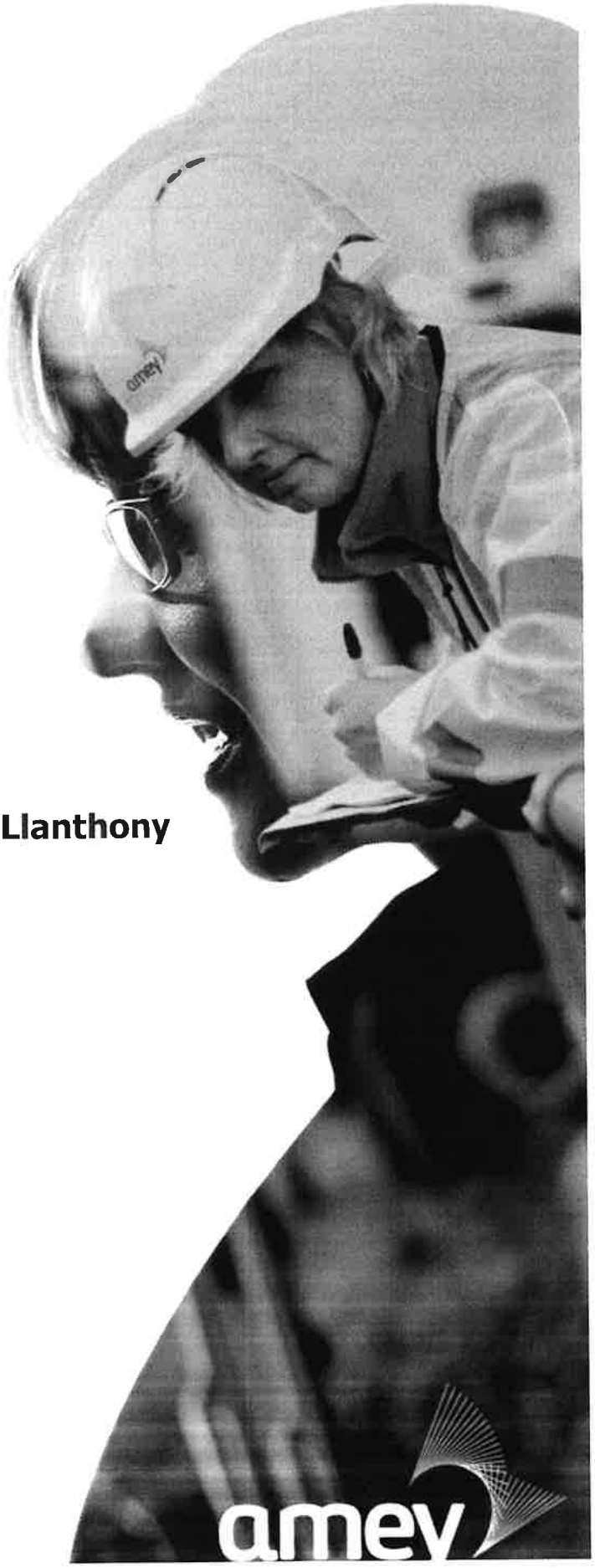
DOCUMENT 5

FULL BUSINESS CASE

Gloucestershire
COUNTY COUNCIL



Full Business Case

Gloucester South West Bypass (Llanthony Road) Improvements

COGL43048679 /FBC

December 2017

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Document Control Sheet

Project Name:	Gloucester South West Bypass (Llanthony Road) Improvements
Project Number:	COGL43048679
Report Title:	Full Business Case
Report Number:	1

Issue Status/Amendment	Prepared	Reviewed	Approved
Draft	Name: Ryan Townsend Signature: Date: 21.07.17	Name: Ian Sanders Signature: I. Sanders Date: 21.07.17	Name: Rae Suemul Signature: Date: 21.07.17
Final	Name: Ryan Townsend Signature: Date:18.08.17	Name: Ian Sanders Signature: I. Sanders Date: 18.08.17	Name: Rae Suemul Signature: RSS Date: 18.08.17
Rev A	Name: Ryan Townsend Signature: Date: 06.09.17	Name: Ian Sanders Signature: I. Sanders Date: 06.09.17	Name: Rae Suemul Signature: RSS Date: 06.09.17
Rev B	Name: Ryan Townsend Signature: Date: 06.10.17	Name: Ian Sanders Signature: I. Sanders Date: 06.10.17	Name: Rae Suemul Signature: RSS Date: 06.10.17
Rev C - Final	Name: Ryan Townsend Signature: Date: 13.12.17	Name: Ian Sanders Signature: I. Sanders Date: 13.12.17	Name: Rae Suemul Signature: RSS Date: 13.12.17

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Improving this vital piece of infrastructure would potentially unlock additional public and private sector investment of **£5,300,000** which is already committed to the scheme predominantly from GCC but also from S106 developer funding and Llanthony Secunda Priory. The proposed scheme will significantly improve productivity by reducing travel time for the users of this corridor by up to 5 and 10 minutes for the peak periods (the details of all potential journey time savings for identified routes are included in Appendix E). Through the Economic calculations, this equates to a present value benefit of **£64,270,000** to the local economy over a 60 year appraisal period, with a Benefit Cost Ratio (BCR) of **12**. The scheme is therefore considered to represent very high value for money (also taking in to account other non-monetised factors).

The importance of capacity improvements along this corridor were identified in Gloucestershire's Strategic Economic Plan (SEP) in 2015, which resulted in the initial Growth Deal Allocation. The scheme promoter has now undertaken detailed traffic modelling and also optimised the design to ensure that the final scheme delivers best value for the public, local businesses, and all other partners and interested parties. To deliver the scheme will require the purchase of third party land which will give opportunity for further redevelopment of the Gloucester Business Centre site, and also to include a reconfigured access for Llanthony Secunda Priory from St Ann Way, as the current access from Llanthony Road will be closed off as a result of the final design and widening.

The scheme has undertaken several iterations of design and testing using PARAMICS modelling to ensure the optimal design is taken forward, and that the final scheme delivers best value for all of the partners and interested parties. The scheme is supported by local stakeholders, including the MP Richard Graham, and is also strongly supported by the general public and local businesses, as well as other invested parties such as Gloucester City Council and Llanthony Secunda Priory.

This is a scheme that matches Gfirst LEP's ambition to drive economic growth in Gloucester Docks and across Gloucestershire, including proposals as part of the Joint Core Strategy. There are concerns that this length of the bypass will increasingly act as a limiting factor to future investment. In addition to the significant demand for access to this area, there is also through traffic, including routes to the south including M5 J12, and to the A40 including the Forest of Dean and M5 North/M50 to the north. Without improvements to this section of the A430 Llanthony Road, the current problems of congestion and poor journey time reliability will significantly deteriorate. This has been proven by traffic models and future congestion predictions. As a result, access to planned and potential future development would be significantly hindered and impeded, and in addition air quality would also decline if the scheme is not taken through to construction.

The optimal scheme involves widening on the A430 Llanthony Road from north of the Spinnaker Road Junction to Llanthony Industrial Estate. This option allows the two northbound lanes to be extended further north, from the two lane merge at the junction at Spinnaker Road to the existing two lane merge north of the Llanthony Road Junction. It also extends the two southbound lanes further north to the junction with Hemmingsdale Road. The westbound approach from St Ann Way is widened to three lanes to accommodate two right turn lanes into Llanthony Road, and new traffic signals at Sudmeadow Road improve access to and from the side road. To optimise the signals, the staggered pedestrian crossing has been relocated from the south arm of Spinnaker Road signalised junction to the south arm of the newly signalised Sudmeadow Road.

The Full Business Case in this document represents the best and final iteration of the scheme, and quantifies the estimated benefits that the improvements would deliver. Therefore, it is concluded that the scheme represents very high value for money in terms of investment of public funds, and would benefit a significant number of residents, commuters and businesses within Gloucester and the wider region.

1 Introduction

1.1 Purpose of this Document

This document provides information to support the implementation of proposed changes to the Gloucester South West Bypass (GSWB), and is the Full Business Case. This report is based on the preferred design option, and aims to provide the required detail as scoped for in the earlier Appraisal Summary Report (ASR).

1.2 Need for Proposed Changes

1.2.1 *The Scheme*

This application is for £2,000,000 Growth Deal funding, as part of the total scheme cost of £7,300,000 to progress high priority and very significant traffic capacity improvements on this final section of Gloucester South-West Bypass (GSWB).

In recent years, Gloucester Quays and Gloucester Docks have seen significant private investment for both residential and commercial schemes. Such continued investment is significantly more likely if the transport infrastructure does not create a barrier or capacity constraint. The GSWB, Netheridge, Hempsted and Castlemead sections were built to standards at the time of construction determined by the funding available and known levels of committed development, with recognition that constrictions remained on the network. The completion of this stage of the GSWB network improvements would provide business confidence that there is continued investment in the local road infrastructure.

1.2.2 *Local need for the improvements and benefit to the economy*

The importance of capacity improvements along this corridor were identified in Gloucestershire's Strategic Economic Plan (SEP) in 2015. With approximately 25,000 vehicles a day using the GSWB, it is estimated that between 40,000 and 50,000 people would benefit from improvements to this section of road every day.

This scheme directly links to SEP priorities by providing strategic linkages between the M5 Growth Zone at Junction 12 and the A40. It will also provide wider regeneration benefits in both the immediate vicinity in Gloucester as well as further afield, including access to the Forest of Dean, A40, and Cheltenham. It will directly benefit areas of significant importance to the local and regional economy, such as Gloucester Quays and Gloucester Docks. The vision of the GFirst LEP is that by 2022 the county will have 'world class companies, a diverse business portfolio and a reputation for starting and growing great businesses'. Transport has an important role to play in facilitating this business growth through providing the connectivity between markets required by businesses, as well as providing businesses with access to high quality transport networks.

The scheme will also ensure that the area will continue to be attractive to private investors and can continue to fulfil a role as a top visitor attraction in Gloucestershire, where some events (Gloucester Docks and Gloucester Quays) can attract in excess of 30,000 visitors a day, and 100,000+ visitors over three days for both the Tall Ships Festival and Food Festival.

The improvements will also future proof the access route to accommodate for future development such as 'Bakers Quay' and 'Gloucester City Football Club', which will increase demand on the corridor. The scheme also includes for a new access to the Llanthony Secunda Priory, by providing an improved access via St Ann's Way.

Congestion acts as an economic dis-benefit to Gloucestershire due to its impacts on productivity. Every hour spent in traffic congestion is time that could otherwise be spent achieving productive outputs. According to an independent consultant (Atkins) report, the cost of delays on roads in Gloucestershire in 2005 were estimated as equivalent to £50m-£100m per year (in GVA equivalence). There are areas immediately to the west of this section of Llanthony Road which could be ideally located for future development if the traffic congestion was not perceived as a limiting factor.

1.2.3 *Agreed Objectives of the Scheme*

The key objectives which have been identified by the LEP, (and accepted when the scheme was previously accepted by the LEP as a Congestion pinch point scheme) are as follows;

- Reduce congestion on the GSWB corridor and key linkages to it between Cheltenham and the Forest of Dean;

- Reduce economic disadvantage on the GSWB corridor and key linkages to it between Cheltenham and the Forest of Dean;
- Alleviating congestion via addressing congestion hotspots on and in association with the GSWB corridor between Cheltenham and the Forest of Dean;
- Improving access between the west of Gloucester and the identified strategic employment growth site at Innsworth, to the north of Gloucester;
- Maximise economic productivity and efficiency;
- Address bottlenecks within the transport network, particularly where these are predicted to worsen and put a brake on economic recovery;
- Improve access to skills, jobs, goods and services.

1.3 Gloucester Southwest Bypass Study Area

The A430 is classified a primary link by Gloucestershire County Council, and therefore is critical to the local economy. It provides strategic access linking the A40 to junction 12 of the M5 and enabling access to the Gloucester Quays mixed use development and diverting traffic from central Gloucester. The bottleneck caused by the narrowing of the carriageway at Llanthony Road causes congestion and prevents the bypass operating at its full capacity.

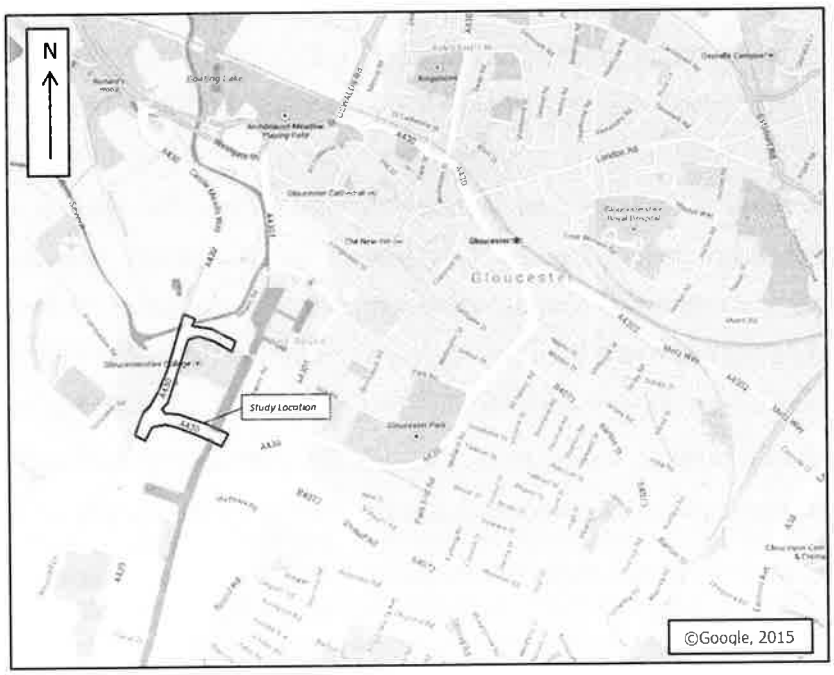


Figure 1.1: Gloucester South West Bypass, Study Location.

1.4 Sections of the corridor considered for the Full Business Case

Improvements to GSWB have been a long stated priority for the County Council, and the need for the upgrade has been high profile since the completion of the initial sections of the Bypass. Consequently, the options along the corridor have been tested on a number of occasions by the County Council and their consultants. For this iteration of the scheme, Amey considered a number of different options in detail as summarised below;

Option 1: Option 1 involves widening on the A430 Llanthony Road from north of the Spinnaker Road Junction to Llanthony Industrial Estate. This option allows the two northbound lanes further north, from the two lane merge at the junction at Spinnaker Road to the existing two lanes merge north of the Llanthony Road Junction. It also extends the two southbound lanes further north to the junction with Hemmingsdale Road. The westbound approach from St Ann Way is widened to three lanes to accommodate two right turn lanes into Llanthony Road, and new traffic signals at Sudmeadow Road improve access to and from the side road. To optimise the signals, the staggered pedestrian crossing has been relocated from the south arm of Spinnaker Road signalised junction to the south arm of the newly signalised Sudmeadow Road.

Option 2: Option 2 also involves widening on the A430 Llanthony Road. This option provides two northbound lanes and two southbound lanes on the A430 from Spinnaker Road junction to north of Llanthony Road junction. In order to accommodate two through lanes in each direction, the staggered pedestrian crossing on the north side of Llanthony Road junction has been relocated to the south side of the junction, and the central island has been removed. This means that pedestrians will have to cross four 3.65m wide lanes in a single stage during an 'all-red' traffic phase, resulting in an increase in 'lost time' for vehicles at this junction. The existing northbound dedicated right turn lane (lane 3) on Llanthony Road junction has also been removed to accommodate two southbound lanes on the southern arm of the junction. As a result, right turning traffic from the southern arm of Llanthony Road junction will have to share lane 2 with straight ahead traffic. The northbound and southbound phases run together at this junction, and as such, it's likely that most northbound traffic on the mainline will use lane 1 to avoid being stuck behind stationary right turning traffic in lane 2.

Other options were considered but not taken forward, including the following;

i. Southbound Widening: (1 lanes northbound: 2 lane southbound): This option could also provide substantial benefits for road users. However this was not shown to be as beneficial when taken to the detailed traffic modelling and signal assessment.

ii. Junction layout improvements: A number of different lane and pedestrian access improvements were identified at the Spinnaker Road, Sudmeadow Road and Hemmingsdale Road junctions dependant on the outcome of detailed traffic modelling and signal assessment works.

1.4.1 *Option Development*

The preferred option put forward for the Full Business Case is Option 1 (Detailed above). After reviewing all options detailed above, Option 1 was considered to achieve the desired results. The most significant benefit from this option is derived from reductions in travel times, however the level of benefits far exceed the cost of the scheme resulting in a high economic return.

It is also important to note that the economic case for Option 1 produced a Benefit Cost Ratio (BCR) value of 12.0, which corresponds to a "Very High Value for Money".

Further justification for the selection of option 1 is detailed throughout the report and in the results of traffic modelling and justification through the 5-Case Business Model.

There have been some key additional developments to the scheme that have arisen throughout the design of the scheme. The changes have been detailed below;

- Inclusion of additional dedicated turning lanes to maximise traffic flows and improve accessibility for residents and businesses on side roads;
- Increased width footways to west side of scheme to allow combined footway/cycling facilities;
- Creating a pedestrian central reserve area at a new crossing point, to improve pedestrian facilities and safety, whilst also maximising traffic flows;
- Full demolition of Gloucester Business Centre could not be avoided, however this provides an additional business opportunity for the development of a new high quality employment site;

- A remodelled access to Llanthony Secunda Priory (from St Ann Way as the current access from Llanthony Road will be closed off) to enable full delivery of the Llanthony Priory improvement proposals.

