

# West of England

## Full Business Case

### *LGF Pinch Points Fund: A4018*

		Originated	Reviewed	Authorised	Date
1	Version 1.0	13/05	JP	SR	20/05/19
2	Version 2.0	23/05	JP	SR	24/05/19
3	Version 2.1	28/05	JP	JH	28/05/19
4	Version 2.2	01/06	JP	JP	01/06/19
5	Version 2.3	21/06	JP	JP	21/06/19
6	Version 3	18/10	SR	SR	28/10/19
7	Version 3.5	21/11	JH	JR	26/11/19
8	Version 3.6	27/11	Jacobs/ JR/ KS	JR	28/11/2019
9	Version 3.7	29/11	JH/ KS/ JR	JP	29/11/2019
10	Version 4.0	29/11	JH	SB	29/11/2019
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## Executive Summary

The A4018 corridor is an important radial route into Bristol providing a connection between the city centre and west of the city, the M5 motorway at Junction 17, as well as to the Cribbs Causeway shopping centre, nearby retail parks and emerging Cribbs Patchway New Neighbourhood. As with much of the highway network within the city the A4018 experiences congestion during weekday peak traffic periods with queuing and delay on the approaches to a number of pinchpoint junctions along the corridor.

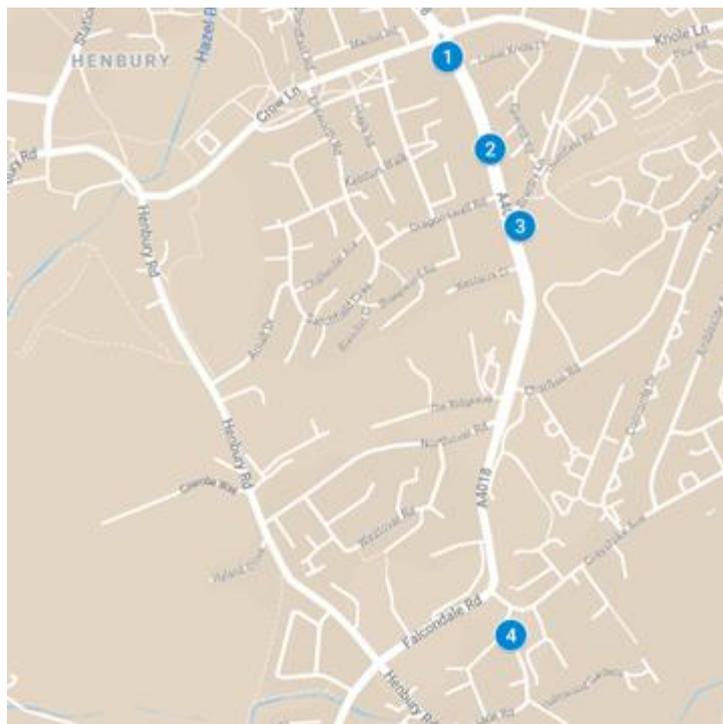
Alongside a wider package of improvements, the objective of the A4018 Improvements project is to facilitate reliable, rapid and affordable alternatives to car use for both new and existing residents and commuters in the area. While not dependent on the scheme, the Cribbs Patchway New Neighbourhood (CPNN) comprising 5,700 new homes would also benefit by being served by high-quality sustainable transport provision on adjacent transport corridors. The transport interventions within this project form part of a wider programme for the entire corridor including bus priority measures, upgrades to key junctions, to improve traffic flow, and the creation of new walking and cycling infrastructure.

### Details of measures

- **Public transport improvements:** Upgrading the outbound Brentry Lane bus stop along Passage Road (currently flag and pole) to a modern full bus shelter with real-time passenger information (RTPI).
- **Safety improvements:** Upgrading the existing signalised crossing on Passage Road, immediately south of the Crow Lane Roundabout, and installing a new signalised pedestrian crossing across Passage Road near the junction with Dragonswell Road. The installation of a Zebra Crossing on Passage Road near the junction with Shipley Road to facilitate safer crossing movement for pupils of Westbury on Trym Primary School and local residents.
- **Active mode infrastructure:** Constructing a segregated bi-directional cycle path from Crow Lane roundabout to the Charlton Road junction, with a priority crossing over the side road of Brentry Lane, while maintaining high-level walking provision and footway capacity.
- **Variable messaging signs:** Installing two variable messaging signs (one inbound-facing and one outbound-facing) along the A4018 to improve network flow.

The measures proposed within this request for funding cover a significant section of the existing A4018 corridor. An overview map with five key interventions marked is shown below in Figure 0.1:

Figure 0.1 Overview map of A4018 interventions



**Intervention 1:** The proposed signalised crossing upgrade south of Crow Lane Roundabout

**Intervention 2:** The proposed new signalised crossing near Dragonswell Road

**Intervention 3:** This marks the midpoint of the proposed new segregated cycling and walking facility between Crow Lane Roundabout and Charlton Road

**Intervention 4:** The proposed new zebra crossing near Shipley Road

#### Links to other schemes and relevant policy

The improvements outlined in this Business Case are linked in with policy, strategic and housing aims in the area, including:

- Cribbs Patchway New Neighbourhood (CPNN), consisting of 5700 new homes is progressing at Filton Airfield, some of the impacts of which the proposed scheme aims to mitigate.
- 'Bus Deal' improvements are proposed to take place on all major corridors in Bristol, including the A4018. These improvements will aim to meet the same strategic goals as the interventions suggested as part of this FBC, and will build on improvements that we deliver.
- As further mitigation against the impact of the new housing on Filton Airfield, South Gloucestershire Council are also undertaking a package of measures north of Crow Lane roundabout.
- The A4018 is also a key route in the Local Cycling and Walking Infrastructure Plan, demonstrating its value as a priority walking and cycling corridor.

The project is well supported by local policy including the emerging Bristol Transport Strategy and Joint Local Transport Plan 2019-2036. Both of these strategic documents highlight the need for a transformational sustainable change to the transport network to both accommodate the 105,000 new homes and 82,500 jobs that are expected to be created in the area by 2036 and a more sustainable way of travelling in the area.

The improvements proposed within this FBC will support and integrate with the schemes and policy described above, supporting shared strategic goals.

### Scheme objectives

The scheme objectives, discussed in greater detail later in the FBC as part of the Options Appraisal process, are:

- TPO1: To improve journey quality for all users of the corridor, especially in order to facilitate reliable, rapid and affordable alternatives to car use for new and existing residents and commuters.
- TPO2: To improve the safety of all users, including those in non-car modes, along the A4018 corridor.
- TPO3: To improve the attractiveness of active travel mode infrastructure along the A4018 corridor.

These objectives are designed to inform our options appraisal process and result in the delivery of positive outcomes on the A4018 corridor for existing residents and commuters, as well as additional users of the corridor as a result of new developments.

### Economic summary

The economic impacts associated with the package of improvements to the A4018 are as follows;

£8.6m (2010 prices and values) of conventional transport economic benefits relating to an uplift in walking and cycling trips, public transport user benefits as well as time savings from the introduction of VMS signs:

- i. Public transport user benefits (2010 prices and values): £34,261
- ii. Variable messaging signs (2010 prices and values): £1,449,176
- iii. Active mode user benefits relating to commuters and school children at primary/secondary schools within the identified catchment (2010 prices and values): £7,120,919.

68 construction stage jobs and a construction stage GVA uplift £1.6m (2010 prices and values).

The benefits are summarised in the table below (Figure 0.2). A detailed methodology including assumptions and the assessment of the impacts is presented in the accompanying economic appraisal note.

### Value for Money Summary Table

<i>Total project cost (including project management and QRA allowance)</i>	<i>£4,060,091 (2019 prices, undiscounted)</i>
<i>Grant sought (EDF/LGF/RIF)</i>	<i>£3,448,916 (2019 prices, undiscounted)</i>
<i>Present Value of Costs</i>	<i>£2,760,862 (2010 prices, discounted)</i>
<i>Net Quantified Benefits</i>	<i>£8,604,356 (2010 prices, discounted)</i>
<i>VfM indicator*</i>	<i>3.1</i>

Figure 0.2: Value for money table

### **\* Benefit compared to total cost**

The scheme along with other enabling infrastructure would also indirectly support unlocking of homes and jobs in the area, as it would reduce network constraints and make the area more attractive for growth. In the short / medium term, using TEMPRO data, it is estimated that such indirect benefits of infrastructure improvements in the area including the scheme proposals could be 211 homes and 41 jobs. Further analysis of these benefits is provided in Appendix B.

### **Procurement and delivery**

Procurement will be undertaken through an existing Highway Construction Framework, which provides for flexibility for smaller and larger tenders.

The project itself will be delivered by Bristol City Council's Transport Programme Team, which has experience in delivering a range of infrastructure projects. Detailed information about the project structure is available in the Management Case section of the FBC.

Key risks to delivery are discussed in detail as part of the Quantified Risk Assessment (QRA) process, but particular notice is drawn to:

- Potential conflict with other important schemes, such as the Clean Air Zone, resulting in the reduction of capacity to deliver the A4018 project
- Unforeseen reductions in capacity internally in the Transport service and other areas
- Construction issues on site that might increase the complexity of the work to be undertaken

# 1 Strategic Case

## 1.1 State Aid Considerations

The A4018 Improvements scheme involves a series of transport interventions that will provide accessible infrastructure to the public. Procurement of goods and services to deliver the schemes will be undertaken using Bristol City Council's Highway Construction Framework which is compliant with public sector procurement regulations. The scheme is not in breach of State Aid regulations. Although the scheme does make use of state resources, its realisation will not result in an advantage to one organisation over another, nor have the potential to distort competition between economic entities or affect trade between Member States.

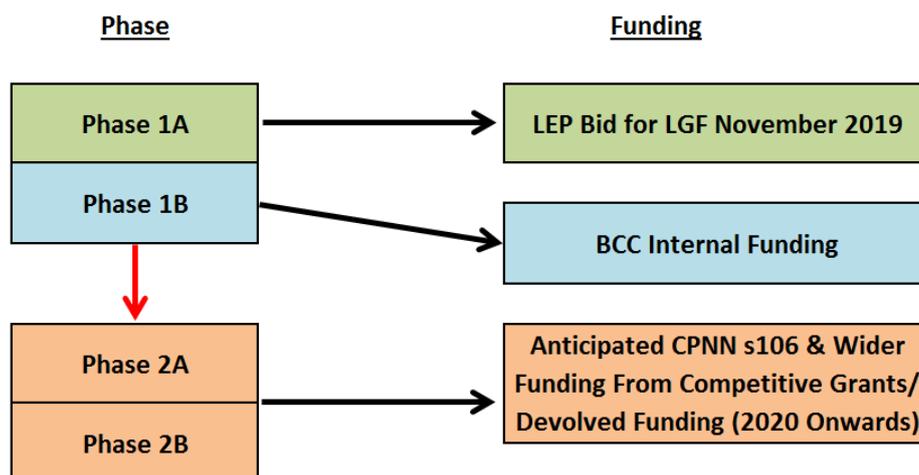
## 1.2 Project Description

The A4018 project is the first stage of a wider programme of interventions on and alongside the corridor and consists of 2 main phases:

- 1) Phase 1 is the initial series of interventions, beginning just south of Crow Lane Roundabout, which will be delivered starting 2020. Of this:
  - i) Phase 1A consists of those elements proposed to be delivered using LGF funding through this Business Case to the West of England LEP.
  - ii) Phase 1B consists of those elements of the wider programme to be delivered alongside the LGF works, minimising highway and resident disruption. These will be funded by Bristol City Council local contributions. These complementary measures are not dependent on the delivery of Phase 1A, although co-ordinating the works would provide benefits.
- 2) Phase 2 contains the elements of the wider programme, which will be funded from other funding opportunities chiefly anticipated to be s106 contributions from the CPNN development. Of this:
  - i) Phase 2A consist of the most-developed, priority elements of the wider programme, including interventions proceeding south along the corridor from the limit of the proposed LGF works.
  - ii) Phase 2B consist of less-developed or non-priority wider works around the corridor, including interventions subject to local or political re-engagement.

The process by which this phasing has been defined is detailed in the Options Appraisal Section. Figure 0.3 below shows a summary diagram of the phasing.

Figure 0.3: A4018 phasing diagram.



The implementation of Phase 1A (taking place between 2019 and 2021) is dependent on securing LGF funding through this bid and consists of the following elements:

- Public transport improvements: Upgrading the outbound Brentry Lane bus stop along Passage Road (currently flag and pole) to a full bus shelter with real-time passenger information (RTPI).
- Safety improvements: Upgrading the existing signalised crossing on Passage Lane immediately south of the Crow Lane Roundabout and installing a new signalised pedestrian crossing across Passage Road near the junction with Dragonswell Road. Installation of a Zebra Crossing on Passage Road near the junction with Shipley Road to facilitate safer crossing movement for pupils of Westbury on Trym Primary School and local residents
- Active mode infrastructure: Constructing a segregated bi-directional cycle path from the Crow Lane junction to the Charlton Road junction, with priority crossings over the side road of Brentry Lane, while maintaining high-level footway capacity.
- Variable messaging signs: Installing two variable messaging signs (one inbound-facing and one outbound-facing) along the A4018.

The improvements outlined above have been progressed to preliminary design stage and General Arrangement drawings are available in Appendices A1, A2 & A3. Please note that the bus priority elements of the wider programme are included on these drawings as a result of the entire corridor being designed at the same time. These bus priority elements are the principal element of Phase 1B.

Additional works north of the Crow Lane Roundabout will be managed by South Gloucestershire Council and will focus on providing entrance and egress to and from the south and west of the CPNN development in the form of new junctions and possible bus priority measures.

### 1.3 Project Objectives and Case for Change

The West of England area is one of the strongest performing sub-regional economies in the country, and one of few that provides an annual surplus to the Treasury. Despite this impressive growth, the continued success of the area will rely heavily on delivering a transformational change to the transport network to manage the additional demand created by new housing and jobs.

