connect to the existing junction with Sutherland Drive.

Mitigation Schedule

9.6 A primary objective of this assessment was to identify the mitigation measures necessary to ensure that the NBBC Borough Plan can be delivered and that its impact on the surrounding network is minimised.

9.7 In total the delivery of 30 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. In the first 5 years of the Plan period a total of 7 specific junction schemes have been highlighted, with a further 7 by the end of 2027 and then 14 more required by 2031. The 3 schemes promoting sustainable travel are assumed to be incorporated throughout the Plan period.

9.8 The estimated cost of delivering the highlighted schemes is currently £49.33 million (at 2016 prices). The cost associated with the schemes that have been highlighted as a priority for the first 5 years is £8.76 million (excluding the appropriate element towards the sustainable measures).

Sustainable Measures

9.9 This assessment has revealed that even with an allowance of 15% for mode shift from the proposed development sites, there is still a need for physical highway mitigation measures to be delivered. 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 £9.2 million of works to be included which will help deliver this mode shift target; this includes the following proposals:

- Sustainable Transport contributions
- Bus Priority enhancements
- Long Shoot to Town Centre Cycle Route

Further Areas of Assessment

9.10 It is anticipated that the Nuneaton town centre and A444 schemes in particular will require further amendments before they represent the final strategy for these areas. Separate studies have been undertaken by WCC, and are still ongoing, with the objective of refining the overall highway strategy. As such, there is a risk that the final delivery costs for these improvements may altered significantly. However, these strategies will also benefit from improvements to pedestrian and cyclist connectivity, public transport initiatives and wider improvements to the public realm and external funding contributions may be identified to meet any shortfall (e.g. Strategic Economic Plan/Growth Deal).

9.11 Impacts have been noted at M6 Junction 3, however, it is clear from the modelling that M6 Junction 3 is experiencing high levels of congestion, which is likely to get worse in the future, even without the introduction of the Borough Plan demands. A more focussed study of the potential for improvements at Junction 3 would be beneficial and should be considered in the future when cumulative impacts of both NBBC and Covenrty's Plans can be assessed. The review of the impact of the Borough Plan does not highlight significant worsening but the Reference conditions, particularly in the AM period, do indicate capacity issues with the current arrangement.

9.12 The access junction included on the A444 to connect to the Woodlands site will benefit from further refinement and a design and feasibility review. This will be the responsibility of the site promotor but may have an impact in the wider network, particularly if a route is provided through the site allowing traffic to bypass M6 Junction 3, for example. The same applies for all site accesses, however, this one is likely to be the significant in terms of strategic impact on the network.

9.13 It should be noted that results from the 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

9.14 The feasibility of the proposed mitigation measures has been assessed at a very high level. There are 30 schemes proposed for delivery within the modelling, progressing each scheme through detailed design would have been 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.

9.15 Furthermore, it should not be assumed that the schemes recommended in this study are fixed and must 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.

Scenario Testing

9.16 A total of 9 scenarios were modelled reflecting the forecast conditions in the three assessment years; 2022 (+ 5 years), 2027 (+ 10 years) and 2031 (end of Plan). The following scenarios were assessed:

- ***2022, 2027 and 2031 NBWA Reference Case Models***
  Reference Case conditions as per the forecasting process outlined within the model forecast report.
- ***2022 NBBC Borough Plan 'Do Nothing' Scenario***
  The NBWA 2022 Reference model with the addition of the 2022 NBBC Plan sites but no network mitigation.
- ***2022 NBBC Borough Plan 'Do Something' Scenario***
  The 2022 NBWA Reference model with the addition of the 2022 Borough Plan demands and the proposed mitigation package.
- ***2027 NBBC Borough Plan 'Do Minimum' Scenario***
  The 2027 NBWA Reference model with the addition of the 2027 Borough Plan demands and the 2022 'Do Something' proposed mitigation package.
- ***2027 NBBC Borough Plan 'Do Something' Scenario***
  The 2027 NBWA Reference model with the addition of the 2027 Borough Plan demands and the revised 2027 mitigation package (i.e. 2022 schemes plus addition schemes).
- ***2031 NBBC Borough Plan 'Do Minimum' Scenario***
  The 2031 NBWA Reference model with the addition of the 2031 Borough Plan demands and the 2027 'Do Something' proposed mitigation package.
- ***2031 NBBC Borough Plan 'Do Something' Scenario***
  The 2031 NBWA Reference model with the addition of the 2031 Borough Plan demands and the revised 2031 mitigation package (i.e. 2027 schemes plus addition schemes).

Conclusions

9.17 Based on the outcome of the modelling assessments the following conclusions can been made:

- 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 Borough Plan will likely require at least 30 schemes at a cost, in today's prices, of approximately £49.33 million;
- An initial 7 schemes have been identified as priority schemes required during the first 5 years up until 2022 at an estimated cost of £8.76 million;
- Further mitigation has been highlighted as necessary during the period between 2022 and 2027. These schemes are focussed in and around Nuneaton town centre at an estimated additional cost of £17.04 million;
- Finally, 14 more schemes have been identified to mitigate the impact highlighted in the 2031 assessment with the inclusion of the additional 4 years of Plan growth from 2027. An additional 14 schemes were identified at an estimated cost of £14.33 million;
- Allowances have been made for the delivery of £9.2 million of sustainable works to be included to help deliver the mode shift targets;
- The delivery of the proposed schemes in their corresponding assessment year result in a significant improvement in network conditions when compared to the equivalent 'Do Nothing'/'Do Minimum' scenario. In all 3 assessment years the AM conditions are shown to be consistent with the Reference Case levels once the proposed schemes are include. The PM period shows more significant impacts, which is exacerbated in the later years, however, the introduction of the proposed schemes shows considerable benefit and results in network conditions similar to those experienced in the AM period; 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. The results presented in this report should therefore be considered as a worst case.

10 FURTHER CONSIDERATIONS & RECOMMENDATIONS

Further Considerations

10.1 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 Borough 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 (N.B. the majority of schemes fall within Highway land or land under control of the proposed development sites) 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 schemes 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 where schemes have been proposed in areas where information regarding the highway extent was limited (such as those near Bedworth).
    - Specific risks where schemes may not meet the required design standards (such as the proposals at Greenmoor Rd/Heath End Rd/College St/Bull Ring or at Coventry Rd Exhall/Blackhorse Rd/Longford Rd/Wilsons Ln).

10.2 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

10.3 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 is considered during any future stages of assessment:

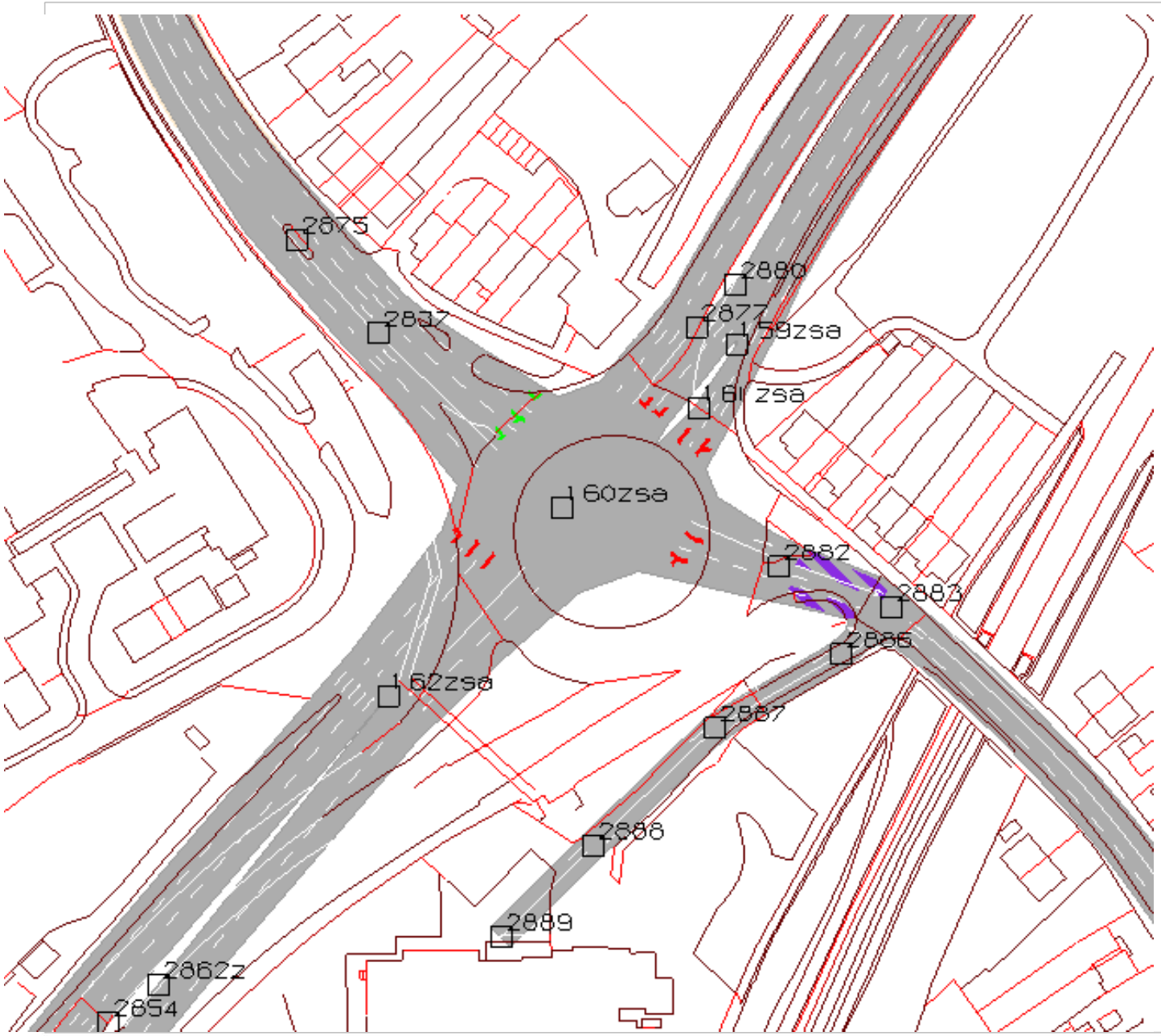
- When the details surrounding the employment sites use classes are established, the assumptions pertaining to the usage of the employment sites (B1, B2, and B8) should be updated accordingly.

10.4 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.

