

**ATKINS**

**Somerset County Council**

**Yeovil Western Corridor**

**Strategic Transportation  
Appraisal**

Final Report  
For Internal Consultation

# Somerset County Council

## Yeovil Western Corridor

### Strategic Transportation Appraisal

FINAL REPORT

FOR INTERNAL CONSULTATION

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## Executive Summary

This report summarises the work undertaken to assess the impact of future growth in traffic on the Yeovil Western Corridor (YWC). The report is subdivided into the following sections.

### *Section Two – Study Background*

The report summarises current policy at the Regional, County and District levels. As part of this, reference is made to the South Somerset Local Plan and Somerset County Council's Local Transport Plan.

Prevailing traffic conditions are described as well as provision for public transport, pedestrians and cyclists. Accident information is summarised and provisional conclusions drawn concerning the best form of mitigation.

The assessment outlines the volume and location of growth planned for Yeovil in the next 10 years, and the role the town will play as a sub-regional centre. Future development and related growth in traffic is assessed.

The framework for assessing improvements to the YWC is identified as a series of Key Performance Indicators (KPIs). These are based on the Yeovil Transport Strategy Review (YTSR) and the current LPT2 submission, culminating in an amalgamation of KPIs from both sources.

### *Section Three - Traffic Forecasting and Modelling*

The report describes the development of the Yeovil Transport Model (YTM). In the context of this study the model has been used to:

- Replicate the 2002 Base Year situation;
- Forecast 2011 Do Minimum turning movements net of any development in the YWC;
- Forecast 2011 Do Something turning movements for various strategic options in the YWC; and
- Assess the effects of trip reassignment and redistribution arising from the strategic options in the YWC.

### *Section Four - Operational Assessment*

The report outlines the main sequence of work undertaken as part of the operational assessment to determine the optimum form of junctions in the YWC.

This involved initially assessing the 2011 Do Minimum so as to identify those junctions which would exceed capacity as a result of forecast growth in the corridor.

This was followed by the development of two alternative strategies based on 2011 traffic forecasts – referred to as Option 1 and 2. Option 1 was based upon the signalisation of most of the major junctions in the corridor, and reflects the desire to improve provision for pedestrians and cyclists by reconfiguring most of the major junctions in this way. Option 2 emerged from the realisation that the implications of wholesale signalisation was undeliverable in terms of enlarging most of the junctions, widening lengths of intervening

carriageway and the implications both in terms of third party land acquisition and cost. In response to this, Option 2 has, for the most part, retained most of the existing roundabouts and enlarged and modified them as necessary. This has been augmented with the provision of Toucan Crossings at strategic locations along the length of the YWC as part of an accompanying sustainable transport strategy.

In assessing the viability of proposed modifications reference has been made to changes in Inclusive Delay at each of the junctions in the YWC. Inclusive Delay is output as part of the more detailed assessment of junctions based upon forecasts turning movements derived from the SATURN traffic model. It represents the sum of all delays incurred by vehicles passing through each junction. These changes were assessed in relation to the agreed levels of service to be attained during the AM and PM peak hour as summarised in the YTSR. This amounts to an admissible increase in congestion of 126% in the AM peak hour and 60% during the PM peak hour by 2011.

Results from this work reveal that it has been possible to manage overall delay within the Yeovil Western Corridor in accordance with the standards specified in YTSR, although in some cases one or more junctions exceed the preferred threshold in one or more time periods. In essence, the preferred strategy involves the retention of the existing roundabouts as far as possible - subject to selective modifications at some locations. This has involved the following changes:

- ◆ The reconfiguration of the Western Ave/Thorne Lane junction as a priority ghost island junction in accordance with the designs for the new distributor road;
- ◆ The reconfiguration of the Western Ave/Copse Road junction as a roundabout;
- ◆ The realignment of the existing roundabout at Preston Road as an enlarged roundabout;
- ◆ The enlargement of the Westland's roundabout;
- ◆ The enlargement of the Lysander Road roundabout.

### *Section Five - Sustainable Transport Initiatives*

Most of the sustainable transport initiatives are concerned with the provision of Toucan Crossings and a comprehensive network of footways and cycleways in this corridor. Reference is also made to public transport services though it is recognised that there is only limited scope for any significant improvement in services.

### *Section Six - Statutory Undertakers Plant and Equipment*

Information about Statutory Undertakers plant and equipment has been received from all the main providers. The report summarises where there is a potential risk to equipment arising from the realignment of the carriageway.

### *Section Seven - Evaluation*

This part of the report comprises two parts. The first assesses Option 2 improvements in relation to the composite KPIs and concludes that on balance this Option confers considerable benefits to the corridor. The provision of Toucan Crossings and the network of footways and cycleways is an important source of benefit in this respect.

The second part of the evaluation comprises a Stage 1 Road Safety Audit of the proposed scheme improvements. Most of the comments received identify ways in which the proposed arrangements can be improved without having to undertake a wholesale revision of any recommendations. The report summarises the way in which some of the recommendations have been assimilated within the preferred arrangement.

#### *Section Eight - Budget Costs and Apportionment*

The report concludes by identifying budget cost estimates for the four junctions (Copse Road, Preston Road roundabout, Westland's and Lysander Road roundabout) that will be subject to modification, as well as the dualling of the Western Relief Road and the provision of new footways, cycleways and Toucan crossings. This amounts to approximately £10.452 million.

#### *Section Nine – Conclusion*

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## 1. Introduction

- 1.1 Atkins has been commissioned by Somerset County Council to investigate the implications of future urban development and related traffic growth in the Yeovil Western Corridor (YWC). The corridor comprises Western Avenue, Bunford Lane and the Western Relief Road, between Thorne Lane in the north and Watercombe Lane in the south. **Figure 1.1** shows the extent of the area covered by the assessment.
- 1.2 Major development sites are situated in this corridor and its surrounding environs. These include - among others - the following sites:
- ◆ Lufton;
  - ◆ Brimsmore, north of Thorne Lane;
  - ◆ Bunford Park, south of the Western Relief Road;
  - ◆ GKN Playing Field site, south of the airfield.
- 1.3 These sites are seen as being responsible for a significant proportion of future growth in traffic in this area – in addition to the effects from other sources within and beyond the town.
- 1.4 In response to the forecast growth in traffic - the study has made a series of recommendations about ways in which the capacity of the highway network can be increased to accommodate future growth. This has concentrated upon increasing the capacity of junctions - as junctions effectively control the capacity of the corridor. As part of these recommendations every attempt has been made to minimise the impact on third party land.
- 1.5 In addition to increasing the capacity of the highway network, specific consideration has been given to the needs of both pedestrians and cyclists in the YWC. This has been made by the provision of Toucan Crossings at various locations where there is a perceived need on account of existing and future demand by pedestrians and cyclists. In addition to this, existing footways and cycleways have been preserved and widened wherever possible.
- 1.6 The study has also sought to identify the number of short distance trips travelling from/to the YWC which could be encouraged to change travel mode in favour of walking and cycling. This analysis has been used to inform the extent to which future growth in vehicle traffic should be accommodated in this corridor.
- 1.7 As part of this study, budget cost estimates have been prepared for the proposed improvements. These are based on construction cost and make allowance for design costs preliminaries and contingencies. Third party land costs have not been included. At present the County Valuer & Estates Office is undertaking further assessment of potential part one compensation claims together with a detailed assessment of land costs. Information has also been received from Statutory Undertakers and the diversion costs have been estimated based on the preliminary data. Diversionary costs are, however, subject to detailed engineering design and further survey and must therefore be treated as being provisional at this stage.

- 1.8 The study has evaluated the proposed recommendations using a series of Key Performance Indicators (KPIs). These have been taken from both the Yeovil Transport Strategy Review (YTSR) and the current LTP2 submission, and seek to reflect both the needs of the corridor as well as the strategic aims of the town and county.
- 1.9 As part of the evaluation process a Stage 1 Safety Audit has been completed for each of the preliminary junction designs developed as part of this study.
- 1.10 The report is divided into the following eight sections. These are as follows:
- ◆ Study Background;
  - ◆ Traffic Forecasting and Modelling;
  - ◆ Operational Assessment;
  - ◆ Sustainable Transport Initiatives;
  - ◆ Statutory Undertakers Plant and Equipment;
  - ◆ Evaluation;
  - ◆ Budget Costs and Apportionment; and
  - ◆ Conclusion.

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## 2. Study Background

### CONTEXT

- 2.1 Yeovil is the second largest town in Somerset after Taunton and the largest town within the District of South Somerset. With a population of 47,000 <sup>(1)</sup> it dominates this area. The next largest town in South Somerset is Chard with a population of 12,000, followed by Crewkerne with 6,000 <sup>(2)</sup>. The nearest town in Dorset (Yeovil being practically at the county boundary) is Sherborne with a population of 7,500. As a result, Yeovil has been, and will continue to be a focus for new development over much of the surrounding area.
- 2.2 The A303 Trunk Road, which is the main route from Exeter to London, passes to the north west of Yeovil, and is linked to the town by the A3088 Cartgate Link and the A37. These roads, combined with the topography of the town, have meant that the bulk of new development proposed is on the northern and western sides of the town.

### Regional Policy

- 2.3 Regional Planning Guidance as expressed in RPG 10 seeks to focus growth on Principal Urban Areas (including Taunton) and Other Designated Centres (including Yeovil) so as to reduce the need to travel.

### County and District Policy

- 2.4 The South Somerset Local Plan, as reported by the Planning Inspectorate following the Local Plan Inquiry in 2002/2003, identified four key sites for housing/mixed use development within Yeovil. Chard, Crewkerne and Wincanton have one Key Site each, although the Crewkerne and Wincanton sites are considerably smaller than any of the Yeovil sites. South Somerset District Council has proposed to reject one of the Key Sites in Yeovil (Keyford) and replace it with a major employment site at Bunford Park also in Yeovil.

### EXISTING CONDITIONS - YEovil WESTERN CORRIDOR

#### Highway Network

- 2.5 **Figure 1.1** shows the study area and associated highway network.
- 2.6 The Western Corridor can be defined as comprising Western Avenue, Bunford Lane and the Western Relief Road. These form an orbital route around the western side of the town, although only the Western Relief Road has 'A' road status and a strategic designation. The Western Relief Road is a National Primary Route (as categorised by the Somerset and Exmoor National Park Joint Structure Plan Review 1991-2011) while all the other roads have only local significance.

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(1) Base Line Review of Transport Conditions – YTSR June 2004 (para 2.4.3).

(2) 2001 Census.

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2.7 Observed AM and PM peak hour traffic flows and turning movements, based on data collected in September and October 2002, are shown for key links and junctions in **Appendix A**. This includes observed Saturday counts based on data collected in July 2005 and averaged over the time period 1100-1300. This reveals the following key features:

- ◆ Traffic volumes are heaviest between the Westlands and Lysander Road roundabouts summed over all time periods,
- ◆ Westland's roundabout is the busiest junction during the AM and PM peak with Preston Road busiest during Saturday,
- ◆ The PM peak hour is the busiest of the three time periods assessed, with Saturday traffic flows at or close to the PM peak at the Preston Road roundabout.
- ◆ The high volume of right turning traffic at Preston Road roundabout turning into Preston Road and the reciprocal movement turning into Bunford Lane is caused in part by the presence of the Asda store on Preston Road.

### **Cycling and Walking Routes**

2.8 **Figure 2.1** shows the existing cycling and walking facilities within the vicinity of the YWC and the location of controlled pedestrian crossings. There is an extensive network of footpaths through the adjacent housing and industrial estates but several sections are unpaved.

2.9 The cycle path network in the western half of Yeovil has been developing in recent years and connects to various points on the corridor. The provisional Local Transport Plan 2006-2011 (LTP2) revealed that 6.2% of work trips were made by bicycle in Yeovil. This is above the County average, and is centred on trips to Westland's, where over 10% of staff cycle to work. The volume of cycling trips was noted as being 'surprising' given the town's topography which is classified as being 'very hilly'.

2.10 There are a total of two controlled crossings in the YWC, one stand alone (pelican) crossing south of the Western Ave/Copse Road junction, and one incorporated into the signal phasing at the Asda access. These facilities have been included in the operational assessment of the corridor, which has involved the provision of additional controlled crossing facilities in Option 2.

2.11 Other zebra crossing facilities can be found on Stourton Way. In addition to this, there are refuge islands provided on all the roundabout junctions, but heavy flows make using these facilities unpleasant and potentially unsafe.

2.12 The Pedestrian Strategy within the Yeovil Transport Strategy Review (YTSR) recommends that appropriate pedestrian crossings should be considered on Bunford Lane south of the crematorium, and Western Avenue north of the Stourton Way (south) junction.

2.13 The Cycling Strategy in the YTSR identified three points on the Western Corridor where improved conditions are likely to encourage higher levels of cycling. These are:

- ◆ Western Avenue north of the Stourton Way (north) junction;
- ◆ Preston Road roundabout;
- ◆ South of the Bluebell roundabout.

These recommendations for both pedestrians and cyclists have informed the sustainable transport strategy described in Section 5 of this report.

### Public Transport

- 2.14 **Figure 2.2** shows the extent of existing public transport routes servicing the Yeovil Western Corridor (YWC), and the basic level of provision. The core service in this area is operated by First Group, in the form of the Town Circle service No 1. A once daily service to Taunton is also operated by First.
- 2.15 ‘Nippy Bus’ operate two further services which access the YWC. The service is designed to be Demand Responsive in outlying villages, but operates a fixed schedule closer to the town.
- 2.16 There has been a decline in inter-urban bus services in recent years between Yeovil and the other main urban areas and outlying villages. Town routes within Yeovil have by contrast been evolving and there is developer support to try and improve these facilities. Existing service frequencies within the YWC are shown in **Table 2.1**. This shows some gaps in service at weekends and in the evening.
- 2.17 **Figure 2.3** shows the location of bus stops in the YWC and its surrounding environs. As part of this information an area within a 600 metre radius of each stop is shown. This is based upon the LTP2 standard, and Government advice that residential properties should be within 13 minutes walking time or 800 metres of an hourly service or better. A 600m radius has been plotted to represent an averaged 800m distance allowing for indirect routes, cul-de-sacs and crossing facilities. In addition to this, 200 and 400 metre radii are plotted as the target and maximum distances respectively for non residential development as specified in RPG10.
- 2.18 **Figure 2.3** shows that, at present, the YWC has a reasonable standard of coverage for residential access but that further consideration should be given to the adequacy of services in respect of non residential development to the west of Western Avenue.

**Table 2.1 - Existing Public Transport Services - YWC**

No	Route	Daytime Frequency	Evening Frequency	Weekend Frequency
1	Yeovil Town Service Abbey Manor Park - Cavalier Way via Borough	15 minutes	No service after 7pm (see N1)	15 mins, no Sunday service
11/11A	Yeovil (Borough-Preston Grove-Asda-Whitemead)	30 minutes	No service after 5pm	30 mins, no Sunday service
N1	Martock-Yeovil	N-A	Hourly (Weds-Sat)	No service
N3	Yeovil Town Service	N-A	Hourly (Weds-Sat)	No service
N7	Dowlish Wake to Yeovil	Mid morning to Yeovil	No service	No service

		Early afternoon return		
N8	Lakefields – Yeovil College	Hourly	No service after 5pm	No service
630/632	Yeovil-Taunton	AM to Taunton PM return service	No service	No service
681	South Petherton-Yeovil (connects to Crewkerne service)	Hourly	No service after 5pm	Hourly, no Sunday service

### Recorded Personal Injury Accidents

- 2.19 Data has been obtained from Somerset County Council regarding Personal Injury Accidents between January 2002 and December 2004 within the vicinity of the YWC. This information comes from the Police accident records STATS 19 data. Accidents are plotted on **Figures 2.4** and **2.5**.
- 2.20 Generally speaking, calculated accident rates in the YWC are comparable to local rates within the town, signifying that there are no serious accident problems in the YWC. Apart from this, the other noteworthy issues are as follows:
- ◆ There were no Fatal or Serious accidents;
  - ◆ The high proportion of accidents that occur when the carriageways are wet, signifying the possible need to make provision for anti - skid surfaces at selected locations in the corridor, or a more general programme of resurfacing given the cost of maintaining anti - skid surfaces;
  - ◆ Only one of the 22 recorded accidents involved a cyclist. All other accidents only involved cars;
  - ◆ No pedestrians were injured in any of the recorded accidents.

