Stafford Growth Options Study

Addendum to the Initial Option Assessment Report

February 2009

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Notice

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Contents

Section Page

List of Tables

List of Figures

Appendices

1. Introduction

1.1 Atkins Transport Planning has been appointed by Staffordshire County Council (SCC), to carry out a technical study to understand the implications of proposed growth around Stafford on the transportation network as part of the 2003 Call on Commission.

1.2 This is an addendum to the Initial Options Assessment Report (December 2008) that considered the three initial options 1a, 1b and 1c. This addendum now follows the same methodology to consider three higher growth options; namely Option 2, 3 and 4.

Background

1.3 The key element of the commission was to develop a new transport model to identify the most sustainable locations, in transport terms, for new housing and employment development in Stafford.

1.4 The Stafford Model built was required to contain provisions to incorporate the emerging development sites identified from currently ongoing studies.

Purpose of the Stafford Transport Model

1.5 The purpose of the Stafford Transport Model (STM) is to:

- **Represent** in more detail the local and other movements in the Stafford Area. To provide a reliable forecast model by ensuring a good base year representation of trip patterns and incorporating multi-modal travel;
- **Assess** the impact of additional traffic on the performance of highway and transportation networks due to proposed developments;
- **Provide an Evidence Base** to support the selection of preferred options through Local Development framework process; and
- **Develop, Test and Report** the effectiveness of transport strategies that will be put forward to achieve sustainable growth.

Report Structure

1.6 This addendum to the Initial Options Assessment Report summarises the development and the results of the initial option tests for the land use scenarios developed in conjunction with SCC.

1.7 Sections contained in this report are as follows:

- Land Use Options;
- Model Assumptions;
- Performance Indicators;
- Initial Option Assessment; and
- Summary.

Integration into Overall Study

1.8 The overview and scope of the Stafford Options Assessment is detailed in the Atkins report *"Understanding the Transport Implications of New Developments in Stafford: Inception Report (July 2007)",* the **Inception Report,** which was the culmination of Phase I of the study.

1.9 The study has five key phases, being:

Phase I	Inception;
Phase II	Base Year Model Development;
Phase III	Forecast Model Development;
Phase IV	Initial Land Use Option Assessment; and
Phase V	Detailed Transport Option Assessment.

1.10 The Initial Options Assessment Report (December 2008) completes Phase IV of the study which includes the following tasks:

Task 13	Initial Option Assessment; and
Task 14	Identification of Key Growth Issues.

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2. Land Use Options

2.1 The development of the land use options for the Stafford Growth Options Study has been detailed in the **Land Use Options Report**. This has been undertaken through consultation between SCC/SBC and Atkins and has resulted in four Land Use Options being developed for assessment within the model.

2.2 Within these options different levels of both housing and employment allocation has been identified and these are outlined in the following sections.

Housing

2.3 The housing allocations have been developed from various sources. These include:

- Stafford Transport Assessments (TAs);
- SCC/SBC Committed Housing sites;
- SCC/SBC Housing Options; and
- Windfall Sites – Quantity known but specific site locations unspecified.

2.4 Based on these data sources four potential development scenarios have been developed, each tested in a different option. A breakdown of the number of housing units contained within each of the development scenarios, to be provided between 2007 and 2026, is shown in Table 2.1.

Table 2.1 – Breakdown of the Housing Options

	Do Minimum	Option 1	Option 2	Option 3	Option 4
Stafford TAs	1448	1448	1448	1448	1448
SCC/SBC Committed Sites	391	391	391	391	391
SCC/SBC Housing Option	0	4500	7500	7500	7500
Windfall	661	661	661	661	661
TOTAL	**2500**	**7000**	**10000**	**10000**	**10000**

2.5 All four schemes contain the same TAs, Committed Sites and Windfall housing numbers so it is noted that the key difference between the scenarios is the Housing Options, which are not considered in the Do Minimum.

2.6 Option 1 is made up of 7,000 dwellings and is the subject of the main Initial Option Assessment report and is not analysed any further within this Addendum. The main IOA report compared the impacts of 7,000 additional dwellings in three different sectors of the town and concluded that, if that level of growth were to be approved, the preferred location for it would be in the North and West quadrants of the town.

2.7 The analysis in this Addendum has used the findings of the Option 1 assessment to guide the location of the housing development sites that would make up the 10,000 dwellings for Options 2, 3 and 4. It assesses the impacts of providing 10,000 new dwellings in various locations in Stafford, concentrated on sites in the West of the town combined with other sites in the North, East and South. The total number of houses is identical for Options 2, 3 and 4 but they are made up of different combinations of development sites, as noted in Appendix A.

2.8 This report analyses the transport effects of the Growth Options to provide a total of 10,000 dwellings in different parts of the town in order to identify a preferred option for this level of growth.

This preferred option will need to be agreed by the client group before the study moves on to the next stage, which is to assess the transport effects of the largest development level of 13,000 additional dwellings. These tests will use the results of the previous Option tests as the basis for the location of these larger development proposals.

2.9 Whilst it is noted that that overall number of houses are consistent between the options the key differences are as follows:

- **Option 2** – Housing growth is focussed towards the **West, North and South** sides of Stafford;
- **Option 3** – Housing growth is focussed towards the **West, North and East** sides of Stafford; and
- **Option 4** – Housing growth is focussed towards the **West, South and East** sides of Stafford.

Employment

2.10 The employment options have been developed from a variety of sources. These include:

- Stafford Transport Assessments (TAs);
- SCC/SBC Committed Employment sites; and
- SCC/SBC Employment Options sites.

2.11 A summary of the employment developments included in each of the tested scenarios is provided in Table 2.2. These figures represent the growth in employment sites between 2007 and 2026.

Table 2.2 – Breakdown of the Employment Options (Jobs)

	Do Minimum	Option 1	Option 2	Option 3	Option 4
Stafford TAs	6986	6986	6986	6986	6986
SCC Committed Employment Sites	1668	1668	1668	1668	1668
SCC Employment Options	0	8621	11584	11584	11584
TOTAL	**8653**	**17274**	**20237**	**20237**	**20237**

2.12 The key difference between the scenarios is the SCC/SBC Employment Options, not present in the Do Minimum. The sites that make up the Option 1 employment scenario were tested alongside the Option 1 housing sites in the main IOA report and are not analysed any further in this Addendum. Options 2, 3 and 4 have the same overall level of employment growth of 20,237 jobs on sites totalling 131.6ha in size, but the combinations of sites that make up this overall total has been varied to keep the proposed employment sites closer to the proposed housing sites to reduce the overall travel demand.

2.13 It is noted that for the purpose of this assessment the land uses for these employment sites has been based on an assumed percentage split between the different employment land use categories.

2.14 Full details of the methodology applied to convert these employment sites to jobs is outlined in the **Land Use Options Report**.

Land Use Options

2.15 Table 2.3 provides an overview comparing the four land use scenarios in terms of housing and job numbers between 2007 and 2026. The locations of the sites are provided in Figures 2.1 to 2.4.

Table 2.3 – Land Use Scenarios to be tested in the Stafford Transport Model

Development Test Scenario	Housing Option	Employment Option	Employment Option	2007 - 2026		Spatial Distribution of New Employment	Spatial Distribution of New Housing
				Total Households	Net Total Jobs		
Do Minimum	Do Minimum	Do Minimum	Do Minimum	2500	8653	-	-
Option 2	Option 2	Option 2	Option 2	10000	20237	W-N-S	W-N-S
Option 3	Option 3	Option 3	Option 3	10000	20237	W-N-E	W-N-E
Option 4	Option 4	Option 4	Option 4	10000	20237	W-N-E	W-S-E