The planned improvements would provide further betterment and future-proofing of the corridor for increased traffic flows that are anticipated due to significant ongoing and future development in the local area, which are considered essential to support the much needed local economic growth. It is also noted that the scheme obtained strong public support and approval at the Public Share events that took place in July 2017.

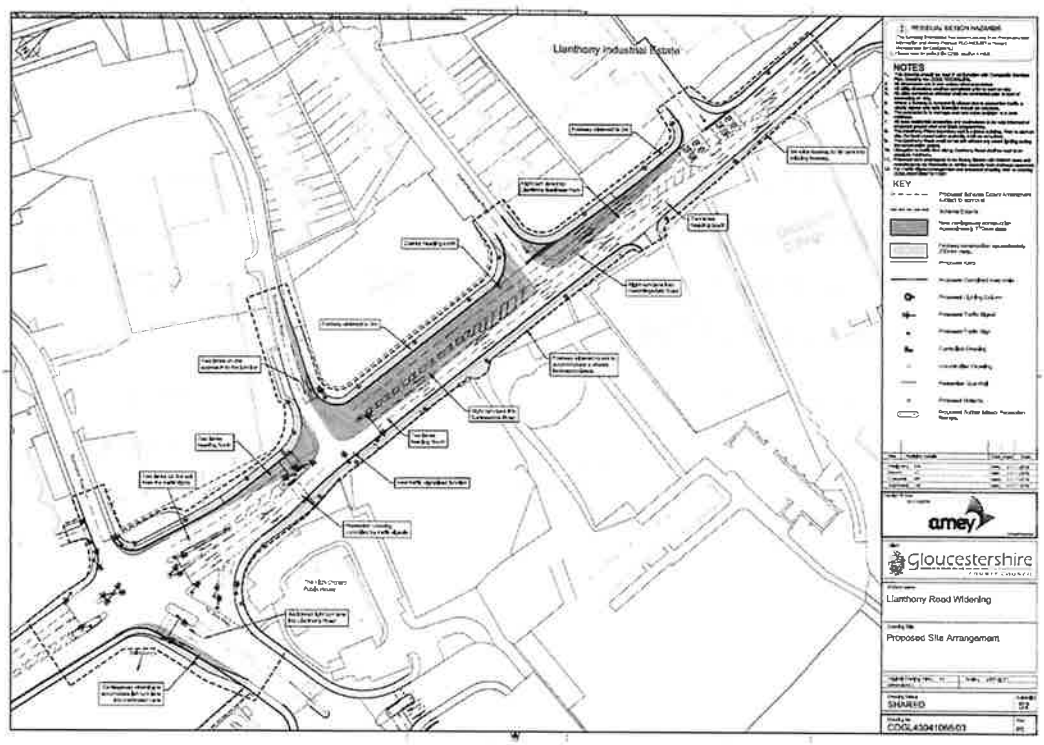


Figure 1.2: Proposed Scheme, Proposed Layout.

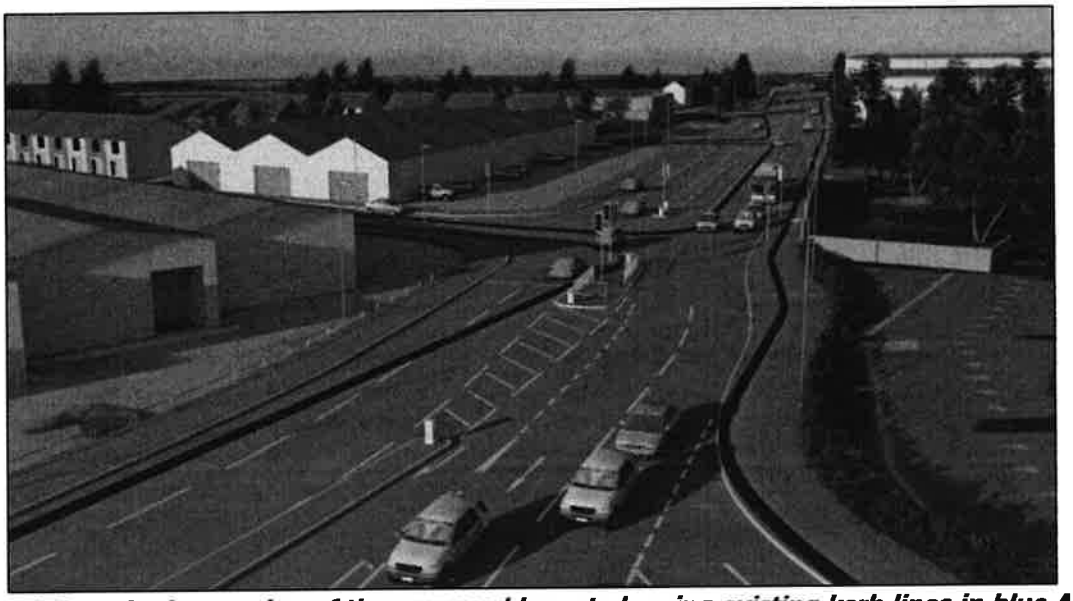


Figure 1.3: Artist impression of the proposed layout showing existing kerb lines in blue Aerial view near St Ann Way/High Orchard Public House looking north towards Gloucestershire College.

1.5 5-Case Model

The Transport Business Case process 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 proposed scheme.

1.5.1 *Context of the Transport Business Case Process*

Currently promoters of all schemes involving an investment of public funds ('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, 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 The Strategic Case

2.1 Rationale for Intervention

Congestion currently occurs on the A430 corridor into Gloucester during peak periods, particularly on the section between St Ann Way and Llanthony Road (Detailed in section 2.3). The adopted Gloucestershire Local Transport Plan 2015 – 2031 (LTP3) identified this section of the A430 as a congestion hotspot which is only expected to worsen in the future as new housing and employment comes online in this major local growth area. As a result, the A430 Llanthony Rd and St. Ann Way (Southwest bypass) Improvement scheme has been identified as a short term capital project (2015 – 2021) within the LTP3. The scheme has been provisionally accepted by the Gloucestershire County Council as a priority for construction.

Gloucestershire's Local Transport Plan (LTP3) sets out the transport strategy for the county encompasses 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 making the network more reliable and increasing journey time reliability.

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 adopted Local Transport Plan 2015-2031.

2.1.1 *Proposed Scheme*

Extent of the scheme

The scheme proposal is for highway changes to alleviate the current peak period problems of congestion and journey reliability on the Llanthony Road section of the A430 GSWB.

The scheme comprises selected road widening and new traffic signals at the Sudmeadow Road junction. Drawing number COGL 43041066/02 Proposed Site Arrangement is included with this submission to provide additional visual information. The following traffic signal junctions are located within the scheme:

- A430 St Ann Way / Sainsbury's;
- A430 Llanthony Road / A430 St Ann Way / Hempsted Lane / Spinnaker Road;
- A430 Llanthony Road / Castle Meads Way.

The following priority junctions are located within the scheme:

- A430 Llanthony Road / Sudmeadow Road;
- A430 Llanthony Road / Hemmingsdale Road;
- A430 Llanthony Road / Llanthony Industrial Estate.

Key points regarding the project are as follows:

- The scheme will require land purchase from a number of land owners;
- It is anticipated that land purchase will be negotiated although it may be necessary to use Compulsory Purchase Order.
- With the exception of directly affected parties there is very little opposition to the scheme.

Improvements to the A430 Llanthony Road section are vital to support both planned and potential future residential and commercial development in the west of Gloucester, and across the county.

Critical Local Factors

The A430 is classified as a primary link by Gloucestershire County Council, and therefore is critical to the local economy. It provides strategic access linking A40 to junction 12 of the M5 and enabling access to the Gloucester Quays mixed use development and diverting traffic from central Gloucester. The bottleneck caused by the narrowing of the carriageway at Llanthony Road causes congestion and prevents the bypass operating at its full capacity (Site Visit Observation detailed below in section 2.3).

It is also important to note that St Ann Way has a significant impact on Llanthony Road and also experiences congestion during AM and PM peaks, which severely slows down Llanthony Road traffic and consequently the GSWB. With several large established businesses nearby including Sainsbury's and Gloucester Quays, the congestion is only expected to increase over the coming years with more businesses planned, including at the Peel Centre and Baker's Quay. The corridor will continue to grow as a major route for people visiting Gloucester and act as a main connector for people travelling towards the motorway (North and South), Forest of Dean and other surrounding areas.

This section of the GSWB has several side roads with residential properties and there are businesses located adjacent to the corridor. The side roads which allow access to these businesses and residential proprieties include Sudmeadow Road, Hemmingsdale Road and Spinnaker Road. Although traffic flows on these are relatively low they significantly contribute to traffic congestion due to them operating on a give way basis, causing the main carriageway to become blocked when vehicles are waiting to turn into the side roads along the corridor.

Also located adjacent to GSWB is Gloucester City Football Club which is currently not open and awaiting redevelopment. Once the planned redevelopment of this location takes place there will be a potential increase in traffic flows and therefore the planned improvements would be a significant boost for access and future of the redeveloped Gloucester City Ground, as well as benefits for all of the other businesses and residents.

Drawing COGL43041066/02 Proposed Site Arrangement indicates the land required for new carriageway as part of the scheme.

Scheme Costs

To achieve the aims above a total of **£2,000,000** Growth Deal funding is required, as part of the total scheme cost of **£7,300,000**. The result of the investment will be to provide additional capacity at the pinch point, accommodate future traffic levels, and therefore enable further investment within Gloucester. The project will be completed in 2021.

A positive decision will enable the County Council to deliver the scheme, elements of which include surveys, design, land purchase, demolition and construction.

2.2 Summary of Scheme Objectives

The overarching goal is to provide a free flowing link in terms of traffic approaching and travelling through the currently heavily congested GSWB. The key objectives which have been identified by the LEP are as follows, these also led to the provisional allocations of the funds;

- Reduce congestion on the GSWB corridor and key linkages to it between Cheltenham and the Forest of Dean;
- Reduce economic disadvantage on the GSWB corridor and key linkages to it between Cheltenham and the Forest of Dean;
- Alleviating congestion via addressing congestion hotspots on and in association with the GSWB corridor between Cheltenham and the Forest of Dean;
- Improving access between the west of Gloucester and the identified strategic employment growth site at Innsworth, to the north of Gloucester;
- Maximise economic productivity and efficiency;
- Address bottlenecks within the transport network, particularly where these are predicted to worsen and put a brake on economic recovery;
- Improve access to skills, jobs, goods and services.

Table 2.2 below summarises the Objectives and associated Stakeholder Benefits for 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, services and local businesses. **Residents of Gloucester** 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.
Investment Objective 2 Improving local links in the area	**Users** Improving journey times. Improving access to jobs and services. Enhanced bus service with reduced delay and improving future routes. **Residents of Gloucester** Maintaining attractiveness of area for domestic and non- domestic properties. Safeguarding of existing jobs and facilitation of new job creation. Improved health potential via us of new cycleways.
Investment Objective 3 Providing the most direct route, reducing CO_2 emissions, noise and air pollution	**Users** Maintaining lower vehicle operating costs. Avoiding journey time increases and reducing delays on the corridor. **Local residents and businesses** Environmental stakeholders. Avoiding increase in air pollution CO2 and noise. **Local Enterprise Partnership** Maintaining attractiveness of area for businesses (including leisure related business development).

Table 2.2: Objectives and Stakeholder Benefits

2.3 Need for the scheme

At present, this section of the A430 GSWB is a significant congestion point. With only two traffic lanes it represents a bottleneck in Gloucester's highway network, and as a result traffic is forced on to alternative routes through the City Centre causing congestion, reducing journey time reliability and creating potentially unsafe environments.

The proposal is also reacting to significant redevelopment in the immediate local area and across Gloucestershire, including proposals as part of the emerging Joint Core Strategy and developments within Gloucester and the surrounding areas. There is significant demand for access to this section of the network and for through traffic, including routes to the south including M5 J12, and to the A40 including the Forest of Dean and M5 North/M50 to the north.

Without improvements to the A430 Llanthony Road, the current problems of congestion and poor journey reliability will continue, and deteriorate. As a result, air quality would decline and access to planned and potential future development would be significantly hindered.

2.4 Existing Situation and Delay

All of the results from the surveys and site visits (Included in the Appendices) have been taken into account for the design of the submitted scheme.

Site observations completed by Amey in December 2016, over a week long period noted significant peak period congestion at various points along this section of the GSWB. A major congestion point was around the ST Ann way junction which links GSWB north and south and also provides access to Gloucester city centre, Gloucester quays and the Peel Centre.

Travelling south along the by-pass and attempting to turn left onto St-Ann way towards Gloucester City centre queues of over 50 metres were recorded in both the AM peak, which had an average queue length of 53 metres (Between 08:00-10:00) and the PM peak which had an average queue of 54 metres (Between 16:00-18:00) but did peak at nearly 100 metres during both periods.

This junction has a significant impact on the entire GSWB as this is where the bottle neck originates. The queueing mentioned above can often cause traffic to become blocked to the point the carriageway become one lane and the additional lanes become blocked. This can cause congestion back the Severn Road junction and consequently all the way back to the lights at over causeway.

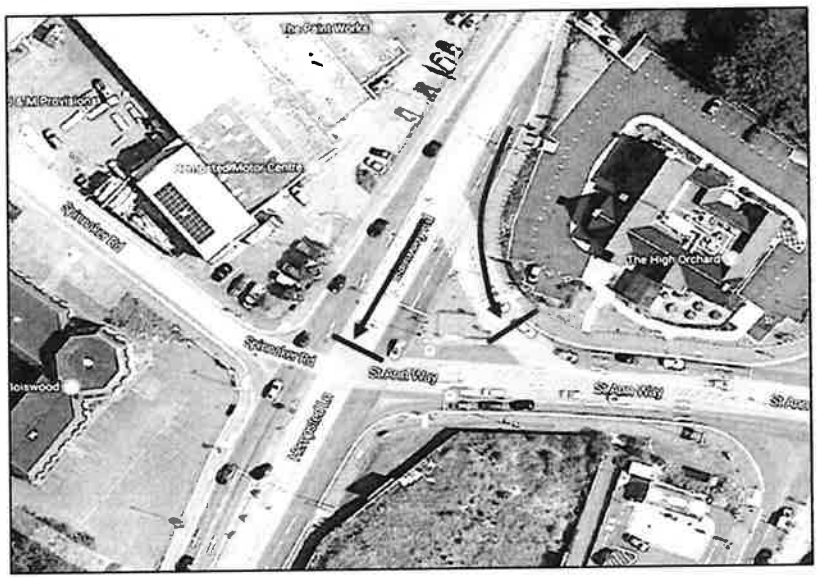


Figure 2.1: Illustrates location of St Ann Way site observations (Southbound).

Travelling north is very similar and often queues back towards the Hempsted lane roundabout and again becomes very congested between St Ann's way junction and Severn road junction where the carriageway is reduced to one lane. Also during observations, travelling north at this junction the right-turn lane would reach peak capacity and saturation.

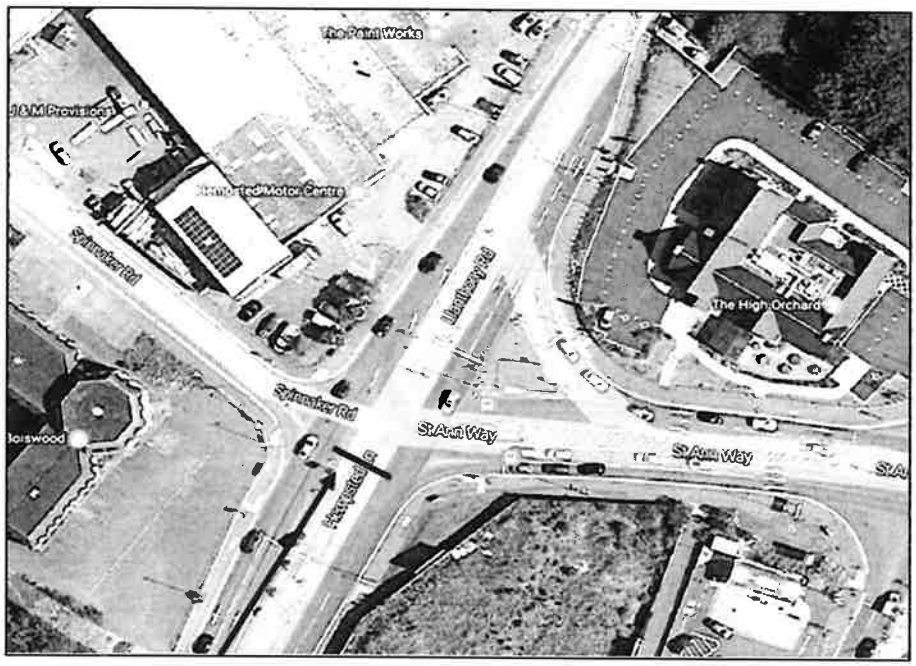


Figure 2.2: Illustrates location of St Ann Way site observations (Northbound).

2.4.1 *General Layout of the Road Network*

The A430 effectively forms a relief road around the centre of Gloucester and extending southwards, as illustrated in Figure 2.3 below. The central loop is the Gloucester Inner Ring Road, passing along St Ann Way, Trier Way, Black Dog Way, and Gouda Way, joining the A417 at St Oswald Road/Priory Road signalised junction. The north-south section of the A430 forms the GSWB, running from the A417 Westgate signalised junction in the north, to the signalised junction with the A38 Quedgeley bypass in the south. The road is a mixture of single and urban dual carriageways with no central reserve.

The A430 has an annual average daily traffic flow of 25,000 vehicles per day and is subject to a 40mph speed limit at its northern and southern extents (Westgate to 85m north of the car park on Castle Meads Way, and Quedgeley bypass to Secunda Way Gyratory). From the car park on Castle Meads Way to Secunda Way Gyratory, the road is subject to a 30mph speed limit. With the exception of the gyratory on Secunda Way, all the primary junctions on the A430 are traffic signal controlled.