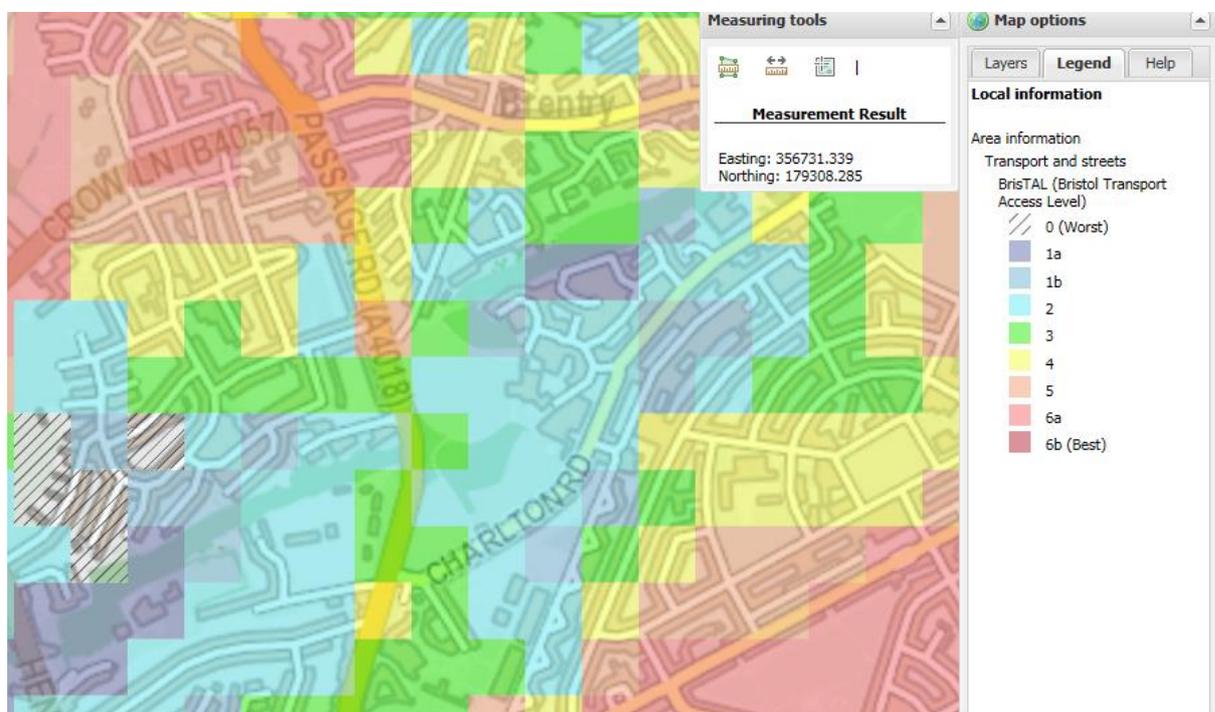
The key objective of the A4018 Improvements scheme is to encourage new and existing residents, as well as other stakeholders in the area, to choose sustainable modes of transport in favour of car travel. This is specified as part of the Options Appraisal process, along with two other secondary objectives:

- TPO1: To improve journey quality for all users of the corridor, especially in order to facilitate reliable, rapid and affordable alternatives to car use for new and existing residents and commuters.
- TPO2: To improve the safety of all users, including those in non-car modes, along the A4018 corridor.
- TPO3: To improve the attractiveness of active travel mode infrastructure along the A4018 corridor.

These objectives have been designed to ensure a scheme that addresses the transport issues in the area. These consist of:

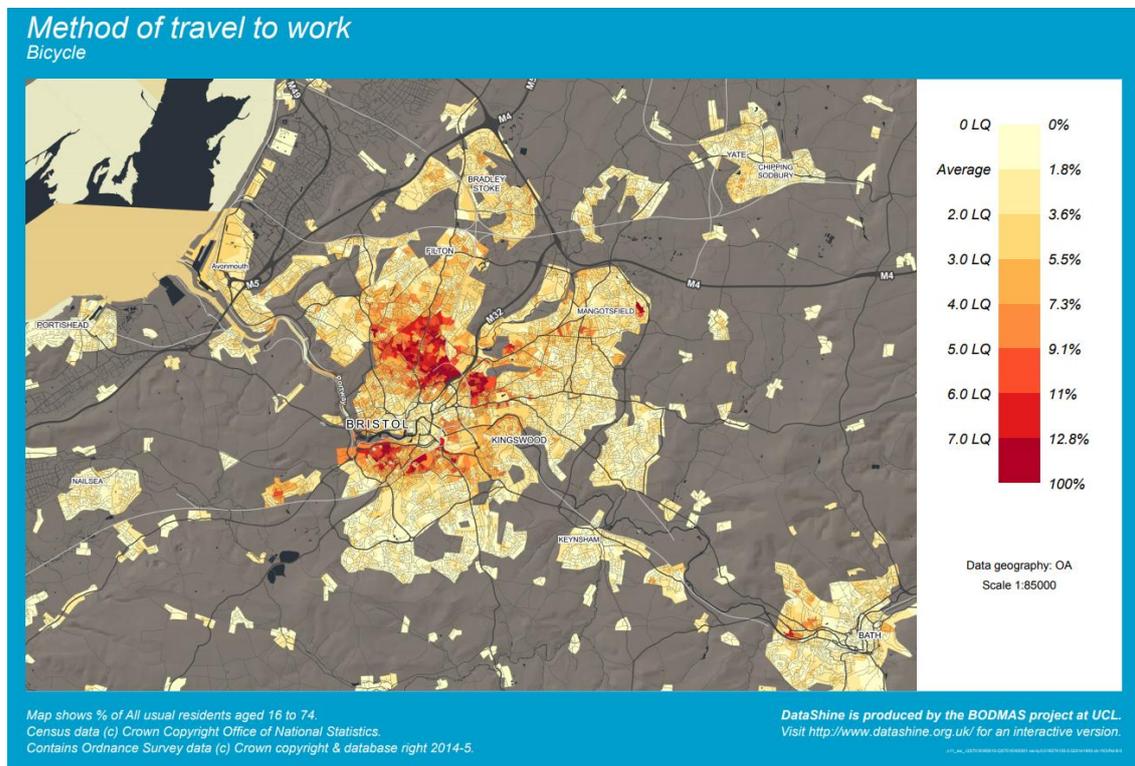
- Journey time issues. VISSIM modelling for the corridor shows a 17% increase in AM and PM vehicle traffic expected between 2016 (reference case) and 2036 without any action taken. Illustrated through journey times for all vehicles in the morning peak, there is a 75% increase for southbound traffic between Crow Lane and Henbury Road between 2016 and 2036; the opposite direction in the evening peak sees a 50% increase.
- Public transport accessibility. Figure 0.4 below illustrates the level of access to public transport in the area immediately adjacent to the scheme. The corresponding legend shows the colour coded performance rating of each 100m<sup>2</sup>. The tool (BrisTAL) assesses public transport access based on walk time to bus stops, waiting time at bus stops, frequency of services and timing of services (e.g. AM peak, midday, PM peak). The tool suggests that residential areas along Charlton Road and areas of Henbury (south of Crow Lane) have a particularly poor level of access to bus services.

Figure 0.4: Accessibility to public transport.



- Low active mode share. As illustrated in Figure 0.5, the mode share for cycling in the study area is comparable to other outlying suburban areas of Bristol, ranging from 0-5% of commuting mode share based on 2011 Census data. However this level of cycling is relatively low compared to the city average as whole (8%). Moreover, areas such as Fishponds (an equivalent distance from the city centre) have a cycling mode share ranging from 7-12% which suggests that the presence of high quality cycling infrastructure (in the case of Fishponds: the Bristol to Bath Railway Path) can encourage people to cycle greater distances.

Figure 0.5: Accessibility to public transport.



- Road Safety. Between the 24/04/2014 and the 12/12/2018 there have been 12 recorded collisions within the Phase 1A area. Of these, 11 has been 'slight' involving a combination of cars, cycles and bus/coaches and another in November 2017 which resulted in a fatality. Injury or fatalities through traffic collisions are clearly not acceptable on any road in Bristol and the safety improvements at junctions and new crossing points proposed through this project should help reduce the potential for future collisions.

The case for change is that the 'do-nothing' scenario would represent an unacceptable increase in traffic volume affecting the quality, sustainability, and safety of local journeys.

The interventions to be delivered as part of this project will achieve these objectives through encouraging new and existing local residents and commuters to choose active and sustainable travel modes on and along the corridor as opposed to the private car, resulting in improved journey quality. Specifically:

- 1) New and improved bus shelters will increase the attractiveness of bus journeys along the corridor. This will result in less congestion through the more efficient movement of people, and public environment improvements.
- 2) Safety improvements will increase the attractiveness of active mode travel choices such as walking and cycling along the corridor and will enhance journey quality of all users.
- 3) Active travel infrastructure improvements will increase the attractiveness of active mode travel choices such as walking and cycling along the corridor. This will result in less congestion through the more efficient movement of people, improvements in the built environment, and public health improvements in both exercise and cleaner air.
- 4) Network Management improvements will result in journey time savings along the corridor, improving the quality of journeys for all users.

The future scenario to be achieved through the delivery of these integrated interventions will be a corridor in which infrastructure unlocks efficient, active, and sustainable journey choices for those who use it, minimising congestion and prioritising safety.

## **1.4 Rationale for Public Intervention**

The scheme should receive public funding as it represents a pre-emptive and proactive approach to supporting sustainable development that will help the sub-region meet its ambitious housing and employment targets. Without public funding to meet the shortfall, the necessary sustainable transport infrastructure will be delivered in a piecemeal and disjointed manner stifling growth and resulting in a poor quality transport offering to new and existing residents of the area.

The risk is that developer funding will arrive too late in the delivery programme to ensure that new residents of CPNN benefit from viable alternatives to car travel from the period they move in. The likelihood is that this will result in a dependency on car travel which will not only have a detrimental effect on highway capacity, but will also 'lock-in' unsustainable travel habits that can prove hard to shift once they become ingrained behaviour. Moreover, given the scale of the works required, developer contributions will not be sufficient to cover the costs of the complete programme of works.

In relation to the biggest development in the area – CPNN – South Gloucestershire Council (SGC) is in a landowner framework agreement with the three principal developers. This agreement ensures that developers provide a financial contribution to the transport mitigation package as set out in the CPNN Development Framework (2014). Securing LGF funding for Phase 1A will facilitate a proactive approach to mitigating the impacts of the development and allow BCC to direct s106 funding to other critical elements of the programme of works, as outlined in Phase 2.

## **1.5 Strategic Fit**

The A4018 project is well-aligned to local policies and strategies. The emerging Joint Local Transport Plan sets the transport vision for the West of England Area and notes the key challenges facing the sub-region including:

- Two out of three commutes are currently made by car
- Transport is the largest contributor to greenhouse gas and CO2 emissions
- Over 300 premature death per annum are linked to NO2 emissions
- Two in five commutes by car are less than 2km

- Only one in 11 commutes by public transport

By facilitating the use of high-quality, affordable and reliable alternatives to car travel the project will help to meet these challenges and support sustainable economic growth – also a key objective of the Strategic Economic Plan.

The Bristol Transport Strategy specifically identifies integrated corridor approaches as a BCC objective, with ‘Outcome 11’ specifying ‘More efficient transport corridors to move the largest number of people in the space available’. Through the promotion of active and sustainable modes to prioritise highway space, the A4018 Improvements Project will help achieve this.

The West of England’s emerging ‘Local Cycling and Walking Infrastructure Plan’ (LCWIP) uses recognised DfT methodology and data sets to identify priority walking and cycling routes across the sub-region. The A4018 is amongst the region’s priority routes for investment, with the proposed package of works contributing to meeting the improvements detailed in this plan, such as the bi-directional cycle route south of Crow Lane and the school crossing near the junction of Passage and Shipley Road.

Finally the A4018 is noted in the Bristol Core Strategy Key Diagram as a proposed ‘Showcase Bus Corridor’. As a major bus corridor, especially for the Number 1 and 2 services, it is also likely that complementary works undertaken as part of the Bus Deal project will provide a wider programme of interventions to improve journey quality for public transport users, with the potential for achieving modal shift.

The proposals have undergone informal public consultation between 4 February and 17 March 2019. Over 3,000 responses were received, and it is estimated that over 2,000 people attended drop-in sessions at local venues.

Elements of the original proposal that received a large number of consultation objections (such as signalisation of Crow Lane Roundabout; banned local movements along the corridor and restricting through-traffic through Westbury Village) have either been dropped from the programme or will be re-considered via further engagement with the local community. The original proposal for 24-hour bus lanes through the area of these proposals (76% against and 13% in favour) have been amended to have the bus lanes enforced only in the morning and evening peaks.

On the other hand, the zebra crossing in Westbury Village received 65% support and is being taken forward; the signalised crossing close to Dragonswell Road received an even higher level of support. Of the several hundred free text responses referring to cycling, the largest number expressed a preference for high-quality segregated cycle routes; this input has resulted in the re-design work that has resulted in the segregated cycle routes now being progressed rather than the previous shared-use paths that are less popular.

Due to this process, BCC have confidence that the measures being taken forward as part of this bid are supported by the public and local community.

## **1.6 Options Appraisal**

An options appraisal summary table is provided in Appendix F.

## **Background**

The A4018 Improvements Project, as planned to be delivered with LGF funding, is the first phase of a wider programme of corridor improvements on and alongside the A4018.

As established in the introduction, the principal aim of this programme of works is to promote and improve sustainable and active-travel modes as alternatives to the private car for new and existing residents along the A4018 corridor, especially in light of the CPNN development.

## **Rationale for Intervention**

The overall 'Do Nothing' option involves no delivery of cohesive transport infrastructure improvements by BCC to improve journeys for new and existing residents. The appraisal quickly concluded this option be rejected, as it is likely to lead to significant increases in the use of private vehicles, exacerbating existing congestion and air pollution. The VISSIM modelling for the corridor showing a 17% increase in AM and PM vehicle traffic expected between 2016 (reference case) and 2036 without any action taken. It is also inconsistent with local and regional transport policies such as the Joint Local Transport Plan and Bristol Transport Strategy.

The 'Do Minimum' option involves the signalisation of Crow Lane roundabout, in conjunction with a banned right turn movement northwards onto Knole Lane, to allow better vehicle access to new residential developments, including CPNN. This would facilitate the optimisation of the arterial movement north and south along the A4018, to and from the City Centre. However, it would disadvantage local journeys on and across the corridor, do nothing to solve existing traffic issues in the area, and do nothing to promote active and sustainable travel goals in line with local and regional transport policies. It would especially fail to promote immediate alternatives to car use for new residents. In addition, any future forthcoming s106 would then result in limited and piecemeal improvements to the transport network. Hence, it was concluded this option be rejected.

The 'Do Something' option involves seeking to significantly improve public transport, active travel, and highway safety infrastructure along the corridor, such that it encourages both new and existing residents to limit the number of trips undertaken by private vehicles. This is the core option being taken forward for development and business case submission. It will cohesively align with the wider A4018 programme of highway works, of which this bid comprises the first phase.

## **Transport Planning Objectives**

The primary objective of these improvements has been established as:

- TPO1: To improve journey quality for all users of the corridor, especially in order to facilitate reliable, rapid and affordable alternatives to car use for new and existing residents and commuters.

