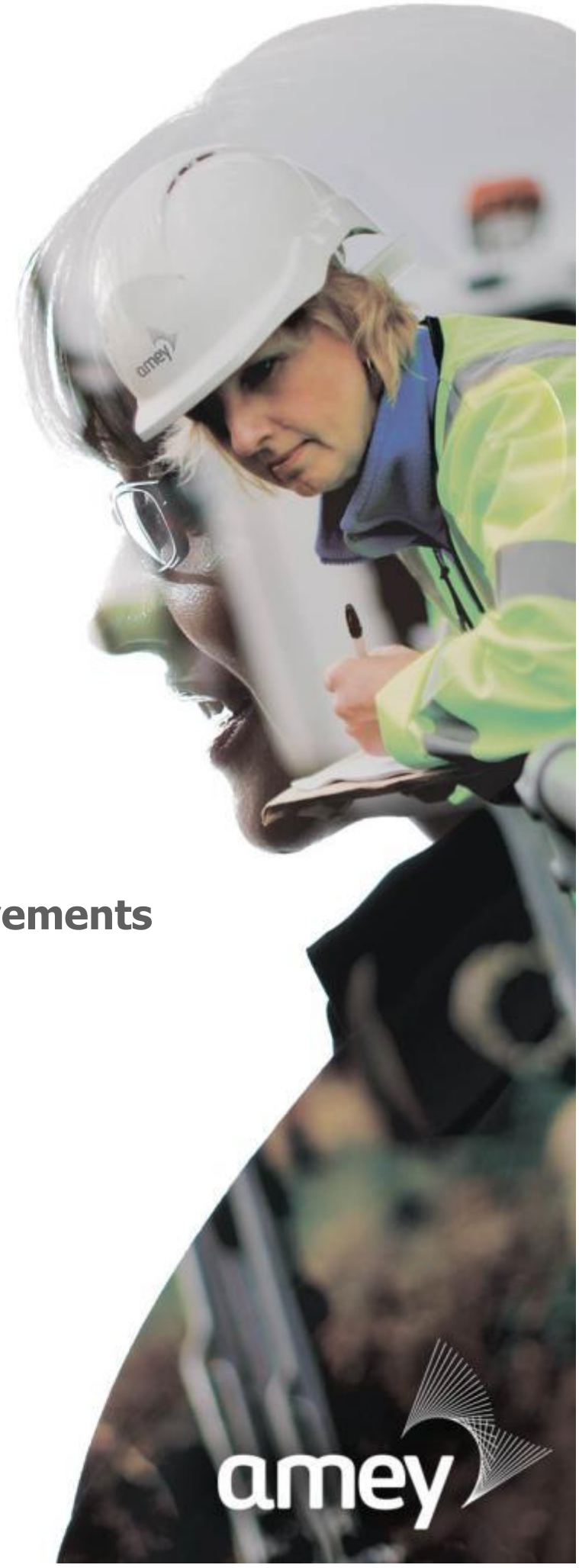
Gloucestershire COUNTY COUNCIL



Full Business Case

Stonehouse A419 Improvements

August 2017

INVESTORS IN PEOPLE | Gold

INVESTORS IN PEOPLE | Champion

Contents

Appendices

1 Introduction

1.1 Purpose of this Document

This document provides information to support the implementation of proposed changes along the A419 corridor, situated in Stroud Gloucestershire between the M5 junction 13 and Stroud. This report is based on the current preferred preliminary design options, and aims to provide the required detail as set out in the Appraisal Summary Report (ASR) for the Full Business Case (FBC).

Figure 1.1- Location of the A419 and project area

1.2 Need for Proposed Changes

Amey has been requested by Gloucestershire County Council to recommend and design an improvement scheme for the A419 corridor between Chipman's Platt Roundabout and Horsetrough Roundabout.

This new proposal seeks to improve the A419 corridor which links Stroud/Stonehouse to the M5 junction 13 and also seeks to 'future proof' the junction, given the strategic importance of the link and current traffic flows. The overall aim of the proposed scheme is to reduce queues and delays on the A419 improving vehicle journey times and addressing journey reliability problems. The scheme will therefore support planned growth (including on land near to the corridor), improve access to jobs, and support the efficient movement of goods.

The key objectives which have been identified by the LEP are as follows, these also led to the provisional allocations of the funds;

- Facilitate delivery and sustained growth of the Gloucestershire Renewable Energy, Engineering and Nuclear (GREEN) initiative at Berkeley and surrounding locality;
- Provide transport enabling works to support employment expansion at the Stroudwater Industrial Estate and Sharpness Docks sites;
- To reduce peak period congestion on the A419 and A38;
- To support strategic housing and employment growth sites at Stonehouse, Stroud and Berkeley;
- To increase capacity, optimise the efficiency of the corridor and reduce delays for general traffic, HGV's and buses, whilst also providing adequate provision for pedestrians and cyclists;
- To support planned growth (including on land near to the corridor), improve access to jobs and support the efficient movement of goods.

1.3 A419 Study Area

The A419 corridor is located to the south of the County, and links Stroud to the M5 (Junction 13). The A419 is a route of local importance connecting the Stroud Valley with the wider strategic network, in particular to the M5 which provides connections for freight and other traffic to Bristol, Gloucester, Cheltenham and the remainder of the UK.

The A419 acts as the primary link for commuters traveling from Stroud to M5 Junction 13 (North/South). The land adjacent to the scheme and immediate surroundings consist of open farm land, residential developments and business parks.

Currently there are some footpaths and cycle routes which allow users to navigate the route safely via dedicated cycle and pedestrian routes (however these are limited in terms of direction and consistency).

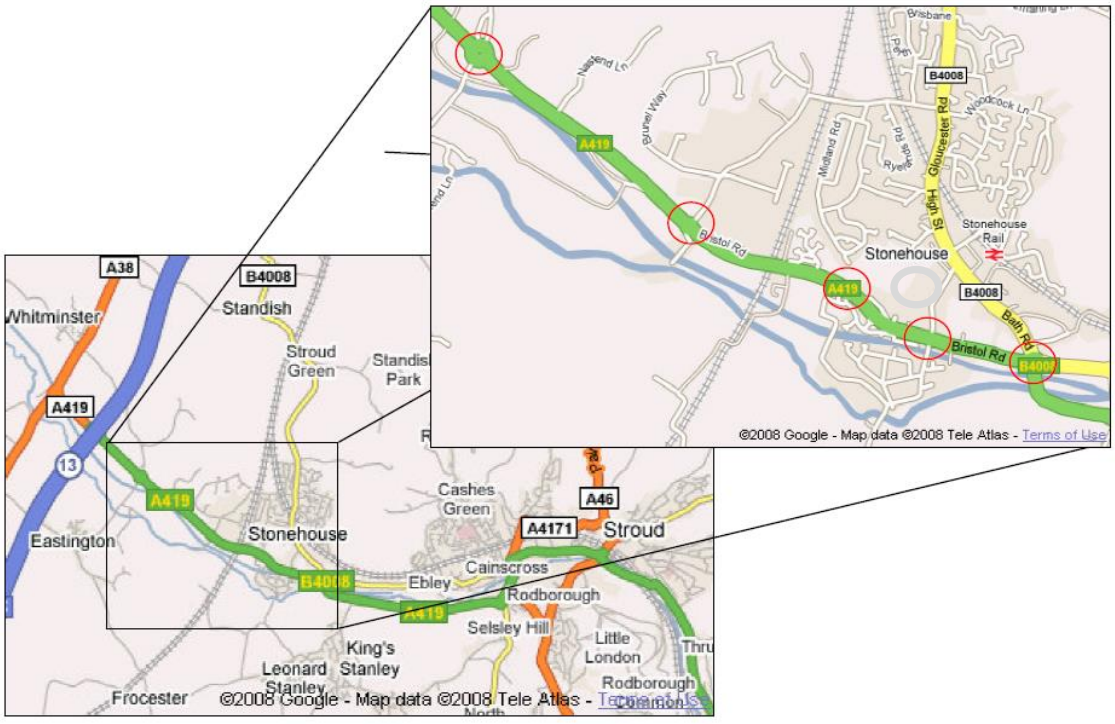


Figure 1.2 - A419 Corridor location, Stonehouse

1.4 Sections of the corridor considered for the Full Business Case

The A419 between M5 Junction 13 and Stroud currently experiences significant congestion and delays, particularly during peak hours at the key junctions identified via the scheme (detailed below).

The proposed junction improvements aim to increase capacity, optimise the efficiency of the corridor and reduce journey time delays for all traffic using the A419, whilst also maintaining and improving access for businesses, and facilities for pedestrians and cyclists.

During the process to identify suitable modifications to the corridor, it was sought to balance the provision of additional capacity against cost and the need to acquire any third party land. The proposed layouts have been developed to deliver the maximum benefit across the four junctions with the LEP funding available. Previous studies have evaluated more significant proposals requiring land take and although not necessarily viable given the budget available, they have been assessed in further detail in this report.

The current preliminary design of the scheme comprises of a package of junction improvements and carriageway widening along the A419, with the key locations identified as follows:

- Chipman's Platt Roundabout;
- Oldends Lane Roundabout;
- Downton Road Signals;
- Section between Downton Road and Horsetrough Roundabout;
- Horsetrough Roundabout.

The preliminary design drawings for the junction improvements are included in Appendix A.

Location	Description of the Improvements
Chipman's Platt Roundabout	Widening of the A419 eastbound and westbound entries and exits from one lane to two lanes. Improvements to National Cycle Route through the installation of an off carriageway shared use cycle way from Spring Hill Road to Grove Lane. Improvements to street lighting, signing and lining.
Oldends Lane Roundabout	Widening of Oldends Lane approach to roundabout from one lane to two lanes. Installation of new pedestrian / cycle toucan crossing of the A419. Slight modifications to island geometry and improved signing and lining.
Downton Road Signals	Upgrade of traffic signals. Widening of A419 westbound exit to two lanes to improve capacity through the junction.
Stretch of carriageway between Horsetrough Rbt and Downton Road Signals	Widening of the westbound carriageway from one to two lane between Horsetrough roundabout and Downton Road signals.
Horsetrough Roundabout	Creation of a segregated left turn lane from A419 northbound entry (Ebley bypass) to the A419 westbound exit (Bristol Road). Widening of the A419 eastbound to extend the two lane approach to the roundabout. Off carriageway cycle route around roundabout perimeter.

Table 1.1 - Brief summary of proposals at each of the junctions.

Existing access to businesses will remain, and the scheme will maintain or improve all existing footpaths and cycle paths. Additional cycle infrastructure will be added at Chipman's Platt and Horsetrough roundabouts in addition to a new shared use off carriageway cycle facility between Horsetrough roundabout and Downton road signals. Improvements to the National Cycle Route running through this area will be considered during detailed design.

During the design phase, consideration will be given to accesses in the area between Horsetrough Roundabout and Downton Road signals where the westbound carriageway is increasing from one to two lanes. The scheme is expected to improve access and reduce severance for pedestrians as an indirect consequence of the corridor improvement.

A full review, together with assessing the impact through traffic modelling packages has been undertaken to establish the most appropriate scheme for the corridor, and the preferred scheme will be taken forward (subject to LEP approval) to detailed design and construction.

1.5 Scheme Locations

1.5.1 Chipman's Platt

Situated to the north of Chipman's Platt Roundabout there is a petrol filling station, and the adjacent land use comprises of open farmland. The roundabout currently consists of five arms (one of which for entry to the petrol station). The predominant movements at Chipman's Platt roundabout are through movements on the A419 in both the east and westbound directions.

The plans are to widen the A419 eastbound and westbound approaches to create two lane entries and exits to the roundabout. The introduction of a shared use cycle facility will provide users of the national cycle route a quality off carriageway alternative to crossing the roundabout on the carriageway. There will also be improvements to the street lighting, signing and lining.

Situated on the land to the northeast of the roundabout, there is planning permission in place for a 'West of Stonehouse' housing development for 1,350 new homes. Access to the development will be via a new T junction to be built by the developer off Grove Lane approximately 150m to the north of Chapman's Platt roundabout. The developers plans do not affect the proposals at Chipman's Platt although it is expected that tie in will be made with the shared use cycleway to provide a link to the development.

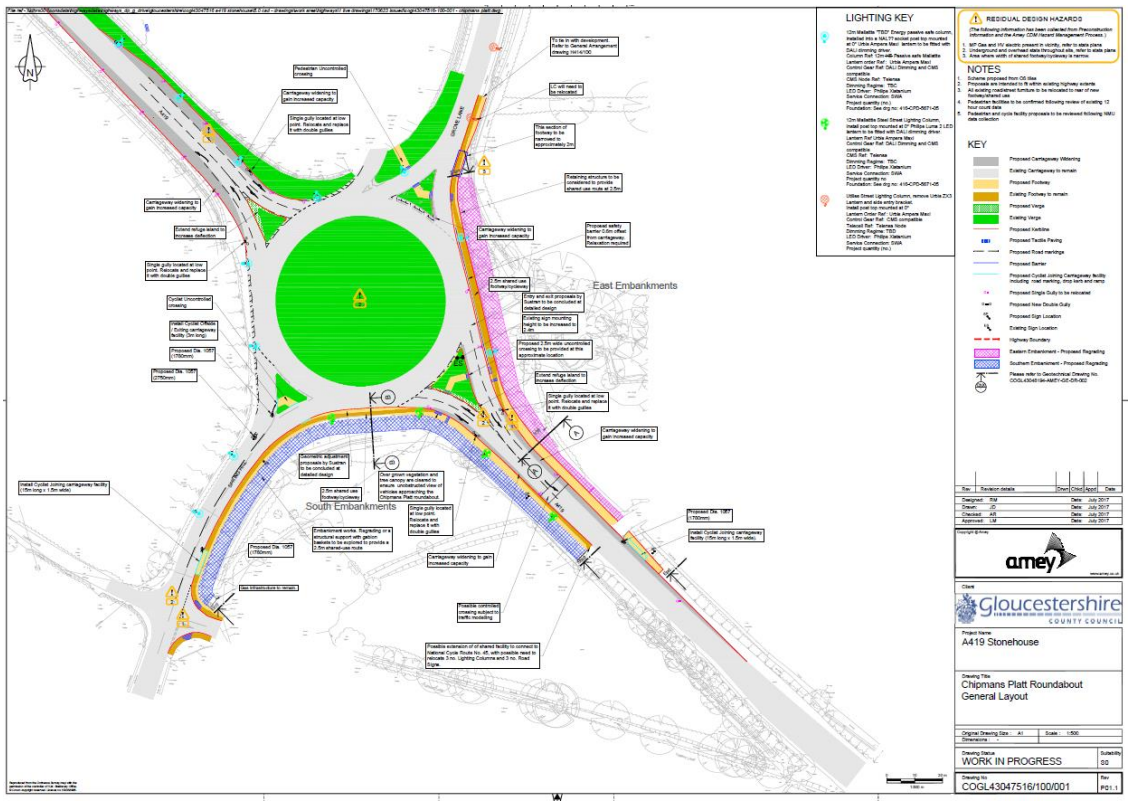


Figure 1.3 - Proposed improvements at Chipman's Platt Roundabout (see Appendix A)

1.5.2 Oldends Lane Roundabout

Oldends Lane roundabout is the next junction travelling east along the corridor. The roundabout has five arms with the north east, southern and southwest arms providing access to industrial estates. Adjacent land is business and residential homes; extended land is open farm land.

The scheme proposes that amendments are made to improve the capacity at Oldends Lane roundabout without any major changes to the layout of the junction. The Oldends Lane approach to roundabout is to be widened from one lane to two lanes with slight modifications to island geometry and improved signing and lining. The two lane approaches and exits of the A419 will also be increased slightly in length.

The national cycle route currently passes through the junction. The route is off carriageway with and uncontrolled crossing of the A419. The proposals include for relocation of the crossing and upgrade to a new toucan crossing.

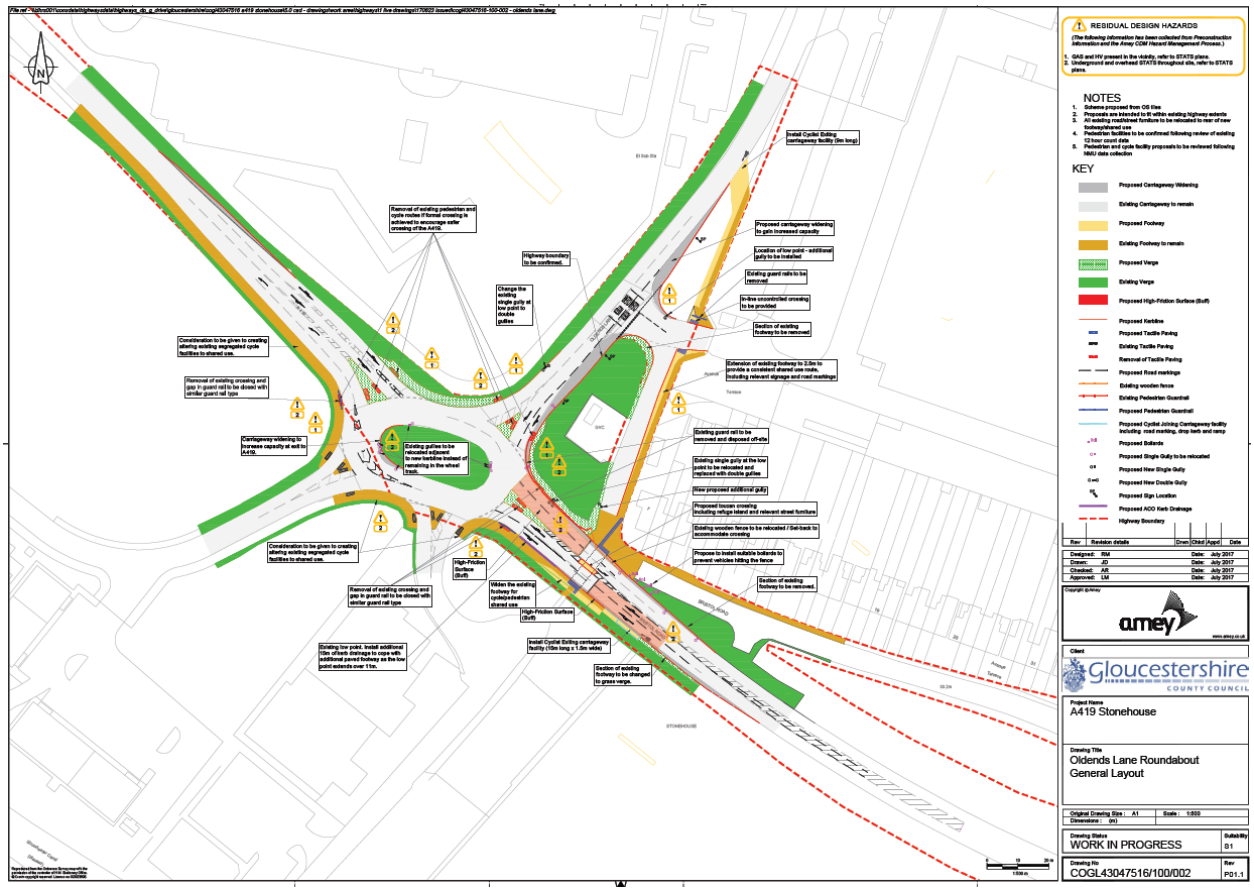


Figure 1.4 - Proposed improvements at Oldends Lane Roundabout (see Appendix A)

1.5.3 Downton Road Signals

Downton Road is currently a signalised junction with staggered pelican pedestrian crossings both east and west of the junction on the A419. There is also a cycle crossing on the A419 which is demand activated and requires an all red phase to allow crossing. An advance stop line is provided on Downton Road for cyclists. Adjacent land use is predominantly residential. The scheme proposes carriageway widening on the westbound exit to create a two lane merge. The proposed scheme is detailed in Figure 1.5 below.

1.5.4 Section between Downton Road and Horsetrough Roundabout

In the section of the A419 between Downton Road and Horsetrough roundabout, the scheme will implement widening on the westbound carriageway to provide for two lanes. Currently, in this area there is a shallow embankment which is covered with vegetation as you approach Downton signals. On the area of land immediately to the south of the A419, Wycliffe school have planning permission for a leisure complex. A bell mouth entrance has been installed onto the A419 although no further construction has been completed.

On the opposite side of the road Wycliffe school is present to the north of the A419. Currently, the A419 has wide verges with grass and occasional trees.

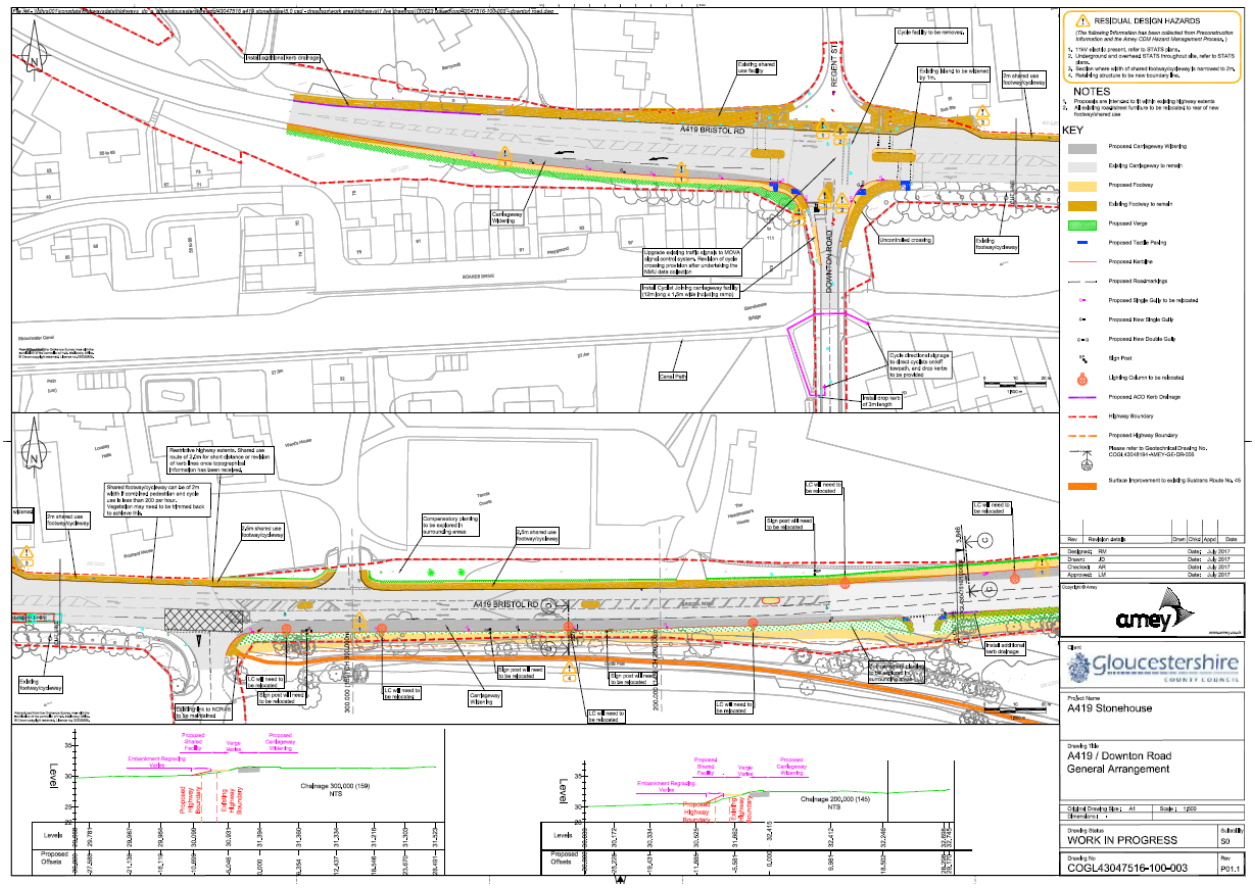


Figure 1.5 - Proposed improvements at Downton Road (see Appendix A)

1.5.5 Horsetrough Roundabout.

The area immediately to the southwest of Horsetrough roundabout is currently scrub land, and the roundabout is at the top of the embankment with the land sloping steeply towards this area of land. To the north, there are school playing fields and a number of residential properties on Browns Lane.

