

**Cotswold Local Plan Highway
Capacity Assessment**
Draft Final Report
Cotswold District Council

April 2016

ATKINS

Plan Design Enable

Notice

This document and its contents have been prepared and are intended solely for Cotswold District Council information and use in relation to the Cotswold District Council's Pre-submission Draft Local Plan

Atkins Ltd assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 42 pages including the cover.

Document history

| Job number: | | | Document ref: | | | |
|-------------|-----------------------------|------------|---------------|----------|------------|----------|
| Revision | Purpose description | Originated | Checked | Reviewed | Authorised | Date |
| Rev 1.0 | Draft | MS | MT | TC | | 21/01/15 |
| Rev 2.0 | Final Draft | MS | MT | TC | | 16/06/15 |
| Rev 3.0 | Post Client Review Comments | MT | TC | TC | | 12/10/15 |
| Rev 4.0 | Post Client Review Comments | DC | TC | TC | | 14/04/16 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Client signoff

| | |
|--------------------|---|
| Client | Cotswold District Council |
| Project | Cotswold Local Plan Highway Capacity Assessment |
| Document title | Final Report |
| Job no. | |
| Copy no. | 4.0 |
| Document reference | Cotswold Local Plan Highway Capacity Assessment.doc |

Table of contents

| Section | Pages |
|---|-----------|
| 1. Introduction | 5 |
| 1.1. Background | 5 |
| 1.2. Project Requirements | 5 |
| 1.3. Cotswold Emerging Local Plan Preferred Development | 5 |
| 1.4. Report Structure | 8 |
| 1.5. Technical Annex | 8 |
| 2. Junction Details | 9 |
| 2.1. Introduction | 9 |
| 2.2. Junction 1: A429 (High Street) / A44 (Oxford Street) | 10 |
| 2.3. Junction 2: A429 (High Street) / A44 (Bourton Road) | 11 |
| 2.4. Junction 3: A429 (Fosse Way) / A424 (Evesham Road) | 12 |
| 2.5. Junction 4: A429 (Fosse Way) / A436 (Sheep Street) / B4068 | 13 |
| 2.6. Junction 5: A429 (Fosse Way) / A424 | 14 |
| 2.7. Junction 6: A429 (Roman Road) / A436 (Old Gloucester Road) | 15 |
| 2.8. Junction 7: A429 / A40 | 16 |
| 2.9. Junction 8: A433 (London Road) / A433 (Long Street) / Hampton Street/ New Church Street | 17 |
| 2.10. Junction 9: A433 (Long Street) / A433 (Church Street) / B4014 (Silver Street) / Chipping Street | 18 |
| 2.11. Junction 10: A44 (Fish Hill) / B4081 (Conduit Hill) | 19 |
| 2.12. Junction 11: A44 (Five Mile Drive) / A424 | 20 |
| 2.13. Junction 12: A40 / A436 | 21 |
| 2.14. Junction 13: Not Assessed | 21 |
| 2.15. Junction 14: A417 (High Street) / A361 (Thames Street) | 22 |
| 2.16. Junction 15: A361 (Burford Street) / A417 (St.John's St) | 23 |
| 3. Capacity Assessment Methodology | 24 |
| 3.1. Inception Meeting | 24 |
| 3.2. Data Review and Collection | 24 |
| 3.3. 2014 Baseline Data | 24 |
| 3.4. 2031 Baseline | 25 |
| 3.5. 2031 Baseline + Preferred Development | 25 |
| 3.6. 2031 Baseline + Preferred & Reserved Development | 26 |
| 3.7. Trip Distribution and Assignment | 27 |
| 3.8. Junction Impact Assessment | 27 |
| 3.9. Junction Capacity Assessment | 27 |
| 3.10. Mitigation Proposals | 27 |
| 4. Junction Impact Analysis | 28 |
| 5. Mitigation Options | 33 |
| 5.1. Proposed Mitigation Schemes | 33 |
| 5.2. Proposed Mitigation Scheme Impact | 35 |
| 5.3. Scheme Cost Estimates | 37 |
| 6. Summary and Conclusions | 38 |
| 6.1. Summary | 38 |
| 6.2. Conclusions | 38 |
| Appendices | 39 |
| Appendix A. Mitigation Scheme Drawings | 40 |

Tables

| | | |
|-----------|---|----|
| Table 1-1 | Local Plan Preferred Development Site Areas | 6 |
| Table 1-2 | Assessment Junctions | 6 |
| Table 3-1 | Existing Data..... | 24 |
| Table 3-2 | Commissioned Traffic Counts..... | 24 |
| Table 3-3 | Committed Development Sites | 25 |
| Table 3-4 | Local Plan Preferred Development Areas | 26 |
| Table 3-5 | Local Plan Reserved Development Areas..... | 26 |
| Table 4-1 | Junction Capacity Assessment AM Peak | 29 |
| Table 4-2 | Junction Capacity Assessment PM Peak | 30 |
| Table 5-1 | Summary of Mitigation Capacity Assessments | 36 |

Figures

| | | |
|-------------|---|----|
| Figure 1-1 | Location of Assessment Junctions | 7 |
| Figure 2-1 | A429 (High Street) / A44 (Oxford Street) Layout..... | 10 |
| Figure 2-2 | Junction 1 Existing Traffic Flows | 10 |
| Figure 2-3 | A429 (High Street) / A44 (Bourton Road) Layout Plan..... | 11 |
| Figure 2-4 | Junction 2 Existing Traffic Flows | 11 |
| Figure 2-5 | A429 (Fosse Way) / A424 (Evesham Road) Layout Plan | 12 |
| Figure 2-6 | Junction 3 Existing Traffic Flows | 12 |
| Figure 2-7 | A429 (Fosse Way) / A436 (Sheep Street) / B4068 Layout Plan | 13 |
| Figure 2-8 | Junction 4 Existing Traffic Flows | 13 |
| Figure 2-9 | A429 (Fosse Way) / A424 Layout Plan | 14 |
| Figure 2-10 | Junction 5 Existing Traffic Flows | 14 |
| Figure 2-11 | A429 (Roman Road) / A436 (Old Gloucester Road) Layout Plan | 15 |
| Figure 2-12 | Junction 6 Existing Traffic Flows | 15 |
| Figure 2-13 | A429 / A40 Layout Plan | 16 |
| Figure 2-14 | Junction 7 Existing Traffic Flows | 16 |
| Figure 2-15 | A433 (London Road) / A433 (Long Street) / Hampton Street/ New Church Street Layout Plan 17 | |
| Figure 2-16 | Junction 8 Existing Traffic Flows | 17 |
| Figure 2-17 | A433 (Long Street) / A433 (Bath Road) / B4014 (Silver Street) / Chipping Street Layout Plan 18 | |
| Figure 2-18 | Existing Traffic Flows | 18 |
| Figure 2-19 | A44 (Fish Hill) / B4081 (Conduit Hill) | 19 |
| Figure 2-20 | Junction 10 Existing Traffic Flows | 19 |
| Figure 2-21 | A44 (Five Mile Drive) / A424 Layout Plan..... | 20 |
| Figure 2-22 | Junction 11 Existing Traffic Flows | 20 |
| Figure 2-23 | A40 / A436 Layout Plan | 21 |
| Figure 2-24 | Junction 12 Existing Traffic Flows | 21 |
| Figure 2-25 | A417 (High Street) / A361 (Thames Street) Layout Plan | 22 |
| Figure 2-26 | Junction 14 Existing Traffic Flows | 22 |
| Figure 2-27 | A361 (Burford Street) / A417 (St.John's St) Layout Plan | 23 |
| Figure 2-28 | Junction 15 Existing Traffic Flows | 23 |

1. Introduction

1.1. Background

Cotswold District Council (CDC) is preparing a Local Plan to cover the period 2011 to 2031 and it will be the key planning policy document which guides decisions on the use and development of land in the district.

Atkins have been commissioned to prepare a Junction Capacity Assessment to form part of the Local Plan evidence base and to inform the Infrastructure Development Plan. This report considers the development impact on the principal highway network within the Cotswold District and identifies mitigation measures required.

On the 30th September 2014 a meeting was held at CDC offices to discuss the extent of transport evidence required to support the growth identified within Cotswold District's Emerging Local Plan.

This meeting concluded that further analysis relating to traffic growth identified within Cotswold District's Emerging Local Plan would need to be undertaken.

1.2. Project Requirements

A highways based spreadsheet modelling tool was constructed to forecast the growth in traffic flows through key junctions and links as a result of future housing and commercial development proposals in the Cotswold District.

The study area was determined by identifying junctions of principal roads within the district. The junctions identified were then agreed with Gloucestershire County Council (GCC).

As part of the work to support the Chesterton development in Cirencester, an S-Paramics model was developed of the area. The S-Paramics model has therefore been used to assess the Local Plan impact on junctions in Cirencester. Whilst these junctions have been excluded from this analysis, the traffic generation of the development in Cirencester has been considered within this assessment.

The specific link and turning movement outputs required from the model include:

- Development traffic flows in PCUs per hour;
- Total traffic flows (baseline plus development flows) in PCUs per hour; and
- Percentage uplifts from baseline to total.

The results from the spreadsheet model are in the form of AM (08:00 – 09:00) and PM (17:00 – 18:00) peak hour highway network maps with link and turning movement arrow annotations, giving an immediate picture of the high-level highway impacts of the development proposals. This data was used for junction capacity modelling.

It was requested that future year development traffic should be based on generic trip rates derived from the TRICS database applied to the quantum of development under each land use class.

Junction improvement options were identified to address capacity issues. These preliminarily indicate of the level of improvement required to accommodate forecast traffic in capacity terms. Further detailed design for these junctions will need to be developed, and subsequently agreed by relevant stakeholders.

1.3. Cotswold Emerging Local Plan Preferred Development

Table 1-1 summarises the future development sites, land uses and sizes currently included within the Cotswold District's Emerging Local Plan. Due to the large number of small individual sites, the development sites have been grouped into development areas.

Table 1-1 Local Plan Preferred Development Site Areas

| | Area | Employment (ha) | Dwellings |
|--------------|----------------------|-----------------|--------------|
| A | Andoversford | | 40 |
| B | Blockley | | 51 |
| C | Bourton-on-the-Water | 3.38 | 10 |
| D | Chipping Campden | 1.76 | 127 |
| E | Cirencester | 9.1 | 2381 |
| F | Down Ampney | | 31 |
| H | Kemble | | 12 |
| I | Lechlade-on-Thames | 1.25 | 18 |
| K | Moreton-in-Marsh | 7.13 | 21 |
| L | Northleach | | 53 |
| O | Stow-on-the-Wold | | 30 |
| P | Tetbury | 6.74 | 27 |
| R | Willersey | | 80 |
| Total | | 29.36 | 2,881 |

To meet the aims and objectives of CDC, Atkins has undertaken capacity assessments for 14 junctions identified by Gloucestershire County Council within the Cotswold District to provide an indication of current and future capacity constraints taking into account the Cotswold District's Emerging Local Plan.

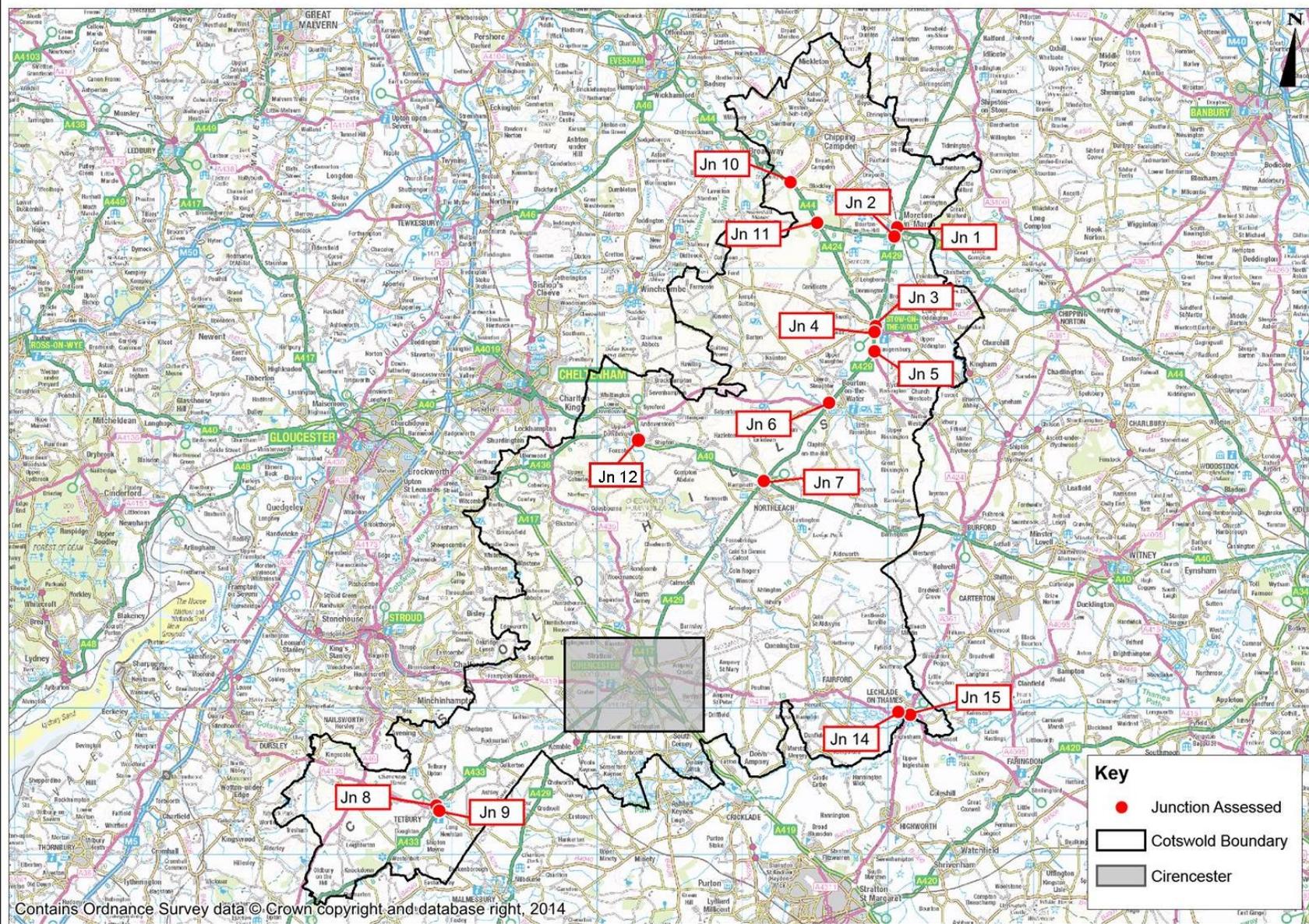
The junctions to be assessed are listed below in **Table 1-2**.

Table 1-2 Assessment Junctions

| Ref. | Junction Name |
|------|--|
| 1 | A429 (High Street) / A44 (Oxford Street) |
| 2 | A429 (High Street) / A44 (Bourton Road) |
| 3 | A429 (Fosse Way)/ A424 (Evesham Road) |
| 4 | A429 (Fosse Way) / A436 (Sheep Street) / B4068 |
| 5 | A429 (Fosse Way) / A424 |
| 6 | A429 (Roman Road) / A436 (Old Gloucester Road) |
| 7 | A429 / A40 |
| 8 | A433 (London Road) / A433 (Long Street)/ Hampton Street/ New Church Street |
| 9 | A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) / Chipping Street |
| 10 | A44 (Fish Hill) / B4081 (Conduit Hill) |
| 11 | A44 (Five Mile Drive) / A424 |
| 12 | A40/ A436 |
| 14 | A417 (High Street) / A361 (Thames Street) |
| 15 | A361 (Burford Street) / A417 (St.John's St) |

The location of the Assessment Junctions are shown in **Figure 1-1**.