In addition, two secondary objectives have been established for the programme:

- TPO2: To improve the safety of all users, including those in non-car modes, along the A4018 corridor.
- TPO3: To improve the attractiveness of active travel mode infrastructure along the A4018 corridor.

These were used, along with Strategic Case and Management Case elements, to sift the initial options. With reference to this wider programme, the Options Appraisal Process has been undertaken along two key lines:

- i) The strategic fit and deliverability of each option and sub-option according to the objectives for inclusion in the wider programme of funded works
- ii) The suitability of options that passed stage 1 to be included in the bid to the LEP for LGF funds as part of Phase 1A.

As such, an option generation and sifting process was undertaken to identify recommended options for further development and inclusion in the programme as a whole. A second stage of appraisal was then taken forward to identify options and sub-options for inclusion in the bid to LEP for LGF funding as part of this FBC.

### **Summary of results**

The A4018 Options Appraisal summary table is attached as Appendix F. In summary, of the initially identified long list, 7 options were taken through to the second stage of appraisal. Of these 7 options, 4 passed this second stage, and have been developed into interventions comprising Phase 1A, the A4018 Improvements Project which is the subject of this bid. 2 of the remaining 3 options, and one sub-option, have been identified to be delivered alongside or immediately following the LGF works as Phases 1B or 2A.

The 4 options and sub-options taken forward for further development as part of this bid consist of a series of proposed interventions on and along the highway corridor, principally from just south of Crow Lane roundabout to just north of Charlton Road junction. These are listed below, with a brief rationale, and form **Phase 1A** of the programme.

- 1) **Upgrade existing bus infrastructure, such as bus shelters and RTI to improve quality of journey and attractiveness for bus passengers:** Not upgrading the bus shelter along this corridor would result in sub-standard waiting infrastructure for public transport users. No provision of real time information would mean that passengers would be unaware of any potential delays to their service which could in turn lead to a loss of confidence in using public transport. Not upgrading the bus stop to have a shelter would result in a poor customer experience, especially in inclement weather.
- 2) **Improving road safety for all users (including pedestrians) of the A4018 corridor to reduce accidents and increase the attractiveness, especially for schoolchildren:** Not installing a new crossing across Passage Road, A4018 (and upgrading the crossing immediately south of Crow Lane Roundabout) would result in continued community severance and access issues between Bentry/Southmead and Henbury. This crossing will also be a toucan crossing to provide a new crossing facility for cyclists. Moreover, the lack of pedestrian crossing infrastructure could result in collisions as residents attempt to informally cross what is a busy and fast corridor. The new crossing proposed to the north of Dragonswell Road is actually located at the site of a fatal accident where a pedestrian was struck by a car in 2017, and BCC have been in correspondence with the Coroner over this intervention as a response to the accident. Not installing a new crossing for school children on Passage Road would result in the continuation of safety issues for pupils, and encourage the use of the private car to access school as a means to avoid these safety issues, as opposed to active modes.

- 3) **Improving active travel infrastructure, such as segregated walking and cycling improvements by constructing a segregated bi-directional cycle path from the Crow Lane junction to the Charlton Road junction (connecting to existing shared-use provision and a new signalised toucan crossing at the northern end), with a priority crossing over the side road Brentry Lane, while maintaining high-level footway capacity:** Not installing a segregated path for cyclists would result in cyclists having to use existing 'on highway' infrastructure. This would maintain the current situation which sees only low-level cycle use along this corridor as a result of many potential cyclists being deterred by the intimidating and dangerous road environment. An alternative alignment for the cycle path is not considered feasible given the lack of a coherent and direct parallel route, while the Bristol Cycling Campaign's response to the consultation is that cycle facilities should follow the main route where possible. Findings from the West of England's emerging Local Cycling Walking Infrastructure Plan also suggest that the A4018 is one of the priority routes for investment given the high potential for cycling along the corridor. A raised table was considered for the cycle lane crossing of Brentry Lane, but ruled out on the grounds that there is a considerable uphill gradient on the entry to this side road. Upgraded crossing facilities at Charlton Road crossing have been considered, but are out of scope for this bid, whilst remaining a part of the wider programme.
  
- 4) **Increase reliability and punctuality of general journeys throughout the corridor with network management infrastructure:** Not providing the variable message signs along the corridor will result in the Traffic Control Centre being unable to provide road users with information which could help them with their journey, whether this be advanced warning of future roadworks, event management or an incident that may require real time traffic management.

**Wider Programme Phasing:** Of the 3 remaining options that passed stage 1 of the appraisal, 2 full options and 1 sub-option are being taken forward for delivery. This will be either alongside the LGF works as **Phase 1B**, or as a priority from wider funding as part of **Phase 2A**. These are:

- 1) Bus priority measures such as bus lanes, bus gates and priority at signalised junctions: Delivering peak hour bus lanes from Crow Lane Roundabout to Charlton Road Junction (NB & SB). These will be delivered in conjunction with the segregated cycle path in Phase 1 of the works to reduce highway disruption during the build phase and to maximise use of available resources, as part of **Phase 1B**. Delivering a 24h inbound bus lane from Charlton Road junction to Greystoke Avenue junction as part of **Phase 2A**.
- 2) Signalisation of junctions to improve network management and reduce accidents as part of **Phase 2A**: Full signalisation on the grounds of safety and capacity of two major junctions: Greystoke Avenue junction with A4018 and Westbury Road junction with A4018.
- 3) Further active travel infrastructure improvements from Charlton Road junction south to Greystoke Avenue junction as part of **Phase 2A**. This will consist of a continuation of the high quality, bi-directional segregated cycle track whilst retaining high level footway provision.

In addition, of the 10 options ruled out at the sifting of the long-list on the grounds of deliverability in their current iteration, 2 were identified for eventual re-development and potential progression as non-priority elements of the wider programme, being **Phase 2B** of the works. These were the

Westbury Village improvements, which require re-engagement and a subsequent design, and the shared-use path on the Downs, which requires progression through the Downs Committee.

## 1.7 Environmental Sustainability Considerations

The significant environmental impacts of the A4018 project are as follows:

- Long term positive impact: investment in sustainable transport options resulting in a reduction in car journeys and associated emissions. This will be monitored using manual and automatic traffic counts and NO2 diffusion tubes.
- Short term negative impacts: the use of fuels and material and the associated production of waste during construction.

An Ecological Impact Assessment has been produced for the project with input from BCC's Environmental Performance Team. A summary of impacts and mitigation is presented in the table below (Figure 0.6):

Figure 0.6: Ecological Impact Assessment table.

Will the proposal impact on...	Yes / No	Negative	Impact	Mitigation
		Positive		
Emission of Climate Changing Gases?	Y		<p>The project includes the introduction of new improvement measures to encourage the use of sustainable modes of transport (better walking and cycling facilities) to reduce reliance on private cars.</p> <p>Construction works will result in short term negative impact on emissions.</p>	<p>Consider contractor travel during procurement. Look to procure local contractors/ materials where possible.</p>
Consumption of non-renewable resources?	Y		<p>Construction will require the use of new materials some of which will be non-renewable.</p>	<p>Ensure contractors use sustainably sourced materials where possible. Utilise advancements in technology to minimise the volume of non-renewable resources.</p> <p>Currently some recycled materials are used for road surfacing, research is being undertaken to use innovative technologies such as plastic</p>

				roads for future works; continue to research this option.  Consider contractor travel: during procurement, look to procure local contractors/ materials where possible.
Production, recycling or disposal of waste	Y		Construction will generate waste	Ensure all waste is disposed of legally, according to the waste hierarchy and legislation.
The appearance of the city?	Y		During construction, there could be negative impacts from large-scale construction works close to residential properties.  In all transport schemes such as this, the possibility for tree planting will be examined in every possible location.	The full possible mitigation will depend on the contractor selected and their programme; the most intrusive works could be planned outside term times, for example.  The Bristol Tree Replacement Strategy will be complied with in full if any trees need to be removed.
Wildlife and habitats?	Y		Investigations into environmental enhancements on roundabouts  In all transport schemes such as this, the possibility for tree planting will be examined in every possible location.	Within this include improvements to biodiversity – Take advice from BCC ecology officer if needed.  The Bristol Tree Replacement Strategy will be complied with in full if any trees need to be removed.

## 1.8 Equality and Diversity Impact Assessment

Equality and Diversity impacts have been (and continue to be) a key consideration in the design of the programme. A full Equality Impact Assessment has been produced with input from BCC's Equalities Team, and is presented below.

### Step 1: What is the proposal?

Please explain your proposal in Plain English, avoiding acronyms and jargon. This section should explain how the proposal will impact service users, staff and/or the wider community.

#### 1.1 What is the proposal?

Mitigation of the likely traffic impacts of the major new Cribbs Patchway New Neighbourhood (CPNN) development in South Gloucestershire through the implementation of a public transport corridor comprising in- and out-bound bus lanes and upgraded traffic signal junctions that will also improve the environment for pedestrians and cyclists.

The provision of a more reliable and resilient bus network will benefit anyone who relies on public

transport to travel on this corridor, including those who require low-floor buses for wheelchair and pushchair access. Each traffic signal junction will see the signals upgraded to improve traffic flow on the main corridor while providing wider and more convenient pedestrian crossing facilities.

Alongside the improved provision for sustainable modes of transport, the proposals on which consultation was undertaken also included restrictions to private car use in Westbury Village. Following the consultation, these proposals will no longer be taken forward but will be replaced by carrying out engagement with a 'blank sheet of paper' to seek the views of local members and representative groups in achieving similar benefits in an alternative way.

## Step 2: What information do we have?

Decisions must be evidence-based, and involve people with protected characteristics that could be affected. Please use this section to demonstrate understanding of who could be affected by the proposal.

### 2.1 What data or evidence is there which tells us who is, or could be affected?

The changes proposed by this project are very similar to those made on Bath Road, Fishponds Road, and Whiteladies Road by the GBBN (Greater Bristol Bus Network) project between 2008 and 2012, which was subjected to its own EqlA. During the consultation for GBBN, including an EqlA workshop, a number of themes related to equalities emerged that will be used to inform this project.

The BCC website contains a substantial amount of equalities data and research, at <https://www.bristol.gov.uk/statistics-census-information/new-wards-data-profiles>. The information here could be used to identify areas where there are potentially concentrations of people from certain protected characteristics along the corridor.

For the five wards that cover the majority of the route (Henbury and Brentry, Redland, Southmead, Stoke Bishop, and Westbury-on-Trym and Henleaze), the following information is relevant:

- A higher than average population of older people aged 65+ (17.5% compared to 13% for Bristol overall).
- 30% of people with a limiting illness, health problem or disability (as asked in the 2017 Quality of Life survey), two higher than the average for Bristol overall.
- A higher than average number of cars per household (1.2 compared to 1.04 for Bristol overall).
- A satisfaction level with local bus services of 43.8%, higher than the 40% of Bristol overall.
- 24% of people who cycle to work at least once a week (this data for Westbury-on-Trym and Henleaze only).

### 2.2 Who is missing? Are there any gaps in the data?

It appears that the likelihood for significant negative impacts is limited (see Section 3) and that further investigation may not be necessary.

A summary of how well the consultation process reached the various equalities strands mentioned in Section 2.1 can be found in the table below:

<u>Protected characteristic</u>		<u>%</u>
Age 65+	Consultation	27
	Ward data	17.5
No religion	Consultation	34
	Ward data	34.6
Christian	Consultation	42

	Ward data	53.0
Other	Consultation	24
	Ward data	12.3
White British	Consultation	76
	Ward data	83.5
BME	Consultation	7
	Ward data	10.6
Other	Consultation	17
	Ward data	5.9
Disability	Consultation	6
	Ward data	30.0

In terms of reaching the elderly population, the consultation was extremely successful. The large numbers of people that chose 'prefer not to say' against the other three questions skews the figures slightly.

If it appears that the outreach to disabled people is lacking, it is worth noting that the ward data is from the Quality of Life question about "a limiting illness, health problem or disability" and that there were 14% of consultees who preferred not to answer the question. A description of how we will try to rectify this lack can be found in the following answer.

### 2.3 How have we involved, or will we involve, communities and groups that could be affected?

Public consultation was carried out between 4 February and 17 March 2019. Using the knowledge of ward members, representative local groups were involved in this process.

Correspondence was held with BPAC (Bristol Physical Access Chain), although they were unable to attend a planned meeting. The current proposals for a Phase Two of the scheme that involves public engagement for Westbury Village will provide a further opportunity for more detailed discussions.

### Step 3: Who might the proposal impact?

Analysis of impacts on people with protected characteristics must be rigorous. Please demonstrate your analysis of any impacts in this section, referring to all of the equalities groups as defined in the Equality Act 2010.

#### 3.1 Does the proposal have any potentially adverse impacts on people with protected characteristics?

We are not aware of any negative impacts at this stage. The improvement of public transport reliability, facilities for accessing it, and more and better means of crossing the roads are benefits that can be enjoyed by anyone using or living in the area, particularly as the traffic signal junction refurbishments or upgrades will replace old equipment that does not include tactile cones on the pedestrian crossing push button.

The proposed removal of access through the centre of Westbury Village by cars was raised as detrimental in various ways through the consultation. As well as comments about retail vitality, many elderly and disabled people stated that it would make their ability to access and use the village more difficult (including such facilities as the doctors' surgery, banks, and churches. Taking into account all such comments, we have removed the proposed restrictions and will instead carry out engagement with a 'blank sheet of paper' to seek the views of local members and representative

groups, including equalities groups, in achieving similar benefits in an alternative way.

Responses to consultation with equalities groups on GBBN raised a number of concerns that were beyond the scope of an infrastructure construction project. These included: poor level of detail on on-bus audio announcements, lack of driver awareness of equalities issues, and concerns over bus services including withdrawal. These issues were not specifically raised again in consultation for this scheme, but if raised at a later stage will be passed to the bus operators via BCC's regular liaison with them.

3.2 Can these impacts be mitigated or justified? If so, how?

Consultation responses from elderly and disabled residents have already been an element in removing elements of the scheme as it was consulted upon. As noted above, the opportunity for further input has been guaranteed in advance of new proposals emerging.

3.3 Does the proposal create any benefits for people with protected characteristics?

As regards access to or participation in a service, the improved reliability of buses using the A4018 corridor will be a benefit for anyone who uses them and especially those that rely on them, while encouraging a sustainable and healthier means of transport. New bus stops will improve access to these buses, and new pedestrian crossings will improve the access to the stops. The bus stops will also be of the 'safe haven' design with new paving, shelters, lighting, CCTV, and information including real-time information.

The quality of life for anyone living on the A4018 will be improved by public transport taking the place of the forecast increase in the number of cars using the corridor after CPNN is built.