Appendix A

Mitigation Schedule

Ref	Location	Existing	Proposed	Year	2016 Cost	Adjusted Cost
1	College Street/A444	Roundabout	Signalised Crossroads with widening on approached & exits	2022	£4,070,000	£6,123,794
2	College Street/Bull Ring	Priority junction	Roundabout with significant widening on approaches	2022	£1,120,000	£1,678,047
3	Greenmoor Road/Heath End Road	Mini-roundabout	Signalised junction with widening on approaches	2022		
4	A425/Crowhill Road	Mini-roundabout	Signalised T junction. Widening on all approaches and EB exit.	2022	£1,210,000	£1,821,986
5	A4254/B4114/Eastboro Way	Roundabout	Widening on west, east and southern approaches to extend the two lane approach	2022	£730,000	£1,100,090
6	B4113/Longford Rd/Bedworth Rd/Wilson Ln	Roundabout	Addition of signals on the B4113 Bedworth Rd approach/circulatory	2022	£190,000	£281,497
7	Bermuda Sustainable/All Modes Transport Bridge	Closed Route	Opened route from St Georges Way to Bermuda Road connecting A444 Griff to Heath End Road, West Nuneaton	2022	£1,440,000	£2,160,204
8	Roanne Ringway/Coton Road/Vicarage St	Roundabout	Widening to accommodate two lane exit onto Vicarage St. Extending this two lane section to allow two lane section full length of Vicarage St between Coton Rd and Church St Rdbt Reducing exit into Coton Rd (north) to 1 lane	2027	£990,000	£1,989,999
9	Church Street/Vicarage Street	Roundabout	Widening to accommodate third lane flare on Church Lane (south) approach Widening on circulatory to 3 lane on south-west section Widening of Vicarage St NEB exit and continuing the two lanes to join the existing two lanes on approach to Wheat St junction	2027	£810,000	£1,633,689
10	A444 Back St/Leicester Rd Gyratory incl. Bond St, Regent St & Back St	One-way Gyratory	New junctions at Leicester Rd/Vicarage St/Back St (4-arm roundabout) and Leicester Rd/Regent St (LiLo from Regent St only) Back St widened to accommodate a two lane southbound section, allowing the flow of traffic from Newtown Rd to reach Vicarage St and Leicester Rd without traversing the Bond St/Regent St gyratory, via the new roundabout. Closure of Bond St to vehicular traffic	2027	£13,500,000	£13,500,000
11	Trent Road/Leicester Road/Weddington Lane	Priority junction	Reconfiguration of Trent Road to Left-In Left-Out and reduction of the Leicester Road/Weddington Lane movement from two to one lane.	2027	£650,000	£1,311,864
12	Corporation Street/Newtown Road/Powell Way/Roanne Ringway	Roundabout	Addition of dedicated slip from flow from Corporation St to Newtown Rd (east) with extended merge section on Newtown Rd.	2027	£520,000	£1,047,673
13	Roanne Ringway/Queens Road	Signalised Crossroads	Increased two lane merge section on NB exit onto Roanne Ringway (north)	2027	£450,000	£912,996
14	Croft Road/Greenmoor Road Priority	Priority junction	Widening on NB approach to accommodate right turners into Greenmoor Rd (~15m)	2027	£120,000	£250,858
15	Higham Lane/A47 Old Hinckley Road	Mini-roundabout	Signalisation and widening on Higham Lane and Hinckley Rd (east) approaches and on Hinckely Rd (west) exit.	2031	£750,000	£1,913,130
16	Eastboro Way/Townsend Drive	Roundabout	Signalised crossroads	2031	£1,920,000	£4,882,913
17	Donnithorne Ave/Coventry Road	Mini-roundabout	Signalised T junction. Widening on southern approach.	2031	£440,000	£1,126,102
18	Weddington Road/Weddington Terrace	Priority junction	Addition of second lane on northern approach for right turns into Weddington Terrace	2031	£210,000	£530,531
19	Ansley Road/Anstley Lane	Priority junction	Mini-roundabout with minor widening on the eastern approach	2031	£250,000	£643,733
20	A444/Washingham Drive	Roundabout	Addition of 3rd lane flare on all approaches, widening on circulatory to 3 lanes. Widening full length of Walsingham Dr approach from St Davids Way Rdbt	2031	£1,650,000	£4,184,907
21	Coventry Road/Gipsy Lane	Priority junction	Signalisation and significant widening. Southern and eastern approach widened to accommodate 3rd lane on immediate approach (~25m) Northern approach widened to accommodate 2 lanes, connecting to two lane section from Griff Island exit NB exit widened to accommodate 2 lane exit, joining two lane section on approach to Griff Island	2031	£760,000	£1,924,379
22	School Road/B4113 Coventry Road/Bayton Road	Signalised Crossroads	Widening of northern approach (2 to 3 lanes) and southern exit (1 to 2 lanes) to allow two lane SB movement on Coventry Road	2031	£780,000	£1,979,245
23	A444 Weddington Rd/Shanklin Dr	Priority junction	Signalisation. Addition of long two lane section on NB approach to accommodate right turners into Shanklin Dr	2031	£500,000	£1,270,376
24	A4254 Eastboro Way NB Corridor (between Crowhill Rd & Townsend Dr)	Single lane carriageway	Addition of second lane in NB direction from Crowhill to Camborne Dr, joining the two lane exits and two lane approaches introduced by the schemes at Crowhill and Townsend junctions, and the widening come forward with the committed site at the north of Eastboro Way.	2031	£5,760,000	£14,644,922
25	Arbury Rd/Heath End Rd	Mini-roundabout	Signalised T junction. Widening on western approach to accommodate a second lane for right turners into Heath End Rd.	2031	£310,000	£797,010
26	Coventry Rd Exhall/Blackhorse Rd/Longford Rd/Wilson Lane	Signalised Crossroads	Addition of second lane on the SB approach to accommodate the right turners into Wilson Lane (access to the new employment site). This two lane section will connect with the two lane section on the SB exit introduced by the School Road / B4113 Coventry Road / Bayton Road improvements	2031	£680,000	£1,729,228
27	Church Lane/Bowling Green Lane/School Lane	Priority junction	Roundabout with two lane approach from School Lane	2031	£320,000	£823,074
28	Sustainable Transport Contributions			-	£3,000,000	£3,000,000
29	Bus Priority Enhancements			-	£5,000,000	£5,000,000
30	Long Shoot to Town Centre Cycle Route			-	£1,200,000	£1,200,000
TOTAL COST					**£49,330,000**	**£79,462,247**



Signalised Crossroads with widening on approaches & exits

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

College Street / A444

SCALE:

NTS

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

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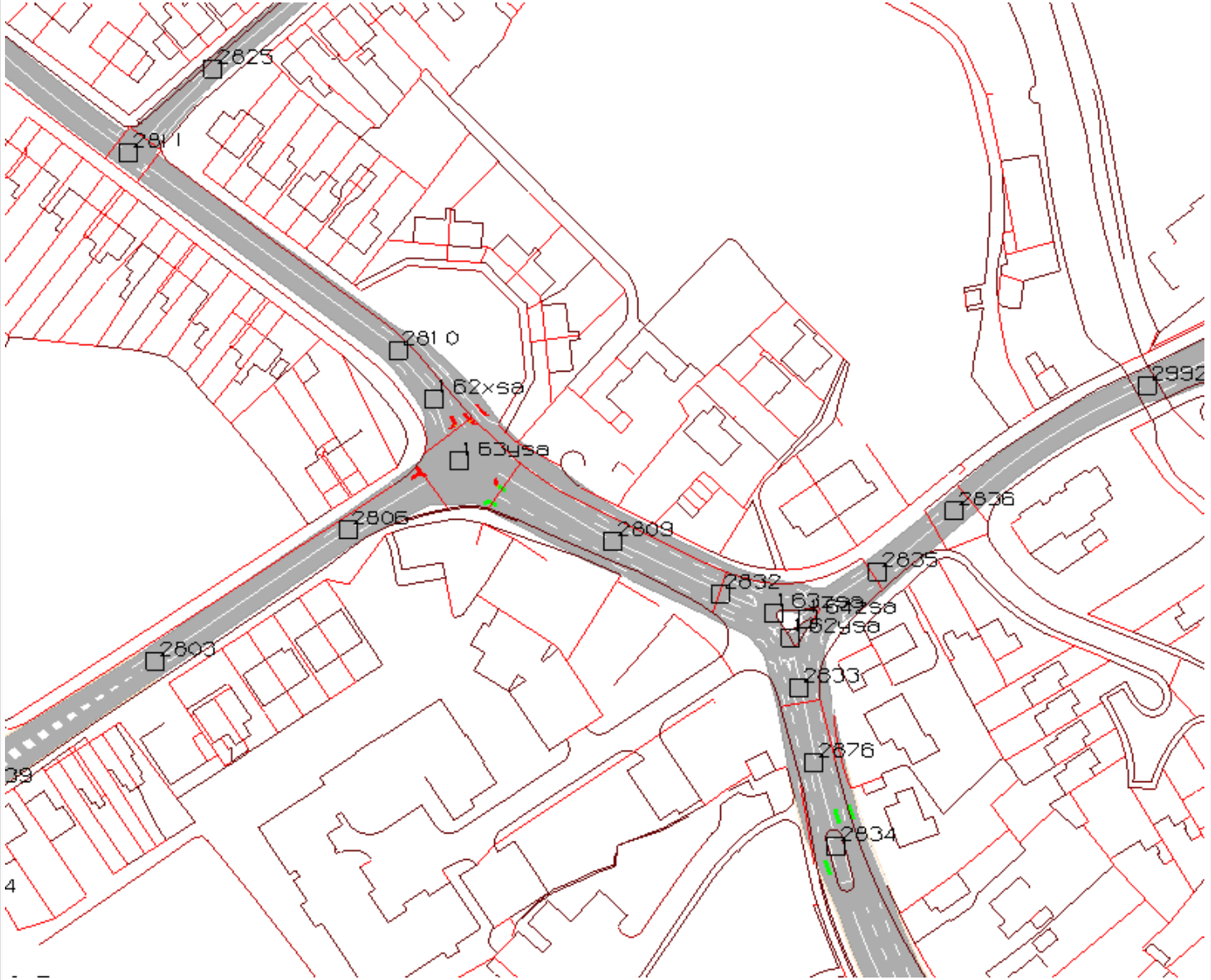
DRAWING REFERENCE:

Ref 01



Heath End/Greenmoor - Signalised junction with widening on approaches

College St/Bull Ring - Roundabout with significant widening on approaches

CLIENT: Warwickshire County Council

PROJECT: VM165048 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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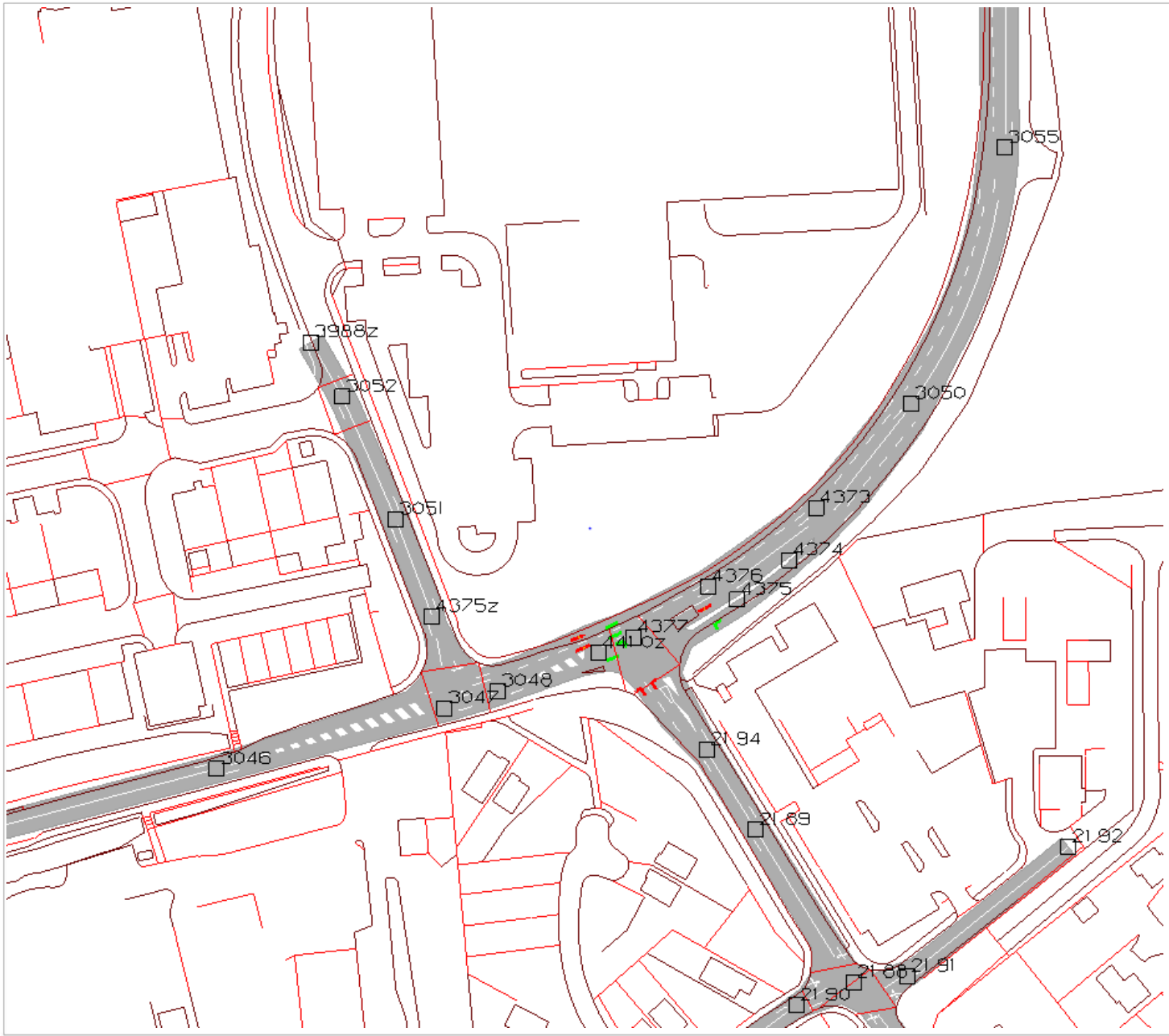
DRAWING REFERENCE: Ref 02 & 03



Signalised T junction.

Widening on all approaches and EB exit. (the continuation of the SB section is part of Scheme Ref 22)

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC Strategic Transport Assessment

TITLE: A425 / Crowhill Road

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
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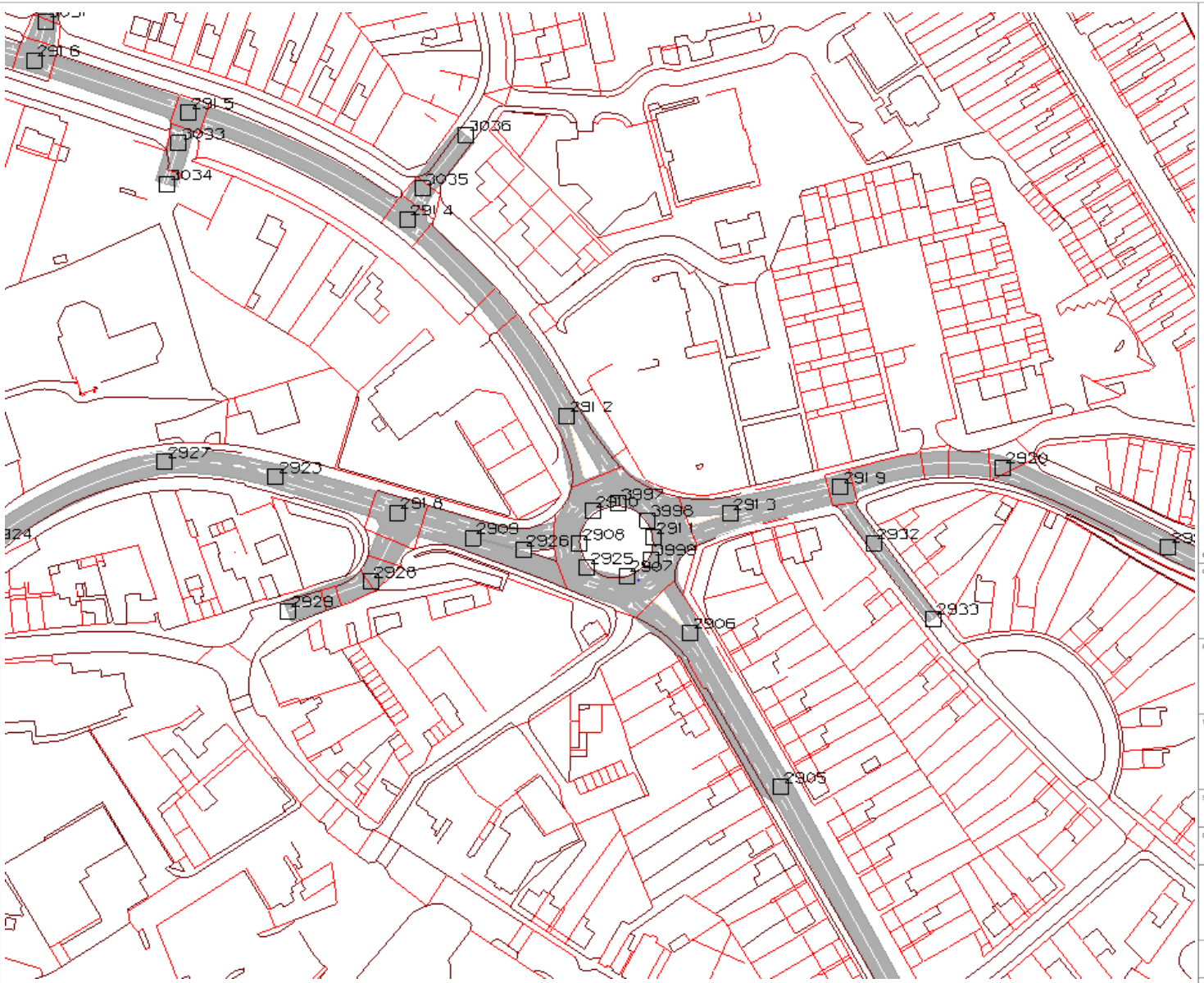
DRAWING REFERENCE: Ref 04



Widening on west, east and southern approaches to increase the two lane approach section.

