Communities Directorate

Nuneaton and Bedworth Borough Council
Local Development Framework Borough Plan

Warwickshire County Council
Highways Agency

Strategic Transport Assessment

February 2011

Warwickshire County Council

HIGHWAYS AGENCY

Communities Directorate

Project:	NBBC LDF Borough Plan Strategic Modelling and Transport Assessment
Date:	February 2011
Report:	NBBC LDF Core Strategy Strategic Transport Assessment
Issue:	011
Status:	Final Draft
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1 Introduction

1.1 Background

1.1.1 This document forms the County Council's response on transport matters to the most recently identified Borough Plan proposals for possible employment and housing sites throughout the borough. This response supersedes the submissions on transport which the County Council made as part of the previous Nuneaton and Bedworth Borough Local Development Framework Core Strategy.

1.1.2 The County Council has prepared this document to form a key input to the decision making process regarding the levels of future housing and employment growth within the Borough over the next 16 years. It is recognised however that transport is only one of many important considerations in the planning process.

1.1.3 The approach taken by the County Council in presenting this submission builds on the experience gained from the similar assistance which has been provided to Warwick District and Rugby Borough Council as part of the preparation of their Core Strategies. The use of an evidence based approach is also consistent with the expectations of the Planning Inspectorate, who will ultimately determine whether or not the Borough Plan is deemed to be sound.

1.2 The Process

1.2.1 An iterative, staged approach is being adopted by the County Council in providing its advice to the Borough Council on the transport implications of the Borough Plan. It is envisaged that further timely input to the process will be made at the post preferred option and submission stages.

1.2.2 In parallel with this process, the County Council, Highways Agency and Borough Council are working closely with promoters of a number of potential development sites within the area. It is likely that this work will help:

(i) Identify the key transport infrastructure and services which will be needed to support the Borough Plan proposals, in advance of the Independent Examination; and

(ii) Inform the position of the County Council and the Highways Agency when planning applications and supporting Transport Assessments (TAs) come forward for these sites in due course.

1.3 Terminology

1.3.1 A number of terms relating to the planning process and specialist terminology relating to transport planning are used throughout the document. Further clarification of definitions is included in Appendix I Glossary and Abbreviations.

2 Portrait of the Borough

2.1 The Borough in its Wider Spatial Context

2.1.1 Nuneaton and Bedworth Borough is located in the north of Warwickshire, between Coventry and Hinckley. The Borough is bordered by four local authorities, these being Rugby Borough and North Warwickshire Borough in Warwickshire, Hinckley and Bosworth Borough in Leicestershire and Coventry City within the West Midlands. The principal towns of Nuneaton and Bedworth are supplemented by a number of smaller settlements and villages (e.g. Bulkington) which can be found in the rural parts of the Borough. The proximity of Coventry and Hinckley to the area leads to an intensive interaction which places demands on the local and strategic transport network.

2.1.2 The resident population of Nuneaton and Bedworth Borough in 2008 was 122,000, with 79,700 living in Nuneaton and 36,150 in Bedworth (Source: ONS/Warwickshire Observatory). The resident population has increased by around 1700 in the period 2003-2008, representing a growth of 1.4%. This is just below the West Midlands average of 1.9% growth.

2.1.3 The Borough has a central position within the geography of Britain, given its proximity to the A5, M6/M6 Toll, M69 and M42 and West Coast Main Line. Good strategic transport links do however mean that the area is a popular place to live, work, and visit, all of which puts pressure on the strategic and local transport system. It is vital that future growth is seen to benefit the area rather than add to existing problems.

2.1.4 A number of major employers are also based in the area that play a vital role in supporting the local economy. Nuneaton forms the main commercial centre of the Borough, and is also home to the Borough Council. Bedworth also has a thriving town centre which has recently been redeveloped to incorporate a new large supermarket, improved transport system and pedestrian friendly areas.

2.1.5 The key employers in the area include the local NHS trusts (incl. George Eliot Hospital), North Warwickshire and Hinckley College, and the large number of employers in the Bayton Road industrial estates. This is supported by more recent development at Eliot Park Innovation Centre (EPIC), Rope Walk (retail), Tescos expansion in Bedworth and Pride in Camp Hill. Recent developments on the border of the Borough at Prologis Park, RICOH Arena, MIRA and Ansty Park continue to provide major employment opportunities with varying levels of accessibility.

2.1.6 There are currently two declared Air Quality Management Areas (AQMAs) within Nuneaton and Bedworth Borough, both of which are located in Nuneaton and relate directly to emissions from road traffic. One was declared in December 2006 around the Leicester Road/Old Hinckley Rd Gyratory, and a further area was declared in the Corporation St/Central Ave/Midland Rd/Abbey St area.

2.1.7 An Air Quality Action Plan(AQAP) to cover the AQMA on the Leicester Road/Old Hinckley Rd Gyratory was subsequently prepared by the Borough and the County Council. A revised AQAP for the Borough incorporating the Corporation St/Central Ave/Midland Rd/Abbey St area AQMA was published in 2011.

2.2 Transport Context

Transport Policy

2.2.1 At a national level, transport policy is underpinned by five national transport goals which were set by the previous Government for the development of the UK's future transport policy and infrastructure. These national goals and associated challenges were identified in the Department for Transport's publication 'Delivering a Sustainable Transport System' (DaSTS) in 2008. The five goals are outlined below.

- To reduce transport's emissions of carbon dioxide and other greenhouse gases, with the desired outcome of **tackling climate change**.
- To **support economic competitiveness and growth**, by delivering reliable and efficient transport networks.
- To **promote greater equality of opportunity** for all citizens, with the desired outcome of achieving a fairer society.
- To **contribute to better safety, security and health** and longer life expectancy by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health.
- To **improve quality of life** for transport users and non-transport users, and to **promote a healthy natural environment**.

2.2.2 The Local Transport White Paper, 'Creating Growth, Cutting Carbon: Making Sustainable Local Transport Happen' (January 2011) reiterates the Government's vision for a sustainable local transport system that supports the economy and reduces carbon emissions. It explains how the Government is placing localism at the heart of the transport agenda, taking measures to empower local authorities when it comes to tackling these issues in their areas. The White Paper also underlines the Government's direct support to local authorities, including through the Local Sustainable Transport Fund.

2.2.3 The wide ranging nature of the goals contained in both DaSTS and the Local Transport White Paper reflect the important contribution that transport can make in both supporting and acting as a stimulus to achieving a range of objectives, including supporting future growth proposals.

Warwickshire Local Transport Plan 2011-2026

2.2.4 The recently published Warwickshire Local Transport Plan (LTP3) sets out the County Council's proposals to improve transport and accessibility between 2011 and 2026. The Plan, which was submitted to the Department for Transport in March 2011, provides a 15-year strategy for transport up to the year 2026, with a rolling short term Implementation Plan.

2.2.5 The previous Warwickshire Local Transport Plan (2006-11) identified five overarching objectives for transport in the County. These have been reviewed to ensure that they remain relevant within the current policy context for transport. The revised objectives are as follows:

1. To promote greater equality of opportunity for all citizens in order to promote a fairer, more inclusive society;
2. To seek reliable and efficient transport networks which will help promote full employment and a strong, sustainable local and sub-regional economy;
3. To reduce the impact of transport on people and the [built and natural] environment and improve the journey experience of transport users;
4. To improve the safety, security and health of people by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health;
5. To encourage integration of transport, both in terms of policy planning and the physical interchange of modes; and
6. To reduce transport's emissions of carbon dioxide and other greenhouse gases, and address the need to adapt to climate change.

2.2.6 Objective 6 has been added to support the Government's commitment to tackling climate change as set out in the Climate Change Act 2008, the National Transport Goals and the Local Transport White Paper.

Existing Travel Patterns

The Highway Network

2.2.7 The highway network within or near the Borough is dominated by a number of important motorway and trunk roads which carry large volumes of local and longer distance traffic, these being:

- M6 and M6 Toll, which link the M1 with the Midlands, the North West and the South West (via the M5);
- M42, which forms part of the motorway box around Birmingham and links to the M40 and the M5;
- M69, which links the M6 with the M1;
- A5, which links Cannock, Lichfield, Tamworth, Atherstone, Nuneaton/Hinckley, Rugby, Northampton and Milton Keynes; and
- A46, which links the M1/M69 with the M40.
- A45, HA road to the south of Coventry, connecting the A46

2.2.8 There are a limited number of routes which link the main towns as well as provide access to the motorway and trunk road network described above, these being:

- A444 between Coventry and the A5 via Nuneaton, bypassing Bedworth to the west of the town;
- A47 between Nuneaton, the A5 and Hinckley;
- A4254 linking the A444 to A47 to the south east of Nuneaton town centre;

2.2.9 Certain routes within Nuneaton carry a significant amount of local and through traffic (particularly during peak periods of the day), including:

- A444 Roanne Ringway;
- A444 Bermuda to Roanne Ringway;
- A47/A444 Leicester Road/Old Hinckley Rd Gyratory;
- A4254 Avenue Rd/Coton Arches;
- B4114 Tuttle Hill/Midland Rd/Corporation St;
- B4102 Croft Rd/Queens Rd; and
- B4112 Heath End Rd/Bull Ring/College St and Greenmoor Rd area.

2.2.10 Within Bedworth, the following routes are heavily used by traffic:

- B4113 Heath Rd/Newtown Rd/George St Ringway;
- B4113 Rye Piece Ringway/Coventry Rd; and
- B4029 Bulkington Rd.

2.2.11 Other junctions or routes within or close to the Borough that experience high traffic flows and congestion include:

- A47/A5 Longshoot and Dodwells junctions (committed improvements);
- A444/A5 Redgate junction (committed improvements);
- A5/Higham Lane (committed improvements);
- A444 slips to B4113;
- A444 Griff Roundabout (recently signalised);
- A444/Ricoh Arena area;
- M69 J1/A5 (recently signalised);
- M6 J3/A444; and
- M6 J2/M69 (recently improved).

2.2.12 Whilst there are a number of committed road network schemes related to significant developments within the area (e.g. MIRA), there are currently no County proposal for any major new road building. The most significant schemes related to new development include;

- A5/Dodwells roundabout redesign with increased capacity (hamburger signalised configuration);
- A5/Longshoot signalised junction reconfiguration;
- A5/Higham Lane capacity improvement;
- A5/A444/Redgate priority junctions redesign with a lozenge shaped roundabout configuration;
- A5/MIRA access roundabout and left in with dual carriageway section; and
- George St Ringway, Bedworth, to become 2-way and Mill St bus-only with reconfiguration of the Park Rd/Newtown/Mill St junctions into a single signalised junction.

2.2.13 Civil Parking Enforcement (CPE) (formerly known as Decriminalised Parking Enforcement (DPE)) took effect within the Borough on 7th November 2011. This allows the Local Authorities to take over the enforcement of parking regulations from the Police. In terms of the impact of CPE on transport users, it is hoped to have the following effects;

- Improved traffic flow. The increased availability of on-street parking spaces reduces congestion caused by drivers searching for on-street car park spaces;
- Improved road safety and network capacity through better enforcement of illegal parking on yellow lines, at road junctions and on narrow streets;
- Improved accessibility for public transport;
- Improved accessibility for people with disabilities who rely on the use of the car, through better parking enforcement; and
- Less parking on footways, making life easier for pedestrians and wheelchair users.

2.2.14 Traffic flows in each of the major urban areas in Warwickshire has been monitored on an annual basis to establish traffic growth (or reduction). Nuneaton has experienced the highest rate of traffic growth at approximately 7.5%, with Bedworth experiencing a lower growth rate of 2.7%. This overall growth in traffic masks a trend in recent years for a reduction in traffic levels. This is thought to be due to a combination of factors including rising unemployment levels and an increase in fuel prices. In contrast to other towns within Warwickshire, traffic growth in Bedworth has continued, albeit at a slower rate in more recent years. (Source: Warwickshire LTP3, Nuneaton and Bedworth Urban Area Strategy).

2.2.15 Within the Borough, 64.4% of people use the car for their journey to work (Source: Census 2001). The respective figure for the journey to school is 32% (Source: WCC School Travel Survey 2010).

Public Transport

2.2.16 The urban areas of the Borough have a relatively comprehensive network of bus services, made up of a combination of intra and inter-urban routes. The majority of these services are provided on a commercial basis by Stagecoach and, to a lesser extent, Travel Coventry, Arriva, Centrebus and Cresswells.

2.2.17 Access to the rail network can be found at both Nuneaton and Bedworth. Nuneaton and Coventry act as the principal railheads for the Borough by providing access to train services on the West Coast Main Line (Virgin and London Midland services). Funding has recently been approved for Phase 1 of the NUCKLE heavy rail improvements, which will include new stations at Bermuda and RICOH arena, platform extensions at Bedworth and improved service frequencies between Nuneaton and Coventry.

2.2.18 From Nuneaton there are hourly services between Liverpool/Crewe and London Euston, hourly services between Coventry and Nuneaton, and half-hourly connections between Birmingham and Stansted.

2.2.19 Approximately 6% of journeys to school are made on public transport (Source: WCC School Travel Survey 2010). The journey to work by public transport (bus and rail) accounts for 5.8% of the modal share (Source: 2001 Census).

Walking and Cycling

2.2.20 The cycle network within the Borough has been incrementally expanded and improved over the last 10-15 years through investment by the County Council (using LTP funding), Sustrans (as part of the development of the National Cycle Network), the Borough Council and developers. Key routes include the A444 Weddington Rd and Regent St/Bond St/Back St Gyratory on-road cycle routes, Weddington Country Walk (NCN 52) off-road route (which will see further improvements as part of the MIRA development), and NCN 52 which follows the route of the canal through Bedworth linking to Coventry. The MIRA development also includes off-road cycle schemes along the A5. The Wembrook Trail off-road route links Whitestone to the town centre and off-road cycle tracks are provided around Roanne Ringway. The Attleborough to Bermuda on and off-road route provides excellent links to employment though the recently signalised Griff Roundabout at the A444 with cycle crossing facilities. This will be further complemented by improvements associated with Bermuda Station and committed improvements linking to Bermuda village through provision of an official cycle route on the bridge over A444. From Bedworth, the Bermuda Park employment area can be accessed from B4113 Coventry Rd via Griff Lane off-road cycle route and the bridge over A444 or via cycle facilities at Griff Roundabout.

2.2.21 Apart from the usual range of controlled and uncontrolled pedestrian crossings, the main facilities for those on foot can be found within the existing pedestrianised areas of Nuneaton and Bedworth town centres.

2.2.22 The mode share for journeys to work made on foot and by bike in the Borough is 9.3% and 2.8% respectively (Source: 2001 Census). For the journey to school, 58% of pupils walk whilst 3% cycle (Source: WCC School Travel Survey 2010).

Performance of the Local Transport Network

The Highway Network

2.2.23 There are a number of issues and constraints which tend to be the cause of the majority of congestion problems across the transport network within Nuneaton and Bedworth Borough. These include;

- The historical nature and configuration of certain routes within the main town centres;
- The geographical location of large employment sites to the south of Nuneaton (George Eliot Hospital, Bermuda Park, Caldwell Rd, Townsend Dr), and north and south of Bedworth (Bermuda Park and Bayton Rd) which results in a heavy demand for movements at peak times of the day through both Nuneaton and Bedworth town centres;

- The proximity of Nuneaton and Bedworth to parts of the motorway and trunk road network. This has implications both for traffic passing through the area in order to access this network, and when there is an incident on either the A5, M6 or M69; and
- The limited number of routes between Nuneaton and Bedworth (A444 and B4113 Coventry Rd), Nuneaton and Coventry (A444) and Nuneaton and Hinckley (A47 or A5);

2.2.24 These issues result in delays and congestion throughout the network (as described earlier), principally (though not exclusively) at peak periods of the day and on Saturdays.