3.4 Can they be maximised? If so, how?

The design will maximise all the potential benefits as far as practicable, while further consultation with equalities groups will be used to ascertain whether further specific improvements could be made.

#### **Step 4: So what?**

The Equality Impact Assessment must be able to influence the proposal and decision. This section asks how your understanding of impacts on people with protected characteristics has influenced your proposal, and how the findings of your Equality Impact Assessment can be measured going forward.

4.1 How has the equality impact assessment informed or changed the proposal?

Consultation with elderly and disabled residents has led to a change in which elements of the design have been taken forward towards construction.

4.2 What actions have been identified going forward?

The engagement for Westbury Village planned with local members and groups will be planned carefully to ensure it involves the relevant groups representing local equalities bodies.

4.3 How will the impact of your proposal and actions be measured moving forward?

Evaluation of the A4018 improvements as a public transport corridor (such as reductions in traffic queues and increased bus patronage) will be measured regularly to ensure the funding has been spent appropriately (although construction is not due to commence until 2020). Any complaints will be monitored for possible equalities concerns and contact made with the relevant group to discuss any such issues.

## 2 Economic Case

This section presents an overview of the economic impacts appraised for the package of improvements to the A4018. This package includes a number of improvements to the section of the A4018 between the Crow Lane roundabout and the junction with Greystoke Avenue. These improvements include public transport improvements (an upgraded bus stop), safety improvements (upgraded pedestrian crossings), improved roadside landscaping, new active mode infrastructure (the installation of shared cycleways and segregated at-carriageway cycle lanes), and the installation of variable messaging signs. Funding has been requested for £3.45m (2019 prices, undiscounted). Funding of the scheme is necessary as a number of developments in North Bristol (primarily the new developments around the Filton airfield) have the potential to lead to congestion along this key arterial route in the future.

### 2.1 Economic Appraisal

Prior to consultation with the public between 4 February 2019 and 17 March 2019, Bristol City Council identified a number of road improvements along the A4018, which have the potential to mitigate additional traffic generated by new developments in the North of Bristol. Following consultation, BCC opted for the following final scheme: -

- **Public transport improvements.** Upgrading the outbound Brentry Lane bus stop along Passage Road (currently flag and pole) to a full modern bus shelter with real-time passenger information (RTPI).
- **Safety improvements:** Upgrading the existing signalised crossing on Passage Road immediately south of the Crow Lane Roundabout and installing a new signalised pedestrian crossing across Passage Road near the junction with Dragonswell Road. Installing a Zebra Crossing on Passage Road near the junction with Shipley Road to facilitate safer crossing movement for pupils of Westbury on Trym Primary School. Considering the size of the impact, this has not been monetised.
- **Active mode infrastructure:** Constructing a segregated bi-directional cycle path from the Crow Lane junction to the Charlton Road junction, with a priority crossing over the side road Brentry Lane, while maintaining high-level footway capacity.
- **Variable messaging signs.** Installing two variable messaging signs (one inbound-facing and one outbound-facing) along the A4018.

#### 2.1.1 Scheme Costs & Assumptions

Scheme cost estimates were provided by BCC. The scheme is estimated to cost £4,060,091 in 2019 prices. The table below provides a breakdown of the costs.

## Scheme cost breakdown

	<b>19/20</b>	<b>20/21</b>	<b>21/22</b>
<i>Design</i>	£337,149	£0	£0
<i>Project Management (BCC match)</i>	£30,862	£0	£40,969
<i>Construction (BCC Match)</i>	£0	£0	£539,344
<i>Construction</i>	£0	£2,417,879	
<i>Project Management</i>	£8,851	£84,037	£0
<i>QRA-based Risk Allowance</i>	£0	£601,000	
<b>Total</b>	<b>£376,862</b>	<b>£3,102,916</b>	<b>£580,313</b>

The scheme costs above show the financial costs of the scheme, in current prices. Further information on how the cost estimates above have been derived can be found in the financial case section of this business case.

For the purpose of this economic appraisal, scheme costs are converted into present value of costs (PVC) in 2010 prices and values. This includes application of an optimism bias as per guidance in WebTAG unit A1.2.1. Considering the second-stage design of the scheme, optimism bias of 15% has been adopted as part of the appraisal. Further design work will be carried out following the approval of the FBC. These final designs will be used for tendering and delivery of the assets proposed as part of the scheme.

Present value of scheme costs used in this economic appraisal (after discounting, deflation and the application of optimism bias) are estimated at £2,760,862 (2010 prices and values).

Note the PVC derived is void of maintenance costs as they have not been included in BCC's scheme estimates. However, it is acknowledged that there a nominal quantum of maintenance costs may occur as a result of the scheme in the longer term. This is deemed to have minimal impact on the PVC.

Where increasing the highways footprint is proposed, this has the potential to increase maintenance costs. For example, an increase in the highways footprint of 1m<sup>2</sup> could increase maintenance costs by £13 per year. However, the current highways provision along the study area is in poor condition, and therefore currently requires high levels of ongoing maintenance. Therefore, it is likely, given that the proposed investment involves large areas of resurfacing, that maintenance costs will fall at least in the short-to-medium term.

In comparing the increase in maintenance costs from a larger highways asset with the reduction in maintenance costs from resurfacing, it is assumed that the impact of the investment on operating costs will be neutral overall.

The maintenance of this new infrastructure will be accommodated as part of existing highways maintenance costs. As mentioned above, it is assumed that the impact of the investment on highways operating costs will be neutral overall.

The assets required to deliver VMS (signals and RTI), are assumed to have an asset life of 20 years. The management of the new equipment will be part of existing traffic management arrangements for BCC. Hence, the operating cost impact of this element of the scheme will be neutral overall.

The ongoing maintenance of new / replaced bus shelters will be part of existing maintenance arrangements. Hence, the operating cost impact of this element of the scheme will be neutral overall.

### 2.1.2 Benefits

This appraisal follows a standard WebTAG appraisal. The categories of benefits that have been appraised for this scheme are: -

- **Public transport user benefits.** These include benefits from upgrading the outbound bus stop at Brentry Lane to a full modern bus shelter with real-time passenger information (RTPI) boards. These impacts have been valued using guidance from WebTAG M3.2 and values from section M3.2.1 of the WebTAG data book for a 20-year appraisal period.
- **Safety improvements:** Considering the nominal, non-material size of this impact, this has not been monetised.
- **Active mode benefits.** These cover the benefits to users and wider society from a shift to more active modes of transport as a result of the introduction of higher-quality active mode infrastructure. These impacts have been valued using the DfT's Active Mode Appraisal Toolkit for a 20-year appraisal period.
- **Time savings from installing VMS.** We have monetised the potential time savings benefits to car users as a result of installing two VMS units (one facing the outbound direction, the other facing the inbound direction) along the study area of the A4018. These have been monetised using evidence from a funded comparator scheme in Aberdeen and using values of time from WebTAG unit 1.3 for a 20-year appraisal period.

The current scheme is expected to be largely neutral in terms of its impact on general traffic operation as the proposed infrastructure does not reduce the amount of highways capacity available to users.

#### 2.1.2.1 Public Transport User Benefits

Improvements in public transport user benefits were modelled as equivalent generalised journey time (GJT) time savings as per guidance in WebTAG unit M3.2. Bus passenger counts for each of the Brentry Lane stops were provided by Bristol City Council and both this and the inputs from WebTAG were combined with a blended value of time to determine the value of equivalent GJT savings associated with the upgrade of the outbound Brentry Lane bus stop.

Total lifetime discounted public transport user benefits have been valued at £34,261 in 2010 prices over a 20-year appraisal lifetime.

#### 2.1.2.2 VMS benefits

Evidence from a similar VMS scheme in Aberdeen was used to monetise the benefits of this element of the intervention. This evidence assumed that VMS could lead to a 3 second journey time saving<sup>2</sup>

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<sup>2</sup> Analysis used in 2018 for a VMS scheme in Aberdeen which led to funding from NESTRANS (the regional transport funding body for the North-East of Scotland) there found that the installation of VMS could have potential time savings of between 1% and 2.5% on average journey times. Each percent accounts for a journey time saving of around 3 seconds. For the purpose of this analysis, we have taken a conservative approach, and used the lowest of these time-saving scenarios (i.e. a 1% or 3 second journey time savings approach).

on average, as VMS can be used to re-route car drivers away from potential incidents (e.g. accidents or high-level of congestion) to use other routes to get into or out of Bristol city centre.

Journey time savings were calculated using the 3 second assumption, average annual daily traffic (AADT) flow from the Greater Bristol Area Transport Study (GBATS) model and WebTAG values of time. In estimating these impacts, we have taken a deliberately conservative approach, and monetised the time savings benefits from the introduction of VMS to car users only. Real-world benefits could therefore be higher as other road users (e.g. HGV drivers) may also benefit from the introduction of this technology.

Total discounted journey time savings from the introduction of VMS is £1,449,176 in discounted 2010 prices over a 20-year appraisal period.

Bristol is more congested than Aberdeen (Bristol is the 6<sup>th</sup> most congested outside of London; <https://www.statista.com/chart/12828/the-uk-cities-with-the-biggest-traffic-jams/>). Within this context, it is reasonable to assume that the installation of VMS may lead to a larger reduction in journey times than has been the case in Aberdeen. However, it is recognised that there is limited evidence on the VMS, and for this reason the lowest of the range of journey time savings for Aberdeen, even though the impact for Bristol may be larger, was adopted for this proportionate appraisal.

### **2.1.2.3 Active mode benefits**

DfT's Active Mode Toolkit based on TAG Unit A5.1 has been used to assess the benefits associated with an increase in cycling and walking as a result of installing high-quality walking and cycling facilities along the A4018. Using evidence from across a number of different studies<sup>3</sup>, we have assumed that the new infrastructure could increase rates of walking and cycling by 30%. The national and Bristol specific case study evidence summarised below indicates that the scheme has the potential to achieve much higher uplifts.

#### **Manchester Wilmslow Road / Oxford Road (86% rising to 103% increase after two years).**

This scheme involved the installation of a 3-mile cycleway into the city centre. The majority of the cycleway is segregated with kerbs, with some unsegregated route. Further information can be found in the following link.

<https://tfgm.com/cycling/routes/wilmslow-road-cycleway>

[http://www.manchester.gov.uk/download/downloads/id/26359/state\\_of\\_the\\_city\\_report\\_2018\\_a\\_connected\\_city.pdf](http://www.manchester.gov.uk/download/downloads/id/26359/state_of_the_city_report_2018_a_connected_city.pdf)

#### **Tower Hill to Lancaster Gate Route alignment (200% increase on Lower Thames Street)**

These schemes involved the creation of two fully-segregated cycle ways along two major corridors in central London with cyclist traffic lights along the whole route.

<http://content.tfl.gov.uk/east-west-cs-overview-map-18-12-17.pdf>

<https://www.london.gov.uk/press-releases/mayoral/mayor-confirms-doubling-of-protected-cycle-routes>

<sup>3</sup> These studies were based on a number of different schemes in UK cities (Manchester, London, Leeds, Bradford and Cambridge and looked at the impact of installing active-mode infrastructure on walking and cycling. Further information on these studies can be found on the Living Streets website (<https://www.livingstreets.org.uk/media/3890/pedestrian-pound-2018.pdf>) and on the Guardian website (<https://www.theguardian.com/environment/bike-blog/2019/apr/26/if-you-build-them-they-will-come-record-year-for-cycle-counters>)

### King's Cross to Elephant & Castle (124% increase on Blackfriars Road)

<https://www.london.gov.uk/press-releases/mayoral/mayor-confirms-doubling-of-protected-cycle-routes>

<http://content.tfl.gov.uk/cs6-ns-map-september-2018.pdf>

**Leeds to Bradford (51% increase in the first year of operation with a further 26% increase on that in the following year).**

This scheme involved the creation of a fully-segregated cycleway between Leeds and Bradford.

<https://cyclecityconnect.co.uk/projects/cityconnect-cycle-superhighway>

<https://www.theguardian.com/environment/bike-blog/2019/apr/26/if-you-build-them-they-will-come-record-year-for-cycle-counters>

### Cambridge Huntington Road and Hills Road (38% - 100% increase in cycling)

This scheme involved the creation of a cycleway on two city centre routes. Both cycleways were at carriageway-level and were segregated along parts of the route, while other bits of the route were unsegregated.

<https://road.cc/content/news/215646-cycling-doubles-cambridge-road-thanks-protected-bike-lane>

### Bristol Cycle Ambition Fund 2 (CAF2) – Broom Hill

The project upgraded existing white line shared use facilities to the kerb segregated.

Count	Northbound Uplift	Southbound Uplift	Overall Uplift
Walking	367%	696%	467%
Cycle on Path	141%	179%	158%
Cycle on Road	176%	153%	164%

Source: BCC one-day count before and after the scheme

In order to take a conservative approach, it is assumed that the increase in cycling and pedestrian activity along the study area would be 30%. However, note that the impact on the number of these increased trips could be higher than 30%.

The modelled active mode benefits using a 30% uplift have been broken down by individual active mode benefit categories in the tables below (presenting active mode impacts related to access to employment and access to primary and secondary schools separately):

Impact Drivers (commuters)	Estimates, (2010 present value and prices) £ 000's
Congestion benefit	65.03
Infrastructure	-0.61
Accident	18.42
Local Air Quality	0.08
Noise	1.23
Greenhouse Gases	3.27
Reduced risk of premature death	2,196.00
Absenteeism	1,494.67
Journey Ambience	884.93
Indirect Taxation	-12.57
<b>PVB</b>	<b>4,651.05</b>

<b>Impact Drivers (Primary school access)</b>	<b>Estimates, (2010 present value and prices) £ 000's</b>
Congestion benefit	22.35
Infrastructure	-0.21
Accident	6.33
Local Air Quality	0.03
Noise	0.42
Greenhouse Gases	1.12
Reduced risk of premature death	1,498.48
Absenteeism	0.00
Journey Ambience	230.62
Indirect Taxation	-4.32
<b>Impact Drivers (Access to Secondary Schools)</b>	<b>Estimates, (2010 present value and prices) £ 000's</b>
Congestion benefit	13.53
Infrastructure	0.13
Accident	3.83
Local Air Quality	0.02
Noise	0.26
Greenhouse Gases	0.68
Reduced risk of premature death	536.22
Absenteeism	0.00
Journey Ambience	162.91
Indirect Taxation	-2.62
<b>PVB</b>	<b>714.84</b>

Overall, active mode benefits were monetised as £7,120,919 in discounted 2010 prices over the 20-year period.

### 2.1.3 Construction Stage Impacts

Construction stage impacts are defined as those which arise as a result of additional economic activity created during the construction phase of the proposed scheme. These have been captured in terms of additional GVA and short-term jobs created.