Figure 1-1 Location of Assessment Junctions



1.4. Report Structure

This report sets out the findings of this analysis and sets out the methodology used to assess the impact, including; background traffic growth rates, trips rates, land use assumptions and distribution methodology.

The structure of this report will be as follows:

- **Section 2** provides details of each junction;
- **Section 3** describes the methodology used to predict development traffic impact;
- **Section 4** summarises the junction impact analysis results;
- **Section 5** describes proposed conceptual mitigation measures at each junction; and
- **Section 6** provides a summary and conclusions.

1.5. Technical Annex

This report should be read in conjunction with the Technical Annex which provides additional details and modelling outputs for each junction including the traffic count data, traffic flow analysis and detailed junction capacity analysis outputs.

2. Junction Details

2.1. Introduction

This section provides additional details of each junction which has been assessed as part of this study. Where available, the following information has been provided:

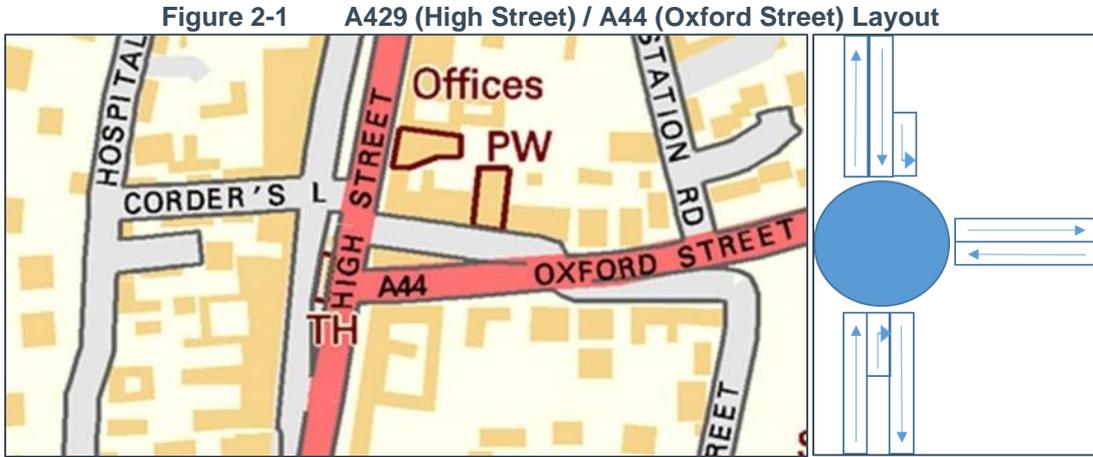
- Junction Layout;
- Pedestrian and cycling facilities; and
- Peak hour traffic levels.

2.2. Junction 1: A429 (High Street) / A44 (Oxford Street)

Location: Moreton-in-Marsh

Junction Layout

The junction layout is shown in **Figure 2-1**.



The junction is a mini-roundabout with three arms. The A429 High Street (N) and the A429 High Street (S) have two entry lanes (one right turn and one straight ahead), the lanes are narrow with insufficient space for two larger vehicles (i.e. larger than a car) side by side.

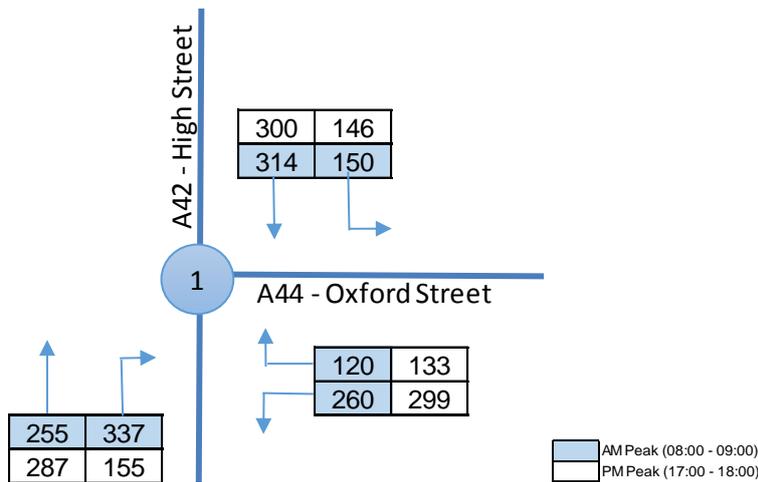
Pedestrian and Cycling Facilities

The A44 Oxford Street has a pedestrian refuge and there are footways adjacent to all arms. There are no other pedestrian facilities or any cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-2**.

Figure 2-2 Junction 1 Existing Traffic Flows

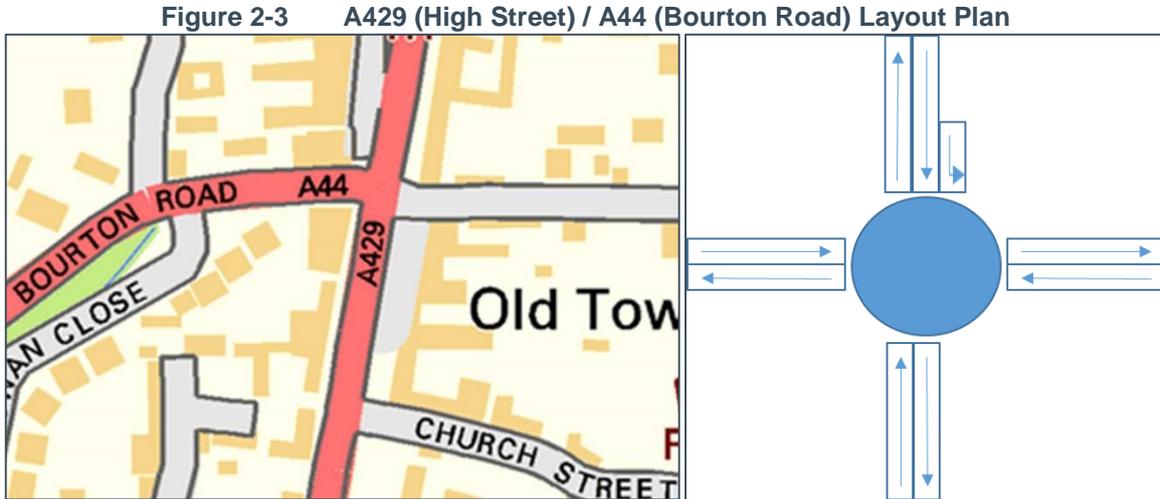


2.3. Junction 2: A429 (High Street) / A44 (Bourton Road)

Location: Moreton-in-Marsh

Junction Layout

The junction layout is shown in **Figure 2-3**.



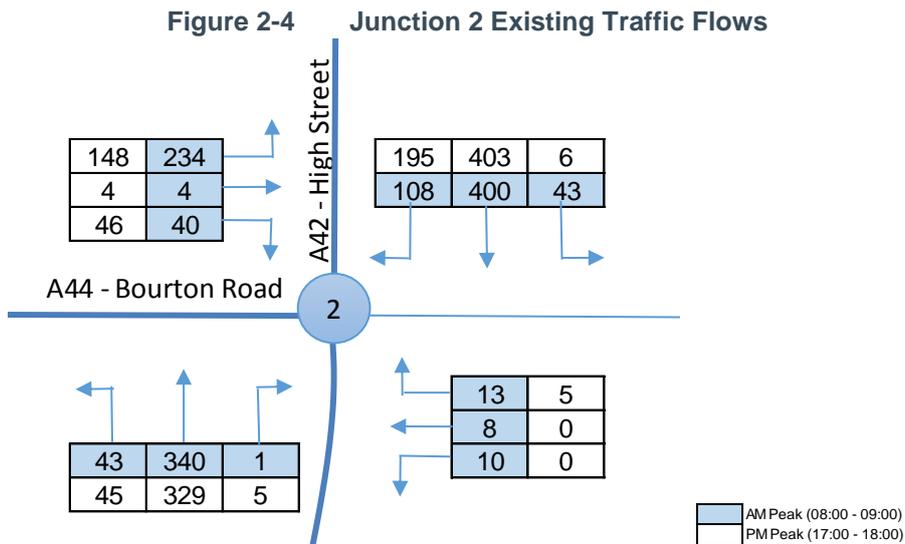
The junction is a mini-roundabout with four arms. The A429 High Street (N) has two entry lanes (one right turn and one straight ahead), the lanes are narrow with insufficient space for two larger vehicles (i.e. larger than a car) side by side.

Pedestrian and Cycling Facilities

The A44 Bourton Road has a pedestrian refuge and there are footways adjacent to all arms. There are no other pedestrian facilities or any cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-4**.

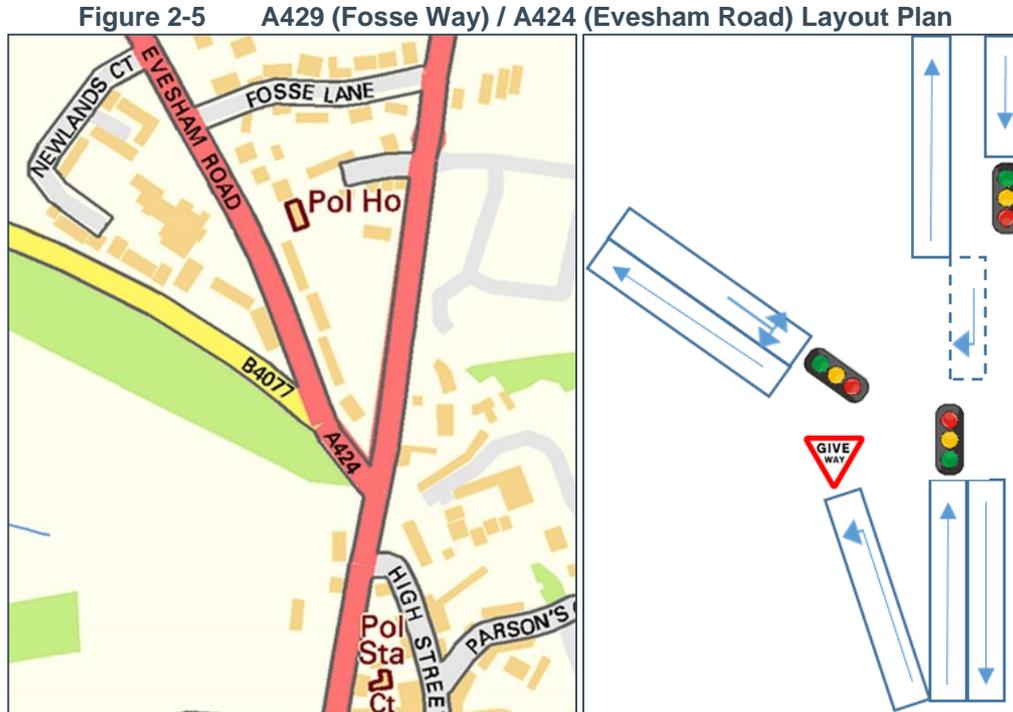


2.4. Junction 3: A429 (Fosse Way) / A424 (Evesham Road)

Location: Stow-on-the-Wold

Junction Layout

The junction layout is shown in **Figure 2-5**.



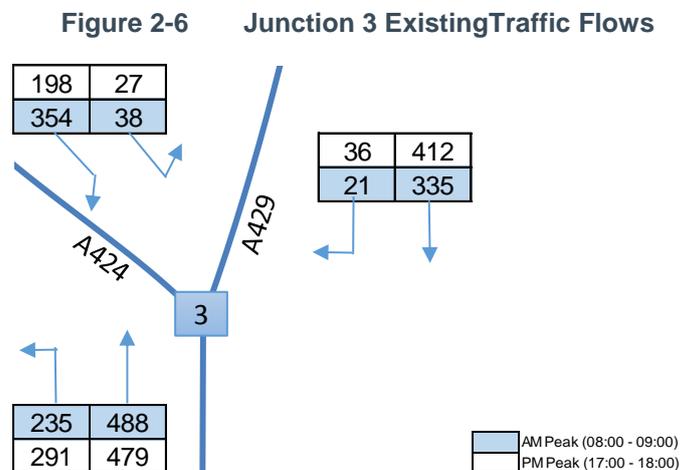
The junction is signalised on all three arms, however the left turn from the A429 Fosse Way (S) onto the A424 Evesham Road is a give-way to vehicles turning into the Evesham Road from the A429 Fosse Way (N). The stop line on the A429 Fosse Way (N) is set back from the junction.

Pedestrian and Cycling Facilities

There is a pelican crossing on the A429 Fosse Way (N) and there are footways adjacent to all arms at the junction. There are no other pedestrian facilities or any cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2.6**.

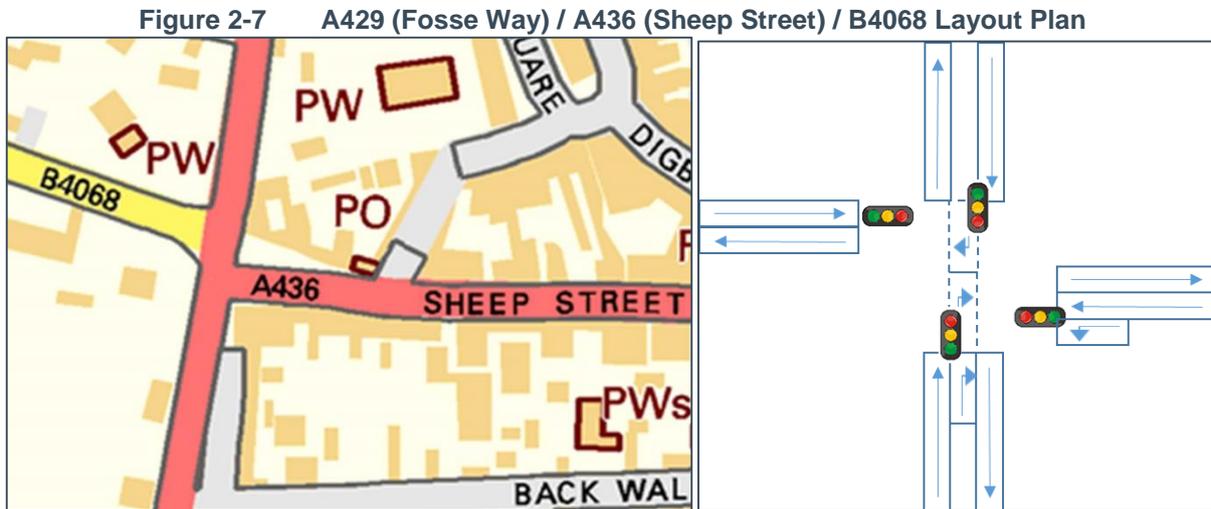


2.5. Junction 4: A429 (Fosse Way) / A436 (Sheep Street) / B4068

Location: Stow-in-the-Wold

Junction Layout

The junction layout is shown in **Figure 2.7**.