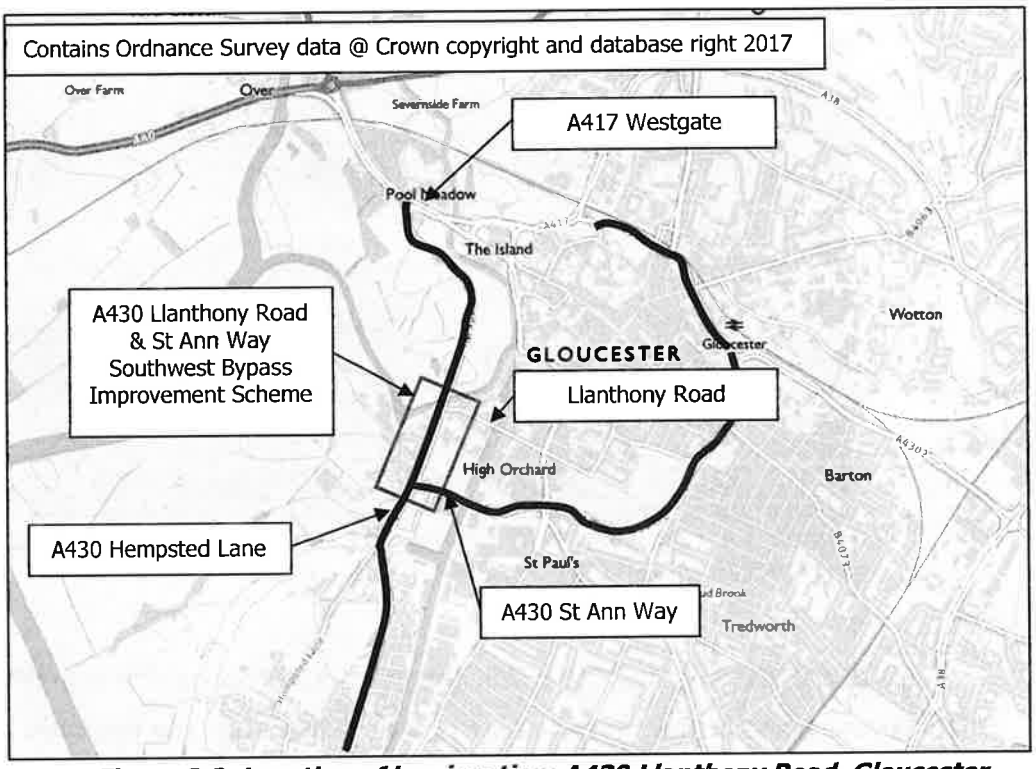


Figure 2.3: Location of key junction; A430 Llanthony Road, Gloucester.

2.4.2 *St Ann Way Signalised Junction*

The junction of Hempsted Lane with St Ann Way/Spinnaker Road/Llanthony Road is a large signalised crossroads with staggered pedestrian crossings across the southern and eastern arms of the junction, (Hempsted Lane and St Ann Way). From Secunda Way Gyratory, the southern arm approaches the junction in three lanes with lane one designated as a straight ahead/left turn lane, lane two as straight ahead only, and lane three as a dedicated right turn lane. The two northbound through lanes quickly merge into a single lane on the north side of the junction.

Figure 2.4: Hempsted Lane - Southern arm showing three lane approach and merge on exit from the junction.

To the east of the junction, St Ann Way has two lanes on the approach to the signals, a left turn lane and a straight ahead/right turn lane. There are also two lanes on the exit from the junction, with lane 1 designated as a straight ahead/left turn lane and lane 2 designated as a right turn lane for the Sainsbury's signalised junction 50m downstream. Traffic turning left from Llanthony Road to St Ann Way has a left turn filter lane which becomes the eastbound lane 1 on St Ann Way. Right turning traffic from Hempsted Lane and straight ahead traffic from Spinnaker Road exit the junction in lane 2 on St Ann Way.

Figure 2.5: St Ann Way - Eastern arm showing two lane approach and two lanes on exit and the Sainsbury's signalised junction 50m further east.

Travelling southbound, Llanthony Road approaches the junction in a single lane, widening to two straight ahead lanes, a right turn lane and a left turn filter lane at the signals. The two southbound ahead lanes continue as two lanes on Hempsted Lane all the way to the gyratory.

Figure 2.6: Llanthony Road - Northern arm showing left turn filter lane, two straight ahead lanes and a right turn lane.

The St Ann Way arm of the signalised junction is a single lane approach from and exit to the industrial area on Spinnaker Road.

2.4.3 *Llanthony Road Signalised Junction*

The junction of Llanthony Road with Castle Meads Way is a large signalised T junction with a staggered pedestrian crossing across the northern arm of the junction, (Castle Meads Way). The southern arm approaches the junction in two lanes, widening to three lanes north of the industrial estate. Lanes one and two are straight through lanes merging into a single lane on the exit. Lane 3 is a designated right turn lane. The stop line is set back approximately 12m from the centre of the side road, to accommodate the swept path of larger vehicles turning left out of the side road.

Figure 2.7: Llanthony Road –Northbound arm showing right turn filter (Towards Severn Road) lane and two straight ahead lanes. (Towards the Over Roundabout)

Figure 2.8: Llanthony Road –Northbound (Towards Over Roundabout) arm exit showing two lane merge for northbound traffic exiting the junction and congestion in AM peak for southbound traffic.

On the eastern side of the junction, Llanthony Road is a single lane carriageway, widening to two lanes, a left turn lane and a right turn lane, on the approach to the signals. Again, the stop line is set back approximately 20m from the mouth of the junction.

Figure 2.9: Llanthony Road – Eastern arm (Towards Severn Road) showing set back stop line with two lane approach and single lane exit from the junction.

Castle Meads Way approaches and continues through the junction in a single lane. During peak periods, southbound traffic regularly queues back from the junction with St Ann Way, through the Llanthony Road junction all the way to the A417 at Westgate.

Figure 2.10: Castle Meads Way – Showing southbound traffic queueing back from downstream signalised junction at St Ann Way during the AM peak.

2.5 Wider Economic Benefit

The proposed scheme is expected to have a positive impact on the surrounding area, and has the potential to have a major impact upon existing and planned developments.

Improved journey times along the corridor will have a positive impact upon local business and future development adjacent to the route and the surrounding areas. The scheme will also accommodate future development such as 'Bakers Quay' and 'Gloucester City Football Club' which will increase demand on the corridor, discussed below.

The GSWB currently has several developments existing or planned which are situated adjacent to the route or within close proximity to the scheme which rely heavily on the route for access (Details of developments below).

2.5.1 *Gloucester City Football Club – Future Development*

The Gloucester City Football Club site is situated adjacent to the corridor, and can be accessed through Spinnaker Road which links directly to Llanthony Road.

Regeneration of the existing Gloucester City football club is expected to take place in 2018/2019. The regeneration is expected to include an expansion to a 4,000 capacity stadium and include a car park with a capacity of 250 vehicles. The increased capacity and reduction in traffic congestion promotes this development and will future proof the corridor for the additional demand expected.

Assessment of Match-day traffic

The new development of Gloucester City Football Club will potentially have an impact upon traffic flows on the corridor, most significantly on a Saturday match day. The concern is that this may impact on queues and delays along the corridor and in particular the access in and out from Sudmeadow Road, and note that this was not addressed in the Transport Assessment or planning application made by the Football Club.

This increase in traffic will be on match days only, which are likely to be twice a month on Saturday afternoons (during the football season September to May).

An assumption has been made that the Football Club may attract up to 100 inbound trips during the peak hour before the match, and 10 outbound trips, with the majority assumed to be from the north (75%) and therefore, as a worst case, would be looking to turn right. This is based on the following assumptions:

- Maximum car park capacity of 250 vehicles, therefore any other cars would have to park away from the ground and walk;
- Attendance of between 460 (average attendance 2016/2017) to 1000. It is accepted that this is below the capacity of the new stadium; however, if attendances were to increase significantly, park and ride and accessibility plans would need to be formulated by the club to include a policy for alternative parking facilities where supporters could walk back to the ground.

The above assumptions indicate that traffic flow is likely to increase by an average of 100 vehicles during the hour before kick-off, and during the hour after the game is finished. This is only vehicles turning in and out of Sudmeadow Road to Gloucester City Football Club and not on the entire network.

It is therefore concluded that the corridor will be able to cope with the extra demand created by the additional traffic flow on match days and no significant queue along the route will be caused as a direct result of the football matches. This has been tested in a LinSig signal assessment, and there are no predicted material increases in the queue length in to Sudmeadow Road.

It is also noted that the signals could be further amended to provide a dedicated right turn phase for traffic in to Sudmeadow Road, and this has not been tested at present.

2.5.2 *Peel Centre*

The proposed redevelopment /regeneration of the Peel Centre incorporating a new relocated Next home and fashion store.

The planned proposals involve

- The demolition of former Pizza Hut and Angel Chef units and the alteration, conversion and extension of the vacant cinema building to provide:
  - 4,194 sq. gross (GIA)/2,555 Sq. m net of comparison goods retail floor space for a new modern Next Home and fashion store with ancillary;
  - 4,328 Sq m Gross (GIA)/3,679 Sq.m net of comparison goods retail floor space within two retail warehouse units; and
  - 929 Sq.m gross (GIA)/ 743 Sq.m net of convenience goods retail floor space within one retail warehouse unit.

The regeneration of the sites detailed above will potentially increase the demand on the GSWB and surrounding links. Most significantly could be the potential increase of HGV's making deliveries to the new Next store.

2.5.3 *Bakers Quay*

Bakers Quay is another large development situated within close proximity of the GSWB. In a joint venture Merchant Place Developments and Rokeby has purchased the 4.13 acre Bakers Quay site within Gloucester Docks, to implement a £55 million regeneration of this city centre site.

Some of this development has been completed, starting in 2016, and is expected to include;

- Provender Mill: 46 new build residential apartments and 5,339 Sqft of ground floor restaurant accommodation;
- Downing's Malthouse: Conversion to 42 residential apartments over 17,963 Sqft restaurant accommodation overlooking an extended Merchants Road;
- Malthouse Extension: conversion to 74 residential apartments;
- Transit Shed: rebuild and extended to provide 6,700 Sqft canal side restaurant;
- Engine Shed: Conversion to 5,634 Sqft Brewers Fare Restaurant.
- Costa Coffee: New build café and drive through.

In addition proposals are made to pedestrianise Merchants Road along the restaurant frontage; create a new square adjacent to the Transit shed, a new canal walkway and 226 car parking spaces.

The GSWB provides access to this area significantly from the M5 junction 12 and surrounding areas.

This potentially could increase the demand on the corridor in the future due to the increase in residents and visitors to the area. It is important to note that the additional demand will have a direct effect on the GSWB therefore the improvements provided by this scheme will be vital to support and facilitate such developments.

2.5.4 *Llanthony Priory*

Llanthony Secunda Priory Trust proposes the regeneration of grade I and grade II-listed buildings at the Priory. Work on the site will include internal and external repairs to the historic buildings bringing them back into use, landscaping and new parking provision. The Llanthony Secunda Priory trust indicated an intent to provide £29,000 contribution towards their new access. However, this amount is not yet fully committed, so has not been included in Table 5.2: Scheme Funding Sources.

A Design and Access statement submitted with the planning application said: "this project will comprehensively repair and conserve three of the six grade I-listed structures, developing sustainable uses for the two main buildings and the entire site, while interpreting the 900 year story of this long misunderstood, hidden site to a diverse audience."

The current access to the Priory from Llanthony Road will be closed off as a result of the final design and widening for the Improvement Scheme.

As part of the access to Llanthony Priory, it is proposed that a new junction will be constructed off St Ann Way to allow access to the Priory, the new development to the east (McCarthy Stone Retirement Home) and the existing Pub and Restaurant to the west (High Orchard). This was previously proposed as a roundabout, but is now to be designed as a priority junction.

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.

3.2 Methodology (Modelling)

3.2.1 *SATURN Modelling*

The Economic Case has been primarily based on the benefits derived from the journey time reduction, which will be transferred to the sub impacts assessment regarding business users, transport providers, commuting and other users, and indirectly greenhouse gases and indirect tax revenue. The transport modelling has been carried out to appraise these impacts (and for the Economics), using S-Paramics, as detailed in this report.

In addition to the S-Paramics model, a highway assignment strategic model (SATURN) has been referred to – the 2013 Central Severn Vale SATURN model. The SATURN model is strategic in nature and therefore looks at the impact across the network as a whole, and any detailed modelling of a specific scheme usually requires refinement of the model and/or local models (such as S-Paramics) depending on the initial model runs. This is specified in the GCC Model Protocol for developers.

For SATURN, the network improvements have been implemented for a future year, with the network as tested for the JCS 'Do Minimum Networks' (2031 Planning Period). It is noted that Gloucestershire County Council envisage that the proposed scheme is required to help mitigate for the full housing allocation predicted for the County (as stated in the Joint Core Strategy Evidence Base). By looking at this scheme in SATURN, it has shown an improvement (compared to the Do Nothing) and reflected by an increase of traffic along the network, but not as we would have specifically anticipated in terms routeing and increases along the specific Llanthony Road corridor. As explained above, due to the level of detail regarding journey times and signal times/interaction, the S-Paramics model is more appropriate in terms of the outputs being applied for the Economics.

It is important to note that using S-Paramics, modelling sensitivity tests were carried out applying additional traffic flows on the network. The level of traffic applied to the S-Paramics sensitivity tests (as detailed in the report) is circa 220 and 249 vehicles for the AM and PM peaks respectively.

3.2.2 *S-PARAMICS Modelling*

Therefore, in order to assess the impact of the new scheme on journey times, the parallel step has involved the application of a microsimulation model with the software S-Paramics.

The model was carried out using S-Paramics version 2014.1. The model extends from A417 Westgate in the north to the five-arm gyratory at Secunda Way in the south. The road network in this area is a mix of urban single and dual carriageway. The software Linsig has also been utilised to model the signalised junctions. Further details regarding the network can be found in the Model Validation Technical Note. (Full report included in Appendix E).

The BCR results in the Technical Note are very slightly different to those presented in this report, due to the Economics for the FBC taking in to account other factors with the calculations and Value for Money, and fully assessing all extraneous impacts on the scheme.

The base model has been developed using traffic data from surveys carried out in October 2014. No survey data was available for the gyratory at Secunda Way so the traffic flows at this junction were extracted from a SATURN model of the Gloucester area.

A review of TEMPRO (predicted traffic growth) in this area shows that there has been no significant growth in traffic on the A430 in Gloucester between 2014 and 2016 suggesting that current traffic conditions have not changed since 2014. Forecast year trip matrices have been developed by applying TEMPRO growth to the 2014 base year matrices. The modelled forecast years considered in the traffic analysis through Paramics were 2016-2031.

As previously advised, different options have been considered for the assessment of the Business Case.

3.2.3 *Option 1*

Option 1 involves widening on the A430 Llanthony Road from north of the Spinnaker Road Junction to Llanthony Industrial Estate. This option allows the two northbound lanes to be extended further north, from the two lane merge at the junction at Spinnaker Road to the existing two lane merge north of the Llanthony Road Junction. It also extends the two southbound lanes further north to the junction with Hemmingsdale Road. The westbound approach from St Ann Way is widened to three lanes to accommodate two right turn lanes into Llanthony Road, and new traffic signals at Sudmeadow Road improve access to and from the side road. To optimise the signals, the staggered pedestrian crossing has been relocated from the south arm of Spinnaker Road signalised junction to the south arm of the newly signalised Sudmeadow Road.

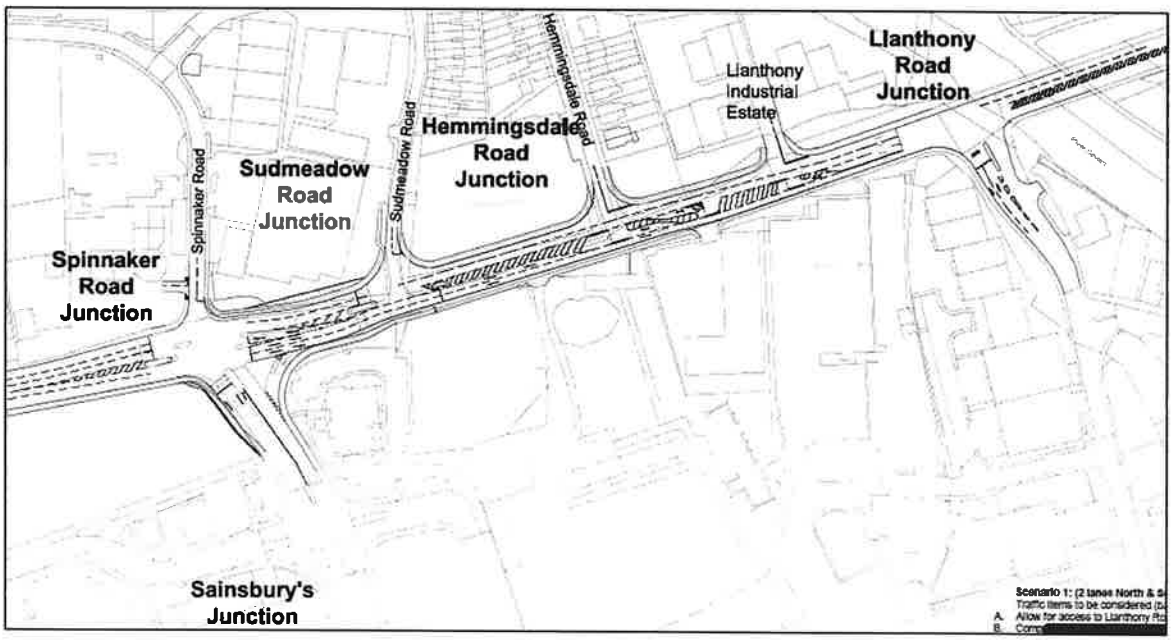


Figure 3.1: Proposed Layout under Option

3.2.4 *Option 2*

Although this option was not considered in the economic case option 2 also involves widening on the A430 Llanthony Road. This option provides two northbound lanes and two southbound lanes on the A430 from Spinnaker Road junction to north of Llanthony Road junction. In order to accommodate two through lanes in each direction, the staggered pedestrian crossing on the north side of Llanthony Road junction has been relocated to the south side of the junction, and the central island has been removed. This means that pedestrians will have to cross four 3.65m wide lanes in a single stage during an 'all-red' traffic phase, resulting in an increase in 'lost time' for vehicles at this junction. The existing northbound dedicated right turn lane (lane 3) on Llanthony Road junction has also been removed to accommodate two southbound lanes on the southern arm of the junction. As a result, right turning traffic from the southern arm of Llanthony Road junction will have to share lane 2 with straight ahead traffic. The northbound and southbound phases run together at this junction, and as such, it's likely that most northbound traffic on the mainline will use lane 1 to avoid being stuck behind stationary right turning traffic in lane 2.