Public Transport

2.2.25 The principal constraints to bus operations within the Borough relate to issues of congestion and journey time reliability on certain routes. Generally speaking, bus service timings during the peak periods are more generous to reflect this issue. New or enhanced bus services to serve future growth within the Borough will require careful planning in order to integrate them into the existing commercial and subsidised network.

2.2.26 The primary constraint for rail to maximise its role within the area is the capacity of stations and rail services, both of which will be partially addressed by NUCKLE Phase 1.

2.2.27 The large commuter destination at Bermuda Park currently lacks its own railway station. The County Council (in conjunction with Coventry City Council and Centro) has developed proposals and secured funding though NUCKLE Phase 1 for a new station to be provided, the site of which is safeguarded on St Georges Way off Griff Roundabout.

Walking and Cycling

2.2.28 There are limited issues in terms of the performance of the pedestrian and cycle network within Nuneaton and Bedworth Borough. The expansion of the cycle network within and around the town over the last 10-15 years has significantly improved conditions for cyclists. There are however a number of gaps in both the intra-urban and inter-urban cycle route network (e.g. Nuneaton to Bedworth and within Bedworth town centre).

Nuneaton and Bedworth Borough Transport Issues

2.2.29 Maps of the Borough have been produced summarising the key transport issues, highlighting congested routes and areas and with safety concerns (Appendix A). Additionally, important recent, committed and proposed schemes have also been plotted.

2.2.30 Key Committed and Completed Schemes within the area are as follows:

- A444 Griff Roundabout signalisation completed 2009.
- M69 J1 Signalisation completed.
- Abbey St Bus Gate completed.
- A5 Dodwells Roundabout hamburger signalisation committed .
- A5 Longshoot reconfiguration committed.
- A5 Higham Lane Roundabout capacity improvement committed.
- A5/A444 Redgate junction reconfiguration to lozenge roundabout committed.
- A5 MIRA access roundabout and dualling committed.
- B4113 George St Ringway 2-way and Park Rd junction signalisation due to be completed in 2012.
- Bermuda Station (NUCKLE Phase 1) (funding committed).
- RICOH Station (NUCKLE Phase 1) (funding committed).

2.2.31 MIRA related schemes on the A5 have been treated as committed schemes, related to future proposals for expansion. Strictly speaking, they are not actually committed schemes, but they will go ahead and as such have been described as committed. These schemes are focussed on the mitigation of the MIRA development impact only. There may be residual capacity due to some of these junction improvements. These schemes could be further enhanced to provide additional capacity for the Borough Plan housing and employment proposals.

2.2.32 Key Scheme Proposals or Investigations which are not currently committed are as follows:

- M6 J2 Strategic Park and Ride investigation (study underway).
- Bermuda sustainable transport bridge.

2.3 Strengths, Weaknesses, Opportunities and Threats

2.3.1 A summary of the strengths, weaknesses, opportunities and threats of the transport network is set out in Table 2.1 overleaf.

Strengths	**Weaknesses**
• Unique location of Nuneaton and Bedworth Borough in relation to the national road and rail network • Committed improvements to rail services, funded proposal for heavy rail infrastructure and improved service frequencies on certain routes • Well developed cycle network • Reasonably comprehensive intra and inter-urban bus network • Partially pedestrianised areas within the main town centres	• Existing congestion on key routes within and around the main town centres • Pressure on capacity at rail stations and provision of rail services • Majority of bus and rail services are outside the control of the County Council • Existing bus network will probably need to be revised to maximise the public transport potential of development sites • Schemes to major issues (e.g. Roanne Ringway capacity constraints, reducing impact on AQMA's not easily achieveable)
Opportunities	**Threats**
• All of the strengths above represent opportunities • Future development could be provided in a way that maximises the benefits of new or enhanced transport infrastructure and services, e.g. public transport proposals will become commercially viable in the medium/long term after initial pump-priming • Revisions to the existing bus network may open up new journey opportunities Schemes related to MIRA development provide capacity improvements on the A5 for all users. Such schemes could be enhanced further through this development planning process.	• Development sites may come forward which are not supported by sustainable transport improvements, leading to a growth in car-based travel. Subsequent impacts on rat-running and increased congestion (particularly in town centres and surrounding residential areas) and on local air quality

Table 2.1: Strengths, Weaknesses, Opportunities and Threats

3 Option Assessment

3.1 The Vision for Transport within Nuneaton and Bedworth Borough

Introduction

3.1.1 The proposals for transport in relation to the Borough Plan should, where possible:

1. Contribute to the area being a place where people want to live, work and visit;
2. Support the economy of the main towns and surrounding rural areas, thus stimulating growth and prosperity;
3. Mitigate, where possible, the negative impacts of growth;
4. Help achieve connectivity between new and existing neighbourhoods, community facilities and public spaces; and
5. Ensure that communities can access heath and local services by sustainable means.

Local imperatives

3.1.2 As set out earlier, the County Council's objectives for taking forward the National Transport Goals at a local level are as follows:

1. To promote greater equality of opportunity for all citizens in order to promote a fairer, more inclusive society;
2. To seek reliable and efficient transport networks which will help promote full employment and a strong, sustainable local and sub-regional economy;
3. To reduce the impact of transport on people and the [built and natural] environment and improve the journey experience of transport users;
4. To improve the safety, security and health of people by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health;
5. To encourage integration of transport, both in terms of policy planning and the physical interchange of modes; and
6. To reduce transport's emissions of carbon dioxide and other greenhouse gases, and address the need to adapt to climate change.

3.1.3 When these are combined with the vision for transport in Nuneaton and Bedworth Borough as set out above, a number of local imperatives begin to emerge:

1. The need for a sustainable transport system to underpin growth, with a focus on public transport, walking, cycling and targeted highway improvements;

2. The need to ensure that any growth proposals support the economy of the Borough, and do not adversely impact upon it (particularly in terms of congestion);
3. The need for the impact of any transport improvements on the built and natural environment to be minimised (particularly air quality); and
4. The need to ensure that existing and future residents/visitors to the area can access and use the transport network safely and in an integrated way.

3.2 Future Growth in Nuneaton and Bedworth Borough

Introduction

3.2.1 As described below, the Borough Council has provided details of the required levels of housing and employment growth that could take place over the next 15 years. In order for the County Council to inform this process, it has been necessary to make some assumptions regarding what broad geographical areas across the Borough could come forward to deliver this growth. In conjunction with officers from the Borough Council, a number of sites which were identified in the Strategic Housing Land Availability Assessment (SHLAA) have been used as the basis of a number of option tests. By inclusion in this piece of work, no implication should be taken that these are the preferred sites for future development within the Borough. Without making some assumptions about the location of development, it is extremely difficult to come to any meaningful conclusions regarding the likely impact on the transport network of one growth scenario compared to another.

Development Scenarios and Assumptions

Levels of Growth and Location of Sites

3.2.2 NBBC requested a specific level of growth to be assessed in terms of high level highway impact and accessibility to sites. Five variations of combinations of potential housing sites were tested and analysed, a further three scenarios were tested and these results have been included in Appendix E. NBBC provided potential broad locations for residential development and gave specific locations to be used in all scenarios for commercial development and advised on the capacity of these sites. Suitable access points onto the highway network were identified by the Project Board. Further details on the scenarios tested are shown in Table 3.1 below (page 17).

3.2.3 All scenarios assume a quantum of growth equating to between 5200 and 6000 housing units (dependent on selected sites) and 100 Ha of employment land with a 40% build out assumption, this equated to 40 Ha of employment. The employment land use class split was defined as;

- B1 13%
- B2 28%
- B8 59%

3.2.4 As a second stage, a sensitivity test was undertaken to understand the impacts of developments that already have planning permission and are committed developments but are not included in the base line traffic flows.

3.2.5 The following tasks and assumptions were undertaken in order to model committed developments;

- All committed housing and employment within the Borough was distributed according to the capacity and location sites described in the AMR, Housing in the pipeline as at April 2011 and through consultation with NBBC planning officers and WCC Development Group.
- Hinckley and Bosworth Borough Council and Coventry City Council were consulted to obtain details of any significant committed developments surrounding the borders of the Borough outside of Warwickshire.
- WCC Development Group were consulted to obtain details of any significant committed developments surrounding the borders of the Borough within Warwickshire.
- Employment trip rates adopted for each land use were the same as the trip rates adopted in the analysis of each scenario (see 3.2.7).
- Only employment sites greater than 0.2Ha were considered. All other growth was accounted for by applying DfT NTM growth forecasts.
- Only housing sites greater than 10 units were considered. All other growth was accounted for by applying DfT NTM growth forecasts.
- Housing trip rates adopted were the same as used in the scenario testing (see 3.2.7).

3.2.6 The MIRA development, although not committed, has been included as a committed development due to the strong political support, secured RGF monies and no objection from the highway authorities. A committed development schedule for 2028 is provided in Tables 4.3 and 4.4 (page 42)

3.2.7 Town centre improvement proposals promoted by NBBC have been tested in CITEware to ascertain their impact and percentage draw from potential housing sites. Based on likely development mixture and potential capacity of town centre sites provided by NBBC, no significant difference was identified in terms of draw from housing sites and impact on town centre routes.

Trip Rates

3.2.8 The trip rates adopted for each housing and employment land use are shown in Appendix C. The trip rates which have been adopted are for strategic modelling use only. Once the actual characteristics of each site are more certain more detailed analysis and identification of suitable trip rates will be required for microsimulation modelling purposes.

3.2.9 The trip rates used for assessing developments that are already committed and for testing the impact of the town centre proposal shared the same set of trip rates. Where land use differed from the land use classes used for LDF sites, new strategic trip rates were adopted. These are also shown in Appendix C.

Prerequisites for site delivery

3.2.10 Where it is considered that an internal link road through the site would be required as a distributor road for development site trips and as a route to take external traffic, these have been included as a prerequisite and are taken into account in the CITEware modelling.

	Parcel	Capacity			Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Additional Scenarios: Scenario 6	Additional Scenarios: Scenario 7	Additional Scenarios: Scenario 8
		@ 35 dph	@ 40 dph	Tested	Housing (Units)					Housing (Units)		
Housing Sites	PDA 1	1749	1999	1800	0	1800	0	0	1800	0	0	1800
	PDA 2	3671	4195	3700	3700	3700	0	0	0	3700	0	0
	PDA 3	483	552	500	500	500	500	500	500	500	500	500
	PDA 4	1317	1506	1400	0	0	1400	0	0	0	1400	0
	PDA 5	2927	3345	3000	0	0	3000	3000	3000	0	3000	3000
	PDA 6	1428	1632	1500	0	0	0	1500	0	1500	0	0
	PDA 7	591	676	600	600	0	0	0	0	0	600	0
	PDA 8	280	320	300	300	0	300	0	0	0	0	0
	PDA 9	731	836	200	200	0	200	200	200	0	0	0
	Total	*13177*	*15061*	*13000*	*5300*	*6000*	*5400*	*5200*	*5500*	*5700*	*5500*	*5300*
	Emp Site	Has	Has(40% build out) Tested		Employment (Has)					Employment (Has)		
Employment Sites	WB/01/08	2.02	0.81		0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
	AR/13/08h	6.55	2.62		2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62
	AR/13/08i	9.41	3.77		3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77
	AR/13/08j	16.73	6.69		6.69	6.69	6.69	6.69	6.69	6.69	6.69	6.69
	AR/13/08k	27.24	10.90		10.90	10.90	10.90	10.90	10.90	10.90	10.90	10.90
	HE/01/08	20.87	8.35		8.35	8.35	8.35	8.35	8.35	8.35	8.35	8.35
	EX/19/08	21.07	8.43		8.43	8.43	8.43	8.43	8.43	8.43	8.43	8.43
	P11	3.47	1.39		1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39
	P04	4.19	1.68		1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
	P27	0.88	0.35		0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	P03	1.71	0.68		0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
	Total	*114.15*	*45.66*		*45.66*	*45.66*	*45.66*	*45.66*	*45.66*	*45.66*	*45.66*	*45.66*

Table 3.1: Development Scenarios and Site

nb PDA9 was tested using a 200 dwelling assumption due to other land constraints identified by NBBC.
dph – dwellings per hectare

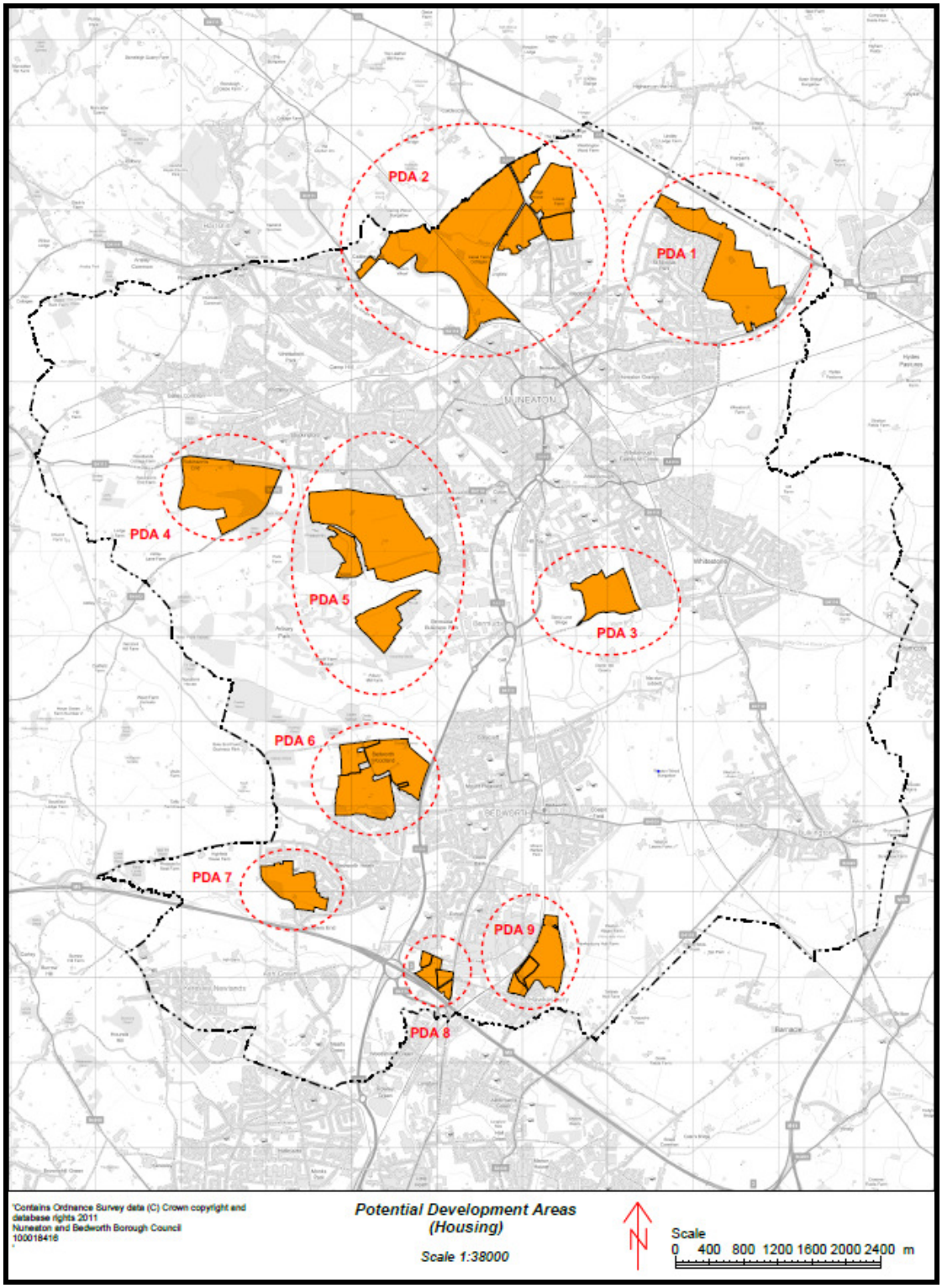

Figure 3.1: Potential Development Areas (Housing)