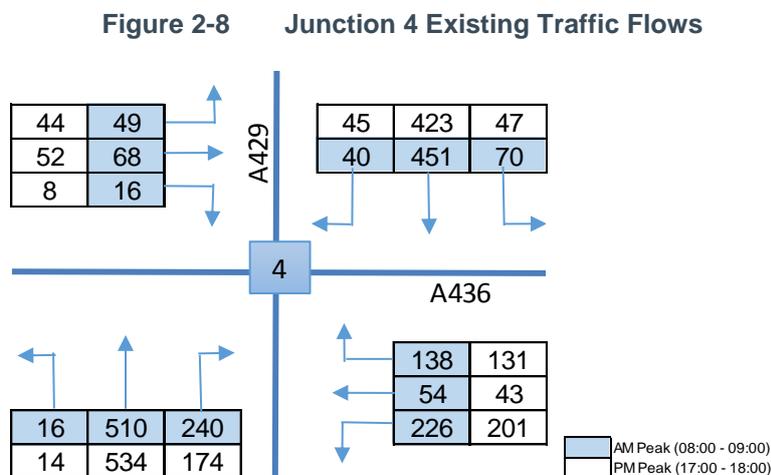
The junction is signalised on all four arms. The A429 Fosse Way (N) and the A429 Fosse Way (S) have right turn waiting areas but only the A429 Fosse Way (S) has a dedicated right turn lane prior to the stop line. The A436 Oddington Road (Sheep Street) also has a dedicated left turn prior to the stop line.

Pedestrian and Cycling Facilities

There is a pelican crossing on the A429 Fosse Way (N), there are pedestrian refuges on the A436 Oddington Road (Sheep Street) and the B4068, and there are footways adjacent to all arms at the junction. There are no other pedestrian facilities or any cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-8**.

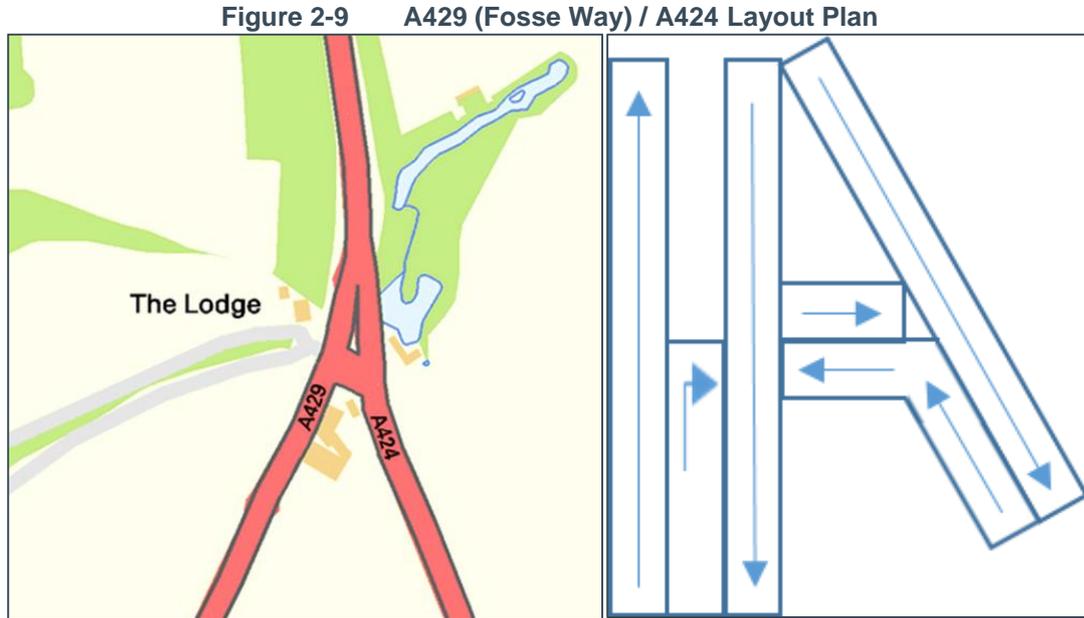


2.6. Junction 5: A429 (Fosse Way) / A424

Location: South of Stow-in-the-Wold

Junction Layout

The junction layout is shown in **Figure 2-9**.



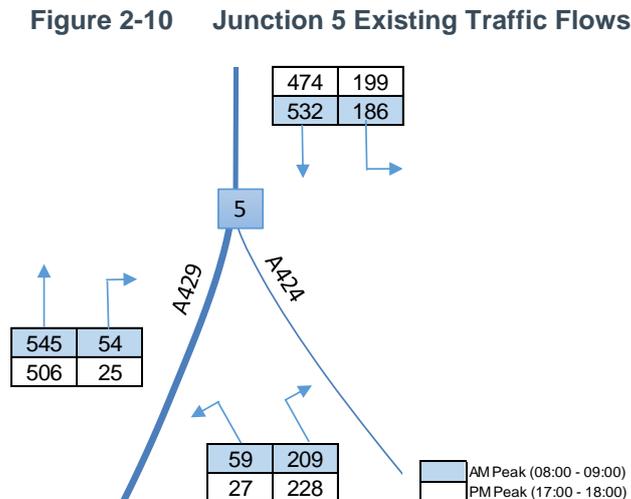
The junction is a priority junction with a dedicated off slip for vehicles travelling between the A429 Fosse Way (N) and the A424. There is a right hand turn lane for vehicles turning from the A429 Fosse Way and the A424.

Pedestrian and Cycling Facilities

There is a small section of footway adjacent to the A428 Fosse Way (N). There are no other pedestrian facilities or any cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-10**.

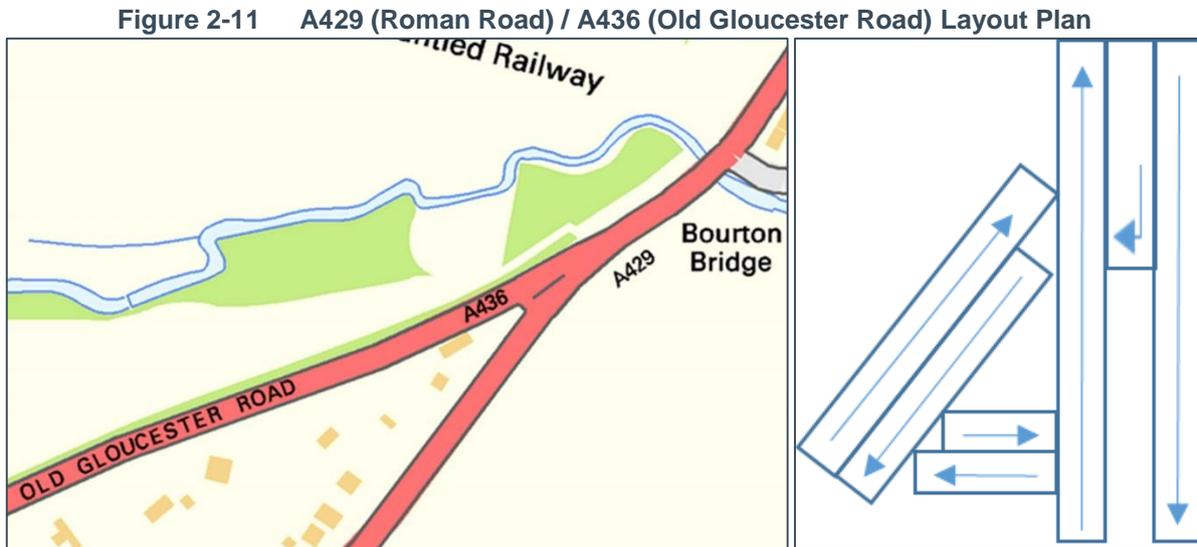


2.7. Junction 6: A429 (Roman Road) / A436 (Old Gloucester Road)

Location: Bourton-on-the-Water

Junction Layout

The junction layout is shown in **Figure 2-11**.



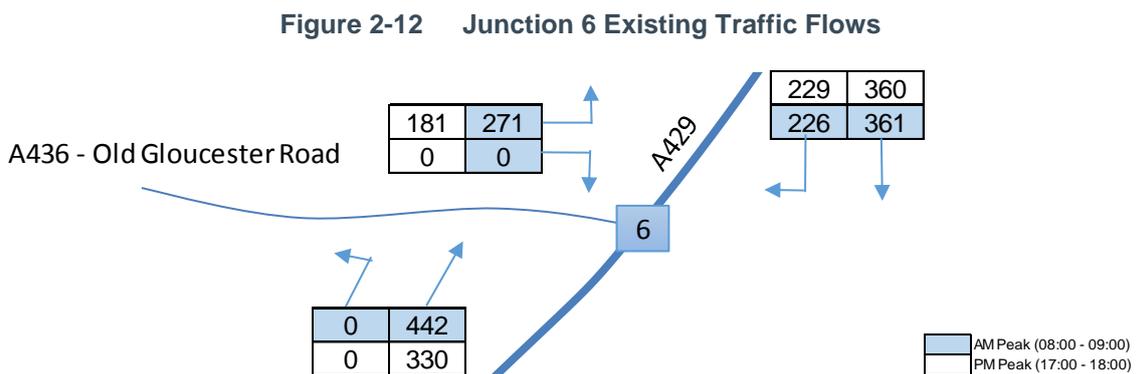
The junction is a forked priority junction with a connecting link for vehicles travelling between the A429 (S) and the A436 Old Gloucester Road (S). There is a right hand turn lane for vehicles turning from the A429 (N) to the A436 Old Gloucester Road (N).

Pedestrian and Cycling Facilities

There is a footway adjacent to the A429. There are no other pedestrian facilities or any cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-12**.

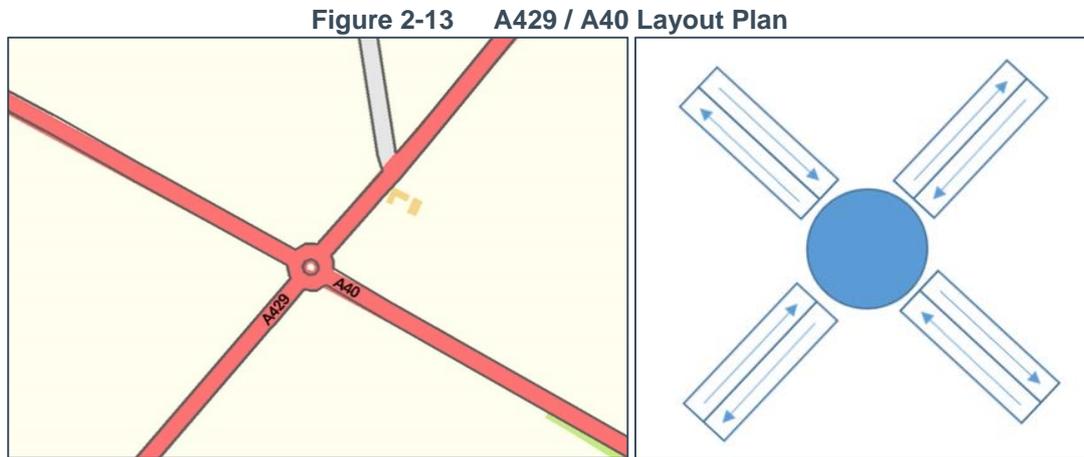


2.8. Junction 7: A429 / A40

Location: Northleach

Junction Layout

The junction layout is shown in **Figure 2-13**.



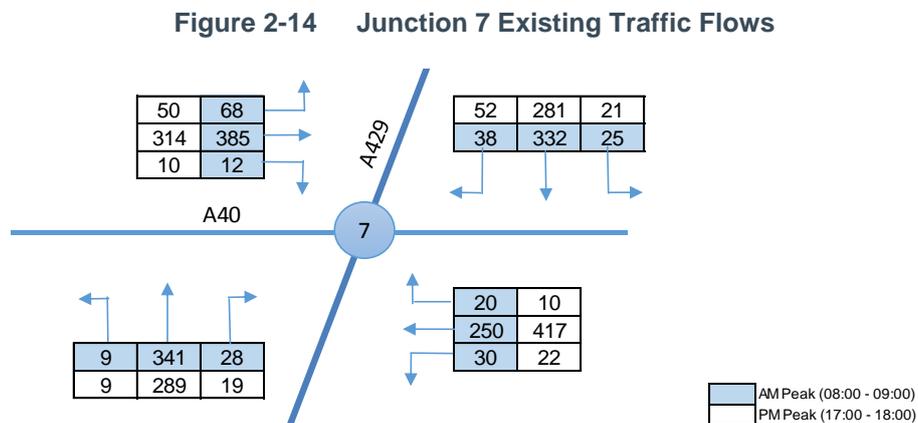
The junction is roundabout with four arms. All arms are single carriageway.

Pedestrian and Cycling Facilities

There are no pedestrian or cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-14**.



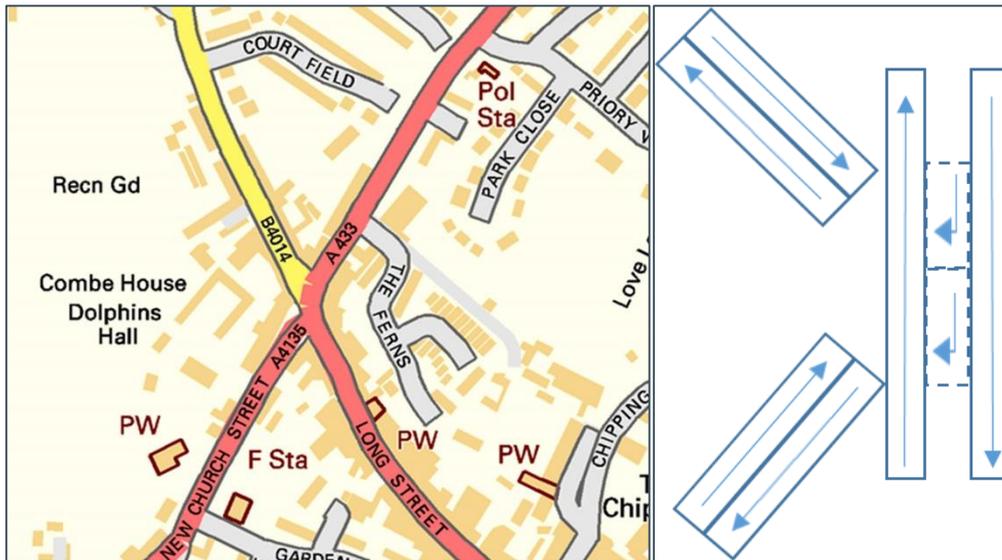
2.9. Junction 8: A433 (London Road) / A433 (Long Street) / Hampton Street/ New Church Street

Location: Tetbury

Junction Layout

The junction layout is shown in **Figure 2-15**.

Figure 2-15 A433 (London Road) / A433 (Long Street) / Hampton Street/ New Church Street Layout Plan



The junction has two minor arms in close proximity (both junctions are on the western side of the A433). There are two right hand turn lanes (one for each junction) for vehicles turning from the A433 London Road to New Church Street and from the A433 London Road to the B4014.