Figure 2.1 – Land Use Do Minimum

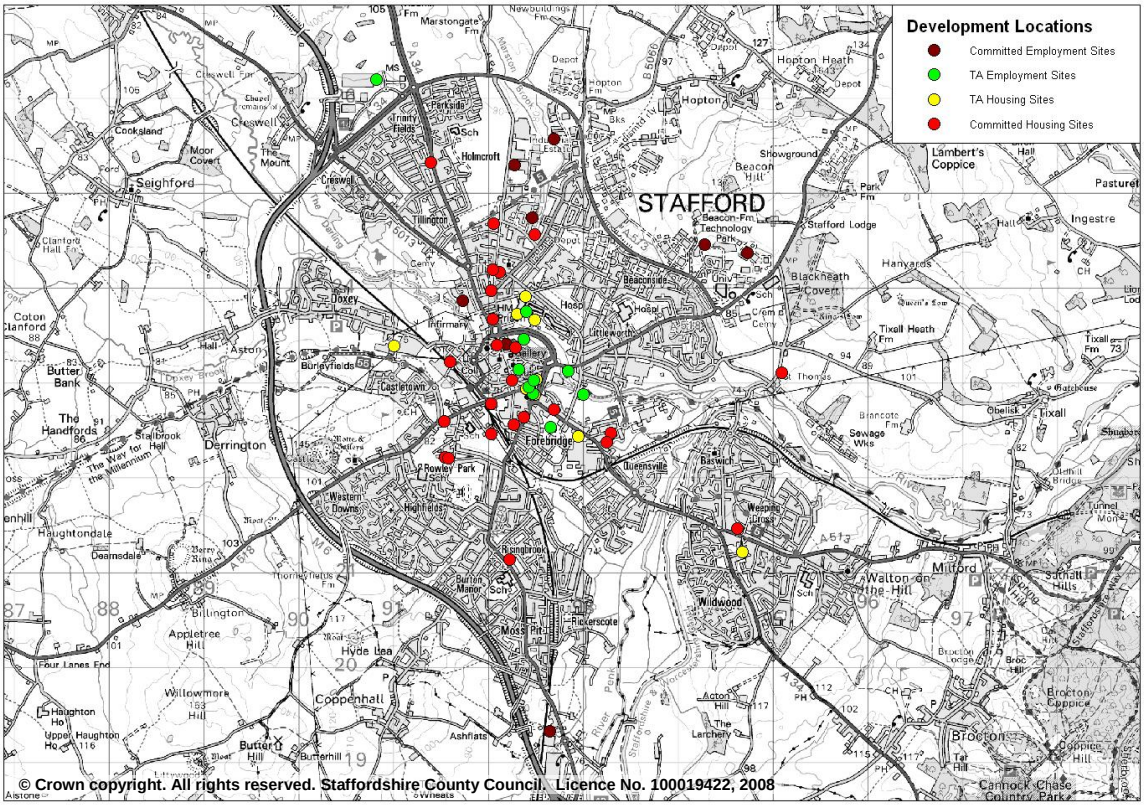


Figure 2.2 – Land Use Option 2

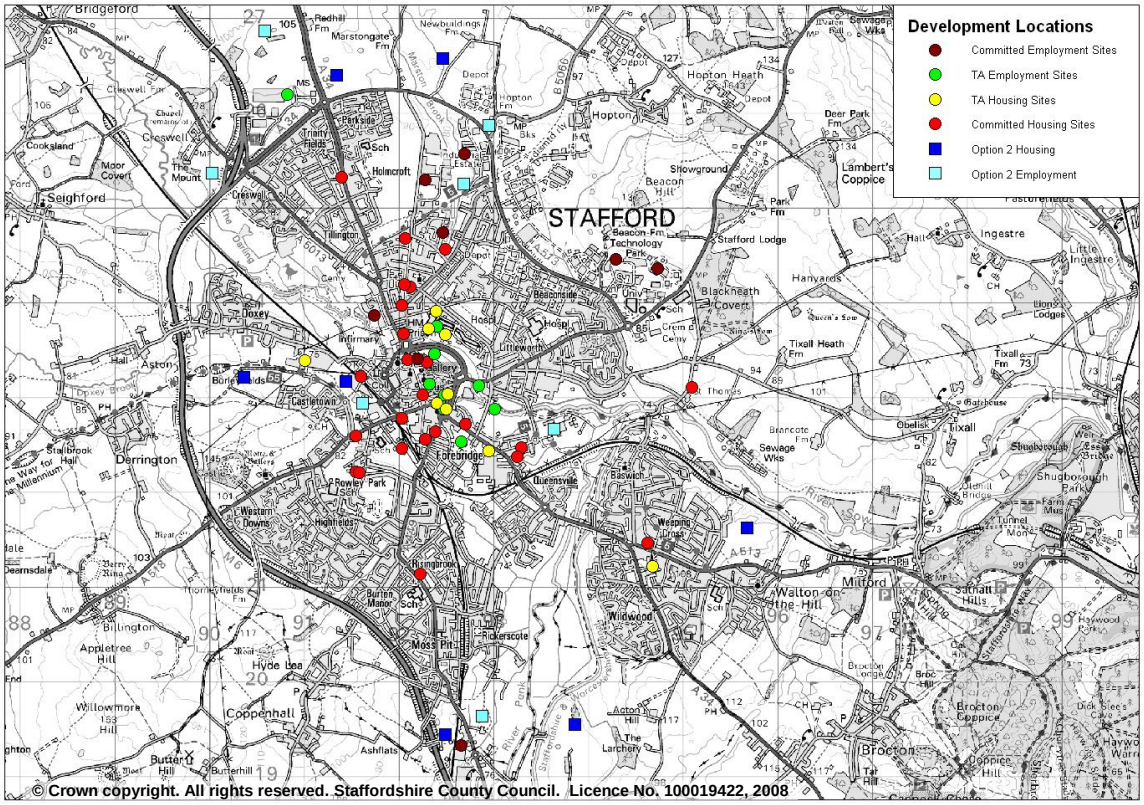


Figure 2.3 – Land Use Option 3

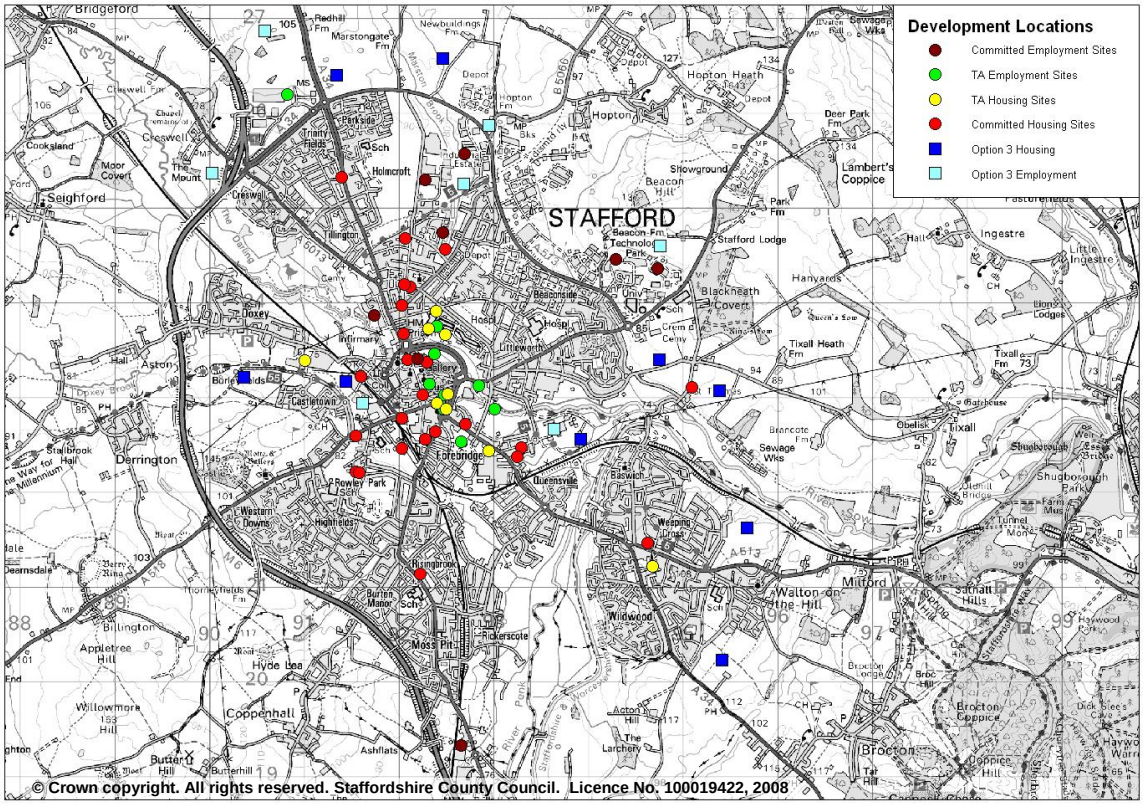
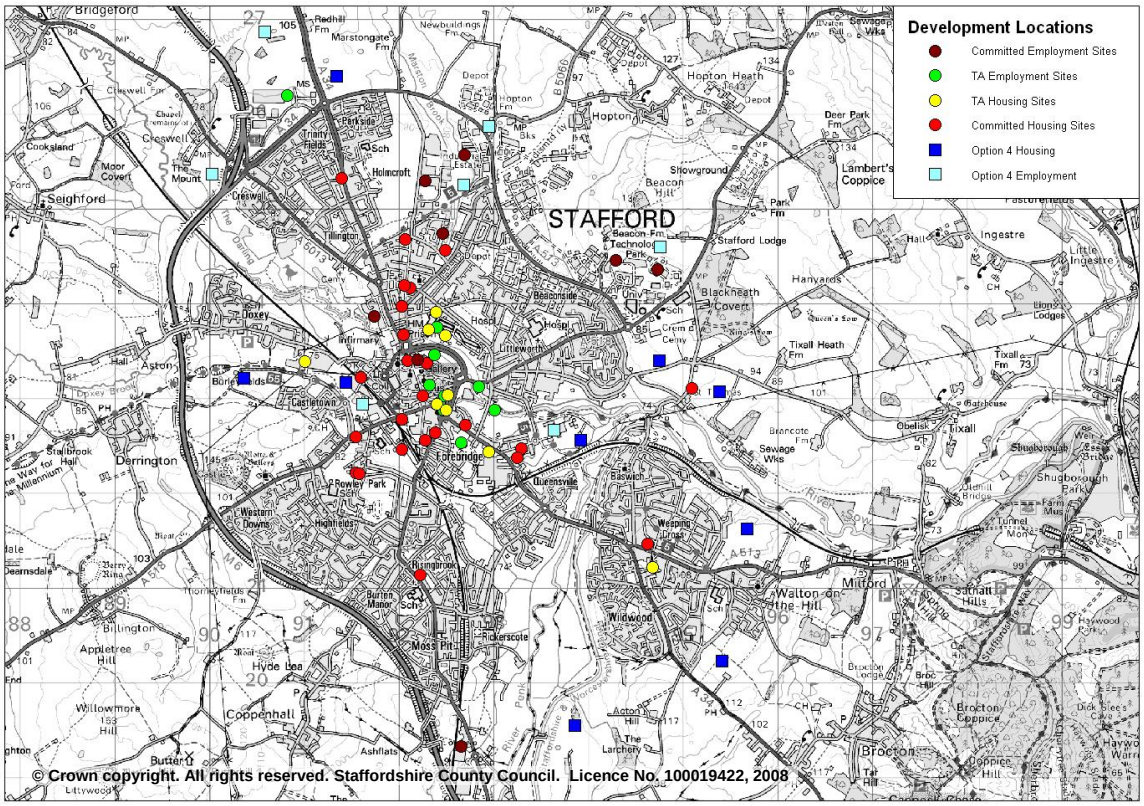


Figure 2.4 – Land Use Option 4



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3. Model Assumptions

3.1 The development of the forecast models used in the initial assessment of the land use options has been detailed in the 'Stafford Transport Model – Forecasting Report' (the **Forecasting Report**) and may be summarised as follows:

Model years

3.2 Forecast models have been developed for 2026 AM and PM peak hours. This future year has been determined in conjunction with the scenarios set out in the Regional Spatial Strategy (RSS) which forms the basis for this study. The Regional Spatial Strategy identifies Stafford as a Local Regeneration Area and considers three levels of house building in the town leading up to 2026.

Do Minimum Networks

3.3 A Do Minimum network has been developed and has incorporated proposed schemes as defined in the following:

- Stafford Urban Area Transport Model Study; and
- Stafford Town Centre Traffic Management Measures.

3.4 Full details of each scheme are provided in the '**Forecasting Report**'.

Forecast Demand Matrices

3.5 Forecast demand matrices have been developed for each of the four initial land use options outlined in Section 2. These have accounted for the following:

- Development type and gross floor areas as specified by SCC;
- Household densities of 40 units per Hectare;
- Development vehicle trip rates, as agreed with the Highways Agency and SCC;
- Light vehicle trip distributions based on the 2001 Journey to Work Census data;
- Heavy vehicle trip distribution has been based on existing heavy vehicle movements across the study area;
- Consideration for trips between new developments is made to ensure that double counting is removed. This process is discussed in detail within the '**Forecasting Report'**; and
- Overall matrix growth constrained to TEMPRO growth factors, adjusted to account for the forecast levels of household and job growth within the study area for each of the four land use options.

3.6 Based on this the overall matrix totals for the Base Year and 2026 land use options are as shown in Table 3.1.

Table 3.1 – Land Use Options Trip Matrix Totals

Year	Option	AM Peak	PM Peak
2007	Base Year	35888	37572
2026	Do Minimum	45908	49232
	Option 2	49562	53565
	Option 3	49562	53565
	Option 4	49562	53565

3.7 Overall, Options 2, 3 and 4 are identical in terms of matrix totals and represent the maximum growth scenarios. We would expect this given that they each contain the same number of new households and jobs.

Forecast Assignments

3.8 As demand for the road network increases over time, so does the level of congestion. This increase in journey time for trips can result in various responses including:

- Decide to continue to travel;
- Re-schedule the journey (to a different time period, perhaps when it is less congested);
- Mode shift (e.g. car to bus etc); and
- Decide to no longer travel (suppression).

3.9 As a result, an elasticity approach has been adopted. This enables these responses to be accounted for in the future year assignment and reduces the potential for unrealistic growth to occur in a congested network. Details of this approach are outlined in the **'Forecasting Report'.**

3.10 It is noted that as this response reflects individual's responses to increased congestion over time, no elasticity is allowed to those users of the new developments as these will be new trips.

3.11 Overall the model matrix totals have been reduced by a maximum of 3.6% (but an average of 3.4%) in 2026 as a result of the elasticity effects of increased congestion. Further details are presented in the forecasting report.

4. Performance Indicators

4.1 A key stage in the Stafford Transport Model is the definition of the preferred land use option. At present some four key options have been defined and modelled as outlined in Sections 2 and 3.

4.2 In determining the preferred option, an initial assessment has been undertaken of the key performance indicators for each. This assessment focuses on the 2026 forecast year assignments to evaluate performance.

4.3 The assessment of the options has considered the appropriateness of each against a series of criteria. In developing this criteria it is recognised that the Partnership for Growth and Government offer the following guidelines for areas in growth as outlined in the DCLG Advice - Annex C, namely:

- Exploit existing public transport networks in determining the most sustainable locations for growth;
- Minimise any increase in long-distance commuting by the appropriate alignment of housing and employment opportunities;
- Ensure that the design and location of new developments enables access to employment opportunities and key services by bicycle, walking and public transport; and
- Note that the Highways Agency is required to protect the service levels on the strategic road network and may need to introduce restraints on access to that network.

4.4 As a result, the assessment of the options has concentrated on the merits of each option against the key issues for the region. These issues have been grouped into the following objectives to address the DCLG guidelines outlined above:

- Impact on all users;
- Impact on strategic routes;
- New development trips;
- Network impacts;
- Environmental impacts;
- Access to existing public transport; and
- Access to non motorised modes.

4.5 These criteria have been further split into 19 local sub objectives to provide a comprehensive assessment of the options. The overall Key Performance Indicators (KPIs) are shown in Table 4.1.

4.6 The assessment of the four land use options against the KPIs is summarised in the following section.

Table 4.1 – Key Performance Criteria

Objective	Local Sub Objective
Impact on all users	Vehicle Hours
	Vehicle Kilometres
	Average Speed
	Average vehicle distance per trip
	Demand
Impact on strategic routes	Change in Flow on the M6
New Development Trips	Development Trip Vehicle Hours
	Development Trip Vehicle Kilometres
	Development Trip Average Speeds
	Development Trip average trip length
	Development Demand
Network Impacts	Junctions
	Links
Environmental Issues	Impact on CO2 emissions
	Impact on NOX emissions
Access to Existing Public Transport	Total Number of existing services passing the developments
	Direct access to Rail
Access to non motorised modes	Access to national cycle network
	Percentage of development land with access to the town centre within 15 minutes

5. Initial Option Assessment

5.1 This section outlines the assessment of the Key Performance Indicators (KPIs) and the comparison of these for each land use option.

5.2 For all of the objectives outlined in Section 4, the performance of each of the final options have been compared against these criteria, and the options subsequently ranked between 1 to 4, with 4 being the worst, according to how they compared against one another.

5.3 The rankings were reviewed to allow options to be, for example, second-equal, if the differences between two options were insignificant.

5.4 Appendix B – Detailed Evaluation of Options contains the detailed qualitative and quantitative information used for the rankings, and shows how the options were ranked for each of the 19 local sub-objectives. The methodology used to rank the options against each objective is also described.

5.5 A summary of each of the sub objectives is provided in Table 5.1. We should expect that the Do Minimum scenario will score best on most objectives as the Do Minimum scenario considers only 2500 new houses and 8653 new jobs instead of the 10000 new houses and 20237 new jobs provided by options 2, 3 and 4. The network is the same for all options and no improvements are included in any of the options. Therefore, during the analysis, it shall be assumed that the Do Minimum performed best unless stated otherwise. With this in mind the key points to note are as follows:

Impact on All Users

5.6 The assessment of the impacts on all users has noted the following:

- The number of vehicle hours in a model is the sum of trip times for all trips that occur in the model. Therefore, if you assign the same demand to two networks, the network with the lower vehicle hours is the one that, on average, allows users to complete their trips in less time. Excluding the Do Minimum, Option 2 provides the lowest overall vehicle hours while Option 3 performs the weakest. There is little fluctuation between the options however as the AM and PM peak hour totals span just 670 hours from the lowest to the highest. The greatest difference is a 16.7% increase from Do Minimum to Option 3 AM. The Do Minimum scores significantly better due to the much lower additional jobs/housing;
- The total vehicle kilometres in a network is the sum of the distance that each trip makes on the network. The figures in Appendix B show vehicle kilometres to be largely dependent on demand. However, there are differences between the high growth options. Option 2 provides the lowest vehicle kilometres whereas Option 4 provides the most. The scoring is chosen to reflect this.
- Overall average speeds give an indication of how well the network keeps traffic moving on the network. If the average speed is increased without providing more capacity on the road (i.e. new roads etc) then this may indicate that the network is coping with the demand better and that junctions are performing well. There is small but significant variance between the options when considering the average of the AM and PM speeds. This figure ranges from 52.9kph to 53.9kph excluding the Do Minimum. The average Do Minimum speed is slightly higher at 59.2kph due to the much lower demand on the network;
- The trip length indicator shows how average journey length will change in response to variations in the size and location of new development, but also how it changes in response to congestion within the model. Peripheral development locations will cause journey lengths to increase but greater congestion will have the effect of reducing journey lengths. The Do Minimum performs worst on the average trip length with an average, across peak period, trip

length of 17.9km. The three remaining options all score almost equally with an average cross peak period trip length of between 17.2km and 17.3km; and

- Overall, the level of development demand is consistent with the level of household and employment provided in each option. However, the small differences between option 2, 3 and 4 inform us of the trip suppression caused by the delays on the network. Therefore, with this in mind, Option 2 is considered marginally stronger and Option 4 marginally weaker as Option 2 suppresses demand less. This is reflected in the scenario scoring.

Impact on Strategic Routes

5.7 The assessment of the changes in trips on the M6 around Stafford has shown the following:

- On the M6 North of Stafford, all three of the Options perform better than the Do Minimum, i.e. it has less traffic with those options. Options 2, 3 and 4 perform similarly for this section of the M6;
- The M6 through Stafford - between junctions 13 and 14 – delivers the expected result that the Options perform less favourably than the Do Minimum. Option 4 performs best with Option 2 worst on this section of road. This is likely to be due to the location of the housing and employment developments. Those wishing to make north-south (or vice versa) movements through Stafford find it easier to use the motorway with the additional housing/ employment development traffic on the network. In Option 2 the housing/ employment is located to the north and south of Stafford and hence has good access to both Junction 13 and 14 of the M6. Whereas, trips originating or terminating at the housing/ employment developments in option 3 or 4 effectively deter trips into rerouting onto the motorway because of their more easterly location;
- For the M6 south of Stafford, the Do Minimum performs slightly better than each of the options. Options 2, 3 and 4 all perform similarly for this southern section of the M6; and
- The overall scoring of the M6 flow indicator is derived by considering all three sections of road together, summing these to provide a means for comparison. As we would expect, the Do Minimum performs best overall, but it should be noted that in general none of the options performed poorly in relation. Option 4 was the best of the high demand options with Option 2 the worst performing.

5.8 It appears that the growth of traffic on the M6 does not cause immediate problems to the M6 junctions 13 and 14 as their volume over capacity ratio is still significantly below 85%. It is however, the 3 lane M6 itself that exceeds 85% volume over capacity for all four scenarios suggesting that congestion issues will arise regardless of the development in Stafford.

Table 5.1 – Option Evaluation Summary Table

Objective	Local Sub Objective	Potential Options			
		Do Minimum	Option 2	Option 3	Option 4
Impact on all users	Vehicle Hours	1	2	4	3
	Vehicle Kilometres	1	2	3	4
	Average Speed	1	2	4	3
	Average vehicle distance per trip	4	2	2	2
	Demand	1	2	3	4
Impact on strategic routes	Change in Flow on the M6 Motorway	1	4	3	2
New Development Trips	Development Trip Vehicle Hours	1	2	4	3
	Development Trip Vehicle Kilometres	1	3	3	3
	Development Trip Average Speeds	1	2	4	3
	Development Trip average trip length	4	2	2	2
	Development Demand	1	3	3	3
Network Impacts	Junctions	1	2	4	3
	Links	1	2	4	3
Environmental Issues	Impact on CO2 emissions	1	2	4	3
	Impact on NOX emissions	1	3	3	3
Access to Existing Public Transport	Developments with access to bus network	1	3	3	3
	Direct access to Rail	1	1	1	1
Access to non motorised modes	Access to national cycle network	1	1	1	1
	Percentage of development land with access to the town centre within 15 minutes	1	4	2.5	2.5
Effects of large developments		1	4	3	2
Overall Average Ranking (Assuming Even Weighting)		**26**	**48**	**60.5**	**53.5**

Key: 1 = best, 4 =worst

Impacts on New Development Trips

5.9 The assessment of impacts on new development trips has shown that:

- Similarly to the 'all users' assessment, the Do Minimum performs best for all indicators except average trip length. This is expected due to this being a low growth option compared to the others;
- Option 2 is the strongest of the high growth options providing the lowest vehicle hours, vehicle kilometres, shortest average trip length and highest vehicle speeds. The network is able to cope best with the developments that make up Option 2. Option 4 performs slightly better than Option 3 in vehicle hours and vehicle speeds; and
- Due to the development demand being equal for Options 2, 3 and 4 they have each been scored 3 as they cannot be separated.

Network Impacts

5.10 An assessment has been undertaken of the overall network impacts in the key study area. These have considered the following:

- Average junction stress – where the volume to capacity (V/C) ratio is >85%; and
- Average link stress on the approach to each junction – where the volume to capacity (V/C) ratio is >85%.

5.11 A V/C ratio has been used as the criteria for this indicator as it is recognised that where V/C increases above 85% then the link or junction is assumed to be at capacity and hence any additional flow may cause increased delays and queuing (i.e. over capacity).

5.12 Diagrams showing links >85% within the key simulation network for each option and time period are provided in Appendix C. In addition, average vehicle queue length plots are also presented to identify potential locations of excessive queuing and blocking back in the highway network.

5.13 This indicator has highlighted the following points:

- Predictably, the Do Minimum has few V/C problems as there is only relatively small growth;
- Option 2, 3 and 4 are directly comparable due to their identical development growths. Option 2 performs slightly better than the others, with Option 3 performing particularly poorly. It is noted that in the PM peak there appears to be little fluctuation from one scenario to another;
- It is recognised that junction improvements can be expensive and so each additional junction with V/C in excess of 85% is treated as critical. With this said, Option 2 AM out performs Option 3 and Option 4 significantly on this measure; and
- It is noted that some remedial work will be necessary in conjunction with developments to mitigate their impact on the surrounding highway network.