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC
Strategic Transport Assessment

TITLE: A4254 / B4114 / Eastboro Way

SCALE: NTS

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

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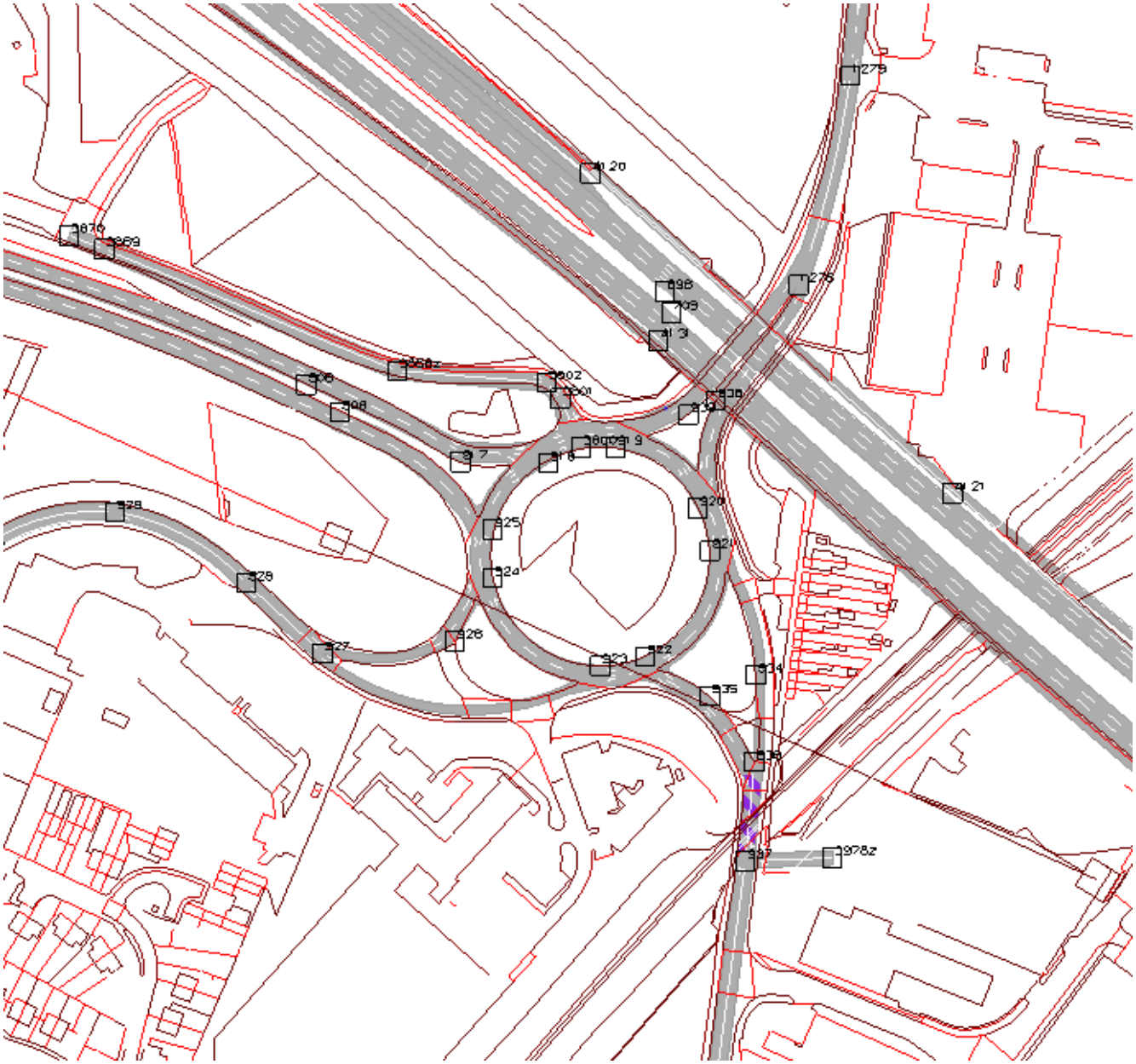
DRAWING REFERENCE: Ref 05



Addition of signals on the B4113 Bedworth Rd approach and circulatory

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

B4113 / Longford Rd / Bedworth Rd / Wilson Ln

SCALE:

NTS

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

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DRAWING REFERENCE:

Ref 06

Opened route from St Georges Way to Bermuda Road connecting A444 Griff to Heath End Road, West Nuneaton

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Bermuda Sustainable / All Modes Transport Bridge

SCALE: NTS

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

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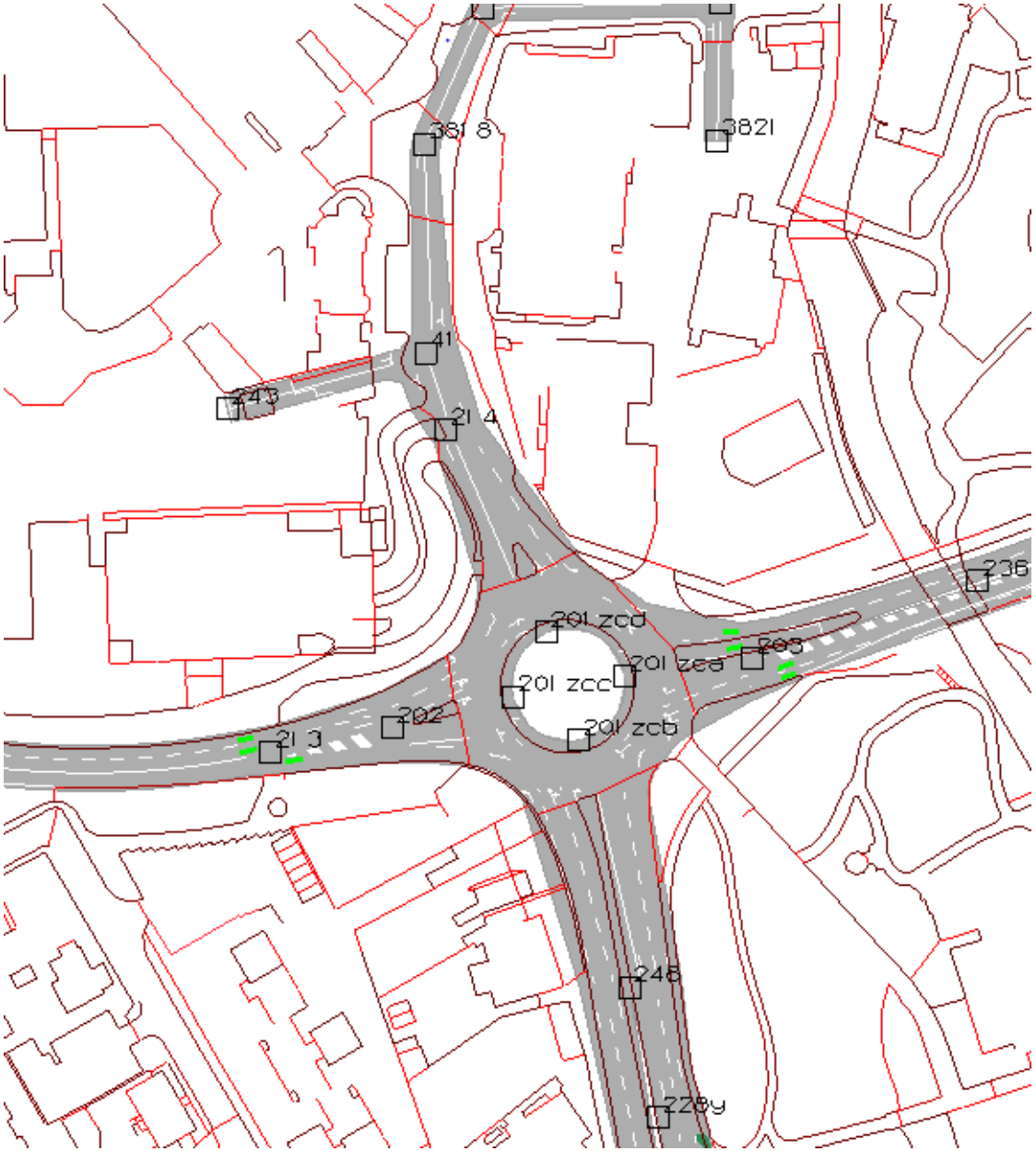
DRAWING REFERENCE:

Ref 07



Widening to accommodate two lane exit onto Vicarage St.

Extending this two lane section to allow two lane section full length of Vicarage St between Coton Rd and Church St Roundabout

Reducing exit into Coton Rd (north) to 1 lane

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC
Strategic Transport Assessment

TITLE: Roanne Ringway / Coton Road / Vicarage St

SCALE: NTS

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

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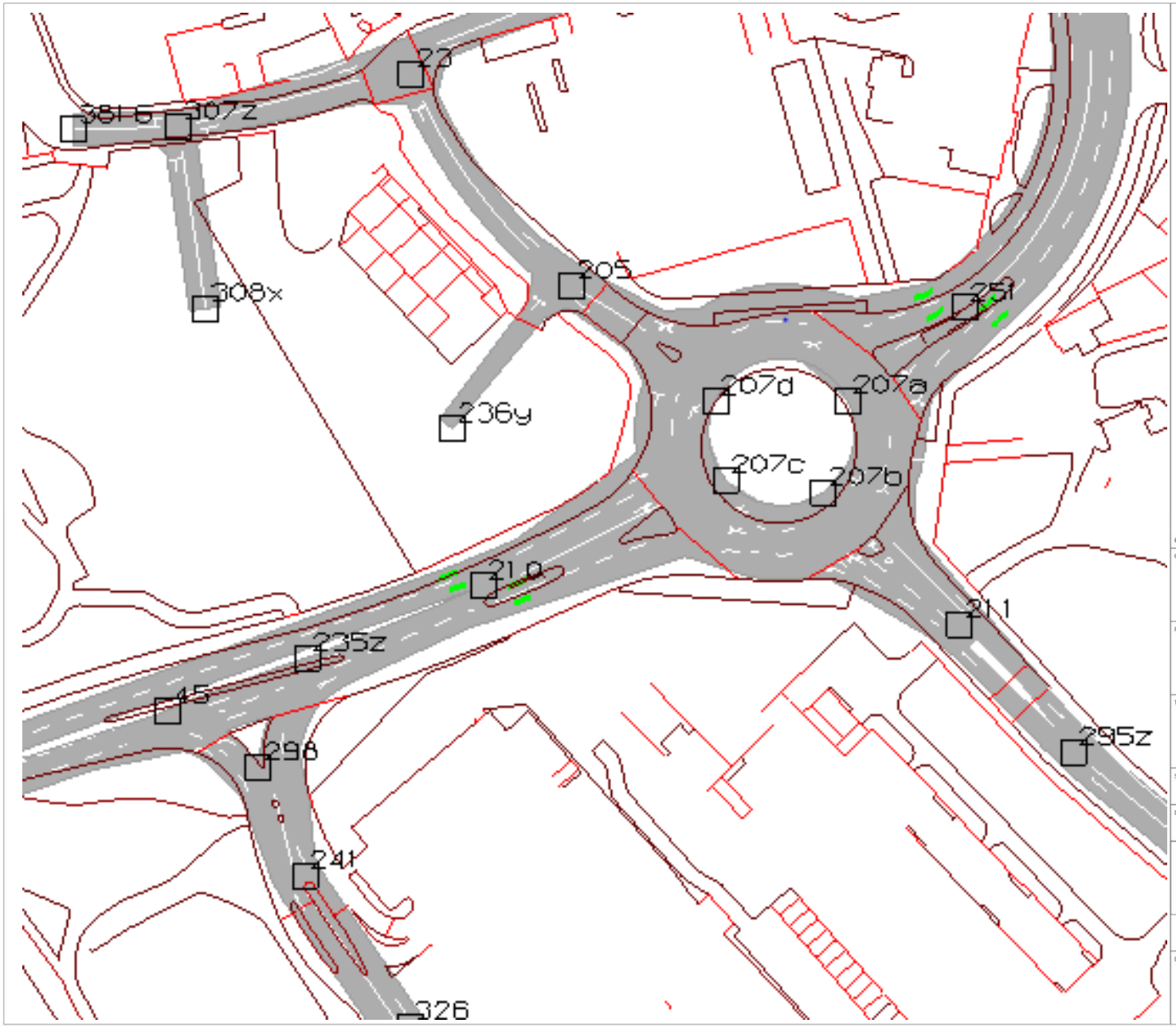
DRAWING REFERENCE: Ref 08