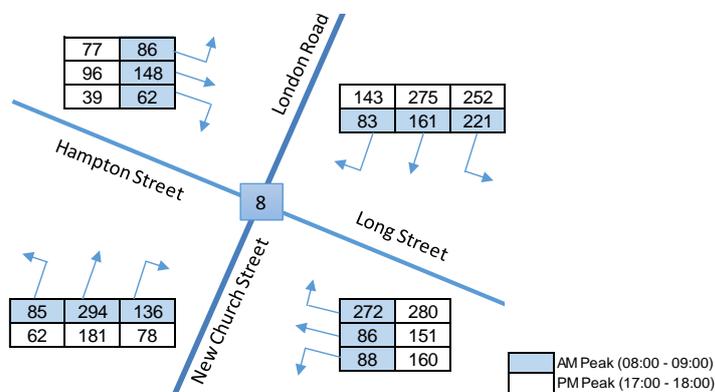
Pedestrian and Cycling Facilities

There are pedestrian refuges on the A433 (London Road), the A433 (Long Street) and New Church Street and pedestrian footways adjacent to all arms. There are no other pedestrian facilities. There are no cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-16**.

Figure 2-16 Junction 8 Existing Traffic Flows



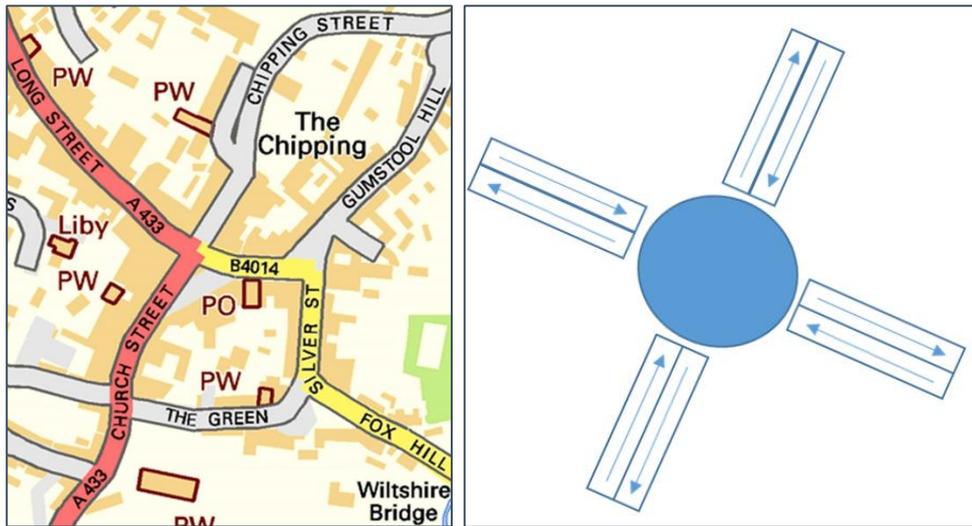
2.10. Junction 9: A433 (Long Street) / A433 (Church Street) / B4014 (Silver Street) / Chipping Street

Location: Tetbury

Junction Layout

The junction layout is shown in **Figure 2-17**.

Figure 2-17 A433 (Long Street) / A433 (Bath Road) / B4014 (Silver Street) / Chipping Street Layout Plan



The junction is mini-roundabout with four arms. All arms are single carriageway.

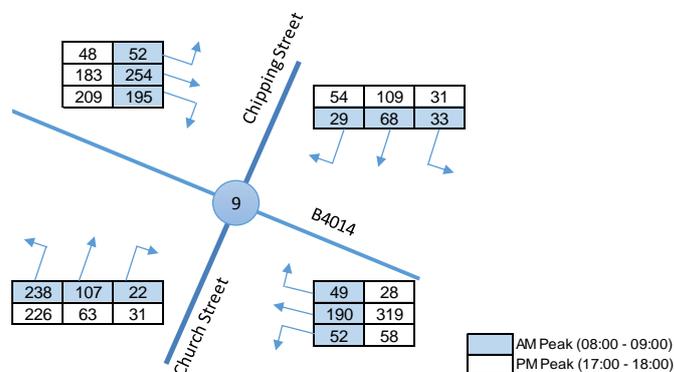
Pedestrian and Cycling Facilities

There are three zebra crossings within the vicinity of the junction. These are on the B4014 Silver Street and the A433 Long Street (approximately 30m from the junction) and the A433 Bath Road (Church Street) (approximately 60m from the junction). There are footways on all arms of the junction. There are no cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-18**.

Figure 2-18 Existing Traffic Flows

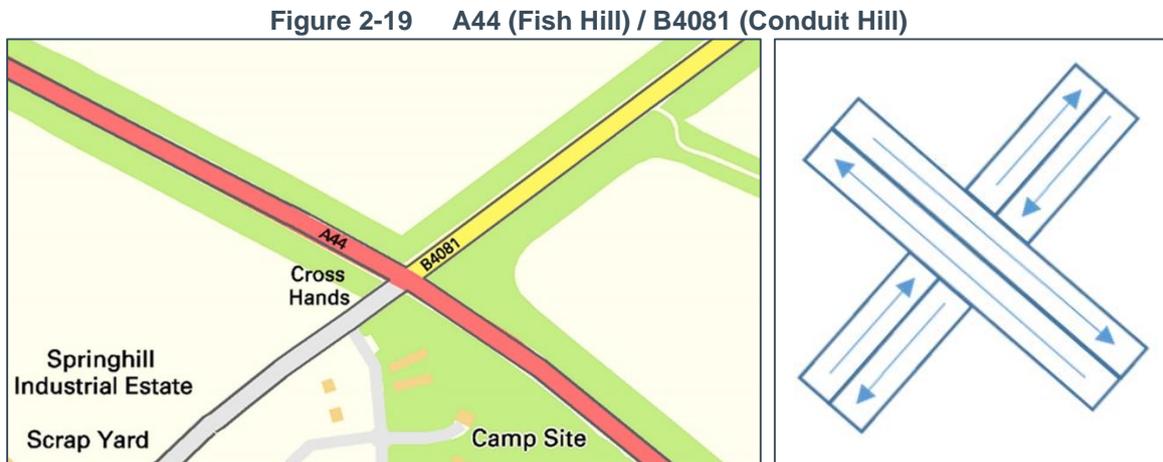


2.11. Junction 10: A44 (Fish Hill) / B4081 (Conduit Hill)

Location: Southwest of Chipping Campden

Junction Layout

The junction layout is shown in **Figure 2-19**.



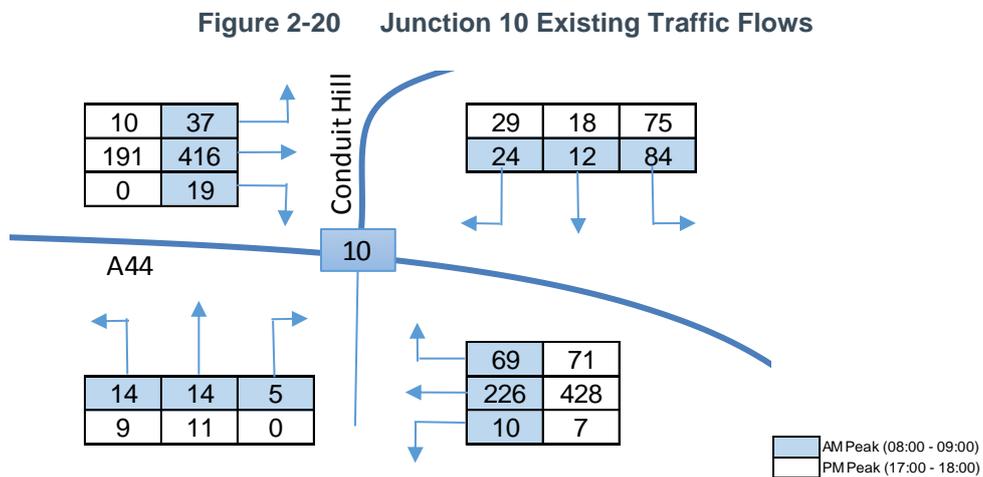
The junction is a crossroads priority junction. All arms are single carriageway.

Pedestrian and Cycling Facilities

There are no pedestrian or cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-20**.

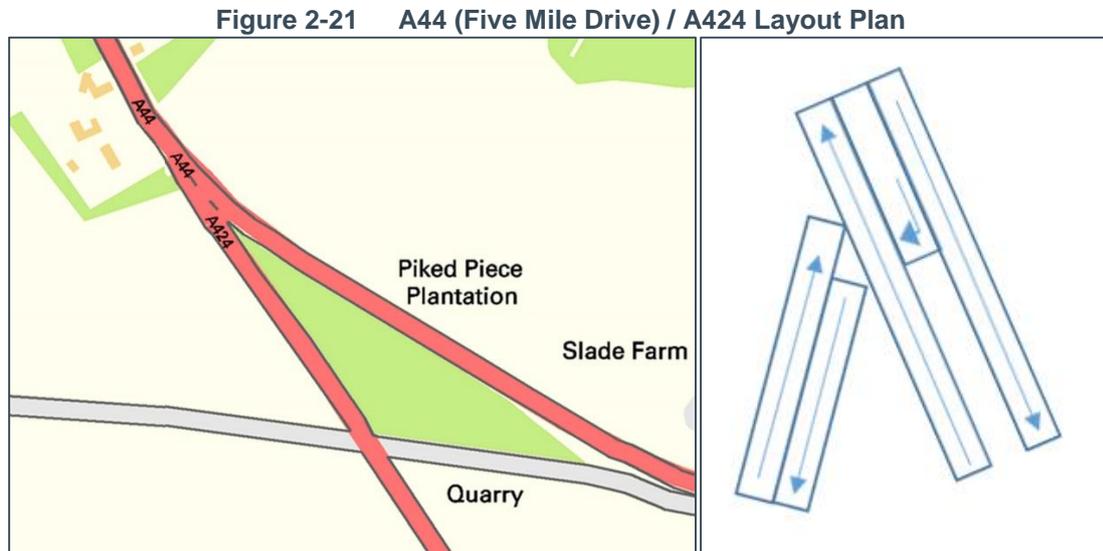


2.12. Junction 11: A44 (Five Mile Drive) / A424

Location: West of Moreton-in-Marsh

Junction Layout

The junction layout is shown in **Figure 2-21**.



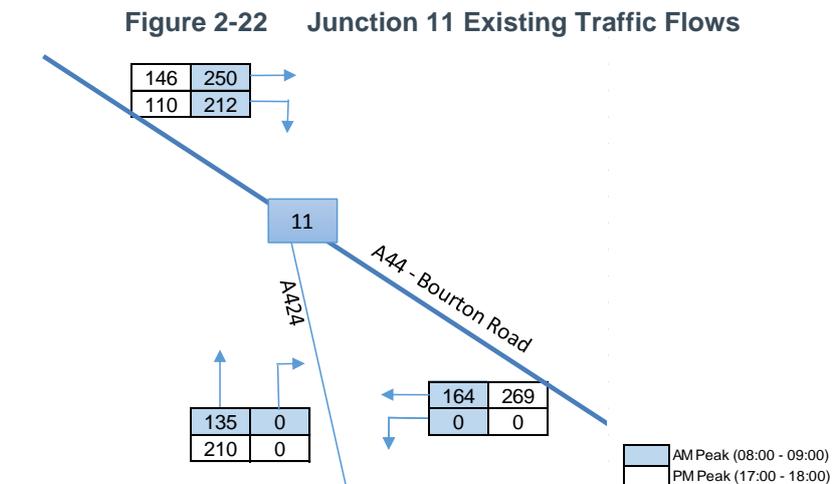
The junction is a forked priority junction with a connecting link for vehicles travelling from the A44 Five Mile Drive (N) to the A44 (S). There is a right hand turn lane for vehicles turning from the A44 Five Mile Drive (N) to the A424 Five Mile Drive (S).

Pedestrian and Cycling Facilities

There are no pedestrian or cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-22**.

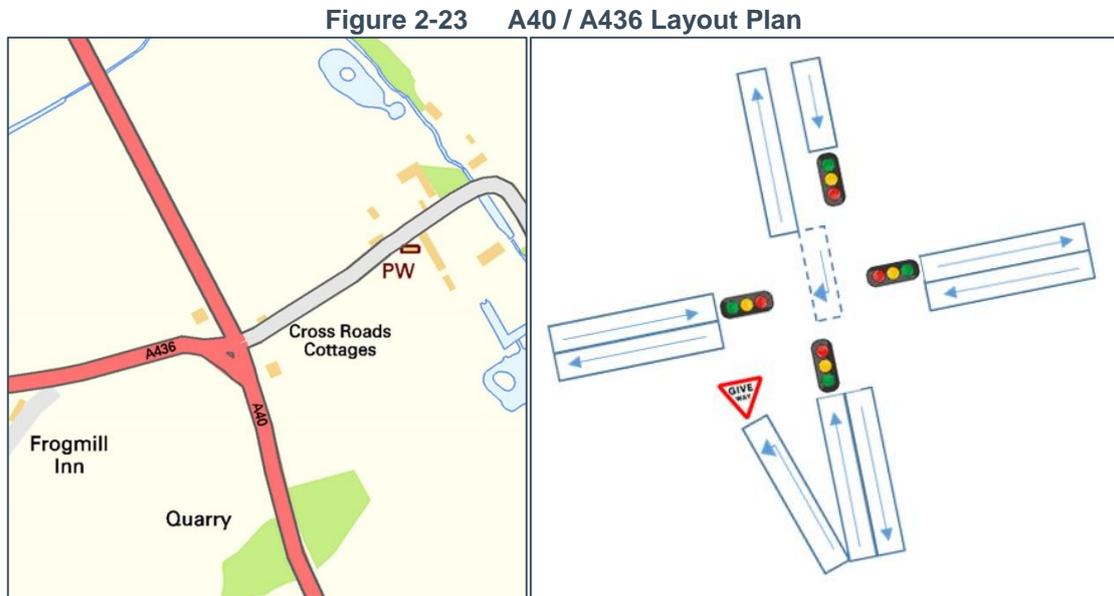


2.13. Junction 12: A40 / A436

Location: Andoversford

Junction Layout

The junction layout is shown in **Figure 2-23**.



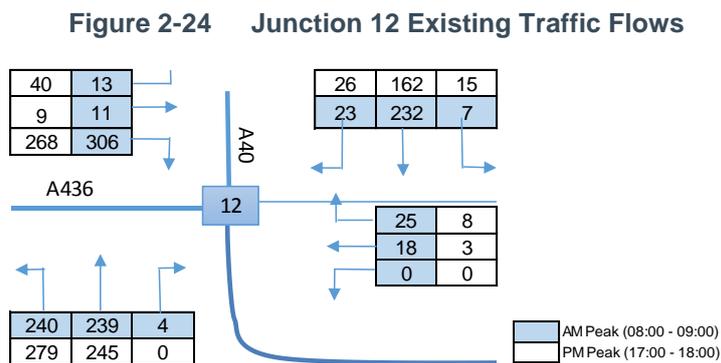
The junction is signalised on all four arms, however the left turn from the A40 (S) into the A436 bypasses the signalisation and is required to give-way to vehicles turning into the A436 from the A40 (N). There are two dedicated right turn waiting lanes for vehicles turning from the A40 into the Unnamed Road and the A436.

Pedestrian and Cycling Facilities

There is a pedestrian refuge (although no footway) on the A436 and a small section of footway on the corner of the Unnamed Road and the A40 (N).

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-24**.