Environment

5.14 A review of the environmental indicators extracted from the SATURN model runs has been undertaken. It is recognised that SATURN provides only a simplified emissions model and hence the validity of these results should be treated in this light. The results do, however, provide a like-for-like comparison of the options and hence the results have highlighted:

- For CO2, the Do Minimum is strongest due to its lower demand. Option 2 is notably better than the others while Option 3 performs the weakest. It should be noted however that the difference between environmental impacts are not huge and should not be taken as conclusive; and

- The differences in NOX between Options 2, 3 and 4 are so small that they are scored equally.

Access to Public Transport

5.15 A diagram showing the location of developments and the current bus routes is shown in

Figure 5.1.

5.16 It is considered reasonable that patrons walk up to 400 metres to a bus stop. With this in mind, a diagram for each option showing an indicative area around the central point of each development that a patron could walk to take a bus is shown in Appendix D.

5.17 The diagrams in Appendix D have been used as evidence to rank the options with regards to bus access. It is recognised however that this indicator does not consider the frequency of bus services, the bus journey times or the location of bus stops and hence should be considered in this light.

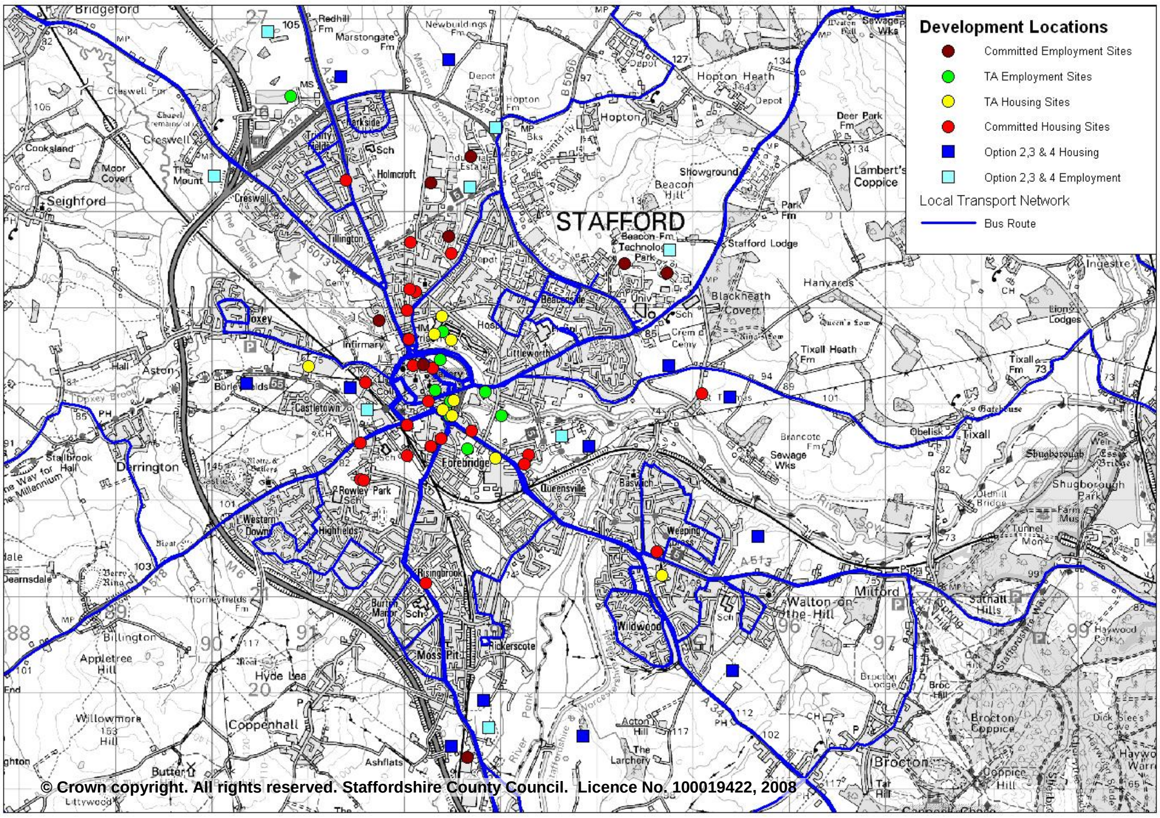
5.18 The results of this methodology highlight the following:

- The land use option that has the best access to the bus network is the Do Minimum. The large growth options have a very similar level of access to the bus network and have therefore been scored equally. It is appreciated that any of these development scenarios could easily have good access to public transport if bus routes were reconsidered in the light of new developments being built.

5.19 The results of the rail access assessment were:

- The rail station in Stafford is centrally located and so 14 bus routes serve the station directly. However, due to its central location it is noted that any of the current bus routes could be combined with a short walk to reach the rail station. For this reason, all four options are scored equal for access to rail. It is noted that in all cases the introduction of a new bus service to access a specific development site could change these results and hence could be considered as a condition.

Figure 5.1 – Access to Public Transport Networks



Access to Non Motorised Modes

5.20 This indicator considers what proportion of land use can access the town centre within 15 minutes through cycling. This assumes a cycle speed of 16kph and that cycling distance is 1.3 times the 'crow-fly' distances. Accession, upon the DfT's guidance, uses the factor 1.2 to move from 'crow-fly' distance to actual travelling distance between two points. Based on our experience the factor 1.3 is chosen as an adjusted version of the DfT's recommended walking distance factor. The adjustment is made based on the assumption that cyclists are less likely to be able to take as many shortcuts as people travelling on foot and so will travel further on average. This indicator has highlighted the following;

- The Do Minimum provides the best access to the city centre from developments with 89% of developments within a 15 minute cycle of the centre; and
- Of the high growth options, Options 3 and 4 perform the best, providing access to the centre for 77% of developments. Option 2 performs least favourably with 73% of developments able to access the centre, the main reason for this is that Option 2 includes the two largest housing developments that are furthest from the town centre, SF2 (North of Beaconside) and SF8 (Between Cannock Road and Wolverhampton Road). The other options only include one of these two sites.

5.21 The second cycle indicator is access to the national cycle network. Due to the spatial nature of the cycle routes, all options will provide access to the cycle network for a high number of sites. In fact, due to the comprehensive cycle access shown in the Staffordshire County Council urban map all options have been assessed as equal for access by cycle.

Effects of Key Developments

5.22 This measure shall consider the localised impact of new large developments installed in options 2, 3 and 4 compared to one another. This really only considers developments labelled as either SCC

Housing or SCC Employment as the other developments are identical in all options and the Do Minimum

5.23 In this measure, a large development is defined by the number of trips it generates. Based on this, the largest trip generators are seen to be the following four developments: the housing developments on land North of Beaconside (SF2), Between Cannock Road and Wolverhampton Road (SF8), South of Doxey Road (SF11) and the employment development West of Stone Road (SFh).

5.24 Each development is considered in turn and how each option copes with the influx of traffic in the surrounding area appraised.

5.25 The North of Beaconside development loads onto the A513 Beaconside Road to the north of Stafford. Option 4 doesn't include this development and is therefore inevitably strong in this area with link V/Cs 10-15% better in this area in the AM and 20-40% better in the PM than the other high growth options. Option 2 performs the better of the two options that include this development, consistently keeping V/Cs 2-4% lower than in Option 3.

5.26 The development between Cannock Rd and Wolverhampton Rd to the south of the town loads onto the A449 just north of M6 J13 with a second loading on the A34 Cannock Rd. This development is not included in Option 3 inevitably making it the strongest of the options here. Option 2 performs least favourably near this development with the local area, particularly on the A449 having high link V/Cs in both time periods. These frequently are in excess of 85% whereas Option 4 is generally better with a few exceptions.

5.27 The third development – South of Doxey Road – is to the west of the town centre and it loads on to both Doxey Road and Martin Drive (which leads to the A518). This development is included in all options and so there are only minor differences between each option. Compared to the Do Minimum the introduction of the development makes the network perform worse but all roads still have V/Cs much less than the critical 85%.

5.28 Finally, the West of Stone Road development is also in all 3 options. This employment site loads off Mustang Drive, which is part of the new Prime Point development off the A34 to the north of Stafford. The localised impact of this development is similar for all 3 of the options. However, when compared to the Do Minimum the true impact of this development is seen. It increases the V/Cs of the links in the local vicinity by around 20%. While this usually keeps the V/C below the critical 85% level, on the approach to the Beaconside/Stone Road roundabout the V/C increases to 100% and 108% in the AM and PM peaks respectively. The junction itself increases from 88% to 98% V/C in the PM and a similar pattern is seen in the AM.

5.29 In general, the network has proved reasonably resilient on the large developments considered with regards to localised impacts. This has been demonstrated by an expected increase in V/Cs, but generally not increasing beyond 85% on most occasions.

5.30 The Do Minimum scores best for this measure but has fewer developments. Option 4 is scored as the best performing of the options as it generally keeps the localised impacts of large developments reduced. Option 2 performs least favourably but then this could have been anticipated as it is the only Option to contain each of the 4 sites considered. It should be remembered that Options 3 and 4 both have 16 SCC growth locations to contribute to their 10,000 new houses and 20,237 new jobs whereas Option 2 only has 14 locations. Therefore we might expect the localised impacts of Option 2 to be more severe because the extra traffic is concentrated in fewer locations.

5.31 The results presented in this section are only indicative and the impacts of each option need to be analysed in greater detail. However, it is fair to say that remedial measures may need to be considered at critical points on the network to account for the immediate affect of new developments.

Weighted Comparison of Options

5.32 Table 5.2 combines the results of each indicator to show an overall ranking for the Do Minimum and Growth Options. As already stated, the Do Minimum is clearly the best performing, purely because the level of development and, therefore, the transport impact is significantly lower than the other options. To achieve a better comparison a weighting has been applied to the results to take account of the greater level of development. If the original option rankings are weighted by the number of new jobs and households included in the scenario the following scoring is given.

Table 5.2 – Weighted Option Ranking

	Do Minimum	Option 2	Option 3	Option 4
Overall Average Ranking (Assuming Even Weighting)	**26**	**48**	**60.5**	**53.5**
Weighted by additional houses plus additional jobs	**0.0023**	**0.0016**	**0.0020**	**0.0018**
Ranking (based on weighting)	**4**	**1**	**3**	**2**

5.33 The weighted ranking shows that, per household and job, Option 2 is the preferred option. To put it another way, the most efficient way of increasing households and jobs in Stafford is to follow Option 2. Option 3 scores the least favourably of the Growth Options but still generates growth better than the Do Minimum.

6. Summary

6.1 Overall this assessment has highlighted the impacts of the four development options on the key indicators outlined in Section 4. The indicators assessed within this report are based on those designed and developed by the Partnership for Growth and Governments. The indicators are defined in the DCLG Advice - Annex C: Conditions of Partnership for Growth. The guidelines encourage development to:

- Exploit existing public transport networks in determining the most sustainable locations for growth;
- Minimise any increase in long-distance commuting by the appropriate alignment of housing and employment opportunities;
- Ensure that the design and location of new developments enables access to employment opportunities and key services by bicycle, walking and public transport; and
- Note that the Highways Agency is required to protect the service levels on the strategic road network and may need to introduce restraints on access to that network.

6.2 Overall it is considered that the indicators assessed within this report have highlighted that as jobs and households increase between the options the level of impact on the overall network increases accordingly. Therefore, it is easy to conclude that the Do Minimum option will have the least impact on the transport network. However, it is worth considering that if growth is desired, Option 2 provides the best growth to adverse reaction ratio; it fosters a lot of growth in the most sustainable manner.

6.3 The key results compared with the DCLG advice highlights the following:

Exploit existing public transport networks in determining the most sustainable locations for growth:

- The Do Minimum developments have the best access to the bus network if considering those developments within a 400m walk of a bus route. However, the Do Minimum developments are contained within all the other options and so of the high growth options the development sites in all Options are equally well connected to the bus network; and
- At present all bus routes go to the town centre and so are within walking distance of the train station which is centrally located. Specifically, some 14 services go directly to the train station. Consequently options have been scored as equal and would only change if bus frequencies and/or routes are improved for different options.

Minimise any increase in long-distance commuting by the appropriate alignment of housing and employment opportunities:

- Options 2, 3 and 4 all show a reduction of average journey distance in comparison to the Do Minimum. This is likely to be due to the increased employment and housing opportunities inside Stafford itself meaning there is less need for long-distance commuting, but is also related to the impact of increased levels of congestion having a suppressing effect on trip making. The journey times for all of the options are higher than the Do Minimum suggesting a corresponding increase in congestion; and
- The reduction in average journey length does not necessarily indicate a positive environmental effect. All of the options generate significantly more CO2 and NOX than the Do Minimum due to the additional trips in Stafford;

Ensure that the design and location of new developments enables access to employment opportunities and key services by bicycle, walking and public transport:

- The Options contain all the Do Minimum developments plus additional developments. Therefore Options 3 and 4, which provide 77% of its developments with a cycling journey time of 15 minutes or less to the town centre, are the best of the high growth options. Option 2 provides 73% of its developments with this level of cycling access to the town centre.

Note that the Highways Agency is required to protect the service levels on the strategic road network and may need to introduce restraints on access to that network;

- Traffic flows on the M6 are adversely affected in the Do minimum and the high growth options increase the flows further, but not severely. The majority of this impact is seen on the M6 between junctions 13 and 14 indicating that traffic is using this as a route to move between the north and south of Stafford; and
- Traffic from the North via the M6 actually decreases in the high growth options. This effect could be a result of more housing and jobs being inside of Stafford meaning that less people have to commute to/from Stafford. It may also be related to the increased flows on the M6 between Junctions 13 and 14 discouraging wider North-South movements from using the motorway.

A.1 Appendix A – Development Information

A.1.1 Many of the developments in the land use options are consistent across the new scenarios. Specifically, all of the new options contain the Do Minimum developments. Therefore for brevity, Table A1.1 contains the Do Minimum developments, while

A.1.2 Table A1.2 to Table A1.4 detail just the additional development information for the three land use Options; 2, 3 and 4 respectively.