Impacts are measured in terms of both direct and indirect uplifts. Direct uplifts are created directly as a consequence of the economic activity (in this case the construction of the infrastructure). Indirect uplifts are created through higher expenditure by construction firms within their supply chain, and through higher expenditure in the area by construction firms, leading to a higher demand for goods and services.

The methodology and assumptions used to calculate the construction stage impacts are based on the West of England LEP's Impact Guidance Note for Infrastructure Projects, which provides GVA and job multipliers (both direct and indirect) as well as guidance on the amount of jobs are generated per £ of construction expenditure.

Direct job creation equals 34 FTE, and indirect job creation equals 34 FTE (we have assumed a multiplier of around 1 between the number of direct and indirect jobs created). The direct GVA uplift has been modelled at £828,409 (2010 prices, discounted), and indirect GVA uplift has been modelled at £745,568. In total, the short-term GVA uplift from the scheme is worth £1,573,976 (2010 prices and present value).

#### **2.1.4 Operational Stage Jobs and GVA Enabled Impacts**

As per the request from the West of England Combined Authority (WECA), dated the 22nd of May 2019, an assessment of wider impacts of A4018 in terms of homes and jobs enabled has been undertaken.

In the absence of any direct dependencies defined in existing planning applications regarding the A4018, the approach for assessing the homes and jobs enabled by the scheme proposals relies in TEMPro data. In particular, TEMPro data has therefore been used to calculate the forecasted growth in homes and jobs in the vicinity of the scheme over the next few years. Bristol City Council is of the view that these developments are unlikely to come forward in the absence of the scheme proposals, as infrastructure constraints could make these developments unattractive. Hence, this short-term forecast growth has been considered to be as homes and jobs enabled by the A4018 scheme.

Appendix B2 Economic Appraisal Addendum outlines the methodology and assessment of this impact. The data analysed in the above-mentioned addendum shows that 124 additional homes and 26 additional jobs are forecast to be created between 2020 (the assumed scheme opening year) and 2023 within the scheme's impact area. In light of Bristol City Council's views regarding the lack of attractiveness of the local market for development in the absence of A4018 improvements, the 124 gross additional homes and 26 gross additional jobs are considered to be enabled by the A4018 scheme proposals. That said, there may be a need for other infrastructure improvement to enable this growth. Hence, all 124 homes and 26 jobs enabled, cannot be attributed to A4018 scheme proposals.

## **2.2 Value for Money Statement**

The economic impacts associated with the package of improvements to the A4018 are as follows;

£8.6m (2010 prices and values) of conventional transport economic benefits relating to an uplift in walking and cycling trips, public transport user benefits as well as time savings from the introduction of VMS signs:

- iv. Public transport user benefits (2010 prices and values): £34,261
- v. Variable messaging signs (2010 prices and values): £1,449,176
- vi. Active mode user benefits relating to commuters and school children at primary/secondary schools within the identified catchment (2010 prices and values): £7,120,919.

68 construction stage jobs and a construction stage GVA uplift £1.6m (2010 prices and values).

The benefits are summarised in the table below. A detailed methodology including assumptions and the assessment of the impacts is presented in the accompanying economic appraisal note.

### **Value for Money Summary Table**

<i>Total project cost (including project management and QRA allowance)</i>	<i>£4,060,091 (2019 prices, undiscounted)</i>
<i>Grant sought (EDF/LGF/RIF)</i>	<i>£3,448,916 (2019 prices, undiscounted)</i>
<i>Present Value of Costs</i>	<i>£2,760,862 (2010 prices, discounted)</i>
<i>Net Quantified Benefits</i>	<i>£8,604,356 (2010 prices, discounted)</i>
<i>VfM indicator*</i>	<i>3.1</i>

**\* Benefit compared to total cost**

Present value costs for the scheme estimated at £2,760,862 (2010 prices and values). Combining discounted costs and benefits for the scheme gives a BCR of 3.1. This scheme therefore is classified as representing high value for money.

We have tested the sensitivity of the BCR to changes in benefits and costs. Our calculations show that present value costs would need to rise by £1.5m or 56% in order for the BCR to fall below 2, and therefore no longer offer high value for money. Similarly, we have calculated the fall in the present value of benefits needed to reduce the BCR of the scheme below 2 to be £3.1m or 36%.

The above analysis indicates that the present value of costs will have to increase significantly or the conservatively-modelled present value of benefits would need to reduce considerably for the BCR to fall below 2. This highlights the robustness of the scheme's BCR estimate and its forecast value for money position.

Assessment of the wider impacts for A4018 has also been conducted using TEMPro, focusing on the quantum of homes and jobs enabled. The analysis suggests 124 gross additional homes and 26 gross additional jobs are considered to be enabled by this scheme. Whilst there might be a need for other infrastructure improvement to enable this growth, this further enhances the Value for Money proposition presented by A4018. More detail can be found in appendix B2 Economic Appraisal Addendum.

### 3 Financial Case

#### 3.1 Chief Financial Officer sign off

A letter providing financial sign-off for this project is provided in Appendix H.

#### 3.2 Scheme Cost

##### Capital Elements

Figure 0.9: Claim Amount table

Cost Heading	Total projected eligible expenditure	Claim Amount
Design	£337,149	£337,149
Construction	£2,957,223	£2,417,879
Project Management	£164,719	£92,888
Risk Allowance	£601,000	£601,000
<b>Total</b>	<b>£4,060,091</b>	<b>£3,448,916</b>

#### 3.3 Spend Profile and Funding Sources

**Total Spend: £4,060,091**

Figure 1: Spend profile table.

	19/20	20/21	21/22
Design	£337,149	£0	£0
Project Management (BCC match)	£30,862	£0	£40,969
Construction (BCC Match)	£0	£0	£539,344
Construction	£0	£2,417,879	
Project Management	£8,851	£84,037	£0
Risk Allowance	£0	£601,000	
<b>Total</b>	<b>£376,862</b>	<b>£3,102,916</b>	<b>£580,313</b>

Figure 1.1: Simplified spend profile table.

Funding Source	19/20	20/21	21/20	Total
<b>LGF</b>	£346,000	£3,102,916	£0	<b>£3,448,916</b>
<b>BCC Match</b>	£30,862	£0	£580,313	<b>£611,175</b>
<b>Total</b>	<b>£376,862</b>	<b>£3,102,916</b>	<b>£580,313</b>	<b>£4,060,091</b>

A detailed cost plan is provided in Appendix D.

## 4 Commercial Case

### 4.1 Procurement

The Transport Team for BCC has a Highways Asset and Associated Works Framework' (HAAWF) in place to ensure that the Department can draw upon the services of contractors via an OJEU compliant process. The framework allows the council to test the market and ensure value for money through a mini-tender process based on a bill of quantities and specification set by the client. The Framework has a £70m ceiling with 2 years (out of 4 at contract start) remaining.

It is proposed that the A4018 project would principally procure services through the HAAWF through 'Lot 7' that applies to projects >£150,000 in value. The council will choose the most economically advantage tender bid for by the 5 contractors permitted to bid to Lot 7 which comprise ETM, Alun Griffiths, Dyer and Butler, Eurovia and North Midland Construction. The exception to this would be for the construction of the school crossing on Passage Road, for which 'Lot 6' of the Framework would be used, which is designed for projects <£150,000 in value and which has a single contractor supply agreement with ETM.

### 4.2 Operation and Financial Viability

The infrastructure delivered through the project will be incorporated into BCC's Transport Maintenance and Replacement Programme. The project largely calls for the significant upgrade of existing infrastructure which will provide a lifecycle maintenance saving by replacing old materials and infrastructure with higher specification and more robust equivalents.

Over the whole programme there are anticipated to be some increases in ongoing costs through the introduction of new signals equipment - which will be managed in accordance with BCC's Signal Replacement Programme – and bus lanes. BCC's Transport Maintenance Team provided the following commentary on impact of the project on maintenance budgets:

Where new bus lanes are proposed alongside the LGF works as part of the carriageway re-shaping, the inside track of a bus lane comes under increased pressure and so requires more regular maintenance, however the exact amount of this is hard to quantify at this point, and it is relatively minor. In addition to this, where there is road widening to create bus lanes, this increases the overall road surface, incurring a maintenance liability of around £12 per metre squared per year over a 25 year lifecycle.

However, given that significant areas of the road will be resurfaced as part of the project, this will provide a lifecycle maintenance saving. As both the positive and negative impact factors cannot be fully quantified until detailed design and procurement is finished, at this stage it is believed that there will be an overall neutral impact

### 4.3 Social Value Act

BCC published an updated Social Value Policy in January 2019 which reinforces the need for the council to consider the 'promotion or improvement of the economic, social and environmental well-being of the area' in the procurement of services. This statement correlates with the government's

Social Value Act (2012) which sets the overarching framework ensuring that council's speak to suppliers about providing wider social benefits where procurement rules permit. BCC's policy covers the 3 pillars of Social Value:

- Economic, e.g. increasing local employment, payment of the Living Wage
- Social outcomes, e.g. compliance with the Construction Charter through the supply chain
- Environmental outcomes, e.g. reducing pollutants, reducing waste

The A4018 project will advance the outcomes set out in BCC's Social Value Policy as well as the government's Social Value Act by procuring services via the Highways Contract Framework (see above). At its inception the Framework required contractors to consider how they could deliver Social Value in their responses to the tender, including encouraging tenderers to adopt the Living Wage for all staff employed on the Framework.

## 5 Management Case

### 5.1 Promoter and Delivery Arrangements

BCC is the promoter for the project and will procure all services relating to the delivery of the project as well as maintain ownership over all assets after project completion.

BCC has been delivering these types of transport schemes, as the Local Highway Authority, for many years and is well placed, in terms of capacity and capability, to continue this rollout. Well-established in-house and third party arrangements for the identification, design, procurement and delivery of schemes of this type are in place.

### 5.2 Project Governance and Delivery

The project will be managed and governed by BCC's Transport Programme Team. The Project Manager will be Steven Riley who has over 19 years' experience in the Transport Service contributing to the delivery of major projects such as MetroBus and the Greater Bristol Bus Network. Ed Plowden, Head of Local and Sustainable Transport, will act as the project Senior Responsible Owner, with over 10 years of experience supervising the delivery of major transport projects including Cycling City.

The project manager will report to the Transport Delivery Board (Project Board) on a monthly basis using the established highlight reporting process. The highlight reporting process will enable the delivery team to identify progress with the project against key milestones, review risks and issues and track spend against the programme. Any issues unable to be resolved by the Project Manager will be escalated first to the Transport Delivery Board (the membership of which includes heads of maintenance, traffic signals, TRO, Urban Design and Accountant) and then to the Transport Management Team, whose attendees are Transport Heads of Service, including the project SRO. Following this, more serious risks and issues will be escalated to the Growth and Regeneration Board (Executive Directorate) and finally to the Mayor's Office.

The change control process will mirror the above, with change requests of scope, time, or budget escalated to the necessary level of the decision pathway depending on the scale of the change. In addition, budget changes will be required to follow the BCC Financial Scheme of Delegations. This specifies the level of approval needed to action changes on the Finance System, from Project manager, up through Head of Service, Service Director, and Executive Director. All change requests and actioned changes will be logged on the Highlight Report.

An organogram is provided below:

Figure 1.1: Organogram



With regard to Construction and Design Management regulations (CDM), the following roles shall be allocated:-

- Client Shall be represented by the Project Manager
- Principal Designer shall be BCC Engineering Design
- Principal Contractor shall be the appointed contractor, following procurement.

BCC Engineering Design will be responsible for progressing the procurement process for the civils works, inviting tenders, and assessing tender submissions. The project manager will be responsible for obtaining approval to accept winning tenders.

BCC Engineering Design will supervise the civils works and any other site-related activities.

### 5.3 Programme Plan

A programme plan setting out key milestones and the critical path can be found in Appendix G. Figure 1.2 below is a table summarising this programme.

Figure 1.2: Programme plan summary.

Milestone completion dates	Baseline
<i>Outline Design and Programme Entry Approval</i>	November 2019
<i>Construction Design</i>	February 2020
<i>Secure statutory powers/CPO/Planning Consent</i>	June 2020
<i>Full Business Case Approval/Offer letter signed</i>	January 2020
<i>Procurement</i>	April 2020
<i>Construction Start on Site</i>	July 2020
<i>Construction Practical/Substantial Completion</i>	June 2021
<i>Operational</i>	July 2021

## 5.4 Risks, Constraints and Dependencies

Appendix C fully details the Quantified Risk Assessment (QRA) process which this project has undertaken in order to establish a final risk register and a contingency budget.

An initial Risk Register was established at project initiation, and has been subsequently updated throughout the development of the project and wider programme. This consists of risks to delivery sorted by category and given owners. Mitigations are also given for each risk. These risks are given an initial rating based on probability and impact to give a risk rating, and subsequently a residual rating following any mitigation.

This Risk Register was then used as the basis of the QRA. A time or impact cost was allocated to each risk, along with a probability. A series of repeated simulations was then run under a 'Monte Carlo' system, and a likely cost established at various levels of risk.

The project team have also taken the decision to use a P80 figure for calculating risk costs, rather than the P50 figure. This is on the basis that an accelerated programme to meet LGF deadlines makes it more likely that higher costs will be incurred to avoid any extension of the programme if risks occur.

## 5.5 Land Acquisition, Planning and Other Consents

All of the work within this project is Permitted Development on adopted highway and therefore has no dependencies relating to land acquisition or planning. A Traffic Regulation Order will be required as is standard legal practice for changes to the highway. This process will commence in December 2019 and is anticipated to be sealed in June 2020.

## 5.6 Service Diversions

The C2 to C4 process forms part of the design delivery of new or diversionary utility works on the public highway operating under the legal framework of the New Roads And Street Works Act 1991 (NRSWA). The process entails the following stages:

C2 – Scheme identification (Preliminary Inquiry). The Project Sponsor or in this case Overseeing Organisation (OO) (being a highway authority) seek from the Undertakers (utilities company), details of their apparatus within the specific section of the highway which is being considered for improvement without making any commitment to the scheme.

C3 – Budget Estimate. The OO submit a preliminary design to the Undertakers. The Undertakers should respond with preliminary details of the effects on their apparatus and provide budget estimates for the necessary works and an indication of any special requirements involved.

C4 – Detailed Budget Estimate. The OO submits a final detailed design with working drawings and an outline programme. The Undertakers should come back within 25 days with (a) their detailed design of their works (b) a detailed specification of the works required; (c) a detailed estimate with itemised costs; (d) provisional programmes and timescale for works; and (e) all necessary information for the civil engineering work required if the Undertaker's works are to be undertaken by the OO's contractor.