2.14. Junction 13: Not Assessed

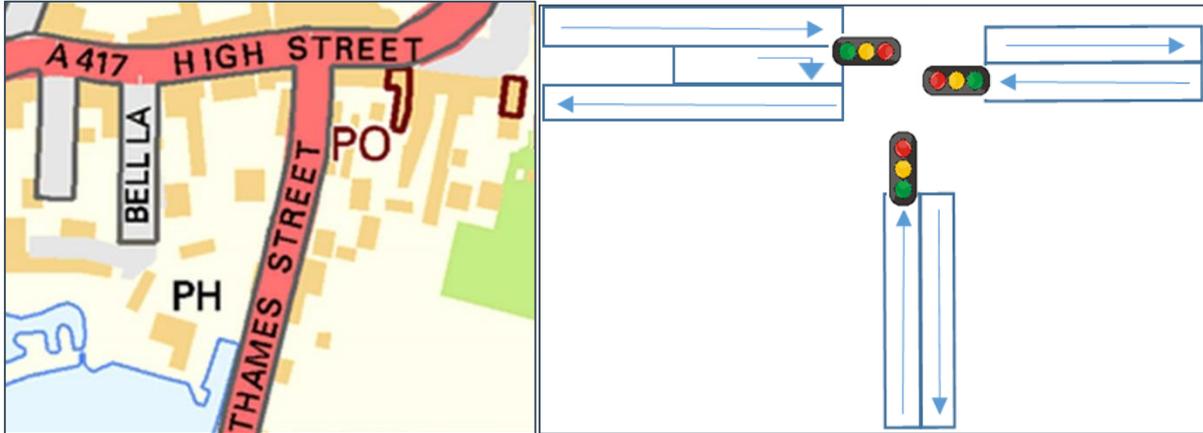
2.15. Junction 14: A417 (High Street) / A361 (Thames Street)

Location: Lechlade-on-Thames

Junction Layout

The junction layout is shown in **Figure 2-25**.

Figure 2-25 A417 (High Street) / A361 (Thames Street) Layout Plan



The junction is signalised on all three arms. There is a right hand turn lane for vehicles turning from the A417 High Street (W) into the A361 Thames Street.

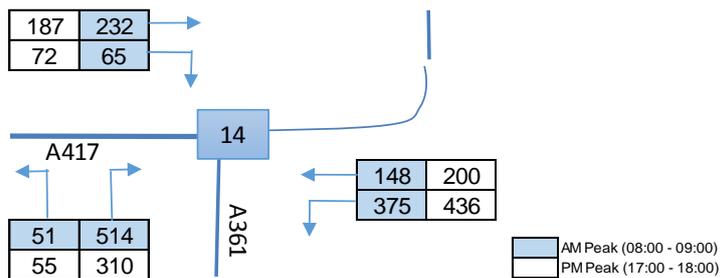
Pedestrian and Cycling Facilities

There are pelican crossings on the A361 Thames Street and the A417 High Street (W), and footways adjacent to all arms. There are no other pedestrian facilities or any cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-26**.

Figure 2-26 Junction 14 Existing Traffic Flows



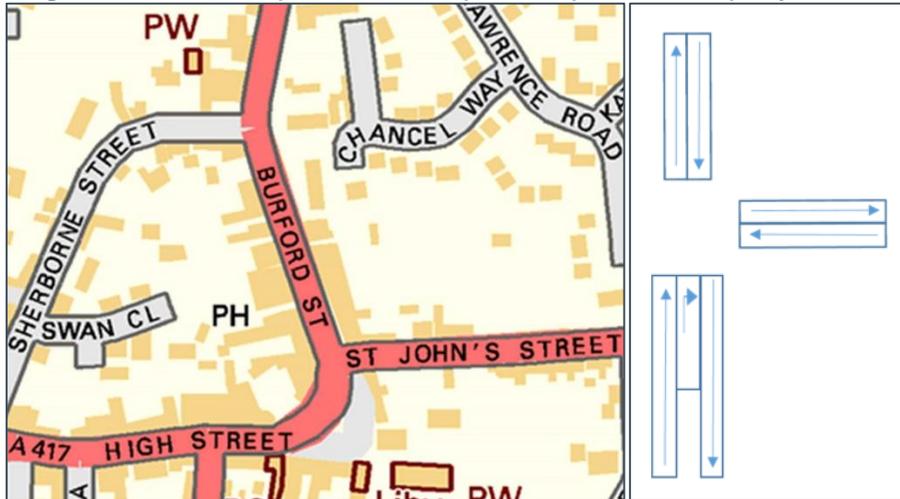
2.16. Junction 15: A361 (Burford Street) / A417 (St.John's St)

Location: Lechlade-on-Thames

Junction Layout

The junction layout is shown in **Figure 2-27**.

Figure 2-27 A361 (Burford Street) / A417 (St.John's St) Layout Plan



The junction is a priority junction with three arms. There is a right hand turn lane for vehicles turning from the A417 High Street into the A417 St. John's St.

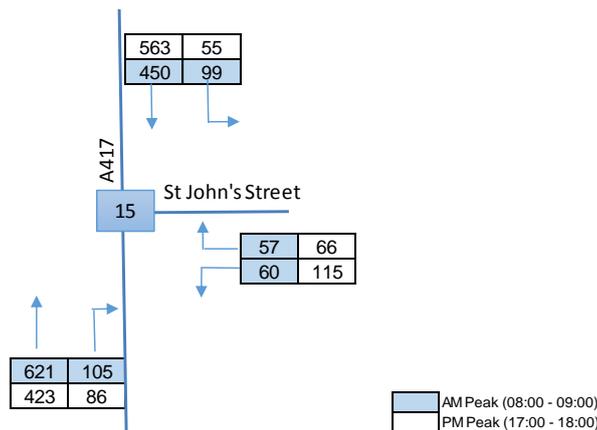
Pedestrian and Cycling Facilities

There are footways adjacent to all arms. There are no other pedestrian facilities or any cycling facilities.

Existing Traffic Flows

Existing Traffic Flows are shown in **Figure 2-28**.

Figure 2-28 Junction 15 Existing Traffic Flows



3. Capacity Assessment Methodology

3.1. Inception Meeting

The scope of works was agreed with Cotswold District Council (CDC) at the inception meeting. Regular meetings were held with CDC to review the work being undertaken and refine and the methodology where required.

3.2. Data Review and Collection

Existing data was sourced from local Transport Assessments where available. Traffic count surveys were commissioned for junctions where existing data wasn't available. The junctions where existing Transport Assessment data was used for the 2014 baseline data are shown in **Table 3-1**.

Table 3-1 Existing Data

| | Junction | Data Year |
|---|---|-----------|
| 1 | A429 (High Street) / A44 (Oxford Street) | 2013 |
| 2 | A429 (High Street) / A44 (Bourton Road) | 2013 |
| 8 | A433 (London Road) / A433 (Long Street)/ Hampton Street/ New Church Street | 2011 |
| 9 | A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) / Chipping Street | 2011 |

National Data Collection and Streetwise Services were commissioned to undertake traffic surveys and collect traffic data at nine sites, shown in **Table 3-2**. The traffic count data is contained in the **Technical Annex**.

Table 3-2 Commissioned Traffic Counts

| | Junction | National Data Collection | Streetwise Services |
|----|---|--------------------------|---------------------|
| 3 | A429 (Fosse Way)/ A424 (Evesham Road) | | 25/11/2014 |
| 4 | A429 (Fosse Way) / A436 (Sheep Street) / B4068 | | 25/11/2014 |
| 5 | A429 (Fosse Way) / A424 | | 25/11/2014 |
| 6 | A429 (Roman Road) / A436 (Old Gloucester Road) | | 25/11/2014 |
| 7 | A429 / A40 | 25/11/2014 | |
| 10 | A44 (Fish Hill) / B4081 (Conduit Hill) | | 25/11/2014 |
| 11 | A44 (Five Mile Drive) / A424 | | 25/11/2014 |
| 12 | A40/ A436 | 25/11/2014 | |
| 14 | A417 (High Street) / A361 (Thames Street) | 25/11/2014 | |
| 15 | A361 (Burford Street) / A417 (St.John's St) | 25/11/2014 | |

3.3. 2014 Baseline Data

The traffic data sourced from Transport Assessments (existing data) were undertaken over various years. To create a consistent baseline, the traffic data was factored so that the data at all junctions equated to 2014 flows. This was done by calculating background traffic growth using TEMPro adjusted NTM growth rates for Cotswold District for the AM peak hour and PM peak hours, to determine a base year flow at each junction.

3.4. 2031 Baseline

A future year baseline scenario has been generated by adding committed development traffic to 2014 base traffic flows. **Table 3-3** summarises the committed development site names, land uses and sizes identified by Cotswold District Council. Due to the large number of small individual sites, the committed development sites have been grouped into areas.

Table 3-3 Committed Development Sites

| | Area | Dwellings |
|--------------|----------------------|--------------|
| A | Andoversford | 18 |
| B | Blockley | 3 |
| C | Bourton-on-the-Water | 269 |
| D | Chipping Campden | 48 |
| E | Cirencester | 433 |
| F | Down Ampney | 22 |
| G | Fairford | 404 |
| H | Kemble | 51 |
| I | Lechlade-on-Thames | 82 |
| J | Mickleton | 149 |
| K | Moreton-in-Marsh | 533 |
| L | Northleach | 32 |
| M | Rural | 236 |
| N | South Cerney | 107 |
| O | Stow-on-the-Wold | 59 |
| P | Tetbury | 721 |
| Q | Upper Rissington | 358 |
| R | Willersey | 3 |
| Total | | 3,528 |

Traffic associated with these development areas has been assigned to the network. To forecast the number of trips generated by the committed developments, trip rates have been derived from the TRICS database.

The only exception to this are the rural sites for which no specific development areas have been identified. A general growth factor has therefore been calculated to account for the trips from the 236 residential units associated with rural housing.

The growth factor was determined by calculating the total number of trips on the network per dwelling for each area, and then multiplying an average of these by the number of rural houses. A growth factor was chosen to generate a total number of trips on the network per dwelling which was comparable to the average of the other sites.

3.5. 2031 Baseline + Preferred Development

A future year with preferred development scenario has been calculated by adding preferred development traffic to 2031 Baseline traffic flows. **Table 3-4** summarises the preferred development site names, land uses and sizes included in the Cotswold District Council Local Development Plan. Due to the large number of small individual sites, the preferred development sites have been grouped into areas.

Table 3-4 Local Plan Preferred Development Areas

| | Area | Employment (ha) | Dwellings |
|--------------|----------------------|-----------------|--------------|
| A | Andoversford | | 40 |
| B | Blockley | | 51 |
| C | Bourton-on-the-Water | 3.38 | 10 |
| D | Chipping Campden | 1.76 | 127 |
| E | Cirencester | 9.1 | 2381 |
| F | Down Ampney | | 31 |
| G | Fairford | | 0 |
| H | Kemble | | 12 |
| I | Lechlade-on-Thames | 1.25 | 18 |
| J | Mickleton | | 0 |
| K | Moreton-in-Marsh | 7.13 | 21 |
| L | Northleach | | 53 |
| M | Rural | | 0 |
| N | South Cerney | | 0 |
| O | Stow-on-the-Wold | | 30 |
| P | Tetbury | 6.74 | 27 |
| Q | Upper Rissington | | 0 |
| R | Willersey | | 80 |
| Total | | 29.36 | 2,881 |

Traffic associated with each of these development areas has also been assigned to the network.

3.6. 2031 Baseline + Preferred & Reserved Development

A future year with preferred and reserved development scenario has been generated by adding reserved development traffic to 2031 Baseline + Preferred Development traffic flows. **Table 3-5** summarises the reserved development site areas, land uses and sizes identified by Cotswold District Council.

Table 3-5 Local Plan Reserved Development Areas

| | Area | Employment (ha) | Dwellings |
|--------------|----------------------|-----------------|------------|
| A | Andoversford | | 0 |
| B | Blockley | | 58 |
| C | Bourton-on-the-Water | | 32 |
| D | Chipping Campden | | 80 |
| E | Cirencester | 2.44 | 31 |
| F | Down Ampney | | 43 |
| H | Fairford | | 77 |
| I | Kemble | | 24 |
| K | Lechlade-on-Thames | | 0 |
| L | Mickleton | | 8 |
| O | Moreton-in-Marsh | 2.03 | 150 |
| P | Northleach | | 0 |
| R | Rural | | 0 |
| Total | | 4.47 | 714 |

Traffic associated with each of these development areas has also been assigned to the network.

The future forecast design year is 2031 to match Cotswold District's Local Plan period. It is considered that the background traffic growth in Cotswold District over the forthcoming period will be entirely accounted for by

the residential and employment development sites included in the Local Plan. Traffic associated with these developments has been assigned to the network as part of this study.

To accurately forecast the number of trips generated by the proposed growth, development trip rates have been derived from TRICS.

All trip rates are provided for the AM (08:00 – 09:00) and PM (17:00 – 18:00) peak periods, and TRICS outputs are included in the Technical Annex.

3.7. Trip Distribution and Assignment

Trips generated by the development sites have been assigned onto a base network, modelled in Excel. This has been done by using various methods, including using journey to work data from the 2011 Census, by inspection of the network and existing turning counts.

The Census Journey to Work data identifies all journeys to work including those outside the district and therefore residents have been assigned to employment in and outside the Cotswold District and some residents from outside Cotswold have been assigned to employment in the District.

3.8. Junction Impact Assessment

The baseline data and forecast traffic flows were used to determine the percentage impact of traffic on each of the junctions. A threshold of 5% impact was used to determine where development impact was significant and where further capacity assessment was required. The 5% limit was considered appropriate as it is a threshold which is typically considered to be significant for development traffic on congested highways. Daily variations in traffic flows can exceed 5% and therefore increases in development traffic of less than 5% may not be perceptible.

Junctions were considered to have reached capacity when the Ratio of Flow to Capacity reached 1.0 or the Degree of Saturation reached 100%. These thresholds are considered to be appropriate when taking into account the strategic nature of this assessment and NPPF guidance which specifies that developments should not be refused unless their residual cumulative impact is severe.

3.9. Junction Capacity Assessment

Junctions 8 (ARCADY and PICADY) and LinSig software was used to assess the capacity of each junction in existing 2014 traffic conditions and in forecast 2031 traffic conditions. The industry standard software was used to assess junction capacity as follows:

- ARCADY for roundabout junctions;
- PICADY for priority junctions; and
- LinSig for signal controlled junctions.

3.10. Mitigation Proposals

Mitigation schemes were identified for junctions which had one or more arm shown to be exceeding capacity with the Local Plan development traffic.

The mitigation measures have been designed with the following objectives:

- Increasing junction capacity so that the overall junction works within capacity or is no worse than existing operation;
- Being provided within the existing highway boundary; and
- Providing a cost effective solution to capacity issues due to increases in traffic levels.

4. Junction Impact Analysis

In this section a summary of the development traffic impact is provided at each junction and the junction capacity assessment results for the existing junction layouts.

Table 4-1 summaries the AM results and **Table 4-2** summarises the PM results. The full capacity analysis is provided in the **Technical Annex**. The junction capacity analysis results have been colour coded to show junctions operating within capacity as green, approaching capacity in amber and exceeding capacity in red. The junction capacity analysis table outlines the maximum RFC/ DoS on any arm.

As explained in the Methodology, four main development traffic scenarios have been tested:

- Scenario 1: Existing 2014 Traffic;
- Scenario 2: Forecast 2031 Traffic and Committed Development;
- Scenario 3: Forecast 2031 and Committed Development and Preferred Development Traffic; and
- Scenario 4: Forecast 2031 and Committed Development, Preferred Development and Reserved Development Traffic.