As with Option 1, Option 2 includes the signalisation of Sudmeadow Road junction. St Ann Way is also widened to three lanes on its approach to Spinnaker Road signalised junction and the pedestrian crossing is relocated from the south side of the junction to the south side of Sudmeadow Road junction.

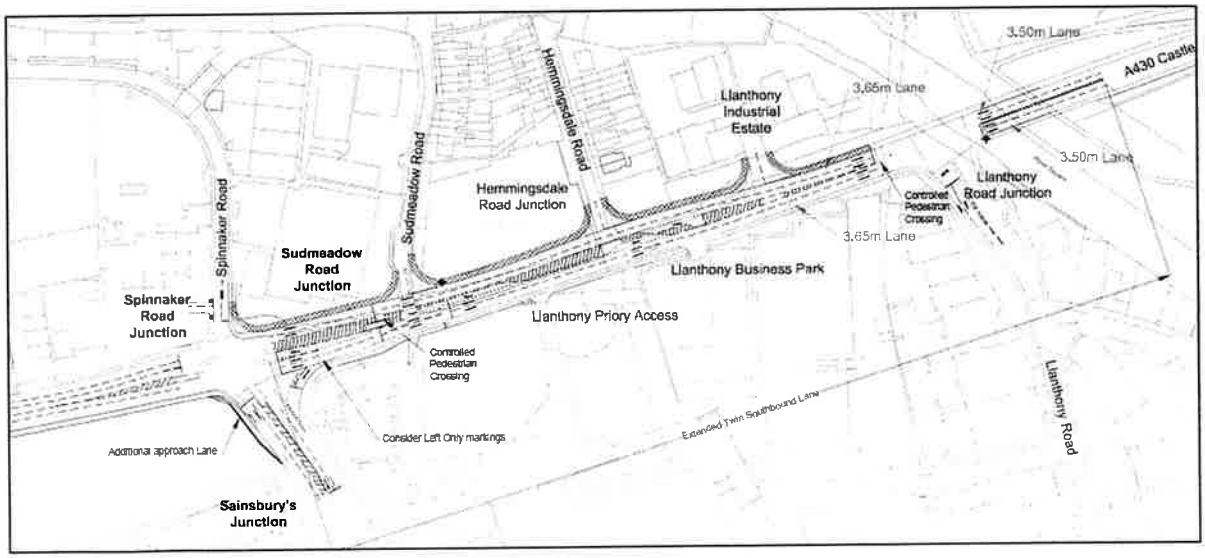


Figure 3.2: Proposed Layout under Option 2.

	Scenario	Network	Description
1	Do Nothing	Do Nothing	Base model without the proposed scheme layout or any future development traffic
2	Opening - Option 1	Do Something	Model to assess the Option 1 layout impact, adjusted signals to match Linsig model
3	Opening - Option 2	Do Something	Model to assess the Option 2 layout impact, adjusted signals to match Linsig model
4	2031 Do Nothing	Do Nothing	Model of future baseline with future growth constrained to TEMPRO
5	2031 Do Min	Do Something	Model of future baseline with future growth constrained to TEMPRO and optimised traffic signals
6	2031 Option 1	Do Something	Model to assess the Option 1 layout impact with future growth(TEMPRO) adjusted signals to match Linsig model
7	2031 Option 2	Do Something	Model to assess the Scenario 2 layout impact with future growth(TEMPRO) adjusted signals to match Linsig model
8	Opening Option 1 – Sensitivity Test	Do Something	Model to assess the Option 1 layout impact with flows and re-assigned trips from Severn Road to Castle Meads Way
9	Opening Option 2 - Sensitivity Test	Do Something	Model to assess the Option 2 layout impact with flows and re-assigned trips from Severn Road to Castle Meads Way
10	2031 Option 1 - Sensitivity Test	Do Something	Model to assess the Option 1 layout impact with future growth(TEMPRO) and re-assigned trips from Severn Road to Castle Meads Way
11	2031 Option 2 - Sensitivity Test	Do Something	Model to assess the Option 2 layout impact with future growth(TEMPRO) and re-assigned trips from Severn Road to Castle Meads Way

Under the Do-Nothing Option, the existing road network is maintained as it currently is in both the year of opening and the 2031 future year models. The Do-Min Option retains the existing road layout; however, the traffic signal timings are optimised in the future year according to the increased traffic demands at the junctions. The Improvement Options are modelled by adjusting the Do-Min model to reflect the proposed changes in road layout and traffic signal timings as detailed in the Linsig models provided. The proposed options are described in detail previously in this documents (see also Appendix E).

Finally, the appraisal was executed utilising the software PEARS (Program for the Economic Assessment of Road Schemes). PEARS is an economic assessment package that has been specifically designed for the use with the output from traffic microsimulation models. PEARS completes out trip-based assessments of changes in travel time costs and vehicle operating costs. The costs of a trip-based assessment derived by aggregating the costs of each individually modelled vehicle on the network.

Included in this model are the peak periods of traffic and these periods have been used in this economic appraisal.

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 of the travel time savings and of the vehicle operating costs (VOC).

This Economic Case has considered two different scheme options and two sensitivity tests in the comparison with the Do-Minimum. The purpose of the sensitivity tests are to see how route performs under different traffic conditions and to test how robust the scheme will be in these different scenarios. The results from PEARS regarding the impacts cited above have been reported in the table below. The values reported in the table are present values discounted to 2010, in 2010 prices.

PEARS Results				
Sub-Impact	**Core Option 1**	**Core Option 2**	**Sensitivity Test 1**	**Sensitivity Test 2**
Non-Business Travel Time	+£33.83M	+£32.20M	+£33.39M	+£18.58M
Business Travel Time	+£33.70M	+£31.77M	+£33.09M	+£19.45M

Non-Business Vehicle Operating Costs	+£2.34M	+£2.22M	+£2.08M	+£1.06M
Business Vehicle Operating Costs	+£3.35M	+£3.10M	+£3.16M	+£1.69M
Private Sector Provider Impacts	+£0.07M	+£0.08M	+£0.08M	+£0.06M
Greenhouse gases (Carbon Dioxide)	+£0.45M	+£0.42M	+£0.42M	+£0.22M
Indirect Tax Revenue	-£2.15M	-£2.01M	-£2.03M	-£1.07M
Total	**+£71.59M**	**+£67.78M**	**+£70.19M**	**+£39.97M**
Total Impact (Present Value of Benefits)	**£71.59M**	**£67.78M**	**£70.19M**	**£39.97M**

From the analysis of the table, significant reductions in journey times can be observed within the modelled options, and their associated reductions in vehicle operating costs and vehicle emissions during the AM and PM peak period produce substantial economic benefits for road users.

Since the costs have been considered the same for the all the scheme options, a first comparison between scenarios can be carried out considering only the Present Value of Benefits (PVB).

The majority of the benefits are derived from reductions in travel times. In all scenarios, the level of benefits far exceeds the cost of the scheme resulting in high PVB values. Under the Core Scenario, Option 1 generates a PVB of £71.59M, whilst Option 2 is less effective, delivering £3.81M fewer benefits to road users.

Under the sensitivity test, southbound trips are reassigned to the A430 mainline, as the journey time savings on the A430 would make this route more attractive. The levels of reassignment are proportionate to the trips on Severn Road, but the trips could be reassigned from any route across the network. The levels of trips reassigned are as follows:

Sensitivity Test Increase in Flows	0700-0800	0800-0900	0900-1000	Total AM	1500-1600	1600-1700	1700-1800	Total PM
Castle Meads Way SB 2031 (no re-assignment)	1122	**859**	850	2831	796	**946**	584	2326
Traffic re-assigned from Severn Way	142	**220**	164	526	215	**334**	249	799
% increase on Castle Meads Way SB	13%	**26%**	19%	19%	27%	**35%**	43%	34%

The increased flows on the mainline marginally reduce the effectiveness of Option 1, reducing the Present Value Benefits, PVB, to £70.19M, with £1.4M fewer benefits over the appraisal period.

Taking into consideration the assumptions established for the development of the modelling process, the scenarios which have been considered in the impacts assessment of this Economic Case are:

- Sensitivity Test (option) 1; and
- Sensitivity Test (option) 2.

Since the induced traffic has been considered negligible in the assumptions, the choice of the scenarios considers the worst case scenarios in the comparison between core and sensitivity test.

It is also important to note that although a higher level of increased trips has not been modelled in S-Paramics (or in the Economics), the outputs and BCR are sufficiently high, and that a further increase in flows would not compromise the positive benefits of the scheme.

3.3 Economy

3.3.1 *Business users and transport providers*

The appraisal of this sub-impact relies on the results produced by the transport model (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 *business users and transport providers* has produced benefits for Sensitivity Test 1 equal to £33.09 million from the travel time, £3.16 million from vehicle operating costs and £0.08 million from transport providers. Regarding Sensitivity Test 2, the benefits are quantified at £19.45 million from the travel time, at £1.69 million from vehicle operating costs and at £0.06 million from transport providers.

In conclusion, the total benefits for *business users and transport providers* are quantified at £33.09 million with regard to Sensitivity Test 1, while are quantified at £19.45 million as regards Sensitivity Test 2. **This is classed as Large Beneficial.**

3.3.2 *Reliability impacts on business users*

In accordance with WebTag guidelines this scheme is not expected to have any significant impact on journey time reliability for *business users and transport providers.* **Therefore, the impact is assessed qualitatively as neutral.** In reality this scheme is expected to improve reliability on business users by providing a less congested corridor which in turn will improve journey times making the traffic on the corridor more consistent.

3.3.3 *Regeneration*

No Regeneration Areas (as specified in the Web Tag) are expected to be impacted by the implementation of the scheme, by either option, however in practice there are areas adjacent to the scheme which can be considered regeneration areas such as the next phase of the Peel Centre and Gloucester City Football Club. This scheme will encourage such regeneration and facilitate future development. **Therefore, the impact is assessed as a Slight Beneficial.**

3.3.4 *Wider impacts*

In terms of wider area network benefits, the proposed widening of this section of GSWB would significantly increase network capacity and improve connectivity between the local and Strategic Road Network (SRN), connecting to the north via the GSWBP Castle Meads link/A417 Over causeway to the A40 Gloucester Northern Bypass and A40 West of Severn, and to the south via the GSWB Netheridge section and A38 to M5 Junction 12. This would offer further benefits of reduced congestion on the SRN, by the removal of inappropriate local north-south traffic movements from the adjacent M5 corridor (Junctions 12 to 11). The LEP is committed to improving the motorway links across Gloucestershire, and this scheme would help in this regard by improving access to and from M5 J12 to Gloucester and the wider region.

The scheme would enhance other schemes that the LEP has invested in, including improving links to the Forest of Dean, connections through to A40 Over Roundabout, and enhancing the routes to and from Longford Roundabout. The scheme would also enhance projects in Cheltenham by reducing the journey time between the two conurbations, and making trips between the two centres more attractive for both residents and visitors and contributing to the Gfirst LEP's ambition to drive economic growth in Gloucestershire

As mentioned previously, a strategic model (SATURN) has been used to assess the potential rerouting derived from the implementation of the scheme. However, from the analysis of the scenarios with the implementation of the schemes, it was observed that the number of vehicles which changed route in favour of the corridor as a result of the scheme is negligible.

For the Economics Assessment, **the impact is assessed as neutral.**

3.4 Environment

3.4.1 *Noise*

The assessment of the environmental noise and vibration impact has been undertaken with regard to the Design Manual for Roads and Bridges (DMRB) Volume 11 (Environmental Assessment), Section 3, Part 7 HA213/08 Noise and Vibration, Simple level of assessment. Reference is also given to both assessment of noise insulation under the Noise Insulation Regulations and WebTAG assessment guidelines.

The results of the assessments indicate that there are predicted to be noise increases of up to 8dB in the short term and 8.4dB in the long term as a result of the implementation of the scheme (including the full removal of the City Business Centre). This is not an unexpected outcome and is principally as a result the potential removal of existing screening, whilst the revised road alignment itself is expected to result in a negligible (<1 dB) increase in noise levels.

An additional two scenarios were modelled that included the installation of a barrier around part of the footprint of the City Business Centre should it be fully demolished and the partial demolition of the City Business Centre.

The results of the additional assessment indicated that, even with proposed the barrier, the increases in noise remain up to 5dB in the short term and 5.4dB in the long term.

The outcome of the WebTAG assessments follow a similar pattern to the outcome of the DMRB assessments, resulting in a figure of -£148,232.

As the proposed works incorporate alignment changes to the existing road an assessment of potential eligibility for noise insulation under the Noise Insulation Regulations was also undertaken. None of the residential receptors identified within the study area meet the required criteria.

Scenario	Short Term Magnitude	Long Term Magnitude
Full Demolition	Major Adverse [8.0dB]	Moderate Adverse [8.4dB]
Full Demolition + barrier	Major Adverse [5.0dB]	Moderate Adverse [5.4dB]
Partial Demolition	Moderate Adverse [3.4dB]	Minor Adverse [3.7 dB]

Scenario	Short Term Significance	Long Term Significance
Full Demolition	Large Adverse	Large Adverse
Full Demolition + barrier	Large Adverse	Moderate Adverse
Partial Demolition	Moderate Adverse	Slight Adverse

3.4.2 *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) and 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. Greenhouse gas emissions (CO_2) were scoped using the same criteria.

An assessment of projected traffic data from the Paramics transport model with the scheme in place was made against the scoping criteria. This indicated the potential for impacts on local air quality. A quantitative assessment of permanent operational effects has been completed based upon output from the transport model. A qualitative assessment of temporary construction phase effects on local air quality has been completed based on the risk of likely impacts in the study area.

There are sensitive receptors in the study area and in proximity to affected road links of which the majority are residential. There are no designated ecological sites that require assessment. The scheme does not lie in one of Gloucester's Air Quality Management Areas. An assessment against Compliance Risk Road Network (CRRN) links in accordance with the EU Directive on ambient air quality (2008/50/EC) has been completed qualitatively in the absence of the required datasets.

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 have not been assessed in the absence of detailed information about the construction programme and methods

The scheme met the criteria for 'Simple' assessment of local air quality because of changes to the road alignment, AADT and average speed. It met the criteria for regional assessment because of changes to the criteria for AADT, average speed and changes to the proportion of HGVs.

In the scheme opening, concentrations are predicted to fall marginally with the scheme in place as a result of improvements to traffic flow resulting from the widening and signalisation works. The largest change in annual average NO_2 and PM_{10} concentrations resulting from the scheme were predicted to be 'small' and in most cases 'imperceptible' within 200m of the affected roads. For annual average NO_2 and PM_{10}, all predictions were under the annual average objective and there is no risk of any exceedance of the objective on the compliance road links.

Overall predicted concentrations of NO_2 and PM_{10} were lower in assessment year 2031 than for the opening year as a result of lower anticipated vehicle emissions and background concentrations. This is because there is more time for improvements in vehicle emissions technology to be realised in the fleet.

The magnitude of change as a result of the scheme is assessed as 'small' at the receptors close to affected roads. However, no new exceedances of the objective or worsening of air quality at receptors already exceeding is predicted to occur. For annual average PM, all predictions were under the objective and impacts imperceptible.

Several links in the study may be 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. However, the results have shown that a new exceedance of the annual average NO_2 objective on a compliance link is highly unlikely and roadside concentrations at these links will in fact improve as a result of the scheme.

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. As a result, it is judged that impacts on local air quality from the scheme will not be significant and can be considered as slight beneficial. For regional air quality and greenhouse gas emissions, impacts in the opening and assessment years are also anticipated to be slight beneficial.

Additional Assessment of Greenhouse Gases through PEARS and S-Paramics

The greenhouse gases emissions associated to the traffic have been derived directly from the traffic model (Paramics) using PEARS, as this can output a prediction of gases directly from the traffic changes. Therefore, the impact produced by the implementation of the scheme is beneficial (CO2 reduction) and quantified at £0.42million as regards Sensitivity Test 1 and at £0.22million with regard to Sensitivity Test 2.

3.4.3 *Landscape & Townscape*

A desktop assessment of the likely key landscape and townscape effects has been undertaken.