In order to accommodate the segregated left turn lane without the need for land acquisition or large geotechnical retaining solution, the proposal is to use the wide verges to the north to relocate the roundabout.

Approximately 70m to the south of the roundabout on the A419 (Ebley bypass) the Stroudwater canal passes under the A419 in a culvert.

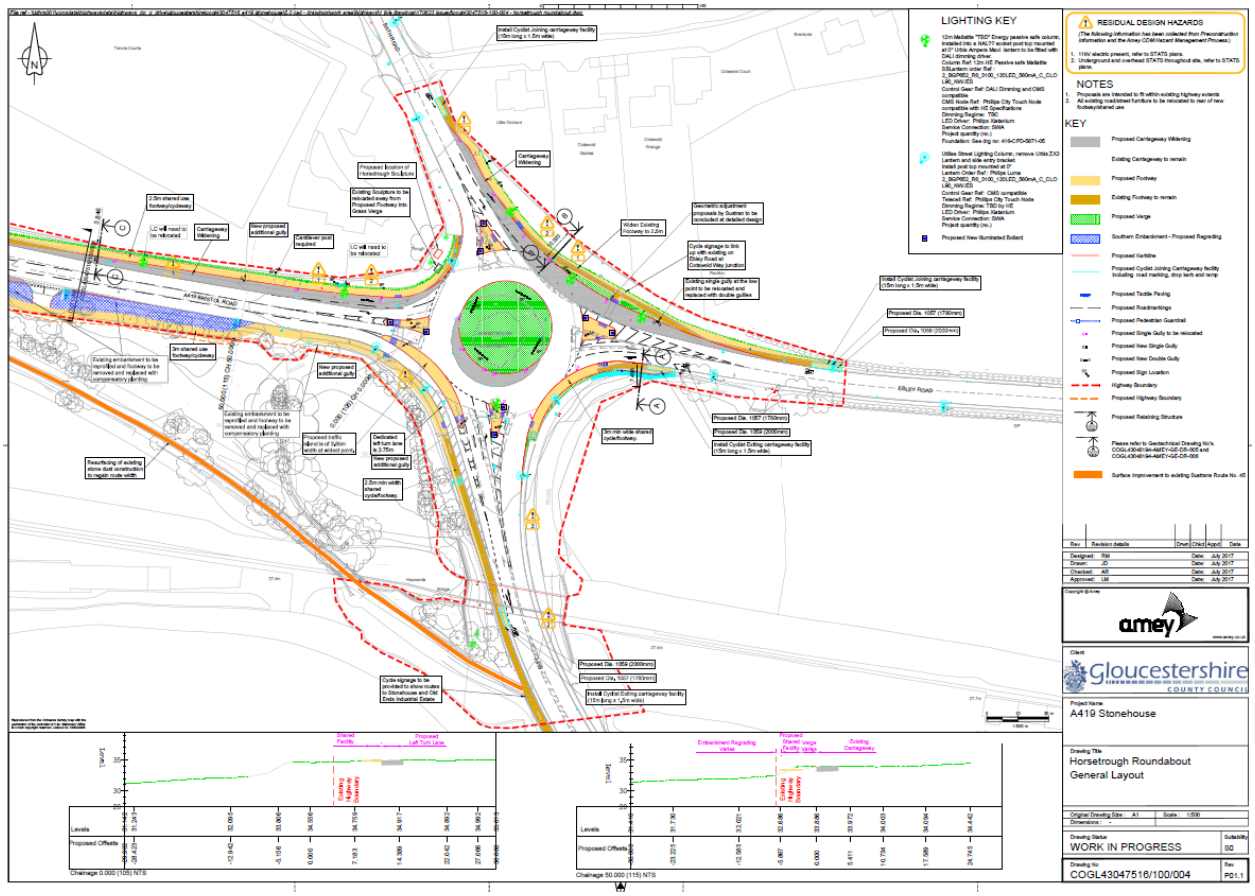


Figure 1.6 - Proposed improvements at Horsetrough Roundabout (see Appendix A)

1.6 5-Case Model

The Full Business Case process for transport schemes is designed to ensure that investments are directed at the right schemes, and that these are managed and delivered in the best way. This ensures that transport investment addresses important issues in an effective way, delivering value for money.

The core of each stage of the Transport Business Case is the 5-Case Model which ensures that schemes:

- Are supported by a robust **case for change** that fits with wider public policy objectives – the 'strategic case';
- Demonstrate **value for money** – the 'economic case';
- Are **commercially viable** – the 'commercial case';
- Are **financially affordable** – the 'financial case'; and
- Are **achievable** – the 'management case'.

This document uses this 5-case model in an appropriate and proportionate way to demonstrate the merit of investing in the proposals to the A419 Corridor improvements.

1.6.1 Context of the Transport Business Case Process

Currently promoters of all schemes involving an investment of public funds over £5m ('major schemes') are required to prepare and submit a Transport Business Case. Previously a Business Case would be submitted to the Department for Transport (DFT).

Government policy changes have involved the devolution of decision-making for smaller major schemes, below £5m, to Local Enterprise Partnerships (LEP's). These bodies are designed to direct investment for an area based on economic priorities set through a partnership which is private-sector led.

2 Strategic Case

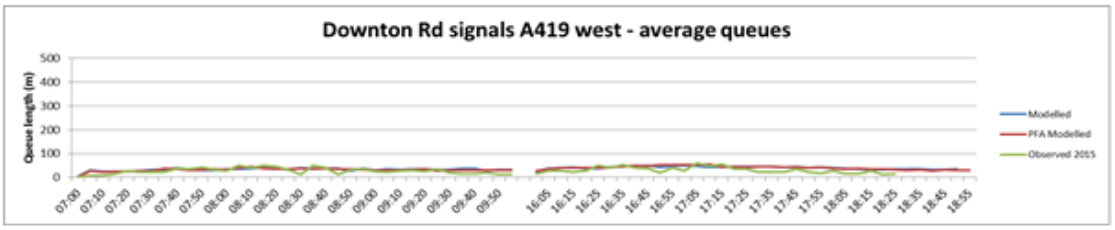
2.1 Rationale for Intervention

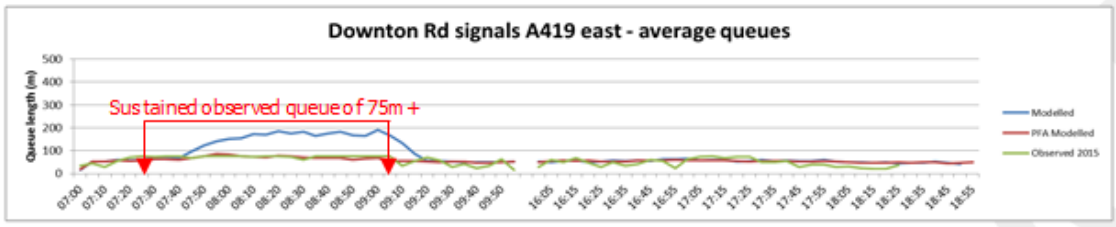
The A419 acts as the primary link for commuters traveling from Stroud to M5 Junction 13 (North/South). This currently experiences significant congestion and delays, particularly during peak hours at the key junctions identified via the scheme.

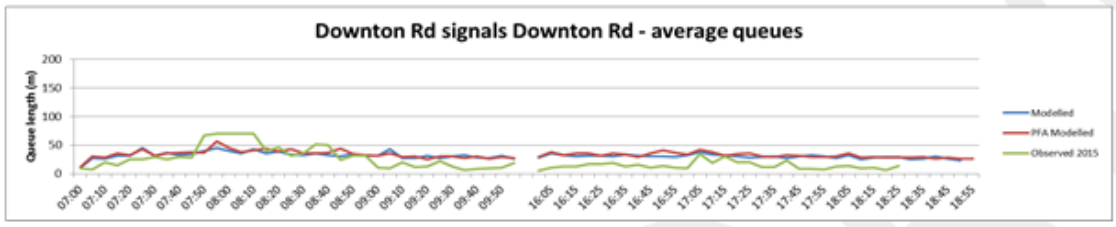
The queue length surveys which were carried out in 2015 at the Downton Road signals identified some significant queue times.

On A419 east approach, queues of at least 75m were recorded during the AM between 07:05 – 09:25hrs and 16:05-17:40hrs which suggests that queues extend beyond 75m for a significant period of time in both AM and PM periods. It is understood that queueing from Downton signals currently extends back to Horsetrough Roundabout (1km) and beyond during the AM peak.

This section of the corridor is of key importance as it covers a large section of the corridor and impacts surrounding links (such as Downton Road) which also experiences high queue times and are often blocked from entering the corridor during green time due to congestion on the corridor itself.







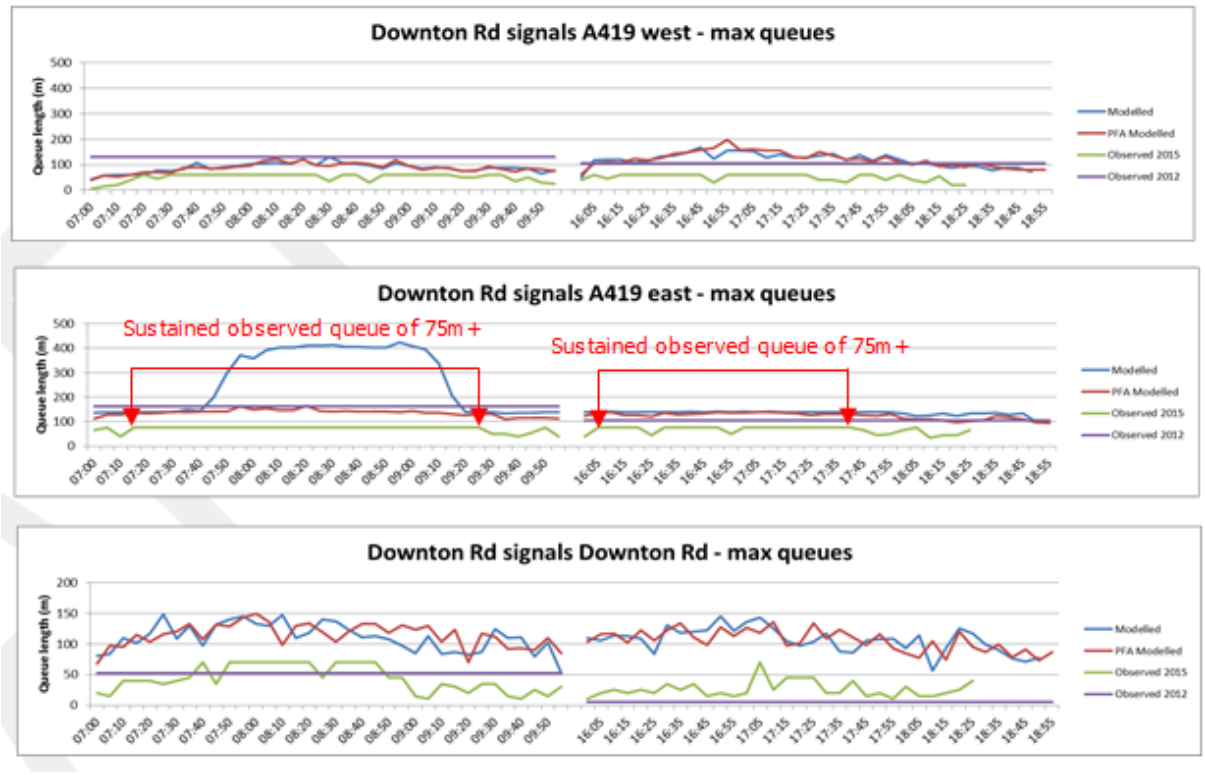


Figure 2.1: Downton Road Signals Queue Times

The overall purpose of the investment is to reduce congestion along the A419 corridor between Junction 13 of the M5 and Stroud.

The aim is to reduce congestion on the identified section of the A419 and reduce delays for all traffic, including HGV's and buses. This will be achieved by increasing the capacity of the corridor through a range of junction improvements which will help to optimise the efficiency of the corridor, whilst also upgrading and providing further infrastructure for pedestrians and cyclists.

The A419 corridor improvement will help support the objectives for growth as set out by the scheme promoter, Gloucestershire County Council. The A419 route provides a key gateway to and from the M5 and efficient links for travel to key locations will safeguard the quality of life for residents of Stonehouse and Stroud. This proposal would contribute towards a preferred strategy for delivering homes and key employment sites, in a sustainable manner to meet future needs and foster economic growth. The planned growth in the local area (from the Local Plan) will increase traffic flow on the network and will increase demand, most significantly during peak periods.

There are no strategic traffic models that can be used for this area of the network (such as SATURN) that accurately cover this area of the network, as the CSV SATURN model only covers this corridor on the edge of the simulation network, and therefore, flows are not suitable for accurate comparison. Therefore, as a suitable alternative, the S-Paramics model was constructed with due consideration given to changes in traffic flows that may be taken by caused by the proposed scheme.

2.2 Scheme Objectives

2.2.1 GCC Local Transport Plan Objectives

Gloucestershire's Local Transport Plan (LTP3) sets out the transport strategy for the county encompassing the period from 2015 to 2031. In terms of the Overarching Strategy, the scheme contributes towards all of the key objectives as summarised in Table 2.1 below from LTP3. In particular, the scheme contributes to the objective of supporting sustainable economic growth by reducing congestion on the route and improving journey times for all users.

The key objectives which have been identified by the LEP are as follows, these also led to the provisional allocations of the funds;

- Facilitate delivery and sustained growth of the Gloucestershire Renewable Energy, Engineering and Nuclear (GREEN) initiative at Berkeley and surrounding locality;
- Provide transport enabling works to support employment expansion at the Stroudwater Industrial Estate and Sharpness Docks sites;
- To reduce peak period congestion on the A419 and A38;
- To support strategic housing and employment growth sites at Stonehouse, Stroud and Berkeley;
- To increase capacity, optimise the efficiency of the corridor and reduce delays for general traffic, HGV's and buses, whilst also providing adequate provision for pedestrians and cyclists;
- To support planned growth (including on land near to the corridor), improve access to jobs and support the efficient movement of goods.

Objective	Expected Outcomes
Support sustainable economic growth	• The transport network is reliable, fit for purpose and demonstrates value for money • Increased journey time reliability • Greater economic activity • Increased footfall in retail areas • A transport network resilient to extreme weather events • A thriving tourist industry which benefits from ease of access to the county's natural, built and historic environmental assets
Enable community connectivity	• Individuals benefit from economic prosperity and social benefits • A financially sustainable passenger transport network • Reduced risk of social isolation • An integrated transport network which provides genuine transport choices • A transport network which provides individuals with the confidence to consider all travel choices
Conserve the environment	• Reduced transport derived carbon emissions • A reduction in solo car use, and an increased uptake of sustainable transport modes (walking, cycling and public transport) • Transport scheme are designed to reduce the adverse impact of transport on Gloucestershire's high quality natural, built and historic environments
Improve community health and well being	• Less car trips resulting in fewer journey delays • Improved air quality • Better safety, security and health by reducing the risk of death, injury or illness arising from transport

Table 2.1 - Key Objectives outline by the Local Transport Plan 2015-2031

2.2.2 Summary of Scheme Objectives and Beneficiaries

The key objectives of this scheme are as identified in Section 1 of the report. Table 2.2 below identifies Investment Objectives that follow on from the main objectives, and relates back to the key stakeholders of the scheme.

	Main benefits Criteria by Stakeholder
Investment Objective 1 Reduce journey times for all users.	**Users** Improving journey times for all users. Improving access to jobs and services. **Residents of Stonehouse/Stroud** Providing an improved transport link, with planning ahead for future development. **Local Enterprise Partnership** Maintaining attractiveness of area for domestic and non-domestic properties. Safeguarding of existing jobs and facilitation of new job creation.

	Main benefits Criteria by Stakeholder
Investment Objective 2 Improving local links in the area.	**Users** Improving journey times (primarily on the A419, but also with regard to the nearby A38 local distributor road). Improving access to jobs and services. Bus service with reduced delay. **Residents of Stonehouse/Stroud** Maintaining attractiveness of area for domestic and non-domestic properties. Safeguarding of existing jobs and facilitation of new job creation.
Investment Objective 3 Providing the most direct route, reducing CO_2 emissions, noise and air pollution.	**Users** Maintaining lower vehicle operating costs, particularly for HGV's and local businesses Avoiding journey time increases and delays. **Local residents and businesses** Environmental stakeholders. Avoiding increase in air pollution CO2 and noise. **Local Enterprise Partnership** Maintaining attractiveness of area.

Table 2.2 - Objectives and Stakeholder Benefits

2.3 Potential Benefit for Local Area

2.3.1 Local Businesses

Currently there are over 30 businesses which are located adjacent to the A419, the majority of which are situated either side of Oldends Roundabout. All business illustrated in Figure 2.1 and 2.2 rely on the route of the A419 to access the wider regional and national road network, including M5 junction 13.

2.3.2 Existing Businesses and Access

The proposal will help to support local businesses which are situated adjacent to the A419 corridor, and also future housing developments anticipated to the West of Stonehouse. Increased capacity is essential for the A419 for several reasons, one of which being the possible development planned in the surrounding areas such as the Ecopark and the development of a football stadium adjacent to junction 13. A potential development of this scale would potentially increase vehicle numbers and put additional pressure on this corridor, in addition to the annual increase of vehicles will only increase journey times along the A419 corridor. This scheme will improve journey times today and will also help to future proof the route to support these developments. This is vital due to the significance of the route which provides access to the M5 (North and south) for the businesses, and also provides vital infrastructure for commuters.

Oldends Lane Roundabout is utilised by many large businesses travelling to Stroudwater Business Park (approximately 40 businesses) with high volumes of HGV'S, including Renishaw, Schlumberger, Nampak Plastics Europe and Delphi Diesel Systems. Improvements to the capacity of this roundabout are essential to support the economic development of the local area.

2.3.3 Local Businesses

Engagement has taken place with local businesses at the Oldends Lane industrial estate and the Upper Mills Industrial Estate. Businesses were invited to attend the share event and scheme information was also provided. Feedback has been received from the following businesses on the A419:

- Business 1: Message of support the any highway proposals that would assist pedestrians and cyclists to access our site whilst also ensuring the A419 remains fit for purpose for future economic growth along the corridor;
- Business 2: Expressed support for pedestrian crossing at Oldends Lane;

- Business 3: Do not believe there is a requirement for the improvements and that money could be better spent reliving congestion through Stroud.

Figure 2.2 - Businesses adjacent to the A419 corridor (Oldends Roundabout)

Figure 2.3 - Businesses adjacent to the A419 corridor (Oldends Roundabout)

2.3.4 Potential Growth - J13 EcoPark (Ecotricity and Forest Green Rovers)

It is important to note that plans have been made available publically for the development of an EcoPark on land adjacent to Junction 13 of the M5. One aspect of the EcoPark is planned to be dedicated to creating state-of-the-art sporting facilities, including a stadium for Forest Green Rovers, training fields, 4G Pitches, multi-disciplinary sporting facilities, as well as a sports science Hub.

The second element of EcoPark will comprise a green technology business park with sustainably built commercial offices and light industrial units, giving EcoPark the potential to create up to 4,000 jobs. The final element of the proposal is a nature reserve located on the west side of the M5.

At present, the promoters and consultants for the development maintain that there would be no traffic impact to the east of the scheme on the A419, and therefore they have not assessed the impact on the junctions that make up this application (to the east of their proposal site).

It is worth noting that the current proposals for the Ecopark development would include the duelling of the A419 between M5 J13 and Chipman's Platt roundabout. Whilst no planning permission has been granted, the improvement for Chipman's Platt roundabout shall consider this and allow for future tie in where possible.

Developments such as the football stadium and the Ecopark will benefit from this scheme due to the impact the scheme will have on the performance of this section of the A419 corridor. Surrounding infrastructure is of huge significance for planned developments and gaining future planning permission, the scheme will reduce journey times and consequently improve access to existing local businesses and potential developments. This will encourage economic development in the area and allow for current and future businesses to grow.

The Football Stadium and Ecopark proposals currently do not have any planning permission or status via the Local Plan. Therefore, the proposals have not been taken in to account for the Business Case. However, all junction improvements will be designed in such a way that no changes would have to be removed or become obsolete if the Ecopark does at a later date gain planning permission. Any junction improvements required to obtain planning permission for the Ecopark and Stadium would be in addition to the current proposals.

Figure 2.4 - Location of the planned EcoPark (sourced from Ecotricity website)

2.3.5 Local Housing Development and Opportunities

Stonehouse currently has a population of circa 8,000 residents, but planning for a housing development has been approved 'West of Stonehouse', which is expected to see up to 1,350 additional homes. This development of 98 hectares is expected to take place between Stonehouse and Eastington and will consist of a series of linked neighbourhoods stretching between Oldends, to Nupend and Nastend. The development is expected to also include 9.3 hectares of employment land, a local centre including shops and a new primary school. This development and other potential growth supports the importance of the improvements of the A419 corridor as the importance of the corridor continues to grow.

Included within the planning permission submission are proposals for improvements for the same four junctions included within this scheme proposal. These layouts have been considered and included within options development carried out at feasibility stage.