Table 4-1 Junction Capacity Assessment AM Peak

| Junction No. | Junction Name | AM Peak (08:00 – 09:00) | | | | | | | | |
|--------------|--|-------------------------------------|-------------------------------------|---|---|--------------------------------------|---|-----------------------|-------------------------|-----------------------------------|
| | | Impact of Committed Development (%) | Impact of Preferred Development (%) | Impact of Committed Development + Preferred Development (%) | Impact of Preferred Development + Reserve Development (%) | Impact of Chesterton Development (%) | Existing Capacity | Com Dev Capacity 2031 | Com Dev + Pref Dev 2031 | Com Dev + Pref Dev + Res Dev 2031 |
| | | | | | | | RFC unless stated/ DoS = Degree of Saturation | | | |
| 1 | A429 (Roman Road) / A44 (Oxford Street) | 24.2% | 38.1% | 62.3% | 46.4% | 0.8% | 0.74 | 0.96 | 1.15 | 1.24 |
| 2 | A429 (Roman Road) / A44 (Bourton Road) | 26.4% | 39.2% | 65.5% | 48.5% | 1.0% | 0.66 | 0.82 | 1.45 | 1.53 |
| 3 | A429 (Fosse Way)/ A424 (Evesham Road) | 15.9% | 15.6% | 31.6% | 20.2% | 1.1% | 76.3% (DoS) | 85.7% (DoS) | 95.0% (DoS) | 98.5% (DoS) |
| 4 | A429 (Fosse Way) / A436 (Oddington Road) / B4068 | 13.4% | 12.6% | 26% | 16.1% | 1.0% | 94.3% (DoS) | 109.7% (DoS) | 118.5% (DoS) | 123.5% (DoS) |
| 5 | A429 (Fosse Way) / A424 | 15.5% | 14.9% | 30.3% | 18.8% | 1.2% | 58.2% (DoS) | 66.1% (DoS) | 76.2% (DoS) | 77.7% (DoS) |
| 6 | A429 (Roman Road) / A436 (Old Gloucester Road) | 15.0% | 14.6% | 29.6% | 17.6% | 2.5% | 0.52 | 0.71 | 0.80 | 0.85 |
| 7 | A429 / A40 | 9.1% | 13.1% | 22.2% | 15.2% | 8.2% | 0.56 | 0.64 | 0.71 | 0.73 |
| 8 | A433 (London Road) / A433 (Long Street)/ Hampton Street | 20.6% | 28.2% | 48.8% | 29.7% | 2.3% | 1.21 | 1.53 | 2.57 | 2.71 |
| 9 | A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) | 11.1% | 12.6% | 23.7% | 13.4% | 1.4% | 0.65 | 0.71 | 0.90 | 0.90 |
| 10 | A44 (Fish Hill) / B4081 (Conduit Hill) | 10.4% | 24.8% | 35.2% | 30.5% | 0.4% | 0.19 | 0.24 | 0.41 | 0.44 |
| 11 | A44 (Five Mile Drive) / A424 | 11.8% | 26.8% | 36.4% | 33.0% | 0.5% | 0.35 | 0.38 | 0.42 | 0.44 |
| 12 | A40/ A436 | 2.8% | 6.5% | 9.3% | 7.1% | 5.1% | 44.7% (DoS) | 46.0% (DoS) | 48.6% (DoS) | 49.2% (DoS) |
| 14 | A417 (High Street) / A361 (Thames Street) | 6.4% | 5.7% | 12.1% | 6.6% | 1.8% | 91.1% (DoS) | 95.9% (DoS) | 105.5% (DoS) | 106.8% (DoS) |
| 15 | A361 (Burford Street) / A417 (St.John's St) | 4.4% | 4.4% | 8.8% | 5.2% | 2.1% | 0.24 | 0.26 | 0.28 | 0.29 |

* Model unable to report due to junction operating over capacity.

Table 4-2 Junction Capacity Assessment PM Peak

| Junction No. | Junction Name | PM Peak (17:00 – 18:00) | | | | | | | | |
|--------------|--|-------------------------------------|-------------------------------------|---|---|--------------------------------------|-------------------|-----------------------|-------------------------|-----------------------------------|
| | | Impact of Committed Development (%) | Impact of Preferred Development (%) | Impact of Committed Development + Preferred Development (%) | Impact of Preferred Development + Reserve Development (%) | Impact of Chesterton Development (%) | Existing Capacity | Com Dev Capacity 2031 | Com Dev + Pref Dev 2031 | Com Dev + Pref Dev + Res Dev 2031 |
| | | | | | | | | | | |
| 1 | A429 (Roman Road) / A44 (Oxford Street) | 25.3% | 32.5% | 57.8% | 41.6% | 0.8% | 0.73 | 0.95 | 1.42 | 1.52 |
| 2 | A429 (Roman Road) / A44 (Bourton Road) | 26.7% | 32.6% | 59.2% | 42.4% | 1.0% | 0.69 | 0.87 | 1.02 | 1.20 |
| 3 | A429 (Fosse Way)/ A424 (Evesham Road) | 15.7% | 12.9% | 28.6% | 17.9% | 1.0% | 65.8% (DoS) | 76.6% (DoS) | 78.5% (DoS) | 81.6% (DoS) |
| 4 | A429 (Fosse Way) / A436 (Oddington Road) / B4068 | 14.1% | 11.2% | 25.2% | 15.1% | 1.0% | 86.3% (DoS) | 99.8% (DoS) | 113.3% (DoS) | 115% (DoS) |
| 5 | A429 (Fosse Way) / A424 | 16.2% | 13.0% | 29.2% | 17.4% | 1.2% | 52.8% (DoS) | 61.5% (DoS) | 65.8% (DoS) | 68.8% (DoS) |
| 6 | A429 (Roman Road) / A436 (Old Gloucester Road) | 17.0% | 13.9% | 30.9% | 17.5% | 2.6% | 0.49 | 0.59 | 0.77 | 0.80 |
| 7 | A429 / A40 | 9.2% | 11.7% | 20.9% | 13.6% | 7.6% | 0.55 | 0.60 | 0.66 | 0.67 |
| 8 | A433 (London Road) / A433 (Long Street)/ Hampton Street | 18.9% | 21.0% | 40.0% | 22.4% | 1.9% | 0.84 | 1.24 | 999.99* | 999.99* |
| 9 | A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) | 9.5% | 8.7% | 18.2% | 9.3% | 1.0% | 0.88 | 1.04 | 1.09 | 1.10 |
| 10 | A44 (Fish Hill) / B4081 (Conduit Hill) | 11.7% | 23.0% | 34.7% | 29.8% | 0.4% | 0.16 | 0.22 | 0.29 | 0.32 |
| 11 | A44 (Five Mile Drive) / A424 | 12.5% | 23.1% | 33.5% | 29.9% | 0.4% | 0.35 | 0.38 | 0.44 | 0.46 |
| 12 | A40/ A436 | 3.0% | 6.1% | 9.1% | 6.6% | 4.8% | 42.0% (DoS) | 43.7% (DoS) | 46% (DoS) | 46.5% (DoS) |
| 14 | A417 (High Street) / A361 (Thames Street) | 8.0% | 4.3% | 12.2% | 5.1% | 1.2% | 83.8% (DoS) | 90.1% (DoS) | 92.6% (DoS) | 93.3% (DoS) |
| 15 | A361 (Burford Street) / A417 (St.John's St) | 4.7% | 2.1% | 6.8% | 2.7% | 0.5% | 0.29 | 0.32 | 0.33 | 0.33 |

* Model unable to report due to junction operating over capacity.

A brief description of the operation of each junction is provided below and considers the existing operation, impact of the proposed development and future year operation of the junction, identifying if mitigation measures are required. Scenario descriptions are shown above.

Junction 1: A429 (Roman Road) / A44 (Oxford Street)

Junction 1 is currently operating within capacity with Existing 2014 Traffic (Scenario 1). The level of delay and queuing in both peaks periods is projected to increase as a result of the Local Plan development traffic. This results in the junction operating near to capacity with Forecast 2031 Traffic (Scenario 2) and over capacity with Forecast 2031 and Preferred Development Traffic (Scenario 3) and with Forecast 2031, Preferred Development and Reserved Development Traffic (Scenario 4).

Mitigation: Required.

Junction 2: A429 (Roman Road) / A44 (Bourton Road)

Junction 2 is currently operating within capacity with Existing 2014 Traffic (Scenario 1). The junction operates near to capacity with Forecast 2031 Traffic (Scenario 2) and over capacity with Forecast 2031 and Preferred Development Traffic (Scenario 3) and with Forecast 2031, Preferred Development and Reserved Development Traffic (Scenario 4).

Mitigation: Required.

Junction 3: A429 (Fosse Way)/ A424 (Evesham Road)

Junction 3 is currently operating within capacity with 2014 baseline (Scenario 1) and Forecast 2031 traffic (Scenario 2). The junction operates near to capacity with Forecast 2031 and Preferred Development Traffic (Scenario 3) and Forecast 2031, Preferred Development and Reserved Development Traffic (Scenario 4).

Mitigation: Not required as cycle time assumed to increase.

Junction 4: A429 (Fosse Way) / A436 (Oddington Road) / B4068

Junction 4 is currently operating near to capacity with Existing 2014 Traffic (Scenario 1). The junction operates over capacity with Forecast 2031 traffic (Scenario 2), with Forecast 2031 and Preferred Development Traffic (Scenario 3) and with Forecast 2031, Preferred Development and Reserved Development Traffic (Scenario 4).

Mitigation: Required.

Junction 6: A429 (Roman Road) / A436 (Old Gloucester Road)

Junction 6 is currently operating within capacity with 2014 baseline (Scenario 1), with Forecast 2031 traffic (Scenario 2) and with Forecast 2031 and Preferred Development Traffic (Scenario 3). The junction is forecast to be operating near capacity with Forecast 2031, Preferred Development and Reserved Development Traffic (Scenario 4) in the AM peak only.

Mitigation: Not required.

Junction 7: A429 / A40

Junction 7 is operating within capacity in all scenarios.

Mitigation: Not required.

Junction 8: A433 (London Road) / A433 (Long Street)/ Hampton Street/ New Church Street

Junction 8 is operating over capacity in all scenarios (excluding existing traffic in the PM period). With Forecast 2031 and Preferred Development Traffic (Scenario 3) and Forecast 2031, Preferred Development and Reserved Development Traffic (Scenario 4), the junction is operating greatly over capacity.

Mitigation: Required.

Junction 9: A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) / Chipping Street

Junction 9 is currently operating near to capacity with Existing 2014 Traffic (Scenario 1). The junction operates over capacity with Forecast 2031 Traffic (Scenario 2), with Forecast 2031 and Preferred Development Traffic (Scenario 3) and with Forecast 2031, Preferred Development and Reserved Development Traffic (Scenario 4).

Mitigation: Required.

Junction 10: A44 (Fish Hill) / B4081 (Conduit Hill)

Junction 10 is operating well within capacity in all scenarios.

Mitigation: Not required.

Junction 11: A44 (Five Mile Drive) / A424

Junction 11 is operating well within capacity in all scenarios.

Mitigation: Not required.

Junction 12: A40/ A436

Junction 12 is operating well within capacity in all scenarios.

Mitigation: Not required.

Junction 14: A417 (High Street) / A361 (Thames Street)

Junction 14 is operating near to capacity with Existing 2014 Traffic (Scenario 1) and with Forecast 2031 traffic (Scenario 2). The junction operates over capacity with Forecast 2031 and Preferred Development Traffic (Scenario 3) and with Forecast 2031, Preferred Development and Reserved Development Traffic (Scenario 4).

Mitigation: Required.

Junction 15: A361 (Burford Street) / A417 (St. John's St)

Junction 15 is operating well within capacity in all scenarios.

Mitigation: Not required.

5. Mitigation Options

The following junctions have been identified as having at least one arm which is projected to be operating over capacity in 2031 (with committed and preferred development included):

- Junction 1: A429 (Roman Road) / A44 (Oxford Street);
- Junction 2: A429 (Roman Road) / A44 (Bourton Road);
- Junction 4: A429 (Fosse Way) / A436 (Oddington Road) / B4068;
- Junction 8: A433 (London Road) / A433 (Long Street)/ Hampton Street/ New Church Street;
- Junction 9: A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) / Chipping Street; and
- Junction 14: A417 (High Street) / A361 (Thames Street).

Mitigation measures were identified for the junctions that were projected to be operating over capacity in 2031 with committed and preferred development included. Each mitigated junction has been modelled (using ARCADY, PICADY or LinSig software) to include the proposed alterations to the junction geometries. The results for all arms of each mitigated junction are shown in this section. The preliminary mitigation scheme designs for each junction identified as requiring mitigation are shown in **Appendix A**. GCC have reviewed the methodology used and the proposed mitigation options which have all been accepted.

5.1. Proposed Mitigation Schemes

Junction 1: A429 (Roman Road) / A44 (Oxford Street)

Arm 3 (A429 High Street South) of Junction 1 has been forecast as operating with a RFC of 1.42 in the 2031 PM Peak with committed and preferred development traffic assigned to the network (no mitigation) – increasing from 0.73 in the existing 2014 PM peak traffic period.

To improve the operational capacity at Junction 1, the following mitigation measures are required (see **Appendix A – SK001 Rev A**):

- Widening of Arm 1 (A429 High Street North) to create two approach lanes and realignment of road markings.
- Widening of Arm 2 (A44 Oxford Street) to create two approach lanes and realignment of road markings.
- Widening of Arm 3 (A429 High Street South) to create two approach lanes and realignment of road markings.
- Modification of the junction from a mini-roundabout to a signal controlled junction.
- Creation of a right-turn bay from Arm 3 (A429 High Street South) to Arm 2 (A44 Oxford Street).

The results show that all arms will operate with a DoS of less than 89.9% with 2031 Committed and preferred development traffic.

Junction 2: A429 (Roman Road) / A44 (Bourton Road)

Arm 4 (A44 Bourton Road) of Junction 2 has been forecast as operating with a RFC of 1.45 in the 2031 PM Peak with committed and preferred development traffic assigned to the network (no mitigation) – increasing from 0.58 in the existing 2014 PM peak traffic period.

To improve the operational capacity at Junction 2, the following mitigation measures are required (see **Appendix A - SK001 Rev A**):

- Widening of Arm 1 (A429 High Street North) to create two approach lanes and realignment of road markings.
- Widening of Arm 2 (East Street) and realignment of road markings.
- Widening of Arm 4 (A44 Bourton Road) to create two approach lanes and realignment of road markings.
- Modification of the junction from a mini-roundabout to a signal controlled junction.

The results show that all arms will operate with a DoS of less than 89.9% with 2031 Committed and preferred development traffic.

Junction 4: A429 (Fosse Way) / A436 (Oddington Road) / B4068

Arm 1 (A429 Fosse Way North) of Junction 4 has been forecast as operating with a DoS of 118.5% in the 2031 AM Peak with committed and preferred development traffic assigned to the network (no mitigation) – increasing from 94.3% in the existing 2014 AM peak traffic period.

To improve the operational capacity at Junction 4, the following mitigation measures are required (see **Appendix A – SK002 Rev B**):

- Widening of Arm 2 (A436 Oddington Road) to create two approach lanes and realignment of the carriageway.
- Widening of Arm 3 (A429 Fosse Way South) and realignment of road markings.
- Modification to the existing signal specifications to allow Arm 2 (A436 Oddington Road) and Arm 4 (B4068) to run in sync with the addition of a right turn lane.
- Modification to the existing signal specifications to allow Arm 1 (A429 Fosse Way North) and Arm 3 (A429 Fosse Way South) to run in sync with the addition of a right turn lane.
- Realignment of road markings.