At present, Somerset County Council is investigating options for the attenuation of accidents at both the Westland's and Preston Road roundabouts.

**Table 2.2 - Personal Injury Accidents - Severity**

Severity	Number	Percentage	Somerset Average
Fatal	0	0%	2.2%
Serious	0	0%	13.7%
Slight	22	100%	84.1%
<b>Total</b>	<b>22</b>	<b>100%</b>	<b>100%</b>

**Table 2.3 - Personal Injury Accidents - Road Surface Condition**

Road Surface	Number	Percentage	RCGB Statistics
Dry	4	18.2%	62.7%
Wet/Damp	18	81.8%	36%
Other	-	-	1.3%
<b>Total</b>	<b>22</b>	<b>100%</b>	<b>100%</b>

**Table 2.4 - Personal Injury Accidents - Weather Conditions**

Weather	Number	Percentage	RCGB Statistics
Fine	12	54.6%	76.5%
Rain Without High Winds	7	31.8%	19.6%
Fog or Mist	1	4.5%	-
Other	2	9.1%	3.9%
<b>Total</b>	<b>22</b>	<b>100%</b>	<b>100%</b>

**Table 2.5 - Personal Injury Accidents - Precipitating Factor**

Factor	Number*	Percentage
Failed to avoid vehicle or object in carriageway	23	42.6%
Loss of control of vehicle	16	29.6%
Failed to give way	6	11.1%
Poor overtaking	3	5.5%
Swerved to avoid object in carriageway	2	3.7%
Poor turn / manoeuvre	2	3.7%
Failed to signal / misleading signal	1	1.9%
Pedestrian entered carriageway without care	1	1.9%
<b>Total</b>	<b>54</b>	<b>100%</b>

\* Where there may be more than one precipitating factor

## FUTURE DEVELOPMENT AND THE WESTERN CORRIDOR

2.21 The Inspector's report into the South Somerset Local Plan identified a number of developments that will be served directly by this corridor. Further discussion concerning these sites is given in Section 3 when describing trip generation. The sites are as follows: (Text in brackets indicates the relevant Local Plan designation)

- ◆ Residential:
  - Lufton - 617 dwellings (H17);
  - Thorne Lane (Brimsmore) - 831 dwellings (H18);
- ◆ Employment:

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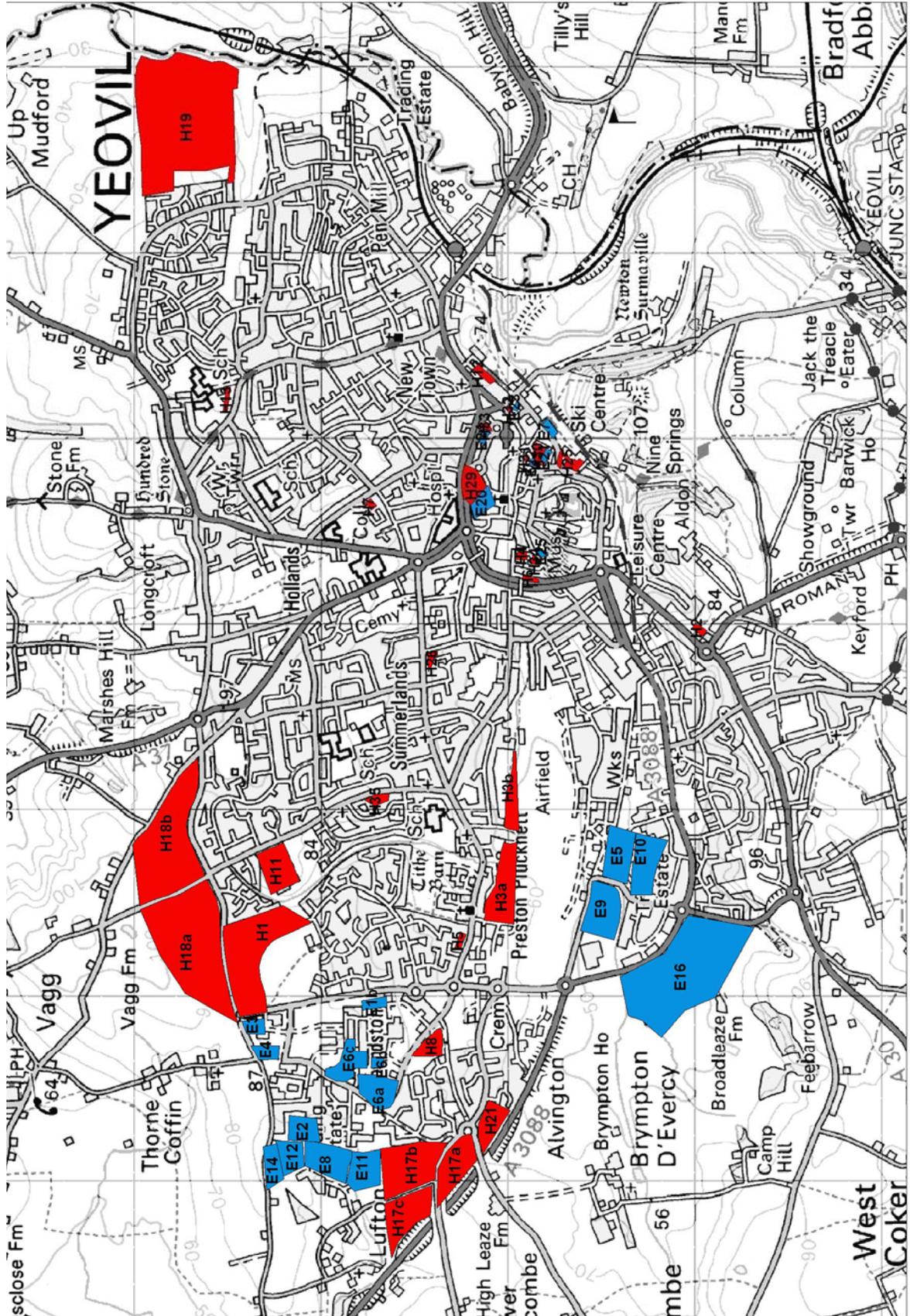
- South of airfield - 4.8ha (E9);
- Watercombe Park - 2.9ha (E10);
- Lufton - 4.5ha (E11, E12);
- Land off Bunford Park - 15ha (E16).
- ◆ Schools:
  - Thorne Lane (Brimsmore) - 270 pupils;
  - Lufton – 150 pupils.

2.22 In addition, the following developments are already committed:

- ◆ Residential:
  - Abbey Manor Park - 133 dwellings (H1);
  - Lufton Way - 49 dwellings (H8).
- ◆ Employment:
  - East of Lufton Way - 4.5ha (E2, E6);
  - Watercombe Park - 1.1ha (E5).

These employment and housing sites are shown in **Figure 2.6**.

Figure 2.6 Yeovil Development Sites



- 2.23 The Planning Inspectorate has recommended that the land at Bunford Park will now only be allocated for 40,000 ft<sup>2</sup> of B1 office development and that the previous allocation of B2 and B8 be removed. Despite this, current allocations in this area mean that the Western Corridor will be absorbing approximately half of the new development in the town.
- 2.24 The ability of the Western Corridor to accommodate these developments was debated at the Public Inquiry in 2002. The public inquiry focused on the ability of the Preston Road roundabout to handle development traffic, as this was seen as the critical point in the highway network – particularly in respect of the Thorne Lane (Brimsmore) and Lufton Key sites. In response to this, the Local Plan states that Somerset County Council's preferred option is for this roundabout to be enlarged from 49m to 58m ICD. Further reference is made to this roundabout and the options in Section 4 of this report.
- 2.25 The proposed enlargement of the Preston Rd roundabout sought to avoid the need to fell any of the four oak trees on Lufton Way. This was discussed at the inquiry and it was concluded that any enlargement of the junction that resulted in the loss of these trees would be unacceptable. By contrast, loss of land from the adjoining Garden of Remembrance in pursuance of this scheme was judged to be admissible.

#### **KEY PERFORMANCE INDICATORS (KPIs)**

- 2.26 Key Performance Indicators (KPIs) have been identified in consultation with Somerset County Council. The intention is to use the KPIs to assess the recommendations for improvement to the YWC. In doing this, the aim is to ensure that the recommendations are consistent with the KPIs identified in both the current LTP2 submission 2006 – 2011, as well as the Yeovil Transport Strategy Review (YTSR).
- 2.27 KPIs taken from the LTP2 submission that were deemed to be relevant to the current study are summarised below in **Table 2.6** along with their 'status' and 'weights'. These were agreed in consultation with Somerset County Council.

**Table 2.6 - LTP2 Key Performance Indicators**

Status	Weight	Description
Mandatory LTP & CPA With special rules	5	Minimise killed or seriously injured.
Mandatory LTP & CPA or CPA with special rules.	4	Encourage the use of public transport.
	4	Minimise the number of slight injuries.
Mandatory LTP only	3	Facilitate Accessibility.
	3	Curtail the growth in vehicle mileage.
	3	Encourage cycling trips.
	3	Encourage the use of slow modes for school trips.
	3	Improve bus reliability.
	3	Attain air quality targets.
	3	Minimise children killed or seriously injured.
Local LTP only	1	Minimise vehicle congestion and delay.

2.28 In addition to this, the YTSR identified a series of strategic objectives derived from the government publication entitled Government Advice on the Methodology for Multi Modal Studies (GOMMMS). They are categorised under the headings of:

- ◆ A. Environment;
- ◆ B. Safety;
- ◆ C. Economy;
- ◆ D. Accessibility; and
- ◆ E. Integration.

These have been subject to a similar process of selection in relation to the perceived needs of the YWC and are referenced in the list below as being either very relevant, relevant or slightly relevant to the needs of the Yeovil Western Corridor.

2.29 The following are **Very Relevant**:

- ◆ B. 1.i) Reduce the number of people killed or seriously injured in road accidents.
- ◆ C. 1.i) Reduce average time lost in congestion per vehicle Kms.
- ◆ C. 2.i) Improve journey time reliability.
- ◆ A. 4.i) Reduce severance effects along sensitive routes.

**Relevant:**

- ◆ B. 1.ii) Reduce the number of Slight injuries per 100 million vehicle kilometres.
- ◆ C. 3.iv) Increase the number of walk and cycle trips.

- ◆ **D. 4 i)** Increase percentage of crossings with facilities for disabled people.
- and **Slightly Relevant:**
- ◆ **A. 1.i)** Meet National Air Quality Standards (NAQS) objectives.
  - ◆ **A. 3 i)** Reduce noise levels along sensitive routes.
  - ◆ **C. 3.ii)** Increase bus use.
  - ◆ **D. 2.i)** Progress/expand Town cycle network.
  - ◆ **D. 2.ii)** Significant increase in approval rating by cyclists and pedestrians after implementation of specific schemes.
- 2.30 As there is an element of duplication between both sets of KPIs it is necessary to rationalise and customise them in relation to the specific needs of the YWC. **Table 2.7** summarises the results of this work. It will be noted that this has retained the categorisation of relevance as described above taken from the YTSR and combined this with the New Assessment for Trunk Road Appraisal (NATA) objectives.
- 2.31 These KPIs will be used to measure the extent to which the recommendations for the YWC are being met. This will be done both in relation to highway links and junctions. Where a recommendation is at variance with a KPI the aim will be to describe why this is the case.

**Table 2.7 - YWC KPIs**

Status	NATA Objective	Description
<b>Very Relevant</b>	Safety	Minimise all Personal Injury Accidents.
	Environment	Reduce the effects of severance.
	Economy	Manage the operational efficiency of the highway network in respect of congestion and delays.
<b>Relevant</b>	Accessibility	Improve provision for walkers and cyclists by increasing the provision of segregated facilities.
	Accessibility	Increase crossings with provision for disabled.
<b>Slightly Relevant</b>	Economy	Improve provision for public transport to facilitate its use and reliability.
	Environment	Encourage measures aimed at reducing noise levels.
	Environment	Meet NAQS.

## 3. Traffic Forecasting and Modelling

### TRAFFIC FORECASTING

- 3.1 The Yeovil Traffic Model (YTM) has been used extensively during this study to forecast the potential effects of traffic growth in the Yeovil Western Corridor (YWC) between 2002 and 2011. This has involved:
- ◆ Using the model to replicate the Base Year 2002 situation net of any future development or network improvements;
  - ◆ Forecasting 2011 Do Minimum turning movements for input to an operational assessment of key junctions in the corridor - which assume the full quota of predicted development, and the presence of network improvements in all parts of Yeovil - excluding the YWC;
  - ◆ Forecasting 2011 Do Something turning movements for two strategic Options in the corridor, which assume the full quota of predicted development and the presence of network improvements in Yeovil - including the YWC;
  - ◆ Assessing the effects of reassignment and redistribution arising from any improvements to the YWC.
- 3.2 The operational assessment of the existing and proposed junctions is covered elsewhere in the report (see Section 4). In this Section, the procedures and assumptions incorporated within the model that was used to produce these traffic forecasts are described.

### THE YEovil TRAFFIC MODEL (YTM)

- 3.3 The Yeovil Traffic Model was developed by Atkins for Somerset County Council, in association with the Highways Agency (HA). It covers the whole of the Yeovil urban area in detail, and extends to the north and west of the town as far as the A303. It is based on SATURN software, and all significant junctions within the modelled area have been 'simulated' so that queues and delays can be properly represented. Link capacity constraints are also included using standard speed-flow curves developed from the DfT's Cost Benefit Analysis Programme (COBA).
- 3.4 The model is based on roadside interview and traffic count data collected in 2002. It represents an average AM peak hour (0800-0900) and PM peak hour (1700-1800) in a neutral month. In each case, a pre-peak hour is also modelled to take account of queues building up at junctions in advance of the peak. These queues are then passed on to the peak hour assignments.
- 3.5 Light Vehicles (cars, vans and LGVs) and Heavy Vehicles (HGVs) are assigned separately to the highway network. Buses are allocated to fixed routes to reflect their impact on highway operating conditions and available road space.
- 3.6 The model was calibrated using standard matrix estimation techniques, and validated against observed traffic counts and journey times, in accordance with the Design Manual for Roads and Bridges (DMRB) recommendations and criteria. These confirm that most of the modelled turning movements meet the (DMRB) criteria for acceptability, namely that they should be within

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+/-100 vehicles of the count where flows are less than 700 vph, +/-15% of the count where flows are greater than 700 vph, and with a GEH statistic of 5 or less, in 85% of cases.

- 3.7 In addition to the performance statistics summarised above, a more detailed comparison between observed and assigned flows along the YWC has been made. Details of this comparison are shown in **Appendix B**. Where there have been absolute differences of more than 30 vehicle trips these corrections were applied to both the Base 2002 and 2011 forecasts prior to being included within the operational assessment of the junctions in the YWC. In making these corrections the aim has been to compensate for the effects of under and over assignment relative to the observed situation.

### Forecasting Procedure and Assumptions

- 3.8 The Yeovil Traffic Model (YTM) was used to forecast Do Minimum 2011 flows for the YWC. This assumed that the proposed developments in Yeovil and the surrounding area would be implemented in accordance with the Local Plan, and that no highway improvements would be made in the Western Corridor. Do Minimum forecasts for the 2011 AM, PM and Saturday peak hours were input to the operational assessment described in Section 4.
- 3.9 The model was also used to test Do Something Options which included highway improvements in the Western Corridor. These incorporated the same assumptions regarding development as the Do Minimum. Forecast flows for each option were derived from the model - reflecting the different operational characteristics of roundabouts and traffic signals. These Options were also assessed over the wider highway network in Yeovil.
- 3.10 Development sites assumed for housing, schools and employment are shown in **Tables 3.1, 3.2 and 3.3** respectively. These are based on the 2011 Local Plan, as defined for the YTSR Reference Case, amended as necessary to reflect recent SCC advice. A number of additional development proposals, including the Douglas Seaton garage site at West Hendford and a garden centre off Bluebell Road roundabout <sup>(1)</sup>, were agreed with SCC after the Do Minimum forecasts had been completed. These were added into the Do Something trip matrices only. The only difference between the YTSR and the YWC relates to the number of homes allocated at Thorne Lane which has risen by 251 units from 580 to 831<sup>(2)</sup>. The sites are depicted graphically in **Figure 2.6**.
- 3.11 Trip-rates used to forecast the number of vehicle trips generated by housing developments and attracted to employment areas are shown in **Table 3.4**. These are based on data extracted from the TRICS database (version 4.6), and were agreed with SCC for the YTSR. Average trip-rates have been used for this assessment to represent the combined traffic impacts of all proposed developments in the Western Corridor and elsewhere in Yeovil. Higher 85<sup>th</sup> percentile rates would generally be used to identify the potential impacts of individual developments. This accounts for some of the differences in the quantitative assessment of traffic impact summarised in this report and the Transport Assessments submitted in support of planning applications.