2.3.6 Existing Traffic Conditions

All of the results from traffic surveys have been taken into account for the design of the submitted scheme. The points in which queue lengths are of high intensity in both peak periods are summarised below:

AM Peak periods

- Eastbound into the junction at Chipman's Platt roundabout;
- Eastbound into the junction at Oldends Lane roundabout;
- Westbound into the junction at Downton Road.

PM Peak periods

- Eastbound into the junction at Oldends Lane roundabout;
- Westbound into the junction at Oldends Lane roundabout;
- Eastbound into the junction at Downton Road;
- Eastbound into the junction at Horsetrough Roundabout.

2.4 Paramics Traffic Model

2.4.1 Summary

S-Paramics models have been developed to test the potential benefit of the proposed improvements along the corridor. Figure 2.5 illustrates the extent of the S-Paramics modelled highway network. There are six key junctions on this section of the A419 that were modelled in detail:

- A38/A419 roundabout;
- M5 Junction 13;
- Chipman's Platt roundabout;
- Oldends Lane roundabout;
- Downton Road signalised junction;
- Horsetrough roundabout.

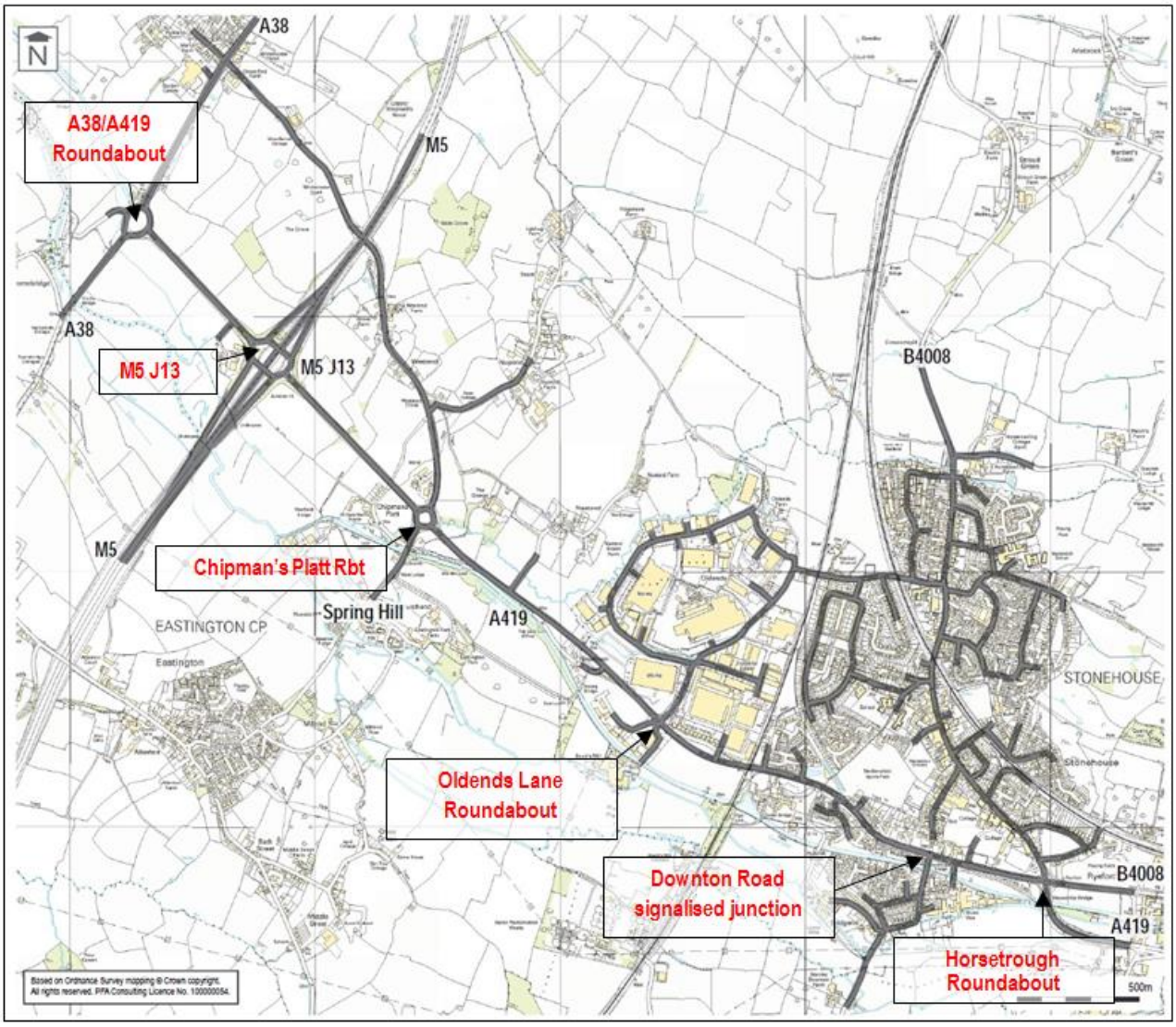


Figure 2.5 - Extent of the S-Paramics Model

The model also includes the B4008 road through Stonehouse which links the A419 at Horsetrough Roundabout to the A38 just south of Gloucester, the Stroudwater Business Park and the key residential streets and through-routes within Stonehouse town.

The railways crossings are included in the model, including the signalised level crossing on Oldends Lane. (Birmingham-Gloucester-Bristol & Gloucester Swindon)

The modelled road network includes all key junctions between the A38 and Horsetrough Roundabout and provides a reasonable level of route choice within the local road network.

The Paramics model has been developed from a previous model prepared by Peter Finlayson Associates (PFA), who also proposed corridor improvements to mitigate for the housing development West of Stonehouse.

2.4.2 Model parameters

The model time periods used in the model are:

- Morning Peak - 07:00 – 10:00
- Evening Peak - 16:00 – 19:00

Note that the model does not cover any inter-peak or weekend time periods.

2.4.3 Network checks

A number of checks have been undertaken on the Stonehouse model to ensure robustness and validity of the coded model. These checks fall into the following categories:

- Network coding (lane use, stop lines, stop line position-angle, roundabout lanes);
- Link categories (Speed, cost factors);
- Flags and Modifiers (Gap acceptance, GA Look Next, Visibility);
- Vehicle type behaviour (Familiarity);
- Route assignment.

2.4.4 Journey Time Validation

Journey time validation is used to check that network conditions and journey travel times are appropriately represented within the modelled network. In the original base model a comparison of modelled and observed journey time was made across 2 key routes; The Green route (B4008 Ebley Rd to B4008 Gloucester Rd) and Red route (A419 East to A419 West), shown in the figure below.

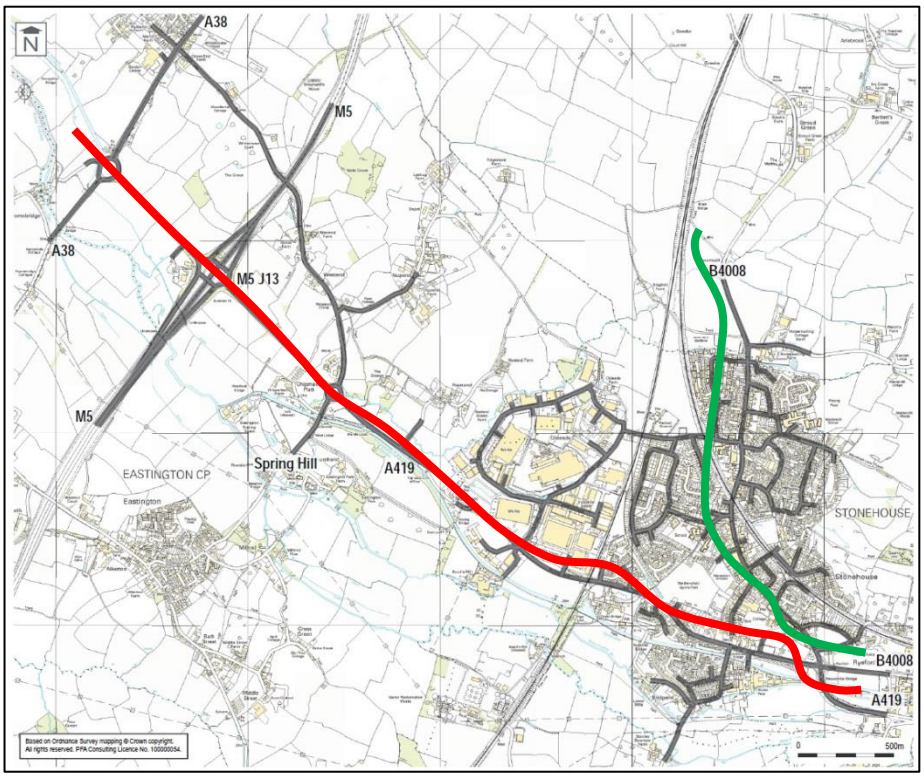


Figure 2.6 - Journey time survey routes

The original journey time surveys for the Paramics model as above (before being re-validated by Amey in 2015) were undertaken in May 2012.

Further journey time data collected by GCC in May 2015 included intermediate journey times (between junctions) and allowed a more refined comparison of the revised model. The Journey Time Validation Criterion and Acceptability Guidelines are set out in Tag Unit 3.1 'Highway Assignment Modelling' which states that:

- Modelled times along routes should be within 15% of surveyed times (or 1 minute, if higher than 15%) for > 85% of routes.

Journey time comparison for the peak periods is shown in table 2.3. The journey time validation for the revised model, using both the 2012 journey time survey routes and 2015 journey time routes show that the modelled journey times compared well with the observed data with 96% of routes meeting the criteria in the AM peak and 100% of routes meeting the criteria in the PM peak.

Table 2.3: Journey time validation

	Path Name	Length (km)	AM (07:00-10:00hrs)					PM (16:00-19:00hrs)				
			Model	Obs	Diff	% Diff	OK?	Model	Obs	Diff	% Diff	OK?
1	A419 Westbound (2015)	3.8	324	363	-39	10.7	YES	352	389	-37	9.5	YES
2	A419 Eastbound (2015)	3.8	256	299	-43	14.4	YES	275	317	-42	13.2	YES
3	B4008 Southbound (2012)	3.2	274	279	-5	1.8	YES	278	285	-7	2.5	YES
4	B4008 Northbound (2012)	3.3	284	266	18	6.8	YES	296	265	31	11.7	YES
No of routes within 15% of surveyed times (or 1 minute, if higher than 15%)							4 100%					4 100%

2.4.5 Queue length validation

There is no criterion for the comparison of queue lengths as a validation measure, since the nature of queueing is variable and therefore less reliable than journey time observations. However, queue lengths can be a useful comparison to check that pattern of queueing in the model is similar to observed conditions.

Surveys carried out by GCC in May 2015 recorded both average and maximum queue lengths. Both have been compared against the modelled queue lengths.

Overall the modelled queue lengths are comparable with the observed data and reflect the key areas of congestion along the A419 corridor.

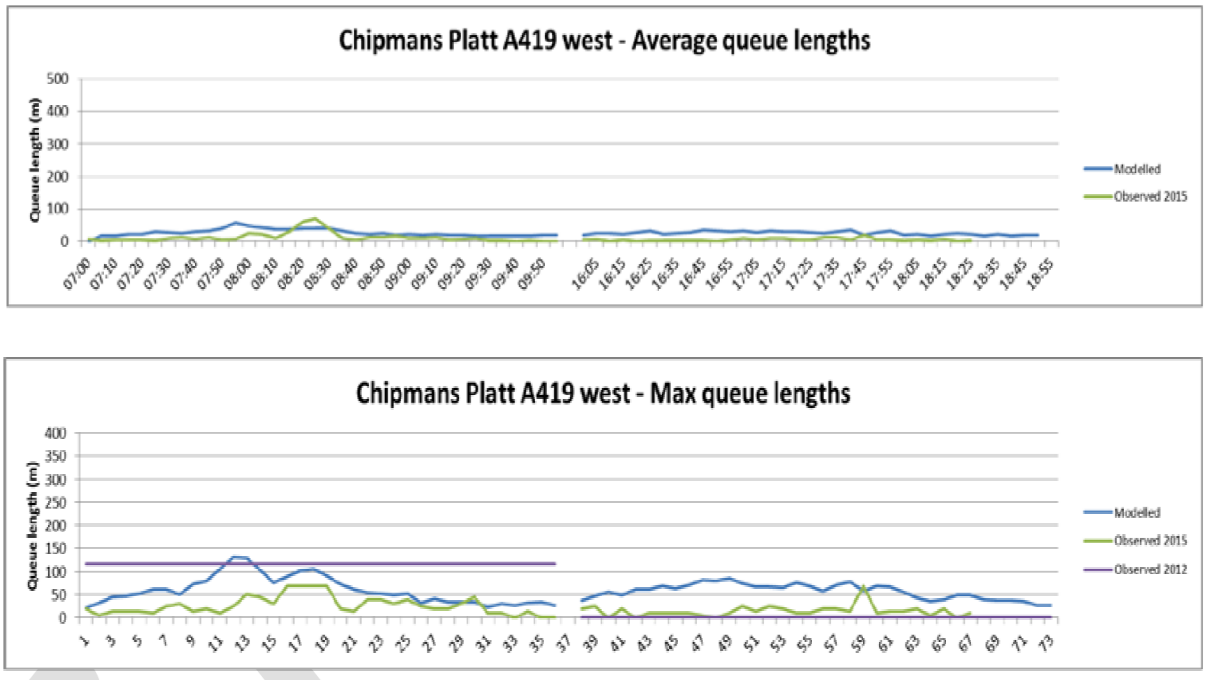


Figure 2.7 – Average queue length at Chipman's Platt

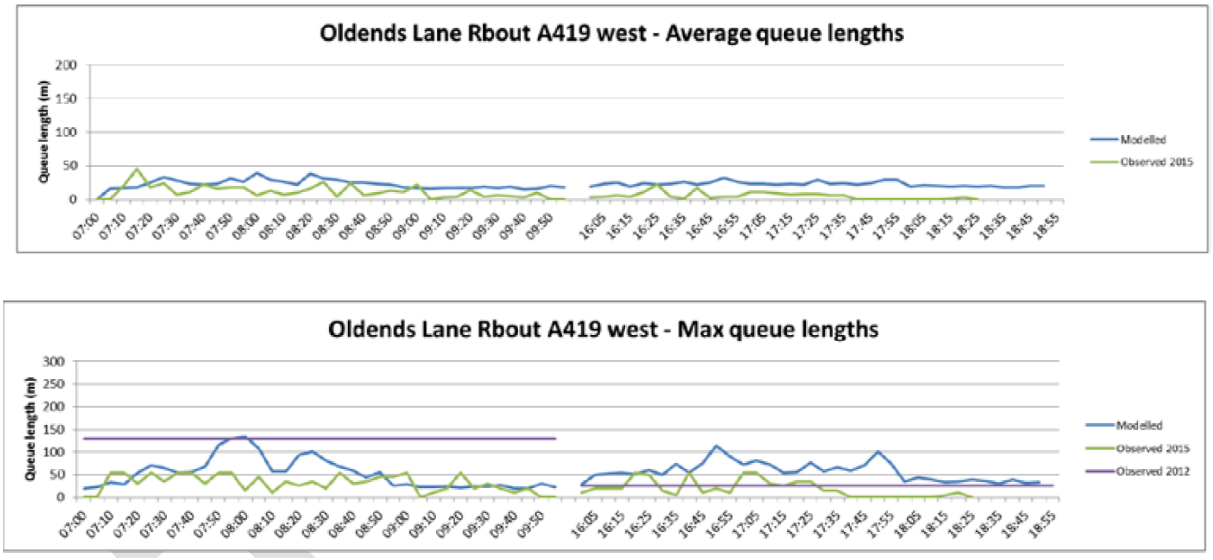


Figure 2.8 – Average queue lengths at Oldends Lane Roundabout.

2.4.6 Option Testing

For the option testing carried out for the alternative layouts and control of Oldends Lane Roundabout and Horsetrough Roundabout three options were appraised, as follows:

- Do Min - No changes to existing network;
- Option 1 – Improvements to Oldends Lane Roundabout, Downton and Horsetrough Roundabout;
- Option 2 - Horsetrough/Downton proposal with a signalised Oldends Lane junction;
- Option 3 – Signalised junction control at all three junctions (Horsetrough, Downton Road and Oldends Lane).

Table 2.4- Option descriptions

Option	Scenario	Chipman's Platt	Oldends Lane	Downton Road	Horsetrough
Do Min	Base Network with forecast and development traffic	No change	No change	No change	No change
Opt 1	Improvements to Oldends Lane Roundabout, Downton and Horsetrough Rbt as per previous PFA proposal with development traffic	Widening of A419 eastbound and westbound entries to 2 lanes. Widening of circulatory carriageway to 2 lanes.	Widening of A419 eastbound entry and Oldends Lane southbound entry arms, re-alignment of central island and redesignation of lane use on circulatory to allow 2 lanes for A419 through traffic.	Widening on westbound exit to allow 2 through lanes for WB traffic	Include segregated left turn (SLT) for westbound A419 traffic. Widening of A419 between Horsetrough and Downton Rd to 2 lanes.
Opt 2	Horsetrough/Downton solution as per previous PFA proposal with a signalised Oldends Lane junction with forecast and development traffic	As per Option 1	Convert to four-arm signalised junction with Bonds Mill and Sperry Way combined to single entry arm.	As per Option 1	As per Option 1
Opt 3	MOVA Signal Control at Downton Junction, Oldends Lane & Horsetrough with forecast and development traffic	As per Option 1	As per Option 2	As per Option 1	Convert to four-arm signalised junction with SLT for eastbound A419 traffic.

2.5 Chipman's Platt Roundabout / Oldends Lane Roundabout

Note that Chipman's is included in all of the model runs. There are congestion issues at this junction that could deteriorate in the future, with queueing back to the motorway junction a concern for both the local highway network and the strategic motorway network. There is also queueing presently in the peaks between Chipman's Platt and Oldends Lane roundabouts. Under Option 1, the improvements are widening of A419 eastbound and westbound entries to two lanes, and widening of the circulatory carriageway to two lanes. This improvement is carried forward for all other options.

The current issues at Oldends Lane Roundabout are understood to include slow moving traffic on the eastbound approach to the junction during the AM peak, and in the PM peak traffic travelling from Oldends Lane creates queueing on Oldends Lane approach and the A419 westbound approach.

Under Option 1, localised widening on the A419 eastbound and Oldends Lane entry arms and the re-designation of roundabout lanes to allow two 'through' lanes for A419 traffic provides sufficient additional capacity to reduce the problematic queueing at this junction. Improved A419 throughput increases the number of gaps for side road traffic and localised widening on Oldends Lane also improves accessibility from this roundabout arm. This reduces the queueing and delay for side road traffic.

Under Options 2 and 3, traffic signals provide controlled access through the junction during peak times, allowing access from the less dominant junction arms to be managed. This interrupts the flow of A419 traffic and results in an increase in queueing and slight delay for A419 traffic during peak periods.

During the inter-peak period, there are no known issues at Oldends Lane roundabout, and therefore signalising this junction will introduce delay.

2.6 Downton Road junction

Performance at Downton Road junction is important to reduce congestion on the westbound A419 approach during the AM peak. The proposed improvement is the same in all options and increases capacity for A419 westbound traffic through the junction by increasing the available lanes for westbound 'through' traffic from one lane to two lanes between Horsetrough Roundabout and Downton Road junction. The carriageway is then reduced back to a single lane westbound via a short merge back to the west of the junction. These improvements will significantly improve the management of traffic through the junction and reduces the problematic queueing which is currently evident during the AM peak.

2.7 Horsetrough Roundabout

The current issues at this junction is related to queuing on the B4008 westbound and A419 northbound approaches to the roundabout during the AM peak (caused by congestion at Downton Road junction), and queuing on the A419 eastbound approach to the roundabout during the PM peak.

Under options 1, 1a and 2, a segregated left turn (SLT) lane is provided at Horsetrough Roundabout from the A419 northbound entry (Ebley Bypass) to the A419 westbound exit (Bristol Road). The SLT leads directly into lane 1 of the widened westbound A419, allowing free movement for westbound A419 traffic. All other westbound traffic using the roundabout exits to join lane 2 of the A419 westbound.

The SLT, combined with the increased capacity between Horsetrough and Downton Road, substantially improves movement for westbound traffic along the A419 during the AM peak.

In the PM there is no noticeable change to the junction operation as a result of the improvements. A419 eastbound traffic must still give way to circulating traffic from B4008 Ebley Road and A419 Ebley Bypass and therefore still generates queueing on the eastbound approach to the junction.

Under Option 3, the roundabout is converted to a signal controlled junction. Signalised junctions generally offer reduced capacity compared to a roundabout layout but can be used to provide controlled access through the junction for less dominant movements. The design for the signalised junction included an SLT lane for westbound traffic travelling from A419 south of the junction with give way priority. This means that only ahead and right turning traffic from the southern arm are signal controlled, however, due to the short stacking length available for this traffic the cycle time must be short enough to prevent queuing from impacting on the SLT access. Consequently, this limits the available green time for A419 eastbound traffic.

During peak periods the competing demands for green time leads to an increased queuing compared to the Do Min. Under fixed time signals prolonged queuing is observed on all arms during the busiest times and while it is possible that under MOVA control would improve performance, the junction is likely to remain with increased delays compared to the roundabout option.

2.7.1 Overall scheme performance

The average journey time comparisons for the AM and PM periods are shown in the tables below. This shows that the best performing option, in terms of journey times along the A419 is Option 1.