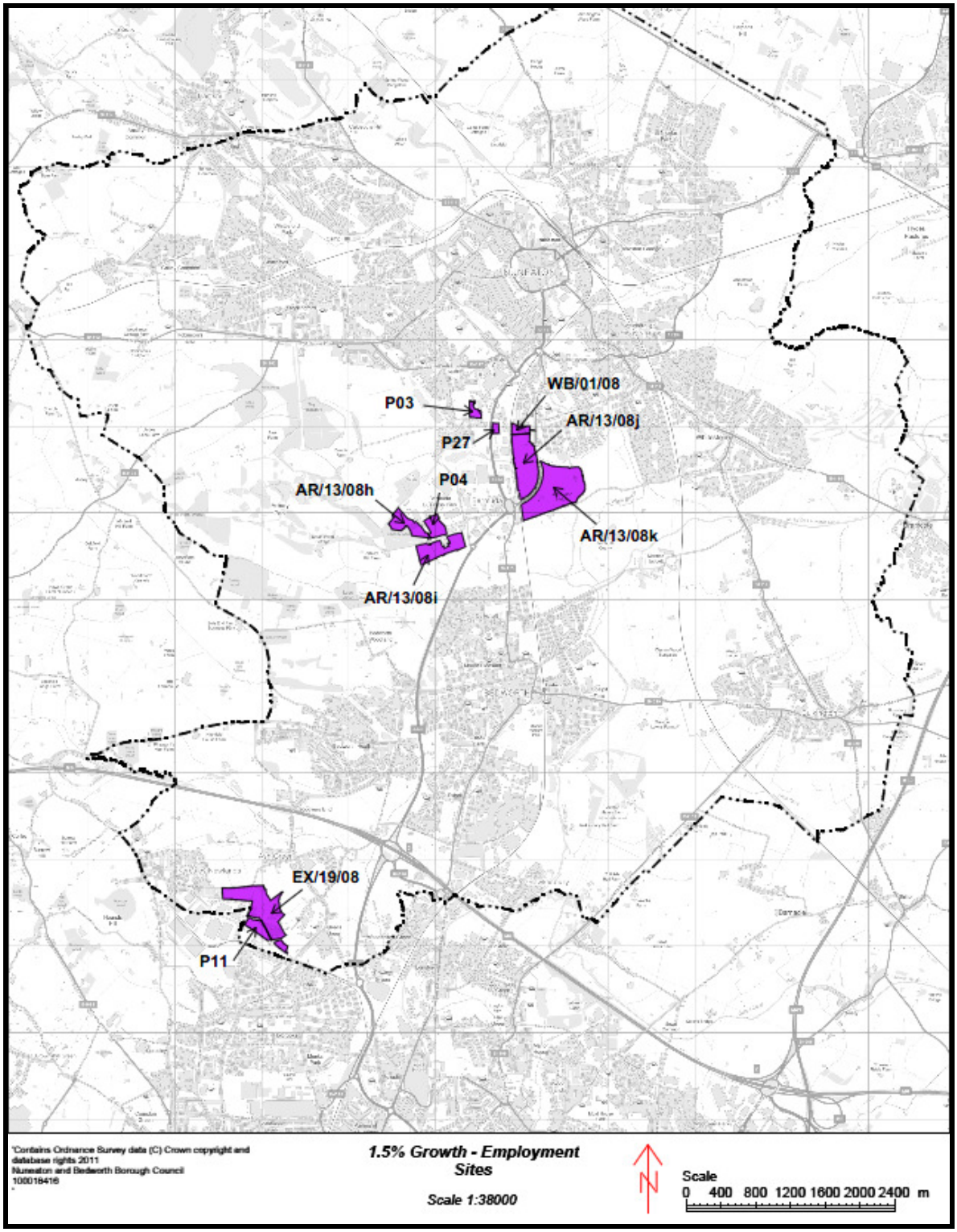

Figure 3.2: Potential Development Areas (Employment)

Strategic Modelling Methodology with CITEware

3.2.11 The test year for all assessments was 2028. AM morning peak (0800-0900) and PM evening peak (1700-1800) have been adopted as the most suitable time periods to test as they represent the worst case in terms of traffic congestion issues on the road network with Nuneaton and Bedworth Borough.

3.2.12 The highway impact relating to each scenario was assessed using JMP's CITEware strategic modelling software. This software was developed with input from WCC and has been tailored for our use through the inclusion of surveyed traffic flows across the entire strategic network and observed vehicle speeds derived from DfT NI167 data. The software also utilises census journey to work data, OS mapping and DfTs NTM for the calculation of growth factors. The model has been used by a number of other local authorities and the Highways Agency. WCC are satisfied that this model is the most suitable tool for the kind of high level strategic modelling required at this stage. Further details on how CITEware works can be found in Appendix B.

3.2.13 It should be noted that this is a strategic modelling exercise. The CITEware model calculates the routes chosen by vehicles based on a time and distance calculation. The time taken to travel along any given link is informed by DfT NI167 data and is therefore based on the delays/speed of travel experienced during 2008/9. Route choice during the 2028 test year may differ as speed of travel along various links may alter as a result of increased congestion and delay. The model cannot take account of the delay caused by the additional traffic on the network nor can it take account of infrastructure changes improving junction capacity (ne links can be modelled) that may be associated with each scenario tested. The CITEware model runs an "All or Nothing" assignment which means that the model will work out the least cost route from the origin of the trip to the development site (or vice versa), there is no rerouting of traffic due to increased levels of congestion for either the baseline traffic flows or the development related traffic flows. Therefore a logic check is required in the interpretation of the CITEware output plots. This involved identifying areas where it is known that capacity is restricted (i.e a town centre) and where there are few options to improve the capacity. It can be expected that a proportion of the development site vehicles would in reality reroute onto more appropriate routes, for example the M69/M6 corridor.

3.2.14 It should also be noted that the outputs from CITEware are considered to be a worst case scenario. The profile of development related trips is based on current mode share and time period choice. By 2028 it is inevitable that there will be a higher degree of modal shift onto more sustainable means of transport and commuters are likely retime their journeys in response to the higher levels of congestion on the network (e.g. commuting between 0700-0800 rather than the current peak period). There is evidence that this behaviour is already happening however it is difficult to protract this evidence to provide reliable 15+ year forecasts. Therefore the most suitable approach is to use current patterns of travel and except that the model is providing a robust worst case scenario.

3.2.15 Stage 2 of the analysis considers the impact of developments that have already achieved a committed development planning status. The impact of these developments will be in addition to that of the strategic sites for housing and employment. This should in theory become the new base situation from which to measure the impact of developments. However, to do this would mask the true impact of the SHLAA and strategic employment development sites and would not recognise the changes to the road network associated with committed development mitigation. Therefore the fairest way to deal with this issue is to apply NTM growth factors(see 3.3.13) to the base flows and then measure the differences between factored flows and factored flows + strategic developments, whilst also keeping in mind the area specific network issues associated with committed developments. This issue is raised in Chapter 4.

3.2.16 This type of modelling provides evidence to be used in a strategic sift of scenarios and sites, and highlights where possible highway infrastructure improvements are required. Once this has been achieved a more detailed modelling exercise should be undertaken using microsimulation modelling to ascertain with more confidence the actual impact on the highway network, thoroughly testing mitigation options and attributing cost to developments. This issue is discussed further in Chapter 6.

3.2.17 Three methodologies have been adopted in the analysis of the CITEware outputs and should be used in conjunction when formulating an opinion on the impact of a scenario on the highway network.

3.2.18 The first methodology involved a simple assessment of the overall increase in 2-way traffic flow on all links within the model relating to each development scenario. The outputs for this method are provided in development traffic plots using the following banding;

- 0-50 additional vehicles
- 50-100 additional vehicles
- 100-250 additional vehicles
- 250-500 additional vehicles

- 500+ additional vehicles

3.2.19 This is useful for understanding the overall increase in traffic in an area/on a route but gives no context. For example, an increase of 100 vehicles on the M69 or M6 would be negligible, we already experience such differences on a daily basis, however, the same increase on Rye Piece Ringway in Bedworth may be considered significant.

3.2.20 To overcome this issue a second methodology was developed using a common traffic modelling calculation called GEH. Using the GEH Statistic avoids some pitfalls that occur when using simple percentages to compare two sets of volumes. This is because the traffic volumes in reality vary over a wide range. For example, the mainline of a motorway might carry 5000 vehicles per hour, while a side road may only carry 50 vehicles per hour (in that situation it would not be possible to select a single percentage of variation that is acceptable for both volumes). The GEH statistic reduces this problem; because the GEH statistic is non-linear and self-scaling, a single acceptance threshold based on GEH can be used over a fairly wide range of traffic volumes. The use of GEH as an acceptance criterion for travel demand forecasting models is recognised in the *DfT Design Manual for Roads and Bridges (DMRB), Volume 12, Section 2*.

3.2.21 For traffic modelling in the "base" scenario, a GEH of less than 5.0 is considered a good match between the modelled and observed hourly traffic flows. Therefore any link that has a GEH value of less than 5 in a forecast model can be deemed to accommodate only a small increase in traffic relative to the existing flows, between 5.0 and 7.5 GEH shows a more significant impact, 7.5 to 10.0 GEH suggests a high impact and anything above 10.0 GEH experiences a very significant impact in relation to the existing flows on the particular link.

3.2.22 In addition to the analysis described above a third exercise was undertaken to assess;

- the increase in traffic movements along key route between towns;
- the increase in traffic movements along key routes between towns and the HA Strategic Road Network (SRN);
- additional numbers of vehicles using the SRN compared to WCC road network;
- the additional numbers of vehicles travelling through, to or within town centres; and
- the additional numbers of vehicles travelling through Air Quality Management Areas (AQMAs).

3.2.23 This methodology provides an easily understood output in a tabular form. Additional development traffic in 2028 has been provided in absolute generation of additional vehicle trips on the network and percentage increase. Base traffic flows were factored according to DfTs NTM forecasting software, standard modelling practice. The growth rates used for this process are in Appendix D.

3.2.24 It should be noted that all analysis has been undertaken using 2-way flow as is typical for a strategic modelling exercise of this nature. Trips originating from the development zones will have tidal flows where in the AM a housing development will be producing many more trips than it will be attracting and vice versa for the PM period. The opposite of this will be true for an employment development site. It should be recognised that any mitigation solutions identified should be able to accommodate the tidal nature of the trips associated with the developments and the baseline traffic conditions.

3.2.25 An analysis of outputs is provided in Chapter 4. CITEware outputs are provided in Appendix E

3.3 Accessibility Analysis Methodology with Direct Route

3.3.1 Accessibility analysis was undertaken using JMP's Direct Route software. This software is similar to a slimmed down version of Accession accessibility modelling software. The software was developed in house by JMP, benefits from fast model run times and is ideally suited to strategic accessibility analysis. The latest version takes into account commuter desire to use transport interchanges (i.e. choosing to use a combination of public transport routes rather than a single route or, as in Accession(an alternative platform) unlimited changes which could be deemed unrealistic. DirectRoute has been used in the North West Regional DaSTS study and by the DoH. Further details relating to the development of DirectRoute, how it works and examples of previous studies are included in Appendix B. Accessibility outputs are provided on a development site basis rather than an option basis, plots by scenario would prove difficult to interpret..

3.3.2 The latest version of Direct Route takes into account commuter desire to use transport interchanges (i.e. choosing to use a combination of public transport routes rather than a single route). The alternative accessibility platform, Accession, considers the possibility of unlimited changes which can lead to some unrealistic outputs.

3.3.3 Information on the locations of employment, healthcare and shopping has been derived from 2006/7 Accession repositories held by WCC. There may have been some small changes to this information since this date. Locations of these sites are based on postcode centroids. Therefore, the points marked on the maps may not correlate exactly with where the employment etc. is geographically located, but they should be within 200 metres.

3.3.4 An analysis of outputs is provided in Chapter 4. DirectRoute outputs are provided in Appendix G.

3.4 Identification and Costing of Transport Interventions

3.4.1 Identification of key transport interventions was based on expert analysis of the modelling outputs through a 9 member project board including senior transport planning and development control officers from WCC, senior planners form NBBC and senior planners from the HA and JMP (HA consultants). Transport interventions were identified in terms of provision of sustainable transport to encourage modal shift and key road network schemes to improve capacity.

3.4.2 Broad approximations of costs have been provided based on suitable mitigation schemes discussed with the project board. These can only be considered as indicative costs. The most suitable mitigation measures will be derived though mitigation option testing using microsimulation modelling. This can only be undertaken once a suitable set of sites and growth level have been decided.

4 Results of Option Assessment

4.1 Introduction to Strategic Modelling

4.1.1 As discussed in the methodology in Chapter 3, all assessments provide a comparison between NTM 2028 factored base flows and NTM 2028 factored base flows + strategic development site traffic flows. Committed developments are considered separately and should be considered when looking at area specific traffic impact. This exercise was to determine the impact of traffic relating to the identified broad location of sites and a comparative difference combinations of sites. As such, inclusion of committed developments would mask the full impact of the strategic development sites. NTM growth factors will take into account the growth related to the committed developments but it will not be area specific. As discussed, Stage 2 of the assessment included analysis of committed development sites.

4.1.2 On the whole AM and PM plots are very similar as the distribution for PM trips is a reversal of the AM journey to work data taken from the National Census. There will be slight difference in trip rates and more significant difference in delays on certain road links (informing route choice) and for this reason PM plots are provided in the Appendices. The following comments relate to AM and PM period traffic impacts, where there is any significant difference between AM and PM outputs this will be noted.

4.1.3 Analysis of results covers the following;

Stage 1

a) Development Traffic Plots – interpretation of the 2 way additional development traffic flow plots over the network.
b) GEH Plots – interpretation of the GEH indicators as described in chapter 3.
c) Comparative Indicators - interpretation of Table 4.1 and 4.2 which highlight additional development traffic on key routes, within town centres and within AQMAs in terms of absolute and percentage increase.
d) Impact on SRN – interpretation of all outputs relevant to the impact on the Highways Agency Strategic Road Network.

Stage 2

a) Impact of Committed Developments

	Base Year 2011		Base Year 2028		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Town centres														
Nuneaton	9711	10171	10881	11573	799	731	1508	1371	556	487	496	428	914	846
Bedworth	3690	3869	4399	4692	352	318	580	514	374	341	390	357	557	524
Trunk														
HA links - A5	3400	3390	3929	3951	570	535	1283	1214	613	579	444	410	1055	1020
HA links - M6	12748	12141	13020	12455	593	528	842	712	788	723	573	508	702	636
HA links - M69	5537	5320	5606	5397	93	81	276	252	128	116	117	105	212	200
AQMA areas														
AQMA 1 - Leicester Rd Gyratory, Nuneaton	1799	1854	2302	2450	1026	1003	2373	2227	196	173	166	142	879	855
AQMA 2 - Midland Road to Corporation Street, Nuneaton	1353	1307	1473	1448	61	57	141	132	52	48	34	29	103	98

Table 4.1: Absolute increase in 2028 development related traffic on selected routes and areas

	Base Year 2028		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Town centres												
Nuneaton	12%	14%	7%	6%	14%	12%	5%	4%	5%	4%	8%	7%
Bedworth	19%	21%	8%	7%	13%	11%	9%	7%	9%	8%	13%	11%
Trunk												
HA links - A5	16%	17%	15%	14%	33%	31%	16%	15%	11%	10%	27%	26%
HA links - M6	2%	3%	5%	4%	6%	6%	6%	6%	4%	4%	5%	5%
HA links - M69	1%	1%	2%	2%	5%	5%	2%	2%	2%	2%	4%	4%
Total			6%	5%	11%	10%	7%	6%	5%	5%	9%	8%
AQMA areas												
AQMA 1 - Leicester Rd Gyratory, Nuneaton	28%	32%	45%	44%	103%	97%	9%	8%	7%	6%	38%	37%
AQMA 2 - Midland Road to Corporation Street, Nuneaton	9%	11%	4%	4%	10%	9%	4%	3%	2%	2%	7%	7%

Table 4.2: Percentage increase in 2028 development related traffic on selected routes and areas

4.2 Stage 1 Strategic Modelling – Growth Scenarios

Scenario 1

4.2.1 This development option allocates developments at PDA 2,3,7,8 and 9 with a total of 5,300 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 2 – 3700 houses
- PDA 3 – 500 houses
- PDA 7 – 600 houses
- PDA 8 – 300 houses
- PDA 9 – 200 houses

Development Traffic Plots

4.2.2 As with all assessments, the greatest impacts are in close proximity to the sites. Employment sites are dispersed centrally between Nuneaton and Bedworth around Bermuda area, significant pressure is experienced throughout the local network especially along the A444 to Coventry. As the majority of proposed employment developments are located in close proximity to each other, appropriate mitigation can be focussed. However, with housing developments spread across the borough it may be more difficult to focus suitable mitigation.