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(1) The planning application for this site has been withdrawn despite having been incorporated within the operational assessment.

(2) Although it is recognised that only about 600 of these units will be built by 2011 it was judged best to include the full quota of development for the purpose of the current assessment.

Table 3.1 - Assumed Housing Allocations for 2011

Ref	Zone No	Location	Area (ha)	No of houses	
				YTSR	YWCS
H1	500	Abbey Manor Park		133	133
H2	501	Dorchester Road		11	11
H3	502	North of Westland's		75	75
H3	503	North of Westland's		70	70
H4	504	Clarence Street		23	23
H5	505	North of Preston Road		11	11
H6	506	Salthouse Lane		17	17
H7	507	North of Sparrow Road		0	0
H8	508	Lufton Way		49	49
H9	509	Stoke sub Hamdon		19	19
H10	510	Yeo Paul Martock		110	110
H11	511	West of Larkhill Road		55	55
H12	512	Jewson's Yard		17	17
H13	513	Bucklers Mead		15	15
H14	514	Gas Works Martock		14	14
H15	515	South Petherton		81	81
H17	516	Lufton		179	179
H17	517	Lufton		259	259
H17	518	Lufton (1)		179	179
H18	519	Thorne Lane		319	457
H18	520	Thorne Lane		261	374
H19	521	Lyde Road		717	717
H20	522	Keyford		0	0
H21	523	Lufton		0	0
H21	524	Lufton		0	0
H25	525	Petters Way		14	14
H27	526	Foundry House/Mill Lane	0.60	10	10
H31	527	South Street Car Park	0.08	5	5
H30	528	Box Factory	0.12	10	10
H29	529	Cattle Market Site	1.50	20	20
H32	530	Newton Street Car Park	0.06	10	10
H33	531	Central Road Car Park	0.20	8	8
H34	532	Queensbury Place Car Park	0.75	10	10
H26	534	Somerset Inn, Preston Rd		12	12
H35	533	Soling Factory		150	150

- Notes:
- 1 YTSR = Yeovil Transport Strategy Review - Reference case; YWCS = Yeovil Western Corridor Study
  - 2 Houses at Thorne Lane increased from 580 to 830 (SCC advice)
  - 3 The following sites were also included on SCC advice (DS scenario only)
    - Douglas Seaton garage site in West Hendford (85 dwellings)
    - 16 dwellings off Primrose Lane (Lyde Road)

Footnote 1 This site (H17) has been loaded onto the highway network at Thorne Lane. It should have been loaded on at Lufton Lane. The resulting error in trip allocation is not judged to have any significant effect on the strategic recommendations of the study.

**Table 3.2 - New Schools Assumed for 2011**

Ref	Zone No	School	No of pupils	
			YTSR	YWCS
S1	701	Thorne Lane	270	270
S2	702	Lyde Road	210	210
S3	523	Lufton	-	150

- Notes:
- 1 YTSR = Yeovil Transport Strategy Review - Reference case; YWCS = Yeovil Western Corridor Study
  - 2 YTSR assumptions used on SCC advice
  - 3 Thorne Lane allocation has been reduced - part of which has now been allocated to Lufton Key

**Table 3.3 - Assumed Employment Allocations for 2011**

Local Plan Ref	Zone No	Employment Locations	Site Area (Ha)	% Land-use Type				
				A1 Retail	B1 Office	B1 Light	B2	B8
E1	601	Mead Avenue	0.40			20	60	20
E1	602	Mead Avenue	0.40			20	60	20
E2	603	East of Lufton Way (1)	0.77		20		60	20
E3	604	North of Copse Road (1)	1.00				50	50
E4	605	North of Copse Road (2)	0.77				50	50
E5	606	Watercombe Park	1.10			20	60	20
E6	607	East of Lufton Way (2)	1.23			20	60	20
	608	East of Lufton Way (2)	1.23			20	60	20
	609	East of Lufton Way (2)	1.23			20	60	20
E7	610	Summerhouse Lane	0.50		100			
E8	611	Artillery Road	5.00			20	60	20
E9	612	South of Airfield	4.80		60	20		35
E10	613	Watercombe Park	2.88		60	20		35
E11	614	Lufton	2.25		60	20		35
E12	615	Lufton	2.25		60	20		35
E13	616	Keyford	10.5					
E14	617	Lufton	0.80					
E16	626	Land off Bunford Lane	15.0		75		12.5	12.5
E18	618	Foundry House/Mill Lane	0.40	50	50			
E19	620	Vincents Site	1.20	100				
E20	619	Cattle Market Site	1.00	50	50			
E21	625	Box Factory Site	0.70	80	20			
E22	621	South Street Car Park (3)	0.12	60	40			
E23	622	Newton Street Car Park (3)	0.09	60	40			
E24	623	Central Street Car Park (3)	0.23	60	40			
E25	624	Queensway Place Car Park (3)	0.75		100			
	627	Palmers Garden Centre	1.97	100				

- Notes:
- 1 Includes sites with Permission or Under Construction
  - 2 The following site was also included on SCC advice (DS scenario only) - garden centre off Bluebell Road Roundabout (Bunford Lane) (1.971ha, 2804m2 retail area)
  - 3 Although these car parks are shown as future development, neither the need for, scale or timing of development can be confirmed with any certainty. Therefore, these assumptions represent a worst case scenario in terms of development traffic in Yeovil.

**Table 3.4 - Average Trip Rates**

Land-Use	Class	Trip Rates (Average)			
		AM Peak		PM Peak	
		In	Out	In	Out
Mixed housing (per household)	C3	0.12	0.50	0.42	0.20
Office (per 100m <sup>2</sup> of GFA)	B1	1.82	0.24	0.19	1.32
Light Industry (per 100m <sup>2</sup> of GFA)	B1	0.39	0.10	0.09	0.51
Industrial estate (per 100m <sup>2</sup> of GFA)	B2	1.06	0.20	0.20	0.92
Distribution (per 100m <sup>2</sup> of GFA)	B8	0.17	0.08	0.10	0.17
Primary School	D1	0.25	0.21	0.02	0.02
Retail	A1	1.30	0.67	1.60	1.84

Notes

- 1 Proposed trip rates are based on TRICS (version 4.6) data
- 2 Residential trip-rates are per household, all others are per 100 sq m Gross Floor Area (GFA)
- 3 Trip rates are all vehicles per hour, including HGVs
- 4 All TRICS data is for weekdays from 1995 onwards except for Distribution which is from 1991 onwards.
- 5 All TRICS data is for England (excluding Greater London), except for 'Office' which includes Wales and Scotland and 'Distribution' which includes all data.

3.12 Forecast Light Vehicle trips to and from the development sites in the study area in the AM and PM peak hours were distributed to origins and destinations respectively on the basis of a gravity function of the form:

$$F(c) = e^{-\beta Cij}$$

where,

- ◆ Cij = travel time (cost) between home zone i and development zone j, or vice versa.
- ◆ β = deterrence parameter calibrated from base year trip and travel time matrices for each time period, as follows:
  - AM peak hour: 0.11;
  - PM peak hour: 0.19.

3.13 Forecast travel times (Cij) to and from each of the proposed developments were skimmed from the unloaded future year network to represent patterns of unrestrained movement. These were adjusted to remove any times less than 3 minutes or greater than 90 minutes, which would fall outside the normal calibration range. (These were set to 3 minutes and 90 minutes respectively). Travel times were converted to trip weightings based on the calibrated deterrence function to provide an initial distribution of development trips.

3.14 Forecast 2011 matrices of background (non-development) Light Vehicle traffic were factored from the 2002 base using appropriate central growth rates extracted from TEMPRO (version 4.2). These trip-end growth factors were adjusted ('netted out') to take account of developments that were modelled explicitly, to avoid double counting of development trips. This was achieved by reducing the district housing and employment forecasts in TEMPRO, as recommended by the DfT.

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- 3.15 The base year trip matrices, extended to include preliminary trips to and from the proposed development zones, were then factored and controlled to the forecast trip-ends using a Furnessing procedure.
- 3.16 Forecast Heavy Vehicle trips to and from the development sites were distributed to origins and destinations, based on patterns of movement determined from other similar zones. These were copied to the development zones and balanced to the forecast development trip-ends using a Furnessing procedure, as for Light Vehicles.
- 3.17 Matrices of background Heavy Vehicle traffic were factored from the base year to 2011 on the basis of a global National Road Traffic Forecast (NRTF) growth factor. Netting out to reflect developments in Yeovil was not applied in this case.
- 3.18 The final forecast demand matrices of light and heavy vehicles were assigned to the future year test networks using a Wardrop User Equilibrium procedure, which seeks to minimise travel costs for all vehicles. These assignments were based on time only for Light Vehicles, and generalised cost parameters of  $t + 0.65d$  for Heavy Vehicles, as for the base year.
- 3.19 The PASSQ option in SATURN was used for all future year forecasts of the AM and PM peak hour trip matrices, in order to represent the build-up of queues during the pre-peak period (0700-0800, and 1600-1700). The AM and PM peak hour reference case matrices were factored by 0.80 and 0.94 respectively to represent demand in these previous periods.
- 3.20 An elastic assignment procedure was used for all tests to allow for:
- ◆ trip suppression, where the increased costs of congestion would discourage more marginal road users from travelling in the peak hour, and therefore reduce traffic growth; and
  - ◆ the induced traffic effects of proposed highway improvements, where travel cost reductions would generate additional vehicle trips, and therefore increase traffic growth.

### **Traffic Forecasts**

- 3.21 Initially the traffic model was used to reproduce the observed situation in 2002. Absolute differences between observed and modelled flows were corrected where these were judged to be significant (>30 vehicle trips). These corrections were then applied to both the Base 2002 and the Do Minimum and Do Something 2011 forecasts. Details of these adjustments are shown in **Appendix B**.
- 3.22 The 2011 Do Minimum (DM) forecasts included all forecast developments and highway improvements but excluded any improvements in the YWC. The 2011 (Do Minimum) highway improvements include the following:
- ◆ Lufton/Thorne Lane – new roundabout on New Distributor Road and the provision of a mini roundabout at the Preston Road/Lufton Way junction;
  - ◆ Signalisation of Preston Road/Larkhill Road junction – with improved pedestrian facilities;

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- 
- ◆ Thorne Lane – new distributor road between Brimsmore and Thorne Lane/Western Avenue;
  - ◆ Lyde Road – new distributor road;
  - ◆ Closure of Silver Street/High Street to all vehicles except taxis and buses (completed since 2002);
  - ◆ 20 mph zone along and around St Michaels Avenue (completed since 2002);
  - ◆ Traffic calming along the existing Thorne Lane to encourage traffic to use the new distributor road.
- 3.23 Possible improvements to the Yeovil Eastern Corridor, which are currently being considered by another study, were excluded from the 2011 DM networks on SCC's advice.
- 3.24 Proposed highway improvements including the Yeovil Western Corridor were then tested in the traffic model. These 2011 forecast assignments represent the Do Something case (DS).

*2011 Do Minimum Forecasts*

- 3.25 The operational performance of the 2011 Do Minimum network in the AM and PM peak hours is summarised in **Tables 3.5** and **3.6** respectively. These show that proposed developments and background traffic growth from 2002 to 2011 will increase overall traffic demand in Yeovil by 19-24% (about 2% per annum). This will have a significant impact on congestion, particularly in the AM peak hour. As a result, about 6% of drivers will be discouraged from travelling in the AM peak hour, and will shift to another time period (peak spreading), switch to car-sharing or use an alternative mode (including slow modes, like walking and cycling), or travel less frequently. Trip suppression in the PM peak hour will reduce traffic demand by about 5%.
- 3.26 Even allowing for this level of trip suppression, traffic growth to 2011 will increase over-capacity queued time (which is frequently used as a measure of congestion) by almost 300% in the AM peak hour, from 243 to 1071 pcu-hrs. This represents a three-fold increase, which would reduce average speeds in the study area from 47 kph to 37 kph. In the 2011 PM peak hour, over-capacity queued time would increase by about 240%, from 303 to 1054 pcu-hrs, and average speeds will fall from 46 kph to 37 kph.
- 3.27 Analysis reveals that increased congestion in the Western Corridor will add over 4 minutes to the northbound journey from the A30/West Coker Road junction to the Thorne Lane/Larkhill Road junction in both peak hours. This will increase the current journey time from about 5 minutes to over 9 minutes. Significant delays will occur at the Lysander Road roundabout in the AM peak hour, and the Westland's roundabout in the PM peak.
- 3.28 In the southbound direction, increased congestion will add 5 minutes to the journey in the AM peak hour, increasing the current time from about 6 minutes to over 11 minutes. Much of the delay will occur on the southbound approach to Westland's roundabout. The PM peak hour journey time will increase by about 2 minutes.

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- 3.29 In respect of Lysander Road, the Western Relief Road and the A3088 Cartgate Link these roads would be less severely affected. Journey times would increase by only 1 minute in both directions in the AM peak hour, and in the eastbound direction in the PM peak. However, the westbound route in the PM peak hour would take an additional 4 minutes, largely as a result of forecast delays at Westland's roundabout.

### DO SOMETHING OPTIONS

- 3.30 The traffic model has also been used to forecast the impacts of proposed junction improvements in the Western Corridor. These are identified and discussed in Section 4 of this report.

#### *2011 Do Something Forecasts*

- 3.31 Broadly speaking two sets of Do Something options were tested. Option 1 involved the signalisation of most of the junctions in the YWC. These included:

- ◆ Western Ave/Copse Road;
- ◆ Houndstone Retail Park roundabout;
- ◆ Preston Road roundabout;
- ◆ Bluebell Road roundabout; and
- ◆ Lysander Road roundabout.

Initially, signalisation (Option 1) was thought to be the preferred alternative as it was seen as being a good way of improving provision for pedestrians and cyclists. By contrast, Option 2 involved the retention of the existing roundabouts - albeit in a modified form in some cases. In both options provision for pedestrians and cyclists was retained and enhanced where possible – although this was done by different means in each case.

- 3.32 Summary assignment statistics for the current (Option 2) Do Something scenario are presented in **Tables 3.5** (AM peak) and **3.6** (PM peak). On this basis, the proposed highway improvements would significantly reduce congestion in the AM peak hour. Over-capacity queued time would be reduced by 23%, from 1071 to 829 pcu-hrs, and average speeds, taken over the whole Yeovil road network, would be increased from 37 to 39 kph. Under these circumstances, just over 5% of traffic demand would be suppressed, compared with 6% in the Do Minimum scenario. In the PM peak hour the proposed schemes would have less impact on network performance.
- 3.33 Journey times through the corridor in the AM peak hour would be reduced by about 1 minute, largely as a result of improvements at the Lysander Road/Watercombe Lane junction (for northbound traffic) and Bunford Lane/Cartgate Link junction (for southbound traffic). Similar reductions are also evident in the PM peak hour, particularly for northbound traffic through the Westland's roundabout.