The key concerns relate to the effects on the setting of the 16th Century remains of the Secunda Priory gatehouse and precinct boundary wall which are located immediately behind the eastern Llanthony Road footway. Both gatehouse and wall are Grade I listed buildings and are Scheduled Monuments. Careful design of footway hard surfacing, lighting, barriers and signage in proximity to the gatehouse and wall at the detail design stage should ensure no adverse townscape impacts and potentially some slight benefit.

There would be possibly slight beneficial effects on the setting of the heritage assets arising from redevelopment of the building opposite which would be demolished as a result of the road widening.

There would be some potential loss of existing planting to enable the road widening, but there are likely to be some limited opportunities for new planting in nearby locations and also as a result of the redevelopment of the site opposite the Priory which would be affected by demolition.

Overall the scheme is assessed as scoring slight beneficial effect on landscape and townscape, using the WebTAG methodology.

In order to progress a detailed highway design and to develop detailed mitigation, a further site based combined Landscape and Townscape Appraisal will be undertaken after approval of the business case, to further develop the mitigation proposed in this report. Consultation with Heritage England is covered in 3.4.3. Further work to develop the detailed landscape and townscape design will include consultation with specialist heritage consultants, the Llanthony Secunda Priory Trust, and continuation of the consultation with local authority officers and Historic England to obtain local and specialist knowledge and concerns. A more detailed appraisal based on a site visit should be undertaken once the scheme business case is approved.

Further recommendations include that an arboricultural assessment of trees and other significant planting and vegetation likely to be affected by the highway works will be undertaken.

3.4.4 *Heritage or historic resources*

To assess the impact of the scheme on historic resources Historic England, Conservation Officer and the City Archaeologist have been contacted, as the heritage constraints have already been identified in the desktop scoping report. These have been identified as a Scheduled Monument 'Llanthony Secunda Priory' located adjacent to the westbound carriageway of Llanthony Rd in the vicinity of the scheme. There are also several Listed Buildings within 300m of the works with the closest being adjacent to the works, forming the boundary of the Scheduled Monument at the interface with the footway:

- 'Llanthony Priory, remains of outer Gatehouse' (Grade I Listed Building)
- 'Llanthony Priory, remains of precinct wall south of outer Gatehouse', (Grade I Listed Building)

There is also the potential for archaeological remains to survive on the land outside of the Priory on the opposite side of the road, as well as the potential for impacts on the setting of the Scheduled Monument and associated listed buildings.

The remains of the Scheduled and listed gatehouse and brick boundary wall along the southbound carriageway date to the 1520's. They are a very rare survival of this period and in places there are decorative elements depicted in burnt brick within the wall including a Cross. The most sensitive areas of the wall are the Gatehouse and the Cross.

Historic England's ideal solution would be for there to be no lighting columns around the Gatehouse, and then southwards to the High Orchard pub. They do appreciate that there will be lighting requirements for the road for safety etc, but have requested consideration be given to relocating lighting columns further away from the wall if possible. Historic England would be content for lighting columns to be higher, to allow a wider spread of light from fewer columns.

The County Council has a Design Code for street furniture with examples of good modern lighting around the City, which will be used to inform design.

The City Archaeologist, has detailed that a minimum of an archaeological watching brief should be undertaken during the site strip works in the affected areas.

From initial consultation with Gloucester's Conservation Officer and Historic England it is understood that listed building consent may be required due to the potential impacts on the designated assets of the Priory with particular reference to the brick wall and gatehouse and their setting. This will be verified during further consultation as the detailed design progresses. However, Scheduled Ancient Monument Consent is not required. **Therefore, with mitigation in place the impact on the Historic Environment would be neutral.**

3.4.5 *Biodiversity*

Alney Island Local Nature Reserve (LNR) is located approx. 100m north of the scheme, and there is a pond within the scheduled monument area adjacent to the carriageway. The pond was subject to Habitat Skills Index (HIS) for Great Crested Newts, a score of 0.62 was obtained indicating that the pond was of average suitability for GCNs, partly due to its urban setting and lack of connectivity to other ponds within 1km. Biodiversity records search have also been conducted for the area.

An ecological walkover was undertaken on 9th February 2015 and recorded relevant habitats, including any that are formally designated for nature conservation, and to highlight the potential for legally-protected or otherwise notable species (see technical note in appendices). There are no sites of international or national environmental importance that will be impacted directly or indirectly through the scheme.

The Llanthony Business Centre building inspection was undertaken on 21st July 2017 by two ecologists, one of which is the holder of an NE survey licence. The preliminary roost inspection of the building followed current best practice guidelines (Collins J. (ed.) (2016) Bat Surveys for Professional Ecologists, Good Practice Guidelines. 3rd Edition. BCT) and entailed a thorough internal and external inspection of the building. The inspection of the exterior of the building was undertaken to identify potential features for roosting bats, and potential bat entry or exit points. The interior was searched for evidence that would indicate the presence of bats such as feeding remains, bat droppings, oil staining, dead bats, and the bats themselves. One part of the roof section, was not able to be physically access due to Health and Safety risks which were deemed unacceptable, however the roof void was thoroughly inspected via torching from the loft hatch. The survey was considered adequate to assess the suitability of the void for roosting bats and complete a partial search for bat evidence.

No bat roosts were confirmed within the building and no evidence of bats was found during the daytime survey. The building was considered to have low potential to support roosts of crevice-dwelling bat species due to the presence of small gaps on the exterior of the building. However, the likelihood of bats using these features for roosting is reduced due the urban context of the building. The roads immediately to the north, south, and east of the building are all lit by street lamps this is likely to decrease the chances of bats using the building for roosting. In addition, there is likely to be better roosting locations within residential buildings close by.

The building is classed as low potential, however bat presence cannot entirely be ruled out, and therefore further mitigation is recommended. As the building is considered to have low potential for bat roosting this would require a single dusk emergence or dawn re-entry survey with four surveyors.

As the demolition date is currently to be confirmed, the following recommendations are made:

Original demolition date was spring 2018:

To demolish before March 2018 – surveys would have had to be conducted before the end of September 2017, which has now elapsed.

To demolish later in 2018 - as bat survey season runs from May onwards, the survey could be undertaken in 2018, but demolition could not commence before the survey in May (assuming absence is established). If works are not envisaged till 2019, the bat survey will be required to be undertaken between May – September 2019.

If bats are identified as utilising the building as a roost during this survey, two further surveys (suitably spaced throughout the survey season) would be required to inform an EPS derogation licence application.

It is anticipated that (if required) the implementation of the mitigation could take place between September 2019 – September 2020; this is dependent on species, roost type, number of individuals utilising a roost. If no bat roosts are found during the survey then the works can begin without further delay.

However, should bat roosts be found a Natural England EPS development licence would be required before works could commence. The formulation and submission of a bat mitigation licence would take approximately 1 month (upon completion of surveys).An EPS derogation licence takes approximately 30 working days for Natural England to process. These risks are reflected in the Risk register.

The Biodiversity records were requested and did not confirm the presence of GCN within the pond at Llanthony Priory, this combined with the fact the works are outside the Priory and separated by a wall and then the road this is viewed as 'no impact on GCN and no further assessment is required' and are therefore scoped out.

No other ecological constraints have been identified.

Based on the above assessment, and on the assumption that the emergence surveys are carried out at the correct time identified above and that no bats are found the significance is potentially identified as Neutral.

3.4.6 *Water environment / flooding*

The River Severn, a main river, is located approximately 80m north of the scheme. The whole of the scheme is located within flood zone 2 and 3. There will be an Increase in run off as a result of carriageway widening (increased hard standing is 0.2ha) which will increase demand on the road drainage.

The drainage strategy will need to factor in attenuation and allowance for climate change. During detailed design, there will be liaison with the relevant stakeholders to discuss any flood management actions/issues. The need for improved drainage would be investigated during the detailed design stage and appropriate measures shall be in place to ensure risk of flooding from potential increased surface water is avoided. **Neutral impact is anticipated.**

3.5 Social

3.5.1 *Commuting and other users*

As for the business users and transport providers sub-impacts, *community and other users* sub-impact relies on the results produced by the transport model (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 for commuting and other users with regard to the Sensitivity Test 1 has produced total benefits equal to £33.39 million from the travel time and £2.08 million from vehicle operating costs.

In conclusion, the total benefits for commuting and other users are quantified at £35.47 million with regard to Sensitivity Test 1, Large Beneficial.

3.5.2 *Reliability impacts on commuting and other users*

In accordance with WebTag guidelines, the information regarding the base model and surveys are not sufficient to assess the *reliability* with regard to the scenarios. From the analysis of the results from the model, it is not expected any significant impact on journey time reliability for *commuting and other users* after the implementation of the scheme. **Therefore, the impact on reliability been assessed as neutral, as no assessment has been carried out for the Economics.** However in practice it is expected that the additional capacity will potentially improve reliability due to the reduction in congestion and make the route consistently reliable throughout the day but most significantly during peak hours.

3.5.3 *Physical activity*

The pedestrian crossings involved in the scheme will alter some of the pedestrian paths along the corridor. This could affect some pedestrians positively while others negatively, albeit without increasing/decreasing the number of pedestrians.

The pedestrian crossing facilities are included as part of the traffic signal regime at the St Ann Way junction. This is expected to improve the facility by making crossing safer and easier. However, this it is not expected to increase/decrease pedestrian demand.

The route is not promoted for use by cyclists, as there are more appropriate nearby routes for leisure cycling (such as along the canal and on cycle paths). Therefore, the scheme will not have any impacts on cycling demand.

Therefore the *physical activity* impact of the scheme is assessed as neutral.

3.5.4 *Journey quality*

The carriageway widening in the section between Sudmeadow Rd and Hemmingsdale Rd will realign and widen the footway. This will have a positive effect on pedestrian journeys; in fact, it will avoid conflicts with vehicles undertaking parking manoeuvres and crossing the footway.

The pedestrian crossing facilities are included as part of the traffic signal regime at both the St Ann Way junction. This is expected to improve the facility by making crossing safer.

An uncontrolled pedestrian crossing may be removed in the section between Hemmingsdale Rd and the access to Llanthony Industrial Estate (located in front of Gloucestershire College building west side). This would reduce the path options for pedestrians and consequently have a slightly adverse impact (see sub-impact severance). However, being a crossing of the uncontrolled type, removal would have a beneficial effect as regards safety and the widening itself would discourage pedestrians from attempting to cross the carriageway out of controlled crossings.

Therefore, the impact of the scheme on pedestrian's journey quality will be slightly beneficial because of the reduction in stress (sub-factor: Fear of potential accident. See Web Tag Unit A4.1) and the number of users involved.

With regard to the vehicles perspective, the impact of the scheme on drivers and travellers' journey quality will also be slightly, albeit not relevantly, beneficial for the reasons described for the pedestrians.

In conclusion, the implementation of the scheme is assessed as slight beneficial

3.5.5 *Accidents*

The existing accidents have been reviewed covering the period 2012 to 2016 covering the GSWB and approaching links. The data shows that between 2012 and 2016 there were a total of 19 collisions which occurred both directly on the GSWB and on surrounding links which may be affected by the implementation of the scheme (Location detailed in figure 3.1 and 3.2). These accidents have been classified below;

- 19 Collisions in total;
- 0 Fatal;
- 4 Serious;
- 15 Slights (2 involved cyclists).

Considering the high volume of traffic which using this corridor on a daily basis these figures are considered to be low. This scheme aims to keep the accidents along the route and surrounding links at a minimum and improve the future safety of route.

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.

It is deemed that the proposed junction design will not have significant impact on safety due to the mitigating factors involved. **Therefore the impact is considered Neutral.**

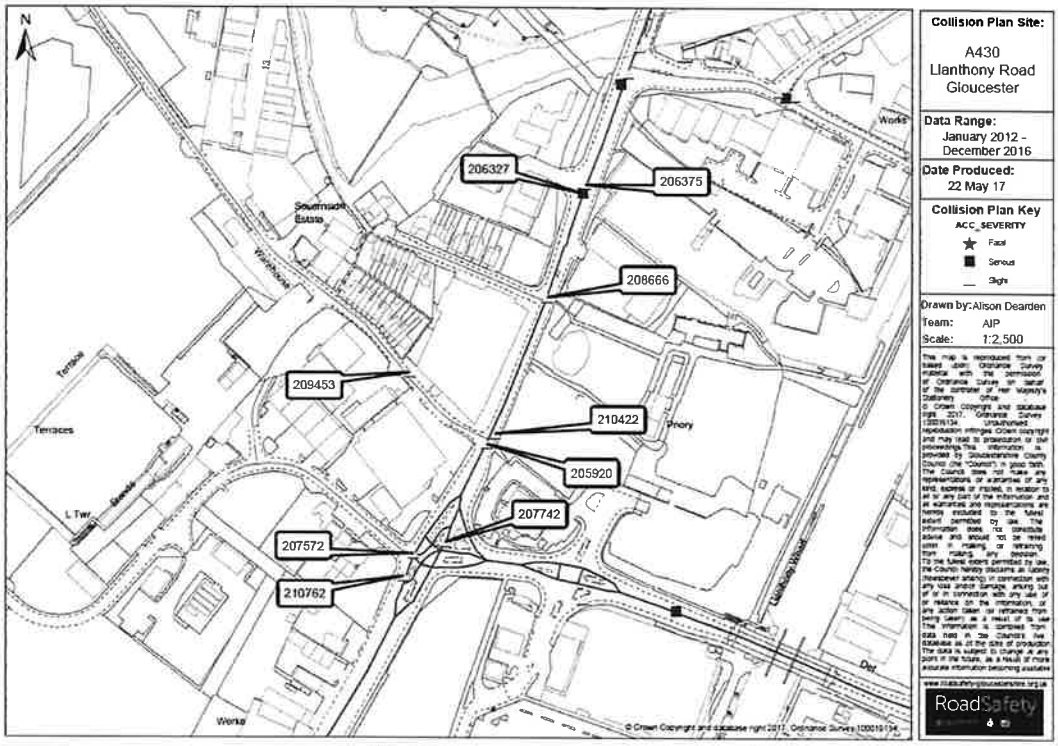


Figure 3-1: Illustrates the collision data along the Gloucester South West Bypass between Jan-12 and Dec-16.

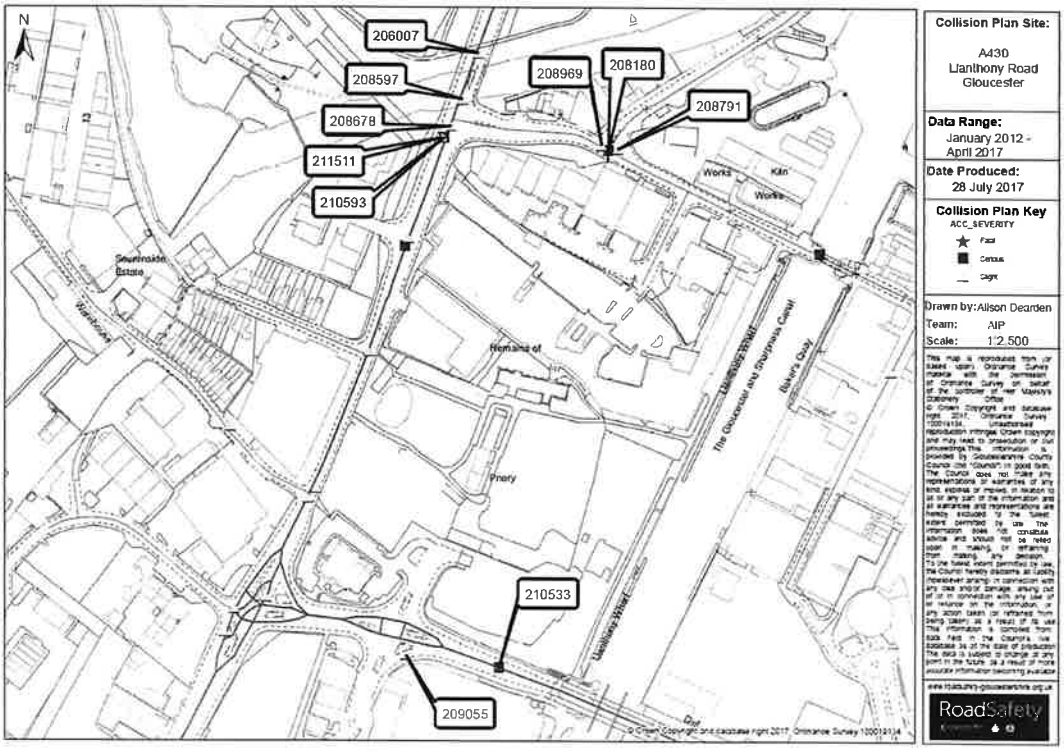


Figure 3-2: Illustrates the collision data along the Gloucester South West Bypass between Jan-12 and Dec-16.

3.5.6 *Security*

No changes expected to security, street lighting expected to remain substantially unchanged. **Therefore, the impact has been assessed as neutral.**

3.5.7 *Access to services*

In accordance with WebTag guidance this scheme will not have any relevant impact to accessibility; as there are no proposed changes in routings or timings of current public transport services. **Therefore, the impact regarding *access to services* is assessed qualitatively as neutral.** However it is important to note that in practice it is expected that access to services will be improved by this scheme. The improvements to route include improvements to the access of the side roads adjacent to Llanthony Road and therefore it will be a lot easier to access services on which are located on this route. It is also expected to encourage bus services to use the route in the future.

3.5.8 *Affordability*

No impact is expected. **Therefore, the impact is assessed qualitatively as neutral.**

3.5.9 *Severance*

As already cited (3.5.3), the pedestrian crossings involved in the scheme may alter some of the pedestrian paths along the corridor. This would affect some pedestrians positively while others negatively.