Table A1.1 – Do Minimum Developments

Group	Development Name	Site ID	Dev Size (Units)	Dev Size (Floor Area)	%HGVs	Dev Zone Number	2007	2026
Committed TA Sites	Former Riverside Recreation Site (A)	TA1	-	1.3	3%	2001	0%	100%
	Former Riverside Recreation Site (A)	TA1	105	-	1%	2101	0%	100%
	Former Riverside Recreation Site (B)	TA1	-	1.9	2%	2002	0%	100%
	Former Riverside Recreation Site (B)	TA1	293	-	1%	2102	0%	100%
	Former Riverside Recreation Site (C)	TA1	-	0.1	3%	2003	0%	100%
	Former Riverside Recreation Site (C)	TA1	67	-	1%	2103	0%	100%
	St Georges A	TA2	136	-	1%	2104	0%	100%
	St Georges Offices	TA2	-	3.6	2%	2004	0%	100%
	St Georges B	TA2	175	-	1%	2105	0%	100%
	Crooked Bridge Boiler House	TA8	173	-	1%	2106	0%	100%
	Lammascote Road Leisure Centre	TA3	-	0.6	3%	2005	0%	100%
	Former Universal Grinding Wheel, Doxey Rd	TA4	150	-	1%	2107	0%	100%
	Former Staffordshire Police Headquarters	TA5	80	-	1%	2108	0%	100%
	Prime Point 14, J14 M6	TA6	-	1.7	5%	2006	0%	100%
	GEC A34 Lichfield Road	TA7	-	0.7	2%	2007	0%	100%
	GEC A34 Lichfield Road	TA7	181	-	1%	2109	0%	100%
	Kingsmead / North Walls	TA8	-	2.3	3%	2008	0%	100%
	Kingsmead / North Walls	TA8	37	-	1%	2110	0%	100%
	Tipping Street	TA9	-	1.8	2%	2009	0%	100%
	Friars Terrace	TA10	51	-	1%	2111	0%	100%
Committed Employment Sites	Tollgate Business Park	CE01	-	3.1	10%	2018	0%	100%
	Staffordshire Technology Park	CE02	-	0.2	2%	2019	0%	100%
	Greyfriars Ind Est	CE02	-	0.2	2%	2020	0%	100%
	Land at Beacon Business Park	CE03	-	0.2	40%	2021	0%	100%
	Moss Pit	CE04	-	0.3	15%	2022	0%	100%
	Common Road Ind Est	CE05	-	0.6	10%	2023	0%	100%
	Astonfields Ind Est	CE06	-	0.1	15%	2024	0%	100%
	17 Salter St	CE07	-	0.0	2%	2025	0%	100%
Committed Housing Sites	Brunswick Terrace	CD01	59	-	1%	2124	0%	100%
	Derelict Land, Foregate Street	CD03	42	-	1%	2126	0%	100%
	The Former Eagle Inn & 14/14A Newport Road	CD04	32	-	1%	2127	0%	100%
	Land At Castle Wharf/Castle View/Castle Stree	CD05	24	-	1%	2128	0%	100%
	9 - 10 Salter Street	CD06	21	-	1%	2129	0%	100%
	Site Off Mill Bank	CD07	20	-	1%	2130	0%	100%
	Westgate, Bellasis Street	CD08	18	-	1%	2131	0%	100%
	88 Wolverhampton Road, Forebridge	CD09	18	-	1%	2132	0%	100%
	24 St Leonards Avenue, Queensville	CD10	15	-	1%	2133	0%	100%
	The Former Bed Centre, Rowley Street	CD11	15	-	1%	2134	0%	100%
	Westhorpe And The Laurels, Rowley Avenue	CD12	12	-	1%	2135	0%	100%
	16 & 17 Lichfield Road	CD13	12	-	1%	2136	0%	100%
	11-11A Princes Street	CD14	12	-	1%	2137	0%	100%
	Land At Albert Terrace	CD15	11	-	1%	2138	0%	100%
	St Thomas Priory	CD16	25	-	1%	2139	60%	100%
	18 - 20A Browning Street	CD17	10	-	1%	2140	0%	100%
	Land To Rear Of 7,9,11,13,15 Weeping Cross	CD18	9	-	1%	2141	0%	100%
	North Stafford Garage, Stone Road	CD19	8	-	1%	2142	0%	100%
	The Hawthorns, 27 Newport Road	CD20	6	-	1%	2143	0%	100%
	The Royal Oak, Rising Brook	CD21	6	-	1%	2144	0%	100%
	Former Staff Houses, Rotherwood Drive, Rowl	CD22	6	-	1%	2145	0%	100%
	Land Between 56 -57 Queensville Avenue	CD23	5	-	1%	2146	0%	100%
	176 Sandon Road	CD24	5	-	1%	2147	0%	100%

Table A1.2 – Option 2 Developments

Group	Development Name	Site ID	Dev Type	Dev Size (Units)	Dev Size (Floor Area)	%HGVs	Dev Zone Number	2006	2026
SCC Housing sites	Beaconside / A34 Stone Road	SF1	Housing	800	-	1%	2112	0%	100%
	North of Beaconside	SF2	Housing	1500	-	1%	2113	0%	100%
	East of Stockton Lane	SF6	Housing	100	-	1%	2117	0%	100%
	Btwn Cannock Rd A34 and Wolverhampton Rd	SF8	Housing	2000	-	1%	2119	0%	100%
	West of Wolverhampton Road A449	SF9	Housing	300	-	1%	2120	0%	100%
	South of Doxey Road	SF11	Housing	2400	-	1%	2122	0%	100%
	North of Castle Street	SF12	Housing	400	-	1%	2123	0%	100%
SCC Employment sites	East of Beaconside	SF-a	Industry	-	1.6	10%	2010	0%	100%
	West of Tollgate Drive	SF-b	Industry	-	3.6	10%	2011	0%	100%
	East of Fairway	SF-d	Industry	-	2.8	10%	2013	0%	100%
	East of Kingsway	SF-f	Industry	-	1.6	10%	2015	0%	100%
	West of Stone Road A34	SF-h	Industry	-	16.0	10%	2017	0%	100%
	East of Wolverhampton Rd A449	SF-e	Industry	-	5.6	10%	2014	0%	100%
	South of Creswell Grove	SF-g	Industry	-	3.2	10%	2016	0%	100%

Table A1.3 – Option 3 Developments

Group	Development Name	Site ID	Dev Type	Dev Size (Units)	Dev Size (Floor Area)	%HGVs	Dev Zone Number	2006	2026
SCC Housing sites	Beaconside / A34 Stone Road	SF1	Housing	800	-	1%	2112	0%	100%
	North of Beaconside	SF2	Housing	1500	-	1%	2113	0%	100%
	South of Tixall Road	SF3	Housing	800	-	1%	2114	0%	100%
	West of Baswich Lane	SF4	Housing	700	-	1%	2115	0%	100%
	East of Fairway	SF5	Housing	350	-	1%	2116	0%	100%
	East of Stockton Lane	SF6	Housing	300	-	1%	2117	0%	100%
	East of Cannock Road A34	SF7	Housing	250	-	1%	2118	0%	100%
	South of Doxey Road	SF11	Housing	2400	-	1%	2122	0%	100%
	North of Castle Street	SF12	Housing	400	-	1%	2123	0%	100%
SCC Employment sites	East of Beaconside	SF-a	Industry	-	1.6	10%	2010	0%	100%
	West of Tollgate Drive	SF-b	Industry	-	3.6	10%	2011	0%	100%
	East of Fairway	SF-d	Industry	-	2.8	10%	2013	0%	100%
	East of Kingsway	SF-f	Industry	-	1.6	10%	2015	0%	100%
	West of Stone Road A34	SF-h	Industry	-	16.0	10%	2017	0%	100%
	West of Weston Rd	SF-c	Industry	-	5.6	10%	2012	0%	100%
	South of Creswell Grove	SF-g	Industry	-	3.2	10%	2016	0%	100%

Table A1.4 – Option 4 Developments

Group	Development Name	Site ID	Dev Type	Dev Size (Units)	Dev Size (Floor Area)	%HGVs	Dev Zone Number	2006	2026
SCC Housing sites	Beaconside / A34 Stone Road	SF1	Housing	300	-	1%	2112	0%	100%
	South of Tixall Road	SF3	Housing	800	-	1%	2114	0%	100%
	West of Baswich Lane	SF4	Housing	700	-	1%	2115	0%	100%
	East of Fairway	SF5	Housing	350	-	1%	2116	0%	100%
	East of Stockton Lane	SF6	Housing	300	-	1%	2117	0%	100%
	East of Cannock Road A34	SF7	Housing	250	-	1%	2118	0%	100%
	Btwn Cannock Rd A34 and Wolverhampton Rd	SF8	Housing	2000	-	1%	2119	0%	100%
	South of Doxey Road	SF11	Housing	2400	-	1%	2122	0%	100%
	North of Castle Street	SF12	Housing	400	-	1%	2123	0%	100%
SCC Employment sites	East of Beaconside	SF-a	Industry	-	1.6	10%	2010	0%	100%
	West of Tollgate Drive	SF-b	Industry	-	3.6	10%	2011	0%	100%
	East of Fairway	SF-d	Industry	-	2.8	10%	2013	0%	100%
	East of Kingsway	SF-f	Industry	-	1.6	10%	2015	0%	100%
	West of Stone Road A34	SF-h	Industry	-	16.0	10%	2017	0%	100%
	West of Weston Rd	SF-c	Industry	-	5.6	10%	2012	0%	100%
	South of Creswell Grove	SF-g	Industry	-	3.2	10%	2016	0%	100%

A.2 Appendix B – Detailed Assessment of Options

Objective: Impact on All Users

Sub Objectives: Various Traffic Indicators

Methodology

This objective has considered the following:

Vehicle Hours	Total vehicle hours for trips within the model area
Vehicle Kilometres	Total vehicle kilometres for trips within the model area
Vehicle Speeds	The Average speed for trips within the model area
Average Trip Length	The Average trip length for trips within the model
Development Demand	The total trip demand

Results

	Do Minimum AM	Do Minimum PM	Option 2 AM	Option 2 PM	Option 3 AM	Option 3 PM	Option 4 AM	Option 4 PM
Vehicle Hours	13607	14403	15473	16277	15875	16545	15711	16412
% Change Rel to DM	-	-	13.7%	13.0%	16.7%	14.9%	15.5%	14.0%
Vehicle Kilometres	818536	839575	841634	870625	842473	872848	843981	873162
% Change Rel to DM	-	-	2.8%	3.7%	2.9%	4.0%	3.1%	4.0%
Vehicle Speeds (km/hr)	60.2	58.3	54.4	53.5	53.1	52.8	53.7	53.2
% Change Rel to DM	-	-	-9.6%	-8.2%	-11.8%	-9.5%	-10.7%	-8.7%
Average Trip Length (km)	18.3	17.5	17.6	16.8	17.6	16.8	17.7	16.8
% Change Rel to DM	-	-	-3.8%	-3.8%	-3.6%	-3.5%	-3.4%	-3.5%
Network Demand	44775	48084	47880	51858	47807	51820	47784	51818
% Change Rel to DM	-	-	6.9%	7.8%	6.8%	7.8%	6.7%	7.8%

-1.6

Overall Score

Objective	Sub Objective	Options			
		Do Min	O2	O3	O4
Development Impacts	Vehicle Hours	1	2	4	3
	Vehicle Kilometres	1	2	3	4
	Vehicle Speeds	1	2	4	3
	Average Trip Length	4	2	2	2
	Demand	1	3	3	3

Objective: Impact on Strategic Routes

Sub Objectives: Flows on the M6

Methodology

This assessment has considered the total flows on the M6 around Stafford

Results

	Do Minimum AM	Do Minimum PM	Option 2 AM	Option 2 PM	Option 3 AM	Option 3 PM	Option 4 AM	Option 4 PM
M6 North of J14								
Nortbound	3379	3444	3277	3395	3264	3387	3272	3387
Southbound	3296	3556	3293	3455	3305	3465	3287	3455
Total	6676	7000	6569	6850	6569	6852	6559	6842
% Change Rel DM	-	-	-1.6%	-2.2%	-1.6%	-2.1%	-1.7%	-2.3%
M6 Between J13 and J14								
Nortbound	4046	4084	4387	4252	4435	4121	4341	4131
Southbound	3645	4202	3755	4469	3563	4491	3636	4413
Total	7691	8286	8141	8721	7998	8612	7978	8544
% Change Rel DM	-	-	5.9%	5.3%	4.0%	3.9%	3.7%	3.1%
M6 South of J13								
Nortbound	3759	4148	3810	4194	3838	4201	3834	4202
Southbound	3801	4072	3881	4069	3885	4062	3884	4089
Total	7560	8220	7691	8263	7723	8263	7718	8291
% Change Rel DM	-	-	1.7%	0.5%	2.2%	0.5%	2.1%	0.9%

Overall Score

Objective	Sub Objective	Options			
		Do Minimum	O2	O3	O4
Strategic Impact	Flows on the M6	1	4	3	2

Objective: Impacts on Development Users

Sub Objectives: Various development Traffic Indicators

Methodology

This objective has considered the following:

Vehicle Hours	Total vehicle hours for trips to and from the new developments
Vehicle Kilometres	Total vehicle kilometres for trips to and from the new developments
Vehicle Speeds	The Average speed for trips to and from the new developments
Average Trip Length	The Average trip length within the model area for trips to and from the new developments
Development Demand	The total trip demand to and from the new developments

Results

	Do Minimum		Option 2		Option 3		Option 4	
	AM	PM	AM	PM	AM	PM	AM	PM
Vehicle Hours	663	937	2392	2730	2649	2866	2542	2827
% Change Rel to DM	-	-	261%	191%	299%	206%	283%	202%
Vehicle Kilometres	29782	40665	92958	106050	93855	106863	93623	106699
% Change Rel to DM	-	-	212%	161%	215%	163%	214%	162%
Vehicle Speeds (km/hr)	44.9	43.4	38.9	38.8	35.4	37.3	36.8	37.7
% Change Rel to DM	-	-	-13.4%	-10.5%	-21.1%	-14.1%	-18.0%	-13.0%
Average Trip Length (km)	10.7	10.8	10.2	10.4	10.3	10.4	10.3	10.4
% Change Rel to DM	-	-	-4.3%	-3.8%	-3.4%	-3.1%	-3.6%	-3.2%
Development Demand	2783	3777	9076	10239	9076	10239	9076	10239
% Change Rel to DM	-	-	226%	171%	226%	171%	226%	171%

Overall Score

Objective	Sub Objective	Options			
		Do Min	O2	O3	O4
Development Impacts	Vehicle Hours	1	2	4	3
	Vehicle Kilometres	1	2	4	3
	Vehicle Speeds	1	2	4	3
	Average Trip Length	4	2	2	2
	Development Demand	1	3	3	3

Objective: Network Impacts

Sub Objectives: Impacts on Junctions and Links

Methodology

This objective has considered the following:

Junctions An assessment has been undertaken of the number of junctions with an average V/C of >85%

Links An assessment has been undertaken of the number of links with an average V/C of >85%

Note:

These indicators have been assessed using the SATURN model for the key simulated area

A V/C Ratio of 85% is considered to represent links and junctions which are approaching capacity and hence beyond this significant delays and queuing may occur.

Results

	Do Minimum		Option 2		Option 3		Option 4	
	AM	PM	AM	PM	AM	PM	AM	PM
No of Junctions V/C >85%	24	28	28	40	33	40	32	39
% Change Rel to DM	-	-	16.7%	42.9%	37.5%	42.9%	33.3%	39.3%
No of Links V/C >85%	72	89	112	140	125	145	117	141
% Change Rel to DM	-	-	55.6%	57.3%	73.6%	62.9%	62.5%	58.4%

Overall Score

Objective	Sub Objective	Options			
		Do Minimum	Option 2	Option 3	Option 4
Network Impacts	Junctions	1	2	4	3
	Links	1	2	4	3

Objective: Environment

Sub Objectives: CO2 and NOX

Methodology

An assessment of the levels of both Carbon Dixoide and Nigrogen Oxide has been undertaken. This has used the direct outputs from the SATURN forecast model assignments and hence the accuracy of these results should be considered in this light.

Results

	Do Minimum		Option 2		Option 3		Option 4	
	AM	PM	AM	PM	AM	PM	AM	PM
CO2 (Kg/hour)	22551	24084	25879	27136	26164	27985	26002	27393
NOX (Kg/hour)	514	549	575	609	573	623	574	609

Overall Score

Objective	Sub Objective	Options			
		Do Minimum	Option 2	Option 3	Option 4
Environment	CO2	1	2	4	3
	NOX	1	3	3	3

Objective: Access to Public Transport

Sub Objectives: Access to existing services

Methodology

Access to Buses

The number of AM Peak development trips with access to existing bus routes within a 400m walk

It is noted that in all four options some developments are not within a 400m walk (333m straight-line distance) of the bus network. The schemes have been scored dependent on the number of developments that don't have walkable access to the bus network.

Access to Rail

Qualitative Statement

Existing direct bus services which pass the rail station are:

9, 74, 75, 76, 101, 481, 482, 825, X1, 880, 835, 836, 837, 490

The routes are shown opposite.

All bus services pass through the city centre and so all buses are technically eligible for connecting to the train service. Therefore, all options are scored equally.