The project is currently at stage C3.

## 5.7 Engagement and Consultation

Between 4 February and 17 March 2019, non-statutory consultation was undertaken on proposals drawn up by Bristol City Council for improvements to the A4018 route in northwest Bristol. The changes were mainly developed in response to the CPNN development, and the new traffic that this has been forecast to generate, although existing traffic concerns affecting local people were also targeted.

The consultation was promoted through various means, including the posting of 4,700 leaflets to properties close to the road, print and radio media, social media, the BCC website, and Ask Bristol e-newsletters. To discuss the proposals, and answer face-to-face questions, council officers attended six drop-in sessions between 9 February and 16 March. It is estimated that more than 2,000 people attended these sessions, although some people attended more than one.

### 5.7.1 Consultation responses:

The majority of feedback was received via the Bristol City Council Consultation Hub website with 2,330 questionnaires filled out online <sup>[1]</sup> and a further 52 on paper. In addition 83 written responses were received by post and 261 by e-mail. Meetings were held to garner the views of representative groups including BS10 Parks and Planning, the Bristol Cycling Campaign, the Bristol Walking Alliance, the Westbury-on-Trym Society, the Henleaze Society, and the Henleaze Business Association. Many of these groups also submitted written responses.

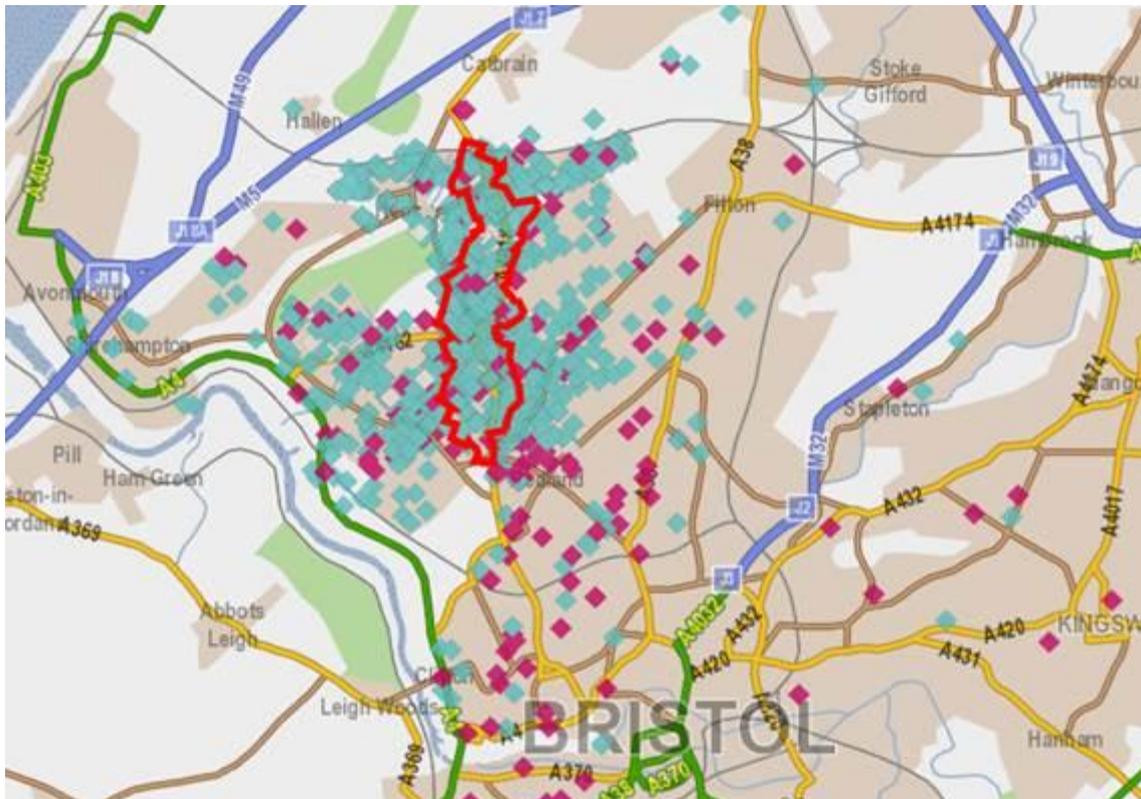
The map below shows a dot for the postcode centre from which a response (all means) was received; blue dots indicate a view mainly objecting to the proposals, purple dots a broadly supportive view. There was a clear level of feeling disagreeing with the proposals as they were put forward, although those submitted from further south have a slightly larger supportive proportion. Elements of the original proposal that received a large number of objections (such as signalisation of Crow Lane Roundabout; banned local movements along the corridor and restricting through-traffic through Westbury Village) have either been dropped from the programme or are being re-considered following further engagement with the local community.

The proposals consulted upon included measures to tackle known local transport issues as well as those to promote sustainable means of transport for residents of the CPNN development. The main focus of the local measures – including banned turns at junctions and a section of road limited to use by buses, taxis, and cycles only – were in and immediately around Westbury Village. As a result of the consultation, re-engagement with local ward members and stakeholders is proposed as part of a co-design exercise to produce ideas that have widespread support in the community. It was important to many consultees that the council ensure they pay equal attention to local issues on local roads as well as the strategic matters to keep the A4018 moving in the face of the forecast traffic levels from CPNN.

---

<sup>[1]</sup> 629 questionnaires were partially completed and have not been considered in this analysis.

The red line shows the area to which the 4,700 leaflets were delivered. This shows the methods used to promote the consultation beyond the leaflet area were also very effective in encouraging correspondence.



### 5.7.2 Ongoing/ future engagement:

The ward members for the areas through which this scheme passes are highly active and engaged with both the council's processes and local representative groups. Using their knowledge, and the representative groups that will become used as stakeholders in the Westbury co-design process, the Project Team will have a very efficient means of communicating with local people. This will be important not only to keep residents and businesses updated on the present works, but also while managing the relationship of the different phases of work.

The detail of the works that form this bid were circulated to ward members in December 2019 as a starting point to regular engagement. Any changes will be circulated in a similar manner by council officers, although it is expected that the high-level of interest in these works among the councillors will more likely see them approaching officers for updates more regularly.

The introduction and changes to construction phase traffic management will also form a part of regular engagement. However, in addition to ward members, a number of key stakeholders – including the local centre business organisations and local schools – will also receive these updates to ensure that as wide an audience is reached as possible.

## 5.8 Project Assurance

The economic benefits arising from the scheme have been analysed by our Professional Services Framework contractor, Jacobs, to ensure that the project meets the funding objectives of the West of England Local Enterprise Partnership.

Internally, the project will be subject to standard BCC Transport Practice, as detailed in section 5.2. Monthly Highlight Reports will be submitted to the Transport Programme Delivery Board, including detailed reporting on expected and actual spend. In addition, Quarterly Highlight Reports will be submitted to WECA, as well as by exception.

In terms of on-going assurance that the project is delivering the forecast benefits, there are a number of gateways specified by the BCC Quality Assurance (QA) Board. The first two stages have already been passed – taking outline design to public consultation and taking preliminary designs to detailed design. Once the detailed design is complete to a state where construction drawings are available to be passed to a contractor, a further gateway will be assessed prior to letting the contract.

The procurement process, with a number of internal checks and balances, provides further assurance that the best value is being achieved for the public funds being invested.

### 5.8.1 M&E Plan Summary

A Monitoring and Evaluation Plan is provided in Appendix E. Adopting a proportionate approach to measuring the outcomes of the proposal the M&E Plan includes a scheme logic model, key evaluation questions, the evaluation methodology and a delivery plan. It also identified the types of data sets that will be used to monitor project outcomes as well as considering resources and dissemination.

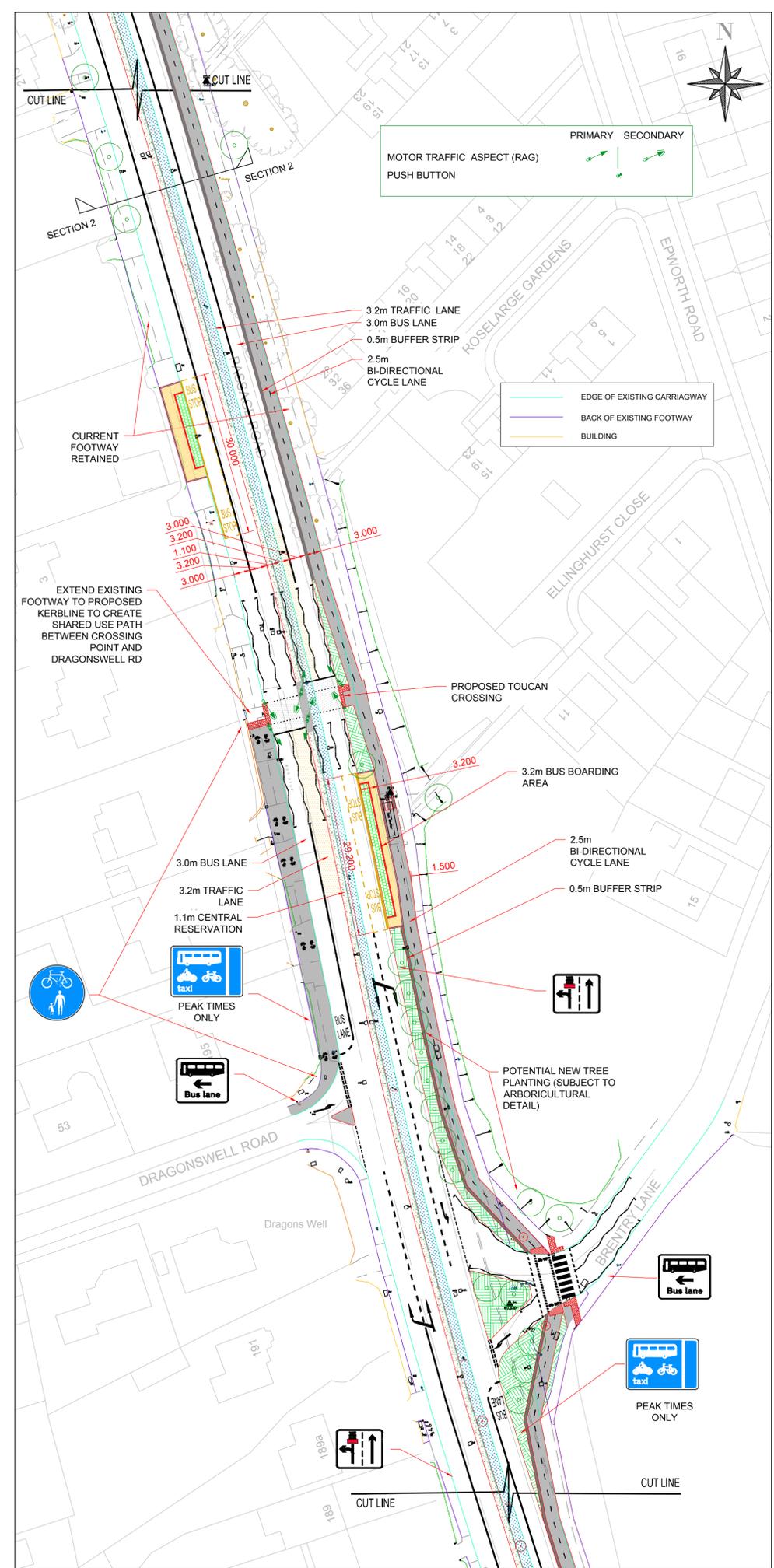
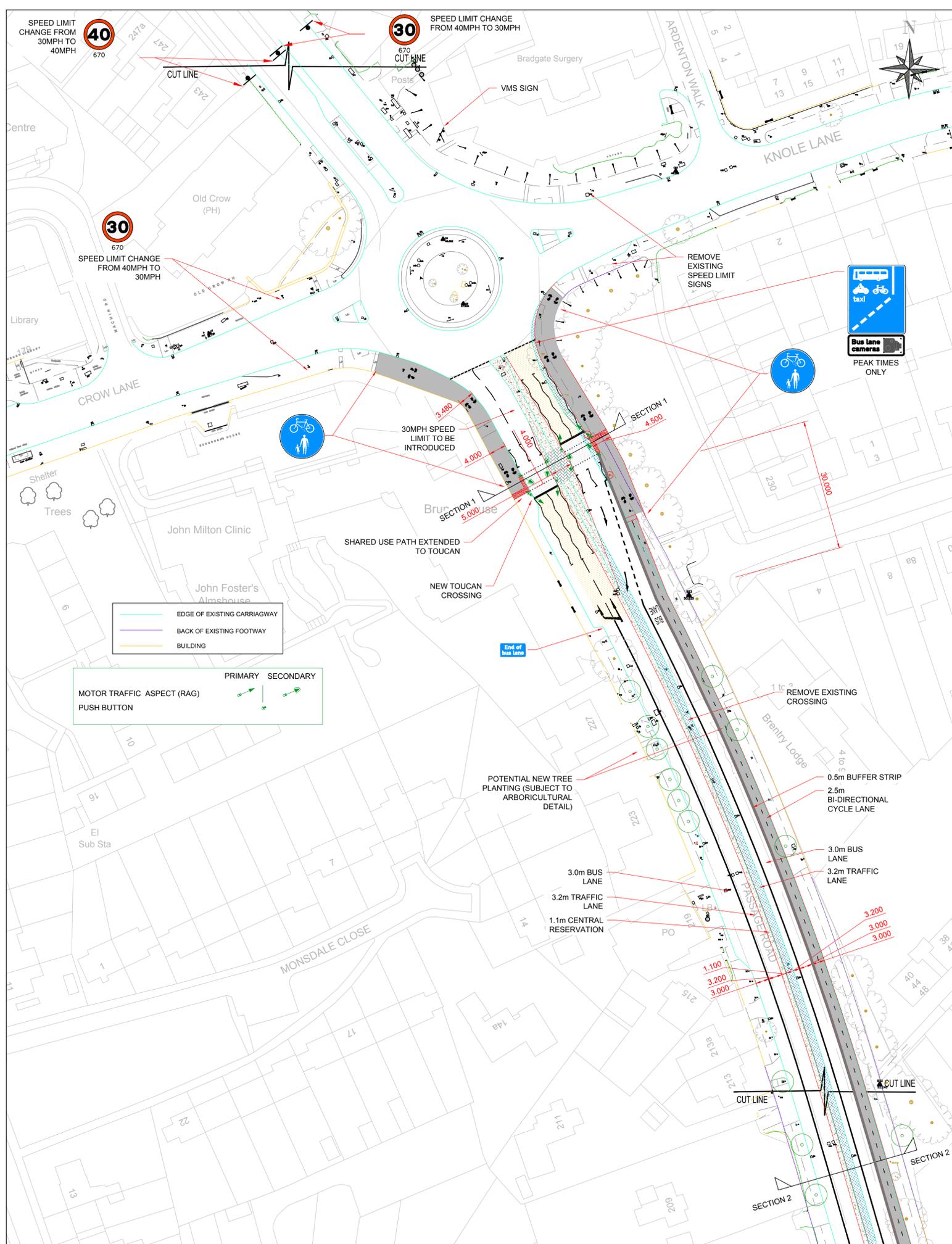
### 5.8.2 Benefits Realisation

In order to ensure that project benefits are successfully realised, a number of systems are in place. These systems are largely not project-specific, as the Council has a number of different projects focusing on improvements to sustainable travel provision. For instance through the Access WEST programme a team of officers is employed to engage with businesses, communities and schools to communicate improvements to sustainable travel infrastructure, as well as encouraging its use. These officers provide on-site roadshows, doorknocking of associated businesses, and printed materials to raise awareness of completed schemes. This will help to raise awareness of the new walking and cycling infrastructure post-construction. This engagement project is currently fully-funded by DfT grant, although elements of the programme are beginning to be streamlined into a BaU.