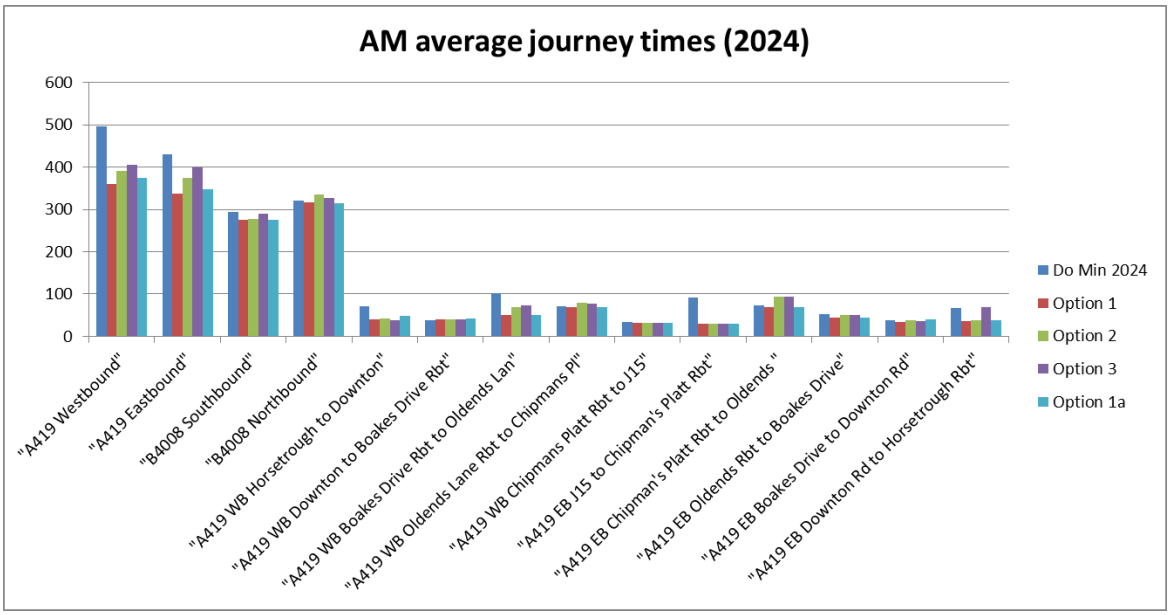


Figure 2.9 – AM Average Journey Times (2024)

All options offer an improvement over the Do Minimum with reduced journey times on the majority of routes during the AM peak. Impact on the B4008 northbound and southbound routes is minimal, with only a slight increase in northbound journey as a result of the signals at Horsetrough Roundabout in Option 3. In all options, the increased capacity through Chipman's Platt and Downton Road junctions reduce queueing and significantly improves journey times along the A419.

Options 1 and 1A offer the greatest journey time savings overall.

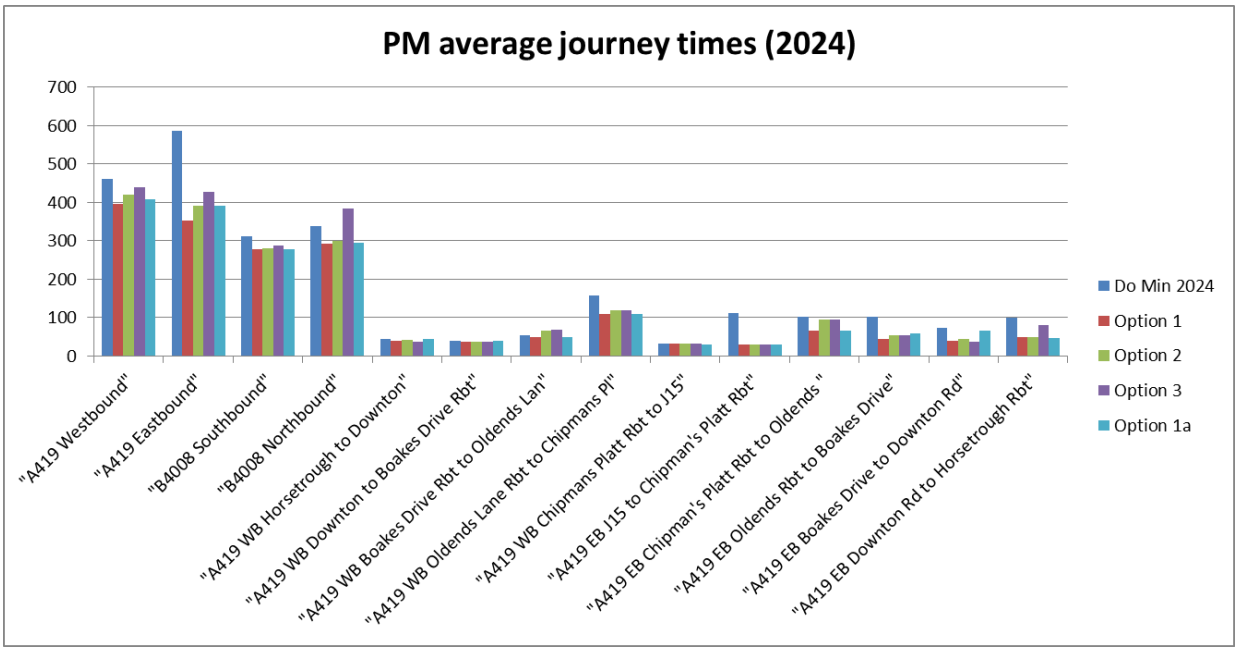


Figure 2.10 – PM Average Journey Times (2024)

Similar to the AM peak, the PM peak shows that all options offer an improvement in journey times over the majority of routes, with only slight increase in journey time on the B4008 northbound route under Option 3. This is related to the minimal green time available on the B4008 Ebley Road arm which competes against the dominant A419 EB movement and the A419 northbound movement for green time. Again, Options 1 and 1a offers the greatest journey time savings on all routes.

The queueing data comparison supports the journey time observations. In summary, the following observations were made:

- Chipman's Platt Roundabout shows significant reductions in queues in all options;
- Oldends Lane Roundabout shows reduction in queues on all arms under Options 1 and 1a and an increase in queue lengths on all arms under signals in Options 2 and 3;
- Downton Road junction shows a reduction in queues on the A419 WB approach in both periods, with significant reductions in maximum queue lengths during the AM peak where maximum queues are reduced from 400m+ in the Do Minimum to less than 200m under the options. Under Option 1a queue levels on the A419 eastbound approach increased slightly against the Do Minimum in the AM as a result of the all red phase for pedestrians;
- Roundabout all options show a reduction in queueing on all arms with the exception of the B4008 (Ebley Road) arm under Option 3. In the PM, the signals also increase queueing on the northbound approach arm.

The modelling results show that all options offer some improvement over the Do Minimum scenario with the greatest operational benefits in terms of journey time and queue reduction gained through Option 1. This is the preferred option in operational terms and is also likely to form the lowest cost option.

2.8 Cycling

The National Cycle Network runs parallel to this section of the A419. This route is primarily off road, with brief on-road sections in two locations. These on-road sections occur when there are near-by parallel roads, and not on the A419 itself. Figure 2.9 shows the cycling route, with the red indicating proposed new sections of cycleway.

The junction of Downton Road and A419 includes a demand activated cyclist crossing facility which activates an 'all red' phase for motorised traffic. On Downton Road, an advance stop line for cyclists has been provided. At Oldends Lane, a toucan crossing will be provided replacing the existing dropped kerb crossing of A419.

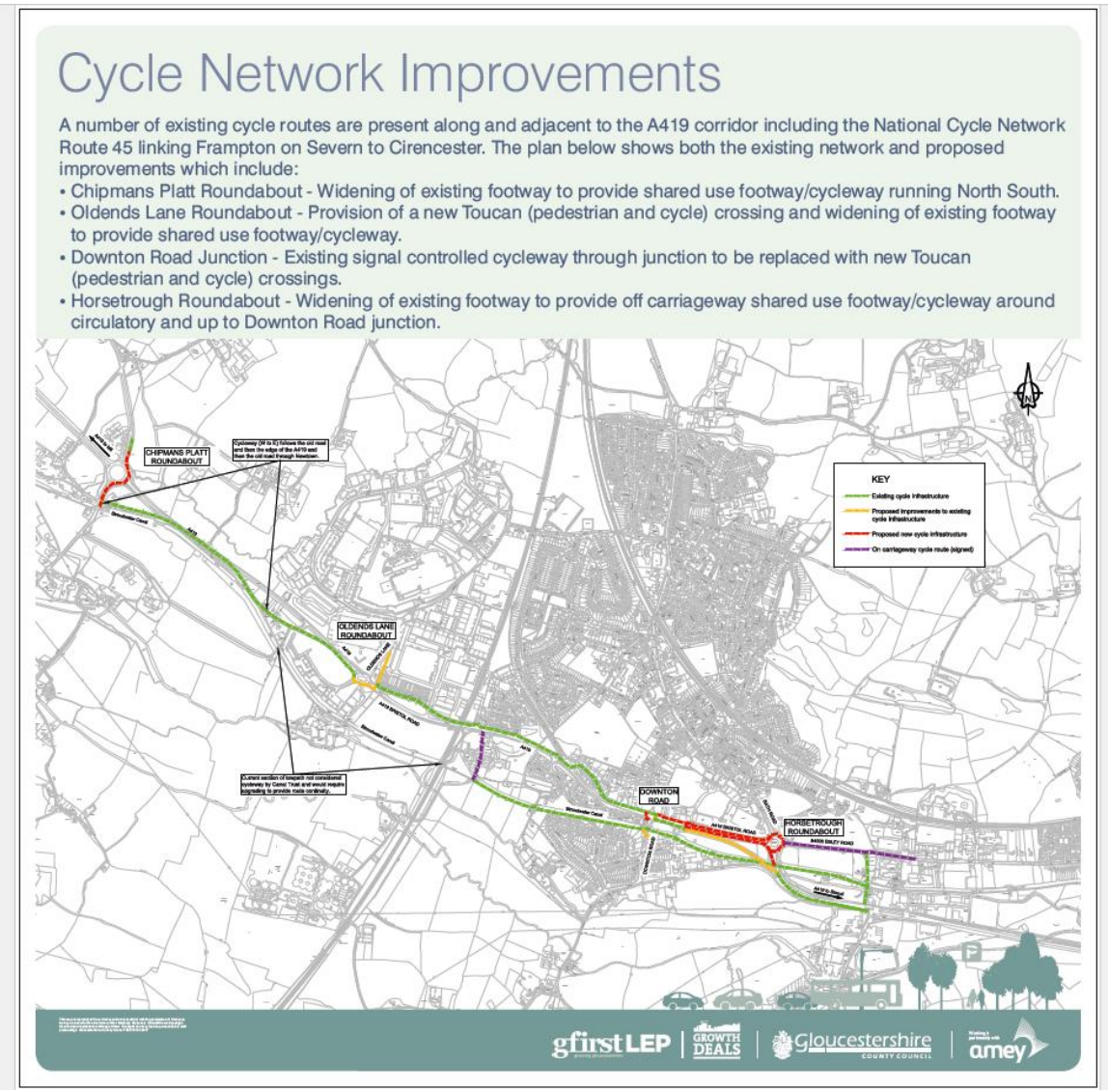


Figure 2.11 - Existing cycle infrastructure and proposed improvements

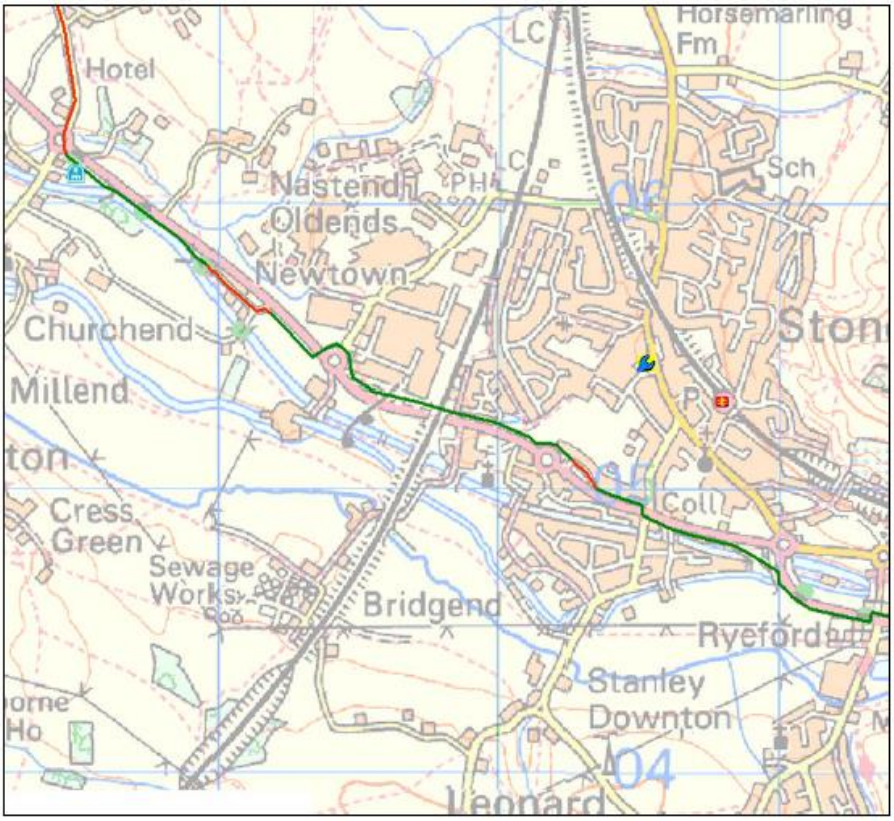


Figure 2.12- National Cycle Network in Stonehouse vicinity

2.9 Pedestrians

A footway is provided along at least one side of the A419 from Chipman's Platt Roundabout to Horsetrough Roundabout. Automated pedestrians crossing facilities are located at Downton Road, in the form of a toucan crossing. At all junctions except Chipman's Platt Roundabout pedestrian refuges can be found to facilitate pedestrian crossing movements. A controlled toucan crossing will be introduced across the A419 at Oldends Lane roundabout.

3 Economic Case

3.1 Introduction

In compliance with Web Tag (The Transport Appraisal Process and Guidance for the Technical Project Manager), the Economic Case has been developed by assessing the sub-impacts gathered in the macro areas of Economy, Environmental and Social.

The sub-impacts assessment has been carried out according to the Appraisal Specification Report (Appraisal Specification Summary Table).

3.2 Economy

3.2.1 Business users and transport providers

In order to assess the impact of the new scheme on the business users and transport providers, a transport model has been developed utilising the micro-simulation software S-Paramics, as outlined in the previous chapter.

The 60-year appraisal for the Economics was developed modelling the following years:

- 2020 (opening year);
- 2035 (intermediate Year – 15 years post-opening);
- 2051 (intermediate Year – last year of TEMPro growth forecasts);
- 2080 (intermediate year – uses same growth assumptions as 2051 model).

The demand forecasting years have been produced utilising TEMPro growth factors regarding the following vehicle classes: Car, LGV, OGV1, OGV2 and PSV. With regard to the classes Car and LGV, growth factors have been adjusted according to the new developments reported in the Stroud Local Plan 2015 (to avoid double counting).

Finally, the 60-year appraisal was executed utilising the software PEARS. Requiring as inputs the scheme costs and the output from the model (Paramics), PEARS produces directly the assessments regarding all the user classes disaggregated in: *business users*, *transport providers*, *commuters* and *other users*.

The analysis, which is based on information in compliance with Web Tag (Data Book), takes into account the travel time savings and of the vehicle operating costs (VOC). The calculation regarding *business users* has produced benefits equal to £29.04 million from the travel time and £2.33 million from vehicle operating costs. With regard to *transport providers*, the benefits from the revenue are quantified at £0.18 million and from the operating costs are quantified at £0.11 million. Local Businesses will benefit from the proposed improvements along the corridor through improved access and improved journey times which are essential for potential development and economic growth.

3.2.2 Reliability impacts on business users

The information regarding the base model and surveys are not sufficient to assess the *reliability* with regard to the without-scheme scenario. However, the scheme will not have any relevant impact on journey time reliability for business users and the analysis of the with-scheme scenario results do not show any significant fluctuations of the journey time. **Therefore, the impact is not assessed.**

3.2.3 Regeneration

No Regeneration Areas (as specified in the Web Tag) are expected to be impacted by the implementation of the scheme regarding to both options. **Therefore, the impact is not assessed.**

3.2.4 Wider impacts

Improved journey times along the corridor will have a positive impact upon local businesses and future development adjacent to the route and the surrounding areas.

3.3 Environment

3.3.1 Noise

A noise assessment was carried out to assess the potential noise effects in terms of operation of the scheme in line with DMRB HD 213/11 and NPPF. Road traffic noise predictions were carried out in accordance with the Calculation of Road Traffic Noise (CRTN) Manual.

There are sensitive noise receptors in the form of two schools within 300m of the scheme and residential receptors within 50m at all four sites. None of the junctions are within Noise Important Areas, but they are present east and west of these along the A419.

The Noise Policy Statement for England (NPSE) aims to (i) avoid significant adverse effects, (ii) mitigate and minimise adverse effects and (iii) contribute to improvements in health and quality of life. Significant adverse effects may typically occur where noise changes are perceptible both in the short and long terms or where noise levels are already above a noise level known as the Significant Observed Adverse Effect Level (SOAEL). Noise levels above the SOAEL are considered noticeable and disruptive. In this case the SOAEL is considered to be 68 dB $L_{A10,18h}$ as Defra has advised that there is no requirement to investigate noise levels below this.

Adverse effects may typically occur where noise changes are perceptible in the short term but not in the long term or where noise levels are already above a noise level known as the Lowest Observed Adverse Effect Level (LOAEL) but below the SOAEL. Noise levels between the LOAEL and the SOAEL are considered noticeable and intrusive but not disruptive.

The Department for Environment, Food and Rural Affairs (Defra) regularly publishes statutory documents called Noise Action Plans which identify priority areas where the responsible highways authority should consider improvements in the current noise levels (in line with the third aim of the NPSE). These areas are known as Important Areas.

In order to determine the impact of the schemes, noise changes in both the short term and the long term have been considered. The DMRB HD 213/11 states that 'a change in road traffic noise of 1 dB $L_{A10,18h}$ in the short term (i.e. when a project is opened) is the smallest that is considered perceptible.' In the long term (typically 15 years after project opening), a 3 dB $L_{A10,18h}$ change is considered perceptible.

The Chipman's Platt scheme is expected to result in an increase in noise levels of more than 1dB in the short term at around 6 properties close to the scheme. This is due to an expected increase in free flowing traffic along the A419 as a result of the scheme. An increase in noise levels of more than 1dB is considered perceptible in the short term. In the long term the expected increase in noise levels is less than 3dB which is not considered perceptible. Some of these properties already experience noise levels above 68dB $L_{A10,18h}$, façade which is considered the SOAEL. However, no properties are expected to qualify under the Noise Insulation Regulations. The overall effect of the Chipman's Platt scheme is considered slight adverse since it will cause perceptible increases in noise levels in the short term in an area with sensitive receptors already subject to noise levels above the SOAEL. The effect will become neutral in the long term.

The Oldends Lane scheme is not expected to result in perceptible changes in noise levels in either the short term or the long term. The study area for the scheme includes the noise Important Area Id 3866 where Gloucestershire County Council is the responsible highways authority. Since the Oldends Lane scheme does not produce perceptible increases in noise the overall effect of the scheme is considered neutral. However, unless mitigation measures are included at a later stage, the Oldends Lane scheme does not address the existing noise Important Area Id 3866 and therefore does not meet the third aim of the NPSE i.e. to contribute to improvements in health and quality of life.

The Downton Road scheme is expected to result in perceptible changes in noise levels in the short term as a result of the proposed carriageway widening and five residential properties could qualify for insulation under the Noise Insulation Regulations 1975. In the long term the expected changes in noise levels are not considered perceptible. The overall effect of the Downton Road scheme is considered slight adverse since it will cause increases in noise levels (which will be perceptible in the short term) in an area with sensitive receptors already subject to noise levels above the SOAEL. However, due to the scheme potentially triggering the provision of insulation under the Noise Insulation Regulations the scheme may result in having a slight beneficial effect at the insulated properties indoors. The costs associated with this and other environmental and scheme risks have been included within the risk register is Appendix D.

The Horsetrough Roundabout scheme is expected to result in noise changes of more than 1dB in the short term which is considered perceptible however in the long term the noise changes are expected to be less than 3dB and therefore not considered perceptible. No properties qualify for noise insulation since most of the properties in the area close to the scheme are non-residential. Therefore, due to the relatively few properties close to the scheme, the overall effect of the Horsetrough Roundabout scheme is considered neutral.

In summary, since most of the schemes do not address the current noise levels in their study areas and in some cases may cause perceptible increases in noise in the short term, the effects in terms of noise ranges from slight adverse to neutral for the Chipman's Platt, Oldends Lane and Horsetrough Roundabout. For the Downton Road scheme, due to the unintended potential triggering of insulation under the Noise Insulation Regulations, the scheme may end up providing slight beneficial effects indoors.

Therefore, globally the noise impact with regard to the implementation of the schemes is assessed as slight adverse in the short term becoming neutral in the long term.

3.3.2 Air Quality

An air quality and greenhouse gas assessment was carried out to assess the potential effects during construction and operation in line with DMRB HA207/07 and the NPPF. Potential impacts on local air quality (nitrogen dioxide (NO_2), particulate matter (PM_{10})) and regional air quality (oxides of nitrogen (NO_x)) were scoped using the DMRB HA207/07 criteria and where impacts were identified as likely, quantitative assessment completed.

An assessment of projected traffic data with the schemes in place against the scoping criteria indicated the potential for impacts on local air quality. A quantitative assessment of permanent operational effects and qualitative assessment of temporary construction phase effects on local air quality has therefore been completed. All regional air quality impacts were scoped out of the assessment on the basis that impacts are deemed to be minimal. The assessment of impacts at ecological receptors was not required because no designated sites are located within the study area.

There are sensitive receptors in the form of two schools within 300m and residential properties within 50m of all four schemes. There are no designated ecological sites that require assessment. None of the junctions are within Air Quality Management Areas, but the A419 consists of Compliance Risk Road Network (CRRN) links in accordance with the EU Directive on ambient air quality (2008/50/EC). Therefore, the potential impact of the schemes on air quality at these links has been assessed.

The 2008 ambient air quality directive sets legally binding limits for concentrations in outdoor air of major air pollutants that impact public health such as NO_2 and PM_{10}. Following the 'Simple' assessment level described in DMRB HA207/07, predicted traffic flows have been combined with estimates of background and vehicle emissions to predict NO_2 and PM_{10} concentrations at key sensitive receptors. Predictions have been made using the HA207/07 Air quality Screening Method Spreadsheet and verified using monitoring data. These predictions have been compared with the statutory objectives for acute (short term) and chronic (long term) effects. The significance or measure of uncertainty (MoU) of these local effects has been assessed in accordance with Highways England's interim advice on the desirability of achieving 10% verifications between modelled and monitored concentrations.

Temporary, construction phase effects can result from deposition and inhalation of fugitive releases of dust and inhalation of pollutants released during the combustion of fuels by on-site and off-site construction vehicles and plant.

Fugitive dust can be released during on-site demolition, earthworks and construction activities and can also be tracked off-site by vehicles accessing the supporting road network. The combustion of fuels in the engines of on-site vehicles and plant and off-site construction vehicles However, temporary effects have not been assessed in the absence of detailed information about the construction programme and methods.

All four schemes met the criteria for 'Simple' assessment because of changes to both the road and alignment and predicted traffic flows. In the baseline, opening and assessment years none of the long term or short objectives for NO_2 or PM_{10} is predicted to be exceeded with or without the scheme in place for all four schemes.

For opening year 2020 and assessment year 2035, the highest concentrations were predicted at the closest receptors to the north of Bristol Road near to the Downton Road Signalised Junction. This applies with and without the scheme in place for both NO_2 and PM_{10}.