Widening to accommodate third lane flare on Church Lane (south) approach

Widening on circulatory to 3 lane on south-west section

Widening of Vicarage St NEB exit and continuing the two lanes to join the existing two lanes on approach to Wheat St junction

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC Strategic Transport Assessment

TITLE: Church Lane / Vicarage Street Roundabout

SCALE: NTS

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

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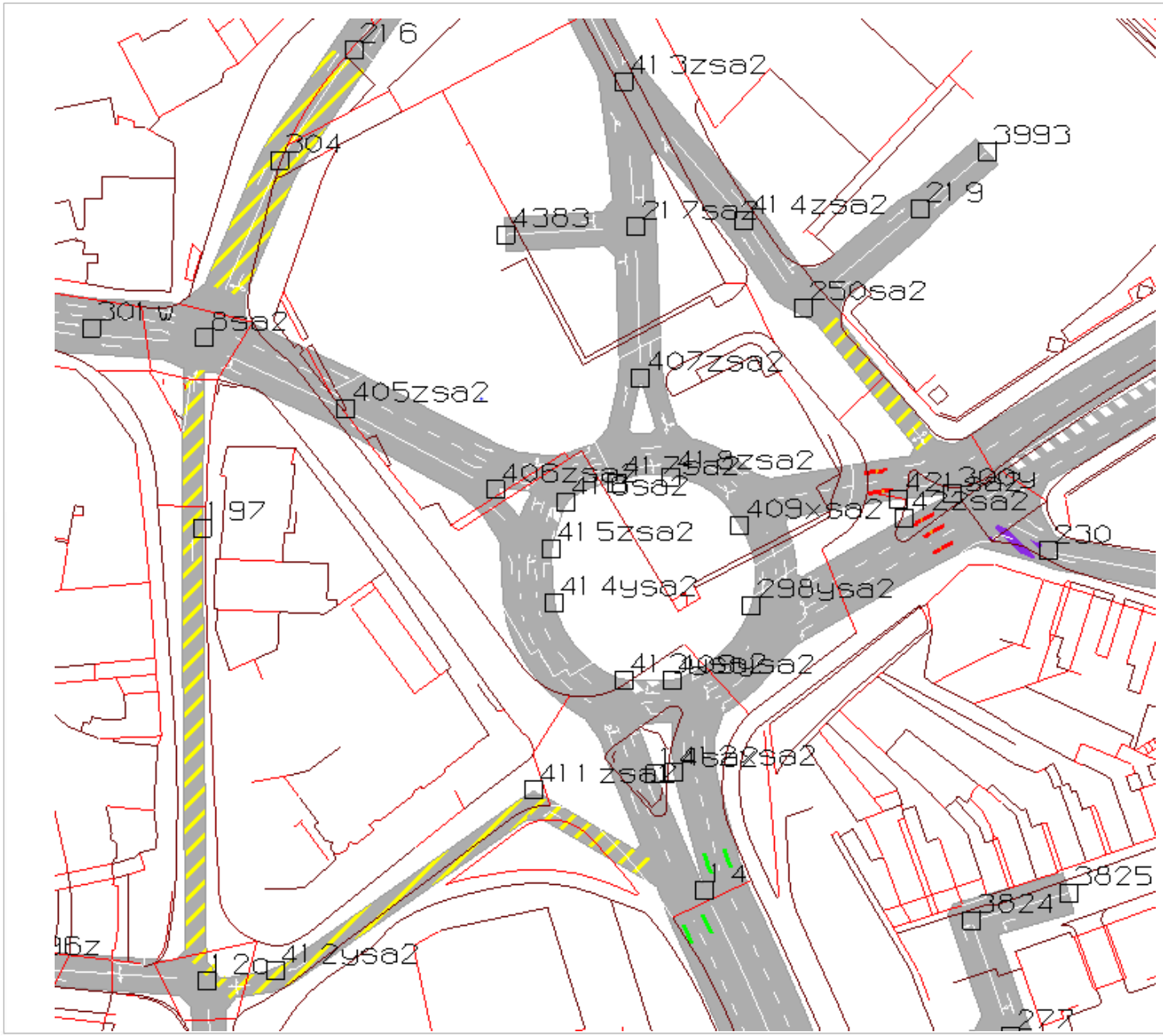
DRAWING REFERENCE: Ref 09



New junctions at Leicester Rd/Vicarage St/Back St (4-arm roundabout) and Leicester Rd/Regent St (LiLo from Regent St only)

Back St widened to accommodate a two lane southbound section, allowing the flow of traffic from Newtown Rd to reach Vicarage St and Leicester Rd without traversing the Bond St/Regent St gyratory, via the new roundabout.

Closure of Bond St to vehicular traffic

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC Strategic Transport Assessment

TITLE: A444 Back St / Leicester Rd Gyratory incl. Bond St, Regent St & Back St

SCALE: NTS

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

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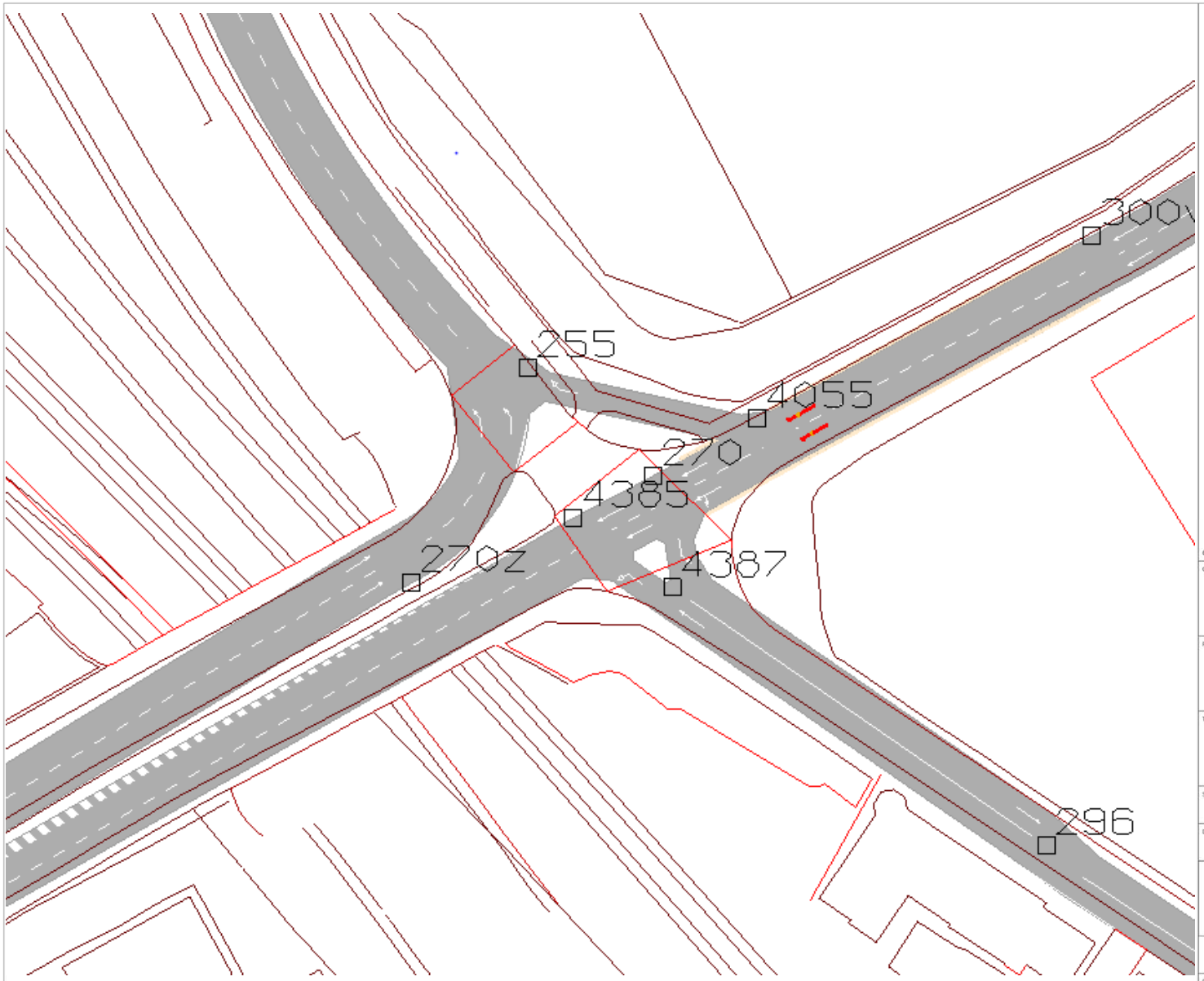

Reconfiguration of Trent Road to Left-In Left-Out and reduction of the Leicester Road/Weddington Lane movement from two to one lane.

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Trent Road / Leicester Road / Weddington Lane

SCALE: NTS

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

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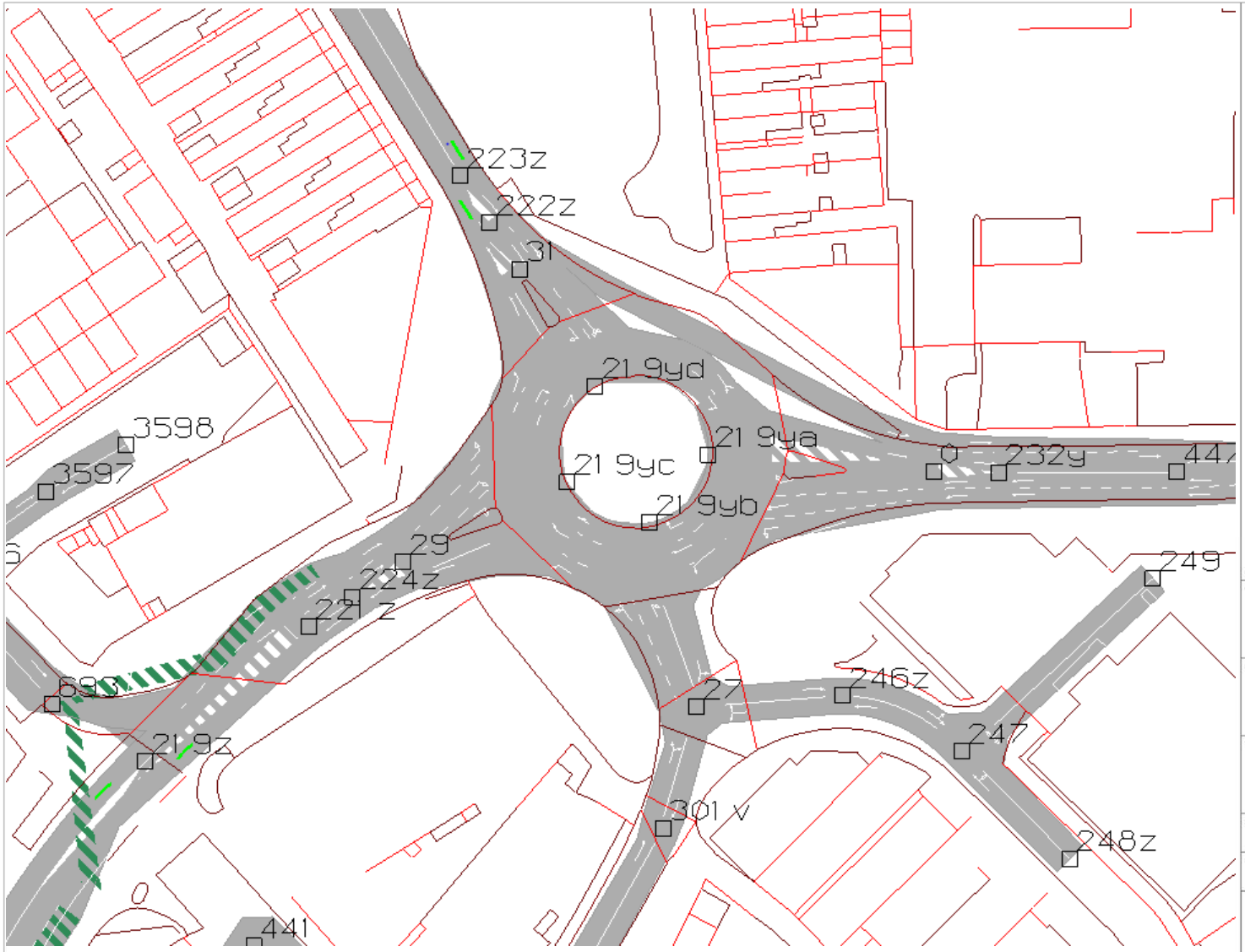

Addition of dedicated slip from flow from Corporation St to Newtown Rd (east) with extended merge section.