The results show that all arms will operate with a DoS of less than 81.6% with 2031 Committed and preferred development traffic.

The analysis demonstrates that with mitigation the junction can work with pedestrians run every cycle or every other cycle. There is not anticipated to be significant pedestrian demand across Fosse Way as there is little development to the west of the road. The largest trip generator is likely to be the pub car park but this impact will be limited and not anticipated to coincide with the peak hours. The mitigation proposed is therefore acceptable.

Junction 8: A433 (London Road) / A433 (Long Street)/ Hampton Street/ New Church Street

The A4136 (New Church Street) has been forecast as operating over capacity in the 2031 PM Peak with committed and preferred development traffic assigned to the network (no mitigation).

To improve the operational capacity at Junction 8, the following mitigation measures are required (see **Appendix A – SK003 Rev A**):

- Creation of a roundabout.
- Widening of Arm 3 (A4136 New Church Street) and realignment of the carriageway.
- Realignment of road markings.

The results show that all arms will operate no worse than the existing situation, with a RFC of less than 1.05 with 2031 Committed and preferred development traffic.

The proposals demonstrate that there is a viable mitigation scheme that would operate better than the present situation which retains and enhances the existing pedestrian facilities. Vehicle swept path analysis has been undertaken which demonstrates that manoeuvres can be undertaken. A Road Safety Audit would be undertaken as part of future scheme development.

Junction 9: A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) / Chipping Street

Arm 2 (A433 Long Street) of Junction 9 has been forecast as operating with a RFC of 1.09 in the 2031 PM Peak with committed and preferred development traffic assigned to the network (no mitigation) – increasing from 0.88 in the existing 2014 PM peak traffic period.

To improve the operational capacity at Junction 9, the following mitigation measures are required (see **Appendix A – SK004 Rev B**):

- Modification of the junction from a mini-roundabout to a signal controlled junction.
- Realignment of road markings.

The results show that all arms will operate with a DoS of less than 88.4% with 2031 Committed and preferred development traffic.

Pedestrian crossing facilities are not incorporated within the junction as Market House restricts pedestrian movement at the junction as there are no footways on the northern side of Church Street or the southern side of Long Street. Pedestrian desire lines are therefore across Chipping Street and Market Place. Zebra crossings are provided on all arms except Chipping Street which has low traffic flows.

Junction 14: A417 (High Street) / A361 (Thames Street)

Arm 3 (A417 High Street West) of Junction 14 has been forecast as operating with a DoS of 105.5% in the 2031 AM Peak with committed and preferred development traffic assigned to the network (no mitigation) – increasing from 91.1% in the existing 2014 AM Peak traffic period.

To improve the operational capacity at Junction 14, the following mitigation measures are required (see **Appendix A – SK005 Rev A**):

- Reallocation of road space to provide improved pedestrian crossing facilities.
- Split pedestrian crossing to reduce pedestrian crossing times.
- Realignment of road markings.

The results show that all arms will operate with a DoS of less than 91.8% with 2031 Committed and preferred development traffic.

5.2. Proposed Mitigation Scheme Impact

A summary of the junction capacity before and after mitigation is summarised in **Table 5-1**. The junction capacity analysis results have been colour coded to show junctions operating within capacity as green, approaching capacity in amber and exceeding capacity in red. The junction capacity analysis table outlines the maximum RFC/ DoS on any arm.

| Junction No. | Junction Name | AM Peak (08:00 – 09:00) | | | | PM Peak (17:00 – 18:00) | | | |
|--------------|--|---|-----------------------|-------------------------|----------------------------|---|-----------------------|-------------------------|----------------------------|
| | | Existing Capacity | Com Dev Capacity 2031 | Com Dev + Pref Dev 2031 | Proposed Mitigation Scheme | Existing Capacity | Com Dev Capacity 2031 | Com Dev + Pref Dev 2031 | Proposed Mitigation Scheme |
| | | RFC unless stated/ DoS = Degree of Saturation | | | | RFC unless stated/ DoS = Degree of Saturation | | | |
| 1 | A429 (Roman Road) / A44 (Oxford Street) | 0.74 | 0.96 | 1.15 | 89.9% (DoS)* | 0.73 | 0.95 | 1.42 | 78.2% (DoS)* |
| 2 | A429 (Roman Road) / A44 (Bourton Road) | 0.66 | 0.82 | 1.45 | | 0.69 | 0.87 | 1.02 | |
| 4 | A429 (Fosse Way) / A436 (Oddington Road) / B4068 | 94.3% (DoS) | 109.7% (DoS) | 118.5% (DoS) | 81.6% (DoS) | 86.3% (DoS) | 99.8% (DoS) | 113.3% (DoS) | 73.0% (DoS) |
| 8 | A433 (London Road) / A433 (Long Street)/ Hampton Street | 1.21 | 1.53 | 2.57 | 0.90 | 0.84 | 1.24 | 999.99* | 1.05 |
| 9 | A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) | 0.65 | 0.71 | 0.90 | 82.1% (DoS) | 0.88 | 1.04 | 1.09 | 88.4% (DoS) |
| 14 | A417 (High Street) / A361 (Thames Street) | 91.1% (DoS) | 95.9% (DoS) | 105.5% (DoS) | 91.8% (DoS) | 83.8% (DoS) | 90.1% (DoS) | 92.6% (DoS) | 85.8% (DoS) |

Table 5-1 Summary of Mitigation Capacity Assessments

*Junctions 1 & 2 Modelled in LinSig as one signalised junction.

** Model unable to report due to junction operating over capacity

5.3. Scheme Cost Estimates

Budget estimates have been calculated for the required mitigation schemes. The budget estimates include the following costs:

- Site clearance;
- Construction work;
- Traffic management;
- New road signage;
- Main contractor preliminaries (25%);
- Site investigation (1.5%);
- Detailed design (8%); and
- Contingency (20%).

At this stage the cost of statutory undertakers diversions or reinforcement is unknown and an assumption of an additional 50% of the scheme cost has been included in the total cost. These total costs are therefore provisional and will need to be considered further by a cost consultant to obtain detailed costings.

Table 5-2 Scheme Cost Table

| Site Reference | Junction | Estimated Total Cost |
|----------------|--|----------------------|
| 1 | A429 (Roman Road) / A44 (Oxford Street) | £870,000 (1+2) |
| 2 | A429 (Roman Road) / A44 (Bourton Road) | |
| 4 | A429 (Fosse Way) / A436 (Oddington Road) / B4068 | £620,000 |
| 8 | A433 (London Road) / A433 (Long Street)/ Hampton Street/ New Church Street | £695,000 |
| 9 | A433 (Long Street) / A433 (Bath Road) / B4014 (Fox Hill) / Chipping Street | £510,000 |
| 14 | A417 (High Street) / A361 (Thames Street) | £360,000 |
| Total | | £3,055,000 |

The total budget estimate for providing the required mitigation to accommodate the Cotswold Local Plan development is therefore approximately £3,055,000.

6. Summary and Conclusions

6.1. Summary

Atkins have been commissioned to prepare a Junction Capacity Assessment to form part of the Local Plan evidence base and to inform the Infrastructure Development Plan. This report considers the development traffic impact on the principal highway network in terms of vehicular capacity, and identifies mitigation measures required.

Traffic generation as a result of the developments identified within the Local Plan has been assessed on the highway network. As part of the work to support the Chesterton development in Cirencester, an S-Paramics model was developed of the area by a third party. The S-Paramics model has therefore been used to assess the Local Plan impact on junctions in Cirencester. Whilst these junctions have been excluded from this analysis, the traffic generation of the Cirencester has been considered within this assessment.

Junctions where impact exceeds 5% have been identified and junction capacity analysed. Where the junctions are forecast to exceed capacity as a result of the Local Plan development, mitigation measures have been identified.

The mitigation schemes have been assessed and found to work within acceptable thresholds of capacity, queuing and delay. Budget cost estimates have been produced for each of the mitigation schemes to identify the cost of mitigating the Local Plan development traffic. The total budget cost of the required mitigation measures is approximately £3,055,000.

6.2. Conclusions

The analysis demonstrates that the proposed Local Plan development can be accommodated on the highway network when the identified mitigation schemes are provided. The proposed developments will need to fund the cost of the mitigation schemes in order for the highway network to accommodate the additional development traffic.

Each development site will also need to undertake a Transport Assessment and Travel Plan to consider specific transport issues relating to each site, such as road safety and sustainable transport requirements.

Appendices

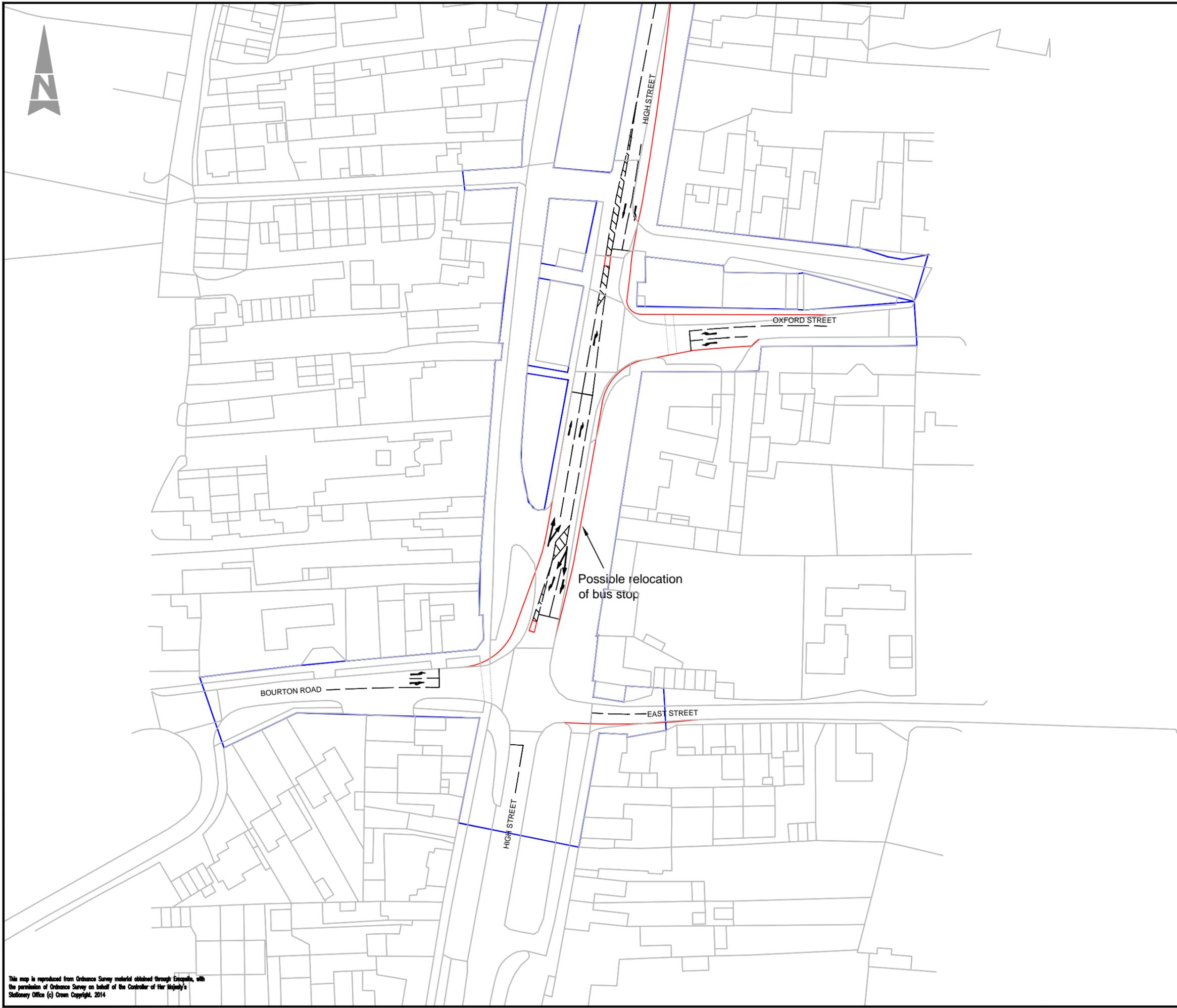


Appendix A. Mitigation Scheme Drawings

| | |
|--------|--|
| Rev | |
| Status | |

A3

File: P:\GBMA\Hand\CS\Projects\Cotswold Junction Assessment\20_CAD\01_Drgs\J1-2 Mitigation.dwg
 Date: Apr 14, 2016 - 12:16pm Plotted by: cor5172



Key

| | |
|--|-------------------|
| | Existing Layout |
| | Extent of Highway |
| | Proposed Layout |

PRELIMINARY JUNCTION CAPACITY REQUIREMENTS. FOR INFORMATION ONLY.

SUBJECT TO SITE SPECIFIC DETAILED DESIGN.

Atkins Limited ©
 The Axis
 10 Holliday Street
 Birmingham B1 1TF
 Tel: (0121) 483 5000
 Fax: (0121) 483 5252
 www.atkinglobal.com

Client
 Cotswold District Council

Project
 Cotswold Junction Assessment

Title
 A429 High Street/A44 Bourton Road/A44 Oxford Street Junction - Proposed Mitigation