4.2.3 With PDA2 situated to the north of Nuneaton, there is a significant demand to and from Coventry and the new employment in the south. Tunnel Rd/Astley Lane/Dark Lane is being used as an alternative route to get to these areas as an alternative to travelling through the town centre which is already nearing capacity. This route is not of a sufficient standard to accommodate these levels of traffic. Capacity constraints mean that it is likely a significant proportion of this traffic will actually use the A444 putting further pressure on town centre routes in Nuneaton.

4.2.4 Manor Court Road/ Croft Rd/Greenmoor Rd/College St route is also being heavily used by traffic associated with PDA 2 and trying to access the A444 and employment in the south.

4.2.5 There is significant pressure on the A47 between Nuneaton and Hinckley whist also putting pressure on the A5, especially between Longshoot and Dodwells.

4.2.6 The A4254 is being used as an alternative to this route and the town centre, and as such, considerable pressure is experienced in this area.

4.2.7 PDA 3 provides housing in close proximity to employment. This will help to reduce car borne trips and allows for suitable mitigation to be focussed in appropriate areas to access the A444, Coventry and the strategic road network.

4.2.8 PDA 7 is a small site in close proximity to existing and proposed employment sites. As with PDA 3 it is likely that this will support more sustainable modal choice. Lack of suitable routes accessing the A444, M6 and to the east of Coventry result in further pressure on the School Lane area south of Bedworth.

4.2.9 PDA 8 and 9 are fairly small in size, however the combined effect and the lack of alternative routes to the employment in the north and the town centres suggests that Bedworth town centre will be put under further pressure.

GEH Plots

4.2.10 The GEH plots highlight the A444 corridor, B4114 Midland Rd and Astley Lane/Dark Lane/Tunnel Rd for the entire route between Coventry and PDA 2, B4112 College St, A444 Weddington Rd, A47 Hinckley Rd and as being the worst affected areas. High volumes of traffic with GEH 10+ are experienced. A GEH value exceeding 10 on these routes suggests demands well out of proportion with existing levels of traffic.

4.2.11 Other points to note;

- Use of Donnithorne Rd, Nuneaton, it is more likely traffic will route via Coton Arches and the A4254.
- Significant use of Manor Court Rd and Greenmoor Rd (an area currently under congestion pressure) in order to avoid town centre congestion.
- Significant pressure at Longshoot and Dodwells junctions on the A5.
- PM impacts are very similar to AM

Comparative Indicators

4.2.12 Nuneaton town centre experiences an additional 6-7% growth in traffic flow in the AM and PM peak. This equates to approximately 730-800 additional vehicles on the route during the peak hours. Bedworth town centre experiences 7-8% extra vehicles in the AM and PM peak. This equates to approximately 320-350 additional vehicles on the route during the peak hours.

4.2.13 AQMA1 (Leicester Rd Gyratory) experiences an additional 44-45% vehicles in the AM and PM peak. This equates to approximately 1000-1020 additional vehicles on the route during the peak hours. This would be considered a very significant impact and would certainly be detrimental to the AQMA. However, capacity constraints are likely to cause rerouting and therefore impact may in reality be less (however may actually be greater in AQMA2). AQMA2 (Midland Rd Area) experiences an additional 4% extra vehicles in the AM and PM peak. This equates to approximately 60 additional vehicles on the route during the peak hours.

Impact on SRN

4.2.14 The SRN experiences a total of 5-6% increase in 2 way flow during the peaks this equates to approximately 1050-1150 additional vehicles.

4.2.15 The A5 experience 14%-15% increase in flow, approximately 530-570 vehicle additional 2 way flow.

4.2.16 The M6 experiences 4-5% increase in flow, approximately 530-590 vehicle additional 2 way flow.

4.2.17 The M69 experiences 2% increase in flow, approximately 80-90 vehicle additional 2 way flow.

Scenario 2

4.2.18 This development option allocates developments at PDA 1, 2 and 3 with a total of 6,000 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 1 – 1800 houses
- PDA 2 – 3700 houses
- PDA 3 – 500 houses

Development Traffic Plots

4.2.19 This scenario places the majority of housing north of Nuneaton whilst the majority of employment sites are dispersed centrally between Nuneaton and Bedworth around Bermuda area. Therefore in addition to the significant pressure experienced throughout the network local to the development there is also a strong north-south draw to the new proposed employment and existing employment in Coventry. This can be clearly seen in the flow plots where the greatest impact of all scenarios is experienced in the Nuneaton town centre and radial routes across Nuneaton urban area destined for the A444 to Coventry. As the majority of proposed employment developments and PDA 3 are located in close proximity to each other, appropriate mitigation can be focussed. However, with housing developments concentrated to the north of Nuneaton and a strong north-south draw for employment it may be more difficult to focus suitable mitigation.

4.2.20 Manor Court Road/ Croft Rd/Greenmoor Rd/College St route is also being heavily used by traffic associated with PDA 2 and trying to access the A444 and employment in the south.

4.2.21 With PDA2 situated to the north of Nuneaton, there is a significant demand to and from Coventry and the new employment in the south. Tunnel Rd/Astley Lane/Dark Lane is being used as an alternative route to get to these areas as an alternative to travelling through the town centre which is already nearing capacity. This route is not of a sufficient standard to accommodate these levels of traffic. Capacity constraints mean that it is likely a significant proportion of this traffic will actually use the A444 putting further pressure on town centre routes in Nuneaton.

4.2.22 Similarly, with PDA 1 situated to the north east there is a strong draw for traffic along the A4254 to the A444 and taking the alternative route through the town centre. Donnithorne Ave also comes under increasing pressure as an alternative route to the A4254.

GEH Plots

4.2.23 The GEH plots highlight extensive significant impacts on the A444 corridor, B4114 Tuttle Hill/Coles Hill Rd and Manor Croft Rd, B4112 Birmingham Rd/Nuthurst Lane/Astley Lane, A444 Weddington Rd, Higham Lane, A47 Old Hinckley Rd to Longshoot, A4254 and B4113 Coventry Rd and Donnithorne Rd as being the worst affected areas. High volumes of traffic are experienced. A GEH value exceeding 10 on these routes suggests demands well out of proportion with existing levels of traffic and significant mitigation measures would be necessary to deal with this level of demand on the road links and junctions in the area.

4.2.24 Other significant impact with +7.5 GEH to note are;

- Greenmoor Rd
- Croft Rd
- Attleborough Rd

Development traffic plots and GEH plots combined indicate that this option has the most significant and extensive impact on the Nuneaton and Bedworth

Comparative Indicators

4.2.25 Nuneaton town centre experiences an additional 12-14% growth in traffic flow in the AM and PM peak. This equates to approximately 1370-1510 additional vehicles in the area during the peak hours. Bedworth town centre also experiences an 11-13% extra vehicles in the AM and PM peak. This equates to approximately 51-580 additional vehicles in the area during the peak hours.

4.2.26 AQMA1 (Leicester Rd Gyratory) experiences an additional 97-103% vehicles in the AM and PM peak. This equates to approximately 2180-2370 additional vehicles in the area during the peak hours. This would be considered a very significant impact and would certainly be detrimental to the AQMA. However, it is clear that this demand on the network far exceeds the capacity of the network. Capacity constraints are likely to cause rerouting and therefore impact will in reality be less (however may actually be greater in AQMA2). AQMA2 (Midland Rd Area) experiences an additional 9-10% extra vehicles in the AM and PM peak. This equates to approximately 130-140 additional vehicles on the route during the peak hours.

Impact on SRN

4.2.27 The SRN experiences a total of 10-11% increase in 2 way flow during the peaks this equates to approximately 1050-1150 additional vehicles.

4.2.28 The A5 experience 31%-33% increase in flow, approximately 1210-1280 vehicle additional 2 way flow.

4.2.29 The M6 experiences 6% increase in flow, approximately 710-840 vehicle additional 2 way flow.

4.2.30 The M69 experiences 5% increase in flow, approximately 250-280 vehicle additional 2 way flow.

Scenario 3

4.2.31 This development option allocates developments at PDA 3, 4, 5 and 9 with a total of 5,400 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 3 – 500 houses
- PDA 4 – 1400 houses
- PDA 5 – 3000 houses
- PDA 8 – 300 houses
- PDA 9 – 200 houses

Development Traffic Plots

4.2.32 As with all assessments, the greatest impacts are in close proximity to the sites. As most sites are dispersed centrally between Nuneaton and Bedworth around Bermuda area, significant pressure is experienced throughout the local network especially along the A444 to Coventry. However it appears that Nuneaton town centre experiences far less impact due to the location of housing and the employment draw of Coventry and the new employment around Bermuda.

4.2.33 The new link road, a prerequisite for PDA 5 is taking very significant volumes of traffic from PDA 4 and PDA 5.

4.2.34 There appears to be further pressure on some of the more rural and local roads as the model attempts to represent commuters finding the quickest route. In reality a significant proportion of these trips will use A and B roads putting pushing further traffic along the new link road and onto the A444.

4.2.35 There are increased flows for routes to the A5 and Hinckley, but to a lesser extent than in Scenarios containing the northern sites. It is notable that pressure between Longshoot and Dodwells on the A5 still occurs in this option.

4.2.36 PDA 8 and 9 are fairly small in size, however the combined effect and the lack of alternative routes to the employment in the north and the town centres suggests that Bedworth town centre will be put under further pressure.

GEH Plots

4.2.37 The GEH plots highlight the A444 corridor, B4102 Astley Rd and Arbury Rd, B4113 Coventry Rd and Astley Lane/Dark Lane as being the worst affected areas. High volumes of traffic are experienced. A GEH value exceeding 10 on these routes suggests demands well out of proportion with existing levels of traffic and significant mitigation measures would be necessary to deal with this level of demand on the road links and junctions in the area.

4.2.38 Astley Lane/Dark Lane is being used as an alternative route to get to Coventry and the new employment in the south from PDA 4 and 5.

Other impacts to note;

- Use of Donnithorne Rd, Nuneaton, it is more likely traffic will route via Coton Arches and the A4254.
- Impact on the M6 between junction 2 and 3.
- PM impacts are very similar to AM

Comparative Indicators

4.2.39 Nuneaton town centre experiences 4-5% additional vehicles in the AM and PM peak. This equates to approximately 490-560 additional vehicles on the route during the peak hours. Bedworth town centre experiences an additional 7-9% extra vehicles in the AM and PM peak. This equates to approximately 340-370 additional vehicles on the route during the peak hours.

4.2.40 AQMA1 (Leicester Rd Gyratory) experiences an additional 8-9% vehicles in the AM and PM peak. This equates to approximately 170-200 additional vehicles on the route during the peak hours. AQMA2 (Midland Rd Area) experiences an additional 3-4% extra vehicles in the AM and PM peak. This equates to approximately 50 additional vehicles on the route during the peak hours.

Impact on SRN

4.2.41 The SRN experiences a total of 6-7% increase in 2 way flow during the peaks this equates to approximately 1500 additional vehicles.

4.2.42 The A5 experiences 15%-16% increase in flow, approximately 600 vehicle additional 2 way flow.

4.2.43 The M6 experiences 6% increase in flow, approximately 750 vehicle additional 2 way flow.

4.2.44 The M69 experiences 2% increase in flow, approximately 120 vehicle additional 2 way flow.

Scenario 4

4.2.45 This development option allocates developments at PDA 3, 5, 6 and 9 with a total of 5,500 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 3 – 500 houses
- PDA 5 – 3000 houses
- PDA 6 – 1500 houses
- PDA 9 – 200 houses

Development Traffic Plots

4.2.46 The site locations for scenario 4 are similar to the scenario 3 proposals with Bedworth Woodlands (PDA 6) being the second largest site rather than Arbury Estate (PDA 4), hence the impact on the road network in this area is very similar. Again, the greatest impacts are in close proximity to the site access.

4.2.47 The main differences are around PDA 6. The inclusion of a slip onto the A444 as a prerequisite for the site does take some pressure off the local road network. However, the all movements junction puts further pressure on Sutherland Drive in Bedworth. It may be more desirable to allow all movements at the Newtown Road slip roads, a scheme that has be considered in the past and is known as "Completing the Diamond"

4.2.48 Overall there is less impact on rural and residential locations and trips are more focussed towards the A444 which would allow for more focussed mitigation proposals.

GEH Plots

4.2.49 Again the impact is similar to that of Scenario 3, the GEH plots highlight that the A444 corridor experiences very significant pressure with GEH 10+ along the entire corridor between College St, Nuneaton and Coventry. High volumes of traffic are experienced. A GEH value exceeding 10 on these routes suggests demands well out of proportion with existing levels of traffic and significant mitigation measures would be necessary to deal with this level of demand on the road links and junctions in the area. However the fact that the route is already dualled means that this is the most appropriate route to accommodate this level of traffic. Spare link capacity exists along the corridor and mitigation could be focussed on junctions.

4.2.50 The impact on Nuneaton is less than with Scenario 3, with a similar overall impact on Bedworth.

4.2.51 Astley Lane/Dark Lane is being used as an alternative route to get to Coventry and the new employment in the south from PDA 5 and 6.

Other impacts to note;

- Use of Donnithorne Rd, Nuneaton, it is more likely traffic will route via Coton Arches and the A4254.
- Impact on the M6 between junction 2 and 3.
- PM impacts are very similar to AM

Comparative Indicators

4.2.52 Nuneaton town centre experiences the lowest impact of all scenarios, with 4-5% additional vehicles in the AM and PM peaks. This equates to approximately 430-500 additional vehicles on the route during the peak hours. Bedworth town centre experiences 8-9% additional vehicles in the AM and PM peak. This equates to approximately 360-390 additional vehicles on the route during the peak hours.

4.2.53 Scenario 4 impacts the least on existing AQMAs. AQMA1 (Leicester Rd Gyratory) experiences an additional 6-7% vehicles in the AM and PM peak. This equates to approximately 140-170 additional vehicles on the route during the peak hours. AQMA2 (Midland Rd Area) experiences an experiences 2% vehicles in the AM and PM peak. This equates to approximately 30 additional vehicles on the route during the peak hours.

Impact on SRN

4.2.54 This option probably has the least impact on the SRN. The SRN experiences a total of 5% increase in 2-way flow during the peaks this equates to approximately 1100 additional vehicles.

4.2.55 The A5 experience 10%-11% increase in flow, approximately 430 vehicle additional 2-way flow.

4.2.56 The M6 experiences 4% increase in flow, approximately 540 vehicle additional 2-way flow.

4.2.57 The M69 experiences 2% increase in flow, approximately 110 vehicle additional 2-way flow.

Scenario 5

4.2.58 This development option allocates developments at PDA 1, 3, 5, 6 and 9 with a total of 5,100 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 1 – 1800 houses
- PDA 3 – 500 houses
- PDA 5 – 3000 houses
- PDA 9 – 200 houses

Development Traffic Plots

4.2.59 Due to the draw of the new employment sites and the more significant draw of existing employment in Coventry, PDA 1 trips create a greater impact on Nuneaton, town centre and especially the A4254. The impact on the A444 is similar as this is the most desirable route to Coventry.