In the scheme opening year 2020, concentrations are predicted to fall marginally from the baseline year as improvements in vehicle emissions are off-set by traffic growth. In the opening year, the largest increase in annual average NO_2 concentrations resulting from the scheme was predicted to the north of Bristol Road. This increase was 1.5% of the objective. For annual average PM_{10}, all predictions were under the objective and impacts imperceptible.

In the scheme assessment year 2035, concentrations are predicted to fall more in relation to the baseline year than the opening year. This is because there is more time for improvements in vehicle emissions technology to be realised in the fleet. In the assessment year, the largest increase in annual average NO_2 concentration resulting from the scheme was predicted close to the north of Bristol Road close to Downton Road Signalised Junction. This increase was 2% of the objective.

The magnitude of change as a result of the schemes is assessed as 'medium' at the receptors north of Bristol Road. However, no new exceedances of the objective or worsening of air quality at receptors already exceeding is predicted to occur. For annual average PM_{10}, all predictions were under the objective and impacts imperceptible.

Some minor improvements in air quality were predicted close the Horsetrough Roundabout as a result of changes to the road alignment. However, these improvements are imperceptible.

Several sections of the A419 were identified as CRRN links in accordance with the EU Directive on ambient air quality. However, at this time it was not possible to obtain the required data to undertake the comparison between the local modelling assessment and the PCM data for future year scenarios. As a result, the highest predicted receptor impact (a 2% increase in NO_2 close to Bristol Road) was added to the CRRN link with the highest Defra modelled concentration to indicate the risk of exceedance. It was shown that an exceedance was unlikely but it is recommended that this assessment is revisited post business case when high resolution, link specific data is available for a more recent baseline year and modelled CRRN links data is available from Defra.

The Simple level assessment has determined that no new exceedances of the objective or worsening of local air quality at sensitive receptors already exceeding is predicted to occur. Furthermore, it is considered unlikely that new exceedances will occur at the CRRN links. The predicted concentrations are such that no specific mitigation measures should be considered at the Chipman's Platt Roundabout, the Oldends Lane Roundabout, Downton Road or Horsetrough Roundabout schemes because an adverse impact on the local and regional air quality environment is not expected.

As a result, it is judged that impacts on *air quality* from the scheme will not be significant and can be considered as slightly adverse.

3.3.3 Greenhouse gases

The greenhouse gases emissions associated to the traffic have been derived directly from the traffic model (Paramics) using PEARS. The impact produced by the implementation of the scheme is beneficial (CO_2 reduction) and quantified at £0.93 million.

3.3.4 Landscape & Townscape

These four project areas have been considered as three study areas:

- Chipman's Platt Roundabout;
- Oldends Lane Roundabout;
- Downton Road to Horsetrough Roundabout

A desktop assessment of the likely key landscape and townscape effects has been undertaken in order to inform the emerging business case for the road improvements. Further work should include consultation with relevant local authority officers to obtain local knowledge and concerns. A more detailed appraisal based on a site visit should be undertaken once the scheme business case is approved.

At Chipman's Platt the key concern is that works to the east of the roundabout would involve some vegetation loss and a retaining structure may be required. A suitable design of the structure, such as the use of gabions filled with local rock and the addition of softening planting would help blend it into the local environment. The cost of a retaining structure has been allowed for within the scheme estimate. However, at detailed design stage it is likely that the design can be amended such that the embankment can be re-grade and / or the kerb line changed so that a retaining structure is no longer required.

However, the roundabout is generally well vegetated with relatively wide vegetation belts on its periphery so that some local loss of vegetation would not be unacceptable. New planting opportunities around the roundabout should be explored and any gaps in the screening belts infilled. Careful detailing of hard surfacing, barriers and signage would ensure no adverse townscape impacts.

It is envisaged that the proposed works at Oldends Lane Roundabout would not have any adverse effects on sensitive landscape or townscape receptors. The extent of highway widening is very limited and in some areas the carriageway/footway would be reduced to provide a greater area of verge. Detail design of the scheme should consider the benefits of additional planting which could enhance the landscape. Careful detailing of hard surfacing, barriers and signage would ensure no adverse townscape impacts.

At Downton Road to Horsetrough Roundabout carriageway widening would cause tree loss which could open up views of the main road from houses on Boakes Drive. Replacement planting or offsite planting in gardens would mitigate this. Slight loss of boundary hedging on the north side of Bristol Road could be mitigated by replacement planting. The costs have been allowed for within the risk allowance, should replacement planting be necessary. Trees in the centre of Horsetrough Roundabout, would be unlikely to be affected by the improvement scheme. With appropriate mitigation, landscape and visual impacts would be negligible. However additional planting should be considered to further soften the roundabout, especially in views from the AONB, to achieve landscape enhancements.

Townscape effects would be localised but would involve the relocation of the horse trough, which should be agreed with local stakeholders. The sensitive detailed design and siting of barriers, signage and hard landscape treatment would mitigate potential townscape effects. There would be no impact on the adjoining Conservation Area.

In order to progress a detailed highway design and to develop detailed mitigation, a further site based Landscape and Townscape Appraisal should be undertaken after approval of the business case. Further recommendations include that an arboriculture assessment of trees likely to be affected by the highway works should be undertaken and detailed landscape and townscape design proposals should be undertaken by a suitably qualified landscape architect. An allowance has been made for this within the design fee element of the scheme cost estimate shown in Table 5.1.1.

Overall the scheme is assessed as scoring Slight Adverse for *Landscape* and Neutral for *Townscape* using the WebTAG methodology.

3.3.5 Historic Environment

As above the four schemes have been considered as three study areas:

- Chipman's Platt Roundabout;
- Oldends Lane Roundabout;
- Downton Road and Horsetrough Roundabout.

The Stroud Industrial Heritage Conservation Area is located to the south of the A419 and 18 Grade II listed buildings are located in the study areas; although only two are within 50m of the works at Downton Road junction. None of the designated heritages assets or their settings will be impacted by the current proposals and no further work will be required.

Two key heritage resources were identified across all three study areas which are considered to be of regional heritage significance; the remains of the woollen/cloth making industry and associated transportation network, notably the Stroudwater Canal and Evidence for Roman activity.

Other heritage assets of local significance are also present within all three study areas, including a horse trough adjacent to Horsetrough Roundabout.

It is not anticipated that the industrial remains or the canal will be impacted by these proposals, nor will the heritage assets of local significance, with the exception of the horse trough. Consent will not be required for its removal, but it is advised that its relocation be undertaken in consultation with the parish and district councils.

An appropriate mitigation strategy will be developed with the County Archaeologist ; It is advised that an archaeological watching brief be undertaken on groundworks within the verges at Downton Road junction and the Horsetrough Roundabout where there is the potential for the works to encounter archaeological remains, particularly those associated with Roman activity. The cost of the archaeological watching brief has been allowed for within the construction supervision section of the scheme cost estimate.

No permanent impacts to historic resources are anticipated as long as the proposed mitigation set out in the Heritage Statement is followed. Impact would therefore be neutral and this topic has been scoped out from further assessment.

In conclusion, for the purpose of this Business Case, the impact on *historic environment* is considered neutral.

3.3.6 Biodiversity

A preliminary ecological (scoping) appraisal of the site has been carried out (appendix B5) and is intended to record relevant habitats, including any that are formally designated for nature conservation, and to highlight the potential for legally-protected or otherwise notable species. There are no sites of international or national environmental importance that will be impacted directly or indirectly through the scheme. An ecological walkover revealed that the scheme has the potential to impact the habitats of birds (e.g. scrub, trees), Badgers, Great Crested Newts (GCN), Otter and Water Vole.

As the scheme is located within close proximity to two Key Wildlife Sites, the River Frome and Stonehouse Newt Pond, the scheme does not impact these sites directly; however, it is recommended that the Site owner / Warden is notified of the proposed works. In order to prevent impact upon this site, no materials or liquids will be stored adjacently to the KWS, and contractors shall be made aware of its location and aware that no access to this area or storage of materials within this area is allowed without prior approval from an ecologist. If the scheme area or nature of works is to change, it is recommended that a consultant ecologist is notified before works are undertaken. If any works enter either of these other non-designated sites, a further assessment may have to be undertaken to determine whether the scheme is likely to have a significant impact upon the site(s) or not.

Chipman's Platt is within a non-statutory site - the conservation road verges (RVNR). The carriageway widening to the north of the roundabout (A419) has species rich verges. We are aware that the verges at Chipman's Platt roundabout are registered as a conservation Road verge site. The verges to the south (A419 and bordering the roundabout round to Spring Hill) are more shaded/ narrower, rougher and less diverse. The planned 2.5m cycleway & footway would involve loss of about a metre or so of these areas of the southern verges and potentially a greater extent of the northern (A419) verge to accommodate the carriageway widening. Similar species rich grassland is present adjacent to the site (in front of Starbucks and the Shell garage) and on the roundabout itself. Further assessment of the RVNR and consultation with Gloucester wildlife trust, Local Planning Authority Ecologist and the creation of a Construction Environmental management plan is likely to be required.

The required vegetation clearance will be undertaken between September and February (inclusive) to avoid the nesting bird season. If any vegetation clearance is required during the breeding season (March-August) then an inspection for active nests will be made within 48 hours prior to cutting. If an active nest is found, a buffer zone will need to be established and works delayed at this location until the chicks have fledged. There are known to be nesting Swans on the Stroudwater Canal at Chipman's Platt.

It is recommended that the work should be undertaken during the day to negate the use of artificial lighting. If the work needs to be undertaken at night, mitigation measures to minimise impacts on bats will need to be utilised such as directional lighting and louvers.

To reduce any impact of the Scheme, linear features such as hedgerows and tree lines should be retained wherever possible within the proposed scheme. Unavoidable loss of scrub or trees within the Scheme area should be compensated, as part of the scheme design, with replacement planting using native species of local provenance.

A targeted otter and water vole survey should be undertaken prior to the commencement of works. The survey should be undertaken following best practice guidelines for each species.

Appropriate pollution prevention measures should be implemented during works within proximity to sensitive aquatic receptors.

As the risk of reptiles/ Amphibians being present is low. However, it is considered prudent for Reasonable Avoidance Measures to be adopted during the course of works.

Inactive badger setts were found within the scheme boundary. The known badger sett will be re-surveyed prior to construction to ensure that it is still inactive. If the badger sett has become active a licence from Natural England will be required to disturb the sett prior to construction. The risk of active badger sets being found prior to construction has been included within the risk register in Appendix D.

The area around Chipman's Platt roundabout will also require a pre-construction badger survey to establish absence.

As a precaution any excavations present on site that are left overnight will have graded edges to allow any badgers (and any other mammals) that may fall in the excavation, to leave.

If badgers are found to be utilising the sett or have constructed a new sett in the intervening time between the original survey and commencement on site, a Natural England derogation licence may be required prior to the commencement of works.

No invasive plant species have been found on site thus far; however there is Japanese knotweed in the general area. So due to seasonal changes the Scheme area will be subject to re-survey immediately prior to the commencement of works and that a 'Invasive Species Eradication Method Statement is formulated and implemented prior to the commencement of works.

The required vegetation clearance will be undertaken between September and February (inclusive) to avoid the nesting bird season. If any vegetation clearance is required during the breeding season (March-August) then an inspection for active nests will be made within 48 hours prior to cutting. If an active nest is found, a buffer zone will need to be established and works delayed at this location until the chicks have fledged.

Therefore, the biodiversity impact with regard to the implementation of the schemes is assessed as slightly adverse.

3.3.7 Water environment / flooding

A desktop assessment has been undertaken as per WebTAG Unit A3.

A main river, The River Frome, runs approx. 350m south of the Bristol Rd, at closest point. The scheme crosses/ runs close to the Stroud water canal at both Downton and Chipman's Platt.

There is a risk of flooding from surface water and rivers at sections within the scheme. Increase in run off as a result of carriageway widening will increase demand on the road drainage. The most significant area of additional carriageway is between Horsetrough roundabout and Downton Road signals. An initial drainage assessment has taken place and likely improvements required allowed for within the works estimate. The exact requirements for the improved drainage will be confirmed during detailed design stage and increase in run off as a result of carriageway widening will increase demand on the road drainage. The need for improved drainage would be investigated during detailed design stage and appropriate measures shall be in place to ensure risk of flooding from potential increased surface water is avoided.

Works will be carried out above and/or adjacent to the Stroudwater Navigation Canal which flows south of Horsetrough roundabout with temporary impacts anticipated.

No impacts are anticipated to the watercourse which runs under Chipman's Platt Roundabout.

Consult with Canals and River Trust regarding the temporary impact along the Stroudwater Navigation Canal and consultation with the Local Lead Flood Authority (GCC) regarding works in proximity to the Ordinary watercourse which runs under Chipman's Platt Roundabout will be required.

Detailed design will be progressed with consultation with The Lead Local Flood Authority (GCC) and the Environment Agency should to discuss any flood management actions/issues under the Flood and Water Management Act 2010. Appropriate pollution prevention measures will be implemented during works to prevent contamination to the water environment.

Therefore, the impact with regard to the implementation of the schemes is assessed as neutral.

3.4 Social

3.4.1 Commuting and other users

As for the business users and transport providers sub-impacts, commuting and *other users* sub-impact relies on the results produced by the transport model (S-Paramics), and the 60-year appraisal was executed utilising the software PEARS.

The analysis, which is based on information in compliance with Web Tag (Data Book), takes into account of the travel time savings and of the vehicle operating costs (VOC). The calculation regarding commuting and other users has produced total benefits equal to £34.01 million from the travel time and £1.55 million from vehicle operating costs.

In conclusion, the total benefits for *commuting and other users* are quantified at £35.56 million (refer to TEE table below)

3.4.2 Reliability impacts on commuting and other users

As for the business users, the information regarding the base model and surveys are not sufficient to assess the *reliability* with regard to the without-scheme scenario. However, the scheme will not have any relevant impact on journey time reliability regarding *commuting and other users* and the analysis of the with-scheme scenario results does not show any significant fluctuation of the journey time. **Therefore, the impact is not assessed.**

3.4.3 Physical activity

Although cycle paths and lanes improved with the scheme, the extents of the interested sections are not sufficient to formulate any assumptions with regard to the potential increase in demand (new users attracted) and to assess the sub-impact. On the other hand, the sections interested by the scheme in which the carriageway is widened (for the general traffic), always present a dedicated cycle lane or a shared pedestrian/cycle lane; therefore, the increased capacity for the traffic will not affect (disincentivise) the utilisation of the pedal cycles and reduce the number of users. However a more predictable flow of traffic and less congestion may reduce severance for pedestrians and cyclists may encourage such users to utilize the corridor. Also improved journey times and less congestion may encourage bus services to implement more bus services along the route and encourage sustainable modes of transport which involve physical activity.
Therefore the *physical activity* impact of the scheme is Neutral

3.4.4 Journey quality

The new cycle lanes and the improvements of the existing cycle lanes are expected to generate positive impacts with regard to journey quality. Department for Transport traffic counts (2015) have been used to quantify the amount of cyclists using the route detailed below (Figure 3.2).

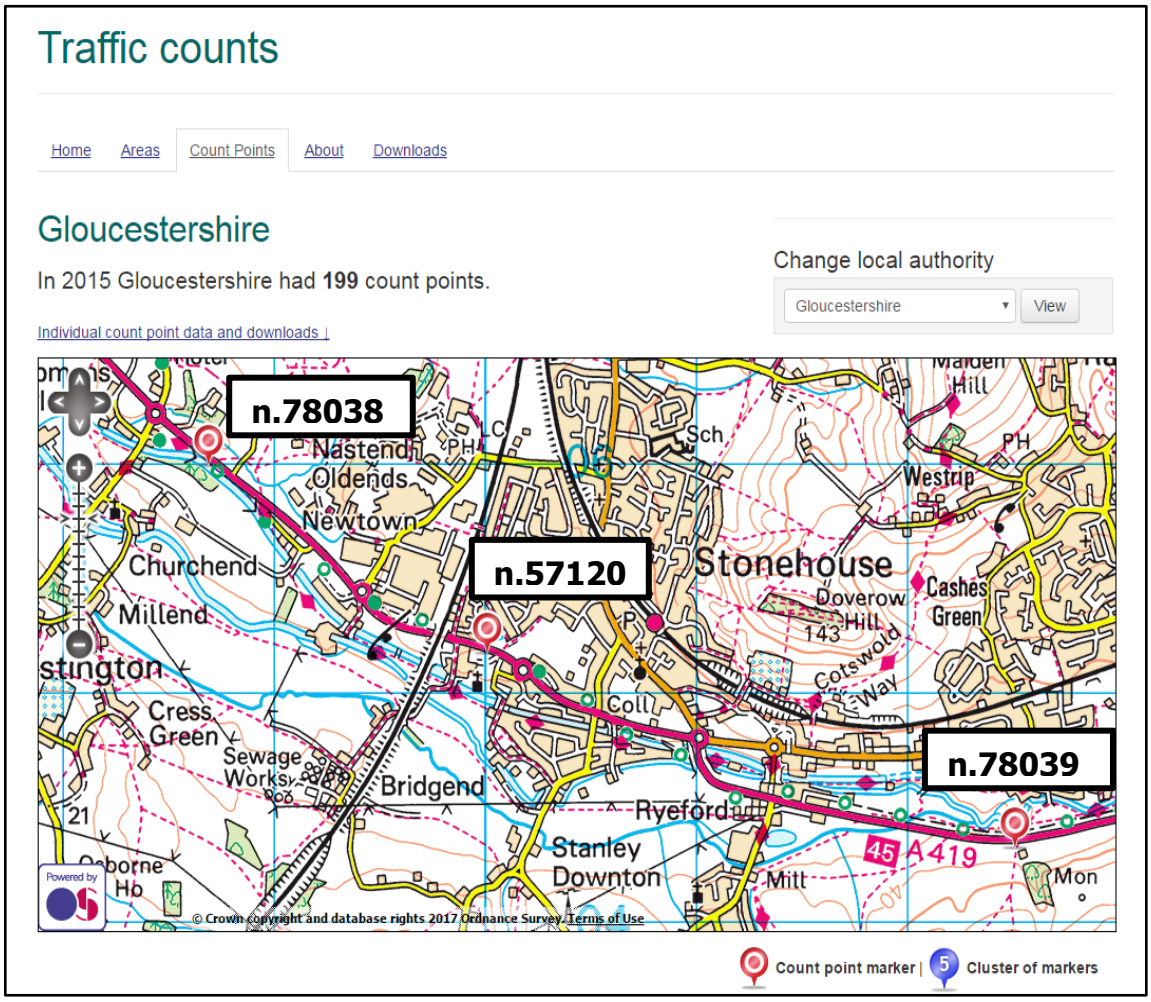


Figure 3.1 - DfT Traffic Counts located along the corridor A419

Table 3.1 shows the AADT value. The traffic count sites covered by the scheme are 78038 and 57120. The sections of the scheme in which the most significant cycling improvements are implemented are Chipman's Platt Roundabout south-east arm and the section between Upper Mills Industrial Estate Road and Horsetrough Roundabout.

DfT Traffic Counts Site	Pedal Cycle AADT (2015)
78038	205
57120	228
78039	23

Table 3.1 - DfT Traffic Counts – AADT values

However, the extent of the section affected by the scheme at Chipman's Platt Roundabout south-east arm is quite small (50 metres approximately). Therefore, even though the pedal cycle flow will lead to a slightly beneficial qualitatively assessment, the extent of the cycle lanes will not produce significant quantifiable benefits.

With regard to the section between Upper Mills Industrial Estate Road and Horsetrough Roundabout, the improvement is represented by the implementation of 2.5 metre cycle/pedestrian shared paths (on both sides of the carriageway), which will substitute the existing footways. The length of the section is approximately 350 metres. In this case, the extent of the section, the value of the flow in proximity to the section (228) and the value per minutes produced by the implementation of the cycle lanes (Web Tag Data Book) will guarantee a significant (albeit not high) benefit. However, the site where the traffic counts have been detected is not located in the same section interested by the scheme. Therefore, the assumptions regarding the pedal cycle flow cannot be considered robust enough to allow a quantitative assessment.

A qualitative assessment has been considered utilising Web Tag Unit_A4.1 – reported below (Figure 3.2). Given the improvements reported above, the scheme will be beneficial in relation to the sub-factor *environment* (factor: *Travel Care*). Moreover, the improvements implemented at A419 / Downtown Road Junction will positively impact the users in relation to the sub-factor *fear of potential accidents* (factor: *Traveller Stress*).

By applying the criterion reported in the guidelines (Web Tag Unit_A4.1 – 6.2.7), since the number of users which will benefit from the scheme is < 500 (also verified as regards the forecasting years), the impact is to be assessed slightly beneficial.

On the other hand, the carriageway widening will slightly improve journey quality also with regard to the vehicles transiting along the corridor.

Therefore, the *journey quality* impact is assessed as slightly beneficial.

Factor	Sub-factor	Description
Traveller Care	Cleanliness	Internal and external cleanliness and graffiti; the condition of the seats; tables; brightness of internal lighting.
	Facilities	Types of seats, handles, luggage racks and storage, toilets, buffet/restaurant facilities and level of staff customer service, presence of service stations and facilities for motorists.
	Information	Audibility, frequency and usefulness of on-board PA announcements; the provision of general travel information and customer magazines; and the condition of advertising posters.
	Environment	Extent of overcrowding, ventilation; temperature; noise; overall condition and smoothness of ride, motor vehicle condition and driver capability.
Travellers' Views	-	Depth of cuttings or natural/ artificial barriers, the presence of which may block views of the surrounding countryside or townscape.
Traveller Stress	Frustration	Road layout and geometry; condition of the road network; ability to make good progress along a route.
	Fear of potential accidents	Presence of other vehicles, inadequate sight distances, possibility of pedestrians stepping into the road, presence of central reservation or safety barriers (or not); inadequate lighting; the width of the road/ carriageway/lane; presence of roadworks; the absence of lane markings, cats eyes, and hard shoulders.
	Route uncertainty	Timetables and network maps (e.g. available in public places, or on the Internet), provision of in-vehicle route signs. (NB actual time savings through better information should be assessed as a TEE benefit).

Table 3.2 – Classification and Examples of Journey Quality Factors (Web Tag Unit_A4.1)

3.4.5 Accidents

The existing accidents have been reviewed covering the period between January 2012 and December 2016 covering the A419 corridor and approaching links in which will be affected by this proposed scheme.

Further details of the collisions which occurred directly on this section of the A419 corridor have been included below.