Table 3.5 - Summary Assignment Statistics – AM Peak Hour

AM Peak Hour	2002	2011			
		DM		DS Option 2	
		Demand	Capped	Demand	Capped
<b>Matrix Size (vehs)*</b>					
Light vehicles	17,483	22,285	20,835	22,285	21,061
Heavy vehicles	892	1,083	1,034	1,083	1,043
Total vehicles	18,375	23,368	21,869	23,368	22,104
<b>Capped Traffic and % change</b>					
Light vehicles	-		1,450		1,224
% change	-		6.5%		5.5%
Heavy vehicles	-		49		40
% change	-		4.5%		3.7%
Total vehicles	-		1499		1264
% change	-		6.4%		5.4%
<b>Network Operation</b>					
Link Cruise Time	8,113	10,365	9,982	10,350	9,992
Transient Queued Time	536	947	808	931	804
Over Capacity Queued Time	243	2,726	1,071	2,004	829
Total Travel Time	8,892	14,038	11,862	13,285	11,625
Travel Distance	439,200	551,057	533,991	550,427	535,003
Average Speed (kph)	47	28	37	31	39
<b>Convergence Statistics</b>					
Convergence after iteration	13	25	13	25	12
Delta function (%)	0.181	0.272	0.179	0.167	0.180
% links flows differing by <5%	96	96	99	99	98

- Notes:**
- 1 Trips are in vehicles.
  - 2 Demand assignments exclude suppression and induced traffic, Capped assignments include these effects.
  - 3 All times are in pcu-hours, distances in pcu kilometres.
  - 4 \* = Intra-zonal trips excluded

**Table 3.6 - Summary Assignment Statistics – PM Peak Hour**

PM Peak Hour	2002	2011			
		DM		DS Option 2	
		Demand	Capped	Demand	Capped
<b>Matrix Size (vehs)*</b>					
Light vehicles	18,949	24,866	23,536	24,866	23,670
Heavy vehicles	484	573	540	573	542
Total vehicles	19,433	25,439	24,076	25,439	24,212
<b>Capped Traffic and % change</b>					
Light vehicles	-		1,330		1,196
% change	-		5.3%		4.8%
Heavy vehicles	-		34		31
% change	-		5.8%		5.4%
Total vehicles	-		1364		1227
% change	-		5.4%		4.8%
<b>Network Operation</b>					
Link Cruise Time	8,142	10,291	10,019	10,277	10,042
Transient Queued Time	555	974	863	967	870
Over Capacity Queued Time	303	1,509	1,054	1,214	996
Total Travel Time	9,000	12,775	11,936	12,459	11,908
Travel Distance	440,890	546,747	534,112	545,676	535,083
Average Speed (kph)	46	34	37	36	37
<b>Convergence Statistics</b>					
Convergence after iteration	9	11	10	8	9
Delta function (%)	0.140	0.149	0.188	0.152	0.173
% links flows differing by <5%	96	98	99	99	98

- Notes:**
- 1 Trips are in vehicles.
  - 2 Demand assignments exclude suppression and induced traffic, Capped assignments include these effects.
  - 3 All times are in pcu-hours, distances in pcu kilometres.
  - 4 \* = Intra-zonal trips excluded

**2011 Do Something Trip Length Distributions**

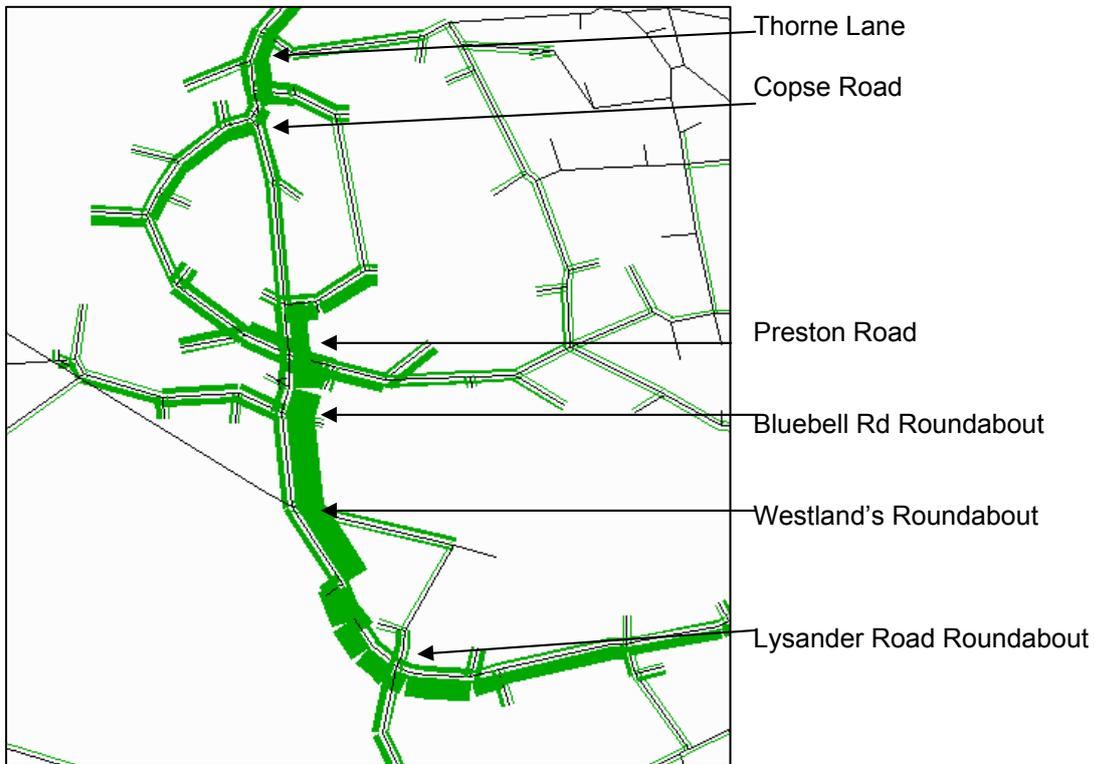
- 3.34 It is possible that forecast traffic growth in the Western Corridor could be moderated to some extent by encouraging the transfer of short car trips to alternative modes, notably walking and cycling. Forecast light vehicle trips passing through key junctions have therefore been analysed to identify their trip-length distribution and turning movements. The percentage reduction attributable to short distance trips are shown in **Table 3.7**.
- 3.35 In most cases 3%-7% of trips are less than 2 kilometres, and could therefore be walked; and 30%-50% are less than 5 kilometres and could be cycled. **Figures 3.1** and **3.2** give a broad indication of the routes which would be used by these trips during the AM peak hour. It is worth noting that for those trips less than 2 kilometres in length there is a fairly pronounced north-south orientation between Lysander Road junction and the Houndstone Retail Park junction. Evidence of this trend is similarly manifest north of the Copse Road junction. The implication of this pattern of trips indicates that provision for sustainable modes should orientated as far as possible in a similar manner.
- 3.36 Clearly, a significant transfer of these short trips to walking and cycling would reduce traffic demand in the corridor, and potentially reduce the scale of infrastructure provision required to accommodate future growth. However, this transfer may be difficult to achieve in practice. Also, given forecast levels of trip suppression, transfers to other modes may be partly offset by traffic which would be generated as a result of the improved operating conditions. Further reference is made to this in Section 4 of this report.

**Table 3.7 - Trip Length Distribution**

Junction	Trip Length Proportion			
	AM Peak		PM Peak	
	<2km	<5km	<2km	<5km
Thorne Lane / Western Avenue	4.2%	37.0%	2.7%	47.5%
Western Avenue / Copse Rd	4.2%	37.0%	3.4%	46.4%
Western Avenue / Stourton Way	4.8%	45.9%	8.2%	57.0%
Western Avenue / Preston Road	4.4%	47.7%	6.5%	49.8%
Bunford Lane / Bluebell Rd	4.3%	39.7%	6.1%	42.5
Bunford Lane / A3088 Cartgate Link	3.8%	32.9%	5.0%	32.8%
Lysander Rd / Watercombe Lane	4.2%	38.6%	3.3%	38.0%

- Notes: 1 Table shows the proportion of trips passing through each junction which are less than 2 and 5 kilometres.  
 2 Based on 2011 Do Something assignments.

**Figure 3.1 – Traffic, Trips under 2km – 2011 AM Peak Hour**



**Figure 3.2 - Traffic, Trips under 5km – 2011 AM Peak Hour**



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## 4. Operational Assessment

4.1 This section of the report addresses a range of issues relating to the proposed modification of the highway network within the YWC. In summary, this includes the following information:

- ◆ Introduction;
- ◆ Levels of Service;
- ◆ Demand, Actual and Attenuated Flows;
- ◆ Assessment of Existing and Do Minimum Situation;
- ◆ Alternative Junction Arrangements;
- ◆ Toucan Crossings and Cycle Routes;
- ◆ Summary.

### INTRODUCTION

4.2 The report to date has explained the importance of the corridor and the high concentration of new development and travel demand that this will generate. In its present form the corridor consists of nine key junctions which have been assessed. Running from north to south these are:

- ◆ **Western Ave/Thorne Lane** - a priority junction at the northern end of Western Avenue;
- ◆ **Western Ave/Copse Road** - priority junction with Western Avenue;
- ◆ **Houndstone Retail Park** - roundabout junction with Western Avenue and Stourton Way (south);
- ◆ **Preston Road** - roundabout junction with Western Avenue/Bunford Lane;
- ◆ **Asda Supermarket** - signalised junction that provides entry to the store and Petrol Filling Station;
- ◆ **Bluebell Rd Roundabout** - junction of Bluebell Road, Bunford Lane and Higher Farm Trading Estate;
- ◆ **Westland's Roundabout** - junction of Cartgate Link, Bunford Lane and the Western Relief Road;
- ◆ **Bunford Park Key Site Development** - new junction to access B1 development south of Cartgate Link;
- ◆ **Lysander Road Roundabout** - junction of Lysander Road, Watercombe Lane, Bunford Hollow and the eastern end of Western Relief Road.

4.3 Each of these junctions has been assessed using traffic flows generated by the SATURN model as described in Section 3. The junction names described here are used throughout this section.

### LEVELS OF SERVICE

4.4 A key issue facing the YWC, and Yeovil more generally, is the extent to which forecast traffic flows can and should be accommodated by modifying the highway network. Guidance in this respect has been obtained from the YTSR

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which acknowledges that it will not be possible to accommodate unlimited growth in traffic in the future. As such, it is accepted that there will be some further deterioration in levels of service in both the AM and PM peak periods, as well as the Saturday peak period. The level of admissible deterioration adopted by Somerset County Council and referred to in the YTSR is as follows:

- ◆ AM Peak Hour 126% increase in delays;
- ◆ PM Peak Hour 60% increase in delays.

4.5 The implication of this has been reflected in the operational assessment of key junctions within the YWC. In practice this has meant that it has been necessary to ensure that the growth in Inclusive Delays (as output by computer programmes ARCADY, PICADY and OSCADY) should not, in total, exceed this forecast increase. This has also meant that savings incurred at one junction can be used to offset increased delays at other junctions as long as this was judged to be within reasonable limits.

#### DEMAND, ACTUAL AND ATTENUATED FLOWS

4.6 The existing Yeovil SATURN model outputs Demand and Actual traffic flows for links and junctions throughout the town during the AM peak (08:00-09:00) and PM peak hours (17:00-18:00). This information has been used to derive a Saturday (12:00 - 13:00) peak hour as a composite of the two peak hours.

4.7 Demand flows represent the volume of traffic that under free flow conditions will pass through a junction net of any upstream congestion and delays. As such, this corresponds to a theoretical maximum demand. By contrast, Actual flows are those that actually reach the junction once allowance has been made for the effects of upstream congestion and are consequently less than or equal to Demand flows.

4.8 Finally, Attenuated flows have also been used in this assessment. These are derived from Actual flows and represent the effects of attenuation due to the short distance trips as referenced in the preceding Section in **Table 3.7**. The rationale behind the use of these flows is based on the belief that short distance trips should be encouraged to use alternative 'slow modes' and that junction capacity should not be automatically increased to accommodate these (Actual) trips. It does not necessarily follow that restricting the forecast capacity of the highway network will ensure that this occurs in practice.

4.9 The analysis summarised below has been confined to Actual and Attenuated flows as these are judged to be the most representative flows in the YWC. This decision was influenced by the fact that Demand and Actual flows in the YWC revealed only minor differences in most cases.

4.10 Given the uncertainties associated with the actual realisation of any further attenuation in Actual flows, some care must be exercised in any assessment of its likely effects. In recognition of this fact we recommend that this be confined to the 2 kilometre threshold as this represents an average reduction of between 4% to 5% in the AM and PM peak respectively. On balance, this range is judged to be potentially deliverable as long as there is no redistribution or reassignment of trips into the YWC, and that suitable provision is made for 'slow modes' as part of the overall corridor strategy.

4.11 **Tables 4.1 and 4.2** summarise the forecast increase in Do Minimum flow at each of the specified junctions. These are shown for each of the trip categories described above. These forecasts contain the corrections in Base Year assignments to compensate for the under and over assignment of traffic in the corridor. Key points worth noting are as follows:

- ◆ By comparison with the 'capped' growth in trips during the AM (19%) and PM (24%) peak hours, traffic growth in the YWC is well below this figure, reflecting in part the attenuating effects of not upgrading the capacity of the corridor in the Do Minimum;
- ◆ 'Capping' and 'Attenuation' should not be confused. 'Capping' refers to the effects of 'elasticated' assignments and the redistributive effects which can contribute to trip suppression throughout the entire network. 'Attenuation' relates exclusively to the effects of short distance trips within the Western Corridor.

**Table 4.1 - Forecast Do Minimum Traffic Growth in YWC - AM Peak (Vehicles)**

Junction	Total Inbound Flow		
	2002 Base Year	2011 Actual	2011 Attenuated
Western Ave/Thorne Lane	1495	1793	1718
Western Ave/Copse Road	1336	1677	1607
Houndstone Retail Park	1300	1630	1552
Preston Road Roundabout	2318	2797	2674
Asda Supermarket	1123	1262	1222
Bluebell Roundabout	2164	2310	2209
Westland's Roundabout	2793	2746	2641
Lysander Road Roundabout	2681	2572	2464
% Δ	15,210	16,787 (+10.4%)	16,087 (+5.8%)

**Table 4.2 - Forecast Do Minimum Traffic Growth in YWC - PM Peak (Vehicles)**

Junction	Total Inbound Flow		
	2002 Base Year	2011 Actual	2011 Attenuated
Thorne Lane	1608	1619	1576
Copse Road	1489	1455	1405
Houndstone Retail Park	1508	1445	1327
Preston Road Roundabout	2705	3069	2870
Asda Supermarket	1490	1805	1719
Bluebell Roundabout	2353	2695	2531
Westland's Roundabout	3324	3571	3392
Lysander Road Roundabout	2579	2888	2793
% Δ	17,056	18,547 +(8.7%)	17,613 +(3.3%)

## ASSESSMENT OF EXISTING AND DO MINIMUM SITUATION

### Existing Junction Arrangements

- 4.12 As part of the operational assessment, junction capacities have been derived from measurements using Ordnance Survey mapping - supplemented by site visits. These measurements were input to one of the following computer programmes – ARCADY or PICADY along with traffic forecasts for each junction.
- 4.13 All measurements have been made in accordance with prescribed methods and make allowance for the effects of white lining where applicable.

### Base Year Assessment

- 4.14 Initially, the operational assessment was confined to the Base Year - 2002. This was used to gauge the current level of service in terms of Inclusive Delay. This information was then used to benchmark the results for the 2011 Do Minimum and Do Something Options so as to determine admissible levels of service in relation to the criteria specified in the YTSR. This amounts to an increase in delays of 126% in the AM peak and 60% in the PM peak hour. The results of this assessment were also used to determine the need to modify junctions in the Do Something Options. Details of the operational assessment are summarised in **Appendix C**.
- 4.15 It has been noted that as part of the Base Year assessment there are some significant differences between observed and modelled queue lengths at some of the junctions in the corridor. These include Preston Rd, Westlands and Lysander Road roundabouts. Without exception, there has been a

consistent tendency to over estimate the capacity at these junction relative to the observed situation. The implication of these results is that there may be a corresponding tendency to under estimate the required scale of geometrical improvements to accommodate Design Year forecasts - assuming that the same tendency recurs in any modified configuration in the Design Year. As such, any proposed modifications at these junctions should be seen as *desirable minimum levels of provision*. This tendency also has implications for the Do Minimum assessment that is referred to below.