Overall Score

Objective	Sub Objective	Options			
		Do Minimum	Option 2	Option 3	Option 4
Access to Public Transport	Bus	1	3	3	3
	Rail	1	1	1	1

A.3 Appendix C – Network Impacts

Figure A3.1 – Do Minimum 2026 AM Peak: Link Volume / Capacity Ratio > 85%

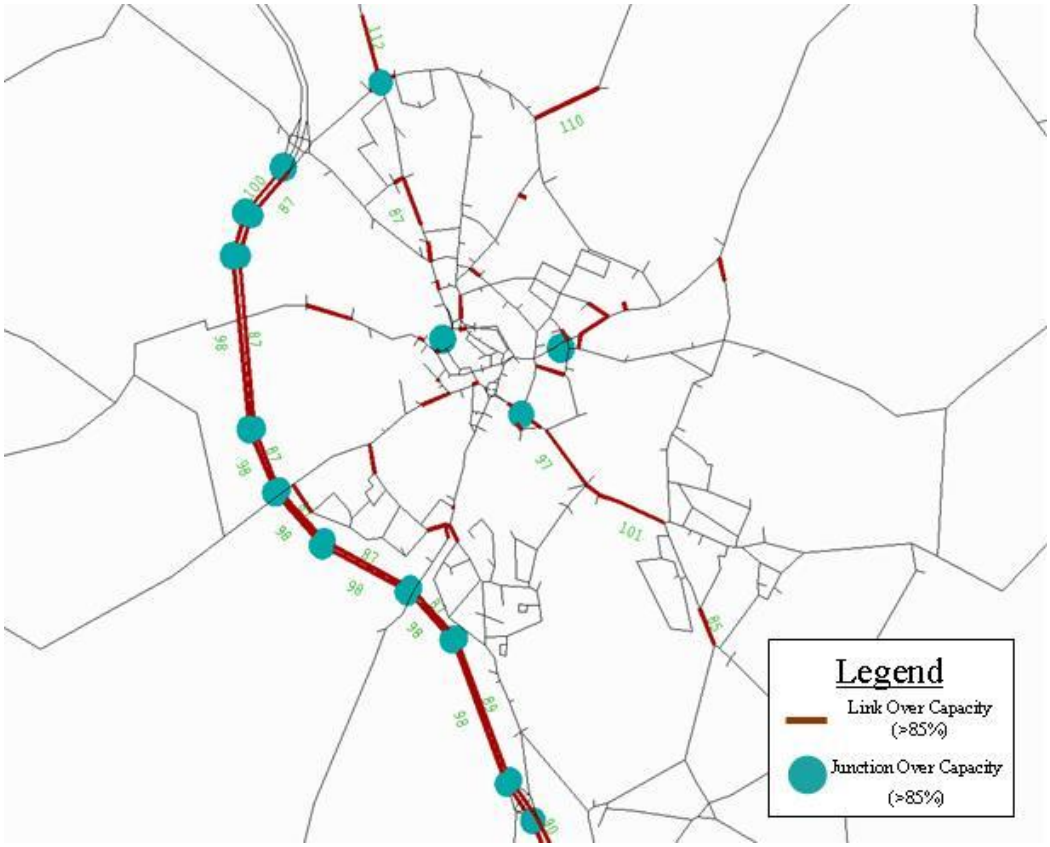


Figure A3.2 – Do Minimum 2026 AM Peak: Relative Queue Lengths

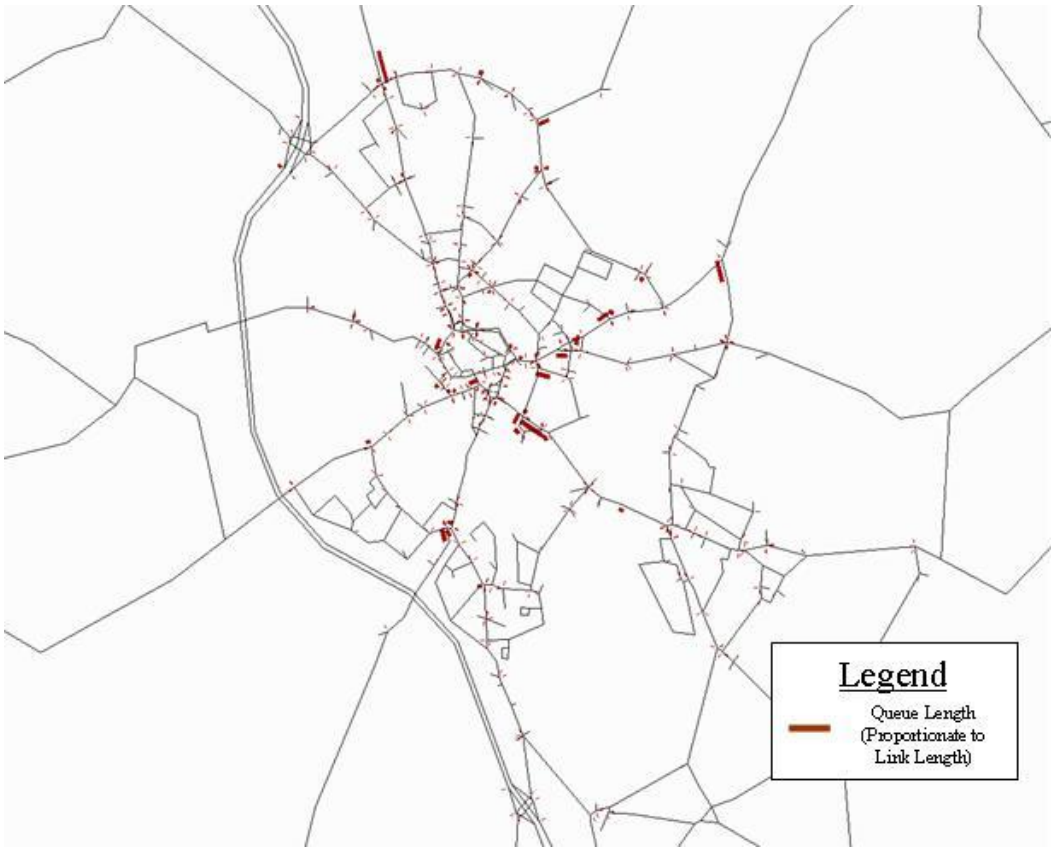


Figure A3.3 – Do Minimum 2026 PM Peak: Link Volume / Capacity Ratio > 85%

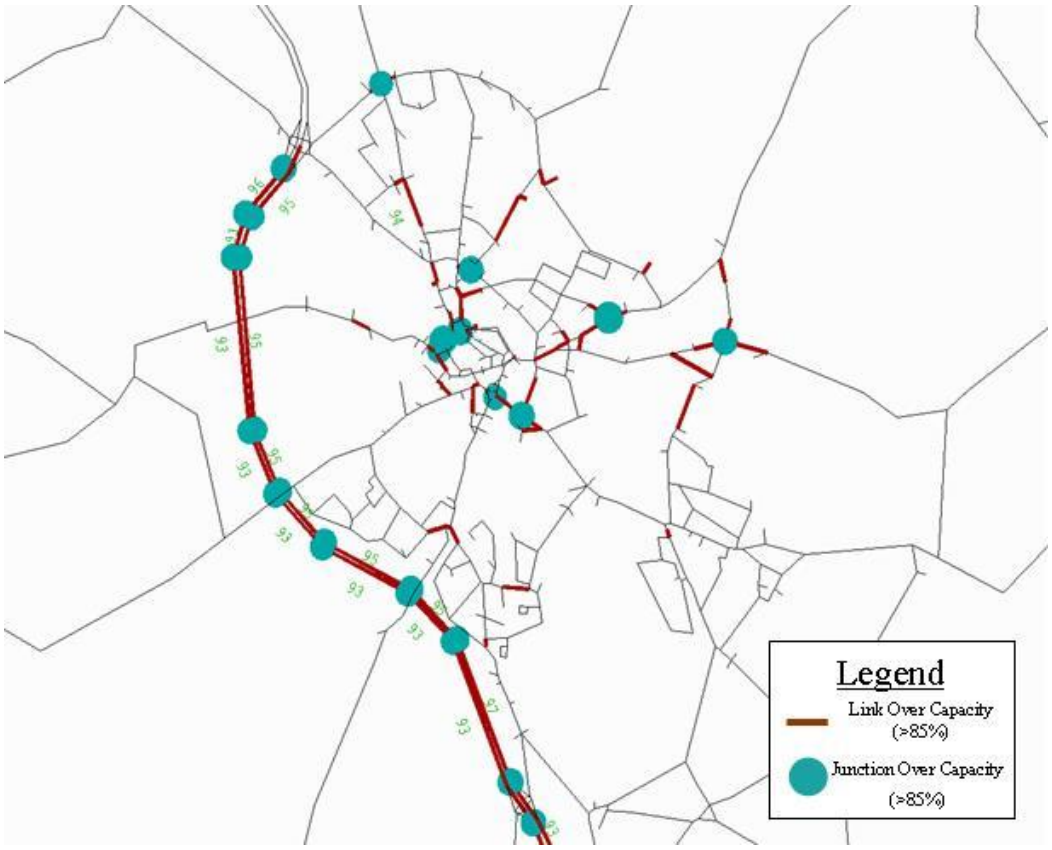


Figure A3.4 – Do Minimum 2026 PM Peak: Relative Queue Lengths

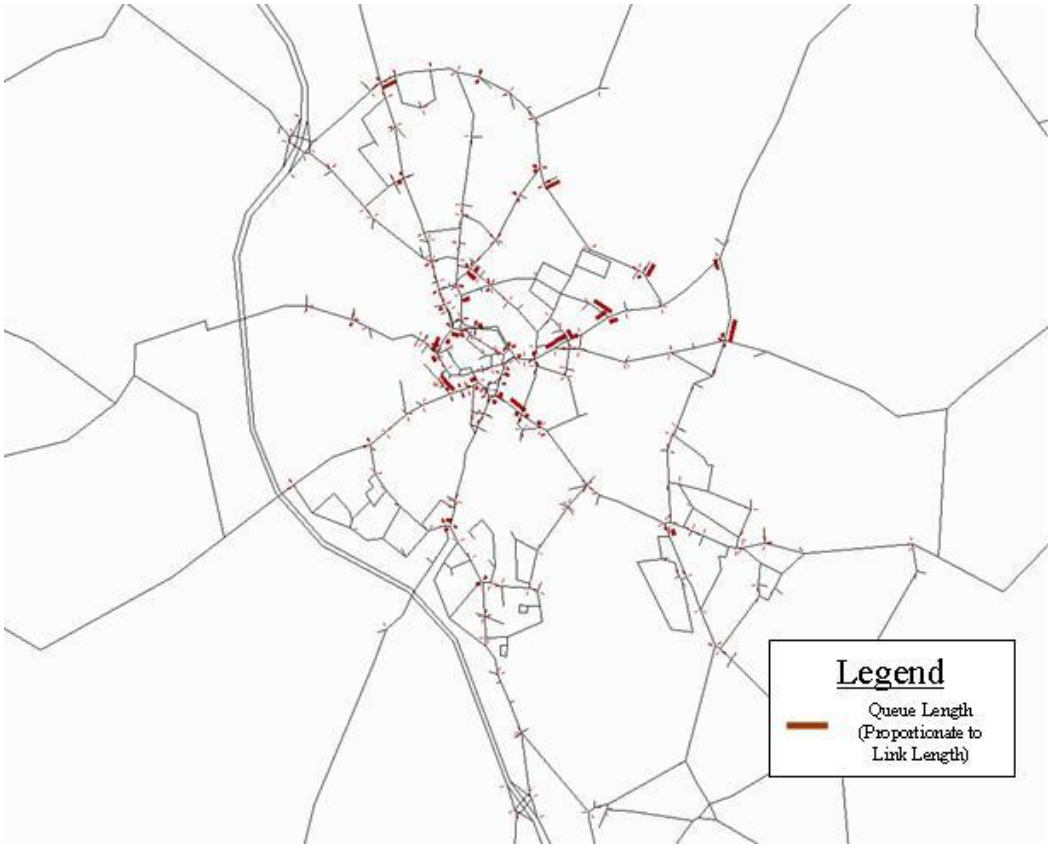