A total of 24 collisions have been reported to have occurred on the section of the corridor affected by this proposed scheme:

- 2 of these collisions were "Fatal" both of these involved a pedestrian or cyclists;
- 5 classified as "Serious";
- 17 classified as "Slight";
- 9 of these total accidents involved either a pedestrian or cyclists.

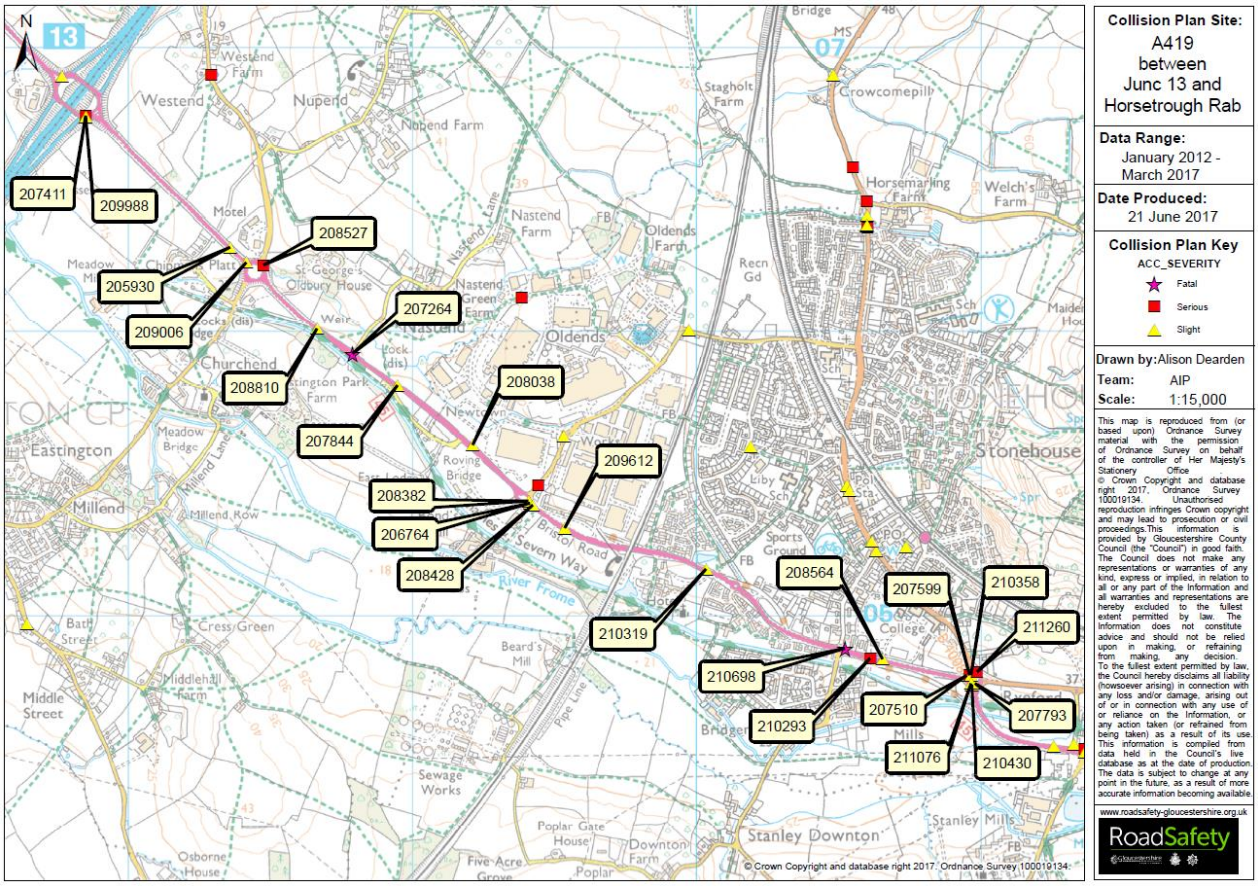


Figure 3.2- Collison plan site: A418 between junction 13 and Horsetrough Roundabout

The scheme is expected to have beneficial impact on cycling users and pedestrians with regard to safety (in particular the crossing modifications regarding Oldends Lane and Downton Road), this will give pedestrians and cyclists a safe place to cross and navigate the route and in turn avoid crossings occurring at random points along the corridor and increasing the risk of accidents. This is expected to reduce accidents or at minimum keep accidents figures at a minimum (Accident data included below).

With regard to the general traffic, although the new markings and linings will have a positive impact on safety, this is of difficult quantification.

There is the potential that the increased number of merge points in the entries (with the accommodation of the second lane) could increase the number of collisions. However it is expected that the speed mitigation due to the lane width reductions and the mutual interferences between adjacent lanes will potentially reduce the number of collisions.

Therefore, it is deemed that the proposed junction design will not have significant impact on safety due to the migration factors involved.

Therefore the *accidents* impact of the scheme is considered Neutral

3.4.6 Security

No change to security is predicted to arise due to the scheme and **therefore, no assessment will be executed.**

3.4.7 Access to services

As for private vehicles, bus services will benefit from the journey times reduction derived from the implementation of the scheme. However, this has been taken into consideration in the assessment regarding transport providers.

On the other hand, the scheme will not have any relevant impact to accessibility; therefore **an assessment of access to services is not proposed.**

The scheme will not have any relevant impact to accessibility, **an assessment of access to services is not proposed.**

3.4.8 Affordability

In general, users will benefit from the journey times reduction derived from the implementation of the scheme; and this has been taken into consideration in the assessment regarding users (business, commuting and others) and transport providers. However, journey time reduction will not have a significant impact to any of the social groups in particular; therefore, no impact on affordability (as intended in the Web Tag) is expected. **Therefore, the impact is not assessed.**

3.4.9 Severance

A more predictable flow of traffic and reduced congestion along the route may reduce severance for pedestrian and cyclists; however this is likely to be minimal. The benefits derived from the implementation of the cycling and pedestrian schemes have been assessed in relation to the journey quality improvement. The new cycling and pedestrian infrastructures do not guarantee continuity and will not have a significant impact on severance. **Therefore, the impact is Neutral.**

3.4.10 Option and non-use values

No impact expected, not assessed.

3.5 Public Accounts

3.5.1 Cost to Broad Transport Budget

The calculation has been carried out using Tuba v1.9.7 and using the costs and costs profile reported in the tables below.

DO_SOM_COSTS					
*Type	Mode	Funding	Cost	Price	GDP
P	1	loc	175.0	F	110.9
C	1	loc	3702.195	F	110.9
S	1	loc	482.711	F	110.9

Table 3.3 - Disaggregated Costs

DO_SOM_PROFILE				
*Year	Mode	%Prep	%Const	%Superv
2017	1	100	0.0	0.0
2018	1	0	14.8	52.2
2019	1	0	50.0	31.9
2020	1	0	35.2	15.9

Table 3.4 - Costs Profile

The considered values are factor costs (in £k).

As can be observed in the tables, the cost components which have been considered in the calculation are: preliminary, construction and supervision costs. It has been assumed that the maintenance costs regarding the with-scheme scenario are equal to the ones related to the without-scheme scenario. Therefore, maintenance costs are not considered in the calculation. Developer contributions to the scheme and local funding are not applied to this scheme.

The following table summarises the results produced by the model:

Table 3.5 - Public Accounts	
Local Government Funding and LEP	ALL MODES
Revenue	0
Operating Costs	0
Investment Costs	3428
Developer Contributions	0
Grant/Subsidy Payments	0
NET IMPACT	3428
Central Government Funding: Transport	ALL MODES
Revenue	0
Operating costs	0
Investment costs	0
Developer Contributions	0
Grant/Subsidy Payments	0
NET IMPACT	0

Broad Transport Budget	**3428**

Note: All entries are present values discounted to 2010, in 2010 prices (in £k).

3.5.2 Indirect Tax Revenues

From the results regarding *business users and transport providers* and *commuting and other users* undertaken by using the transport model (Paramics), the software PEARS has also calculated the *indirect tax revenues* deriving from the utilisation of the fuel.

The calculation has produced negative benefits quantified at - £1.68 million.

3.6 Economics Tables

Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	13.81		13.44	0.37		
Vehicle operating costs	0.76		0.76			
User charges						
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	14.57	(1a)				

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	20.20		17.56	2.64		
Vehicle operating costs	0.79		0.76			
User charges						
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	20.99	(1b)				

Business

User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	29.04		2.58	25.76	0.70			
Vehicle operating costs	2.33		1.22	1.11				
User charges								
During Construction & Maintenance								
Subtotal	31.37	(2)						

Private sector provider impacts					**Freight**	**Passengers**	
Revenue	0.18						
Operating costs	0.11			0.29			
Investment costs							
Grant/subsidy							
Subtotal	0.29	(3)					

Other business impacts						
Developer contributions		*(4)*				
NET BUSINESS IMPACT	31.66	*(5) = (2) + (3) + (4)*				

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	67.22	*(6) = (1a) + (1b) + (5)*

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

Public Accounts (PA) Table

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Local Government Funding*						
Revenue						
Operating Costs						
Investment Costs	3.56					
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT	3.56	*(7)*				
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs	0					
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT	0	*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues	1.68	*(9)*				
TOTALS						
Broad Transport Budget	3.56	*(10) = (7) + (8)*				
Wider Public Finances	1.68	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

* = For the purpose of this BC, LEPs have been included under this category

Analysis of Monetised Costs and Benefits

Noise		*(12)*
Local Air Quality		*(13)*
Greenhouse Gases	0.75	*(14)*
Journey Quality		*(15)*
Physical Activity		*(16)*
Accidents		*(17)*
Economic Efficiency: Consumer Users (Commuting)	14.56	*(1a)*
Economic Efficiency: Consumer Users (Other)	20.99	*(1b)*
Economic Efficiency: Business Users and Providers	31.66	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-1.68	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	66.29	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget		*(10)*
Present Value of Costs (see notes) (PVC)	3.56	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	**62.73**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**18.61**	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Appraisal Summary Table

Date produced:	01/08/2017

Name of scheme:		Stonehouse A419 Improvements			
Description of scheme:		An improvement scheme for A419 corridor between Chipman's Platt Roundabout and Horsetrough Roundabout.			
Impacts		**Summary of key impacts**	**Quantitative**	**Qualitative**	**Monetary £(NPV)**
Economy	**Business users & transport providers**	**Overall Assessment** Avoidance of increased costs, increased journey time savings and increased delay. **Economic Considerations** The calculation regarding business users has produced benefits equal to £29.04 million from the travel time and £2.33 million from vehicle operating costs. With regard to transport providers, the benefits from the revenue are quantified at £0.18 million and from the operating costs are quantified at £0.11 million.	**Benefit Cost Ratio (BCR) 18.61** **Value of journey time changes(£)** 29,040k	Large Beneficial	31,660,000
	Reliability impact on Business users	**Overall Assessment** Avoid increase in journey times, improve reliability of the corridor and improve local access. **Economic Considerations** The information regarding the base model and surveys are not sufficient to assess the reliability with regard to the without-scheme scenario. However, the scheme will not have any relevant impact on journey time reliability for business users and the analysis of the with-scheme scenario results does not show any significant fluctuation of the journey time. Therefore, the impact is not assessed.	Not Assessed	Slightly Beneficial	N/A
	Regeneration	**Overall Assessment** Maintain attractiveness of the area for domestic and non-domestic properties • Improve access to jobs and services; • Improving the most direct and safe route for all users; • Improving reliability of the route via improved journey times; • Increasing the overall capacity of the corridor will future proof the route to manage future development.(Ecopark Mentioned below) **Economics Considerations** The LEP Forest Green Stadium and Ecopark proposal described in paragraph 2.2 is expected to have a significant impact to the connected immediate network. However, no planning permission has been granted. Furthermore, the promoters of the Stadium predict a significant impact only on the motorway junction, while no significant impact is predicted along the corridor directly interested by the scheme. The available data were not sufficient to be used in the model; therefore, the demand was not included. Considering the increase in demand generated/attracted by the Ecopark, it could be assumed that the scheme will be slightly beneficial (due to the increase in capacity). However, since modelling would be necessary to study the phenomenon and confirm the positive impact, regeneration cannot be assessed.	Not Calculated for this scheme.	Slightly Beneficial	N/A
	Wider Impacts	No wider impacts are expected from the implementation of the scheme.	Not Assessed	Neutral	N/A
Environmental	**Noise**	Most of the schemes do not address the current noise levels in their study areas, which for some properties are above the Significant Observed Adverse Effect Level (SOAEL) of 68dB LA10,18h,façade. In some cases the schemes cause perceptible increases in noise in the short term, which become imperceptible in the long term. The effects for the Chipman's Platt, Oldends Lane and Horsetrough Roundabout range from slight adverse to neutral. The overall effect of the Downton Road scheme is considered slight adverse since it will cause increases in noise levels (which will be perceptible in the short term) in an area with sensitive receptors already subject to noise levels above the SOAEL. However, due to the scheme potentially triggering the provision of insulation under the Noise Insulation Regulations the scheme may result in having a slight beneficial effect at the insulated properties.	Households experiencing increased daytime noise in forecast year: 4 in Chipman's Platt; 4 in Oldends Lane; 24 in Downton Road and 4 in Horsetrough roundabout. Households experiencing reduced daytime noise in forecast year: 0 in Chipman's Platt and Oldends Lane; 10 in Downton Road and 3 in Horsetrough roundabout	The risk of temporary effects from construction phase emissions is considered to be medium because of the scale of the sites.	N/A

			Households experiencing increased night time noise in forecast year: 2 in Chipman's Platt; 4 in Oldends Lane; 4 in Downton Road and 0 in Horsetrough roundabout. Households experiencing reduced night time noise in forecast year: 0 in Chipman's Platt; 1 in Oldends Lane; 6 in Downton Road and 8 in Horsetrough roundabout. Overall: 36 households with increased daytime noise for 13 households with reduced daytime noise. 10 households with increased night-time noise for 15 households with reduced night-time noise.	However, It is considered that with mitigation commensurate to the risk the impacts of the all the schemes will be **Slightly Adverse.**	
	Air Quality	For the proposed interventions, quantification of the release of vehicle exhaust gases has shown that air quality will improve from opening to assessment year as a result of likely improvements in vehicle emissions technologies and background concentrations. No exceedances of the statutory objectives for NO2 or PM10 are predicted in any of the scenarios with or without the scheme in place. The majority of impacts are predicted to be imperceptible with the exception of some receptors close to the Downton Road and Horsetrough Roundabout schemes where slight adverse impacts are predicted. The slight adverse impacts do not cause any exceedances of the objectives. As a result the impacts of each schemes is assessed as neutral. As a result no specific mitigation is proposed other than sustainable design with relating to route alignment, landscaping and traffic management. Any claims under the Land Compensation Act ware likely to be unfounded on the evidence of the assessment.	**Chipman's Platt Roundabout (18 properties)** • In 2020 18 properties will see an improvement in NO_2 and 18 a deterioration in PM_{10}. • In 2035 18 properties will see an improvement in PM_{10} and 18 a deterioration in NO_2. **Oldends Lane (128 properties)** • In 2020 128 properties will see an deterioration in NO_2 and PM_{10}. • In 2035 128 properties will see an deterioration in NO_2 and PM_{10}. **Downton Road and Horsetrough Roundabout (383 properties)** • In 2020 383 properties will see an deterioration in NO_2 and PM_{10}. • In 2035 383 properties will see an deterioration in NO_2 and PM_{10}. For the combined schemes, 18 households will experience some improvement in concentrations of NO_2 and PM_{10}. 511 will experience deterioration only. The majority of impacts will be imperceptible.	The risk of temporary effects from construction phase emissions is considered to be medium because of the scale of the sites. However, It is considered that with mitigation commensurate to the risk the impacts of the all the schemes will be **Neutral**	**Chipman's Platt Roundabout** -9,538 **Oldends Lane** -23,746 **Downton Road and Horsetrough Roundabout** -60,401 **Combined** **-93,685 (Adverse)**
	Greenhouse gases	All the schemes are expected to lead to smoother traffic flows, reduced acceleration and deceleration and increases in speeds which all improve fuel efficiency. As a result, the release of greenhouse gases is expected to reduce with the schemes in place with the anticipated improvements in driving conditions expected to off-set natural traffic growth. The highest releases in greenhouse gases are estimated at the Downton Road and Horsetrough Roundabout and the lowest at the Chipman's Platt Roundabout which is related to the volume of traffic using these junctions. The Chipman's Platt Roundabout and Downton Road and Horsetrough Roundabout schemes are predicted to have beneficial impacts on greenhouse gas emissions and Oldends Lane adverse. The greenhouse gases emission associated to the traffic have also been derived directly from the traffic model (Paramics) using PEARS. The impact produced by the implementation of the scheme is beneficial (CO2 reduction) and quantified in £0.75 million (central).	**Chipman's Platt Roundabout (t CO2e)** • DM2020 1,006 • DS2020 887 • DM2035 1,153 • DS2035 996 This is a decrease of 119 tCO2e in 2020 and 157 tCO2e in 2035 which represents a **Slightly Beneficial Impact.** **Oldends Lane** • DM2020 633 • DS2020 656 • DM2035 689 • DS2035 698 This is an increase 23 tCO2e in 2020 and 9 tCO2e in 2035 which represents a **Slightly Adverse Impact.** **Downton Road and Horsetrough Roundabout** • DM2020 1,594 • DS2020 1,607 • DM2035 1,773 • DS2035 1,713 This is an increase of 13 tCO2e in 2020 and a decrease of 60 tCO2e in 2035 which represents a **slightly Beneficial Impact.**	Qualitative assessment not required at FBC therefore **Neutral.** All impacts detailed in quantitative assessment	Chipman's Platt Roundabout +420,755 Oldends Lane -29,696 Downton Road and Horsetrough Roundabout +141,000 **Combined** **+532,059 (beneficial)**930,000

	Landscape	At Chipman's Platt, works to the east of the roundabout would involve some slight loss of vegetation and a new retaining structure would be required. A suitable design of the structure would help blend it into the local environment. The proposed works at Oldends Lane Roundabout would not have any adverse effects on sensitive landscape or townscape receptors. At Downton Road to Horsetrough Roundabout carriageway widening would cause tree loss which could open up views of the main road from houses on Boakes Drive. Replacement planting or offsite planting in gardens would mitigate this. Slight loss of boundary hedging on the north side of Bristol Road could be mitigated by replacement planting. Trees in the centre of Horsetrough Roundabout, would be unlikely to be affected. With appropriate mitigation, landscape and visual impacts would be negligible. However additional planting should be considered to further soften the roundabout, especially in views from the Cotswolds Area of Outstanding Natural Beauty (AONB), to achieve landscape enhancements.	Not quantified	Slightly adverse	N/A
	Townscape	Careful detailing of hard surfacing, barriers and signage throughout the scheme would ensure no adverse townscape impacts. At Horsetrough Roundabout, effects would be localised and would involve the relocation of the horse trough, which should be agreed with local stakeholders. There would be no impact on the adjoining Conservation Area.	Not quantified	Neutral Impact	N/A
	Historic Environment	The key impacts relate to undesignated heritage assets: • Below ground archaeological remains • Horse trough An archaeological watching brief during the construction phase of works and an agreed strategy for relocating the horse trough should form appropriate mitigation for any impacts.	Not quantified	Neutral Impact	N/A
	Biodiversity	The key impacts relate to the loss of habitat, in particular the loss of unimproved and semi-improved neutral grassland within the roadside verges at Chipman's Platt roundabout, which is also a non-statutory designated site – Conservation Road verge 2014. Pre-construction species surveys and checks to existing badger setts should be undertaken for badgers, otter and water vole on the Stroudwater Navigation and vegetation clearance undertaken outside of the bird breeding season if possible or under ecological guidance. Reasonable Avoidance Measures (RAMs) should be employed regarding amphibians and reptiles. Work should be undertaken in accordance with BS5873:2012 Trees in relation to design, demolition and construction to ensure that mature trees, hedgerows and tree belts in close proximity is not harmed Further third party consultation regarding the non-statutory designated site / roadside verges at Chipman's Platt is likely to be required.	Not quantified	Neutral Impact	N/A
	Water Environment	The key impacts are likely to be an increase in run-off; detailed design will provide further information.	Not quantified	Neutral Impact	N/A
Social	**Commuting and Other users**	**Overall Assessment** Journey time saving along the A419 corridor primarily between Horsetrough Roundabout and M5 (Junction 13). Avoidance of increased costs, increased journey times, increase delays and reduced reliability. Commuters during the AM and PM will significantly benefit from these savings in particular however all users will experience some benefit from the scheme improvements throughout peak periods in particular. **Economic Considerations** The calculation regarding commuting and other users has produced total benefits equal to £34.01 million from the travel time and £1.55 million from vehicle operating costs.	Refer to modelled data and economics **Value of journey time changes(£)** 34,010k	Large Beneficial	35,560,000
	Physical activity	**Overall Assessment** Although cycle paths and lanes are going to be improved, the extents of the interested sections are not sufficient to formulate any assumptions with regard to the potential increase in demand (new users attracted) and to assess the sub-impact. On the other hand, the sections interested by the scheme in which the carriageway is widened (for the general traffic), always present a dedicated cycle lane or a shared pedestrian/cycle lane; therefore, the increased capacity for the traffic will not affect (disincentivise) the utilisation of the pedal cycles and reduced the number of users. This scheme has the potential to increase physical activity. The improved crossing points will provide a safe place for both pedestrians and cyclists to cross this will reduce severance for potential users and improve confidence in using the route via such	Not Assessed quantitatively	Slightly Beneficial	N/A

		methods. The reduction in congestion and a more predictable flow of traffic may also have a positive impact on potential user's perception of route and may encourage them to at least consider walking or cycling. However it is important to note that these improvements may be limited by the impact the increase lanes and junction capacity will have on user's perception of the corridor and the current demand for such infrastructure determined mainly by users destination and if this is realistic via transport which involves physical activity. The impact upon 'physical activity' has not assessed quantitatively.			
	Journey quality	**Overall Assessment** The potential combination of improved journey times, reliability and safety will directly increase journey quality along the route. **Economic Considerations** A qualitative assessment has been considered utilising Web Tag Unit_A4.1 – Table 6.1. Given the improvements reported above, the scheme will be beneficial in relation to the sub-factor environment (factor: Travel Care). Moreover, the improvements implemented at A419 / Downtown Road Junction will positively impact the users in relation to the sub-factor fear of potential accidents (factor: Traveller Stress). By applying the criterion reported in the guidelines (Web Tag Unit_A4.1 – 6.2.7), since the number of users which will benefit from the scheme is < 500 (also verified as regards the forecasting years), the impact is to be assessed slightly beneficial.	Refer to Economics	Slightly Beneficial	N/A
	Accidents	**Overall Assessment** Accident figures are expected to remain low along the route and as a result of the scheme may reduce further due to a more organised and efficient transit along the corridor. The increased number of merge points in the entries (With the accommodation of the second lane) could potentially increase the number of collisions. However it is expected that the speed mitigation due to the lane width reductions and the reduction of the mutual interferences between adjacent lanes will act as mitigation for the additional merge points and consequently not increase the number of collisions on the route. The scheme is also expected to have a beneficial impact on cyclist and pedestrians accidents. The proposed crossing modifications at Oldends lane and Downton Road. This will give peestrai9ns and cyclists a safe place to cross and navigate the route and in turn avoid crossings occurring at random points which would increase the risk of a collision. It is important to note the importance of the crossing points due to the increased number of lanes which can cause collisions to increase. It is expected that collisions involving pedestrians and cyclists will remain low due to such mitigation **Economic Considerations** Although part of the scheme is expected to have beneficial impact on the cycling users and pedestrians with regard to safety (in particular the modifications regarding Oldends Lane and Downton Road), a quantitative assessment has not been undertaken given the number of users which will benefit from the scheme, the data available, and the type and the size of scheme.	Refer to accident data	Slightly Beneficial	N/A
	Security	No change to security is predicted to arise due to the scheme and therefore, no assessment will be executed.	Not Assessed	Neutral	N/A
	Access to services	An improved corridor will improve access to services particularly through access to the M5, the A419 provides direct access to Junction 13 which is situated between Gloucester to the north and Bristol to the south these cities will provide large amounts of employment for small towns like Stonehouse and Stroud. The M5 will also provide access to the M5 for more than 40 businesses which are situated adjacent to the A419 some of which have high volumes of HGV's utilising the route in which the surrounding infrastructure has a significant impact on the performance of the business. The improvements of the scheme will ensure the continued economic growth of local Area. A quantitative assessment of 'access to services' is not proposed.	Not Assessed quantitatively	Slightly Beneficial	N/A

	Affordability	No impact expected.	Not Assessed	Neutral	N/A
	Severance	A more predictable flow of traffic and reduced congestion along the route may reduce severance for pedestrian and cyclists; however this is likely to be minimal.	Not Assessed	Slightly Beneficial	N/A
	Option and non-use values	Not Relevant	Not Assessed	Neutral	N/A
Public Accounts	**Cost to Broad Transport Budget**	The investment costs are entirely funded by the Local Enterprise Partnership. The calculation has been carried out using Tuba v1.9.7	The calculation has considered (including Optimism Bias and Risks): preliminary costs = £0.175 million; construction costs = £3.702 million; and supervision = £0.483 million.	Expected net overall benefit	3,428,000
	Indirect Tax Revenues	From the results regarding business users and transport providers and commuting and other users undertaken by using the transport model (Paramics), the software PEARS has also calculated the indirect tax revenues deriving from the utilisation of the fuel.	The calculation has produced negative benefits quantified at -£1.68 million	Slightly Negative	1,680,000

3.7 Value for Money Statement

3.7.1 VfM Category

From the quantitative assessment of the sub-impacts, the scheme will have positive benefits from the Economy and Social areas, and specifically from the journey time savings, which will primarily involve business users, transport providers, commuters and other users. Other appreciable impacts are the ones deriving from the traffic model and related to greenhouse gases emission (benefits) and indirect tax revenue (disbenefits).