**Do Minimum Assessment**

- 4.16 The Base Year assessment was followed by a Do Minimum assessment. This assessed the ability of the existing geometrical arrangements to accommodate Actual 2011 forecast traffic flows. This was based on the operational assessment of the existing junctions in the YWC. Results from this assessment are summarised in **Table 4.3** and **Appendix D**. This showed some over capacity occurring in the YWC at some of the junctions – where the Ratio of Flow to Capacity (RFC) exceeds 0.85 on one or more arms of a junction.
- 4.17 Although the RFC value of 0.85 represents the preferred maximum threshold figure on any arm of a roundabout or (urban) priority junction, this figure should be seen as an approximate guide to junction capacity. Where current observations indicate that the capacity of an arm is above or below this threshold figure then due regard should be given to actual observations in any assessment of junction capacity. As part of this process there may be a need to adjust capacity on one or more arms in line with recommended procedures, or make sufficient allowance in the interpretation of results to allow for this sort of anomaly.
- 4.18 Actual observations made at both Preston Road, Lysander and Westland’s roundabout indicate that the current RFC values tend to over estimate capacity. Current observations show that there are significantly longer queues on some arms of the junction compared to the current Base Year forecasts. As such, due regard needs to be given to current prevailing conditions when interpreting these results and assessing the need for junction improvement in the Do Minimum. In practice this means that in addition to Westlands there is ample anecdotal evidence to suggest that both Preston Road and Lysander Road roundabouts will be over capacity on some of their arms in the Do Minimum.

**Table 4.3 - Initial 2011 Do Minimum Junction Assessment- Arms Over Capacity**

Junction	AM Peak	PM Peak	Saturday
Thorne Lane (modified)	-	-	-
Copse Road	-	Copse Road	-
Houndstone Retail Park	-	-	-
Preston Road Roundabout	*	*	-

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<b>Asda</b>	-	-	-
<b>Bluebell Rd Roundabout</b>	-	Bunford Lane (N)	-
<b>Westland's Roundabout</b>	Cartgate Link (W)	Bunford Lane (E) Western Relief Rd (S)	-
<b>Bunford Park</b>	-	-	-
<b>Lysander Road Roundabout</b>	*	*	-

\* Junctions where anecdotal evidence suggests the presence of over capacity in both the Base Year 2002 and the Do Minimum 2011

- 4.19 As part of the Do Minimum assessment Inclusive Delays were monitored in relation to the levels of service specified in the YTSR. These are summarised in **Table 4.4**. This revealed that total Inclusive Delays (for Actual flows) changed by between -5% to +112% during the AM and PM peak hour respectively, and, by implication, confirmed the need to mitigate these effects in relation to the admissible increase in delays as specified by the YTSR during the PM peak hour. In reality these figures should be seen as minimum values in light of the comments made above which further strengthen the case for mitigating the effects of forecast growth in traffic in the YWC. Similarly, the points raised in the remaining part of this section (para 4.20 – 4.23) should bear these points in mind.
- 4.20 The forecast increase in Do Minimum Inclusive Delay referred to in para 4.19 omits the effects of Thorne Lane from the analysis. This is for two reasons. First, there are current proposals to change the priority at Thorne Lane as part of the proposed development at Brimsmore, which will contribute to a significant improvement in junction performance. Second, it was felt that if this improvement was included in the analysis of Inclusive Delay it would tend to distort the analysis to the detriment of the other junctions in the corridor. This view is borne out by the analysis summarised below (in **Table 4.4**), which reveals that if Thorne Lane is included in the analysis of Do Minimum Inclusive Delay, the overall increase will fall within the threshold figures specified by the YTSR, thereby implying that there is no need to implement any improvements in the YWC. The omission of Thorne Lane was agreed with Somerset County Council.
- 4.21 **Table 4.4** also reveals that the highest combined (AM+PM) Inclusive Delay occurs at the following junctions – indicating that there are potentially significant benefits to be obtained from remediation at:
- ◆ Copse Road; and
  - ◆ Preston Rd roundabout.
- 4.22 Inclusive Delays have also been quantified for controlled pedestrian crossings in both the existing situation and the Do Something Option 2. This was deemed to be necessary on account of the proposals to significantly increase provision for these crossings as part of Option 2, and the need to reflect any increase in associated delay arising from their provision. In the Do Minimum

this has been confined to the Pelican crossing on Western Ave south of its junction with Copse Rd.

4.23 It will be noted that some of the Inclusive Delays go down in the 2011 Do Minimum relative to the 2002 Base. In the case of Houndstone Retail Park (PM) this is due to a slight reduction in forecast flows in the 2011 Do Minimum. At Lysander Road the reduction in Inclusive Delay during the AM peak hour in 2011 is caused for the most part by a significant change in flow patterns relative to the 2002 Base situation. By contrast, the significant increase in delay at Copse Rd during the PM peak is caused by an increase in side road traffic linked to future developments in this area.

**Table 4.4 - Changes in Do Minimum Inclusive Delays (Vehicle Mins)**

Junction	2002 Observed		2011 Actual			
	AM Peak	PM Peak	AM Peak	%Δ	PM Peak	%Δ
Thorne Lane	5698	36253	49	-99	28	-100
Copse Road	147	120	202	37	3975	3212
Houndstone Retail Park	103	125	147	43	116	-7
Preston Road Roundabout	243	383	425	75	564	47
Asda Supermarket	274	553	282	3	625	13
Bluebell Rd Roundabout	202	253	235	16	455	80
Westland's Roundabout	389	3312	402	3	4523	37
Bunford Park	0	0	1140		322	
Lysander Road Roundabout	807	329	367	-55	462	41
Controlled Crossings	2.0	2.8	2.8	38	2.5	-10
<b>Total* (Including Thorne Lane)</b>	<b>7865</b>	<b>41331</b>	<b>2112</b>	<b>-73.0</b>	<b>10751</b>	<b>-74</b>
<b>Total* (Excluding Thorne Lane)</b>	<b>2167</b>	<b>5077.8</b>	<b>2063</b>	<b>-4.8</b>	<b>10723</b>	<b>112.0</b>

\* Excludes Bunford Park

YTSR Congestion Index: AM Peak Hour +126%, PM Peak Hour +60%

## ALTERNATIVE JUNCTION ARRANGEMENTS

### Underlying Principles

4.24 Recognition of the need to make geometrical modifications to some of the junctions in the YWC necessitated some consideration of the underlying principles that should guide this process. The commentary below seeks to reflect the fact that it has been necessary to reconsider some of these principles as the study has progressed. These are as follows:

- i. Initially, it was thought that improving provision for pedestrians and cyclists could best be made by providing traffic signalised junctions. This principal had to be altered in favour of controlled pedestrian

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crossings when it was found that traffic signalised junctions required too much third party land and imposed unacceptably high delays on traffic in the YWC. Of these two factors it was the third party land and the associated time and costs implications linked to its acquisition which were deemed to be most important.

- ii. Where an existing roundabout exceeded capacity two options were considered. These were – modifications to lining and signing, or enlargement. Selection of either option was largely governed by the scale of over capacity and the need to ensure conformity with the strategic guidelines set out in the YTSR regarding peak hour level of service.
- iii. Signalisation of roundabouts was, as a general rule, avoided as it was not felt that the roundabouts in the YWC had adequate storage on their circulatory carriageways.
- iv. Where a priority junction failed to accommodate forecast traffic flows it was converted to a roundabout unless side road priority could be altered so as to facilitate its operation as a priority junction – as at Thorne Lane.
- v. Junctions have been configured so as to avoid as far as possible any increase in accidents. As part of this work a Stage 1 Safety Audit has been completed for each of the proposed junctions.
- vi. Due consideration has been given to the number of controlled pedestrian crossings and the delays they impose on vehicle traffic so as to be consistent with the admissible levels of peak hour service specified in the YTSR.
- vii. Every attempt has been made to minimise the need to acquire third party land.

These principles have been applied to each of the junctions described below.

### **SATURN Modelling Sequence**

4.25 The SATURN model has been run to provide Base and Design Year turning movements. These turning movements have been specified for Base Year 2002 and Design Years 2011 scenarios - details of which are summarised in the following appendices:

- ◆ Base Year 2002 – Appendix C;
- ◆ Do Minimum 2011 – Appendix D (Actual Flows);
- ◆ Option 1 – 2011 – Appendix E (Actual Flows);
- ◆ Option 2 – 2011 – Appendix F (Actual Flows); and
- ◆ Option 2 – 2011 – Appendix G (Attenuated Flows).

Turning movements for each scenario were then input to the more detailed analysis of junction delays as summarised below.

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## Junction Assessment

- 4.26 Summarised below are the results of the operational analysis of different junction arrangements.

### *Thorne Lane*

- 4.27 The existing priority junction exceeds capacity in the 2002 Base Year situation in both the AM and PM peak hours. This is caused very largely by the existing priority not being aligned in relation to current traffic flows.
- 4.28 Do Minimum proposals involve the re-alignment of the junction in accordance with future development at Brimsmore. This will result in the western arm of Thorne Lane becoming the minor arm of the junction. Outline proposals for the arrangement are shown in **Figure 4.1**.
- 4.29 Preliminary proposals to re-orientate the junction's priority are common to all options tested and summarised in **Tables 4.6** and **4.7**.
- 4.30 Results from operational analysis for the proposed arrangement are summarised in both **Appendix E** and **Appendix F**. This reveals a significant improvement relative to the Base Year 2002 situation summarised in **Appendix C** largely on account of the change in priority from east-west to north-south. This is similarly reflected in the significant reduction in Inclusive Delay relative to the Base Year in 2002.

### *Copse Road*

- 4.31 The existing priority junction is forecast to exceed capacity by 2011 in the Do Minimum. This is caused by a significant growth in side road traffic on Copse Road in the PM peak hour and the greater impedance experienced by this traffic.
- 4.32 Two alternative options were considered. These involved signalisation and a roundabout.
- 4.33 Operationally, both arrangements (signals and roundabout) worked in relation to forecast 2011 (Actual) flows in that the signalised arrangement recorded a positive Practical Reserve Capacity and the roundabout recorded RFC's less than 0.85.
- 4.34 Signalisation of the junction (Option 1) summarised in **Appendix E** contributed to a significant reduction in delays relative to the 2011 Do Minimum. However, by comparison with the roundabout it was felt that these delays were too high and, as such, the roundabout was retained as the preferred option.
- 4.35 Two arrangements of the roundabout were considered. The first involved the provision of a 'through lane' for north to south movements on Western Avenue. The second configuration represented a more conventional arrangement and removed provision for the 'through lane'. This latter arrangement was selected as it was judged to be in conformity with standards and was less likely to fail the safety audit. In this respect, the former option would have necessitated the provision of a give way to allow for safe merging

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of southbound traffic from Copse Road and Western Avenue. Preliminary proposals for the preferred roundabout are shown in **Figure 4.2**. Results from the operational assessment of the preferred arrangement are summarised in **Appendix F** and **Appendix G** for Option 2.

#### *Houndstone Retail Park*

- 4.36 Results from the operational analysis revealed that the existing roundabout will continue to operate well within capacity in the 2011 Do Minimum scenario using Actual flows. The same is also true for the signalised alternative.
- 4.37 Initially this junction was tested as signals in Option 1, in recognition of the demand for improved pedestrian provision in this area. This reflected the presence of the adjoining retail park and business park and the anticipated demand for pedestrian crossing in this area.
- 4.38 Although traffic and pedestrian forecasts could be accommodated within the proposed signals design, it was found that it contributed to a significant increase in Inclusive Delay that was judged to be incompatible with the YTSR levels of admissible congestion during peak periods. Consequently, the existing arrangement was retained in Option 2 as it contributes to only a modest increase in Inclusive Delays relative to the Base Year situation. **Figure 4.3** shows the proposed existing arrangement. Results from the operational assessment of the preferred arrangement are summarised in **Appendix F** and **G** for Option 2.

#### *Preston Road*

- 4.39 Analysis of this junction indicates that it will be able to accommodate 2011 Do Minimum forecasts, despite the fact that current 2005 observations suggest that the junction is at or close to capacity during the peak period. This implies that the ARCADY model of this junction may tend to significantly underestimate queuing and delays in the existing situation, and by implication in the Do Minimum 2011 scenario. These facts have informed the assessment of alternative arrangements summarised below.
- 4.40 The junction was initially tested with traffic signals in Option 1. This arrangement was found to accommodate forecast traffic flows. The intention was that it would be linked to the signalised access at Asda.
- 4.41 Results from the operational analysis of the traffic signals indicate that it would contribute to a significant increase in Inclusive Delay relative to the Base Year situation. Furthermore, the proposed arrangement would necessitate the acquisition of significant quantities of third party land from both the Garden of Remembrance and the Houndstone Retail Park with potentially significant implications both in terms of cost and the timing of any implementation. These facts led to the abandonment of this option in favour of a roundabout.
- 4.42 Two roundabout options were considered as part of Option 2. The first involved an enlargement of the existing 49 metres inscribed diameter to 58 metres. This was the scheme originally identified in the Local Plan public inquiry. The second involved retaining the existing inscribed diameter and removing the white lining from the junction so as to increase lane widths and

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junction capacity. The latter option necessitates reducing the diameter of the island, widening of the circulatory carriageway and remodelling the splitter islands on each arm.

- 4.43 Given the uncertainties concerning the predictive ability of the ARCADY model at this junction the decision was taken to opt for the enlargement of the roundabout to 58 metres. This decision was supported by the results of the operational analysis which showed that the larger roundabout operates more efficiently in terms of capacity. Results from the operational analysis for both roundabouts are summarised in **Appendix F** and **Appendix G** for Option 2.
- 4.44 The results from the operational analysis of the preferred arrangement summarised in **Appendix C, D** and **F** indicate that while there will be some further deterioration in levels of service between the present day (2002) and the Do Minimum in 2011, this will in part be compensated for by the enlargement of the roundabout and will result in the avoidance of any really serious over capacity. An alternative interpretation of the likely effects of enlargement, based upon the assessment of prevailing conditions and a more pessimistic assumption concerning the capacity enhancing effects of enlargement, envisage a further deterioration in levels of service by 2011, with little real benefit being conferred by any enlargement. Faced with these diverging views of the future, we recommend that initially enlargement of the junction should be pursued as this represents the only really credible option in the short to medium term and will probably confer some operational benefit. In the medium to longer term there may be a need to consider signalisation of this junction though this will entail a significant enlargement of the junction with corresponding implications for third party land acquisition both within the immediate vicinity of the junction and on its approaches.
- 4.45 The proposed enlargement of the roundabout will necessitate the acquisition of third party land in the north-western quadrant of the junction adjacent to the retail park. Furthermore, results from a recently completed topographic survey of this junction has confirmed that at least one and possibly two of the oak trees on Lufton Way will have to be felled to make way for the proposed enlargement of the junction. The felling of the oak trees linked to any enlargement of this junction was a matter raised during the Local Plan public inquiry, where the opinion of South Somerset District Council was strongly opposed to the felling of these trees on account of a road scheme.
- 4.46 Preliminary proposals for the preferred arrangement are shown in **Figure 4.4**.

#### **Asda Access**

- 4.47 To improve the safety and operational efficiency of this junction, it is proposed to widen the eastbound carriageway to provide two lanes between the Asda entrance and the Preston Road roundabout. The intention would be to allocate the off-side lane for right turning traffic entering the Asda food store. As part of this work it is recommended that a queue detection facility be installed in the off-side lane so as to limit queue lengths and minimise the risk of blocking back. This improvement seeks to mitigate the current situation in which right turning traffic seeking access to the Asda food store has been seen to queue back to the Preston Road roundabout during peak periods. Preliminary proposals are shown in **Figure 4.4**.

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- 4.48 Existing crossing facilities incorporated within the signal controlled access to Asda on Preston Road (east) will be supplemented with a Toucan crossing on the western arm of the junction. Provision of the Toucan crossing will complement proposals to extend the shared pedestrian/cycleway on both sides of Preston Road (east).
- 4.49 These modifications will necessitate widening Preston Road (east) on its south side adjacent to the food store. This may require the acquisition of land outside the highway boundary, though if this falls within the ownership of Asda it would seem reasonable to expect that they would wish to accommodate this improvement as they will be the prime beneficiary.
- 4.50 Currently, a number of local buses access the store's car park. These services encounter some delay in navigating around the car park, and it is recommended that an alternative solution to this problem is investigated as part of the proposed modifications to Preston Road.

*Bluebell Rd Roundabout*

- 4.51 Results from the operational analysis confirmed that this junction will be at or close to capacity on Bunford Lane (north and east) and the Western Relief Road in the Do Minimum and Option 2 in 2011 during the PM peak hour. In view of this fact we recommend that the consultants acting for the Lufton site are approached with a view to identifying capacity enhancing improvements to this roundabout, in line with the general observations made in their Transport Assessment which acknowledges the need to improve this junction. **Figure 4.5** shows the existing arrangement and the extensive provision both existing and proposed for pedestrians and cyclists that would have to be retained as part of any improvement.
- 4.52 The junction was also tested as traffic signals in Option 1. Although the operational analysis confirmed that signalisation was able to accommodate the forecast traffic flows, it resulted in a significant increase in Inclusive Delay when compared with Option 2. This was judged to be incompatible with admissible levels of peak hour congestion as referenced in the YTSR. Signalisation of the junction would also result in an enlargement of the junction and the need to acquire third party land in the vicinity of the junction and on its approaches.