With regard to the comparison between the Do-Something and Do-Minimum scenarios, the relocation of the pedestrian crossing from Hempsted Lane to Llanthony Rd will benefit pedestrians who, walking from the area located west of Llanthony Rd, intend to move south-eastbound towards the High Orchard, Sainsbury's and the shopping centre beyond the canal (and vice versa). In fact, they will slightly benefit from a shorter path compared to the Do-Minimum scenario. On the other hand, pedestrians approaching from the area located west of Hempsted Ln and heading to the same destination will see their path slightly increased.

As cited above (3.5.4), the removal of the uncontrolled pedestrian crossing would reduce the number of crossings along the corridor. However, this will primarily affect only pedestrian paths as regards Option 1 scheme.

With regard to vehicles, carriageway widening in the sections comprised between Spinnaker Rd and Hemmingsdale Rd will reduce by approximately 30 units the number of parking spaces available for the use of the shops and services by customers and

employees.

In conclusion considering the impact on all the users, **scheme impact on severance is assessed as slightly adverse.**

3.5.10 *Option and non-use values*

No impact expected, not assessed, but assumed qualitatively as neutral.

3.5.11 *Distributional Impact*

No impact is expected. **Therefore, the impact is not assessed, but assumed qualitatively as neutral.**

3.6 Public Accounts

3.6.1 *Cost to Broad Transport Budget*

It has been assumed at this stage that the costs regarding the implementation of the scheme.

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

DO_SOM_COSTS					
*Type	Mode	Funding	Cost	Price	GDP
P	1	loc	920.8	F	111.72
C	1	loc	6356.2	F	111.72

Table 3.3: Disaggregated Costs.

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

DO_SOM_PROFILE			
*Year	Mode	%Const	%Prep
2017	1	0.0	59.9
2018	1	67.7	20.0
2019	1	19.3	13.4
2021	1	13.0	0

Table 3.4: Costs Profile.

Only preliminary and constructions costs have been considered in the calculations. 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.

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	5817
Developer Contributions	0
Grant/Subsidy Payments	0
NET IMPACT	5817
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	**5817**

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

3.6.2 *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* derived from the utilisation of the fuel.

The calculation has produced negative benefits quantified at -£2.03 million as regards Option 1 (Sensitivity Test 1) and quantified at -£1.07 million with regard to Option 2 (Sensitivity Test 2) and therefore is assessed as slight adverse.

3.7 Economics Tables

Economic Efficiency of the Transport System (TEE) – SCENARIO: Sensitivity 1 (Option 1)

Non-business: Commuting	ALL MODES		ROAD		BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs		Passengers	Passengers	
Travel time	14,250		14,140		110		
Vehicle operating costs	1,030		1,030				
User charges							
During Construction & Maintenance							
NET NON-BUSINESS BENEFITS: COMMUTING	15,280	(1a)	15,170		110		

Non-business: Other	ALL MODES		ROAD		BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs		Passengers	Passengers	
Travel time	19,460		18,790		350		
Vehicle operating costs	1,050		1,050				
User charges							
During Construction & Maintenance							
NET NON-BUSINESS BENEFITS: OTHER	20,190	(1b)	19,840		340		

Business								
User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	33,090		2,930	30,040	120			
Vehicle operating costs	3,350		1,110	2050				
User charges								
During Construction & Maintenance								
Subtotal	36,250	(2)	4,040	32,090	120			
Private sector provider impacts						Freight	Passengers	
Revenue								
Operating costs	80				80			
Investment costs								
Grant/subsidy								
Subtotal	80	(3)			80			
Other business impacts								
Developer contributions	-102	(4)						
NET BUSINESS IMPACT	36,228	(5) = (2) + (3) + (4)						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	71,698	(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 (in £K)

Economic Efficiency of the Transport System (TEE) – SCENARIO: Sensitivity 2 (Option 2)

Non-business: Commuting	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	8,800		8,700	100		
Vehicle operating costs	580		580			
User charges						
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: COMMUTING	9,380	*(1a)*	9,280	100		

Non-business: Other	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
User benefits	TOTAL		Private Cars and LGVs	Passengers	Passengers	
Travel time	9,775		9,620	255		
Vehicle operating costs	485		485			
User charges						
During Construction & Maintenance						
NET NON-BUSINESS BENEFITS: OTHER	10,260	*(1b)*	10,005	255		

Business			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
User benefits								
Travel time	19,450		1,610	17,730	110			
Vehicle operating costs	1,684		570	1,114				
User charges								
During Construction & Maintenance								
Subtotal	21,134	*(2)*	2180	18,844	110			
Private sector provider impacts						Freight	Passengers	
Revenue								
Operating costs	60				60			
Investment costs								
Grant/subsidy								
Subtotal	60	*(3)*			60			
Other business impacts								
Developer contributions	-102	*(4)*						
NET BUSINESS IMPACT	21,092	*(5) = (2) + (3) + (4)*						

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	40,732	*(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 (in £K)

Public Accounts (PA) Table – SCENARIO: Sensitivity 1 (Option 1)

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding*	**TOTAL**		**INFRASTRUCTURE**			
Revenue						
Operating Costs						
Investment Costs	5,817					
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT	5,817	*(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	2,030	*(9)*				
TOTALS						
Broad Transport Budget	5,817	*(10) = (7) + (8)*				
Wider Public Finances	2,030	*(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 (in £K).

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

Public Accounts (PA) Table – SCENARIO: Sensitivity 2 (Option 2)

	ALL MODES TOTAL		ROAD INFRASTRUCTURE	BUS and COACH	RAIL	OTHER
Local Government Funding*						
Revenue						
Operating Costs						
Investment Costs	5,817					
Developer and Other Contributions	0					
Grant/Subsidy Payments						
NET IMPACT	4,520	*(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	1,070	*(9)*				
TOTALS						
Broad Transport Budget	5,817	*(10) = (7) + (8)*				
Wider Public Finances	1,070	*(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 (in £K).

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

Analysis of Monetised Costs and Benefits

SCENARIO: Sensitivity 1 (Option 1)

Noise		*(12)*
Local Air Quality		*(13)*
Greenhouse Gases	420	*(14)*
Journey Quality		*(15)*
Physical Activity		*(16)*
Accidents		*(17)*
Economic Efficiency: Consumer Users (Commuting)	15,280	*(1a)*
Economic Efficiency: Consumer Users (Other)	20,190	*(1b)*
Economic Efficiency: Business Users and Providers	36,228	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-2,030	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	70,088	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	5,817	*(10)*
Present Value of Costs (see notes) (PVC)	5,817	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	**64,271**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**12.0**	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.

Values are expressed in £K

Analysis of Monetised Costs and Benefits

SCENARIO: Sensitivity 2 (Option 2)

Noise		*(12)*
Local Air Quality		*(13)*
Greenhouse Gases	220	*(14)*
Journey Quality		*(15)*
Physical Activity		*(16)*
Accidents		*(17)*
Economic Efficiency: Consumer Users (Commuting)	9,380	*(1a)*
Economic Efficiency: Consumer Users (Other)	10,260	*(1b)*
Economic Efficiency: Business Users and Providers	21,092	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-1,070	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	39,882	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	5,817	*(10)*
Present Value of Costs (see notes) (PVC)	5,817	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	**34,065**	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	**6.9**	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.

Values are expressed in £K

3.8 Appraisal Summary Tables

Appraisal Summary Table – SCENARIO: Sensitivity 1 (Option 1)

Date produced:	18.08.2017

Name of scheme:	Gloucester South West Bypass Improvements.
Description of scheme:	Capacity improvements on the Gloucester South-West Bypass.

	Impacts	Summary of key impacts	Assessment: Quantitative		Qualitative	Monetary £(NPV)
Economy	Business users & transport providers	The calculation regarding business users has produced benefits equal to £33.09 million from the travel time and £3.16 million from vehicle operating costs. With regard to transport providers, the benefits derive from the operating costs and are quantified at £0.08 million.	Value of journey time changes(£)	33,090k	Large Beneficial	36,228,000
	Reliability impact 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 does not show any significant fluctuation of the journey time. Therefore, the impact is not assessed.	N/A		Neutral	N/A
	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. There are some potential regeneration sites which will benefit but are not dependent upon the scheme. These include Gloucester City Football club and The Priory which are both located adjacent to the corridor and the Peel Centre which is also nearby. These sites will benefit from the improvements along the GSWB and also future proof the route for the expected future demand.	N/A		Slight Beneficial	N/A
	Wider Impacts	A strategic model (Saturn) has been used to assess the potential rerouting derived from the implementation of the scheme. However, from the analysis of the scenarios with the implementation of the schemes, it was observed that the number of vehicles which changed route in favour of the corridor interested by the scheme is to be considered negligible. Therefore, the impact is assessed neutral.	N/A		Neutral	N/A
Environmental	Noise	Increase in traffic flows and average speed as well as widening of the existing carriageway has the potential of increasing noise levels. The area of scheme, however, does have a low density of sensitive receptors; residential receptors are within 30m at closest point. The scheme is not within a noise Important Area.	See Change in Noise Level table below		Neutral	Scheme + Full Demolition of City Business Centre -£148,232
	Air Quality	Impacts on local and regional air quality can be expected as a result of changes to the flow of traffic resulting from the scheme widening and changes to signalisation. In additional to Llanthony Road, several affected roads have been identified in the study area which means many receptors could potentially be impacted. The scheme or any links affected by it are not situated in an Air Quality Management Area.	See Number of properties table below		Slight Beneficial	1,030,546
	Greenhouse gases	The greenhouse gases emission 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 (CO2 reduction) and quantified in £0.42 million. In addition, the Environmental team have calculated the emissions based on DMRB HA207/07	Change in non-traded carbon over 60y (CO2e)	38,045	Slight Beneficial	1,786,353
			Change in traded carbon over 60y (CO2e)	N/A		

	Change in Noise Level	Residential Receptors	Other Sensitive Receptors
Decrease in Noise Level	< -10 dB	0	0
	-5.0 to -9.9 dB	0	0
	-3.0 to -4.9 dB	0	0
	-0.1 to -2.9 dB	0	1
No Change in Noise Level	0 dB	0	1
Increase in Noise Level	0.1 to 2.9 dB	14	9
	3.0 to 4.9 dB	1	0
	5.0 to 9.9 dB	6	0
	> 10 dB	0	0

Scenario	Number of properties	
	Improvement	Deterioration
NO2 (2018)	1,999	50
NO2 (2031)	1,339	710
PM10 (2018)	1,830	219
PM10 (2031)	1,368	681

	Landscape	The large scale urbanised landscape contrasts with more intricate, historic, localised pattern associated with the	N/A			
		open space and built elements around the Llanthony Secunda Priory. The green open space, mature trees and the nationally important heritage features are the most distinctive and valued features in the landscape. Careful detail design of the scheme would slightly improve the setting of this area. There are also some small areas of soft landscape and trees along the route corridor and detailed design should ensure that these elements are retained, enhanced or replaced where practicable.			Slight Beneficial	N/A
	Townscape	Although the general environment is a large scale commercial, educational and industrial area, the Grade I listed/Scheduled Monument priory gatehouse and precinct boundary wall directly adjoining the scheme and form a very distinctive and highly important feature in the townscape. This is further enhanced by the green open space, trees and further listed buildings associated with the priory. Careful design of footway hard surfacing, lighting, barriers and signage in proximity to the gatehouse and wall at the detail design stage should ensure no adverse townscape impacts and potentially some slight benefit. There would also be possibly slight beneficial effects on the setting of the heritage assets arising from redevelopment of the building opposite which would be at least partially demolished as a result of the road widening.	N/A		Slight Beneficial	N/A
	Historic Environment	The key concerns are the Scheduled and listed gatehouse and brick boundary wall along the southbound carriageway • 'Llanthony Priory, remains of outer Gatehouse' (Grade I Listed Building) • 'Llanthony Priory, remains of precinct wall south of outer Gatehouse', (Grade I Listed Building) Scheduled Monument consent will not be required, however consent for the listed buildings will be required.	N/A		Neutral	N/A
	Biodiversity	There is a potential bat roost in the 'to be demolished' buildings –a preliminary bat roost assessment was undertaken in July, and no bat roosts were confirmed within the building and no evidence of bats was found during the daytime survey. All other Ecological Risk have been scoped out through desktop and site surveys, including the potential impact on a potential GCN pond within the priory (now ruled out as an impact).	N/A		Neutral	N/A
	Water Environment	The River Severn, a main river, is located approximately 80m north of the scheme. The whole of the scheme is located within flood zone 2 and 3. There will be an increase in run off as a result of carriageway widening (Increased hard standing is 0.2ha) will increase demand on the road drainage. Detailed design is required before an accurate assessment can be made, During detailed design, the designer will need to liaise with the relevant stakeholders to discuss any flood management actions/issues. 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.	N/A		Neutral	N/A
Social	Commuting and Other users	The calculation regarding commuting and other users has produced total benefits equal to £33.39 million from the travel time and £2.08 million from vehicle operating costs.	**Value of journey time changes(£)**	33,390k	Large Beneficial	35,470,000
	Reliability impact on Commuting and Other 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 commuters and other users and the analysis of the with-scheme scenario results does not show any significant fluctuation of the journey time. Although it is expected that the improvements implemented by this scheme will improve journey times throughout the day but most significantly during peak periods. This could potentially mean that journey times along the corridor will become even more predictable and fluctuate less creating a reliable route for all users as congestion decreases after the scheme has been completed.	N/A		Neutral	N/A
	Physical activity	The pedestrian crossings involved in the scheme will alter some of the pedestrian paths along the corridor. This could affect some pedestrians positively while others negatively, albeit without increasing/decreasing the number of pedestrians. The pedestrian crossing facilities are included as part of the traffic signal regime at both the St Ann Way junction. This is expected to improve the facility by making crossing safer and easier. The route is not promoted for use by cyclists, as there are more appropriate routes for leisure cycling (such as along the canal and on cycle paths). Therefore, the scheme will not have any impacts on cycling demand (neutral).	N/A		Neutral	N/A

	Journey quality	The carriageway widening in the section between Sudmeadow Rd and Hemmingsdale Rd will relocate the footway. This will have a positive effect on pedestrian journey. The pedestrian crossing facilities are included as part of the traffic signal regime at both the St Ann Way junction. This is expected to improve the facility by making crossing safer. An uncontrolled pedestrian crossing is removed and this will reduce the path options for pedestrians and consequently have a slightly adverse impact (see sub-impact severance). However, being the crossing of the uncontrolled type, it will have a beneficial effect as regards safety and the widening itself will discourage pedestrians from attempting to cross the carriageway out of controlled crossings. Therefore, the impact of the scheme on pedestrian's journey quality will be slightly beneficial because of the reduction in stress. With regard to the vehicles perspective, the impact of the scheme on drivers and travellers' journey quality will also be slightly, albeit not relevantly, beneficial for the reasons described for the pedestrians. In conclusion, the implementation of the scheme is assessed slightly beneficial.	N/A	Slight Beneficial	N/A
	Accidents	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.	N/A	Neutral	N/A
	Security	No changes expected to security, street lighting expected to remain unchanged. Therefore, no assessment will be executed.	N/A	Neutral	N/A
	Access to services	The scheme will not have any relevant impact to accessibility; there are no proposed changes in routings or timings of current public transport services. Therefore, the impact regarding access to services is not assessed.	N/A	Neutral	N/A
	Affordability	No impact is expected. Therefore, the impact is not assessed.	N/A	Neutral	N/A
	Severance	The pedestrian crossings involved in the scheme will alter some of the pedestrian paths along the corridor. This could affect some pedestrians positively while others negatively, albeit without increasing/decreasing the number of pedestrians. The removal of the uncontrolled pedestrian crossing will reduce the number of crossings along the corridor. Therefore, Option 1 scheme impact on pedestrians is assessed slightly adverse. Therefore, the impact of the scheme on private vehicle users is assessed as slightly adverse. In conclusion considering the impact on all the users, Option 1 scheme impact on severance is assessed Slight adverse.	N/A	Slight Adverse	N/A
	Option and non-use values	No impact expected.	N/A	Neutral	N/A
Public Accounts	Cost to Broad Transport Budget	The investment costs are funded by Gloucestershire County Council and by a developer contribution (S106). The calculation has been carried out using Tuba v1.9.7	The calculation has considered: preliminary costs = £0.921 million and construction costs = £6.356 million (at 2017 prices)	Neutral	5,817,000
	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 -£2.03 million	Slight Adverse	2,030,000

3.9 Value for Money Statement

3.9.1 *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 still deriving from the traffic model and related to the greenhouse gases emission (benefits) and indirect tax revenue (disbenefits).

From the qualitative assessment, other positive impacts are produced on *journey quality* relatively to the pedestrians. **The scheme will have an adverse impact on *severance.***

3.9.2 *Option 1*

With regard to Option 1 (Sensitivity Test 1), the Economic Case has produced a **BCR value of 12.0**, which corresponds to Very High Value for Money. However, the qualitative assessment has produced a *Largely Adverse* impact on *severance.*

Since the BCR results present a very high value, **the implementation of the scheme should be still considered as High Value for Money.**

3.9.3 *Option 2*

As regards Option 2 (Sensitivity Test 2), the Economic Case has produced a **BCR value of 6.9**, which corresponds to Very High Value for Money. The qualitative assessment has not produced any moderate/Large impacts; **therefore, the implementation of the scheme will still have a Good Value for Money return.**

3.9.4 *Conclusions*

This Economic Case has assessed that the implementation of the scheme will have Very High Value for money return with regard to either options.