From the qualitative assessment, other positive impacts are produced on *journey quality* relatively to the pedal cycle class. The scheme will have instead slightly adverse impacts on *landscape* and *biodiversity*.

The Economic Case has produced a **BCR value of 18.61**, which corresponds to Very High Value for Money. The qualitative assessment has produced no variation to the results.

Therefore, it can be stated that the implementation of the schemes will have a Very High Value for Money return.

3.8 Critical Success Factors

There are several 'Critical Success Factors' (CSF) that will determine if the scheme can be introduced satisfactorily. These CSF are essentially a combination of performance, finance and delivery assurances, as suggested in HM Treasury's 'The Green Book' and which can be assessed qualitatively and broadly aligned under the five criteria of the Business Case. The CSFs for the Over scheme are as follows:

CSF1: Strategic Fit (Strategic Case)

- Will enable housing and employment development to be brought forward;
- Enables development (housing; employment) to take place, where residents or employees have access to an improved highway network;
- Improvement in quality and reduction in travel time for all vehicles.

CSF 2: Value for Money (Economic Case)

- Will maximise return on investment, striking a balance between the cost of delivery and the cost to the economy of non-delivery.

CSF 3: Achievability (Commercial Case)

- Deliverable utilising current engineering solutions;
- Limit long-term maintenance liabilities.

CSF 4: Affordability (Financial Case)

- Deliverable within the capital funding available;
- Revenue liabilities for the option are affordable within current budgets.

CRF 5: Timescale for Implementation (Management Case)

- Can be delivered within the timeframe of available funding.

4 Commercial Case

4.1 Bus Services

Bus stops currently situated near or along this section of the A419 at the following locations:

- On the A419, east of the junction of the A419 and Nastend Lane, both in the eastbound and westbound directions;
- On the northern side of the A419, across from the first priority junction to the east of Nastend Lane;
- On the Southern side of the A419, between Oldends Lane and the above bus stop;
- On the Oldends Lane, north of the A419 and the first car park entry;
- On the south side of the A419, west of Boakes Drive;
- On the north side of the A419, east of Downton road; and
- On the south side of the A419, in a lay-by approximately half way between Horsetrough Roundabout and Ryeford Road.

These stops are operated by Stagecoach and are shown below and the routes which service them are summarised from west to east.

Improved journey times will be a benefit for bus services and its users by improving journey times for commuters in particular. This may increase or at least encourage use of the bus services and also encourage bus providers to consider more services or an extended route in the future. Furthermore increase bus use will reduce vehicle numbers further and reduce congestion on the corridor.

Figure 4.1- Bus stop locations along the A419 (Between Chipman's Platt Roundabout and Horsetrough Roundabout)

No	Route	Stop	Approximate Frequency
20	Stroud – Stonehouse – Dursley – Uley		3 hourly
20	Stroud – Stonehouse – Dursley – Uley		3 hourly
20	Stroud – Stonehouse – Dursley – Uley		3 hourly
20	Stroud – Stonehouse – Dursley – Uley		3 hourly
14B	Stroud – The Stanleys – Stonehouse – Field Court - Gloucester		4 hourly
20	Stroud – Stonehouse – Dursley – Uley		3 hourly
14B	Stroud – The Stanleys – Stonehouse – Field Court - Gloucester		4 hourly
20	Stroud – Stonehouse – Dursley – Uley		3 hourly
14B	Stroud – The Stanleys – Stonehouse – Field Court - Gloucester		4 hourly

Table 4.1 - Bus frequency along the A419 (Between Chipman's Platt Roundabout and Horsetrough Roundabout)

4.2 Commercial Issues

The scheme will generate no direct income for the County Council.

4.3 Scheme Procurement

4.3.1 Procurement Options

GCC have identified three procurement options for the delivery of their LEP funded schemes. The alternative options are:

A. <u>Full OJEU tender (Schemes greater than OJEU limit of £4,322,012)</u>

GCC would opt for an 'open' tender, where anyone may submit a tender, or a 'restricted' tender, where a Pre-Qualification is used to whittle down the open market to a pre-determined number of tenderers. This process takes approximately one month and the first part is a 47 day minimum period for GCC to publish a contract notice on the OJEU website.

The minimum tender period is 6 weeks but could be longer for more complex schemes. Once the tenders are received they will be assessed and a preferred supplier identified. There is a mandatory 10 day 'standstill' period, during which unsuccessful tenderers may challenge the intention to award to the preferred contractor.

B. Open Tender (Schemes greater than £1M but less than OJEU limit)

GCC would opt for an 'open' tender, where anyone may submit a tender. The tender would include a set of eligibility criteria and a quality submission. Depending on the exact tender assessment method chosen the contractors would be required to meet a quality threshold score or selected using a quality / price evaluation.

Schemes will be procured via ProContract and this would include prior notifications of the tender approximately 4 weeks before the formal tender. Depending upon the complexity of the scheme supplier engagement presentations will be arranged.

The minimum tender period is 6 weeks but could be longer for more complex schemes. All suppliers that meet the eligibility criteria will be assessed and a preferred supplier identified.

C. Delivery through Amey Highways Term Maintenance Contract (HTMC) (Schemes less than £500k)

This option is strictly not procurement as the HTMC is an existing contract. The HTMC is based on a Schedule of Rates agreed at the inception of the contract. The price for each individual scheme is determined by identifying the quantities of each required item into a Bill of Quantities. Amey may price 'star' items if no rate already exists for the required item. If the scope of a specific scheme is different from the item coverage within the HTMC contract a new rate can be negotiated.

The preferred procurement route for the A419 Stonehouse Improvements scheme is Option B Open Tender.

This option has been selected due to the estimated value of the scheme. The budget estimate for the scheme is close to the OJEU limit, however the utility diversion costs will be paid directly by Gloucestershire County Council to the utility supplier, so therefore the contract value for the construction works will be below the threshold.

For budget certainty the scheme will be procured on a lump sum basis as an ECC Option A contract (Lump Sum with Activity schedule). This option is preferred as the scheme will be fully designed with a clear specification of works which allows for a greater transfer of risk to the Contractor through a priced contract. The Activity Schedule used in this form of contract also gives greater confidence in the Contractor's price. This is as a result of the importance given to the Contractor's programme, as tenderers have to plan the scheme whilst preparing their Activity Schedule. This also means the programme is realistic and more likely to be adhered to as payments to the Contractor are linked to their activity schedule.

The ECC Option A contract is Gloucestershire County Councils preferred method of delivery for this size and type of highway scheme. This ensures consistency with internal processes, staff members, supply chain, benchmarking, performance etc. which should all aid successful delivery.

4.4 Commercial Risk Assessment

The table below provides a summary of the identified commercial risks surrounding the scheme.

Qualitative Commercial Risk Assessment										
Scheme Commercial Risk Item	**Likelihood of Risk Arising (✓)**			**Impact Severity (✓)**			**Predicted Effect on Scheme Procurement, Delivery & Operation (✓)**			**Immediate Bearer of Risk and Suggested Mitigation**
	Low	**Medium**	**High**	**Slight**	**Moderate**	**Severe**	**Slight**	**Moderate**	**Severe**	
Scheme construction is delayed and/or costs increase. Eg from unexpected engineering difficulties.		✓				✓		✓		GCC, as scheme promoter, bears the risk. Ensure that scheme development, design, procurement and construction procedures are sufficiently robust to minimise likelihood of construction difficulties.
Ongoing maintenance costs of scheme higher than expected	✓			✓			✓			GCC, as scheme promoter, bears the risk. Ensure that scheme design, materials selection and construction procedures are sufficiently robust to minimise likelihood of maintenance issues.

Table 4.2 - Scheme Commercial Risk Assessment

5 Financial Case

5.1 Project Costs

This section considers the capital costs associated with the proposed scheme investment.

5.1.1 Breakdown and Time Profile of Project Costs

Scheme Cost Breakdown and Profile						
Project Cost Components	**Capital Cost Items**	*** Cost Estimate Status (O/P/D/T)**	**Costs by year (£) Year of Estimate:**			
			2017/18	**2018/19**	**2019/20**	**2020/21+**
Design & Management	Design fees Site surveys Construction supervision	P P P	£320,000 £30,000 -	£33,855 - £120,000	£33,856 - £120,000	- -
Construction including Traffic-Related Maintenance	Construction Utility Diversions Ongoing maintenance	P O O		£535,404 £475,000 -	£1,146,252 £805,000 -	- - £1,933pa
Contingency	(As appropriate)	P		£252,626	£487,813	-
Indirect Tax	Non-Recoverable VAT (if applicable)	-	-	-	-	-
Total Cost	Including Risk Adjustment at 15% Including optimism Bias at 10% (NB - Not Base Cost with Real Cost Adjustment)	P	**£350,000**	**£1,416,985**	**£2,592,921**	**£1,933pa**
*O = Outline estimate, P= Preliminary estimate, D = Detailed estimate, T = Tender price,						
*O = Outline estimate, P= Preliminary estimate, D = Detailed estimate, T = Tender price,						

Table 5.1 - Scheme Capital Cost Breakdown and Profile

5.2 Project Funding

This section considers the capital funding requirements and commitments for the proposed scheme investment.

5.2.1 Sources of Funding

	2017/18	2018/19	2019/20	2020/21	Totals
LEP Total	-	£1,766,985	£2,592,921		£4,360k

Table 5.2 Scheme LEP Funding Profile (£)

As shown when comparing Tables 5.1 and 5.2, the project funds are set to commence in 2017/18 before the funds become available from the LEP in 2018/19. Subject to approval of the business case, the advanced funding of £350,000 in 2017/18 will be initially funded by Gloucestershire County Council and then recovered when the LEP funds become available in 2018/19.

The current proposal is to use the LEP funding to implement improvements at four junctions on the A419 as shown in Section 5.1. The scheme has been developed to align with the forecast £4.36m LEP budget allocation and construction cost estimates have been produced based on the layouts. (In Appendix A).

Within the works estimate an allowance of £1,280,000 has been allocated for the diversion of utilities apparatus across the four junctions. (This has been calculated following the return of the C3 enquires from the utility companies).

The detailed design estimate for the utility diversions will not be known until the detailed design stage following the approval of the FBC.

5.2.2 Security and Earliest Availability of Funds

Security of Scheme funding Sources and Earliest Availability						
		Security of Funding Contribution (✓)			Earliest Available Date for Securing Fund Contribution	
Funding Source	**Fund Details**	**Low**	**Medium**	**High**	**Part Funding Date**	**Full Funding Date**
GLTB/LEP	LEP			✓		2018/19

Table 5.3 - Security and Availability of Scheme Funding Contributions

5.3 Financial Risk Management Strategy

This section examines the risks associated with the costs and financial requirements of the onsite infrastructure and engineering works. It considers the mitigation that may be needed to handle the identified risks, if they arise.

5.3.1 Risks to the Scheme Cost Estimate and Funding Strategy

Table 5.4 show the financial risks and suggested mitigation measures associated with this scheme.

Qualitative Financial Risk Assessment										
Scheme Financial Risk Item	**Likelihood of Risk Arising (✓)**			**Impact Severity (✓)**			**Predicted Effect on Scheme Delivery & Outcome (✓)**			**Suggested Mitigation**
	Low	**Medium**	**High**	**Slight**	**Moderate**	**Severe**	**Slight**	**Moderate**	**Severe**	
Earmarked / secured funds do not cover current scheme capital cost		✓			✓			✓		Amend preferred scheme design content to reduce scheme cost whilst still maintaining agreed outputs.
Design changes during detailed design lead to increase in scheme cost.			✓		✓			✓		Amend preferred scheme design content to reduce scheme cost whilst still maintaining agreed outputs.

Table 5.4 - Scheme Financial Risk Assessment

5.4 Ongoing Maintenance

Gloucestershire County Council

For information only (and not accounted for in the BCR), the following information is from the GCC Maintenance contract;

To cover four surface treatments and two surface course resurfacing, the cost of the ongoing maintenance is estimated as £46.40 per m2. Over a 60 year design life this would equate to £0.77p per m2 per year. The scheme will construct additional Gloucestershire County Council carriageway area of 2,500 m2.

The additional maintenance liability would therefore equate to £1,933 per year and GCC will include for this in maintenance budgets, and therefore does not impact on the budget or LEP funding for the scheme. Note that this figure is based on todays' prices and will vary in line with construction inflation over the period.

6 Management Case

6.1 Overview

The Management Case outlines how the proposed scheme and its intended outcomes will be delivered successfully. It gives assurances that the scheme content, programme, resources, impacts, problems, affected groups and decision makers, will all be handled appropriately, to ensure that the scheme is ultimately successful.

6.2 Project Governance, Roles and Responsibilities

6.2.1 Project Governance

GCC have set up a clear and robust structure to provide accountability and an effectual decision making process for the management of the LEP funded schemes. Each scheme will have a designated project manager who will be an appropriately trained and experienced member of GCC staff. The project management for this scheme is shown in in Figure 6.1.

A detailed breakdown of meetings (along with the attendees, scope and output of each) which make up the established governance process is set out below.

6.2.2 Project Board Meetings (PBM)

Project Board Meetings are held monthly to discuss individual progress on each scheme and are chaired by Amey Project Managers (PMs). Attendees include representatives for different aspects of LEP management (i.e. Communication, Traffic, Risk Management, property services Amey design and/or construction team). Progress is also discussed in technical detail raising any issues or concerns for all to action. A progress report, minutes of meeting and an update on programme dates are provided ahead of the meeting for collation and production of the LEP Progress and Highlight Report.

6.2.3 LEP Progress and Highlight Report

The Progress and Highlight Reports sent by the GCC PMs to Gloucestershire County Council comprise of the following updates; general progress, project finances, issues, risks and meeting dates. The report also identifies any areas of concern or where decisions are required by the PB meeting. An agreed version of the latest Progress and Highlight Report is issued to the PB meeting attendees during the meeting.

6.2.4 Scheme Delivery

During the scheme delivery phase, Gloucestershire County Council retains governance and control of the delivery of the Contract. Gloucestershire County Council will act as the client under the contract with a Contractor appointed via a competitive tender process. Representatives from Gloucestershire County Council or their highways maintenance contractor will be appointed to undertake the project management and supervision roles and will be responsible for managing the Contract during the works.

6.3 Project Management Structure

Gloucestershire County Council and Amey have agreed a project management structure for the project, as shown in Table 6.1 below.

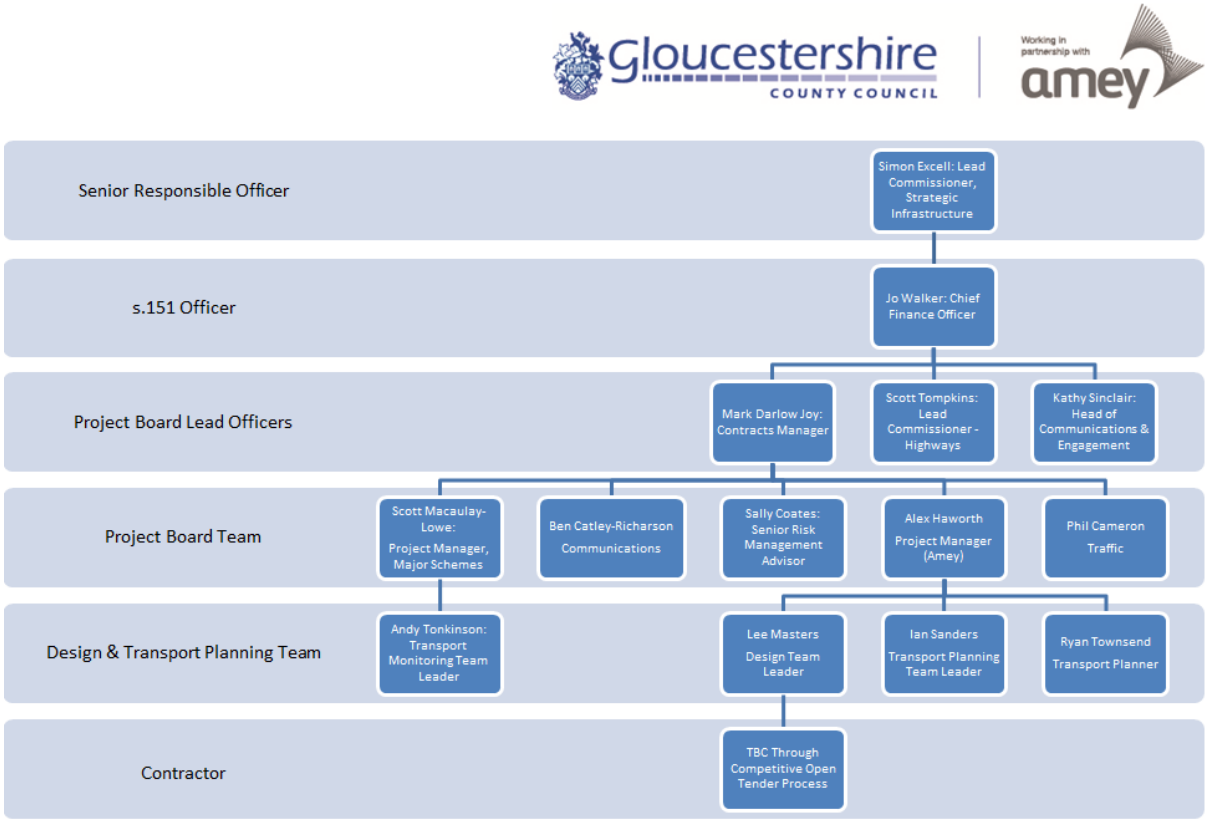


Figure 6.1- Project Management Structure

A full GANTT chart showing the proposed project programme is included as an Appendix C.

6.4 Communications and Engagement Management

GCC have a tried and tested Communication and Engagement Management Plan which is used on all major projects. The plan outlines the approach but is flexible and adapted to suit specific scheme. Effective use of the plan has resulted in limited adverse feedback from the public and ensured successful delivery of schemes both from a project management and public relations perspective. This section will provide further information on how stakeholders are identified, how they are communicated to and the methods/ techniques used to communicate.

6.4.1 Aims and objectives

The main aim of the Communication and Engagement Plan is to ensure that stakeholders and members of the general public are kept informed throughout the development and implementation of a scheme. This can range from keeping key stakeholders updated with critical information, essential to the successful delivery of the scheme to providing information to the general public.

Stakeholder Category	Stakeholder Characteristics
Beneficiary	Stakeholders who will receive some direct or indirect benefit from the scheme.
Affected	Stakeholders who are directly affected by the scheme in terms of its construction and/ or operation
Interest	Stakeholders who have some interest in the scheme, although not affected directly by its construction or operation
Statutory	Stakeholders who have a statutory interest in the scheme, its construction, operation or wider impacts
Funding	Stakeholders who are involved in the funding of the construction or operation of the scheme

Table 6.2 - Stakeholder Categorisation Approach

6.4.2 Engagement Categories

The information supplied to stakeholders can vary depending on their involvement with the scheme. The following table indicates the level of engagement that the variety of stakeholders can expect in relation to this scheme.

Engagement Category	Details of Engagement Method
Intensive consultation	Stakeholders who are directly affected by the scheme and whose agreement is required in order for the scheme to progress. Consultation throughout the design and implementation.
Consultation	Stakeholders who are affected by the scheme and can contribute to the success of its design, construction or operation. Consultation at key stages.
Information	Stakeholders with some interest in the scheme or its use. Information to be provided at appropriate stages.

Table 6.3 - Stakeholder Engagement Levels

6.5 Stakeholder Communication

Table 6.5 below summarises the strategy for managing engagement with stakeholders for the scheme. It itemises the relevant stakeholders and interests and indicates the stakeholder category with which each is associated.