*Westland's Roundabout*

- 4.53 As one of the main entry points to Yeovil this roundabout is an important junction both for the town and the highway network in this area.
- 4.54 Prevailing conditions indicate that there are prolonged periods of queuing on Bunford Lane (north) and the Cartgate Link during the AM peak and Bunford Lane (east) and the Western Relief Road in the PM peak. While the junction models summarised in **Appendix C** more than fully reflects the queuing on Bunford Lane (east) during the PM peak, and indicate that both the Cartgate Link and Western Relief Road are close to capacity during the AM and PM peak hours respectively, they do not reflect the current situation on Bunford Lane (north).

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- 4.55 The existing roundabout is forecast to exceed capacity by 2011 in the Do Minimum scenario as summarised in **Appendix D** – with significant delays being modelled on Bunford Lane (east) in the PM peak hour. Prevailing conditions suggest that this probably under states the effects of future growth in traffic and that there will be a further deterioration in current conditions on all arms of the junction resulting in potentially significant over capacity in the Do Minimum by 2011.
- 4.56 Two alternative roundabout options were considered to accommodate the future effects of traffic growth. The first (Option 1) involved the retention of the existing 65 metre inscribed diameter, but sought to remodel the junction to effect operational improvements over and above those solely associated with increasing junction capacity. The second (Option 2) involved the enlargement of the roundabout to 80 metres inscribed diameter (ICD). This was supplemented with a range of geometric modifications to increase junction capacity on all arms of the junction.
- 4.57 The 65m ICD (Option 1) roundabout was found to exceed capacity on Bunford Lane (east) with an RFC of 1.243. It also records significantly higher combined (AM and PM) Inclusive Delay compared with the larger arrangement – over four times that associated with the 80 metre roundabout.
- 4.58 These results and observations support the adoption of the larger junction, despite the fact that it will cost appreciably more to construct and will require the acquisition of third party land. Furthermore, in view of the tendency for the junction model to under estimate existing congestion and delays at this junction the selection of the larger arrangement would seem sensible and prudent.
- 4.59 As part of this assessment the study has also examined the proposed enlargement using a more pessimistic set of assumptions which reflect more accurately the existing pattern of queuing during the AM and PM peak period. Results from this assessment indicate that the larger junction gives reasonably good results in relation to these more pessimistic forecast. Despite this, it would be prudent to consider the need in the longer term for the provision of segregated left turning lanes on Bunford Lane (north), the Western Relief Road and the Cartgate Link. Although we do not considered that this would be required in the short to medium term it would be prudent to consider the possible reservation of land to implement these sorts of modifications in the longer term.
- 4.60 Preliminary proposals for the enlarged 80 metre ICD roundabout (Option 2) are shown in **Figure 4.6**.

#### *Bunford Park*

- 4.61 As part of the development at Bunford Park there are proposals to provide a new signalised access on the Western Relief Road. This forms one of two signalised access points - the other being situated on Watercombe Lane (south) which falls beyond the remit of this study. Details of the proposed arrangement are shown in **Figure 4.7**. Although this drawing was originally transcribed from the WSP TA for Bunford Park, the current study has made some limited amendments to the junction which seek to improve its overall arrangement.

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- 4.62 Results indicate that the proposed arrangement will be able to accommodate 2011 forecasts in the Do Minimum, Option 1 and Option 2.
- 4.63 This junction has *not* been included within the overall assessment of Inclusive Delay in the corridor. To do so would imply the need to make more significant changes to increase junction capacity elsewhere in the corridor which is not in line with current expectation or policy.

#### *Lysander Road Roundabout*

- 4.64 Prevailing conditions at this junction indicate that most of the arms are subject to some queuing during both the AM and PM peak period, though this does not assume significant proportions on any arm in either period. Although the results from the junction model are broadly in line with these observations there remains a tendency to under estimate queuing on most of the arms at these times of day.
- 4.65 Although the Do Minimum operational assessment of the junction indicates it will be able to accommodate 2011 forecasts, the more pessimistic assessment that seeks to reflect observed levels of existing queuing indicates the need to enlarge the existing junction as far as practically possible. In recognition of this fact various alternative arrangements were tested. These included the following options:
- ◆ A new off line roundabout situated some 50 metres to the south-west of the existing junction, with a priority junction formed by Watercombe Lane (north) and Lysander Road;
  - ◆ A four arm signalised junction – Option 1;
  - ◆ An online enlargement of the existing roundabout broadly in line with the WSP recommendations linked to the proposed development at Bunford Park – Option 2.
- 4.66 The off line roundabout was found to work well in terms of accommodating the 2011 forecast traffic flows. However, the minor arm of the priority junction formed by Watercombe Lane (north) was found to be subject to serious delays and long queues. In mitigation of this effect consideration was given to the possible signalisation of the priority junction, but it was felt that this could result in further complications caused by traffic blocking back into the adjacent roundabout – some 50 metres to the west.
- 4.67 Other factors that weighed against the provision of an off line roundabout was the need to realign both Watercombe Lane and the Western Relief Road. This would require the acquisition of a lot of third party land and incur potentially significant costs, when the perception would be that a cheaper alternative could have been found.
- 4.68 An alternative to signalising the priority junction formed by Watercombe Lane involved its closure - thereby either obviating the need for a junction, or dramatically curtailing the volume of side road traffic on this road. This alternative arrangement was not subject to any detailed testing due to perceived difficulties in effecting a road closure on Watercombe Lane (north).
- 4.69 A similar variant that was tested involved the closure of the Westland's private road (at the bridge on Watercombe Lane (north)) to all traffic other than

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Westland's employees. This option was not considered in any detail as it was found to increase traffic flows on Watercombe Lane (north), thereby further exacerbating potential queuing on this arm of the junction.

- 4.70 Signalisation was also tested. Results indicated that the junction would operate at or close to capacity during the peak hours. It would also contribute to a significant increase in Inclusive Delays which, on balance, was felt to be at variance with the need to manage peak hour congestion in line with recommendations in the YTSR.
- 4.71 Finally, an enlarged version of the existing roundabout was tested. This approximates closely to the arrangement advocated by WSP in their Transport Assessment in support of development at Bunford Park. WSP's proposed arrangement was redrawn by Atkins as the plan they provided in their Transport Assessment could not be accurately measured. Of the various options assessed this arrangement was felt to provide the best overall results. Preliminary proposals are shown in **Figure 4.8**.

#### *Western Relief Road*

- 4.72 At present, the traffic model has assumed that the Western Relief Road is a single carriageway road. This arrangement has been influenced by comments made at the Local Plan Public Inquiry where it was agreed that a single carriageway would probably suffice for some years. As part of this agreement it was accepted that land should, however, be reserved as part of the Bunford Park development to allow for the eventual dualling of this road between Westlands and Lysander Rd roundabout. This reflects the anticipated impact of development traffic from Bunford Park and is in line with proposed improvements to the A37 and the Second Strategic Route improvements. It has been assumed that costs associate with this improvement would be met by the development at Bunford Park as this would be a prime beneficiary of any such improvement and a major contributor in terms of generated traffic.
- 4.73 An overall plan of the corridor and its proposed Option 2 improvements are shown in **Figure 4.9**.

#### **TOUCAN CROSSINGS AND CYCLE ROUTES**

- 4.74 At present there is one Pelican crossing in the YWC south of the junction of Western Ave and Copse Road. The only other pedestrian crossing facility is at the signalised access to the Asda food store on Preston Road.
- 4.75 There are proposals to provide thirteen new Toucan Crossings in the YWC and surrounding environs as part of the recommendations arising from this study. This will involve retaining the existing facility at the Asda access and upgrading the puffin crossing south of the junction formed by Copse Rd and Western Ave. Demand for these crossings has been assessed as part of the wider provision for walking and cycling in this corridor - details of which are described in the following section. In locating these facilities, discussions between SCC, Brympton Parish Council and Westland's Bicycle User Group (BUG) have also been taken into consideration.
- 4.76 Inclusive Delays arising from both the existing and proposed crossings have been included in the analysis of delays in the YWC – details of which are

summarised in **Tables 4.6** and **4.7**. In doing this, it is recognised that the benefits from provision of this sort must be weighed against the potentially adverse implications for other road users. It can be seen that their provision is not forecast to significantly increase overall delay in the corridor.

- 4.77 **Table 4.5** shows the proposed locations for Toucan Crossings and the assumptions that have been made concerning the number of times in any peak hour that pedestrians will seek to cross.

**Table 4.5 - Estimated Crossing Demand / Per Hour**

Primary Location	Secondary Location	AM Demand Per Hour	PM Demand Per Hour
Western Ave	Thorne Lane	12	12
Western Ave	South of Copse Road	15	15
Western Ave	North of Houndstone Roundabout	15	30
Western Ave	North of Preston Road Roundabout	15	30
Preston Road	West of Asda Signalised Access	(1)	(1)
Bunford Lane	North of Bluebell Road	12	30
Bunford Lane	South of Bluebell Road	30	30
Westland's Access	East of Westland's Roundabout	20	20
Western Relief Road	East side Bunford Park	(1)	(1)
Stourton Way (North) (2)	North of Copse Rd	12	12
Stourton Way (South)	East of Houndstone Roundabout	15	15
Luffton Way	East of Preston Rd Roundabout	15	15
Lysander Rd	East of Roundabout	20	20

(1) Phasing incorporated within signals

(2) Flows assumed to be the same on Stourton Way (south)

## SUMMARY AND CONCLUSION

### *Inclusive Delay*

- 4.78 In summary, it can be seen from **Table 4.6** and **Table 4.7** that the proposed modifications in Option 1 result in significantly higher Inclusive Delays at both individual junctions and the corridor as a whole when compared with Option 2. Overall, this amounts to a doubling of Inclusive Delays in both the AM and PM peak hour. This scale of increase is not judged to be compatible with the guidelines specified in YTSR for the management of PM peak hour congestion, although the increase falls just below the 126% threshold during the AM peak hour.
- 4.79 By contrast, Option 2, which is characterised for the most part by the retention of existing roundabouts and the provision of additional pedestrian crossings gives better results than Option 1. Inclusive Delays record little or no change in the AM peak (-9%) and a more significant reduction (-36%) during the PM peak. This latter reduction is largely due to forecast improvements caused by the enlargement of the Westland's roundabout.

- 4.80 Traffic surveys undertaken in November 2005 indicate that there are higher levels of queuing and delay on some arms of the junctions at Preston Road, Westlands and Lysander Road roundabouts, compared with that forecast by the junction models. This may mean that the assessment of operational benefits in Option 2 has been underestimated on account of the higher levels of existing delays in the Base Year (2002) and Do Minimum (2011) assessments. This is a valid conclusion if one assumes that any site specific characteristics contributing to these higher delays will not migrate to any new design. Alternatively, if they do migrate, either in part or in whole, then the proposed design should be seen as the absolute minimum level of provision at these junctions. Under these circumstances we believe that a sensible contingency would be to assume that the proposed improvements represent the absolute minimum level of provision to be made at these junctions.

#### *Third Party Land*

- 4.81 In addition to these considerations the amount of land required to implement a signals based strategy was judged to be excessive. Consequently, both in terms of Inclusive Delay and third party land it is recommended that Option 2 forms the basis of the preferred strategy in this corridor.

#### *Toucan Crossings*

- 4.82 The provision of additional Toucan Crossings is not judged to have a significant impact on delays within the corridor. This conclusion is dependent upon the assumptions that have been made concerning the number of times any crossing is activated (or called) during the peak hours.

**Table 4.6 – Changes in Do Something Option 1 Inclusive Delays (Vehicle Mins)**

Junction	2002 Observed			2011 Actual		
	AM Peak	PM Peak	AM Peak	%Δ	PM Peak	%Δ
Thorne Lane (Priority)	5689	36253	31	-99	26	-100
Copse Road (Signals)	147	120	423	188	517	331
Houndstone Retail Park (Signals)	103	125	732	611	974	679
Preston Road (Signals)	243	383	861	254	1785	366
Asda Supermarket (Signals)	274	553	259	-5	446	-19
Bluebell (Signals)	202	253	517	156	742	193
Westland's Roundabout 65m ICD	389	3312	207	-47	3876	17
Bunford Park (Signals)	0	0	989		459	
Lysander Road (Signals)	807	329	1405	74	2494	658
Controlled Crossings	2.0	2.8	45	2125	58	1961
Total* (Including Thorne Lane) (Excluding Bunford Park)	7856	41331	4480	-43	10918	-74
Total (Excluding Thorne Lane (Excluding Bunford Park)	2167	5078	4449	105	10892	115

YTSR Congestion Index : AM Peak Hour +126%PM Peak Hour +60%

**Table 4.7 Changes in Do Something Option 2 Inclusive Delays (Vehicle Mins)**

Junction	2002 Observed		2011 Actual				2011 Attenuated			
	AM Peak	PM Peak	AM Peak	%Δ	PM Peak	%Δ	AM Peak	%Δ	PM Peak	%Δ
Thorne Lane (Priority)	5689	36253	45	-99	29	-100	40	-99	28	-100
Copse Road (Roundabout)	147	120	124	-16	122	2	114	-22.	114	-5
Houndstone Retail Park (Roundabout)	103	125	109	6	161	29	101	-2	138	10
Preston Road (Roundabout) 58 m ICD	243	383	317	31	476	24	283	16	383	<1
Asda Supermarket (Signals)	274	553	317	16	655	18	269	-2	491	-11
Bluebell (Roundabout)	202	253	355	76	497	96	307	52	389	54
Westland's Roundabout 80m ICD	389	3312	301	-23	672	-80	269	-31	505	-85
Bunford Park (Signals)			1443		459		1443		459	
Lysander Road (Roundabout)	807	329	380	-53	576	75	327	-60	497	51
Controlled Crossings	2	2.8	76	3685	88	3053	73	3525	83	2871
Total (Including Thorne Lane) (Excluding Bunford Park)	7856	41331	2023	-74	3276	-92	1783	-77	2628	-94
Total (Excluding Thorne Lane) (Excluding Bunford Park)	2167	5078	1979	-9	3247	-36	1742	-20	2601	-49

YTSR Congestion Index : AM Peak Hour +126%PM Peak Hour +60%

## 5. Sustainable Transport Measures

### CYCLIST AND PEDESTRIAN (TOUCAN) CROSSINGS

- 5.1 An important part of the transport strategy for the YWC involves the provision of improved facilities to encourage the use of sustainable travel modes in the corridor. This has concentrated for the most part on providing new shared footways and cycleways in conjunction with a significant increase in the number of Toucan crossings. The locations of Toucan crossings have been selected with reference to established desire lines between residential areas, schools, centres of employment, leisure and retail centres - as well as public transport routes.
- 5.2 These measures seek to compensate for the managed reduction in levels of service that will affect motorised modes of transport during peak periods in the YWC and the town more generally during the next decade. In doing this, the selected measures seek to provide a credible alternative for short distance trips currently travelling by car in the YWC.
- 5.3 **Figure 2.1** shows the locations where pedestrian footways and cycleways are currently located in the corridor. This reveals that a significant proportion of the corridor has only limited access to these facilities. **Figure 5.1** shows the intended improvements in this corridor. From this it can be seen that the strategy envisages a significant upgrade in provision for these travel modes.
- 5.4 **Table 5.1** summarises the most significant changes in relation to both links and junctions in the corridor. Key points worth noting include:
- ◆ The provision of thirteen new Toucan crossings;
  - ◆ The provision of a new fully segregated north to south footway/cycleway running to the east of the YWC corridor between Thorne Lane and Preston Road;
  - ◆ The addition of approximately 2,500 metres of combined footways and cycleway;
  - ◆ An additional 450 metres of new footways;
  - ◆ The retention of all existing footway/cycleway provision in the corridor.
- 5.5 It is felt that this scale of provision will form the basis of a credible alternative to the car in the YWC, with the intention of facilitating the transference of local trips from car to either walking or cycling. Furthermore, these measures will also serve to encourage the use of these alternative modes by new residents coming to live in this area.