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Corporation Street / Newtown Road / Powell Way / Roanne Ringway

SCALE: NTS

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

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DRAWING REFERENCE:

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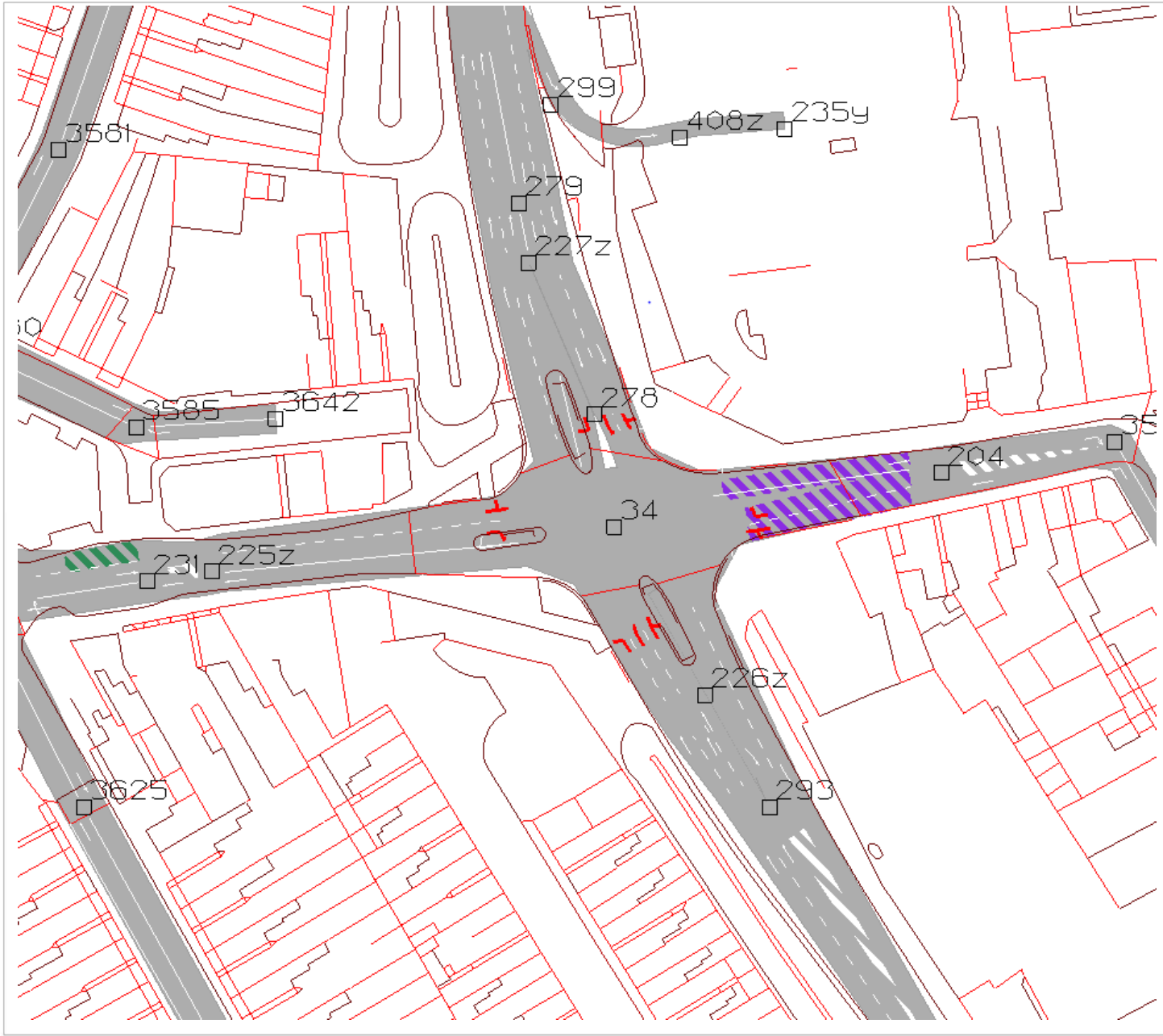

Increased two lane merge section on NB exit onto Roanne Ringway (north)

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC Strategic Transport Assessment

TITLE: Roanne Ringway / Queens Road

SCALE: NTS

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

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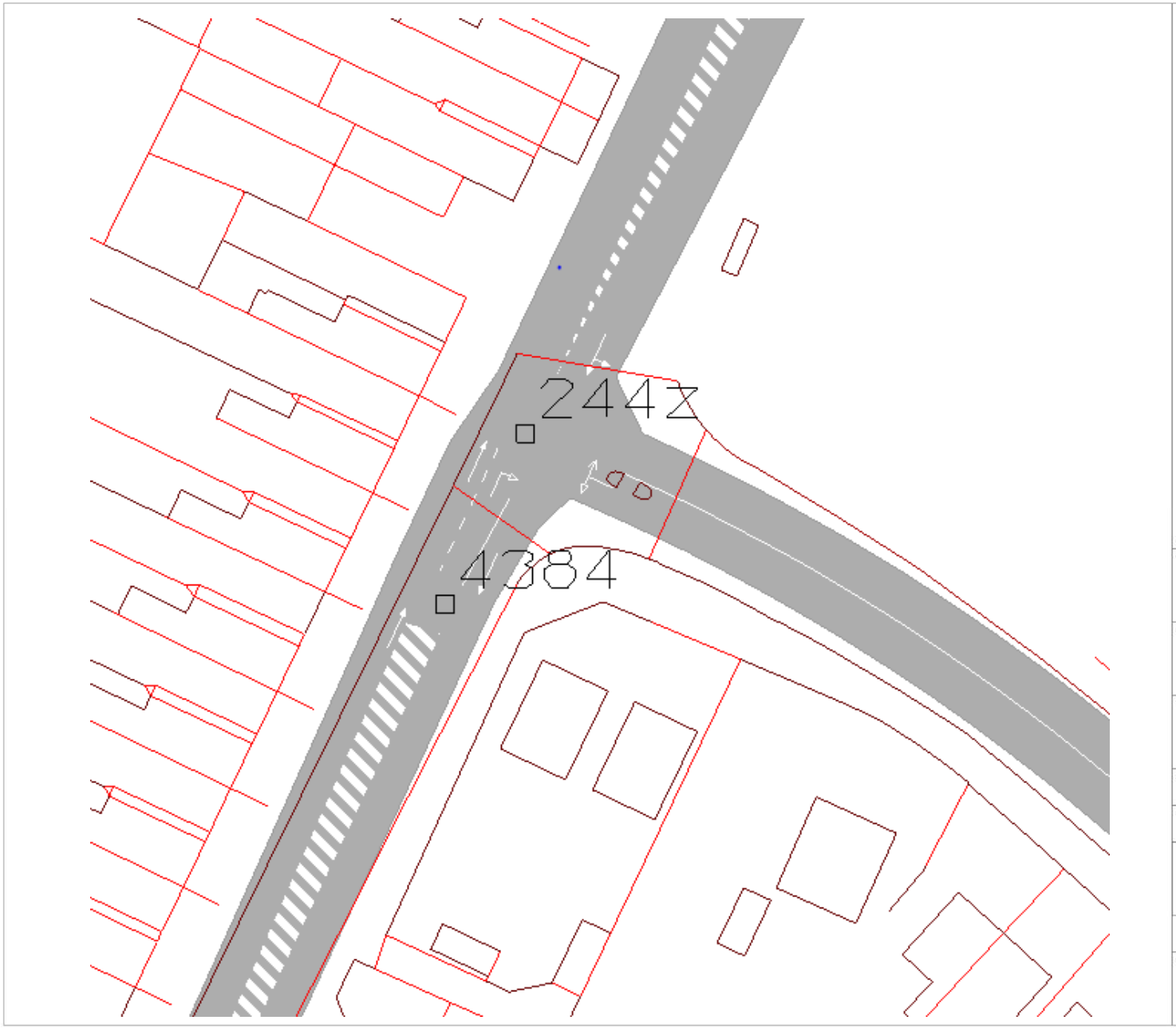

Widening on NB approach to accommodate right turners into Greenmoor Rd (~15m)

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Croft Road / Greenmoor Road
Priority

SCALE:

NTS

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

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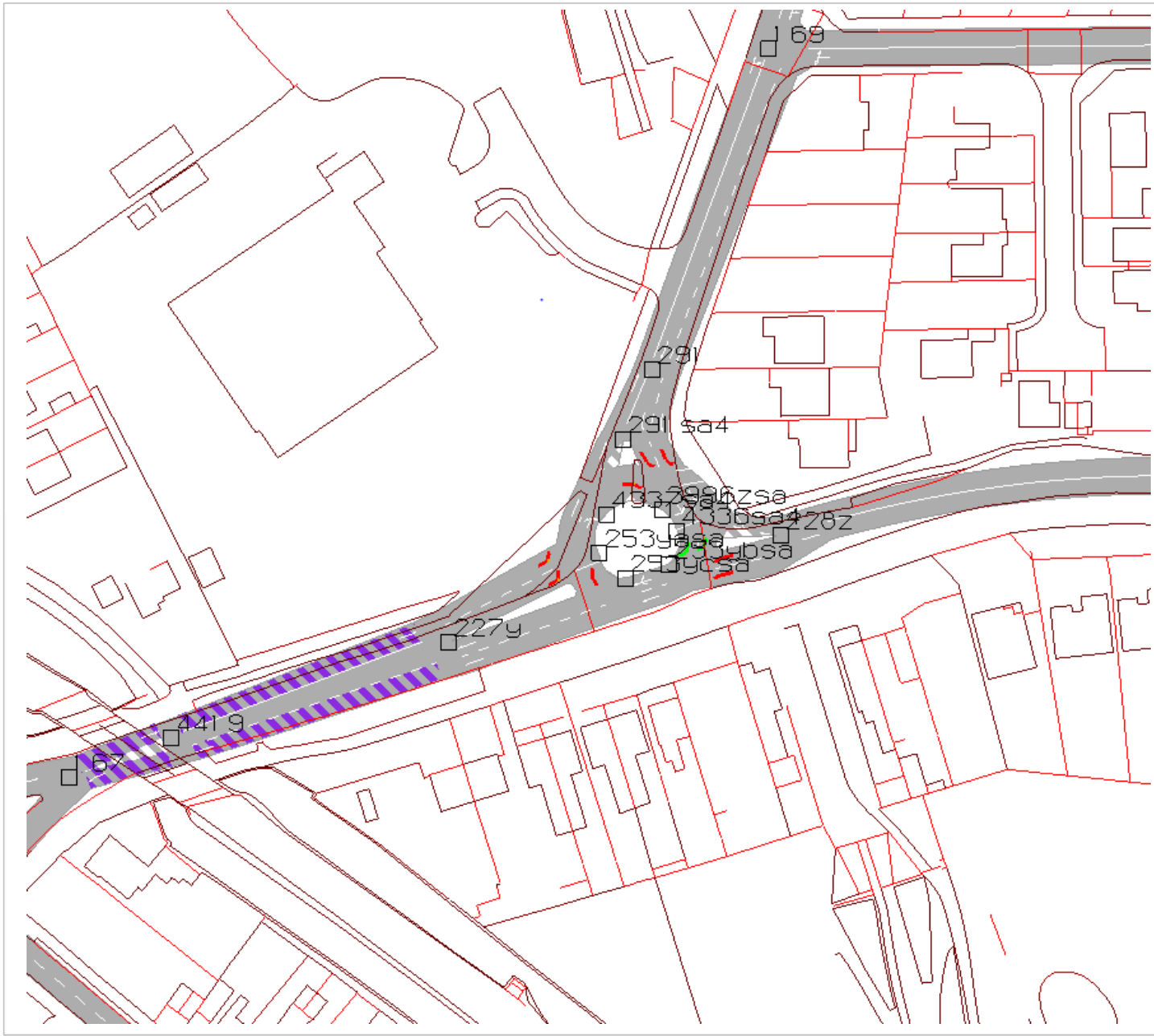
Ref 14



Signalisation and widening on Higham Lane and Hinckley Rd (east) approaches and on Hinckely Rd (west) exit.