4.2.60 The impact on the A5 especially around Longshoot/Dodwells area is also greater due to the proximity of PDA 1 to this route and the draw of employment in Hinckley.

4.2.61 The pattern of impact around Bermuda area is similar to Scenario 4 due to PDA3, PDA5 and the new proposed employment sites.

GEH Plots

4.2.62 Any route with 10+ GEH will experience significant congestion issues without appropriate mitigation solutions especially where existing junctions are already under pressure. It can clearly be seen that a significant number of route have 7.5+ GEH and a number have 10+ GEH in areas already experiencing congestion issues. Routes with 10+ GEH are mostly located in close vicinity to sites, however it is notable that;

- The A4254 and Donnithorne Rd/B4113 Coventry Rd route to join with the A444, and the whole of the A4254 is 10+ GEH, suggesting a strong movement to Coventry and the M6.
- Astley Lane/Dark Lane is being used as an alternative route to get to new employment and existing employment in Coventry
- 10+ GEH is experience on the Leicester Rd gyratory, an existing AQMA

4.2.63 Significant pressures in proportion to the existing traffic volumes are also experienced across a significant proportion of the network in of the Borough, rather than focussed along a particular corridor.

Comparative Indicators

4.2.64 Nuneaton town centre experiences a significant impact, with 7-8% additional vehicles in the AM and PM peaks. This equates to approximately 850-910 additional vehicles within the town centre area during the peak hours. Bedworth town centre experiences 11-13% additional vehicles in the AM and PM peak. This equates to approximately 520-560 additional vehicles within the town centre area during the peak hours.

4.2.65 Scenario 5 also has a very significant impact on existing AQMAs. AQMA1 (Leicester Rd Gyratory) experiences an additional 37-38% vehicles in the AM and PM peak. This equates to approximately 855-879 additional vehicles within the area during the peak hours. AQMA2 (Midland Rd Area) experiences an experiences 7% vehicles in the AM and PM peak. This equates to approximately 30 additional vehicles on the route during the peak hours.

Impact on SRN

4.2.66 The SRN experiences a total of 9% increase in 2 way flow during the peaks this equates to approximately 1900 additional vehicles.

4.2.67 The A5 experience 26%-27% increase in flow, approximately 600 vehicle additional 2 way flow.

4.2.68 The M6 5% increase in flow, approximately 640-700 vehicle additional 2 way flow.

4.2.69 The M69 experiences 4% increase in flow, approximately 200-210 additional vehicles 2 way flow.

Stage 1 General Comments

4.2.70 It is worth noting that certain routes do not highlight significant pressure where one might expect to see an impact, this is due to the congestion that already exists on the network. A good example of this is the Roanne Ringway. As a result, pressure is put on alternative routes as drivers attempt to find the least cost route to their destination. Therefore knowledge of congested routes needs to be used in conjunction to these plots to ascertain the most appropriate location and nature of mitigation. Appendix A shows outputs from the DfT Congestion Indicator data and provides a good guide to the most congested routes in the district – CITEware also utilises this data, hence the congestion avoiding travel behaviour.

4.2.71 It should also be noted that CITEware is a strategic model and does not understand when a road reaches capacity and therefore routing is not based on capacity of a route. Routing is based on time and distance, time of travel is informed by observed DfT Congested Indicator Data and the model does not recalculate based on the additional traffic as a result of the developments. Therefore the model may sometimes show too much traffic on certain routes. In reality a number of these routes will reach capacity and trips would divert to alternative routes, re-time or change mode of travel.

4.2.72 The general routing and distribution assumptions are robust but these comments should be kept in mind when interpreting the impact of the results.

4.2.73 More detailed modelling will be undertaken once there is more certainty over the actual location of sites. Details of this are contained in section 6.2

4.3 Stage 2 Committed Developments

4.3.1 The impact on the road network relating to committed development and background growth up to 2028 should be considered to fully understand the combined impact of SHLAA and committed development sites on the road network. Appendix F highlights the impact of these developments in terms of additional development traffic flow on the road network.

4.3.2 It should also be noted that the committed developments to date are very heavily skewed towards the provision of employment land.

4.3.3 The following committed developments and development assumptions were accounted for;

Development	Area	Use
Bayton Rd Industrial Estate	-	B2,B8
Bermuda Park	168.00	B1,B2,B8
Griff Clara	89.00	B1,B2,B8
Haunchwood Park	89	B1,B8
Hemdale Business Park	100	B1
Liberty Way	40	B8
Prologis park	40.00	B1,B2,B8
Shepperton Business Park	266.00	B1
MIRA	43/66	B1
TESCOs	Existing	A1

Table 4.3: Committed Employment Development

Development	Units
Tuttle Hill, Nuneaton 156 dwellings	156
Ex- Football Club site, Queens Road, Nuneaton	118
St. Marys Road, Nuneaton	60
Smorall Lane	103
Smorall lane	14
Church Rd	42
Camp Hill Phase 2	222
Bennetts Rd	75
Camp Hill Phase 3	158
Camp Hill Drive	13
Bermuda Village	175
Camp Hill Phase 3	714

Table 4.4: Committed Housing Development

Development Traffic Plots

4.3.4 The "Committed Development Traffic" AM and PM plots show significant impact on the highway network prior to the application of the Growth Scenarios.

4.3.5 Most notable issues on WCC highway network include;

Over 1000 additional vehicles -

- on a section of A4254 Avenue Rd.

Over 500 additional vehicles -

- on the A444 between Coton Arches and Coventry.

- between Queens Road and Corporation St.

Over 250 additional vehicles on –

- Roanne Ringway.
- A444 north of Coton Arches.
- on a section of B4114 Lutterworth Rd.
- Sutherland Drive.
- on a section of B4114 Coleshill Rd.

4.3.6 There are other routes with significant traffic impact, some of this may be explained by the following points.

4.3.7 In reality a number of these routes will reach capacity and trips would divert to alternative routes, re-time or change mode of travel.

4.3.8 There appears to be significant rat running on some of the more minor routes. In reality if capacity improvements are made on certain corridors this will be avoided.

4.3.9 No mitigation schemes associated with committed developments have been taken account of through this strategic modelling exercise.

4.3.10 It should be noted that the impact shown is for 2 way flows and not by direction.

Development Impact on SRN

4.3.11 The SRN experiences a total of 4-5% increase in 2 way flow during the peaks this equates to approximately 870-950 additional vehicles.

4.3.12 The A5 experience 16%-17% increase in flow, approximately 530-560 vehicle additional 2 way flow.

4.3.13 The M6 2-3% increase in flow, approximately 270-310 additional 2 way flow.

4.3.14 The M69 experiences 1% increase in flow, approximately 70 additional vehicles 2 way flow.

Stage 2 General Comments

4.3.15 The impact of the committed developments and general background growth up to 2028 is very significant. This is not unexpected as substantial committed developments including MIRA are accounted for.

4.3.16 However, it should be recognised that these outputs are absolute worst case. Strategic trip rates used in throughout this study are based on current trip rates. As road networks become more congested it is highly likely that these trip rates will alter to account for trip re-timing, modal shift and other sustainable measures such as home working.

4.3.17 Modal shift when encouraged by comprehensive sustainable infrastructure and supporting policies can achieve a 15%-20% reduction in travel.

4.3.18 Nuneaton and Bedworth automatic traffic monitors shows clear evidence of peak spreading over the last 10 years. This is likely to be a result of existing capacity constraints on the network. There is no reason to believe that this trend will cease, thus further reducing the future impact of development through time period choice.

4.3.19 As noted in 4.2.69, routing of traffic is based on current congestion observations. Therefore drivers may attempt to take alternative routes to avoid existing congestion. However, the model run will not take account of the additional pressure put on this alternative route and then revert trips to the original congested route. This type of behaviour will be modelled in greater detail at a later stage, using a dynamic assignment microsimulation model which will take into account junction delay and driver behaviour to inform route choice more accurately.

4.3.20 Another consideration is that these impacts assume that economic conditions are good and costs of motoring do not escalate. In recent years there has been 3-4% negative traffic growth. With uncertainty about the future of economies, the supply of fuel and rising insurance premiums the level of background traffic and demands for use of the highway by car based trips may not be as large as expected.

4.3.21 Despite the issues raised, Stage 2 modelling has provided a good insight to the overall impact of background and committed growth to 2028.

4.3.22 When identifying mitigation strategies, only those impacts related specifically to proposed developments can reasonably be expected to be mitigated. Therefore, it is worth remembering the locations where the background growth is having an impact, but not to expect current or future congestion issues to be solved through development. However certain mitigation strategies can actually benefit the network as a whole. Some committed developments and the future LDF proposals will be providing their own network mitigation which may have positive externalities for other road users. A good example of this is MIRA. A substantial mitigation strategy is proposed which provides additional capacity which exceeds the development's mitigation requirements. This may make the A5 a more desirable route. The mitigation package has not been accounted for in these model runs as congestion on the network is based on current observations. These mitigation strategies will be accounted for in the more detailed microsimulation modelling.

4.4 Further Work

4.4.1 It should be noted that this is a strategic assessment of the impact on the road network. Detailed operation of junctions has not been considered. Comparisons have been made against existing peak hour traffic flows and no assessment of latent capacity on routes which may be utilised has been made. The effects of modal choice, time period choice and other measure that influence travel behaviour have not been considered. To make a more informed assessment which considers all these issues it will be necessary to carry out additional modelling work using WCC microsimulation S-Paramics models which cover the Nuneaton and Bedworth areas. This type of detailed modelling can be undertaken when there is more certainty over the level of growth and the options for locations of sites have been limited. These points are covered further in Chapter 6.

4.5 Accessibility Assessment

4.5.1 As discussed in Chapter 3, accessibility to each site has been analysed using JMPs DirectRoute software. The outputs from this process can be viewed in Appendix G. Accessibility to and from each site was assessed on the basis of existing public transport provision and existing provision for pedestrian use. Access to key services and town centres was considered through the analysis.

4.5.2 Table 4.6 and 4.7 ranks the outputs from the DirectRoute runs, the lower the rank, the better the site is in terms of accessibility. The table also combines sites by scenario and gives an average ranking for each combination of sites. Ranking assumes that access to all key services and access to town centres are of equal importance and thus have equal weighting.

4.5.3 In terms of walking accessibility site, PDA3 and PDA8 have the best access to key services and town centres, PDA1, 6 and 9 have the poorest access. However, PDA6 is the closest of all sites to Bedworth town centre and a site of this size weren't certainly increase footfall within the town centre. In terms of public transport accessibility, PDA5 has the best access to key services and town centres by a direct route (1 interchange) within 400m of the site. Site PDA2 has the poorest access in terms of walking. This situation arises as there are no public transport services within 400m that could serve the site, however if a service as available, access ranking in terms obviously alter.

4.5.4 It should be noted that accessibility assessments can only be carried out on existing PT and walking infrastructure. A site may come forward with a set of sustainable travel proposals that improve walking access and provide dedicated bus routes to serve the site. Therefore, a site with poor accessibility should not be disregarded on the basis of this assessment. The assessment provides a guide as to what the current state of accessibility is and where improvements will be required.

4.5.5 Scenario 1 has the poorest accessibility in terms of public transport access. Scenarios 1 and 3 have the worst score for accessibility based on current walking infrastructure.

4.5.6 It should be noted that the ranking is based on the accessibility to the nearest point where the goods/service/employment are located. It gives no indication of the quantity of goods/services/employment at this location. Although, an employment marker will highlight a point where a significant number of jobs are located.

4.5.7 It should also be noted that the marker may represent the centroid point of where a number of goods/services/employment are located and may therefore not be geographically accurate. However it provides the most suitable representation for this type of analysis.

Site	Existing or Proposed Employment	Hospitals	GPs	Fruit and Veg	Town Centre	Education	Average Ranking
PDA1	2	3	1	1	2	1	**1.67**
PDA2	3	3	3	2	3	3	**2.83**
PDA3	1	3	2	1	3	1	**1.83**
PDA4	2	2	1	2	3	1	**1.83**
PDA5	1	2	1	1	2	1	**1.33**
PDA6	2	4	2	1	3	1	**2.17**
PDA7	2	4	2	1	3	1	**2.17**
PDA8	1	3	2	1	2	1	**1.67**
PDA9	1	3	2	1	2	1	**1.67**
Scenario	**Existing or Proposed Employment**	**Hospitals**	**GPs**	**Fruit and Veg**	**Town Centre**	**Education**	**Average Ranking**
1	1.6	16.0	11.0	6.0	13.0	7.0	**10.17**
2	2.0	9.0	6.0	4.0	8.0	5.0	**6.33**
3	1.2	13.0	8.0	6.0	12.0	5.0	**8.33**
4	1.3	12.0	7.0	4.0	10.0	4.0	**7.00**
5	1.3	11.0	6.0	4.0	9.0	4.0	**6.50**

Key

1 0-10 minutes
2 10-20 minutes
3 20-30 minutes
4 30-40 minutes
5 40-50 minutes
6 50-60 minutes
7 over 60 minutes
8 no direct route (1 change allowed)

Table 4.5: Public Transport Accessibility Ranking

Site	Existing or Proposed Employment	Hospitals	GPs	Fruit and Veg	Town Centre	Education	Average Ranking
PDA1	3	8	4	3	7	1	**4.33**
PDA2	2	8	1	1	4	1	**2.83**
PDA3	3	4	3	3	5	3	**3.50**
PDA4	7	7	3	1	8	1	**4.50**
PDA5	1	7	4	1	8	1	**3.67**
PDA6	5	8	3	4	5	4	**4.83**
PDA7	5	8	2	2	6	2	**4.17**
PDA8	2	8	4	1	4	2	**3.50**
PDA9	1	8	4	3	6	4	**4.33**
Scenario	**Existing or Proposed Employment**	**Hospitals**	**GPs**	**Fruit and Veg**	**Town Centre**	**Education**	**Average Ranking**
1	2.6	36.0	14.0	10.0	25.0	12.0	**18.33**
2	2.7	20.0	8.0	7.0	16.0	5.0	**10.67**
3	2.8	34.0	18.0	9.0	31.0	11.0	**19.50**
4	2.5	27.0	14.0	11.0	24.0	12.0	**16.33**
5	2.0	27.0	15.0	10.0	26.0	9.0	**15.83**

Key	
1	0-10 minutes
2	10-20 minutes
3	20-30 minutes
4	30-40 minutes
5	40-50 minutes
6	50-60 minutes
7	60-70 minutes
8	over 70 minutes

Table 4.6: Walking Accessibility Ranking

5 Transport Interventions

5.1 Introduction

5.1.1 Identification of key transport interventions to mitigate the traffic impact relating to sites/scenarios was based on expert analysis of the modelling outputs. A project board which included senior transport planning and development control officers from WCC and senior planners from NBBC, HA and JMP (HA consultants) was set up to interpret the modelling outputs and identify potential mitigation solutions. Transport interventions were identified in terms of provision of sustainable transport to encourage modal shift and key road network schemes to improve capacity.

5.1.2 Key transport interventions were identified to mitigate development scenario traffic impact only. Committed and background growth mitigation have not been considered to the same level. Mitigation requirements for committed developments should have already been identified as part of the planning process.

5.1.3 A Community Infrastructure Levy (CIL) type charging scheme may be required to ensure that cumulative impacts of future development can be mitigated (i.e. no single development may trigger the requirement for a mitigation scheme, however, combined impact may trigger this need and therefore a charging structure may be required). This issue is covered in more detail in Chapter 6.

5.1.4 The mitigation described in this chapter does not include the requirements for site accesses. Position of site accesses is important and can influence the mitigation required.