### PUBLIC TRANSPORT

- 5.6 **Figure 2.2** shows the current public transport routes in this area. **Figure 2.3** shows the location of existing bus stops and the points which fall outside a 600 metre radius of existing stops. This distance has been used as an approximation to an 800 metre walking distance advocated by the County Council (in their LTP2) as being the preferred maximum walking distance to a public transport route. Generally speaking, these results indicate quite good levels of accessibility - albeit to a fairly limited range of services. Where there

is a need to provide additional bus stops these should now include provision for new bus boarders (raised kerbs for low floor buses) in accordance with current best practice.

- 5.7 The study has not made any specific recommendations about the need for new bus services or stops in the YWC. The reason for this is because it is felt that the planning of public transport routes is primarily a strategic consideration which needs to view current provision within the town as a whole, and weigh the relative merits of any new provision in the YWC against other competing services in Yeovil and other places.
- 5.8 Although the study does not specifically identify any new public transport routes, it is obvious that the Western corridor and its surrounding environs represent one of the main growth centres in Somerset. As such, the study strongly recommends that detailed consideration should be given to the changing travel patterns in Yeovil induced by the proposed development in this and other parts of the town, with a view to identifying new public transport services as part of the development process. Ideally, any new services identified as part of this process should be provided during the early stages of the development process so as to 'mould' travel habits at their inception, rather than to try and change them once established in this or other parts of the town. A particular case in point would be the proposed developments at Bunford Park, Lufton and Brimsmore.
- 5.9 In addition to strategic considerations pertaining to the planning of public transport services, the County could review its policy in relation to schools transport. At present only those children living outside a two mile radius of their school are eligible to use school transport. If this criteria was to be relaxed to allow access regardless of residential location it might contribute to a significant reduction in short distance car trips. Confirmation of these benefits would have to be assessed for each school separately.

**Table 5.1 - Proposed Improvements for Pedestrians and Cyclists - YWC**

Links/ Junctions	Current Provision	Proposed Improvement
Thorne Lane to Preston Rd	Existing footway/cycleway provision through residential areas.	New contiguous north-south segregated footway/cycleway running parallel to YWC with links to existing shared footways/cycleways.
Thorne Lane (Priority junction)	Footway provision in places.	New Toucan crossing on northern arm. Eastern arm of Thorne Lane to become a fully segregated route for pedestrians and cyclists. On line cycle facilities on western arm.
Thorne Lane to Cope Rd	Footway on eastern side.	Shared footway/cycleway on eastern side with new footway on western side.
Cope Rd (Priority junction)	Footway provision in places.	New shared footways/cycleways provided.
Cope Rd to Stourton Way (south)	Existing Pelican Crossing.  Footway on eastern side.	Pelican upgraded to Toucan crossing.  Continuous shared footway/cycleway on western side.  New shared footway/cycleway along eastern side linking to new on line cycleway on Westminster and Malmesbury Way.  New Toucan and shared footway/cycleway linked to Meade Ave.
Houndstone Roundabout	Footway provision in places.	Shared footway/cycleway extended along western side of junction.  New footway on north side of Stourton Way (south)
Houndstone to Preston Rd	Footway on eastern side.	New shared footway/cycleway on western side.  New Toucan Crossing north of Preston Rd roundabout.
Preston Rd Roundabout	Footway/cycleway in south east quadrant of junction.  Other footways in places.	Retain existing shared footway/cycleway in south east quadrant.  New shared footway/cycleway in north east and north west quadrants of junction.  Footway reinstated in south western quadrant.
Preston Rd to Asda Access	Footway/cycleway on south side.  Pedestrian phase at signalised access.	Shared footway/cycleway extended along both sides of carriageway linking back to the Asda access.  Pedestrian phase at Asda traffic signals retained and augmented with a new Toucan crossing on western arm of Preston Rd.
Lufton Way	Footway on northern side.	Extend shared footway/cycleway on northern side linking to Houndstone Business Park access.
Preston Rd to Bluebell Rd	Footway/cycleway on eastern side.	Retain existing shared footway/cycleway on east side.  New Toucan crossing north of Bluebell roundabout.
Bluebell Road	Existing footway/cycleway on south side.	Retain shared footway/cycleway on south sides of Bluebell Rd.
Alvington Lane	Existing footway/cycleway.	Retain existing shared footway/cycleway.
Bluebell Roundabout	Existing footway/cycleways in all quadrants except north west.	Retain existing shared footway/cycleways and supplement with additional provision in north west quadrant.
Bluebell Rd to Westland's roundabout	Existing footway/cycleway eastern side.	Retain existing footway/cycleway on eastern side.  New Toucan crossing south of Bluebell roundabout.
Westland's Roundabout	Existing footway/cycleway on east side with additional provision on north side of Bunford Lane (east).	Retain existing shared footway/cycleway on east side.  Realign eastern crossing to new Toucan crossing.  Provide new Toucan crossing on Bunford Lane (east).
Signalised Access to Bunford Park	Existing footway/cycleway east side.	Retain shared footway/cycleway on east side.  Provide new Toucan crossing for access to Bunford Park.
Lysander Rd Roundabout	Existing footway/cycleway.	Retain existing shared footway/ cycleway.
Lysander Rd	Existing footway/cycleway south side	Retain existing shared footway/ cycleway and provide new Toucan crossing east of roundabout.  New footway on Watercombe Lane (N) west side.

## 6. Statutory Undertakers Equipment

6.1 As part of the process of estimating junction design costs, information and maps have been obtained of Statutory Undertakers (SU) plant and equipment in the YWC. These include:

- ◆ Transco (Wales & West Utilities Ltd) have supplied information of their gas infrastructure along the YWC.
- ◆ Wessex Water has supplied data on foul sewer and public water main pipes.
- ◆ Western Power Distribution is responsible for electricity cables to the west of Western Avenue including 132 kV cables running parallel to Western Avenue.
- ◆ Scottish and Southern Energy plc have provided high and low voltage mains records to the eastern side of Western Avenue.
- ◆ British Telecommunications has supplied information detailing their local networks which are predominantly underground cabling.
- ◆ Somerset County Council has shown the known pedestrian crossings south of Copse Road and on Preston Road near Asda. Traffic counting loops are also in the highway south of Thorne Lane and south of Cartgate roundabout.

All other SU companies have replied that they have no equipment in the vicinity of the YWC.

6.2 Based on these returns, a number of items including chamber locations, pipe depth and required level of protection have been identified that may affect junction design and costing.

6.3 We have used this information to identify where there is a potential risk caused by a proposed junction improvement building over existing equipment. **Table 6.1** summarises the situation in relation to Option 2. As part of this process we have also summarised the extent of provision in each quadrant of the existing junctions affected by the proposed modifications. This summary excludes any implications for the new accesses to Bunford Park, or the new junction at Thorne Lane as this forms part of the Brimsmore development.

**Table 6.1 - Statutory Undertakers Plant and Equipment**

	Gas	Water	Electricity	Telecoms
Copse Road	✓	✓	✓	✓
Quadrant	SW	SW	SW	SW
Preston Road Roundabout	×	×	✓	✓
Quadrant			NW,SW,SE	NW,SW,SE
Asda Access	×	×	✓	✓
Quadrant			SE	SE
Westland's Roundabout	✓	✓	✓	✓
Quadrant	SW	SW	SW,SE,NW,NE	SW
Lysander Road	✓	(1)	(1)	(1)
Quadrant	NE			

(1) No information provided

SW = South West quadrant of junction.

- 6.4 At present, no firm conclusions can be reached on suitable solutions or diversions as specific site investigation and consultations with the relevant statutory authorities will be required on a case by case basis. As such, the cost estimates for any diversions must be treated as being only provisional at present.

## 7. Evaluation

- 7.1 This part of the report is split into two halves. The first addresses the performance of the proposed link and junction modifications in relation to the composite KPIs specified in Section 2. The second part summarises the results of the safety audit. It should be noted that since the original safety audit there have been some modifications made to selected junctions which it is felt will enhance safety. These include:
- ◆ An enlargement and realignment of the Copse Road roundabout;
  - ◆ The selection of the 58 metre ICD roundabout at Preston Road.
- 7.2 Within Section 2, an assessment of relevant Local Plan and Local Transport Plan objectives led to the development of a composite series of Key Performance Indicators against which each scheme has been evaluated. This process has been confined to Option 2 which, on balance, is seen to be operationally the better of the two Options. **Table 7.1** summarises the intended changes.
- 7.3 The evaluation is summarised in **Tables 7.2** and **7.3**. Broadly speaking, each junction and intervening length of road has been assessed to determine whether the proposed modification has a positive, negative or neutral effect in relation to the KPIs.

**Table 7.1 - Junction Types- Current and Proposed**

Location	Present	Option 2 Recommendations
Thorne Lane	Priority	Priority Junction- altered priority
Copse Road	Priority	Roundabout
Houndstone Retail Park	Roundabout	Existing Roundabout
Preston Road	Roundabout	Enlarged Roundabout
Asda Access	Signals	Modified Signals
Bluebell Lane	Roundabout	Existing Roundabout
Westland's Roundabout	Roundabout	Enlarged Roundabout
Lysander Road	Roundabout	Enlarged Roundabout

- 7.4 Summarised below is a commentary on the KPIs in relation to the proposed improvements in the YWC - starting with the most relevant KPIs. Where reference is made to changes in Inclusive Delay this is as summarised in **Tables 4.4, 4.6** and **4.7**.

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**VERY RELEVANT KPIS****Minimise all Personal Injury Accidents**

- 7.5 Generally speaking, the provision of Toucan crossings and footways and cycleways are seen as supporting the attainment of this KPI. In addition to this, the modifications at Copse Road are seen as being compatible with the attainment of this KPI, as this type of junction (roundabout) will tend to incur lower rates of accidents compared to the existing priority arrangement. With the exception of Preston Road, Westland's and the Lysander Road roundabouts, all the other junctions are seen as having a largely Neutral impact as they will neither facilitate pedestrian crossing or significantly worsen the existing situation. At Preston Road, Westland's and Lysander Road roundabouts the proposed arrangement will tend to slightly worsen the existing situation, as pedestrians (who choose to cross here) will have to cross over widened carriageways as part of the proposed capacity enhancing measures. In reality, these effects will be very slight as the extent of road widening is of modest proportions.

**Reduce the effects of severance**

- 7.6 Minimising Personal Injury Accidents and reducing the effects of Severance are judged to exhibit broadly similar characteristics within the assessment process. Exceptions to this generalisation include the provision of new footways and shared footways and cycleways which were judged to be Neutral in relation to their effects on Severance. By contrast, Toucan crossings will have the effect of reducing Severance while enlarging junctions will tend to increase Severance. Modifications to the junction at Copse Road is seen as being Neutral in its effects while Thorne Lane is judged to be Positive.

**Manage the operational efficiency of the highway network in respect of congestion and delays**

- 7.7 Those junctions that contribute to a reduction in Inclusive Delay (based on Actual flows) relative to the 2002 Base Year are seen as conferring a Positive impact in the corridor. Those that fall within the permitted threshold for peak hour congestion, as defined in the YTSR, are judged to be Neutral, while those that fall beyond this threshold in one or more peak periods are seen as having a Negative impact. On this basis, all of the junctions are either Positive or Neutral in their overall impact.
- 7.8 Although Toucans will introduce some additional delay to vehicular traffic this must be weighed in relation to their benefits for pedestrians and cyclists. On balance, their effect is judged to be Neutral once allowance has been made for the need to encourage these travel modes in this corridor.
- 7.9 Where provision is being made for a combined footway and cycleway these are similarly seen as conferring Positive benefit in relation to this KPI. Individual footways are judged to be Neutral.
- 7.10 In summary, the impact of the proposed recommendations in relation to the Very Relevant KPIS is for the most part either Positive or Neutral. Where

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there are Negative effects these are largely confined to junctions where there is a need for enlargement as part of a capacity enhancing feature.

### **RELEVANT KPIS**

#### **Improve provision for walkers and cyclists by increasing the provision of segregated facilities**

- 7.11 Most of the improvements in relation to this KPI are linked to the provision of additional Toucan crossings and the extended provision of shared footways and cycleways. The reconfiguration of Thorne Lane junction is also seen as conferring positive benefit to walkers and cyclists, as the eastern arm of the junction will experience a very marked reduction in vehicular traffic, thereby facilitating its use by both these travel modes. This will be further augmented by the provision of the new Toucan immediately to the north of this junction.

#### **Increase crossings with provision for disabled**

- 7.12 The provision of additional Toucans represents tangible evidence of the commitment to improving provision for this particular group of users.
- 7.13 In summary, the Positive and Neutral effects are judged to be fairly evenly distributed among the Relevant KPI's. Furthermore, none of the initiatives are judged to have any Negative effects.

### **SLIGHTLY RELEVANT KPIS**

#### **Improve provision for public transport to facilitate its use and reliability**

- 7.14 Generally speaking access to public transport within the YWC is fairly good, if the distribution of bus shelters can be used as an approximation for access to this mode.
- 7.15 Although consideration was given to the possibility of making segregated provision for public transport within the corridor this was dismissed on two counts. First, the capacity implications and the consequential need to acquire significant amounts of third party land. Second, the existing frequency of services do not justify fully segregated provision either in the present or the foreseeable future.
- 7.16 Most of the junction improvements are judged to be Neutral in relation to this KPI. This is because the increase in Inclusive Delay is confined to within the prescribed limits as specified by the YTSR. Where Inclusive Delay is reduced relative to the 2002 Base the junction is assumed to confer a Positive benefit to public transport. The converse is true when the growth in Inclusive Delay exceeds the prescribed limit.
- 7.17 Toucan crossings are judged on balance to have a largely Neutral impact. This conceals both positive benefits in terms of facilitating pedestrian access to bus stops and Negative impact in terms of additional delay to vehicular traffic.
- 7.18 New footways and cycleways are seen as having a similarly Neutral effect.

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**Encourage measures aimed at reducing noise levels**

- 7.19 In assessing this KPI reference was made to the operational assessment made as part of the assessment of Inclusive Delays. This has been confined to Actual flows.
- 7.20 Where it is forecast that there will be a significant improvement in the operational performance of the junction relative to the existing situation (2002), the impact is judged to be Positive. Conversely, where there is evidence of a marked deterioration in levels of service relative to the existing situation, resulting in prolonged periods of over capacity, the impact has been assessed to be Negative. All other results were judged to be Neutral.
- 7.21 As a general rule, junctions subject to prolonged periods of over capacity will tend to generate higher noise levels than those that operate within capacity.
- 7.22 Although Toucans may result in some increase in noise levels due to slowing down and starting-up, these are not judged to be of discernible proportions.
- 7.23 The provision of footways and cycleways is seen as conferring Positive benefits in this respect as they will serve to encourage walking and cycling - some of which may result in a reduction in vehicular traffic.

**Meet NAQS**

- 7.24 The comments concerning noise levels are judged to be equally applicable to air quality. Generally speaking, junctions that minimise delay and over capacity will tend to generate lower levels of atmospheric pollution. As such, both noise and air quality have been assessed in relation to the recommendations in the same way.
- 7.25 In relation to the Slightly Relevant KPIs the proposed recommendations are for the most part judged to be Neutral with very few recommendations seen as having a Negative impact.

**SUMMARY**

- 7.26 In overall terms about half of all possible KPIs record a Positive Impact. Key to this figure is the provision of Toucan Crossings and new lengths of footway and combined footway and cycleway, which serve to facilitate access for both pedestrians, cyclists and the disabled and record a consistently Positive score. Most of the remaining KPIs are graded as being Neutral. Those that are Negative occur for the most part where it has been necessary to enlarge a junction with potentially adverse implications on pedestrians and cyclists.