Beyond these well-tested methods, continuous improvement is also underway to ensure we realise the benefits of each of our schemes. Going forward, the Council will be formalising a new

engagement approach that increases the importance of both early engagement and benefits realisation, two key areas that result in higher resident satisfaction, greater likelihood of project success, and can always be improved.

This new approach will be applied to the A4018 improvements going forward, meaning a benefits realisation plan will be drawn up by the Engagement Manager including a launch event, leaflets distributed to schools, businesses and community organisations, and greater publicity of existing council interventions and offers to ensure maximum take-up of sustainable transport.



- SURFACING AND KERBING KEY**
- 20mm surface course: AC 6 close surf 100/150, nom aggregate 6mm, no limestone aggregate, 100pen, 55mm binder course: AC20 dense, bin 100/150, 100 pen
  - 200x100x65 PCC block pavers as Standard Detail SD01-004-B (natural grey pavers)
  - 70 ST4 concrete surface course, for STRIP tops and the like
  - 200x133x65 PCC Tactile block paving (buff at uncontrolled, red at controlled crossings) as Standard Detail SD03-005 / 008
  - Bus stop safe haven as Standard Detail SD04-023 D
  - Flexible carriageway construction as Standard Detail SD 01-001-B, Major Road
  - Shared Cycle / Pedestrian Path
- ROAD MARKING KEY**
- Lay new white road markings
  - Lay new primrose yellow road markings
  - Anti-skid surface - buff on approach to signal crossings
  - Anti-skid surface - grey between stop line and studs on signal crossings
- LANDSCAPING KEY**
- Area to be top soiled and grass seeded or soft landscaping
  - Possible proposed new tree (Subject to utility presence)
  - Existing tree to be removed
- NOTES**
- All dimensions in metres, all levels in m AOD

**BRISTOL CITY COUNCIL**

**CITY DESIGN**

**ENGINEERING DESIGN**

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Rev	Date	Description	By

**Project**

**CPNN A4018 Corridor Improvements**

**Title**

**Phase 1 GA**

**Crow Lane to Charlton Road**

**Sheet 01 of 03**

**Client**

**Strategic Transport Team**

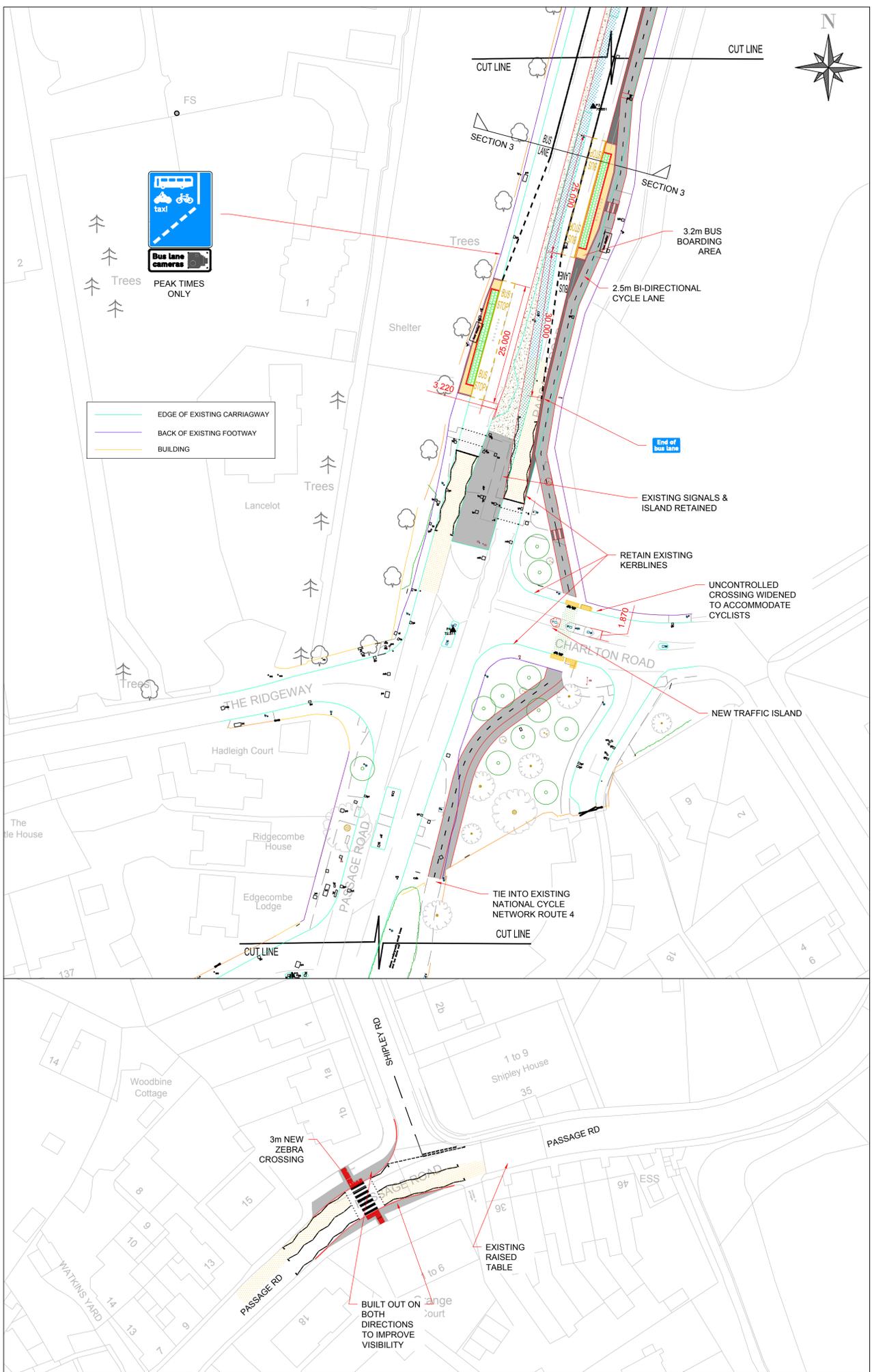
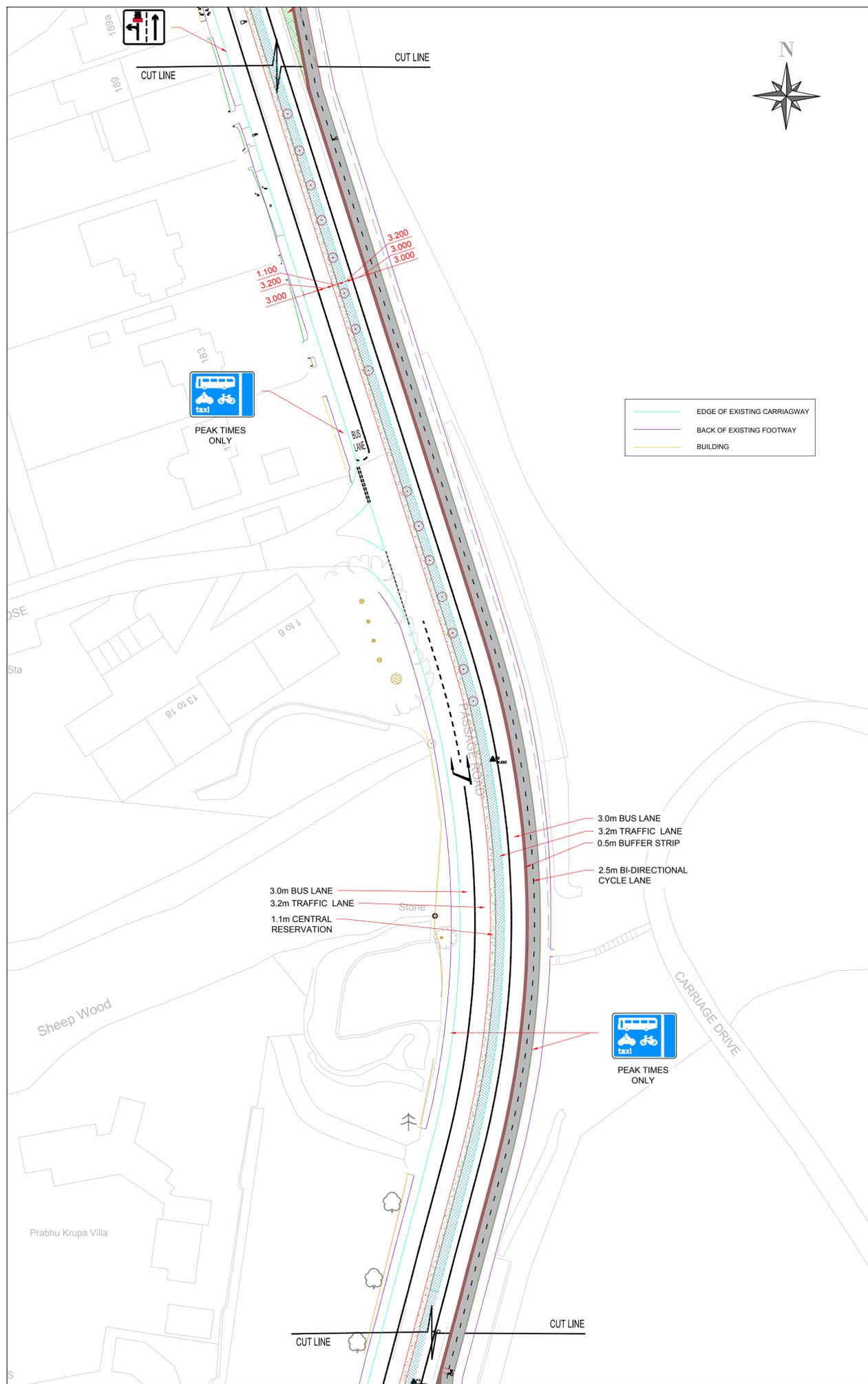
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<b>DB</b>	<b>ND</b>
<b>Date Drawn</b>	<b>Date Issued</b>
<b>August 2019</b>	<b>August 2019</b>
<b>Status</b>	<b>Issued by</b>
<b>PRELIMINARY</b>	<b>ND</b>

**Scale**

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**Project Number** **Drawing** **Revision**

**E17044 - P01 - 0**



- SURFACING AND KERBING KEY**
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Rev.	Date	Description	By

Project  
**CPNN A4018 Corridor Improvements**

Title  
**Phase 1 GA**  
**Crow Lane to Charlton Road**  
Sheet 02 of 03

Client  
**Strategic Transport Team**

Drawn by <b>DB</b>	Checked by <b>ND</b>
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Revision  
**0**





**Bristol City Council A4018 Corridor Improvements  
Final Business Case**

Bristol City Council

**Quantitative Risk Assessment**

Document FBC xx | v1.2

November 2019



## Bristol A4018 Corridor Improvements

Project No: 673846.AC.02.01  
 Document Title: Quantitative Risk Assessment  
 Document No.: 674726.AC.02.01/QRA  
 Revision: V1.2  
 Date: 29 November 2019  
 Client Name: Bristol City Council  
 Project Manager: PB  
 Author: GD

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### Document history and status

Revision	Date	Description	By	Review	Approved
1	18 Nov 2019	DRAFT FBC QRA	GD	PB	PB
1.2	29 Nov 2019	DRAFT FBC QRA with minor updates to the scheme description	GD	-	-

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**Appendix A. @Risk Output**

**Appendix B. Risk Register**

## Acronyms and Abbreviations

BCC	Bristol City Council
FBC	Full Business Case
QRA	Quantitative Risk Assessment

## 1. Introduction

The A4018 corridor is an important radial route into Bristol providing a connection between the city centre and west of the city and the M5 motorway at Junction 17, as well as to the Cribbs Causeway shopping centre and nearby retail parks. As with much of the highway network within the city the A4018 experiences congestion during weekday peak traffic periods with queuing and delay on the approaches to a number of pinch-point junctions along the corridor.

The objective of the A4018 Improvements project is to facilitate reliable, rapid and affordable alternatives to car use for both new and existing residents of the area. The specific measures contained within this proposal include public transport improvements, safety measures, active mode infrastructure and variable message signs.

The **public transport improvements** will involve upgrading the outbound Brentry Lane bus stop along Passage Road (currently flag and pole) to a full bus shelter with real-time passenger information (RTPI).

The **safety improvements** will involve upgrading the existing signalised crossing on Passage Lane immediately south of the Crow Lane Roundabout and installing a new signalised pedestrian crossing across Passage Road near the junction with Dragonswell Road, installing a Zebra Crossing on Passage Road near the junction with Shipley Road to facilitate safer crossing movement for pupils of Westbury on Trym Primary School.

The **active mode infrastructure** will entail constructing a segregated bi-directional cycle path from the Crow Lane junction to the Charlton Road junction, with a priority crossing over the side road Brentry Lane, while maintaining high-level footway capacity.

Finally, the improvements will also include installing **two variable messaging signs** (one inbound-facing and one outbound-facing) along the A4018.

Jacobs has been commissioned to support Bristol City Council (BCC) to produce a Final Business Case (FBC) for the delivery of the A4018 Corridor Improvements. The FBC forms a bid for funding to implement the A4018 Corridor Improvements.

### 1.1 Purpose of this Report

A Quantitative Risk Assessment (QRA) was undertaken for the A4018 Corridor Improvements. This technical memorandum outlines the risk identification (risk register) and the QRA process and presents the QRA outputs.

The main purpose of the QRA is to support the scheme costing as presented within the financial case by predicting the level of risk contribution, having a defined level of confidence, to cover the various stages of the scheme. The QRA allows for uncertainty in unplanned additional cost items, including cost due to delay, that cannot be included in the project costs. The assessed risk value is to be used in the financial case for this package and incorporated in the economic appraisal.