5.1.5 It should be noted that mitigation requirements are based on professional opinion following interrogation of the output from the strategic modelling exercises. To fully understand the impact of the developments and the mitigation requirements, an in depth microsimulation modelling study would be required which would include all committed developments and schemes, would take account of time period choice and modal shift and would test a series of mitigation options for a development scenario. This kind of study is not possible until there is more certainty over the location and size of sites for growth.

5.1.6 A number of the mitigation schemes identified may be delivered/partly delivered by developments that are currently in the planning process. Therefore some schemes may not be required/costs reduced if they are delivered by such developments.

5.1.7 The costs identified for each scheme are indicative and are based solely on professional opinion and experience of similar types of infrastructure delivery. Once a more detailed microsimulation modelling exercise has been undertaken, the nature and costs associated with mitigation strategies can be more accurately assessed. Although efforts have been made to provide some contingency within the cost estimates, it should be noted that the location of utilities and acquisition of non-highway or non-developer owned land could significantly alter some of the estimated costs.

5.1.8 The mitigation schemes listed include both site specific and area wide interventions. There will be derived benefits for public transport through the delivery of network interventions that aid the free flow of traffic on the network. In addition to this a number of sustainable transport schemes are listed which should complement the Green Travel Plans for each development. The mitigation schemes described are for major capital schemes and do not include minor schemes such as bus shelter provision, footpaths and pedestrian crossing facilities, nor do they include revenue based schemes secured through S106 such as provision of additional bus services.

5.1.9 Where a new bus service is required to serve a site or cluster of sites approximately £800,000 contribution over 5 years would be required to deliver a 15 minute bus service. At certain sites there may be opportunity to make minor diversions to existing routes subject to the agreement of bus service providers and will also incur costs. Further work would be required to ascertain the actual bus service provision for each individual site. This work can be undertaken once there is more certainty over the exact location of sites and the level of growth adopted.

5.1.10 Where development sites are clustered it would be possible to achieve a critical mass that enables greater mitigation possibilities. This is especially true in the provision of sustainable travel infrastructure. Although the usual approach is to ensure that the highway network experiences nil detriment, some of the more major mitigation solutions may actually accrue benefits for the wider network. However, it is inevitable that some areas of the network will experience additional congestion issues as a result of all growth levels.

5.1.11 A number of the mitigation proposals should be considered as a prerequisite for certain sites. For example, PDA5 would require a link road through the site linking Arbury Rd to Bermuda. This link would be necessary as a distributor road but will also give alternative routes for those travelling from west Nuneaton to the new and existing employment in the Bermuda area.

5.2 The Transport Strategy

5.2.1 The following rationale underpins the transport strategy which the County Council believes is necessary to support the objectives of the LDF Core Strategy and the delivery of development through the various scenarios for development locations provided by NBBC:

- Maximise the use of public transport to meet new travel demand for both short and medium/longer distance journeys;
- Maximise the overall number of trips which can be made on foot and by bike;
- Ensure that development does not generate significant numbers of car trips through town centres and in surrounding communities; and
- Minimise the need for significant new highway infrastructure, unless it is essential.

5.3 Interventions required to deliver the Transport Strategy

5.3.1 Mitigation schemes for each scenario have been identified and an indicative cost is provided. A full list of all mitigation options is provided in section 5.4 which includes further details on the likely requirements.

Scenario 1

5.3.2 This development option allocates developments at PDA 2,3,7,8 and 9 with a total of 5,300 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 2 – 3700 houses
- PDA 3 – 500 houses
- PDA 7 – 600 houses
- PDA 8 – 300 houses
- PDA 9 – 200 houses

Scheme Code	Key transport interventions that are very likely to be required	Costs	Sites responsible for majority of impact at location
1	A444-B4114 Link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA 2
2	Longshoot-Dodwells Dualling/Capacity Enhancements	Costs still being identified approx. £2m+	PDA2 + Contributions from others
3	Coton Arches roundabout signalisation/junction improvement	£1,500,000	PDA2,3 and Bermuda Employment Areas
4	College St roundabout junction improvement	£1,000,000	PDA2,3 and Bermuda Employment Areas
5	A444/Eliot Way Roundabout junction improvement	£1,000,000	PDA2,3 and Bermuda Employment Areas
6	Walking/Cycle Links to Town Centre/Nuneaton Station	£250,000,000	PDA2
7	Croft Rd/Greenmoor Rd and Greenmoor/Heathend Rd junction improvements	£750,000	PDA2
8	Coventry Rd/PDA 3 link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA 3 + Bermuda Employment Areas
9	Walking/Cycle Links to Bermuda Station	£250,000	PDA3 + Bermuda Employment Areas

10	Virtual P&R and Bermuda	£1,750,000	All Sites
11	Bermuda Sustainable Transport Bridge	£250,000	All Sites
12	Town Centre Improvements	£2,000,000	All Sites
13	Sustainable Transport Contributions	£2,000,000	All Sites
	Total	**£10,750,000**	
Possible Additional Schemes	Link from Greenmoor Rd to Walsingham Dr & junction upgrades	£2,000,000	Possibly PDA 2 + contributions from others. Further investigation required where PDA 5 is not part of scenario.
	A5 – PDA2 Link Rd	£5,000,000	PDA 2
	M6 J3 Potential Improvements	Unknown	Contributions from all sites
	Possible Additional Mitigation Total	£5,000,000	

Table 5.1 Scenario 1 Mitigation

5.3.3 It is expected that Scenario 1 will require around £10.750m of mitigation infrastructure provision with the possibility of additional mitigation requirements subject to further investigation. A significant proportion of the mitigation required relates to PDA2, the strong draw of employment to the south creates capacity problems on the existing network. At this stage it is difficult to assess whether the congestion caused by a site of this size in this area can be successfully mitigated.

5.3.4 Site PDA2 north of Nuneaton puts considerable pressure on the surrounding road network. Roanne Ringway and Corporation St are already congested. The strategic model recognises this and has diverted trips onto alternative routes (e.g. Manor Court Rd/Greenmoor Rd). However this situation is not desirable from a highway planning perspective as it would be preferable if trips used the A road network to distribute traffic onto the SRN. Therefore schemes along both routes have been identified in order to increase capacity whilst also raising the possibility of a Heathend Rd-Walsingham Dr link road.

5.3.5 Committed improvements on the A5 as part of the MIRA development should attract traffic to this route and with additional capacity at Longshoot/Dodwells may make this route a viable alternative to reach destinations in the south via M69.

5.3.6 At this stage the outputs from the strategic modelling suggest that the impact on the road network related to site PDA3 and the cumulative impact of other developments could possibly be mitigated through improvements to junctions as highlighted. However, further analysis and use of more detailed modelling techniques would be required to confirm this.

5.3.7 In addition to the wider benefits to public transport derived from improved network operation, £2m worth of sustainable travel infrastructure will be required to encourage modal shift. This allocation could be used to provide extensive improvements to cycle networks, especially in Bedworth which currently does not have the same extent of network as can be found within Nuneaton. In addition to this WCC would expect significant contribution towards revenue based mitigation such as public transport provision.

5.3.8 Further sustainable transport measures in the form of a Virtual Park and Ride at Bermuda would deliver benefits for commuter vehicle trips approaching Nuneaton from the south. Virtual Park and Rides accrue the benefits of standard park and ride facilities without incurring the capital costs of providing expensive infrastructure. This could also take the form of a park and ride that utilises train services in addition to bus services

5.3.9 £2m has also been identified for network improvements with the town centres. Both Nuneaton and Bedworth have significant pressure on town routes. Careful consideration needs to given as to whether additional capacity should provided in order to alleviate these routes or whether further improvements to sustainable infrastructure and the wider highway network would be effective at reducing the demand for through routes.

5.3.10 Further details of broad specifications of these schemes are provided in section 5 of this report.

Scenario 2

5.3.11 This development option allocates developments at PDA 1, 2 and 3 with a total of 6,000 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 1 – 1800 houses
- PDA 2 – 3700 houses
- PDA 3 – 500 houses

Scheme Code	Key transport interventions that are very likely to be required	Costs	Sites responsible for majority of impact at location
1	A444-B4114 Link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA 2
2	Longshoot-Dodwells Dualling/Capacity Enhancements	Costs still being identified approx. £2m+	PDA2 + Contributions from others
3	Coton Arches roundabout signalisation/junction improvement	£1,500,000	PDA2,3 and Bermuda Employment Areas
4	College St roundabout junction improvement	£1,000,000	PDA2,3 and Bermuda Employment Areas
5	A444/Eliot Way Roundabout junction improvement	£1,000,000	PDA2,3 and Bermuda Employment Areas
6	Walking/Cycle Links to Town Centre/Nuneaton Station	£250,000	PDA2
7	Croft Rd/Greenmoor Rd and Greenmoor/Heathend Rd junction improvements	£750,000	PDA2
8	Coventry Rd/PDA 3 link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA 3 + Bermuda Employment Areas
9	Walking/Cycle Links to Bermuda Station	£250,000	PDA3 + Bermuda Employment Areas
10	Virtual P&R and Bermuda	£1,750,000	All Sites
11	Bermuda Sustainable Transport Bridge	£250,000	All Sites
12	Town Centre Improvements	£2,000,000	All Sites
13	Sustainable Transport	£2,000,000	All Sites

	Contributions		
14	Higham Lane-A47 Link Rd	Prerequisite and part of site. To be included in site development costs.	PDA 1 & PDA2 + Contributions from others
15	A5-PDA1 Link Rd	To be included in site development costs.	PDA 1
16	Higham Lane Roundabouts Improvements	£1,000,000	PDA 1
17	A4254 Eastern Corridor Improvements	£1,500,000	PDA1 + contribution from others
	Total	**£13,000,000**	
Possible Additional Schemes	Link from Greenmoor Rd to Walsingham Dr & junction upgrades	£2,000,000	Possibly PDA 2 + contributions from others. Further investigation required where PDA 5 is not part of scenario.
	A5 – PDA2 Link Rd	£5,000,000	PDA 2
	A4254/A47 –Gypsy lane/Bulkington Lane Link Rd	£10,000,000	PDA 1
	M6 J3 Potential Improvements	Unknown	Contributions from all sites
	Possible Additional Mitigation Total	£15,000,000	

Table 5.2 Scenario 2 Mitigation

5.3.12 Similar types of mitigation proposals to Scenario 1 have been identified for Scenario 2. Again, a significant proportion of the mitigation required relates to the northern sites PDA1 and 2, the strong draw of employment to the south creates capacity problems on the existing network. At this stage it is difficult to assess whether the congestion caused by these sites can be successfully mitigated.

5.3.13 The main differences relate to PDA1 specific mitigation. Some of these would be prerequisites for the site, while others are aimed at alleviating congestion on the A4254. It is likely that more significant mitigation would be required on the A5, this may include a link road and more substantial improvements at Longshoot/Dodwells junctions.

5.3.14 With the combination of sites PDA1 and 2, the Leicester Road/Old Hinckley Rd gyratory, and Corporation St (both AQMAs) and Roanne Ringway areas are all put under significant pressure. There is little scope for network improvement in these areas. Improvements to alternative routes may help to mitigate this impact (e.g. A4254)

5.3.15 The same level of investment for sustainable transport infrastructure is suggested for all scenarios.

5.3.16 Further details on the broad specifications of these schemes are provided in section 5.4.

Scenario 3

5.3.17 This development option allocates developments at PDA 3, 4, 5 and 9 with a total of 5,400 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 3 – 500 houses
- PDA 4 – 1400 houses
- PDA 5 – 3000 houses
- PDA 8 – 300 houses
- PDA 9 – 200 houses

Scheme Code	**Key transport interventions that are very likely to be required**	**Costs**	**Sites responsible for majority of impact at location**
3	Coton Arches roundabout signalisation/junction improvement	£1,500,000	PDA3,4,5 and Bermuda Employment Areas
4	College St roundabout junction improvement	£1,000,000	PDA3,4,5 and Bermuda Employment Areas
5	A444/Eliot Way Roundabout junction improvement	£1,000,000	PDA3,4,5 and Bermuda Employment Areas
6	Walking/Cycle Links to Town Centre/Nuneaton Station	£250,000	PDA4 & 5
7	Croft Rd/Greenmoor Rd and Greenmoor/Heathend Rd junction improvements	£750,000	PDA4 & 5
8	Coventry Rd/PDA 3 link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA 3 + Bermuda Employment Areas
9	Walking/Cycle Links to Bermuda Station	£250,000	PDA3 + Bermuda Employment Areas
10	Virtual P&R and Bermuda	£1,750,000	All Sites
11	Bermuda Sustainable Transport Bridge	£250,000	All Sites
12	Town Centre Improvements	£2,000,000	All Sites
13	Sustainable Transport Contributions	£2,000,000	All Sites
18	Arbury Rd-A444 Link Rd	Prerequisite and part of site. To be included	Prerequisite for PDA 4 and 5

		in site development costs.	
19	Arbury Rd junction Improvements	£1,000,000	PDA 4 & 5
	Total	**£11,750,000**	
Possible Additional Schemes	Link from Greenmoor Rd to Walsingham Dr & junction upgrades	Part of development costs	PDA5 + Contributions from others
	M6 J3 Potential Improvements	Unknown	Contributions from all sites
	Possible Additional Mitigation Total	£0	

Table 5.3 Scenario 3 Mitigation

5.3.18 Scenario 3 contains no housing sites north of Nuneaton. Therefore this negates the need for much of the mitigation associated with these sites. The other migration proposals remain the same with the addition of an Arbury Rd-A444 link road and improvements to junctions in the Arbury Rd area.

5.3.19 The same level of investment for sustainable transport infrastructure is suggested for all scenarios.

5.3.20 Further details on the broad specifications of these schemes are provided in section 5.4.

Scenario 4

5.3.21 This development option allocates developments at PDA 3, 5, 6 and 9 with a total of 5,500 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 3 – 500 houses
- PDA 5 – 3000 houses
- PDA 6 – 1500 houses
- PDA 9 – 200 houses

Scenario 4

Scheme Code	Key transport interventions that are very likely to be required	Costs	Sites responsible for majority of impact at location
3	Coton Arches roundabout signalisation/junction improvement	£1,500,000	PDA3,5,6 and Bermuda Employment Areas
4	College St roundabout junction improvement	£1,000,000	PDA3,5,6 and Bermuda Employment Areas
5	A444/Eliot Way Roundabout junction improvement	£1,000,000	PDA3,5,6 and Bermuda Employment Areas
6	Walking/Cycle Links to Town Centre/Nuneaton Station	£250,000	PDA5
7	Croft Rd/Greenmoor Rd and Greenmoor/Heathend Rd junction improvements	£750,000	PDA5
8	Coventry Rd/PDA 3 link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA3 + Bermuda Employment Areas
9	Walking/Cycle Links to Bermuda Station	£250,000	PDA3 + Bermuda Employment Areas
10	Virtual P&R and Bermuda	£1,750,000	All Sites
11	Bermuda Sustainable Transport Bridge	£250,000	All Sites
12	Town Centre Improvements	£2,000,000	All Sites
13	Sustainable Transport Contributions	£2,000,000	All Sites
18	Arbury Rd-A444 Link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA5
19	Arbury Rd junction	£1,000,000	PDA5

	Improvements		
20	Provision of access onto the A444 from PDA6	Prerequisite and part of site. To be included in site development costs.	PDA 6
	Total	**£11,750,000**	
Possible Additional Schemes	Link from Greenmoor Rd to Walsingham Dr & junction upgrades	Part of development costs	PDA5 + Contributions from others
	M6 J3 Potential Improvements	Unknown	Contributions from all sites
	Possible Additional Mitigation Total	£0	

Table 5.4 Scenario 4 Mitigation

5.3.22 Mitigation proposals are very similar to Scenario 3 with the exception of additional mitigation to "complete the diamond" at the junction of the A444 with Newtown Road (this will be either additional north facing slips or via a new roundabout to the north of this junction on the A444). This is required due to the pressure put on local roads to the west of Bedworth by traffic associated with PDA6.