Figure A3.5 – Option 2 2026 AM Peak: Link Volume / Capacity Ratio > 85%

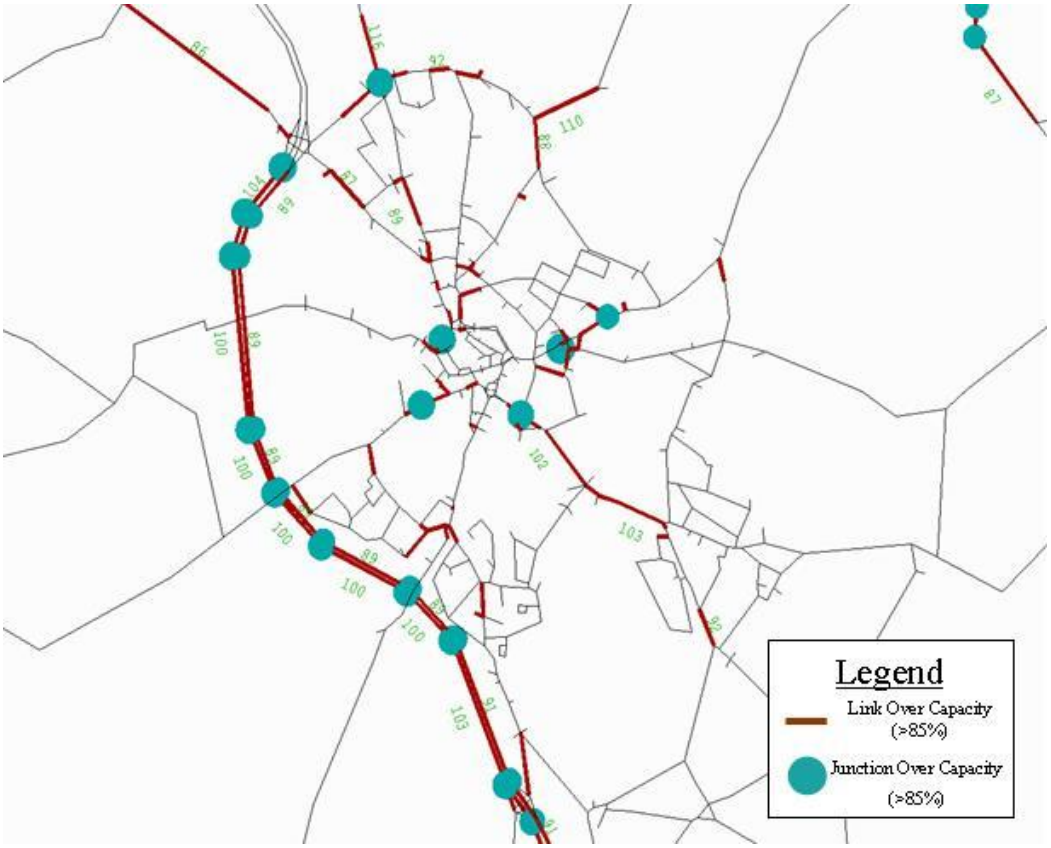


Figure A3.6 – Option 2 2026 AM Peak: Relative Queue Lengths

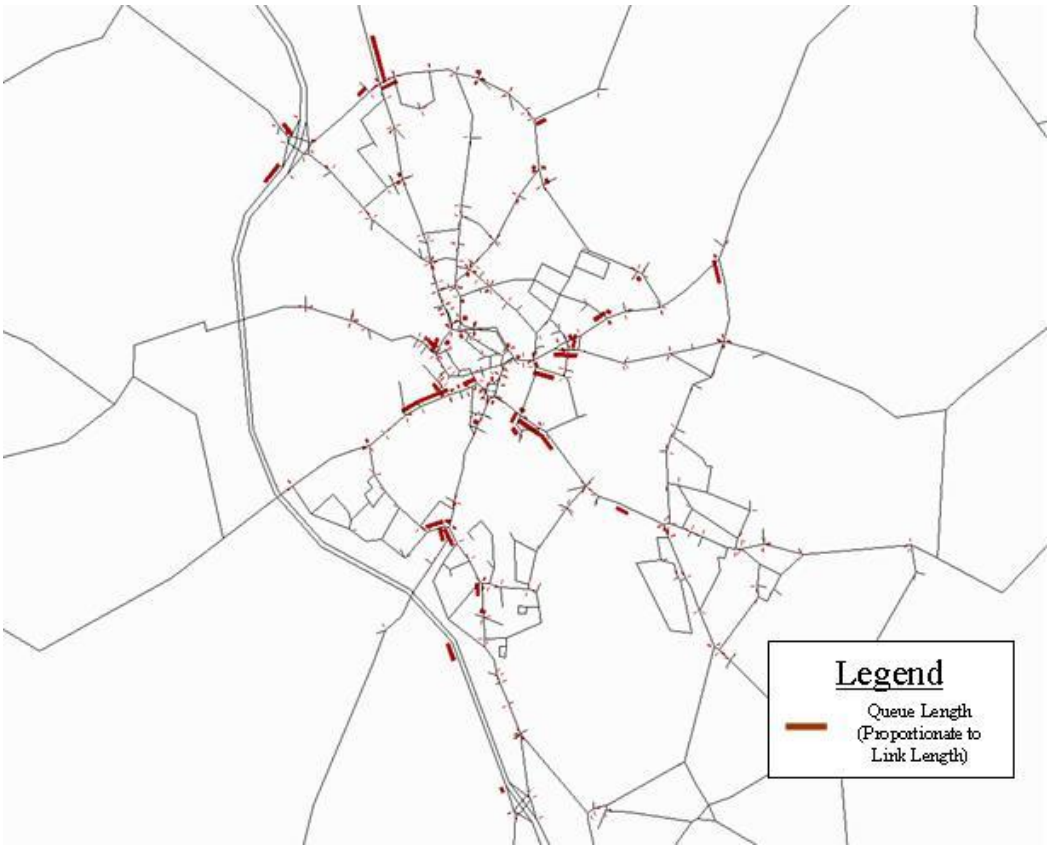


Figure A3.7 – Option 2 2026 PM Peak: Link Volume / Capacity Ratio > 85%

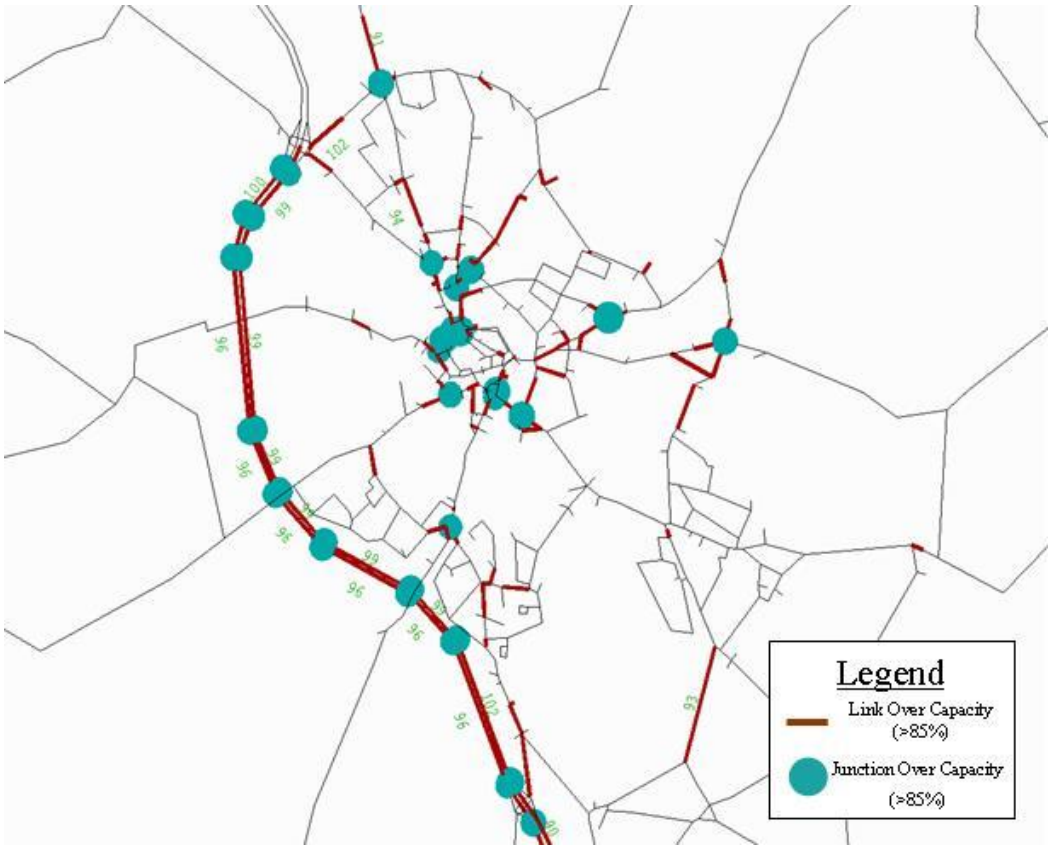


Figure A3.8 – Option 2 2026 PM Peak: Relative Queue Lengths

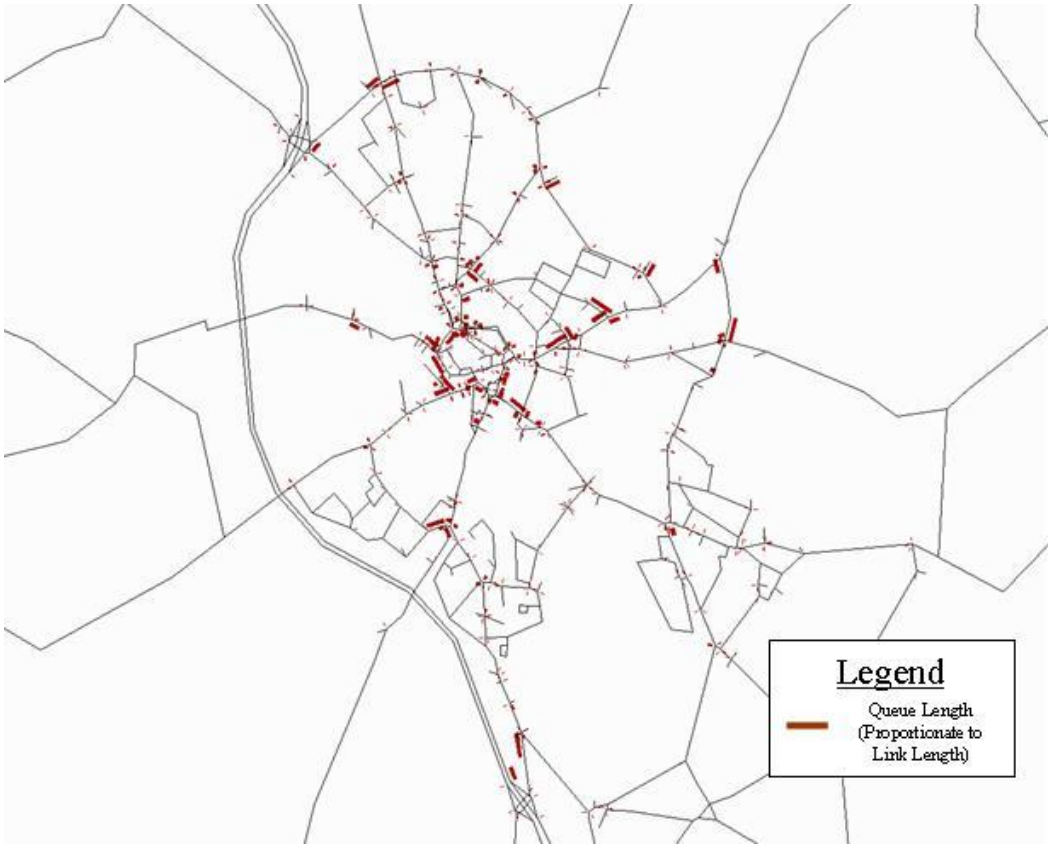


Figure A3.9 – Option 3 2026 AM Peak: Link Volume / Capacity Ratio > 85%

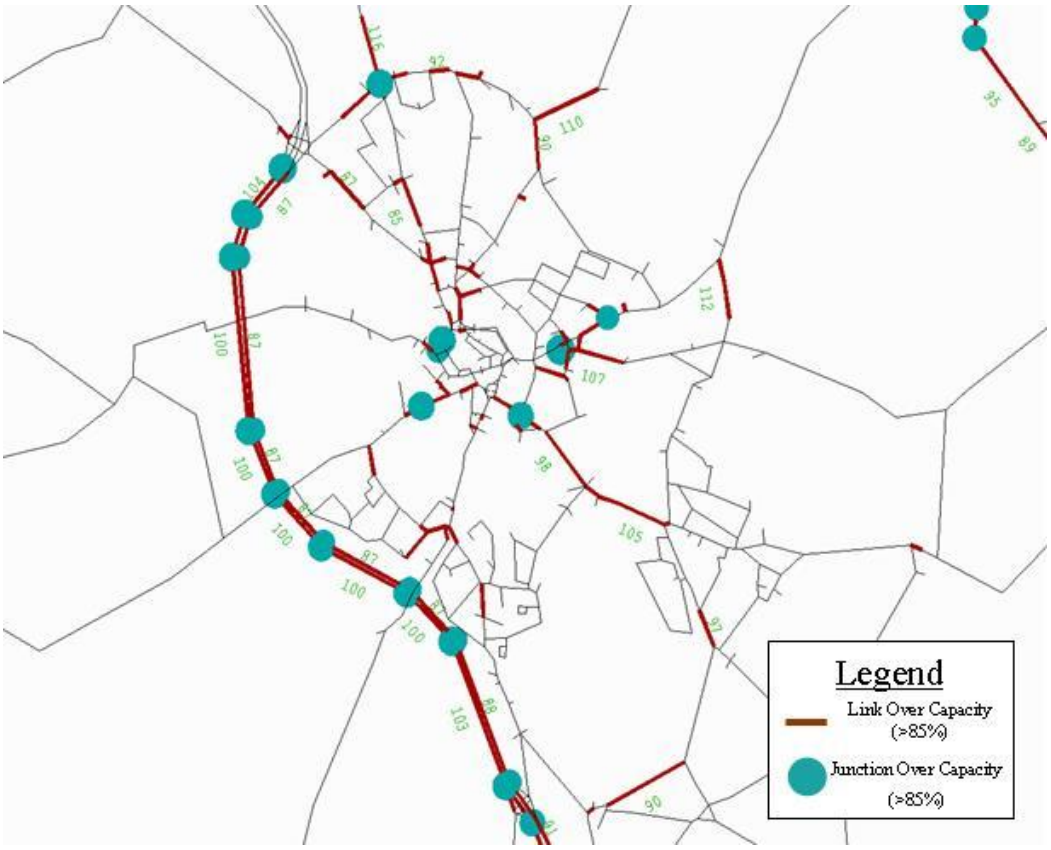


Figure A3.10 – Option 3 2026 AM Peak: Relative Queue Lengths