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Higham Lane / A47 Old Hinckley Road

SCALE:

NTS

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

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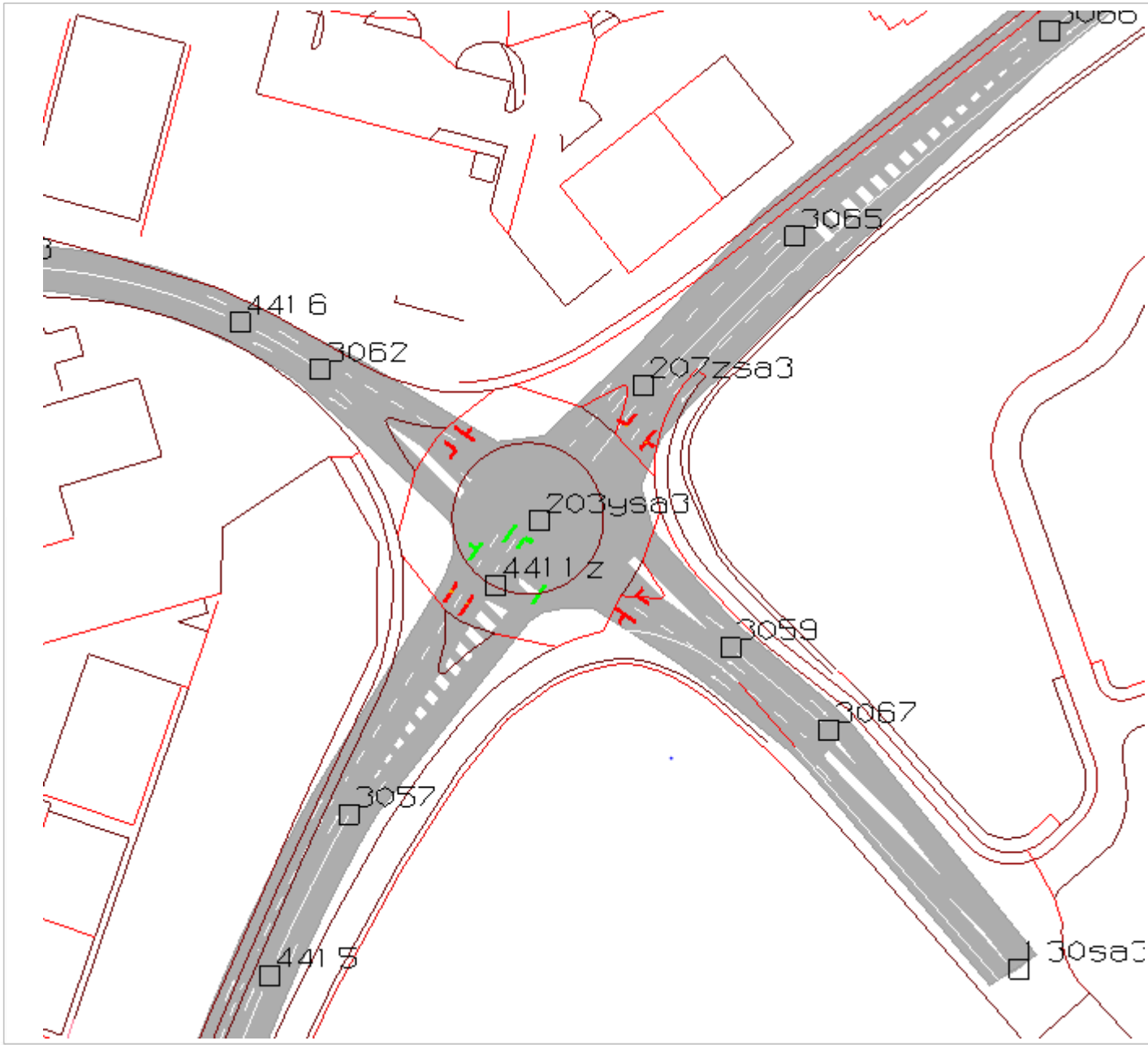

Signalised crossroads

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Eastboro Way / Townsend Drive

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
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DRAWING REFERENCE:

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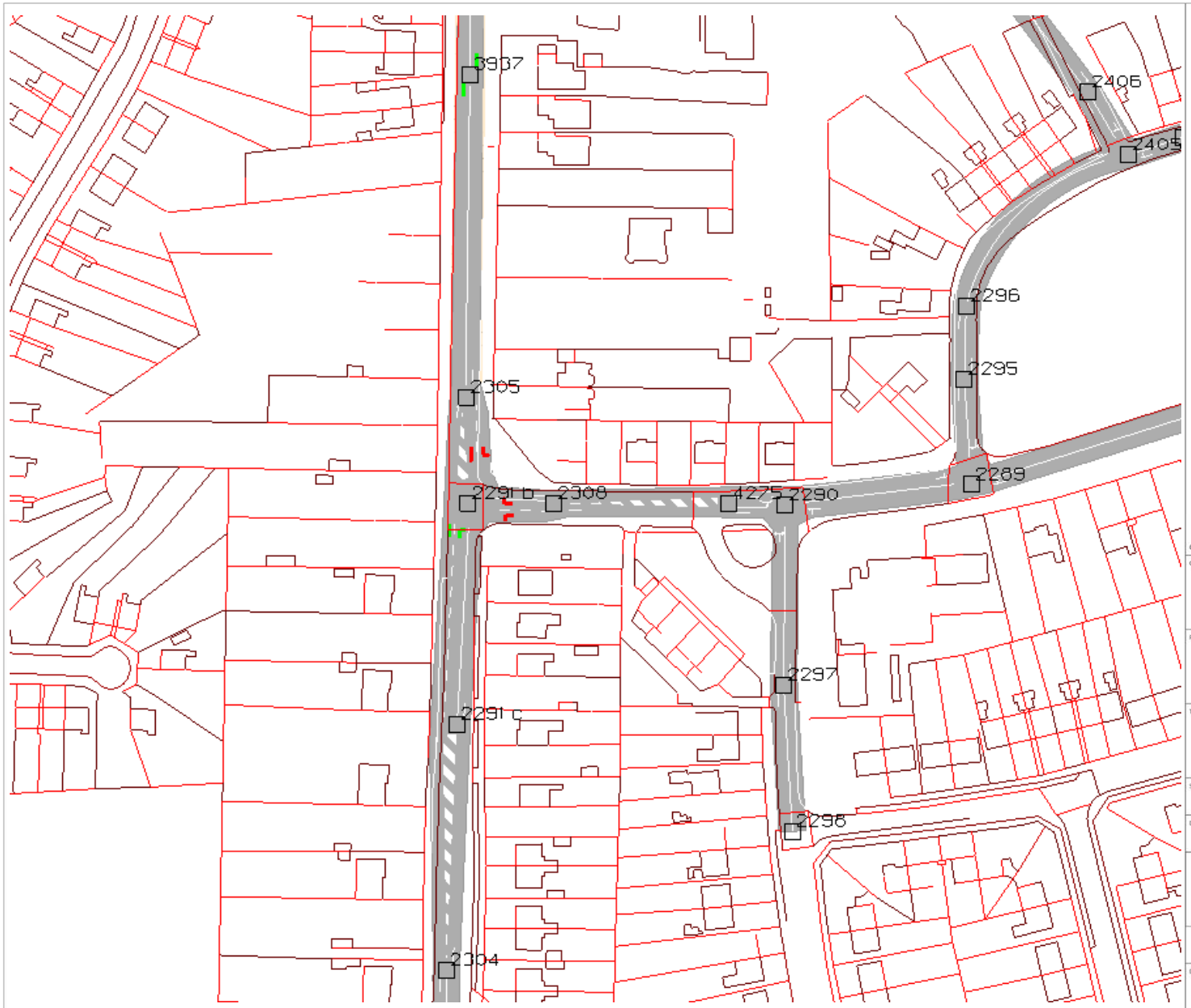

Signalised T junction. Widening on southern approach.

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Donnithorne Ave / Coventry Road

SCALE:

NTS

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

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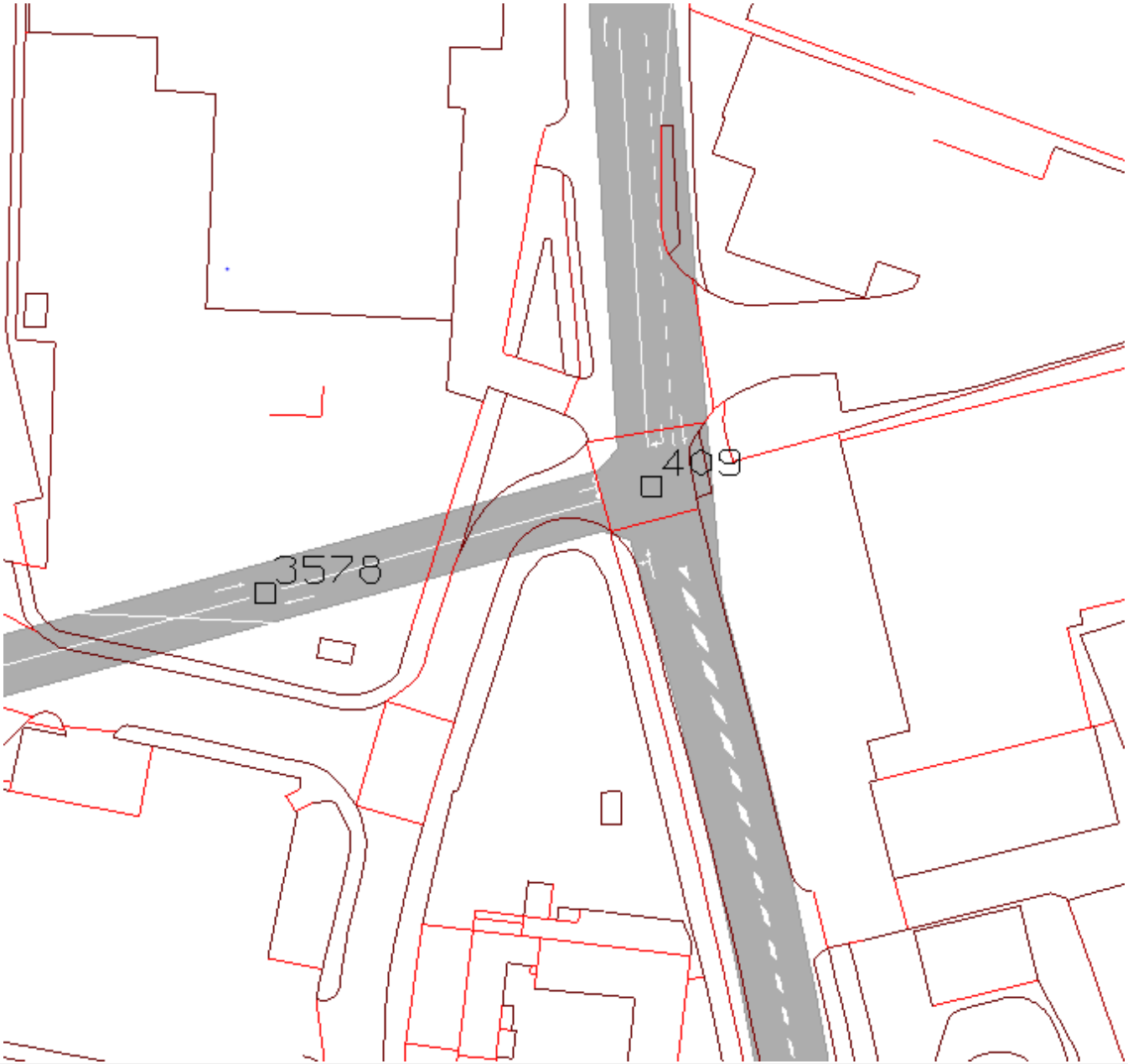

Addition of second lane on northern approach for right turns into Weddington Terrace

(n.b. ignore Weddington Tr alignment, this is not proposed)

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC Strategic Transport Assessment

TITLE: Weddington Road / Weddington Terrace

SCALE: NTS

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

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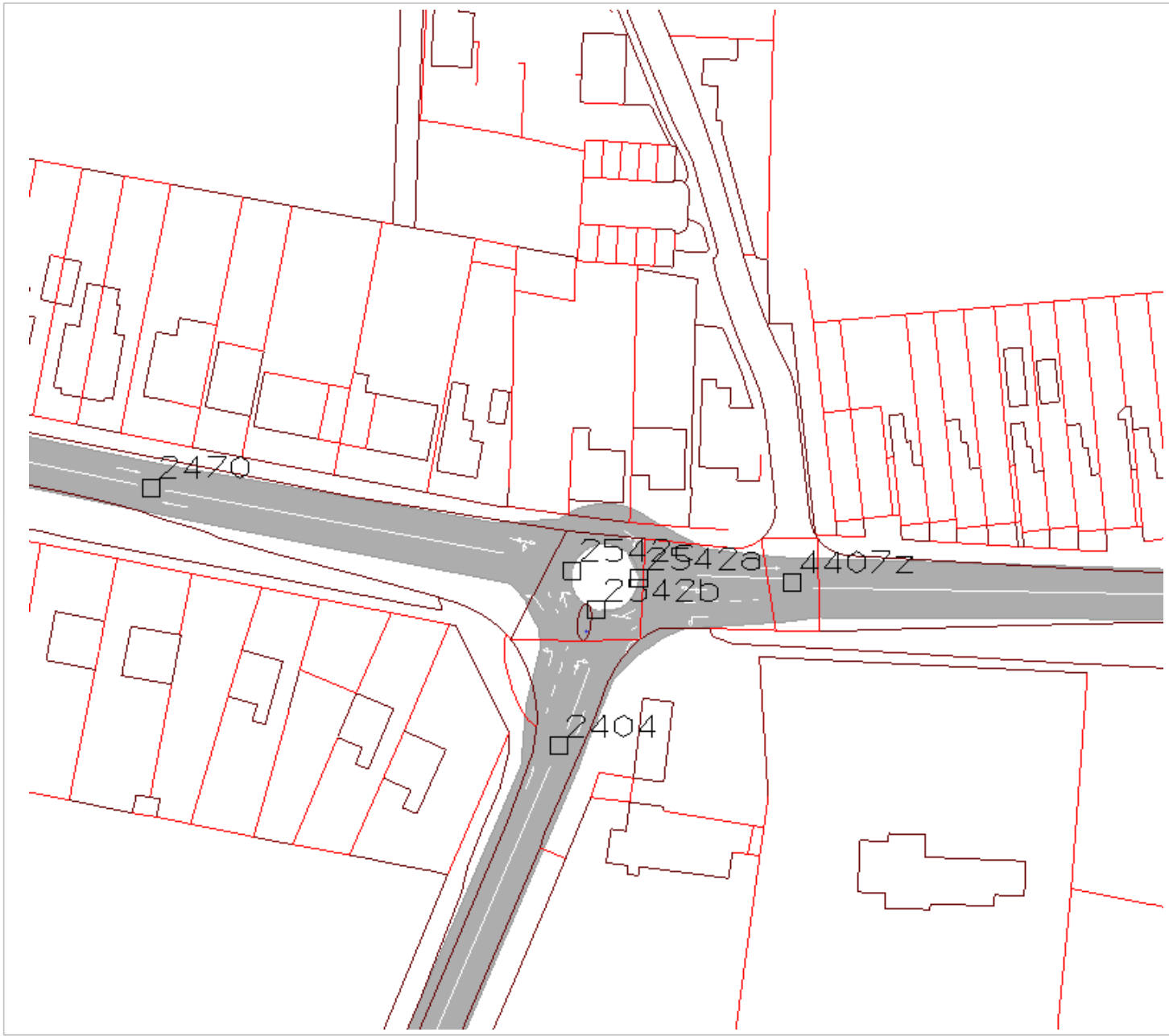