5.3.23 A greater proportion of contribution towards town centre improvements could be directed towards Bedworth. The impact on Nuneaton town centre within this scenario is fairly minimal.

5.3.24 The same level of investment for sustainable transport infrastructure is suggested for all scenarios.

5.3.25 Further details on the broad specifications of these schemes are provided in section 5.4.

Scenario 5

5.3.26 This development option allocates developments at PDA 1, 3, 5, 6 and 9 with a total of 5,100 housing units plus 100 Ha of employment land (40Ha at 40% build out) around Bermuda and M6.

- PDA 1 – 1800 houses
- PDA 3 – 500 houses
- PDA 5 – 3000 houses
- PDA 9 – 200 houses

Scenario 5

Scheme Code	Key transport interventions that are very likely to be required	Costs	Sites responsible for majority of impact at location
2	Longshoot-Dodwells Dualling/Capacity Enhancements	Costs still being identified approx. £2m+	PDA1 + Contributions from others
3	Coton Arches roundabout signalisation/junction improvement	£1,500,000	PDA3 & 5 and Bermuda Employment Areas
4	College St roundabout junction improvement	£1,000,000	PDA3 & 5 and Bermuda Employment Areas
5	A444/Eliot Way Roundabout junction improvement	£1,000,000	PDA3 & 5 and Bermuda Employment Areas
6	Walking/Cycle Links to Town Centre/Nuneaton Station	£250,000	PDA 5
7	Croft Rd/Greenmoor Rd and Greenmoor/Heathend Rd junction improvements	£750,000	PDA 5
8	Coventry Rd/PDA 3 link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA3 + Bermuda Employment Areas
9	Walking/Cycle Links to Bermuda Station	£250,000	PDA3 + Bermuda Employment Areas
10	Virtual P&R and Bermuda	£1,750,000	All Sites
11	Bermuda Sustainable Transport Bridge	£250,000	All Sites
12	Town Centre Improvements	£2,000,000	All Sites
13	Sustainable Transport Contributions	£2,000,000	All Sites
14	Higham Lane-A47 Link Rd	Prerequisite and part of site. To be included in site development	Prerequisite for PDA 1

		costs.	
15	A5-PDA1 Link Rd	To be included in site development costs.	PDA1
16	Higham Lane Roundabouts Improvements	£1,000,000	PDA1
17	A4254 Eastern Corridor Improvements	£1,500,000	PDA1
18	Arbury Rd-A444 Link Rd	Prerequisite and part of site. To be included in site development costs.	Prerequisite for PDA5
19	Arbury Rd junction Improvements	£1,000,000	PDA5
	Total	**£14,250,000**	
Possible Additional Schemes	Link from Heathend Rd to Walsingham Dr & junction upgrades	Part of development costs	PDA5 + Contributions from others
	A4254/A47 –Gypsy lane/Bulkington Lane Link Rd	£10,000,000	PDA 1
	M6 J3 Potential Improvements	Unknown	Contributions from all sites

Table 5.5 Scenario 5 Mitigation

5.3.27 Mitigation proposals are similar to Scenario 4 with the exception of mitigation for site PDA6 is not required and focus will be required to mitigate site PDA1.

5.3.28 PDA1 requires a number of mitigation schemes. These will include capacity improvements on A4254 or provision of a more expensive and controversial new link road to avoid congestion issues on A4254. Higham Lane junctions will also require mitigation as part of the proposals.

5.3.29 The same level of investment for sustainable transport infrastructure is suggested for all scenarios.

5.3.30 Further details on the broad specifications of these schemes are provided in section 5.4.

5.4 Mitigation Scheme Definitions

5.4.1 The following table provides more detailed of the key transport interventions required to mitigate the impact of the development proposals. A plot highlighting the locations of these strategies is provded in Appendix H.

5.4.2 The responsibilities for contributing towards mitigation scheme costs are identified in section 5.4, these may differ for each development site combination in each scenario.

5.4.3 Schemes marked "possible" with no scheme code are classed as more aspirational proposals. Further detailed modelling would be required to identify the requirement for such proposals.

Scheme Code	Key transport interventions	Approximate Cost	Explanation
1	A444-B4114 Link Rd	Prerequisite and part of site. To be included in site development costs.	This scheme would be a prerequisite for the delivery of PDA2. It is likely that it would be required as a distributor road, but should be built to a standard that has capacity to accommodate traffic from north Nuneaton and other proposed sites such as PDA1. This route would form a northern relief road. The link would most likely be aligned between B4114/B4111 junction and would enter the A444 just north of the current urban extent. Further analysis using microsimulation modelling should be undertaken to determine the most appropriate locations for connections onto the existing network.
2	Longshoot-Dodwells Dualling/Capacity Enhancements	Costs still being identified approx. £2m+	Longshoot and Dodwells are key junctions on the A5 accommodating all traffic travelling between Nuneaton and Hinckley on the A47. Proposals for MIRA include extensive mitigation for these junctions, it is likely there will be spare junction capacity. However the section of A5 between Longshoot and Dodwells would require dualling. Some capacity improvements at the two junctions may be required for certain scenarios.
3	Coton Arches roundabout signalisation/junction improvement	1,500,000	Significant pressure is experienced on A444 in most scenarios. This junction already experiences significant congestion. Signalisation of this large roundabout at which A444, A4254 and

Scheme Code	Key transport interventions	Approximate Cost	Explanation
			B4114 intersect will be required. Road space should be sufficient to do this but further work would be required to determine whether the scheme is deliverable.
4	College St roundabout junction improvement	1,000,000	Significant pressure is experienced on A444 in most scenarios. This junction also already experiences significant congestion . Signalisation of this large roundabout at which A444 and B4112 intersect will be required. Further work would be required to determine whether the scheme is deliverable.
5	A444/Eliot Way Roundabout junction improvement	1,000,0000	Another junction on the A444 which provides access to significant employment at GEH, EPIC and other major employers on the western side and a well utilised filling station to the east. Additional pressure on the A444 may require this junction to be improved by increasing its size, adding additional longer approach lanes and circulatory lanes or signalisation.
6	Walking/Cycle Links to Town Centre/Nuneaton Station	250,000,000	PDA1 is close to the town centre, rail and bus stations. However there is no existing route that links this site directly and efficiently. Dedicated cycle and walking links should be investigated
7	Croft Rd/Greenmoor Rd and Greenmoor/Heathend Rd junction improvements	750,000	PDA1, 4 and 5 and to some extent other sites, put considerable pressure on routes in this area which already experience significant congestion issues. Min roundabouts and priority junctions may require improvements such as signalisation. Feasibility of such schemes should be investigated
8	Coventry Rd/PDA 3 link Rd	Prerequisite and part of site. To be included in site development costs.	A link road through site PDA 3 from Gypsy lane to Coventry Rd would help to alleviate pressure on Gypsy Lane. This would also be used by the proposed employment area east of Coventry Rd
9	Walking/Cycle Links to Bermuda Station	250,000	Improvements to walking and cycling links to Bermuda station wil be required from PDA 3 and 5 and all the proposed employment sites.

Scheme Code	Key transport interventions	Approximate Cost	Explanation
10	Virtual P&R and Bermuda	1,750,000	Virtual Park and Rides accrue the benefits of standard park and ride facilities without incurring the costs of providing expensive infrastructure. Developers would be encouraged to provide additional parking at edge of town sites which could then be utilised for P&R facilities. Existing developments where parking capacity is available could also be used. Instead of providing a bespoke bus services to the P&R facilities, a two stage bus journey would be made where the first stage would provide a direct service to the town centres or employment sites with perhaps one or two stop on route thus avoiding. The second stage would distribute local trips around housing areas or employment areas This would maximise potential of new bus routes provided by developers which are necessary to ensure sustainable access to their developments and to meet model share targets. Such facilities would be easier to deliver where there is a critical mass of development proposed in one area. A suitable site may be in the vicinity of the proposed Bermuda Station with parking in the proposed employment areas at this location. Such a scheme would be complimented by Bermuda Sustainable Transport Bridge.
11	Bermuda Sustainable Transport Bridge	£250,000	WCC is currently investigating the formalising the existing Bermuda bridge over the A444 for use by cyclists. WCC has longer term aspirations to open this route up for bus use to serve Bermuda Station and open up alternative routes to and from existing and proposed housing and employment.

Scheme Code	Key transport interventions	Approximate Cost	Explanation
12	Town Centre Improvements	£2,000,000	A contribution towards other capacity improvements around both Nuneaton and Bedworth will be required
13	Sustainable Transport Contributions	£2,000,000	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, completion of the existing cycle networks - this has been termed "Missing Links" and provision of new cycle infrastructure linking proposed developments to the existing cycle network. Provision of "Missing Links" may involve working closely with NBBC and other land owners in order to provide the shortest routes to key destinations. Provision should include toucan/pedestrian crossings to avoid severance. Provision of minor schemes has not been included in these costs but provision of bus shelters should also be included. Bedworth currently has limited provision of cycle network and funding from developers could be used to improve this situation. Sustainable travel infrastructure could also encompass bus priority schemes.
14	Higham Lane-A47 Link Rd	Prerequisite and part of site. To be included in site development costs.	This scheme would be a prerequisite for the delivery of PDA1. It is likely that it would be required as a distributor road, but should be built to a standard that has capacity to accommodate traffic from A444 and other proposed sites such as PDA1. This route could form part of a Northern/Eastern relief Rd and would hopefully alleviate current and future congestion. Further analysis using microsimulation modelling should be

Scheme Code	Key transport interventions	Approximate Cost	Explanation
			undertaken to determine the most appropriate locations for connections onto the existing network.
15	A5-PDA1 Link Rd	To be included in site development costs.	This scheme would allow traffic heading for the SRN (A5, M69 and M42) to avoid travelling on WCC network and compounding existing issues at Longshoot and Higham Lane roundabout.
16	Higham Lane Roundabouts Improvements	£1,000,000	The impact relating to PDA1 and 2 on Higham Lane roundabout will have to be investigated. Additional/longer approach lanes may be required as capacity improvements to mitigate the impact on the junction.
17	A4254 Eastern Corridor Improvements	£1,500,000	The A4254 is an important link for most scenarios providing access to A5 and Hinckley from south Nuneaton avoiding town centre routes. The A4254 also has a substantial amount of employment located along the corridor. Therefore capacity improvements may be required at junctions along this corridor.
18	Arbury Rd-A444 Link Rd	Prerequisite and part of site. To be included in site development costs.	This scheme would be a prerequisite for the delivery of PDA5. It is likely that it would be required as a distributor road, but should be built to a standard that has capacity to accommodate traffic from west Nuneaton and other proposed sites such as PDA4 and 2. This route would form a western relief road and would hopefully alleviate current and future congestion issues on the A444 north of Bermuda. The link would most likely be aligned between Astley Rd/Arbury Rd junction and Walsingham Dr at Bermuda. Further analysis using microsimulation modelling should be undertaken to determine the most appropriate locations for connections onto the existing network.

Scheme Code	Key transport interventions	Approximate Cost	Explanation
19	Arbury Rd junction Improvements	£1,000,000	B4102 Arbury Rd/Croft Rd experiences significant pressure as a result of PDA4, 5 and 2. It is likely that a number of junction improvements area required along the corridor. Measures may need to be investigated at junctions such as Astley Rd/Ansley Rd, Church Rd, Westbury Rd and Heathend Rd.
20	Provision of access onto the A444 from PDA6	Prerequisite and part of site. To be included in site development costs.	This scheme would be a prerequisite for the delivery of PDA6. This scheme would be in place of the "Completing The Diamond" scheme which would provide north facing slips at the Newtown Rd/A444 grade separated junction (would also require CPO of at least one property) – a long term aspiration for WCC, however funding would never be available to undertake such a scheme Instead a route alongside A444 form Newtown Rd and through PDA6 would be provided and would access A444.
Possible Additional Schemes			
	Link from Heathend Rd to Walsingham Dr & junction upgrades	Part of site. To be included in site development costs.	This scheme may only be possible with delivery of PDA5 and would provide another alternative route to access west Nuneaton rather than using A444. It could form part of a higher standard distributor road.
	A4254/A47 –Gypsy lane/Bulkington Lane link Rd	£10,000,000	This may be required if PDA1 goes ahead, it would take pressure off the A4254. However viability may be a serious issue with this mitigation proposal and the impact on communities and political acceptability is also of concern. This proposal would also be dependent on provision of a route through PDA3
	A5 – PDA2 link road	£5,000,000	With the addition of this infrastructure a direct link utilising the suggested PDA2 link rd and following through to tie into the A5 at MIRA could be provided serving the whole of west Nuneaton. This scheme would be desirable, landownership and viability may be an issue and therefore further investigation would be required.

Scheme Code	Key transport interventions	Approximate Cost	Explanation
	M6 J3 Potential Improvements	Unknown	The impact in terms of operation at this majoe HA motorway junction cannot be determined until further microsimulation modelling is undertaken. As such it is difficult to determine the approximate costs.

Table 5.6: Mitigation Schemes – Definitions

5.5 Other mitigation considerations

5.5.1 When combined with the background growth and committed developments, all scenarios put significant pressure on a number of critical links in the Borough. Therefore WCC would recommend to undertake further studies to consider the Congestion Reference Flow (CRF) for link capacity. It is recognised that sections of the network are already nearing capacity, as such, mitigation options including public transport priority schemes and additional link and junction capacity improvement schemes have been suggested. However, further investigation is required,most notably southbound on the A5, A4254 and A444 to determine if link capacity would become a problem. The HA would like further investigation into the mitigation requirements necessary at M6 J3. This could be undertaken once there is more certainty regarding the likely locations and level of growth as part of the suggested microsimulation modelling exercises.

5.6 Other Modal Shift Mitigation Strategies (not included in transport interventions)

5.6.1 Encouraging modal shift is a key strategy aimed at reducing the impact of the proposed growth within the Borough on the road network. An approach combining "sticks and carrots" to influence modal shift is recommended. Options to complement Green Travel Plans could include:

Sticks

- Preferential business rates for those employers that can demonstrate significant shifts in employee travel behaviour.
- Parking tariffs for employee parking.

Carrots

- Subsidised employee bus shuttles from all rail stations to build on the success of the National Grid shuttle bus.
- Subsidised commuter bus shuttles to all rail stations.
- Long distance virtual P&Rs and staff bus schemes.
- Area wide car share databases.
- Further investment in Smarter Choices.

5.6.2 Smarter Choices are ‘soft’ measures that seek to influence people’s travel behaviour away from car use towards more sustainable modes of transport. They are aimed at helping people to choose to reduce their car use while enhancing the attractiveness of more sustainable alternatives, such as walking, cycling and public transport. Examples of such measures include:

- Workplace and School Travel Plans
- Personalised travel planning
- Travel awareness campaigns
- Public transport information and marketing
- Car clubs
- Car sharing schemes
- Teleworking, teleconferencing and home shopping

5.6.3 ‘Smarter Choices’ measures have an integral role in complementing ‘hard’ infrastructure improvements, which alone are unlikely to generate significant behaviour change. Information, promotion, marketing and other supporting measures are key to successful schemes aimed at increasing use of sustainable transport and reducing single-occupancy car journeys through improving knowledge, perceptions and choice of alternative modes of transport. Research by Sustrans shows that lack of information about alternative modes such as cycling and public transport, and motivation to try them, are key barriers to change.

5.6.4 The DfT commissioned a major study in 2004 to examine whether large-scale programmes could potentially deliver substantial cuts in car use. In summary the results suggested that, within approximately 10 years, smarter choices measures have the potential to reduce national traffic levels by about 11% with reductions of up to 21% of peak period urban traffic.