**Table 7.2 - – YWC - KPI Assessment Table - Option 2**

NATA Objective	Status and KPI Thorne Lane to Preston Rd	Thorne La to Copse Rd											Houndstone Rbt to Preston Rd			
		Toucan (1)	Thorne Lane Priority	Footways /Cycleways	New Footway	Copse Roundabout	Toucan (2)	Footway/Cycleways	New Footway	Stourton Way Toucans (2)	Stourton Way Footway Cycleway	Houndstone Rbt	On Road Cycle Routes	Footway/Cycleways	Toucan (1)	Preston Rd Rbt
	<b>Very Relevant</b>															
Safety	Minimise all Personal Injury Accidents	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Environment	Reduce the effects of severance	+	+	~	~	~	+	~	~	+	~	~	~	~	+	-
Economy	Manage the operational efficiency of the highway network in respect of congestion and delays	~	+	+	~	+	~	+	~	~	+	~	+	+	~	~
	<b>Relevant</b>															
Accessibility	Improve provision for walkers and cyclists by increasing the provision for segregated facilities	+	+	+	+	~	+	+	+	+	+	~	+	+	+	~
Accessibility	Increase crossings with provision for disabled	+	~	~	~	~	+	~	~	+	~	~	~	~	+	~
	<b>Slightly Relevant</b>															
Economy	Improve provision for public transport to facilitate its use and reliability	~	+	~	~	+	~	~	~	~	~	~	~	~	~	~
Environment	Encourage measures aimed at reducing noise levels	~	+	+	+	+	~	+	+	~	+	~	+	+	~	~
Environment	Meet NAQS	~	+	+	+	+	~	+	+	~	+	~	+	+	~	~

YWC - KPI Assessment Table - Option 2

NATA Objective	Status and KPI Preston Rd to Lysander Rd	Preston Rd to Asda Access and Lufton Way					Preston Rd to Bluebell Rd			Bluebell Rd to Westland's				Westland's to Lysander Rd Rbt		
		Lufton Way	Lufton Way Toucan	Preston Rd (east)	Asda Toucan (1)	Asda Access	Toucan (1)	Bluebell Rd	Bluebell Rbt	Alvington La Access	Toucan (1)	Westland Rbt	Westland's Toucan	Bunford Toucan (1)	Lysander Rd Toucan	Lysander Rd Rbt
		<b>Very Relevant</b>														
Safety	Minimise all Personal Injury Accidents	~	+	+	+	+	+	~	~	+	+	-	+	+	+	-
Environment	Reduce the effects of severance	~	+	~	+	~	+	~	~	+	+	-	+	+	+	-
Economy	Manage the operational efficiency of the highway network in respect of congestion and delays	+	~	+	~	~	~	+	~	+	~	+	~	~	~	+
<b>Relevant</b>																
Accessibility	Improve provision for walkers and cyclists by increasing the provision for segregated facilities	+	+	+	+	+	+	~	~	~	+	~	+	+	+	~
Accessibility	Increase crossings with provision for disabled	~	+	~	+	~	+	~	~	~	+	~	+	+	+	~
<b>Slightly Relevant</b>																
Economy	Improve provision for public transport to facilitate its use and reliability	~	~	~	~	~	~	~	~	~	~	+	~	~	~	+
Environment	Encourage measures aimed at reducing noise levels	+	~	+	~	~	~	~	-	+	~	+	~	~	~	+
Environment	Meet NAQS	+	~	+	~	~	~	~	-	+	~	+	~	~	~	+

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## STAGE 1 ROAD SAFETY AUDIT

### Commission and Terms of Reference

- 7.27 The second half of the evaluation process has involved a Stage 1 Road Safety Audit (RSA) of the proposed junction improvements. The terms of reference for the audit are as described in HD19/03. The auditors have examined and reported on only the road safety implications of the measures as presented in Option 2, and have not specifically examined or verified the compliance of the designs to any other criteria.
- 7.28 Following the audit, measures have been taken to amend some of the preliminary designs in line with recommendations. These are summarised under the heading of – ‘Actions Following Audit’. Figures shown in the report include these modifications where indicated.
- 7.29 The audit comprised a desktop review of the Audit Brief and a subsequent site visit undertaken by the Audit Team during hours of daylight on Monday 31st October 2005.
- 7.30 No details were provided regarding signs and markings, pedestrian and cycle facilities, lighting, drainage and other details. These items will need to be provided and reviewed during the Stage 2 Road Safety Audit.
- 7.31 The scheme proposals audited involved alterations to the following junctions:
- ◆ **Copse Road/Western Avenue** – install roundabout to replace the existing priority junction.
  - ◆ **Preston Road roundabout** - the enlarged variant of this junction (58m ICD) has now been adopted in light of the comments made as part of this audit.
  - ◆ **Westland’s roundabout** - enlargement and installation of a Toucan crossing on the eastern arm. The original assessment had made provision for a Zebra crossing on the eastern arm.
  - ◆ **Lysander Road roundabout (Watercombe Lane)** – enlargement of the existing roundabout.
  - ◆ **A new Toucan crossing to the north of the Bluebell roundabout** (Bluebell Road/Bunford Lane junction).

Other Toucan crossings have been subsequently added to the strategy following completion of this audit. These will have to be assessed at a later point in time.

### ISSUES RAISED BY THIS STAGE 1 ROAD SAFETY AUDIT

- 7.32 The annotated scheme plans in **Appendix I** indicate the location of the safety issues raised in this section.

#### General

- ◆ **Location: Yeovil Western Corridor**
- ◆ **Summary: Pedestrian and cycle facilities**

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- 7.33 Although footways and cycleways are currently provided in some locations and more are proposed as part of the scheme, it is unclear how the facilities would tie into one another or how it is intended to make safe provision for pedestrians and cyclists at each junction. Inconsistent or fragmented facilities may result in pedestrians and cyclists crossing roads in unsafe locations.
- 7.32 **Recommendation:** Ensure that the pedestrian and cycle facilities proposed provide for all movements and are consistent and continuous across junctions and throughout the scheme.
- 7.33 **Actions following Audit:** Further improvements have been made to the intended provision for pedestrians and cyclists. In addition to this, the modifications have sought to improve the continuity of provision throughout the corridor.

### Copse Road Roundabout

- ◆ **Location: Cope Road roundabout**
- ◆ **Summary: Location of junction would restrict visibility of roundabout**

- 7.33 The Copse Road/Western Avenue junction is located on the crest of a hill which will inhibit approaching drivers' forward visibility to the junction. This issue is exacerbated by the small central island proposed at this location which would not facilitate planting or signage to increase the conspicuousness of the roundabout. Drivers that do not see the roundabout junction may fail to stop at the give-way line increasing the risk of conflict with vehicles already within the circulatory carriageway.
- 7.34 **Recommendation:** Consider means to increase the visibility of the roundabout including landscaping on the surrounds and signage on the approaches to the junction.
- ◆ **Location: Approaches to junction**
  - ◆ **Summary: Inadequate deflection**
- 7.35 The roundabout junction proposed at this location would not provide adequate deflection for some traffic movements; in particular the southbound route through the junction. Poor entry path curvature and/or deflection can encourage both high approach and circulating speeds on the roundabout and may result in failure to give-way by drivers and the associated risk of conflict with vehicles already on the circulatory carriageway.
- 7.36 **Recommendation:** Modify the geometry of the proposed junction to provide adequate deflection for all movements.
- 7.37 **Actions following Audit:** Since the audit this junction has been enlarged and relocated with the intention of increasing deflection for traffic on Western Ave, improving entry path curvature and increasing the overall visibility of the junction to approaching traffic.

### Preston Road Roundabout

- ◆ **Location: Immediately north of junction**
- ◆ **Summary: High speed approach to Toucan crossing**

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- 7.38 The southbound approach to the proposed Toucan crossing immediately north of the roundabout is a high speed section of road which is on a down hill gradient and controlled by a 40mph speed limit. The high speeds of vehicles approaching this crossing may present a hazard to pedestrians and cyclists crossing at this location.
- 7.39 **Recommendation:** Extend the 30mph zone at the roundabout further north to a point upstream of the Toucan crossing. It is also recommended that speed reducing measures, anti-skid surfacing and advanced signage be installed to reduce the risk to pedestrians and cyclists. Consideration should also be given to using the maximum set back at the stop line of 3.0m rather than the minimum of 1.7m. This will reduce intimidation of pedestrians and also provide a greater safety margin.
- ◆ **Location: Pedestrian crossing points at flared entries**
  - ◆ **Summary: Pedestrians would need to cross three lanes of traffic**
- 7.40 Although the design proposals do not increase the crossing distances at the roundabout entries and exits, pedestrians would need to cross three lanes of traffic instead of the current two, complicating the crossing movement. Furthermore, vehicles in the lane nearest to the pedestrian may block visibility of vehicles in the other two lanes; this is a particular concern when the vehicle closest to the pedestrian allows the pedestrian to cross while drivers in the other lanes continue ahead. It is recognised that alternative facilities currently exist, or are proposed, on three of the four approaches to the roundabout, however, pedestrians are still likely to cross at the junction as it is on the shortest desire line.
- 7.41 **Recommendation:** Provide controlled facilities to allow pedestrians to cross at the roundabout junction. However, if the pedestrian and cycle strategy precludes providing such facilities, prevent pedestrians from crossing over the roundabout entries and exits by installing guardrailing.
- ◆ **Location: Central island**
  - ◆ **Summary: Redesigned island size would reduce vehicle deflection**
- 7.42 Decreasing the size of the central island would reduce the deflection of vehicles traversing the roundabout junction. Inadequate deflection can encourage high speeds onto and circulating the roundabout and may result in failure to give-way by drivers and the associated risk of conflict with vehicles already within the circulatory carriageway.
- 7.43 **Recommendation:** Ensure that the proposed modifications to the geometry of the proposed junction do not adversely affect the deflection for movements at the roundabout.
- 7.44 **Actions following Audit:** The modified variant of this junction has involved enlarging the existing arrangement to 58 metres ICD. This will improve deflection and entry path curvature. The Toucan situated to the north of the roundabout has been relocated 40 metres north of the junction.

### Westland's Roundabout

- ◆ **Location: Eastern exit from roundabout**

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◆ **Summary: Crossing located too close to circulatory carriageway**

7.45 The location of the proposed Zebra crossing on the eastern exit from the roundabout would be within 5 metres of the circulatory carriageway. Under this scenario, vehicles stopping for pedestrians would queue back into the circulatory carriageway where they would be in conflict with circulating vehicles.

**Recommendation:** Relocate this crossing facility further from the roundabout to increase the stacking length.

◆ **Location: Approaches to junction**

◆ **Summary: Inadequate deflection**

7.46 The proposed changes to the roundabout junction at this location would not provide adequate deflection for some traffic movements; in particular the route from south to west through the junction. Poor entry path curvature and/or deflection can encourage high speeds approaching the roundabout and may result in failure to give-way with risk to drivers already on the circulatory carriageway.

7.47 **Recommendation:** Modify the geometry of the proposed junction to provide adequate deflection for all movements.

7.48 **Actions following Audit:** The larger 80 metre ICD roundabout has been chosen in preference to the smaller 64 metre alternative that was originally assessed. The Zebra crossing on the eastern arm of the crossing has been upgraded to a Toucan and relocated 40 metres east of the junction.

### Lysander Road Roundabout

◆ **Location: Southbound approach to junction**

◆ **Summary: High speed alignment**

7.49 The proposed changes to the roundabout junction at this location would not provide adequate deflection for some traffic movements; in particular the route from south to west through the junction. Poor entry path curvature and/or deflection can encourage high speeds approaching the roundabout and may result in failure to give-way to drivers already on the circulatory carriageway. This issue is exacerbated by the high observed speeds on the existing downhill northbound approach.

7.50 **Recommendation:** Modify the geometry of the proposed junction to provide adequate deflection for all movements. It is also recommended that anti-skid surfacing and speed reduction measures be installed on this approach and that consideration be given to reducing the speed limit at the junction from the current 'derestricted' down to 30 or 40mph. In conjunction with this, enhanced signs warning of the roundabout should be provided.

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## 8. Budget Costs and Apportionment

### PRELIMINARY ESTIMATED SCHEME COSTS

- 8.1 **Table 8.1** summarises the budget cost estimates for the construction of junctions affected by the proposed recommendations. They omit reference to Thorne Lane as this junction is part of the Brimsmore development. Similarly, no reference is made to the signalised access to Bunford Park on the Western Relief Road as the costs of construction will be met by the proposed development.
- 8.2 Although information is available concerning the location of Statutory Undertakers plant and equipment, as summarised above, it has not been possible to reliably calculate diversion costs. As such, the figures referred to in **Table 8.1** are current best estimates which may be subject to further revision in light of site investigations and detailed engineering design.
- 8.3 Preliminaries and contingencies include the following:
- Contractors Costs (preliminaries) - 20% (includes site establishment & Health & Safety),
  - Contingencies 12.5%,
  - Preliminary design - 7%,
  - Detailed design - 5%,
  - Supervision – 3%,
- giving an overall increase of 56% in construction costs as summarised in **Table 8.1**.
- 8.4 The cost estimates do not include for land or compensation which will be estimated by the County Valuer & Estates Office.
- 8.5 At Westland's roundabout there is evidence of telecoms equipment being affected by the proposed (80 metre ICD) arrangement. Since the previous draft of this report further information has been obtained which has allowed for a more accurate assessment of costs associated with the diversion of these facilities.

**Table 8.1 - Budget Cost Estimates for All Highway Improvements**

Junction	New Roadway	Resurfacing	Cycle/ Footpath	Traffic Management	Stats	Preliminaries/ Contingencies/ Design & Supervision	Total
Copse Road Roundabout	£152,000	£155,000	£42,600	£10,000	£150,000	£285,000	£795,000
Preston Road Roundabout	£170,625	£420,500	£73,950	£15,000	£100,000	£437,000	£1,217,000
Westland's Roundabout	£605,750	£309,000	£ 190,200	£15,000	£200,220	£740,000	£2,060,000
Lysander Rd Roundabout	£289,125	£267,500	£92,810	£15,000	£150,000 (1)	£456,000	£1,270,000
Dualling WRR	£2,040,000	-	-	£20,000	(2)	£1,153,600	£3,214,000
Footways and Cycleways							£336,000
Toucans Crossings							£1,560,000
<b>Total</b>							<b>£10,452,000</b>

(1) Costs based on incomplete information.

(2) No information available.

8.6 **Table 8.2** outlines costs associated with the provision of thirteen new Toucan crossings. These will cost in total approximately £1,560,000. These costs are included in **Table 8.1**.

**Table 8.2 - Budget Cost Estimates for Toucan Crossings**

Pedestrian & Cyclist Infrastructure	
Toucan Crossing (13 planned)	£120,000 each

## 9. Conclusion

- 9.1 This report has sought to identify the scale of transport infrastructure in the YWC required to accommodate forecast growth in travel demand up to about 2011.
- 9.2 The corridor strategy allows for all major developments in Yeovil. This includes all the development sites in the vicinity of the western corridor. In addition to this, allowance has been made for the effects of background growth in traffic up to 2011.
- 9.3 The strategy seeks to build upon the existing infrastructure by modifying and enlarging where necessary some of the roundabouts in the corridor. At only one junction – Copse Rd, is the existing form of junction changed in favour of a roundabout.
- 9.4 As part of the transport strategy consideration was given to the possible signalisation of most of the major junctions in this corridor. Initially, it was thought that this would enable provision for both pedestrians and cyclists to be made while accommodating future growth in travel demand. This option was abandoned when the size of junctions required to accommodate forecast travel demand became apparent, and the growth in delay to traffic was quantified. The increase in delay was found to exceed guidance in the YTSR regarding admissible increases in delay during the peak hours.
- 9.5 With the demise of the traffic signal based strategy it became necessary to consider alternative ways of accommodating the requirements of both pedestrians and cyclists in the YWC. This has involved the enlargement of existing roundabouts at Preston Road, Westland's and Lysander Road, the realignment of the priority at Thorne Lane and the reconfiguration of Copse Road as a roundabout. The strategy also recommends the dualling of the Western Relief Rd.
- 9.6 The strategy also involves proposals that will see a marked increase in the provision of footways and shared footways and cycleways in this corridor. In this respect the strategy seeks to 'join up' provision that already exists for these sustainable modes into a more contiguous entity. The strategy also makes provision for a significant increase in the number of Toucan Crossings in the western corridor.
- 9.7 The study stops short of making recommendations about specific improvements in public transport services within the YWC. Despite this, the study states that due consideration should be given to specific improvements in services as development takes place in Yeovil generally - and the western corridor in particular. As part of this process consideration should be given to the possible contribution that schools transport could make in attenuating travel demand in the AM peak period if access could be made available to all school children regardless of residential proximity to their school.
- 9.8 The report concludes by summarising cost estimates for the construction of the transport infrastructure in the YWC. Current estimates put the total cost at £10.452.

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