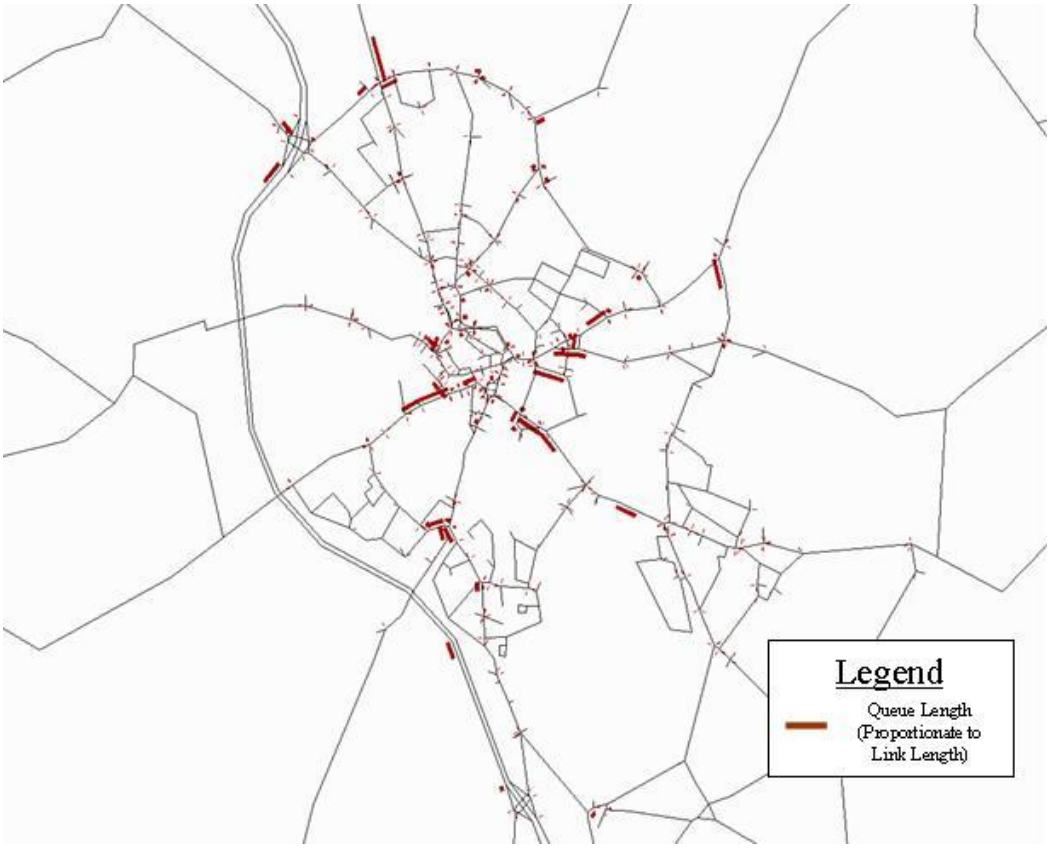


Figure A3.11 – Option 3 2026 PM Peak: Link Volume / Capacity Ratio > 85%

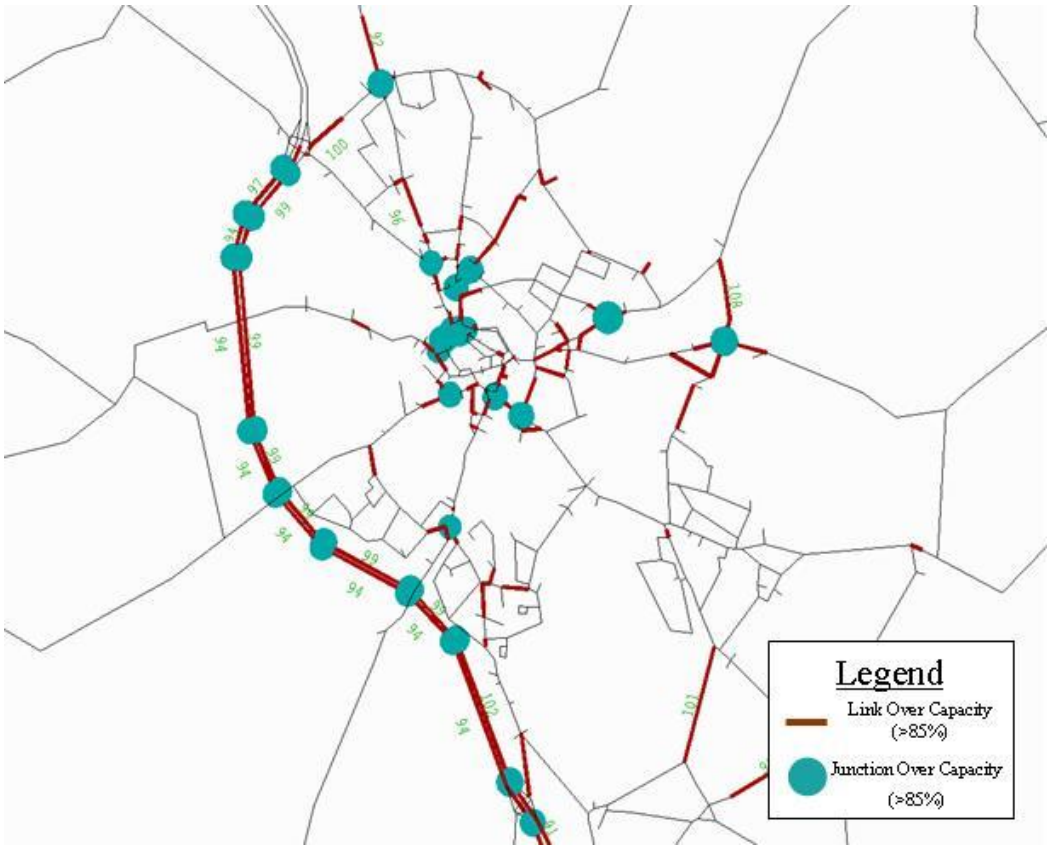


Figure A3.12 – Option 3 2026 PM Peak: Relative Queue Lengths

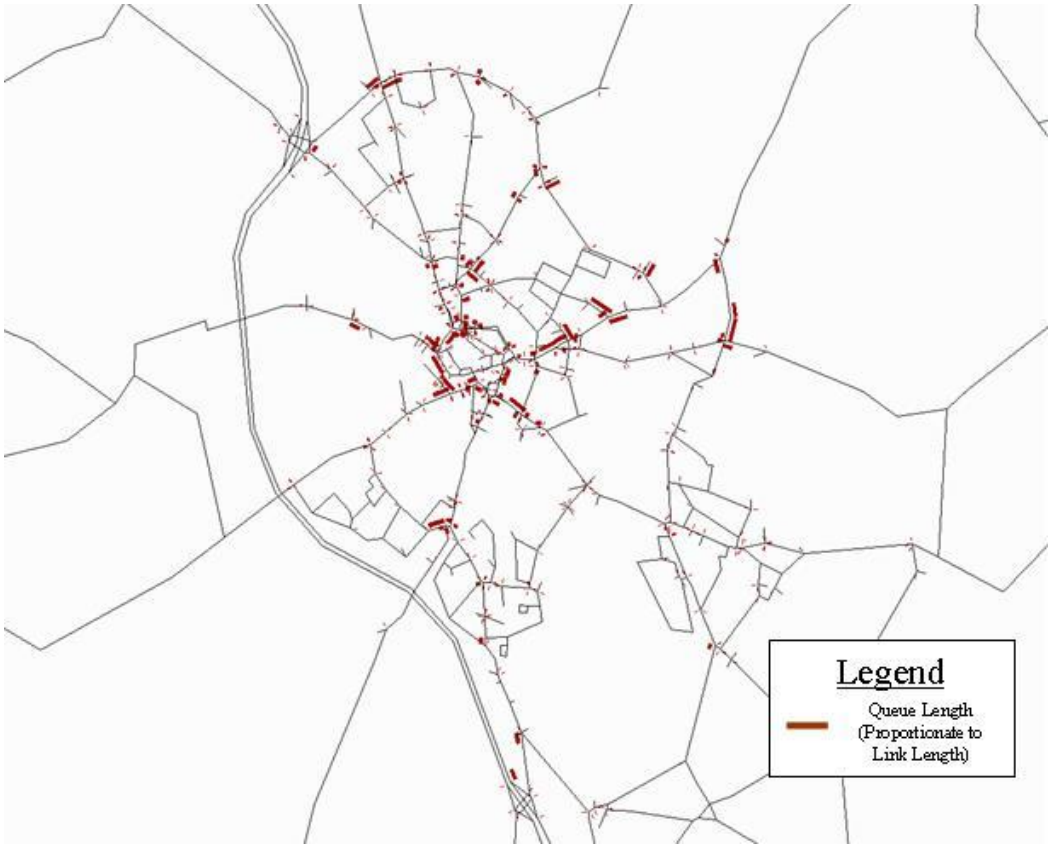


Figure A3.13 – Option 4 2026 AM Peak: Link Volume / Capacity Ratio > 85%

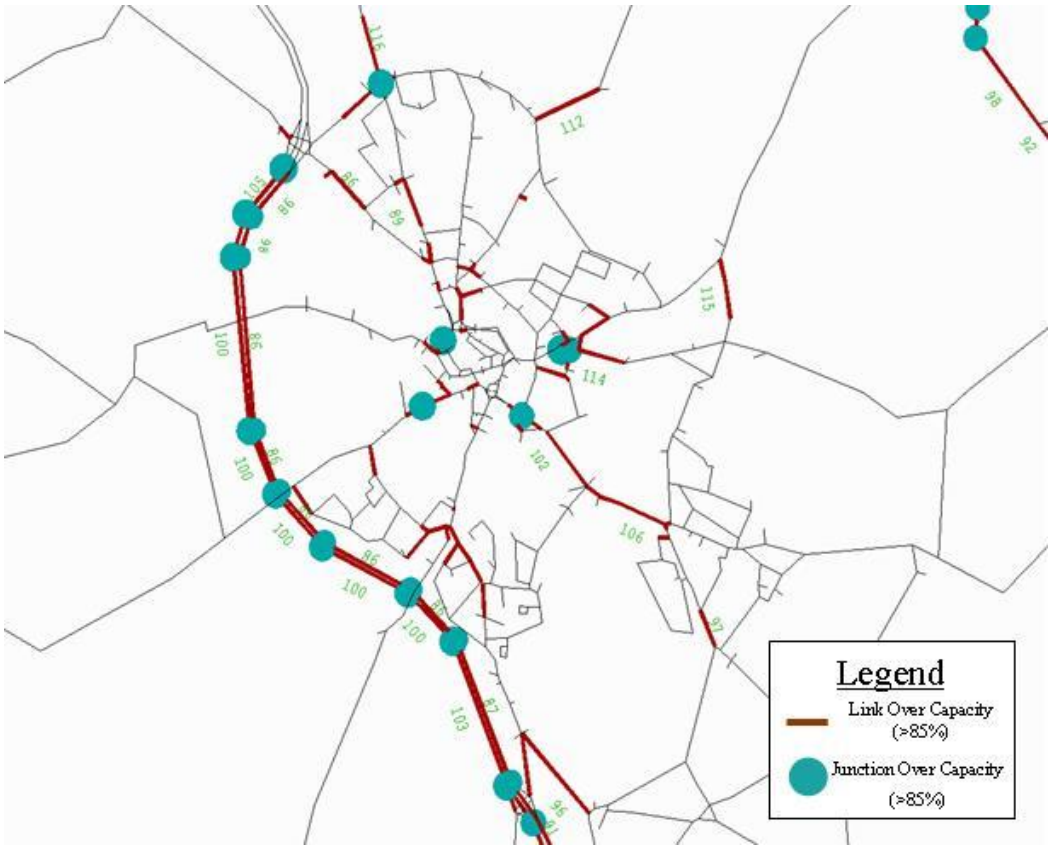


Figure A3.14 – Option 4 2026 AM Peak: Relative Queue Lengths

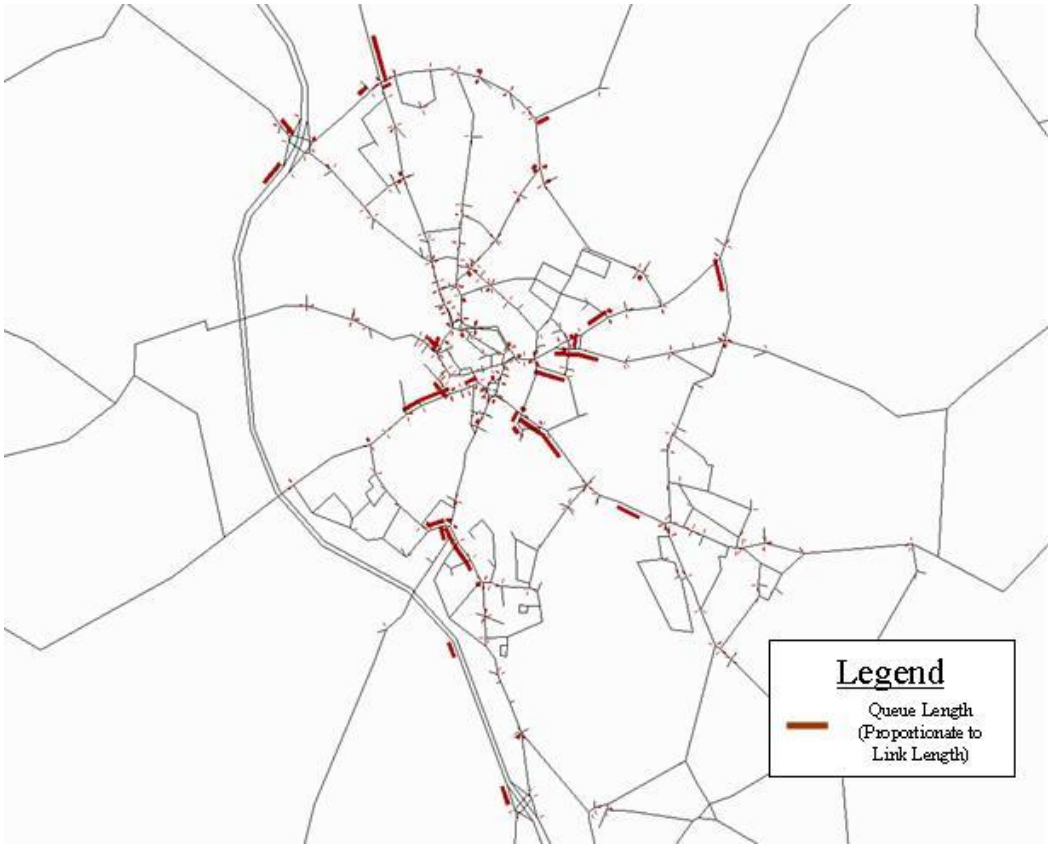


Figure A3.15 – Option 4 2026 PM Peak: Link Volume / Capacity Ratio > 85%

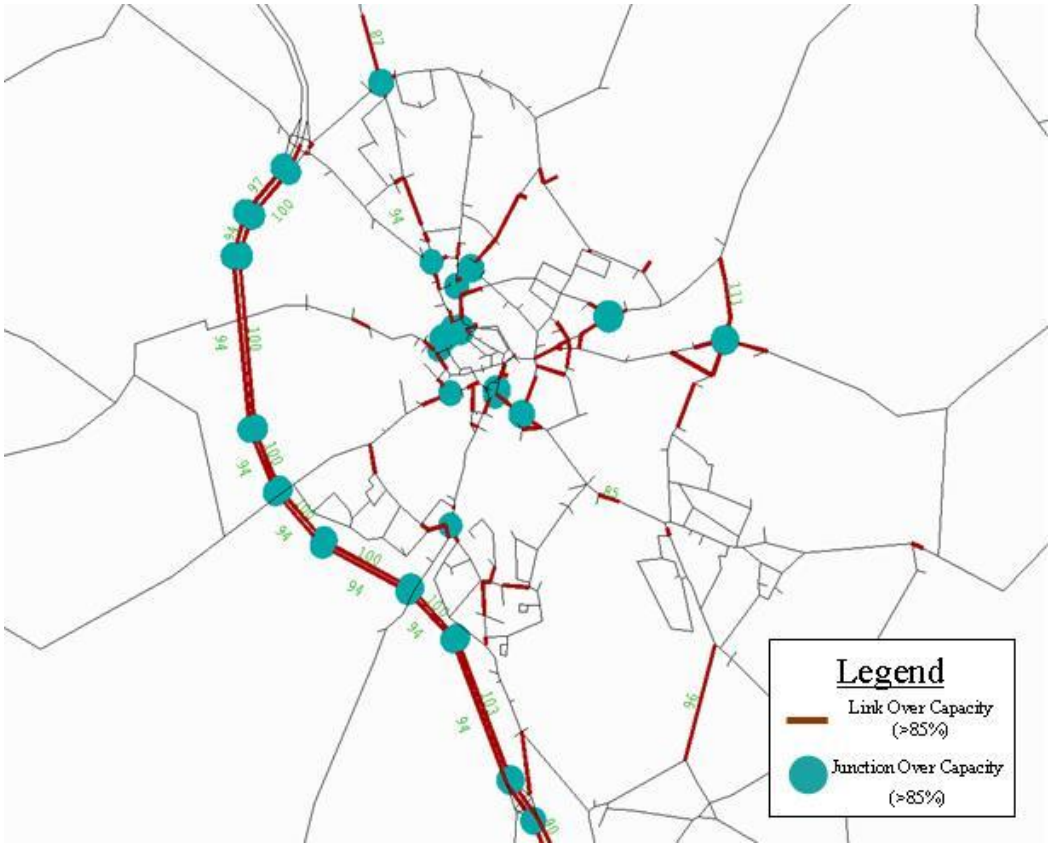
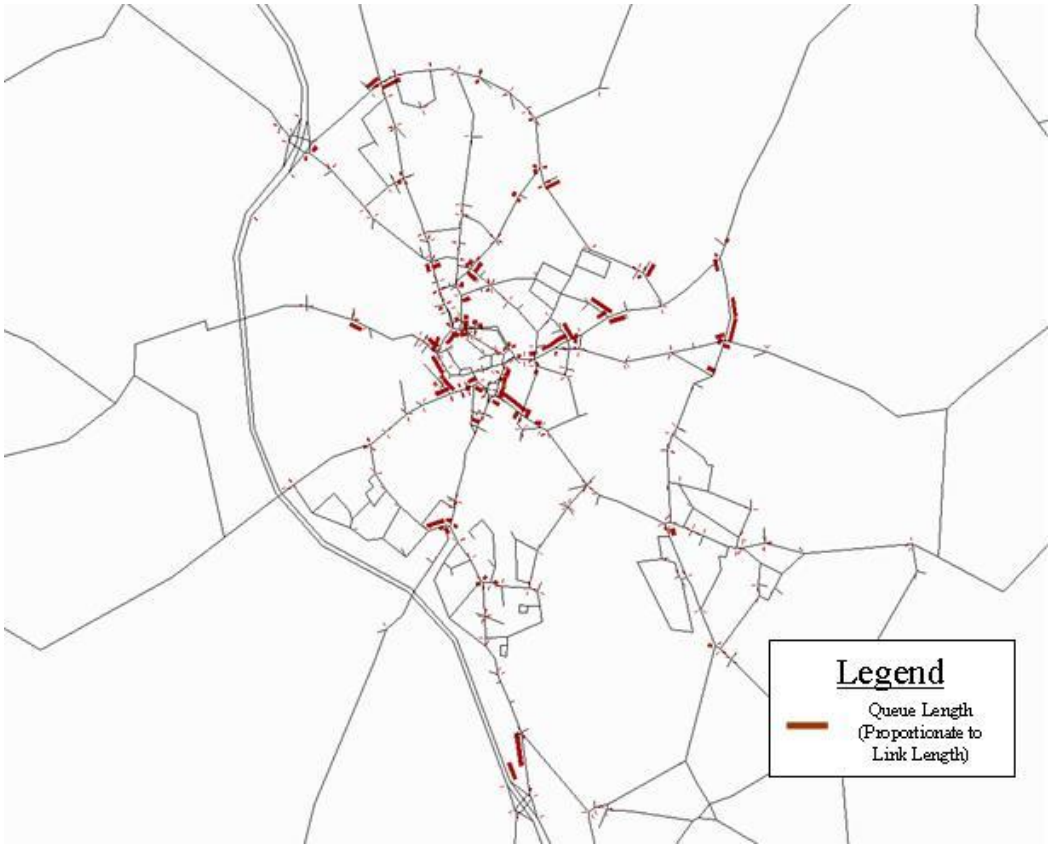