5.6.5 Each measure should work on the three principles of (i) 'inform'; (ii) 'enable'; and (iii) 'promote' with resources and interventions tailored to the individual needs of the target audience and proximity to the development (s).

5.6.6 Example activities for each of the three principles include, but are not limited to:

(i) Inform - provide route maps, timetable information, travel advice;
(ii) Enable - 'taster' public transport tickets, travel training services, marketing offers
(iii) Promote - destination advertising, discount (e.g. 2 for 1 via rail) promotions, public transport launch events.

5.7 Initial Assessment of Deliverability

5.7.1 WCC believe that the impact most scenarios can be mitigated to varying degrees and that there are no fundamental barriers to delivering schemes that achieve mitigation. However WCC do hold concerns over the impact of PDA1 and 2 to the north of Nuneaton. A number of schemes presented have potential to accrue benefits for the wider network. However there will be implications resulting from any level of growth. Overall the network should be able to accommodate the level of growth proposed, however there will be areas of the network that will suffer from increased congestion issues with no potential mitigation options. Implications of development (in particular congestion issues) will be closely related to the growth scenario adopted.

5.8 Managing Risk

5.8.1 Throughout the work undertaken to date on the LDF Borough Plan, the County Council has attempted to identify and manage risk and will continue to do so as the Borough Plan evolves. Examples of this include the following:

- Early discussions with the Borough Council regarding its LDF, and timely submissions on transport throughout the development of the strategy;
- Joint working with the Highways Agency to ensure that a complete assessment of the impact of development on the local and strategic highway network is undertaken with agreements on the most suitable way forward in terms assessing these impacts once there is more certainty on the levels of growth and locations of sites;
- Consulting HBBC on Northern sites that may impact on Leicestershire's network;
- Establishment of joint working arrangements with the developers of the preferred sites;
- To seek agreement with the respective developers and the Highways Agency regarding the combined use of the Nuneaton and Bedworth Area Wide S-Paramics model and the Nuneaton and Hinckley Area Wide S-Paramics Model to include agreement trip rates/distribution and public transport assumptions;
- Carrying out timely discussions with other organisations regarding potential transport interventions and measures;
- Working in partnership with NBBC to deliver a comprehensive cycle network which may involve linking through district land;
- Commenting and advising on the technical work in support of the
- proposals for major infrastructure delivery;
- Possibility of undertaking work on key measures to help support the transport network of the towns and the LDF housing and employment growth. This may include the assessment of public transport

improvements, town centre proposals and the design of key mitigation infrastructure.

- Advising developers on measures to encourage modal shift.

5.8.2 It is envisaged that further detailed work will be undertaken in conjunction with developers, public transport providers and authorities to develop a comprehensive Transport Infrastructure Delivery Plan prior to the LDF Core Strategy Examination in Public to further reduce any remaining elements of risk.

5.9 Funding

5.9.1 WCC indicative costings suggest that contributions towards mitigation schemes would be between approximately £10.75m and approximately £14.25m at 2012 prices, dependent on site selection. Effectiveness of mitigation is dependent on scenario, it is likely that the impact from some sites cannot be fully mitigated. A contingency of 30% should be allowed to account for utilities and other variable costs. This would equate to between £14m and £18.5m at 2012 prices.

5.9.2 These mitigation schemes do not include revenue based contributions towards bus services which could be significant. Further studies would be required to understand the requirements.

5.9.3 Further modelling work would be required to identify the definitive requirements for new infrastructure, and there is the possibility that costs could escalate if major schemes are discovered to be necessary. This is however thought to be unlikely at this stage.

5.9.4 Based on between 5300 and 6000 houses (as proposed by NBBC), a contribution (including 30% contingency) of between approximately £2600 and £3400 per housing unit would be required towards transport improvements. Please note this does not include contributions from employment developments which at this stage would be difficult to calculate. Therefore, costs per household could be considerably reduced.

5.9.5 It should be noted that costs are based on current prices. They are derived from the professional opinion of the project board. No detailed cost estimates have been undertaken. Although contingency has been provided in the cost estimates, the existence of utility services and purchasing of land can substantially increase costs.

5.9.6 Funding could be secured through the traditional S106 agreement approach or a Community Infrastructure Levy(CIL)/Supplementary Planning Document(SPD) type approach.

5.9.7 The benefits of using the CIL type approach would be that an average cost per household/cost per trip could be collected and placed in a funding pool which could be used for mitigation purposes. Under the S106 approach it may be that an uneven distribution of costs and responsibility is placed on the different development sites. For instance, it may be considered the eastern relief road is required for site PDA1 at Calendar Farm and the developers would be expected to pay for it. In reality development traffic from all sites may use the route and diverted background traffic may alleviate routes surrounding alternative developments, thus reducing the need for mitigation in these areas. Therefore all developments accrue benefits from the mitigation packages as a whole and should provide contributions in relation to the numbers of housing unit/size of employment development/numbers of vehicle trips.

6 Conclusions and Further Work

6.1 Conclusions

6.1.1 This document has outlined the existing transport issues within Nuneaton and Bedworth Borough, highlighted the impact of proposed growth scenarios and their existing accessibility, taking consideration of committed development and unidentified (windfall) development site impacts. A series of possible mitigation infrastructure schemes have been proposed to be complemented by sustainable transport provision, soft measures in the form of “Smarter Choices” and policy changes to influence travel behaviour.

6.1.2 Strategic modelling and accessibility assessments have been undertaken using industry recognised tools. The interpretation and identification of mitigation schemes was carried out by senior transport professional working for WCC and the HA.

6.1.3 WCC believe that a combination of innovative engineering solutions in parallel with significant, effective, sustainable transport provision will mean that all scenarios that the District put forward can be accommodated. However there will be differing levels of impact. Options with housing sites located north of Nuneaton have the most significant effect on the highway network as a whole.

6.1.4 It has been demonstrated that no scenario has particularly poor accessibility based on existing provision of infrastructure and services. However all scenarios/sites should improve accessibility through comprehensive sustainable travel packages. It should also be noted that the capacity of existing bus services are unlikely to be sufficient to accommodate some or all of the levels of growth proposed.

6.1.5 All combinations of sites will have implications on the road network. There may be some areas of the network that accrue significant benefits from well targeted mitigation measures especially where a critical mass of development exists. However, with any proposed growth level there will be areas of the network that suffer. The extent to which gains and losses are experienced on the network can only really be assessed once there is more certainty over the level of growth and locations of sites, and when appropriate mitigation is more accurately defined through Microsimulation modelling option testing.

6.1.6 It is likely that existing capacity constrained areas such as town centres and AQMAs will continue to be placed under increased pressure. Although some outputs indicate significant increase in flow in these areas, it is known that the existing capacity would constrain this demand. It is more likely that in this type of situation, pressure would be sustained for a longer periods i.e. peak spreading. These areas are capacity constrained because of the topography and existing land uses, unfortunately there are few engineering solutions to mitigate these impacts given the existing land constraints. Even through provision of upgraded/alternative routes to allow traffic to avoid these areas would still experience a significant impact as there will always be a residual demand for town centre retail and services from both existing users and new trips associated with the development sites. It is evident from the analysis provided within this report that PDA1 & 2 have the most significant impact in these areas.

6.1.7 The impact on the modelling outputs may appear severe in places however a number of points must be considered in their interpretation;

- The strategic modelling does not account of the propensity for modal shift through infrastructure, public transport provision, policy changes, congestion avoidance, escalating costs of motoring and targeted soft measures such as “Smarter Choices”. Approximately 15-20% modal shift was in fact the recommended targets for use in Rugby Borough Council’s LDF Core Strategy which was subsequently approved following the Examination in Public.

- Time period choice becomes a reality. Evidence already exists of peak spreading elsewhere within Warwickshire across the Warwick and Leamington Spa cordon monitors. This is likely to continue as more pressure is applied to the network.

- This is a strategic modelling exercise. Some of the numerous more minor routes will not have been utilised, and as such, some impacts have probably been over estimated.

- The model does not recognise congestion caused by background, committed and proposed sites. Routing is based on current congestion conditions. The model does not recognise that certain links and junction will have capacity. As such there is no dynamic feedback where the model will reroute traffic based on congestion experienced.

- The assumption is that economic conditions are good. Recently we have experienced negative traffic growth as a result of economic recession, thus creating capacity on the network.

- Mitigation proposals to improve a number of corridors to improve access to the SRN will alleviate routes around the town centres.

- Significant committed employment and housing land development has been modelled in Stage 2 modelling. Mitigation assumptions for these sites have not been included in the strategic modelling exercises.

- DfT NTM traffic growth forecasts have recently (post CITEware modelling exercise) been adjusted down to take account of recent economic growth forecasts.

6.1.8 Further recommended work through detailed microsimulation modelling will take account of all the issues raised above. See 6.2.4 – 6.2.11.

6.1.9 A comprehensive and viable set of mitigation infrastructure proposals has been identified for each scenario. Dependent on scenario, these costs range from £14m to £18.5m (including contingency). On the assumption that only the identified sites pay for this mitigation (it is difficult to identify mitigation solutions for unidentified (windfall) sites and therefore costs cannot be attributed) a contribution of up to £3400 per housing unit would be required. This does not include any contribution from the substantial proposed employment land, therefore these costs would reduce significantly. These figures are based on the assumption that microsimulation modelling does not highlight a requirement for the possible additional schemes mentioned in tables 5.1 – 5.6.

6.1.10 Effectiveness of mitigation is dependent on scenario. The impact of traffic from some sites, especially those located north of Nuneaton is more difficult to mitigate. There are some areas of the network that are already at capacity and there is little scope to provide further capacity through junction improvements, especially around Nuneaton town centre. Therefore mitigation should concentrate on alternative routes to and from the developments.

6.1.11 Consideration has been given to managing risk throughout the LDF Core Strategy planning process.

6.1.12 WCC has expressed a view that a Community Infrastructure Levy type scheme is our preferred route to manage developer contributions for mitigation proposals.

6.1.13 A series of further studies is recommended in the following section.

6.2 Further Work

Congestion Reference Flow (CRF) analysis to determine link capacity constraints

6.2.1 It is apparent that when the impacts of the scenarios are combined with the trips associated with the committed developments and background growth link capacity may become an issue.

6.2.2 The analysis of CRF to determine with link capacity will become an issue is recommended along with S-Paramics microsimulation modelling to determine the requirement for elements of the proposed mitigation.

6.2.3 It should be recognised however that the result of the modelling exercise demonstrate a worst case scenario, as no account has been taken for modal shift influenced by sustainable travel infrastructure and provision and use of smarter choices for influencing travel behaviour. As mentioned previously, it is estimated that up to 15%-20% reduction in demand on the road network could be achieved through such measures. In addition to this, no account has been taken of time period choice as commuters choose to re-time their journeys in order to avoid congestion.

Detailed modelling of Preferred Option using S-Paramics

6.2.4 To fully understand the real impact of proposed developments an in depth study using microsimulation modelling tools will be required.

6.2.5 This type of modelling should be undertaken once there is more certainty over the levels of growth and location of development sites.

6.2.6 Microsimulation modelling should be used to determine the effectiveness of the proposed mitigation options.

6.2.7 WCC has a preferred microsimulation modelling package called S-Paramics.

6.2.8 WCC has two up to date models covering Nuneaton and Bedworth Borough;

- Nuneaton and Bedworth 2009, 2018 and 2028 Area Wide Models
- Nuneaton and Hinckley 2009, 2018 and 2028 Area Wide Models

6.2.9 WCC has established a licence agreement and modelling protocol for use of the models by developers. WCC will work either in isolation or with promoters of the preferred sites to test mitigation proposals. This will also cover phasing of development and mitigation.

6.2.10 Microsimulation modelling will take account of the modal shift and time period choice elements missing from this strategic assessment thus giving a true picture of the impact on the local road network.

6.2.11 An explanation of S-Paramics is provided below:

> *"S-Paramics is the latest version of the widely applicable Paramics microsimulation traffic flow modelling system, software for the analysis and design of urban and highway networks. Only S-Paramics offers wide area vehicle routeing with dynamic feedback for accurate traffic flow modelling within a context of active ITS and UTC.*
>
> *S-Paramics simulates the individual components of traffic flow and congestion, and presents its output as a real-time visual display for traffic management and road network design. S-Paramics represents the actions and inter-actions of individual vehicles as they travel through a road network. It models the detailed physical road layout, and includes features such as bus operations, traffic signal settings, driver behavioural characteristics and vehicle kinematics. As a consequence, S-Paramics can accurately portray the variable circumstances which lead to congestion in all types and sizes of road network……*
>
> *…..S-Paramics enables non traffic experts, such as the public and their elected representatives, to interactively test " What If " scenarios and immediately see the results in terms of real-time traffic flows and congestion. The most widely used microsimulation system in the UK for applications at all scales, S-Paramics brings new standards of integrity and veracity to traffic flow modelling.*
>
> *S-Paramics is being applied to trunk, urban, suburban and rural schemes for a very wide range of purposes and situations. It is being used routinely to examine signalised roundabouts, bus priority, emissions control, ramp metering, toll plaza design, urban traffic control, traffic calming, wide area traffic management, road works design, car park location and control, multi-level inter-changes, pedestrian and cyclist interaction, traffic impact, unusual/non-standard layouts and complex junctions, incident management, slow moving traffic on rural roads ... indeed every conceivable combination of circumstances which other modelling systems have difficulty simulating and analysing."*
>
> Source: SIAS S-Paramics Website
> http://www.sias.com/ng/spoverview/spintroduction.htm

Public Transport Studies

6.2.12 Further work on the requirements and viability of public transport provision will be required and will involve close working relationships with site promoters, bus and rail service providers and WCC.

Costing and Feasibility Assessment of Transport Interventions

6.2.13 Initial estimates covering the mitigation requirements at various growth levels and alternative site locations have been provided within this document.

6.2.14 Once there is more certainty over the locations of sites and levels of growth more detailed testing of mitigation requirements can be undertaken. This will inform the actual mitigation requirements.

6.2.15 When the actual mitigation requirements are defined, further work on the costing and feasibility of the transport interventions can be undertaken.

6.2.16 Where substantial mitigation requirements are proposed with significant construction of infrastructure, it may be appropriate to undertake preliminary feasibility studies on individual schemes.

Preparation of Draft IDP/Input to Wider Viability Assessment

6.2.17 It is recognised that the LDF Borough Plan needs to be supported by a comprehensive Transport Infrastructure Delivery Plan, which covers the measures which are required to mitigate the impact of the proposed development sites.

6.2.18 An Infrastructure Delivery Plan will be prepared to support the development proposals set out in the LDF. WCC has identified a number of the transport mitigation measures as described in Chapter 5. These proposals will form the basis for mitigation testing through more detailed modelling exercises. Once the broad specification of the mitigation requirements is defined, the preparation of the Infrastructure Delivery Plan can be undertaken. It is suggested that officers from both the Borough and County Council meet at an appropriate point in the near future to discuss the current mitigation proposals. It is also suggested to convene again, once the mitigation proposals have further defined through the modelling process in order to discuss which measures need to be included in the Plan, who the lead delivery organisation will be, the likely timescale for the improvements to come forward, and their anticipated cost.

6.2.19 It is envisaged that further detailed work will be undertaken prior to the LDF Core Strategy Examination in Public to further reduce any remaining elements of risk within the Transport Infrastructure Delivery Plan.

Preparation of Developer Contributions SPD/draft CIL Charging Schedule

6.2.20 It is anticipated that contributions from developers will be secured through either the conventional S106 route, or via an approach based on the principles of a Community Infrastructure Levy (CIL). This document highlights, the County Council view that the latter, a CIL type developer contribution model, as its preferred approach. It is understood that this would need to be produced as a separate Supplementary Planning Document (SPD) to the LDF Core Strategy.

6.2.21 WCC is currently working with Rugby Borough Council to produce a similar document based on this approach. Stratford District Council has already adopted an SPD for developer contributions which is considered to be working well.

Appendices