Mini-roundabout with minor widening on the eastern approach

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Ansley Road / Astley Lane

SCALE:

NTS

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

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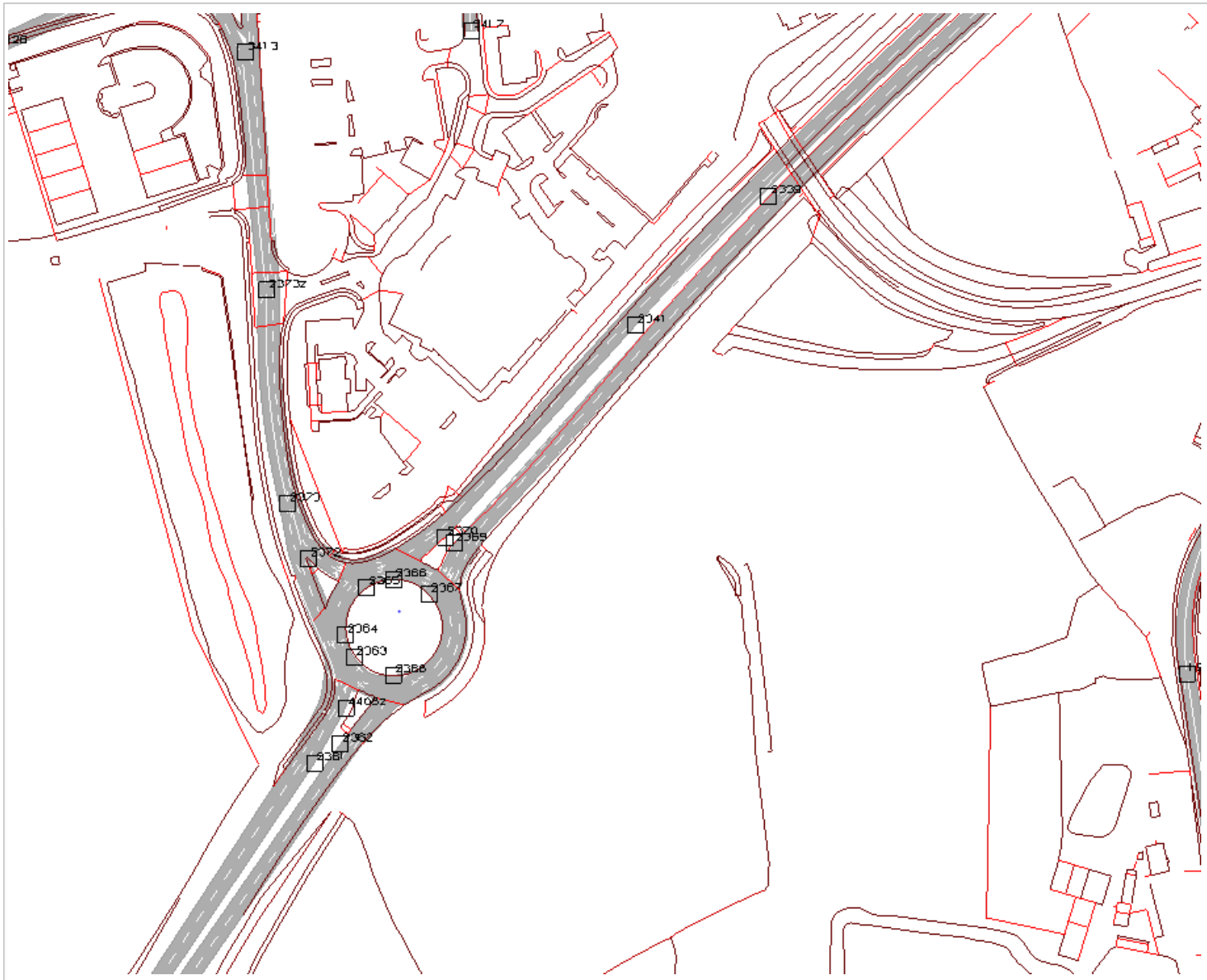

Addition of 3rd lane flare on all approaches, widening on circulatory to 3 lanes.

Widening full length of Walsingham Dr approach from St Davids Way Roundabout

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

A444 / Walsingham Drive

SCALE:

NTS

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

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DRAWING REFERENCE:

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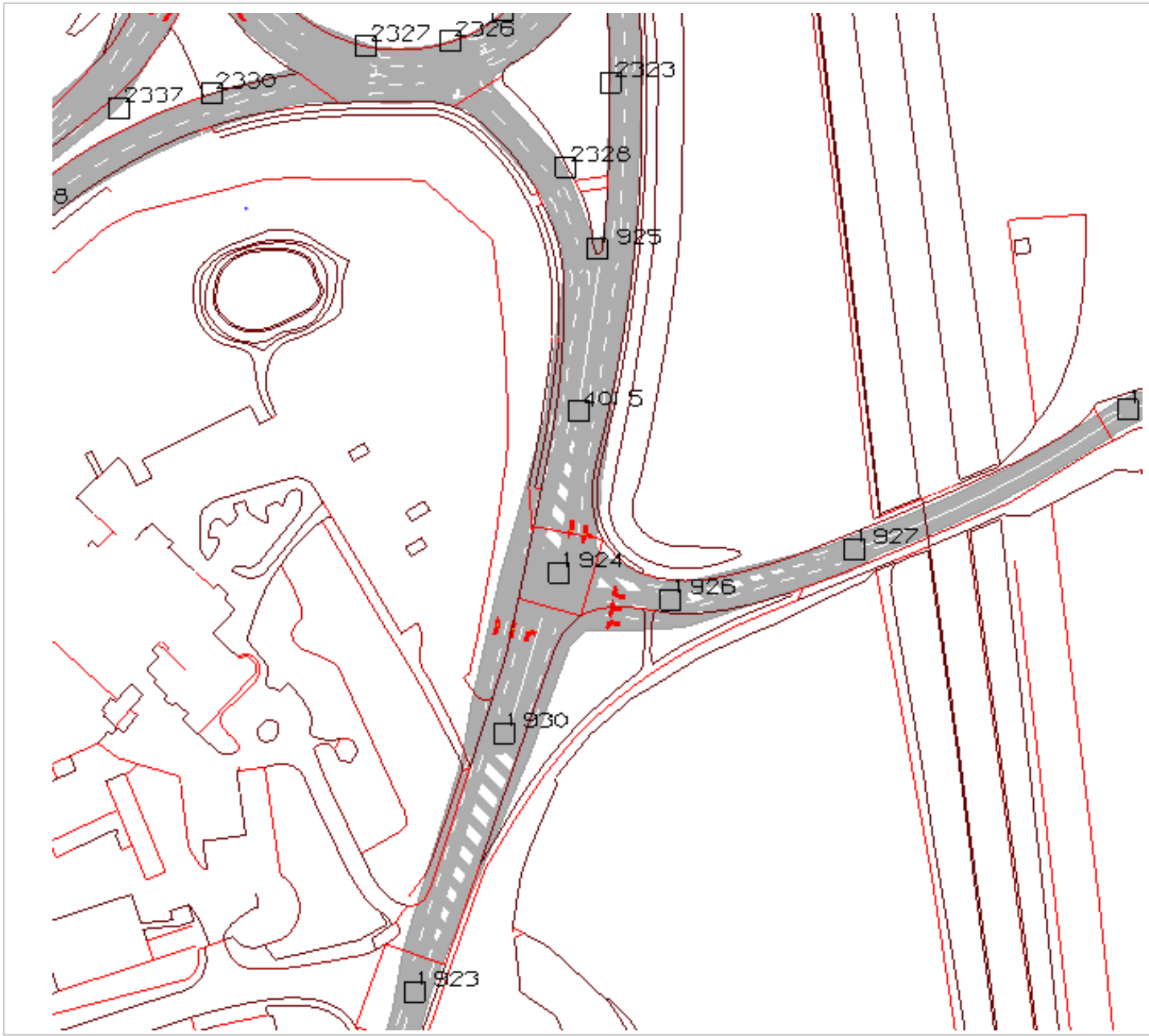

Signalisation and significant widening.

Southern and eastern approach widened to accommodate 3rd lane on immediate approach (~25m)

Northern approach widened to accommodate 2 lanes, connecting to two lane section from Griff Island exit

NB exit widened to accommodate 2 lane exit, joining two lane section on approach to Griff Island

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC Strategic Transport Assessment

TITLE: Coventry Road / Gipsy Lane

SCALE: NTS

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

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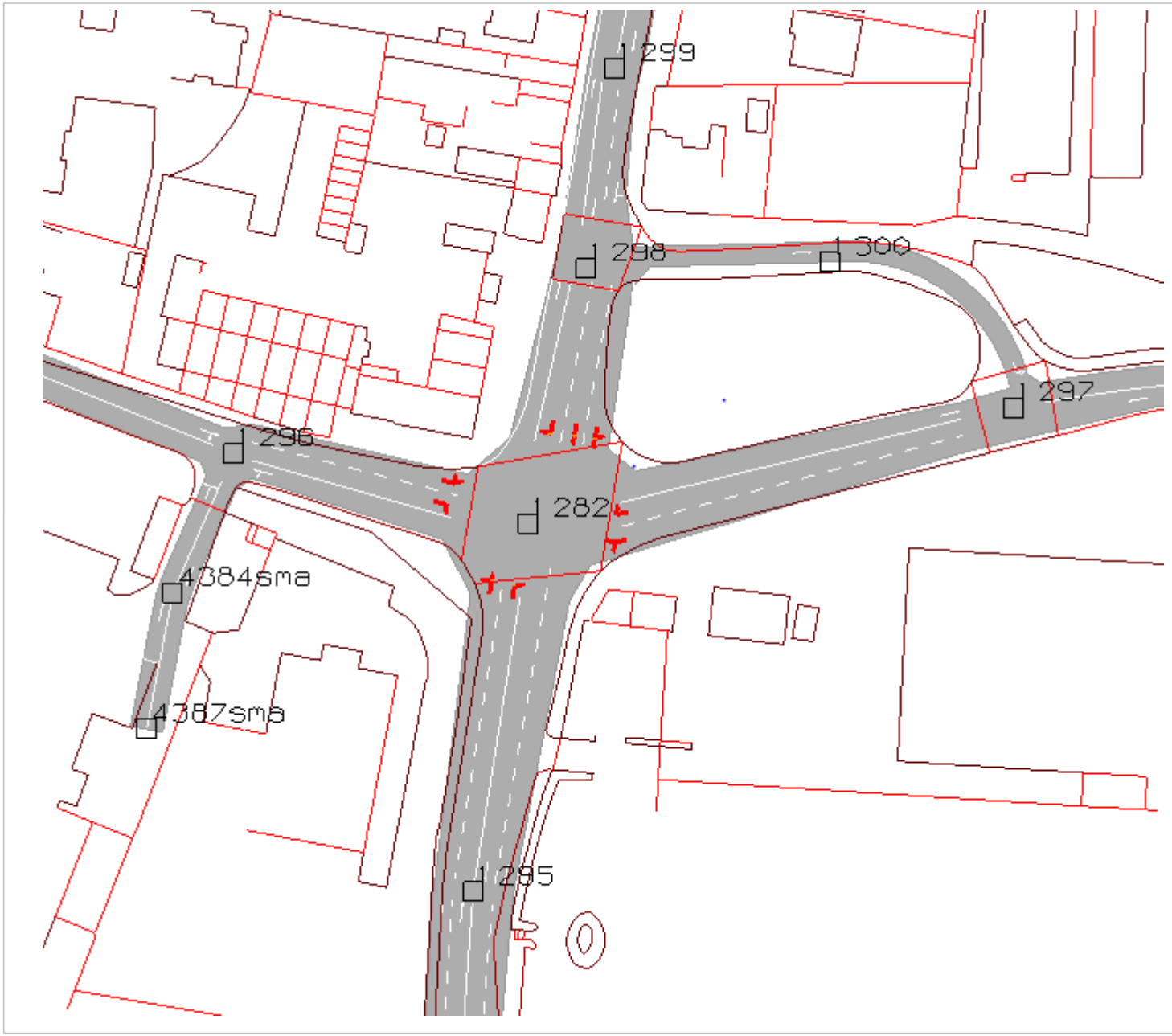
DRAWING REFERENCE: Ref 21



Widening of northern approach (2 to 3 lanes) and southern exit (1 to 2 lanes) to allow two lane SB movement on Coventry Road

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

School Lane / B4113 Coventry Road / Bayton Road

SCALE: NTS

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

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Tel: 0121 213 6376 Email: microsim@vectos.co.uk www.vectos.co.uk

DRAWING REFERENCE:

Ref 22

Signalisation. Addition of long two lane section on NB approach to accommodate right turners into Shanklin Dr

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 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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Tel: 0121 213 6376 Email: microsim@vectos.co.uk www.vectos.co.uk

DRAWING REFERENCE:

Ref 23

Addition of second lane in NB direction from Crowhill to Camborne Dr, joining the two lane exits and two lane approaches introduced by the schemes at Crowhill and Townsend junctions, and the widening coming forward with the committed site at the north of Eastboro Way.