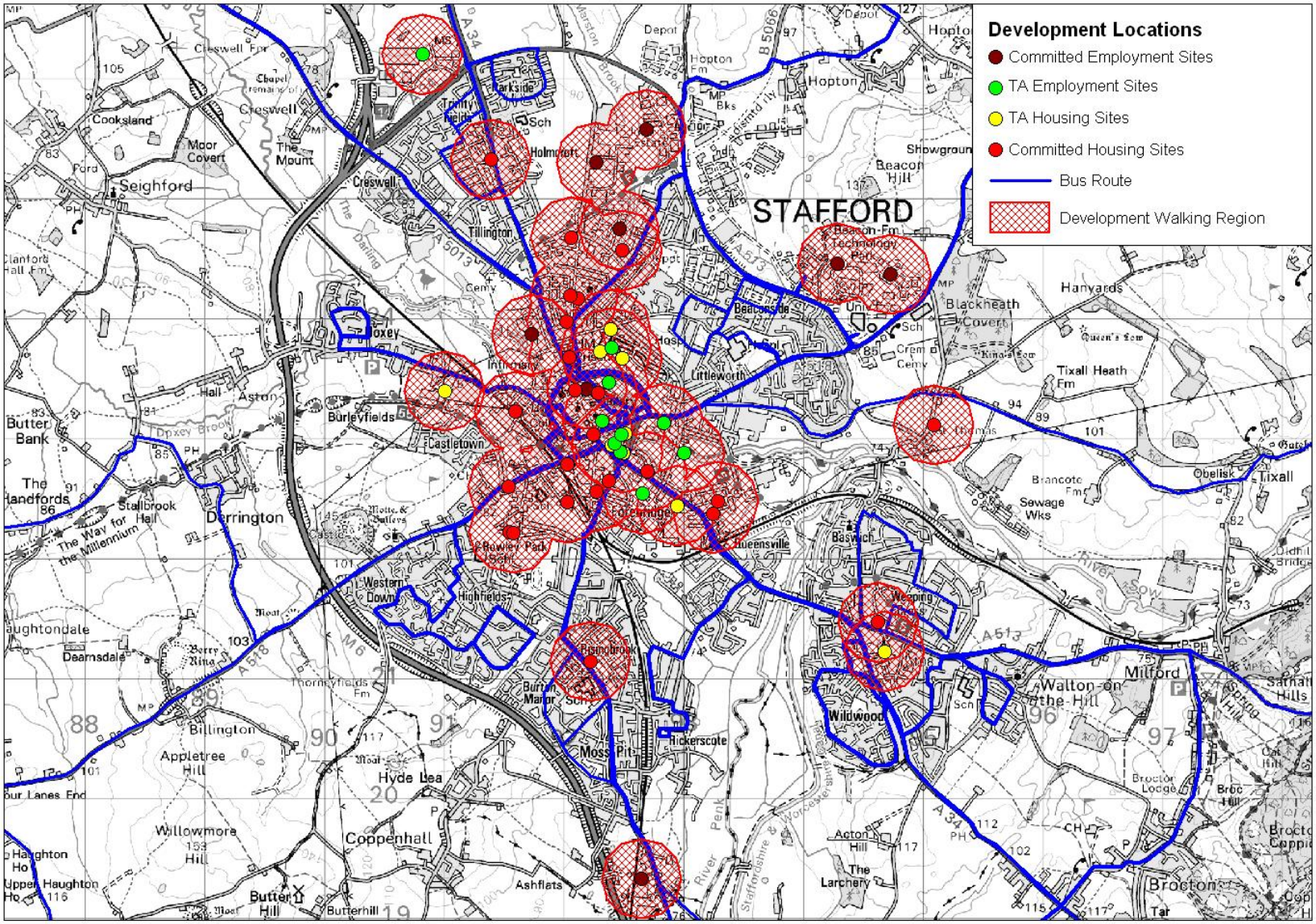
Figure A3.16 – Option 4 2026 PM Peak: Relative Queue Lengths



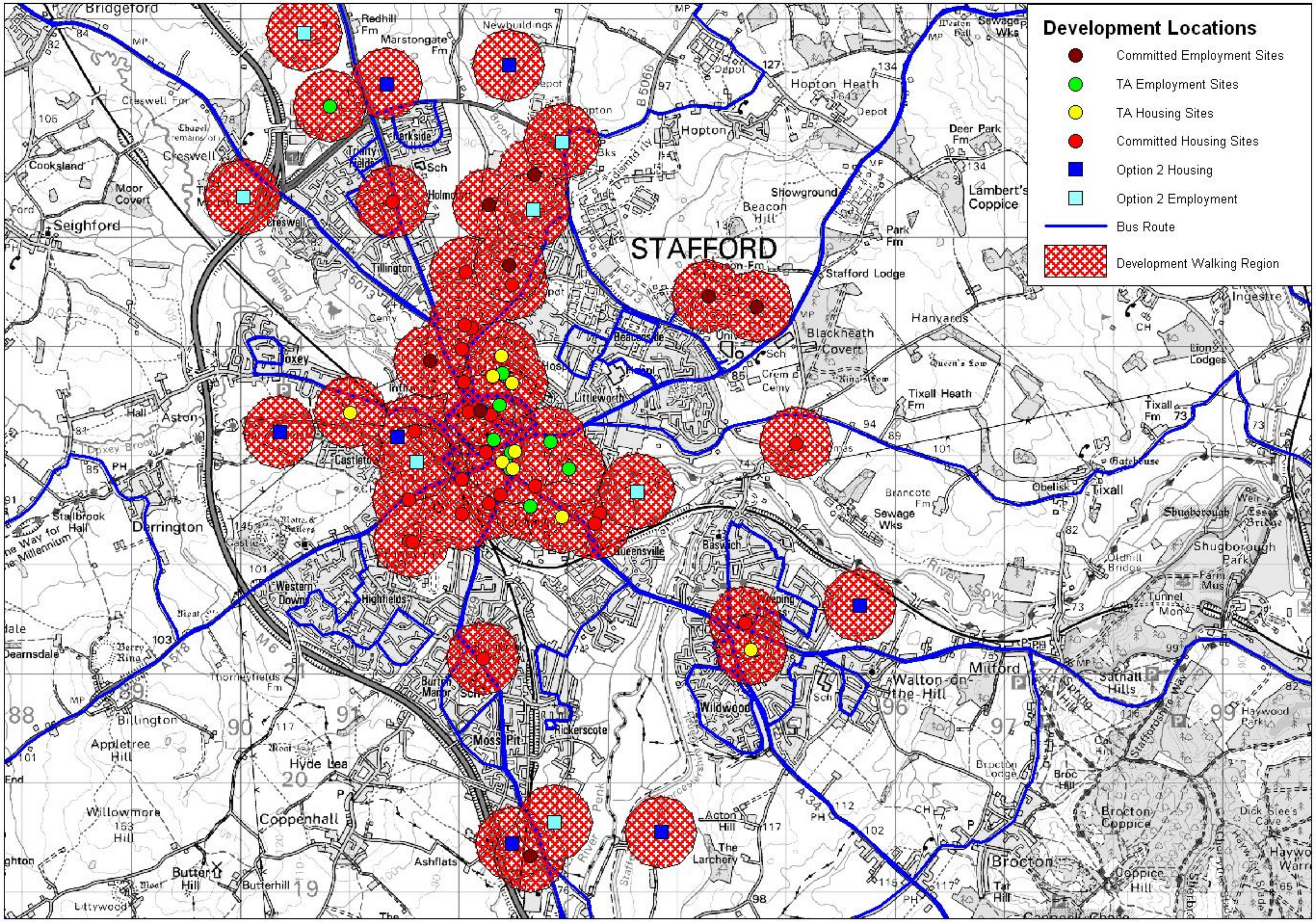
A.4 Appendix D – Bus access within 400 metres of new developments

ATKINS

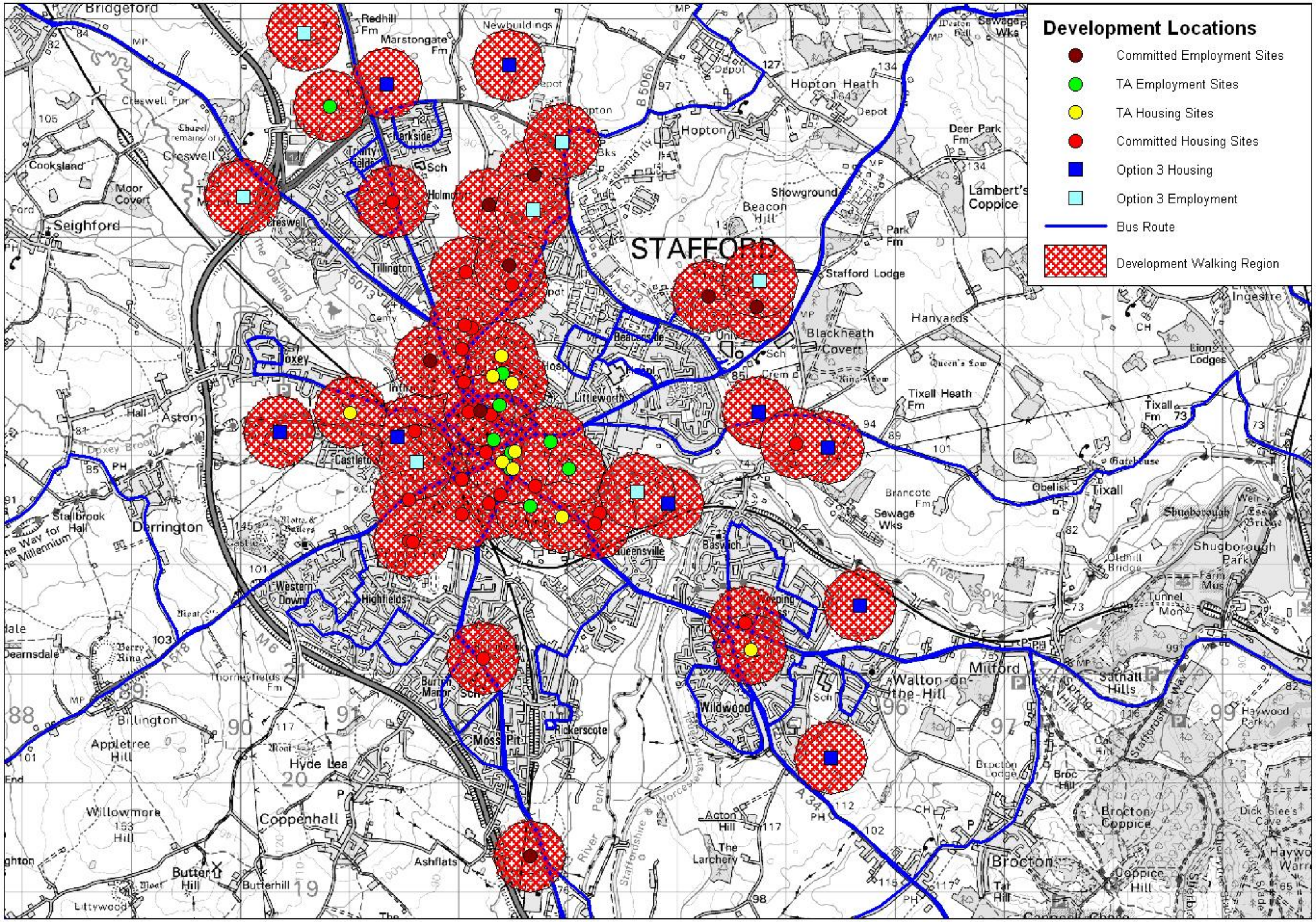
Do Minimum



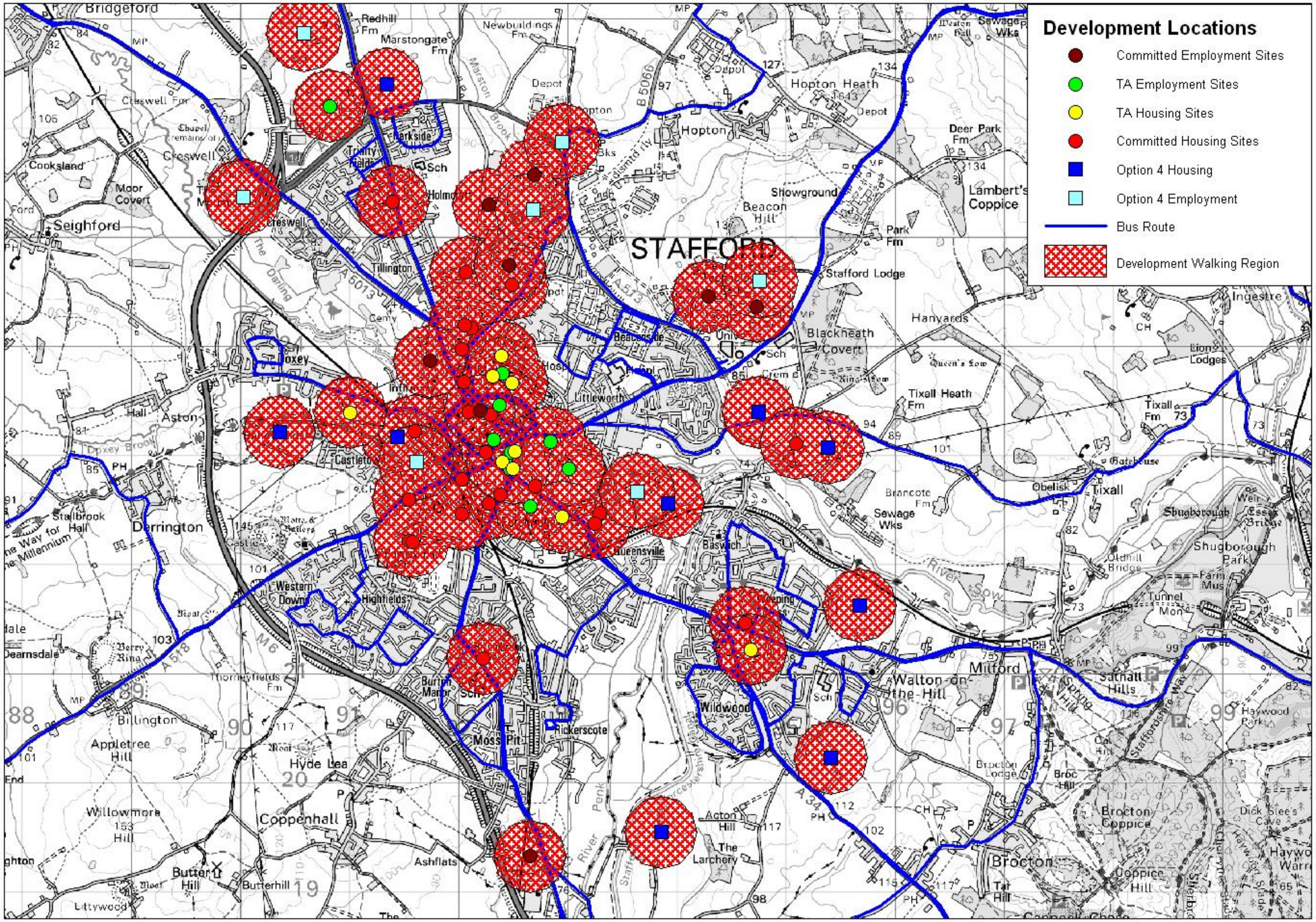
Option 2


Development Locations
Committed Employment Sites
TA Employment Sites
TA Housing Sites
Committed Housing Sites
Option 2 Housing
Option 2 Employment
Bus Route
Development Walking Region
STAFFORD

Option 3


Development Locations
Committed Employment Sites
TA Employment Sites
TA Housing Sites
Committed Housing Sites
Option 3 Housing
Option 3 Employment
Bus Route
Development Walking Region
STAFFORD

Option 4


Development Locations
Committed Employment Sites
TA Employment Sites
TA Housing Sites
Committed Housing Sites
Option 4 Housing
Option 4 Employment
Bus Route
Development Walking Region
STAFFORD
Bridgeford
Seighford
Derrington
Doxey
Aston
Tillington
Hopton
Hopton Heath
Beacon Hill
Stafford Lodge
Hanyards
Blackheath Covert
Tixall Heath
Tixall
Ingestre
Shugborough Park
Baswich
Milford
Walton-on-the-Hill
Wildwood
Brocton
Coppenhall
Hyde Lea
Billington
Appletree Hill
Willowmore
Butter Hill
Ashflats
Moss Pit
Rickerscote
Queensville
Littleworth
Western Downs
Highfields
Burton Manor
Redhill Fm
Marstongate Fm
Newbuildings Fm
Lambert's Coppice
Deer Park Fm
Stallbrook Hall
Creswell
Cooksland
Moor Covert
Acton Hill
The Larchery
Brocton Coppice

A.5 Appendix E – Cycle access to the Town Centre within 15 minutes

Objective: **Access to Non Motorised Modes**

Sub Objectives: **Access to existing Cycle Network**

Methodology

Access to the Cycle Network

Ref: Staffordshire CC Stafford Urban Cycling Map

Key Points:

In general, Stafford caters well for cyclists and other non-motorised users. The diagram shows a reasonably comprehensive cycle network.

Within 15 minutes cycle of town centre

This is tested by assuming that cyclists travel from each development at 16kph. The indicator assumes that the distance travelled to the town centre is 1.3 times the 'crow-fly' distance from the development to the centre.

Results

	Do Minimum AM PM	Option 2 AM PM	Option 3 AM PM	Option 4 AM PM
% Developments within 15 minute cycle of town centre	89%	73%	77%	77%

Overall Score

Objective	Sub Objective	Options			
		Do Minimum	Option 2	Option 3	Option 4
Access for Non Motorised Modes	Access to the Cycle Network	1	1	1	1
	Within 15 minutes cycle of town centre	1	4	2.5	2.5

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