3.10 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 significant housing and employment development (for example at the JCS sites) to be brought forward;
- Enables development (housing; employment) to take place, where residents or employees have access to an improved highway network;
- Improve road safety;
- 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;
- Limits 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

There are five bus services which partly utilize the route currently, however this is diverted through Sainsbury's and therefore avoids using the entire route and isn't significantly affected by the congestion on the route due to this diversion towards Gloucester (details below).This scheme will help encourage bus services to use the entire route in the future and may allow provision for new bus routes to be established in the future also.

Current Bus Services

66E

Gloucester - Kingsway - Waterwells P&R - Hardwicke - Stonehouse – Stroud.

Stroud - Stonehouse - Hardwicke - Waterwells P&R - Kingsway - Gloucester.

66F

Gloucester - Copeland Park - Kingsway - Quedgeley - Frampton – Fretherne.

Fretherne - Frampton - Quedgeley - Kingsway - Copeland Park – Gloucester.

66Q

Gloucester - Copeland Park - Waterwells P&R - Kingsway – Quedgeley.

Quedgeley - Kingsway - Waterwells P&R - Copeland Park – Gloucester.

66S

Gloucester - Waterwells P&R - Stonehouse - King's Stanley – Stroud.

Stroud - King's Stanley - Stonehouse - Waterwells P&R – Gloucester.

113

Quedgeley - Hempsted – Gloucester.

Gloucester - Hempsted – Quedgeley.

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:

1. **Full OJEU tender (Schemes greater than OJEU limit of £4,322,012)**

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 tender period is typically 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.

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

GCC would opt for an 'open' tender, where anyone may submit a tender; this would include Pre-Qualification criteria which will be used to select 5 tenderers.

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. The successful 5 tenders will be assessed and a preferred supplier identified. A 10 day 'standstill' period will be adopted, during which unsuccessful tenderers may challenge the intention to award to the preferred contractor.

3. **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 GSWB Improvements scheme is 2) Open Tender. It is envisaged that the demolition works will be procured separately in advance of the highway scheme.

This option has been selected due to the estimated value of the scheme.

A detailed design will be completed for the scheme and the works are standard construction. For budget certainty the scheme will be procured on a lump sum basis as an ECC Option A contract (Lump Sum with Activity schedule).

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.** **E.g. 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 4-1: Scheme Commercial Risk Assessment.

*Risk allocation will be apportioned between GCC and the Contractor undertaking the site works. This will be based upon NEC principles and regular on-site Risk Management meetings will be held to ensure prompt mitigation of risks.

5 Financial Case

5.1 Project Costs

Commitment to funding the scheme will be sought at the Council Cabinet meeting in January 2018.

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

5.1.1 *Breakdown and Time Profile of Project Costs*

Originally the economics was completed based on a value of £7,449,000 however the revised total cost is now £7,300,000 the economics calculations will remain based on the higher total cost therefore the BCR score is based on a worst case scenario.

Project Cost Components	Capital Cost Items	*Cost Estimate Status (O/P/D/T)	Costs by year (£) Year of Estimate:					Totals
			2016/17	2017/18	2018/19	2019/20	2020/21	
Design & Management	Design fees, Surveys and trial holes	P	£49,000 £123,000	£450,000	£150,000	£100,000	£50,000	£922,000
Construction including Land Cost, Traffic-Related Maintenance	Non-Routine Re-construction Land Costs, Site clearance, Diversions of Statutory services. Widening and re-Surfacing of carriageway.	P	-	-	£3,500,000	£1,000,000	£522,000	£5,022,000
Contingency	Risk Adjustment	P	-	£52,000	£426,000	£130,000	£84,000	£694,000
	Optimism Bias at 10%	P	-	£50,000	£408,000	£123,000	£81,000	£662,000
Indirect Tax	Non-Recoverable VAT (if applicable)	-	-	-	-	-	-	-
Total Cost	(NB - Not Base Cost with Real Cost Adjustment)	P	£172,000	£552,000	£4,486,000	£1,353,000	£737,000	£7,300,000

*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*

The sources of funding for the scheme are summarised below.

	2015/16		2016/17		2017/18		2018/19		2019/20		2020/21		Totals
	Capital	Rev	Capital	Rev	Capital	Rev	Capital	Rev	Capital	Rev	Capital	Rev	
LEP	-	n/a	-	n/a	-	n/a	£2,000k	n/a	-	n/a	-	n/a	£2,000k
GCC	£49k	n/a	£123k	n/a	£552k	n/a	£2,486k	n/a	£1,353k	n/a	£737	n/a	£5,300k
Total	£49k	n/a	£123k	n/a	£552k	n/a	£4,486k	n/a	£1,353k	n/a	£737k	n/a	£7,300k

Table 5.2: Scheme Funding Sources and Profile of Contributions.

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			✓	April 2018	Mar 2018
GCC	GCC – Capital Funds			✓	April 2015	Oct 2021

Table 5.3: Security and Availability of Scheme Funding Contributions.

This FBC has been reviewed and accepted for submission by GCC's S151 officer. As stated in the County Council's Constitution, 'Directors are responsible for ensuring that variations in capital project estimates that occur during the course of a contract are contained within the resources allocated to that service'. Therefore, the County Council are committed to funding any overspend of the project.

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.

Table 5.4: Scheme Financial Risk Assessment.

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**	
Unforeseen increase in scheme cost reduces the VfM (i.e. BCR nearer to 1.0 'low')	✓			✓			✓			Scheme will be amended to reduce costs whilst ensuring that agreed Outputs are achieved. GCC would find additional funds to cover cost overruns
Earmarked / secured funds do not cover current scheme capital cost		✓			✓			✓		As above

5.4 Ongoing Maintenance

The scheme will include the following additional carriageway surface areas;

Gloucestershire County Council

The following information is from the GCC Maintenance contract;

For information only (and not accounted for in the BCR), to cover two surface treatments and a surface course resurfacing, the cost of the ongoing maintenance is estimated as £23.20 per m2. Over a 30 year design life this would equate to £0.77p per m2 per year. The scheme will construct additional carriageway area of 2360 m2.

The additional maintenance liability would therefore equate to £1,817 per year and GCC will include for this in maintenance budgets, and therefore does not impact on the budget and LEP funding for the scheme.

5.5 Land Purchase Funds

Details of funding requirement for land purchase are confidential, but have been made available for review by the LEP.

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 scheme will be managed in accordance with the Council's Code of Corporate Governance, which is available on GCC's web site at the following link;

http://www.gloucestershire.gov.uk/media/16758/gcc-code-of-corporate-governance.pdf

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)*

PB 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, and 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 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.

6.3 Project Management Structure

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

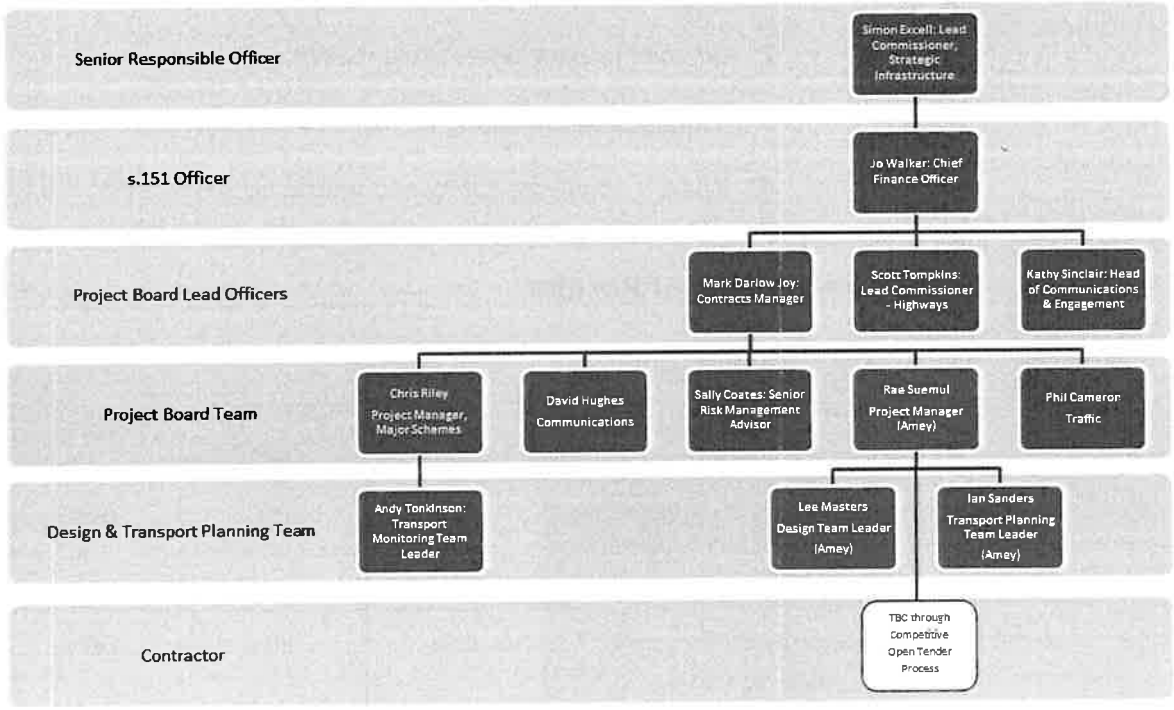


Table 6.1: Project Management Structure

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

6.4 Public Consultation

The key outcomes from the public share consultation have been summarised in table 6.2 and 6.3 below. Two separate public share events were held for the proposed GSWP improvement scheme. One was held at Sainsbury's on St Ann's way on Wednesday 5th of July 2017, and the second at Gordon League Rugby Football Club, Hempsted on Tuesday the 11th July 2017.

Over the two events there was an estimated 250 attendees, of which Amey received 44 comment sheets.

The overall consensus of the feedback received was very positive with support for the scheme and many felt this improvement was long overdue. The public were asked to provide feedback based around the four statements below;

1. Reduce traffic congestion and queues along GSWB;
2. Improve journey times along GSWB;
3. Increase capacity along GSWB to allow for future development;
4. Result in improved safety and reduce accidents along the GSWB.

6.5 Summary of Results

Comments	Agree	Neither Agree or Disagree	Disagree
Reduce traffic congestion and queues along Gloucester South West Bypass.	73%	7%	20%
Improve journey times along Gloucester South West Bypass	70%	14%	16%
Increase capacity along Gloucester South West Bypass to allow for future development.	75%	20%	5%
Result in improved safety and reduce accidents along Gloucester South West Bypass.	59%	25%	16%

Table 6.2: Summary of results from public share events.

6.5.1 *Public Share Event outcomes*

A list of key points raised by the attendees at the public share events are summarised below. The green box items have already been incorporated within the detailed design; the yellow box items are to be reviewed and included if appropriate to the overall scheme or reconsidered at a later stage by GCC. The red box items have been considered but will not affect the scheme on the grounds that they are not relevant, are not of benefit to the scheme or may be progressed separately.

Suggestions and concerns raised by attendees	How responded to and addressed
The moving of the pedestrian crossing will reduce the ability to cross the road safety. Could additional crossing points be included towards Gloucester College? The loss of the existing pedestrian crossing will further reduce the ability of mobility impaired vulnerable users to cross the road safely.	To be considered during "Detailed Design" and provision of additional pedestrian crossings to be included if feasible.
Increasing the road capacity will make it harder to exit (Turn Right) out of Hemmingsdale Close and Sudmeadow.	The planned signals at Sudmeadow road will create gaps in the traffic, which will help egress. A dedicated right turn lane will aid access. However it is accepted that the additional number of lanes will increase the distance required across the traffic lanes. This will be considered further during detailed design and additional space created to allow for dedicated right turn lanes and make this manoeuvre easier and safer.
Moving the roads towards the Priory and moving the Priory historic wall would have made more financial sense and less disruption to businesses.	Historic England has advised that the wall is of protected historic importance and includes the remains of the gatehouse. This dates back to the 1520's and are a very rare survival of this period and include decorative elements depicted in burnt brick within the wall.
Increasing the capacity at Sainsbury's end will just move the problem towards Llanthony Bridge.	The Traffic model indicates that this will not be the case, and planned improvements at A40 Over Roundabout will also help alleviate this.

Suggestions and concerns raised by attendees	How responded to and addressed
More detail on land purchase arrangements should be provided to effected businesses.	GCC Asset Management Property Services team have been in contact with all property owners and their agents. This comment has been relayed to them. Details were taken from all business owners who attended and copies of drawings sent to them.
Hope that the land purchased will be fully utilised and not left unused.	Only land required for the new road alignment will be retained as part of the new highway, although it is required to have some space for vehicle run-off, utilities provisions, lighting etc. Structural survey of the effected buildings is not yet complete and this will determine how viable it is to partially dismantle the buildings.
Concern that traffic Lights at Sudmeadow road will not be in sync with the lights on St Ann's way.	This will be resolved during detailed design. All traffic signals will be tied together and linked so that phasing and signal offsets are optimised.
Yellow box road markings are needed at the front of Gulliver's truck hire to avoid road rage as people not let out.	This will be looked at and addressed during detailed design.
Nothing has been mentioned about the junction linking Hempsted lane with Llanthony Road, which can be difficult.	This has been considered by the GCC in the past but there are no current schemes in place to address this issue. However, it is expected that the proposed scheme will help to alleviate this issue.
What will happen with access to the Secunda Priory?	There is a separate scheme which is currently being developed by GCC and the Llanthony Priory trust to amend access to the Priory. The current access via Llanthony Road will be removed and the new access will be located behind the "High Orchard Pub" on to St Ann's Way.
Left turn lane from A430 into St Ann Way needs to be longer as queues often build up here.	The proposed road widening on the approach to the junction will allow left turning vehicles to queue without blocking the straight ahead movements at the junction. The junction traffic movements will be reviewed and dedicated left turn lane included if justified by traffic figures.
Keep Clear marks are needed on A430 on the entry to old Hempsted Lane (near Monks Corner shop).	This is outside the scope of the scheme but the issue will be reconsidered after traffic patterns have settled down following completion of the road widening scheme.

Suggestions and concerns raised by attendees	How responded to and addressed
Concern about TM causing congestion during the works.	Unlikely that any movements through the site will be severely restricted or that lengthy road closures will be required. All efforts will be made to reduce the impact of TM on residents, businesses and travelling public.
There are currently high speeds along the bypass and this will get worse when the remaining section is widened.	Removing congestion and reducing vehicle queues will result in traffic moving more freely and average speeds being higher. But the top end speeds are not likely to increase because of the scheme.
Speed cameras should be installed to ensure that the speed limit is adhered to.	This is not included in scheme proposal as speed enforcement is by Police authorities.
Allowing vehicles to turn right across 3 lanes of traffic into the businesses on the A430 south of St Ann Way junction is dangerous.	This is outside the scope of the scheme but the issue will be reconsidered after traffic patterns have settled down following completion of the road widening scheme.
A new road should be constructed connecting Hemmingsdale Road to Sudmeadow Road, allowing the Hemmingsdale Road/A430 junction to be closed off.	This suggestion is outside the scope and the budget of the current scheme but would be considered further if there are future developments in the area.
Would it be possible to provide a refuge for vehicles turning right out of Llanthony Business Park. It is accepted that it would be impractical to accommodate large vehicles but if a refuge for a car or small van could be provided it would make a significant contribution to safety	To be considered further as part of the detailed design.

Table 6.3: Summary of comments from the public consultation.

6.6 Communications and Engagement Management

GCC have a tried and tested Communication and Engagement Management Plan which is used on all major projects. 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.

6.6.1 *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.

Table 6.4 below indicates the approach used by GCC to categorise the various scheme stakeholders.

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 6.4: Stakeholder Categorisation Approach.

6.6.2 *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 6.5: Stakeholder Engagement Levels.

Stakeholder Communication

Table 6.6 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
Property owners and businesses operating in building affected by the works	Affected	Intensive consultation	Pre-exhibition briefing Direct contact with owners and where appropriate their agents.
LLanthony Secunda Priory	Affected	Intensive consultation	Direct Contact *(Continuing discussions regarding new access.)
Local MPs	Interest	Consultation	Pre-exhibition briefing
Elected Members	Interest	Intensive consultation	Pre-exhibition briefing
Scheme users	Beneficiary	Consultation Information	Public Share Events

Name of Stakeholder / Interest Group	Stakeholder Category	Engagement and Consultation Level	Engagement Method
Local press/radio	Interest	Information	Pre-exhibition briefing
Local Enterprise Partnership	Beneficiary Funding	Information	Through LGF Business Cases & progress reports

Table 6.6: Stakeholder Management Strategy and Method.

- Historic England – Site meeting has been held with the agency and they have requested the existing Street Lighting columns be moved further away from the historic wall on Llanthony Road. This will be considered further as part of the detailed design and columns relocated if feasible.
- *Llanthony Secunda Priory's response is included at Appendix F. They are in support of the scheme and request their access from Llanthony Road be reviewed. There is a separate scheme, to amend the access, which is currently being developed by GCC. The current access via Llanthony Road will be removed and the new access will be located behind the "High Orchard Pub" on to St Ann's Way. The Llanthony Priory trust will be consulted as this scheme is developed. The Llanthony Secunda Priory trust have committed to providing £29,000 contribution towards the new access.
- Public Share Events – Events held in local venues on a drop in basis. Large scale plans and graphic together with scheme introduction, background and FAQs. The event was manned by scheme designers and engineers together with GCC project manager. Attendees offered 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.
- County Member engagement - Pre- consultation meetings have been held to discuss the scheme in detail with GCC project manager on a one to one basis. Details also provided for all online content which included a public share event literature, display boards and drawings. Feedback was positive with no suggested amendments.
- City Ward Councillors were notified of the public share events and provided with hyperlinks to on-line copies of all the public share information.
- Gloucester City Council has confirmed their support for the scheme and their response is included within Appendix F.