The following stakeholders have been notified of the scheme and their input sought.

Name of Stakeholder / Interest Group	Stakeholder Category	Engagement and Consultation Level	Engagement Method
Highways England	Interest	Information	Pre-exhibition briefing
Parish/Town Councils	Beneficiary	Consultation	Pre-exhibition briefing
Local MPs	Interest	Consultation	Pre-exhibition briefing

Name of Stakeholder / Interest Group	Stakeholder Category	Engagement and Consultation Level	Engagement Method
Elected Members	Interest	Intensive consultation	Pre-exhibition briefing
Scheme users	Beneficiary	Consultation Information	Public Share Events
Access and rights of way groups (including Sustrans)	Interest	Consultation	
Local press	Interest	Information	Pre-exhibition briefing
Local Enterprise Partnership	Beneficiary Funding	Information	Through LGF Business Cases & progress reports

Table 6.4 - Stakeholder Management Strategy and Method

- Highways England – Scheme information has been provided to Highways England. Initial comments acknowledge the scheme is contained within Gloucestershire County Council network but the proposals at Chipman's Platt roundabout have the potential to impact on the strategic road network at M5 J13. GCC responded to query to confirm that the modelling work completed includes assessment of M5 J13. Further meetings to be arranged to ensure the scheme is co-ordinated with Highways England.
- Member engagement - Pre- consultation meetings have been held to discuss the scheme in detail with GCC project manager on a one to one basis. Meetings have been held with Cllr Lesley Williams, Cllr Sarah Lunnon and Stonehouse Town Council and comments received have been considered during the design phase. Details have also been provided for all online content which included a public share event literature, display boards and drawings. Feedback was generally positive and suggestions received included:
    - Requirement for upgraded pedestrian crossing provision at Chipman's Platt and Oldends Lane Roundabouts. *(Included at Oldends Lane, to be reviewed during detailed design at Chipman's Platt)*;
    - Consider the use of toucan crossings at Downton Road;
    - Ensure the narrative of the business case includes all benefits associated with cycling. *(Included within submission)*;

- Scheme to contain improvements to off carriageway cycle routes; particularly the national cycle route off carriageway stretch between Downton Road and Horsetrough roundabout. *(To be confirmed at detailed design stage);*
- Linking of the National Cycle Route to the new housing development at Oldends Lane. *(Review of developer layout undertaken and included within design)*;
- Create new length of cycle way of the A419 between Chipman's Platt roundabout and where the national cycle route leaves the side of A419 to head towards Spring Hill. *(To be reviewed at detailed design).*

- Parish Councils – A request was sent to Stroud, Stonehouse, Eastington, Kings Stanley and Leonard Stanley Parish Councils (from GCC project manager) inviting them to public share events and also providing link to online scheme resources including scheme introduction and information, public share event literature, display boards and drawings.

- Public Share Events – Events held in Stonehouse Town Council hall on Tuesday 20th and Thursday 22nd July 2017 between 14:00 – 19:30 on a drop in basis. Details of the public share event are detailed below.

6.5.1 Statutory Consultees

The following list details the statutory consultees who were contacted by email and provided with an overview of the scheme and copies of the current plans:

- Highways England*
- Road Haulage Association
- Freight Transport Association
- Freight Transport Association
- South Western Ambulance Service
- Community Emergency Response, Gloucestershire Fire and Rescue Service HQ
- Gloucestershire Constabulary (Forest, Cheltenham, Tewkesbury)
- Gloucestershire County Council (Integrated Transport Unit)
- Stagecoach West
- Stroud Cycle Campaign
- Stroud Town Council * (and all Councillors)
- GCC Local County Council
- Stonehouse Town Council *

- Eastington Parish Council *
- Kings Stanley Parish Council
- Leonard Stanley Parish Council
- GCC Local Highways Manager

*Copies of the responses are available on request.

The following stakeholders will be contacted after the scheme has been approved for funding and GCC road space booked.

Name of Stakeholder / Interest Group	Stakeholder Category	Engagement and Consultation Level	Engagement Method
Emergency Services	Statutory	Intensive consultation	Direct contact
Road Haulage Association	Interest	Consultation	Direct contact
Freight Transport Association	Interest	Consultation	Direct contact

Table 6.5: Stakeholder consultation

6.6 Public Consultation

Public Share Events were held in Stonehouse Town Council hall on Tuesday 20th and Thursday 22nd July 2017 between 14:00 – 19:30 on a drop in basis. Presentation boards were provided with large scale plans and graphics together with scheme introduction, background and FAQs. The event was manned by scheme designers and engineers together with GCC project manager. Attendees were offered a personal tour of information available and in depth discussions about issues, concerns, improvements etc. Most attendees took the opportunity to ask questions and give their own views of the scheme using feedback forms that were available for people to leave comments.

Across the two sessions there were over 180 attendees, many of whom chose to leave comments on the day using the forms provided or via email to the GCC major projects inbox. The level of feedback was good and due to the high number of responses, the comments have been reviewed and grouped into themes. These key themes summarise the feedback from the public share events. In Table 6.6 below each theme has been included together with a designers response.

In summary, the overall consensus from the feedback at the share events was an acknowledgement that there is a current congestion issue on the A419 and the proposed plans will help to improve the situation. However, many people questioned whether the scheme will resolve the issues and suggested that larger scale improvements were required.

The main concerns raised by residents living close to the A419 was an increase in noise as a result of the scheme and ensuring suitable crossing points are provided.

The key themes identified within the comments are shown below in Table 6.6. Within each theme an example of the comments made is included together with a response explaining how the comments have been addressed. Items shown within a green box will be incorporated within the detailed design and a blue box indicates that the suggestion will be subject to further consideration by the design team, or have already been addressed in the design.

Comment Theme	Example of suggestions and concerns raised by attendees	How responded to and addressed
Scale of proposed improvements will not address the issues	The proposed plans will move the traffic issue and not solve the problems on the A419. By pass required from Oldends Lane Roundabout to M5.	Optioneering and feasibility design stages completed to ensure most appropriate solutions chosen for given budget and constraints. Scheme proposed is within budget and driven by the objectives of the LEP and therefore a bypass has not been considered.
Concern regarding the merging of traffic after junctions	Concerns around possible conflict of traffic merging from two lanes into one lane. Increasing the approaches / exit from junctions will cause bottle necks further up the corridor.	Traffic modelling work allows for the merging of traffic after junctions. The merges will be designed to standards and subject to a road safety audit.
Pedestrian / cycle crossing facilities	Signalised pedestrian crossings needed at junctions to prevent accidents and help vulnerable road users. Re-sequencing lights for pedestrians crossing at Downton to Regent Street. Toucan crossing required at Chipman's Platt. Changing the current left turn lane into Downton Road will make it difficult to cross.	The pedestrian crossing points are being rationalised with consideration for the most appropriate facilities that take in to account both pedestrians and traffic conditions. Full safety audits will be undertaken for all of the schemes before construction. Provision of Toucan crossing at Chipman's Platt to be considered during detailed design. The current prelim design has been subject to a road safety audit
Support for Horsetrough roundabout improvements	Dedicated left lane will improve current queueing issue towards Horsetrough roundabout from Ryeford traffic lights.	Dedicated left lane design to be taken forward to detailed design.

Comment Theme	Example of suggestions and concerns raised by attendees	How responded to and addressed
Noise concerns	Concerns about the increase in noise at properties on Boakes Drive. Concern around loss of vegetation which acts as a sound barrier for properties on Boakes Drive.	Environmental assessments, including noise impact have been completed for business case. Further consideration regarding these issues will take place at detailed design and mitigation will be advised if there is a predicted impact as a result of the scheme.
Suggested traffic signal improvements	Timed traffic lights needed at Horsetrough roundabout. Redesign corner at Downton lights turning left into Bridgend to stop drivers approaching at speed and going over on to opposite side of carriageway. Review signal sequence at junctions of Bridgend/Downton Road. Improvements to Traffic signals at Downton Road. Yellow Box Junction required at Traffic Lights at Junction of Downton Road to prevent cars on main road blocking exit from Downton Road.	The presented scheme, has undertaken a number of iterations and consideration of alternative schemes, and is the most appropriate within the constraints of the project. Kerb line is being tightened on the turn into Downton Road. Full upgrade of signals proposed at Downton Road. Any requirements for a yellow box will be highlighted in the Safety Audit and considered for the final design.
Impact of Ecotricty development	Scheme does not allow for potential additional traffic Ecotricity proposed football stadium/EcoPark, so will all the improvements be a waste of time/cause unnecessary disruption when it may need further modifications.	This scheme does not take into consideration the potential additional traffic as a result of the EcoPark/Football stadium. This is because this development is yet to receive planning permission, and does not have any valid planning status. However, all improvements of this scheme will not inhibit future improvements to the corridor.

Comment Theme	Example of suggestions and concerns raised by attendees	How responded to and addressed
Heavy Goods Vehicles	Proposed road Westend-Oldends Lane will provide relief to A419 peak traffic but needs to be built in advance of the housing development. HGVs have not been allowed sufficient space to navigate roundabouts. Cars do not allow lorries to merge easily	The presented scheme, has undertaken a number of iterations and consideration of alternative schemes, and is the most appropriate within the constraints of the project. The additional lanes and capacity at the key junctions along the route will allow HGV's to merge efficiently, and the path of the HGV's will be fully tracked using design software.
Air pollution concerns	Air pollution generated by stationery traffic. Could vegetation be planted to alleviate this between road and cycleway?	The proposed scheme will reduce the amount of stationary traffic and any changes to air quality will be highlighted through the Environmental Assessment. The addition/removal of vegetation will be considered during detailed design.
Cycling & public transport	Left filter at Horsetrough roundabout will increase difficulties for cyclists. More buses and bus stops needed for disabled/pedestrians. Reinstatement of stop at A419 Downton Jct.	The final scheme will be designed to provide alternative provision for the safety of cyclists. Consultation has taken place with Sustrans, and final design will be subject to road safety audit. A reduction in congestion will encourage further bus services. Potential development adjacent to the route will create demand for the introduction of more bus stops and services along the corridor and surrounding areas.
Property access off the A419	Concerns about exiting from Boakes Drive. Residents of 22 & 23 Bristol Road - access difficult.	Further consideration regarding this concern will take place at detailed design.

Comment Theme	Example of suggestions and concerns raised by attendees	How responded to and addressed
Oldends Lane roundabout layout	Modifications to design of junction to create additional access and an asymmetric layout have caused difficulties at peak times with traffic flows from expanding business park. Traffic signals would help alleviate situation.	The final design will ensure safety for all users, and will be subject to an iterative design and final road safety audit.

Table 6.6: Summary of the feedback from the public.

6.7 Evidence of Previously Successful Management Strategy

The Walls Roundabout and the C & G scheme are good example of a scheme previously completed by GCC which had a very similar management structure for the proposed scheme on the A419 and has many similarities and potential benefits.

GCC have a successful track record of delivering major transport schemes within the county. The most recent of which was the Walls C&G Roundabout Contract (WC&G).

The WC&G scheme, completed in October 2014, was designed to support economic development, job creation and social regeneration, improving access with high quality connections between the urban centres, transport hubs and development sites. The overall objectives of the scheme were to unlock the development potential of the area, attract inward investment and maximise job opportunities for local people. The extent of the scheme is shown on the two layout plans below.

The scheme was successfully delivered within budget and on programme through the adoption of a robust management approach. The total value of the scheme was £3.1M of which £0.5M was funded by Central Government. The scheme was procured through a full OJEU tender process.

GCC and Amey are also working in partnership with Griffiths contractors Ltd on the Elmbridge Court Roundabout major scheme. This is a £6.4m contract to improve capacity and reduce journey times on the A40 at the busiest roundabout in the County. This scheme follows the management strategy set out in the business case, and is currently on course to finish on time (September 2017) and on budget.

The intended scheme outcomes are currently being monitored but the intended benefits of the scheme are anticipated to be realised.

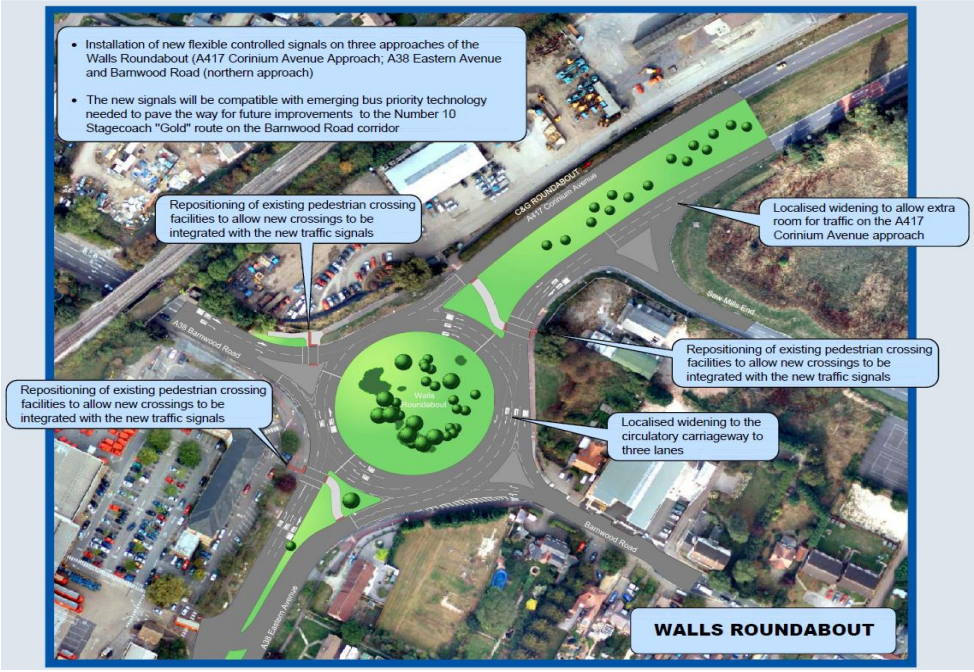


Figure 6.2 – Walls Roundabout improvement description

Figure 6.3 – C & G Roundabout improvement description

6.8 Availability and Suitability of Resources

The scheme is intended to be delivered using a collaborative approach between GCC staff and their appointed support organisation Amey. GCC have identified appropriately trained and experienced staff that will be the responsible for the management of the scheme. The identified staff, fulfilling the GCC Project Manager and Amey Project Manager roles, has been ring-fenced to support the scheme throughout its duration, from design through scheme procurement and onto construction supervision. They will have more junior staff available to support them as required.

GCC will utilise dedicated Amey resource through an existing contract to undertake design and also provide early contractor involvement (ECI), where appropriate, to the design process to ensure best value.

6.9 Design and Construction Methodology

6.9.1 Design Methodology

The scheme design is standard detail and in accordance with current issues of:

- Gloucestershire County Council's Manual for Streets;
- Design Manual for Roads and Bridges;
- Local Transport Notes;
- Inclusive Mobility;
- Traffic Signs Manual and Traffic Signs Regulations and General Directions 2016;
- Sewers for Adoption design code.

6.9.2 Construction Methodology

The proposed works all involve standard construction methodology in accordance with Specification for Highway Works. The proposed works do not require special construction techniques and could be wholly carried out by conventional methods

The Contractor selected for the works will have a proven track record in carrying out similar works.

6.10 Legal Powers Required for Construction

6.10.1 Land/Access

All works are within the highways boundary and there is no requirement for land acquisition for the permanent works. The preliminary design will confirm the possible requirement for land access for temporary works (to be confirmed for final FBC submission).

The majority of the scheme work is on the A419 which is on Gloucestershire County Councils network. A forward planning notice has been submitted to book the road space on the A419. A road space notice will also be submitted to Highways England if necessary.

6.10.2 Traffic Regulation Orders (TRO)

During further stakeholder consultation and detailed design, there is a possibility that a revision to a junction or access layout could result in the requirement for a TRO (Eg. No right turn). Should a TRO be required it would be progressed by GCC in line with the TRO process. There is sufficient time within the design programme would allow for a TRO to be undertaken if necessary. Layouts to access businesses or Wycliffe school from the A419 then there could be a requirement for TROs (E.g. No right turn).

6.10.3 Environmental Restraints

Detailed environmental surveys have not yet been completed and will be delivered to fit in with the programme below, therefore, any mitigation required or identified risk will be included in the Risk Register and costed for.

6.11 Project Programme

The following milestone dates are from the schemes delivery programme, Gantt chart is included as an Appendix C;

Activity	Target Date
Submit Full Business Case for Approval	01st August 2017
Approve Full Business Case	10th October 2017
Detailed Design Start	11th October 2017
Issue Supplier Engagement Notice	07th May 2018
Detailed Design End	25th May 2018
Issue Tender Documents	04th June 2018
Tenders Return	13th July 2018
Complete Tender assessment and award	10th August 2018
Construction Start	22nd October 2018
Construction End	15th November 2019

Table 6.7 – Scheme key dates

Following approval of the full business case, GCC will engage Amey to complete the detailed design phase of the project. A contractor will then be appointed via a competitive tender process. There will then be a Contract mobilisation period in advance of the Construction start date.

6.12 Benefit Realisation Strategy

6.12.1 Scope of the Plan

The Benefits Realisation Strategy is designed to enable benefits that are expected to be derived from the scheme to be planned for, tracked and realised.

6.12.2 Expected Benefits

The outputs and benefits are those expected to be derived from the scheme:

- Outputs – tangible effects that are funded and produced directly as a result of the scheme; and/or
- Outcomes – final impacts brought about by the scheme in the short, medium and long term.

6.12.3 Benefit Measurement Methods

To determine whether the scheme benefits are being realised, the desired outputs and outcomes have been converted into measurable indicators of scheme benefits, as set out in the table below. Benefits have been classified as 'Quantitative' (Qn) or 'Qualitative' (Ql). Quantitative benefits are those which can be measured in terms of specific numerical values on a continuous scale, whether in absolute or percentage terms, whereas qualitative benefits are measured in category-based or descriptive terms.

(Desired Output / Outcome)	Benefit Indicator	Target	Type	Data Req.	Owner
Desired Outputs					
Total length of Corridor (Km)	On completion	3km	Highway Improvement	n/a	GCC
Newly built roads (carriageway)	On completion	Chipman's Platt (lane widening on A419): 0.2km Oldends Lane (Additional lane): 0.1km Horsetrough to Downton Road (dedicated left hand lane): 0.45km	Highway Improvement	n/a	GCC
Creation of additional lanes	On completion	1 x dedicated left lane from Horsetrough roundabout to Downton Road 4 x widened approaches Chipman's Platt 1 x widened Oldends Lane approach to roundabout 1 x exit lane to Downton Road Junction	Highway Improvement	n/a	GCC
New cycleways	On completion	Chipmans Platt: 0.2km, Horsetrough to Downton Road (including widening of footway to 4m shared use) 0.8km	Provision of cycleway	n/a	GCC
Desired Outcomes					
Improved journey times along the A419 corridor.	Journey Time Reduction for the AM and PM peak.	Reduction in vehicle journey times immediately after the scheme is implemented.	Qn	Base Map and Bluetooth Data.	GCC
Minimal Accidents along the A419.	Number of accidents.	Reduction over 5 years, with particular regard to cyclists and pedestrians.	Qn	Accident Data.	GCC
Development of housing and employment proposals	Quantum of development	Number of houses and/or employment provision after opening	Qn	Planning permissions	GCC

Table 6.8 - Outputs and Outcomes, Indicators and Targets

6.12.4 The One Year after Study

The One Year after Study will be carried out no less than one year after the completion of the scheme. It will include assessment against scheme objectives / Desired Outcomes.

The collection of baseline data will also allow a quantitative assessment to be completed also.

6.12.5 The Five Year after Study

The Five Year after Study will follow the same format as the One Year after Study but it will be able to provide a final appraisal of the scheme that includes all benefits. The Evaluation Summary Table will be updated to include five year results. A further consultation exercise to consult on the views of stakeholders and the public is proposed.

6.12.6 Actions to be undertaken for Benefit Realisation Strategy

Tracking of the scheme benefits will be a key element in understanding the success of the scheme. The scheme objectives have been used to develop the desired outputs and outcomes (Table 6.9 above). The table below links the Benefit Realisation for specific measures with responsibility. It is also important to refer to the Risk Register for specific risks and associated controls throughout the project.

Measures	Monitoring	Benefits Realisation	Responsible for Delivery
Delivery on time	Through contract management	Through contract management	Amey/Contractor/GCC
Delivery on budget	Through contract management	Through contract management	Amey/Contractor/GCC
Growth (housing, jobs)	Derived from traffic surveys and ATC data	Realisation involves other schemes, including non-transport (e.g. JCS development)	LEP
Wider economic benefits		Realisation involves other schemes, including non-transport (e.g. development)	LEP

Table 6.9 - Benefits Realisation and Monitoring

6.12.7 Key Project Risks

A project risk register is to be maintained throughout the scheme duration and the Construction risks will be passed to contractor during the construction.

The Project Risk Register is included as Appendix D.

Each of the risks in the risk register has been costed based on three possible outcomes; Minimum event, expected event and maximum event. Within the overall budget a figure of £740,439 is included to cover all risks, contingency and optimism bias.

7 Conclusions and Recommendations

7.1 Conclusions

The preferred option for each junction improvement has been detailed in the Full Business Case. The detailed improvements were deemed the most appropriate options to achieve the agreed aims and objectives.

The most significant benefit from the improvements along the corridor is derived from reductions in travel times, however the level of benefits far exceed the cost of the scheme resulting in a high PVB value and a BCR. The Economic Case has produced a **BCR value of 18.61**, which corresponds to Very High Value for Money. The qualitative assessment has produced no variation to the results. Therefore, it can be stated that the implementation of the schemes will have a Very High Value for Money return.

From the quantitative assessment of the sub-impacts, the scheme will have positive benefits from the Economy and Social areas, and specifically from the journey time savings, which will primarily involve business users, transport providers, commuters and other users. Other appreciable impacts are the ones deriving from the traffic model and related to greenhouse gases emission (benefits) and indirect tax revenue (disbenefits).

From the qualitative assessment, other positive impacts are produced on *journey quality* relatively to the pedal cycle class.

Further justification for the improvements detailed throughout the report and in the results of traffic modelling and analysis via the Business Case.

It is also advised that the planned improvements would provide further betterment and future-proofing of the corridor for increased traffic flows that are anticipated due to significant development in the local area, which is essential to support local economic growth of the area.

7.2 Recommended Next Steps

Development and delivery of the scheme should be approved.

Due to the outcomes reported in this study, and the anticipated return on the public funded aspects of the proposal, it is advised that the scheme represents good value for money, meets the criteria of schemes for the LEP, and therefore should be approved for funding.