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

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

SCALE: NTS

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

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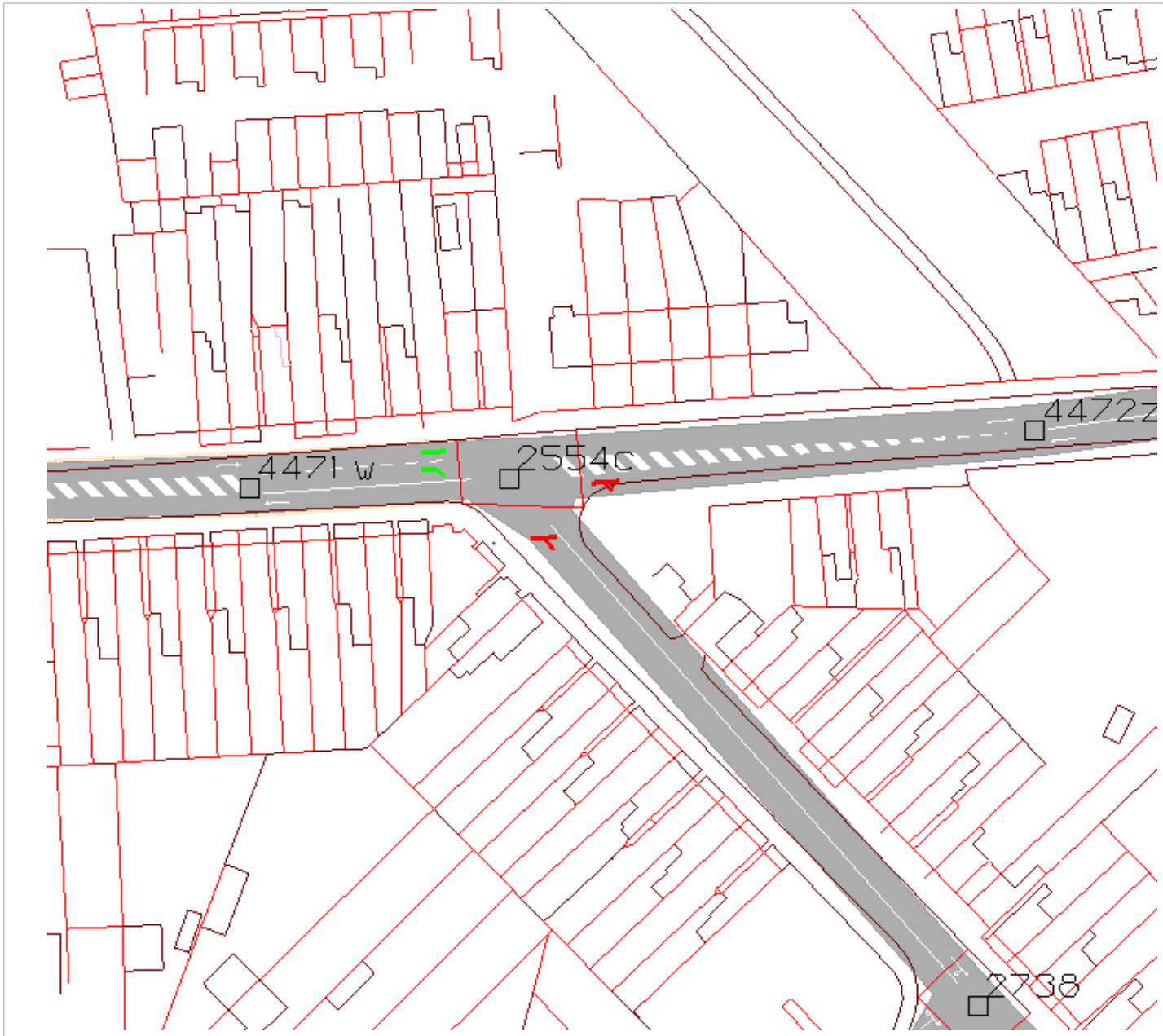
DRAWING REFERENCE:

Ref 24



Signalised T junction. Widening on western approach to accommodate a second lane for right turners into Heath End Rd.

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC
Strategic Transport Assessment

TITLE: Arbury Rd / Heath End Rd

SCALE: NTS

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

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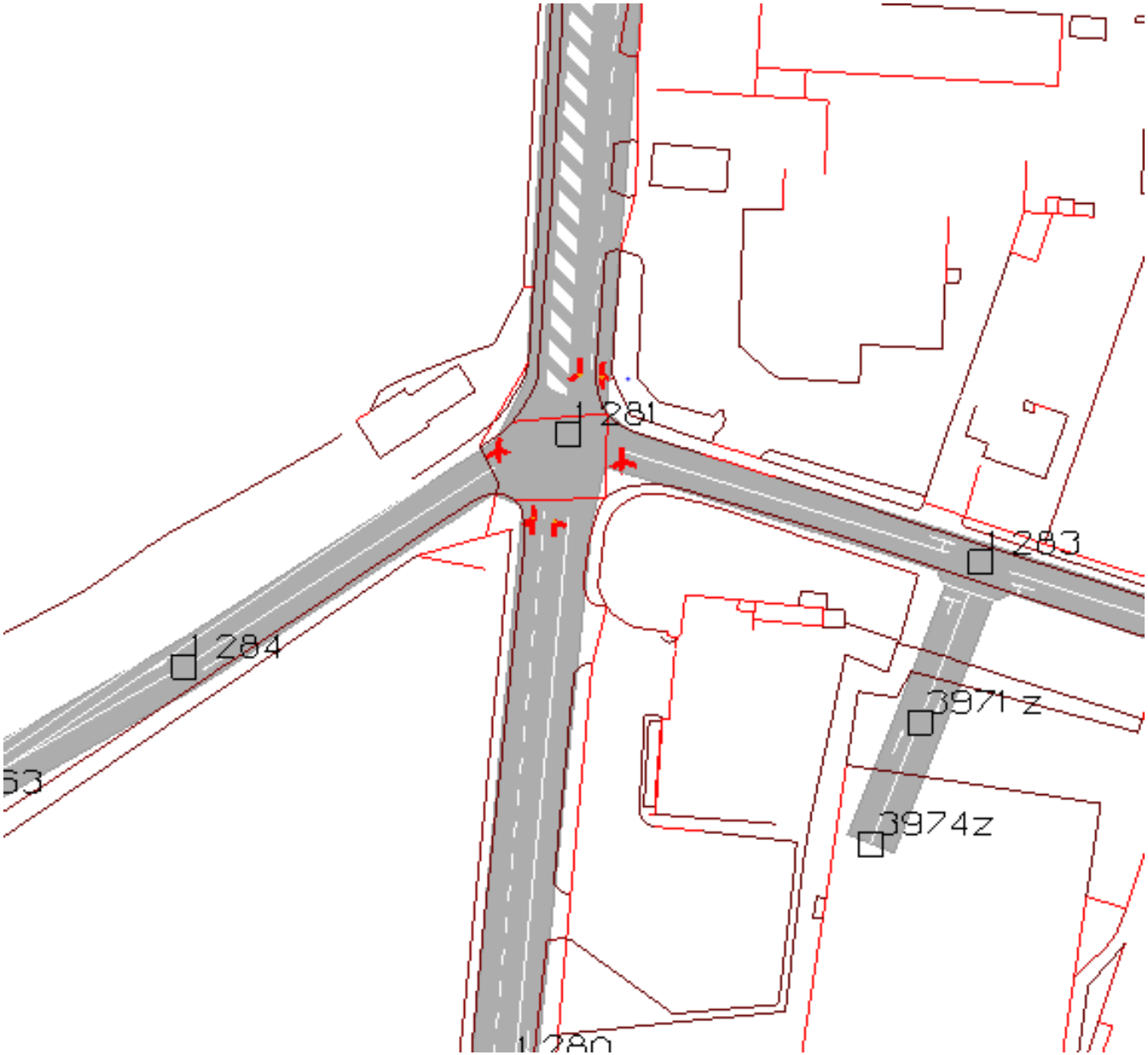
DRAWING REFERENCE: Ref 25



Addition of second lane on the SB approach to accommodate the right turners into Wilson Lane (access to the new employment site).

This two lane section will connect with the two lane section on the SB exit introduced by the School Road / B4113 Coventry Road / Bayton Road improvements (Ref 22)

CLIENT: Warwickshire County Council

PROJECT: VM165048 NBBC Strategic Transport Assessment

TITLE: Coventry Rd Exhall / Blackhorse Rd / Longford Rd / Wilson Lane

SCALE: NTS

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

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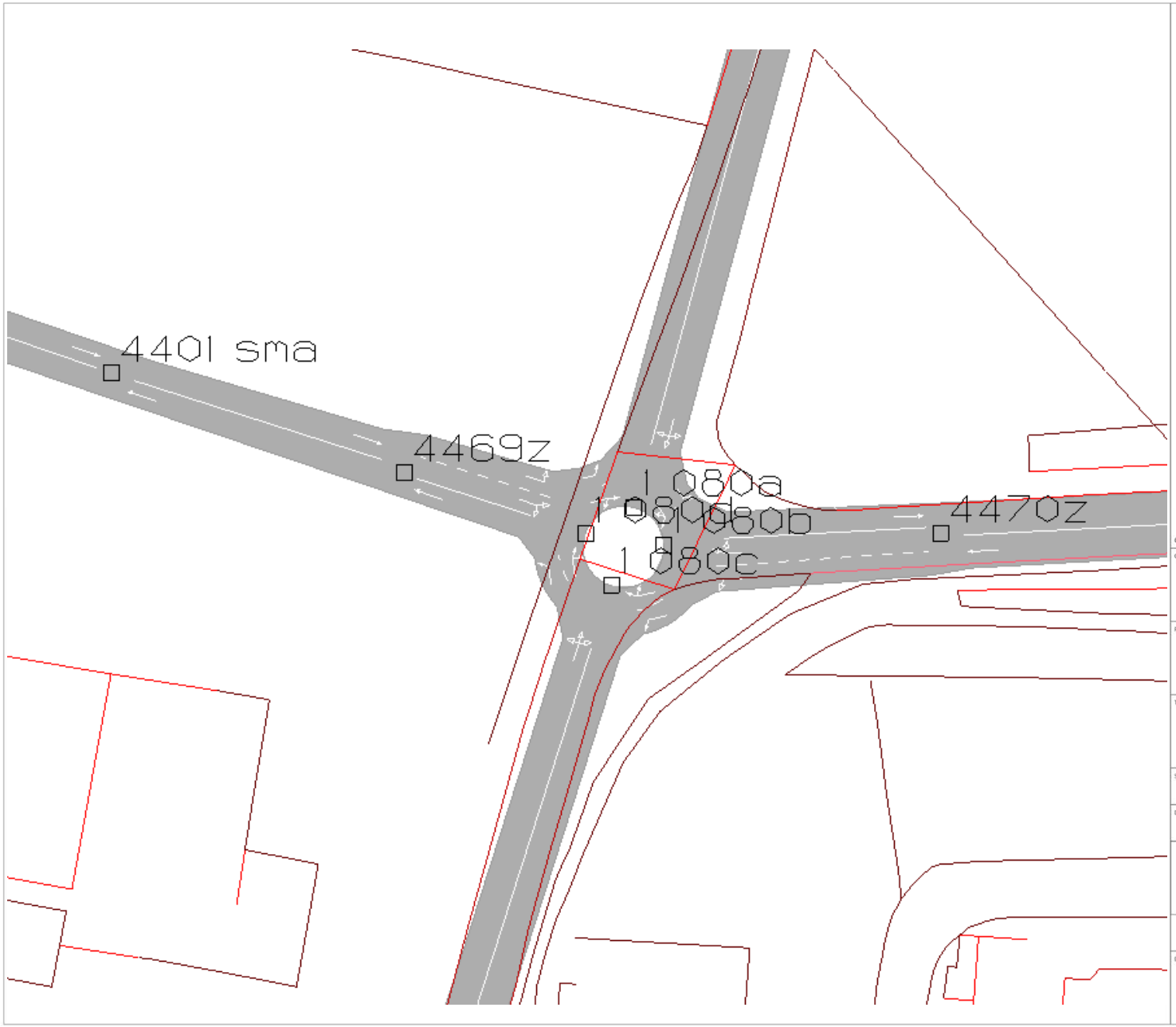
DRAWING REFERENCE: Ref 26



Roundabout with two lane approach from School Lane amd accommodating the new site access to the west.

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

Church Lane / Bowling Green Lane / School Lane

SCALE: NTS

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

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DRAWING REFERENCE:

Ref 27

Appendix B

Queue Analysis Plots

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

2022 Do Nothing vs 2022 Reference
AM 07:00 - 10:00
Average Maximum Queue (Average)

SCALE:

NTS

DRAWN:	CHECKED:	DATE:	REVISION:
DL	SA	15/02/2017	1

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Tel: 0121 213 6376 Email: microsim@vectos.co.uk www.vectos.co.uk

DRAWING REFERENCE:

MQ 001

CLIENT:

Warwickshire County Council

PROJECT:

VM165048 NBBC
Strategic Transport Assessment

TITLE:

2022 Do Nothing vs 2022 Reference
PM 16:00 - 19:00
Average Maximum Queue (Average)

SCALE: NTS

DRAWN:	CHECKED:	DATE:	REVISION:
DL	SA	15/02/2017	1

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DRAWING REFERENCE:

MQ 002