Richard Graham MP; endorsed the scheme ""Sorting out the A430 traffic bottleneck by Llanthony Priory is vital to our City. At the moment traffic queues extensively at this location and the overall increase in congestion has been captured by Stagecoach and forms their biggest Gloucester concern..... "

The following statutory stakeholders have all been contacted and no responses received.

Stakeholder Contact	Representing
midlands-western@rha.uk.net	Road Haulage Association
tseager@fta.co.uk	Freight Transport Association
igallagher@fta.co.uk	Freight Transport Association
publicrelations@swast.nhs.uk	South Western Ambulance Service
fire@glosfire.gov.uk	Gloucestershire Fire & Rescue service
Dave.Collicott@gloucestershire.pnn.police.uk	Gloucestershire Police
bill.carr@gloucestershire.gov.uk	GCC Integrated Transport
Rupert.Cox@stagecoachbus.com	Stagecoach
terry.smith@guidedogs.org.uk	Guide Dogs for the Blind
ian.hathaway@dsa.gsi.gov.uk	The Driving Examiners (Green Farm Business Park)
Susan.Bushell@guidedogs.org.uk	Guide Dogs for the Blind
chair@gloscccp.co.uk	Gloucester City Centre Partnership
tim.ayers@dsa.gsi.gov.uk	The Driving Examiners (Ashville Road)
info@gloucesterchamber.org.uk	Gloucester Chamber of Trade and Commerce
info@marketinggloucester.co.uk	Marketing Gloucester
heretohelp@gloucester.gov.uk	Gloucester City Council

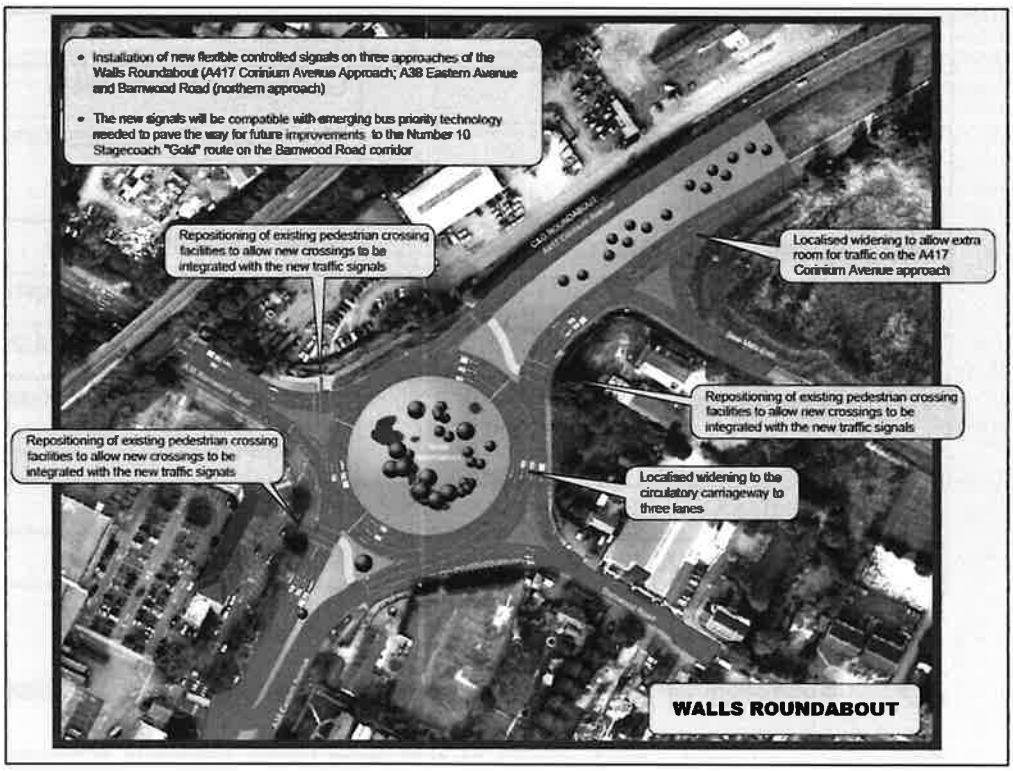
6.7 Evidence of Previously Successful Management Strategy

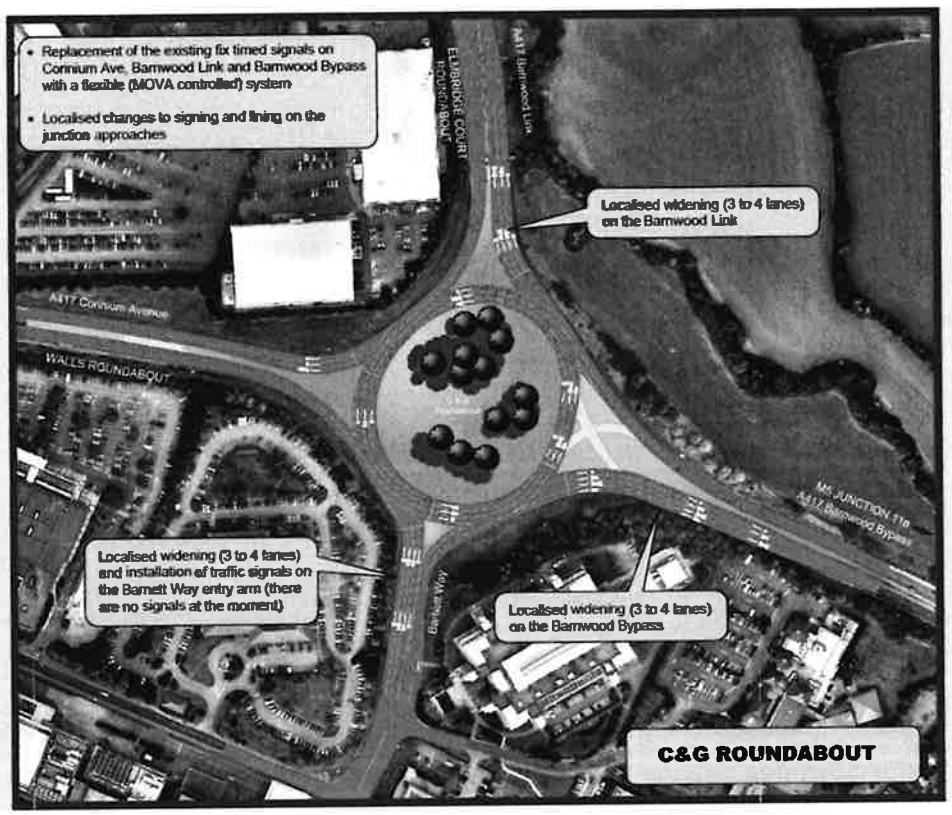
GCC have a successful track record of delivering major transport schemes within the county. The most recent of which was the Walls C&G Roundabout Contract (WC&G).

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.

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





6.8 Availability and Suitability of Resources

The scheme is intended to be delivered using a collaborative approach between GCC staff, their appointed support organisation Amey, and the appointed Contractor (s) for the works. 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.

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*

Works are not all within the highways boundary and there is a requirement for land purchase for temporary and permanent works. Negotiations for land purchase have commenced and are being led by GCC's Asset Management Property Services Team.

6.10.2 *Traffic Regulation Orders (TRO)*

It is likely that TRO's will be required and the processing of these has been programmed. A study of the section of road where changes are proposed will be undertaken to determine what Traffic Regulation Orders (with regards to the Road Traffic Regulation Act 1984) or other formal procedures may be required. In relation to the changes proposed, these could include:

- Waiting restriction changes – new or revised parking restrictions, loading restrictions;
- Turning bans – left or right turn bans, U-turn bans;
- Box Junctions;
- Speed Limit changes – any reduction or increase;
- Footway use changes – i.e. if a shared use foot/cycle way is proposed.

6.10.3 *Environmental Restraints*

With the exception of restrictions to works in the vicinity of the Historic Wall, no other exceptional restraints have been identified.

6.11 Project Programme

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

Activity	Target Date
Submit Full Business Case for Approval	December 2017
Approve Full Business Case	February 2018
Complete Land Purchase	May 2019
Issue Supplier Engagement Notice for Highways Scheme	November 2019
Issue Tender Documents for Highways Scheme	December 2019
Tenders Return	January 2020
Complete Tender assessment and award	February 2020
Construction Start Highways scheme	February 2020
Construction End Highways scheme	October 2021

*Prior to the highways scheme there will be separate land clearance and stats diversions contracts. Worse case dates have been quoted in case CPO becomes necessary.

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 associated outcomes have been converted into measurable indicators of scheme benefits, as set out in the table below. Outcomes 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.

Ref	Benefit (Desired Output / Outcome)	Benefit Indicator	Target	Type	Specific Data Requirements	Owner
Desired Outputs						
1	Improvement to roads (including new signals and increased capacity)	Completion of project	0.7km (length of scheme)	Highway Improvement	n/a	GCC
2	New Roads and Cycleways	Completion of project	0.1km new roads and 0.2km new cycleway (widened to 4m shared use)	Highway Improvement	n/a	GCC
3	New lanes created (for through traffic and improved right-turn provision)	Completion of project	7 (new lanes)	Highway Improvement	n/a	GCC
Desired Outcomes						
4	Improvement in journey time along the GSWB.	Journey Time Reduction Baseline Journey Times have been identified using Base map software (Detailed Below).	Reduction in vehicle journey times immediately after the scheme is implemented.	Qn	Base Map Bluetooth Data.	GCC
5	Minimal Accidents along the GSWB.	Number of accidents. Baseline. **Between Jan 2012 - Dec 2016** **Fatal** - 0 **Serious** - 4 **Slight** - 15 (2 Involved Cyclists)	No increase in accidents 5 years after construction.	Qn	Accident Data.	GCC

Ref	Benefit (Desired Output / Outcome)	Benefit Indicator	Target	Type	Specific Data Requirements	Owner
6	Increased traffic capacity for the corridor	Traffic Flows (See Table 6.9 & 6.10)	Reduce Journey Times.	Qn	Traffic Flows	GCC
7	Regeneration of the corridor	Number of new developments		QI	Development within 1km of scheme (housing & employment)	GCC

Table 6.7: Outputs and Outcomes - Indicators and Targets.

6.12.4 *Baseline Journey Times*

Baseline data will be collected again before the scheme is constructed (programmed for 2020) in order to gain a accurate representation of the effect of the scheme. This will allow a comparison of both journey times and vehicle counts immediately before the start of construction and after the scheme.

Castlemeads Car Park to Quayside Way (Basemap Data)		
Direction	Average Journey Time (Seconds)	
	AM	PM
Southbound	130	157
Northbound	176	157

Table 6.8: Baseline Journey Time along the GSWB, Journey Times (2017)

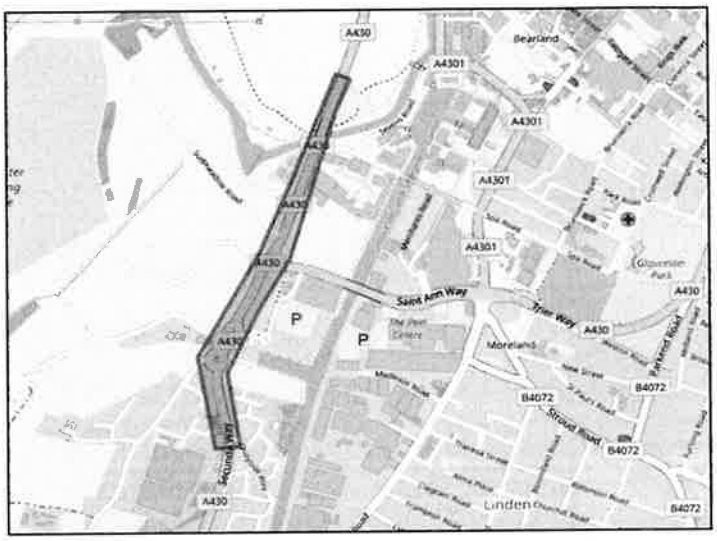


Figure 6.1 – Site Location of Basemap Data, Length of Journey Times.

6.12.5 *Baseline Vehicle Counts*

Baseline traffic data is summarised in the tables below. Note that the two locations for the data are shown in Figure 6.2.

Time Period	Manual Count 2017	
	A430 Gloucester Southwest Bypass (Vehicles)	
	Northbound	Southbound
AM (08:00-09:00)	1373	940
PM (17:00-18:00)	1352	1013

Table 6.9: Manual Vehicle Count during the Peak Periods along the GSWB.

Time Period	Weekday Average ATC Data 2017	
	A430 Gloucester Southwest Bypass (Vehicles)	
	Northbound	Southbound
AM (08:00-09:00)	1158	906
PM (17:00-18:00)	1406	668

Table 6.10: Weekday Average ATC Count during the Peak Periods along the GSWB.

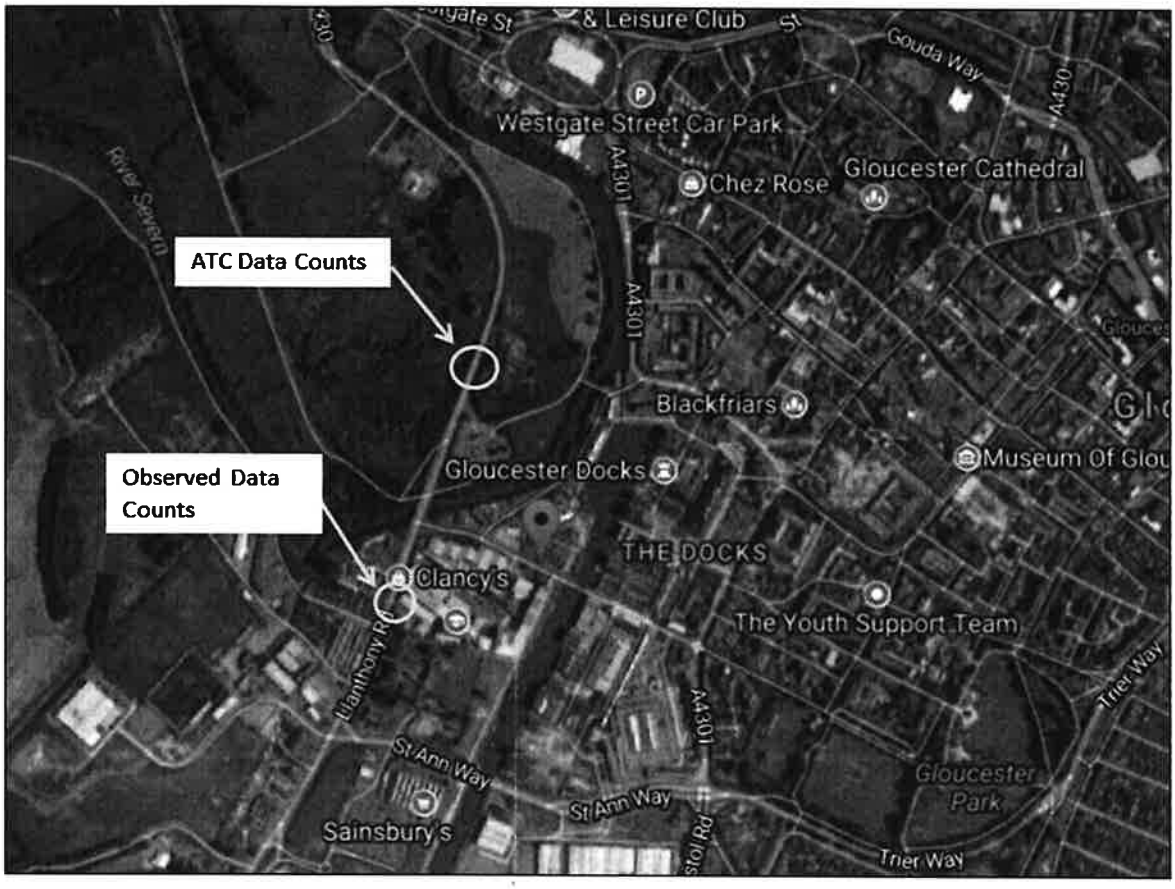


Figure 6.2 – Site Location of the Observed and ATC Counts, Llanthony Road

6.12.6 *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.

6.12.7 *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 possible.

6.12.8 *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 6.7 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.

	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
Economic Growth (housing, jobs)	Derived from traffic surveys and ATC data	Realisation involves other schemes, including non-transport (e.g. JCS development)	Third parties

Table 6.11: Benefits Realisation and Monitoring.

6.12.9 *Key Project Risks*

A project risk register is to be maintained throughout the scheme duration. The Project Risk Register is included as Appendix D and a Construction phase risk register will be developed with the Contractor and proactively managed during the construction phase.

The following risks have been identified as having greater potential to delay the scheme. These items will be reviewed at regular design progress meetings and risk register meetings;

Reference	Risk Description
A1.1	Scheme programme clash with other projects.
A3.1	Land Purchase delays.
A3.2	Planning permission delays.
A3.4	Additional 3rd party land requirements.
A4.1	Delays in diversions by Statutory Bodies.
A5.1	Environmental Assessments/surveys identify new activities or programme constraints.
A5.2	Bird nesting season delays works.
A5.5	Archaeological findings delays works.

7 Conclusions and Recommendations

7.1.1 *Conclusions*

The preferred option put forward for the Full Business Case is Option 1. After consideration of all of the options it was considered Option 1 was the most appropriate to achieve the agreed aims and objectives.

The most significant benefit from this option 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. Option 1 generates a PVB of **£64.27M.**

It is also important to note that the Economic Case for option 1 produced a **BCR value of 12.0**.

Further justification for the selection of option 1 is 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 ongoing and future development in the local area, which are essential to support the much needed local economic growth. It is also noted that the scheme has strong public support and approval at the Public Share events that took place in July 2017.

7.1.2 *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.