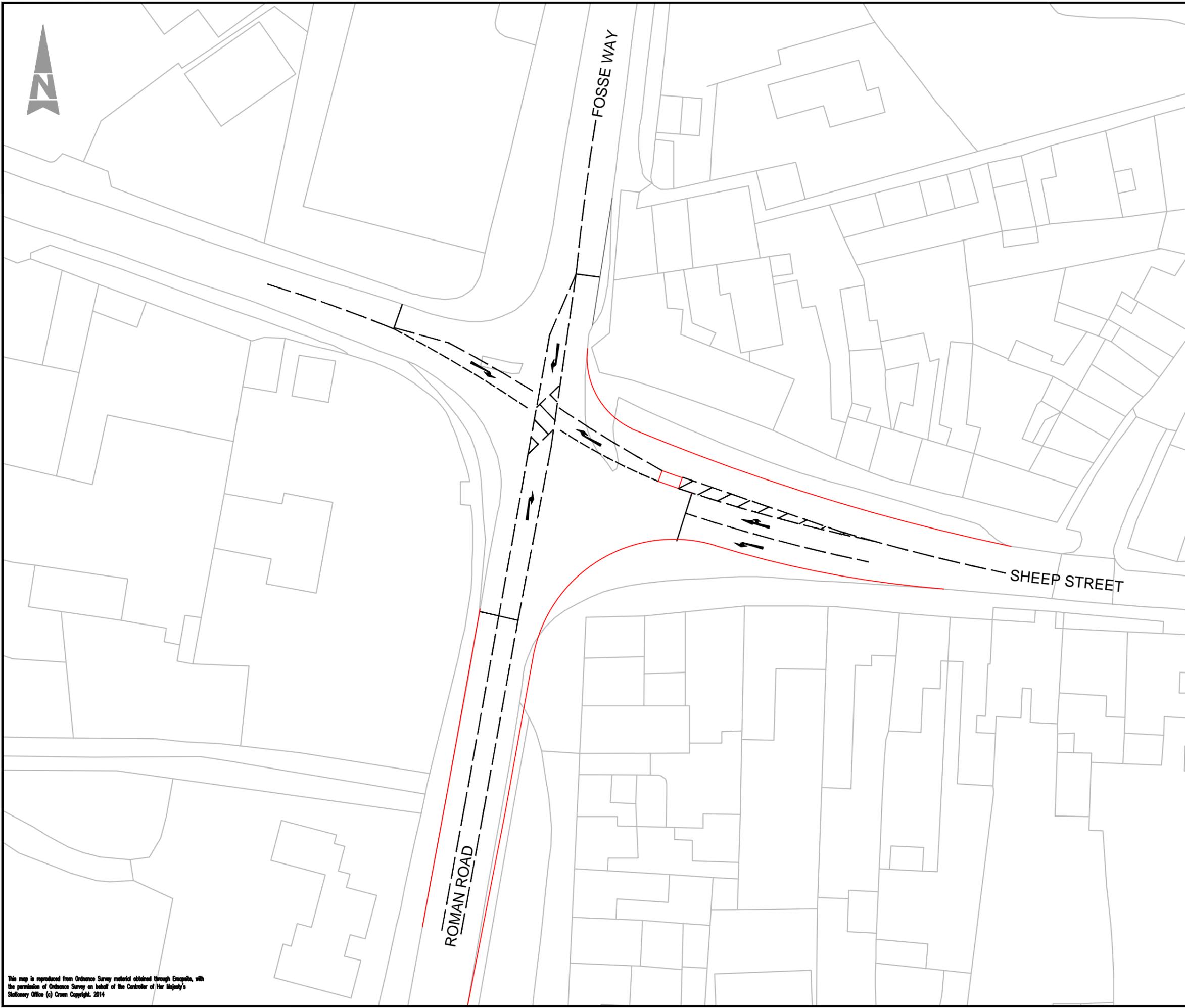
| | | | |
|------------|----------------|----------------|----------|
| Sheet Size | Original Scale | Designed/Drawn | Reviewed |
| A3 | 1:1000 | KN | TC |
| Status | Drawing Number | Date | Date |
| | 5135278- SK001 | | |
| | | Rev | |
| | | A | |

This map is reproduced from Ordnance Survey material obtained through Encapsite, with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office (c) Crown Copyright. 2014

Rev
Status

A3
0 10 50

File: P:\GBBM\Hand\CS\Projects\Cotswold Junction Assessment\20_CAD\01_Drgs\A3.dwg
Date: Apr 14, 2016 - 12:18pm
Plotted by: cat6172



Key

Existing Layout

Proposed Layout

PRELIMINARY JUNCTION
CAPACITY REQUIREMENTS.
FOR INFORMATION ONLY.

SUBJECT TO SITE SPECIFIC
DETAILED DESIGN.

Atkins Limited ©

The Axis
10 Holliday Street
Birmingham
B1 1TF

Tel: (0121) 483 5000
Fax: (0121) 483 5252
www.atkinsglobal.com

Client
Cotswold District Council

Project
Cotswold Junction Assessment

Title
A429 Fosse Way/A436 Oddington
Road Junction – Proposed
Mitigation

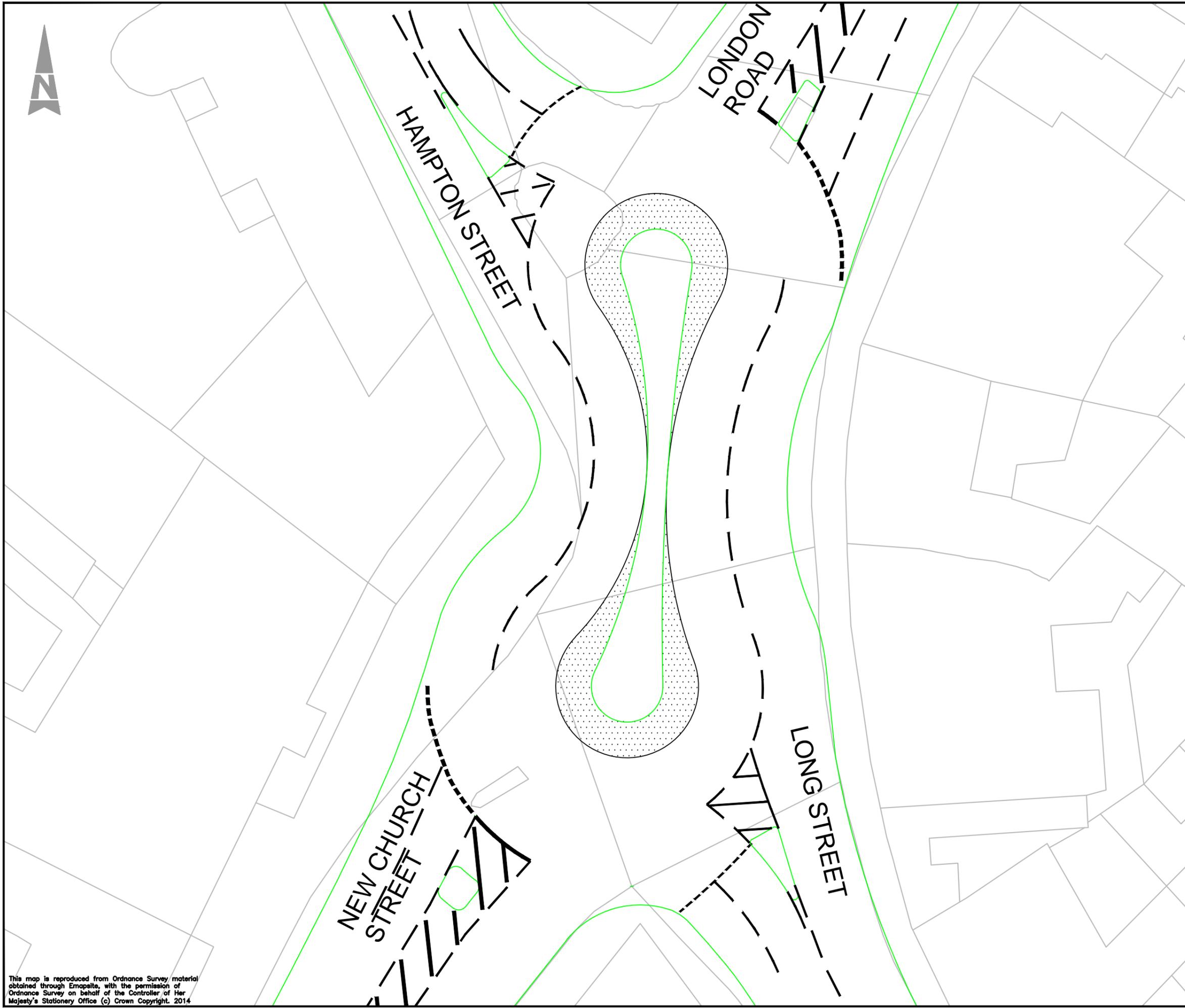
| | | | |
|------------|----------------|----------------|----------|
| Sheet Size | Original Scale | Designed/Drawn | Reviewed |
| A3 | 1:500 | KN | TC |
| Status | Drawing Number | Date | Date |
| | 5135278- SK002 | | |
| | | | Rev |
| | | | B |

This map is reproduced from Ordnance Survey material obtained through Esri/MapInfo, with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office (c) Crown Copyright. 2014

Rev
Status

A3
0 10 50

File: P:\GBBMA\HandT\CS\Projects\Cotswold Junction Assessment\20_CAD\01_Drgs\JB.dwg
Date: Apr 14, 2016 - 2:06pm
Plotted by: cart5172



Key

| | |
|--|-----------------|
| | Existing Layout |
| | Proposed Layout |

PRELIMINARY JUNCTION CAPACITY REQUIREMENTS. FOR INFORMATION ONLY.
SUBJECT TO SITE SPECIFIC DETAILED DESIGN.

Atkins Limited ©
The Axis
10 Holliday Street
Birmingham B1 1TF
Tel: (0121) 483 5000
Fax: (0121) 483 5252
www.atkinsglobal.com

Client
Cotswold District Council

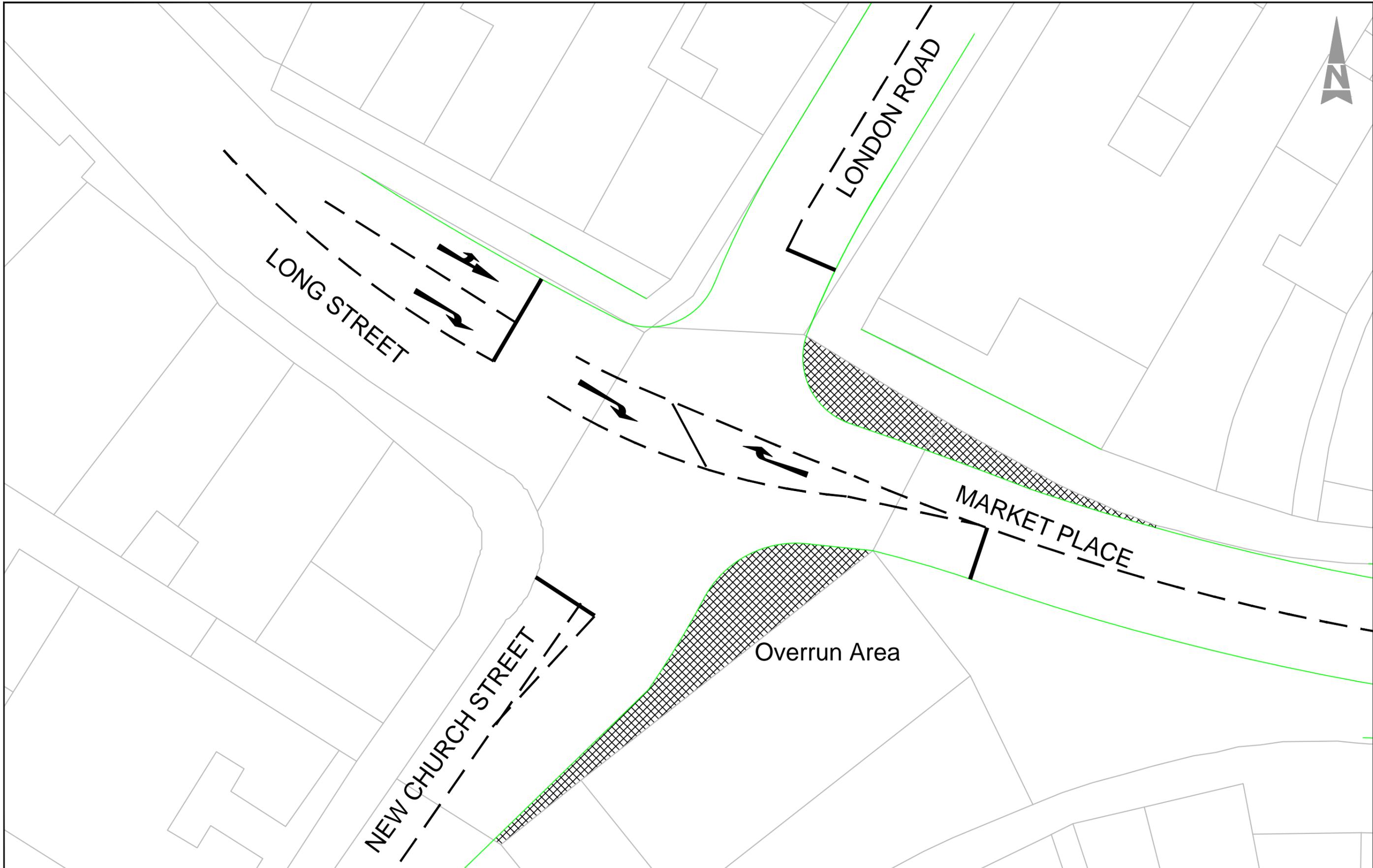
Project
Cotswold Junction Assessment

Title
Junction 8 – Potential Mitigation
A433 London Rd / Long St /
New Church St / Hampton St

| | | | |
|------------|----------------|----------------|----------|
| Sheet Size | Original Scale | Designed/Drawn | Reviewed |
| A3 | 1:2.00 | DC | TC |
| Status | Drawing Number | Date | Date |
| | 5135278- SK003 | 08/02/15 | 08/02/15 |
| Rev | | | |
| A | | | |

This map is reproduced from Ordnance Survey material obtained through Emapipla, with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office (c) Crown Copyright. 2014

DO NOT SCALE



Key
 Existing Layout Proposed Layout

PRELIMINARY JUNCTION CAPACITY REQUIREMENTS.FOR INFORMATION ONLY.
 SUBJECT TO SITE SPECIFIC DETAILED DESIGN.

| Stat | Purpose of Issue | Date | Auth | Rev | Description | By | Date | Chk'd | Auth |
|------|------------------|------|------|-----|-------------|----|------|-------|------|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

ATKINS
 Atkins Limited
 Transport Planning,
 Longcross Court
 47, Newport Road
 Cardiff, Wales
 CF23 0AD

Tel: (029) 20485159
 Fax: (029) 20485138
 www.atkinsglobal.com

| | | |
|---------|---|--|
| Client | COTSWOLD DISTRICT COUNCIL | |
| Project | LOCAL PLAN JUNCTION CAPACITY ASSESSMENT | |

| | | | | | |
|------------|----------------|--|---------|------------|---|
| Title | | A433 LONG ST/A433/BATH RD/B4014 FOX HILL JUNCTION 9 PROPOSED IMPROVEMENT | | | |
| Sheet Size | Original Scale | Designed/Drawn DC | Checked | Authorised | |
| A3 | 1:200 | Date 01.15 | Date | Date | |
| Status | Drawing Number | 5135278- SK004 | | Rev | A |
| P | | | | | |

DO NOT SCALE



This map is reproduced from Ordnance Survey material obtained through Emapsite, with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office (c) Crown Copyright. 2014

Key
 Existing Layout Proposed Layout

PRELIMINARY JUNCTION CAPACITY REQUIREMENTS.FOR INFORMATION ONLY.

SUBJECT TO SITE SPECIFIC DETAILED DESIGN.

| Stat | Purpose of Issue | Date | Auth | Rev | Description | By | Date | Chk'd | Auth |
|------|------------------|------|------|-----|-------------|----|------|-------|------|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

ATKINS
 Atkins Limited
 Transport Planning,
 Longcross Court
 47, Newport Road
 Cardiff, Wales
 CF23 0AD
 Tel: (029) 20485159
 Fax: (029) 20485138
 www.atkinsglobal.com

Client
 Project
 COTSWOLD JUNCTION ASSESSMENT

| | | | | | |
|------------|----------------|--|------------|---------------|---|
| Title | | A417 HIGH ST/A361 THAMES ST JUNCTION JUNCTION 14 MITIGATION OPTION | | | |
| Sheet Size | Original Scale | Designed/Drawn DC | Checked TC | Authorised TC | |
| A3 | 1:200 | Date 02/15 | Date 02/15 | Date 02/15 | |
| Status | Drawing Number | | | | |
| P | 5135278- SK005 | | | | A |



Tim Colles

Atkins Transport Planning
The Axis, 6S
10 Holliday Street
Birmingham B1 1TF

Email: Tim.Colles@atkinsglobal.com

Telephone: 0121 483 5658

© Atkins Ltd except where stated otherwise.

The Atkins logo, 'Carbon Critical Design' and the strapline
'Plan Design Enable' are trademarks of Atkins Ltd.