The QRA process involves four steps.

- Step 1 is identification of all risks affecting the project through risk workshops and risk reviews. This step results in a risk register.
- Step 2 is analysis of the various risks by defining their distributions in terms of probabilities, impacts and knock-on effects. This information is also gathered through risk workshops and other interactions including stakeholders.
- Step 3 is undertaking the risk modelling using Monte Carlo simulation (in this project @Risk® software was used).
- Step 4 is analysing the results against required contingency needs for the project.

The risk model has been constructed by Jacobs using Microsoft Excel® and @Risk® software packages. The model used the Monte-Carlo simulation theory by replicating a large number of iterations of possible project risk

scenarios. Confidence levels relating to the cost of the scheme are obtained from the distribution of the averaged results produced by the simulations.

## 2. Risk Model Inputs

### 2.1 Cost of Implementation and Operation

Monthly costs have been established for risks which occur during various stages of the project. These are split between costs which occur during the FBC, and those which occur during the implementation and delivery of the scheme.

The following unit costs of delay (£ per month) have been considered for the various risks that could cause delay to the project:

- £2,000 to £4,000/month – for risks during the FBC stage that do not affect the critical path of project. This allows for project management costs and the potential for a limited amount of re-work.
- £8,000 to £10,000/month – for risks during the FBC stage that affect the critical path of project. This is based on the average spend per month of the project to date.
- £15,000/month – for risks during the FBC that affect the critical path of project and include external staff resource.
- £10,000 to £30,000/month – for risks that occur during delivery of the scheme.

### 2.2 Risk Identification, Categorisation, and Ranking

A risk register was developed through group consensus via a risk workshop. The risk workshop consisted of staff from BCC that are involved in the project with Jacobs facilitating.

A total of 41 risks were identified. Each risk was categorised based on project objectives, then scored, which produced an Overall Risk Ranking in terms of high, medium, or low for each risk. The current Risk Register is included in Appendix B of this document.

The risks that are used in the QRA are taken directly from the risk register. A number of risk mitigatory/management actions have been taken by the project team. These were then quantified in terms of financial risk and/or delay risk.

### 2.3 Risk Quantification

Individual risks were defined in terms of their distributions, likelihood/probabilities, impacts and knock on effects, etc., through the workshop. For each risk, the key inputs into the @RISK software to be assessed in the QRA model are; Financial/Delay Impact Estimate (best case, worst case, and most likely), and Probability / Likelihood.

The risk category and the Overall Risk Ranking (high, medium, low) were used as a guidance in quantifying risks. These values were then used in the model to determine a Mean Outcome and a Risk Exposure for each risk and for each iteration. The Monte Carlo simulation used 10,000 iterations using the @Risk software to develop a single probability distribution for all possible risk outcomes for the scheme. The results were then used to determine various risk percentile values for the scheme.

## 3. Risk Model Outputs

### 3.1 Risk Value

The QRA figure being included financial case is the 80<sup>th</sup> Percentile - P(80). A risk level of P80 (£601k) is being used on the basis that an accelerated programme to meet Local Growth Fund (LGF) deadlines makes it more likely that higher costs will be incurred to avoid any extension of the programme if risks occur.

In addition, the 50<sup>th</sup> Percentile (P(50)) and the P(Mean), the mean percentile value also provide further levels of confidence. QRA results are shown below. The @Risk outputs for FBC stage are included in Appendix A of this document, which show the full range of percentile values calculated by @Risk.

**Table 3-1: QRA – FBC Stage**

	P(50)	P(80)	P(Mean)
Grand Total Risk (Financial + Delay)	£425,000	<b>£601,000</b>	£475,000

## 3.2 Highest Ranked Risks

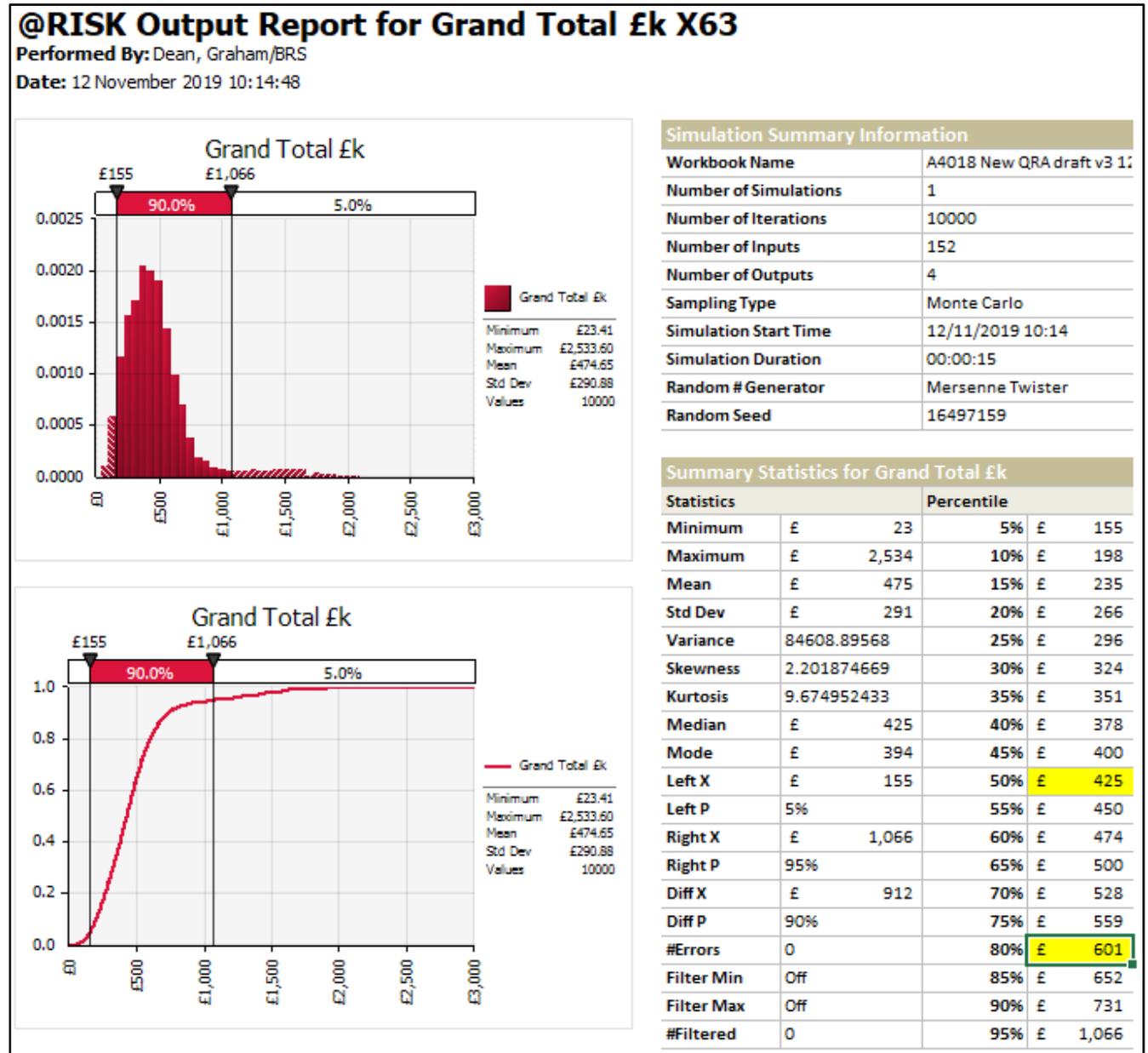
The top five ranked risks in the FBC stage of the project are listed below.

**Table 3-2: Top five risks QRA – FBC Stage**

Rank	Risk Ref	Description
1	Risk 2	If costs come back higher than expected following the tender process, then this could lead to additional borrowing requirements or de-scoping.
2	Risk 32	Hard materials (e.g. reinforced concrete), unknown amounts of material. Also costs of reinstatement.
3	Risk 21	If contractor, consultants, or suppliers cease trading or change ownership, then this could cause increased costs and/or delays to the programme.
4	Risk 12	If there is a lack of timely buy-in from teams, within and outside the Transport Service, as to the principles of project, then this could result in delays in scheme implementation and redesign post-tender leading to extra delays and costs.
5	Risk 3	If utility locations have not been mapped accurately, then costly diversion works may be required.

## Appendix A. @Risk Output

QRA 1 – FBC Stage



## Appendix B. Risk Register

See separate Excel Spreadsheets below:

- 1) QRA - FBC Stage

**A4018 Corridor Improvements - Risk Register and QRA**

Rev: v3 - 12 November 2019

Scheme: A4018 Corridor Improvements - 15143

Milestone: FBC

Works Cost: £3.3m

Cost of delay (k): Varied by risk

Resources	Business case
On-street effects	Legal / Process
Communications / stakeholder challenge	Procurement
Political	Financial
Technical / Design	Construction
Operation	

Likelihood		
1 = Almost Certain	95.0%	
2 = Likely	50.0%	
3 = Possible	25.0%	
4 = Unlikely	12.5%	
5 = Rare	5.0%	

**ENTER QRA QUANTITIES IN THESE COLUMNS**

No.	Risk Ref	Description	Category	Stage at which Risk occurs	Mitigation owner	Initial Risk			Proximity (date)	Approach Avoid, Accept, Reduce, Transfer	Mitigation Measures	DATE OF UPDATE	Status	Residual Risk			Likelihood (%)	Financial			Delay				Workshop Comments	
						Impact	Prob.	RAG						Impact	Prob.	RAG		Min (£k)	Max (£k)	Likely (£k)	Min (mths)	Max (mths)	Likely (mths)	Delay Cost (£k)/Month		
1	Risk 1	If there is a failure to produce sufficient evidence to demonstrate benefits for the Business Case, then this could result in not all the funding being made available	F (Financial)	Business Case	Steve Riley	H	M	6.00	2019	Reduce	Ensure Business Case development is sufficiently challenged at all stages, so evidence is deemed sufficient. Ensure draft BC versions discussed with WECA before final submission.	14/10/2019	Open	H	L	3.00	12.5%	5	30	20					Internal and external fees but not a delay. Conditional funding	
2	Risk 2	If costs come back higher than expected following the tender process, then this could lead to additional borrowing requirements or de-scoping	F (Financial)	Tender	Steve Riley	H	M	6.00	2020	Reduce	Improve design to provide better information to tender process, while maintaining a high level of contingency until the tender prices are confirmed. Ensure that internal stakeholders have their input early before designs are finalised.	09/10/2019	Open	M	M	4.00	5.0%	500	1500	1000	2	4	3	15		
3	Risk 3	If utility locations have not been mapped accurately, then costly diversion works may be required	U (Utilities)	Construction	Nathaniel Davis	H	M	6.00	2020/21	Reduce	Provide better information on utilities at an earlier stage to better inform design, including C3 and C4 notices before letting the tender. Trial holes to be done. Consider use of ground penetration radar.	09/10/2019	Open	H	L	3.00	20.0%	10	200	100	2	6	4	6		
4	Risk 4	If a large number of other schemes are on site at the same time, then there may be a lack of sufficient resource for civils works	O (Operational)	Construction	Steve Riley	H	M	6.00	2020/21	Reduce	Hold regular discussion with Lot 6 and Lot 7 civils contractors - including those not at the cheapest end of the spectrum - and communicate agreement with PMs via TDB.	09/10/2019	Open	M	M	4.00	20.0%				1	6	3	4		
5	Risk 5	If other projects are considered to have a higher political priority, then the resources of external contractors could be taken away from this project - especially CAZ!	M (Management)	Construction	Steve Riley	H	H	9.00	2020/21	reduce / accept	Escalate to BCC and WECA politicians. Early engagement with contractors at early stage. Engagement with funding body.	14/10/2019	Open	H	M	6.00	40.0%				2	6	4	4		
6	Risk 6	If there is significant adverse weather, then delays could be caused to the construction works	E (Environmental)	Construction	Nathaniel Davis	H	L	3.00	2020/21	Reduce	Programme as much work as possible into seasons where weather is likely to be more clement, provide plenty of float for winter construction.	09/10/2019	Open	M	L	2.00	25.0%				0.5	2	1	3		
7	Risk 7	If there are other projects, BAU, or maintenance works in the area that over-run in time or scope, then there could be an adverse impact on the performance of the network and the reputational view of this scheme in the eyes of local people	M (Management)	Construction	Steve Riley	H	M	6.00	2020/21	Avoid	Use TDB to maintain a dialogue with managers of possibly related works and ensure the Capital Programme is planned to allow all activities to run without overlapping.	09/10/2019	Open	H	L	3.00	10.0%				1	2	1	10		
8	Risk 8	Ecological constraints could delay programme and incur specialist costs.	E (Environmental)	Tender/Construction	Nathaniel Davis	H	M	6.00	2019	Avoid	Prepare programme carefully, including float, with front-loading of items involving vegetation. Tree surveys and species surveys	14/10/2019	Open	M	M	4.00	5.0%				3	6	3	30	Design, PM, specialist ecological support, and contractor costs	
9	Risk 9	If local media / stakeholder groups adopt a negative stance to the scheme, then media enquiries and public complaints could occupy officer time	O (Operational)	Design/Consultation	Steve Riley	M	H	6.00	2019	Avoid	Clear communications strategy, early media engagement, try to identify supportive members and businesses.	09/10/2019	Open	L	H	3.00	50.0%				1	3	2	3		
10	Risk 10	If approval is given to include this scheme as part of the Bus Deal, then the additional funding could provide opportunities for betterment of existing proposals or expansion of scope	M (Management)	Design	Steve Riley	H	M	6.00	2021	Exploit	Maintain a costed 'chocolate box' approach to design elements, allowing those initially considered unaffordable to be brought back into the design if additional funding proves to be available. An opportunity, not a risk.	09/10/2019	Open	H	M	6.00	0.0%									
11	Risk 11	If any delays are experienced and the delivery of the northern section extends beyond March 2021, then the WECA funding may be compromised	F (Financial)	Construction	Steve Riley	H	H	9.00	2021	Accept	Maintain dialogue with WECA colleagues to provide regular updates of progress and ensure to be kept informed of any changes to funding guidance.	09/10/2019	Open	H	M	6.00	15.0%									If funding is compromised, the project is over
12	Risk 12	If there is a lack of timely buy-in from teams, within and outside the Transport Service, as to the principles of project, then this could result in delays in scheme implementation and redesign post-tender leading to extra delays and costs	M (Management)	Design	Steve Riley	H	M	6.00	2019	Avoid/ Reduce	Ensure importance of scheme is made aware to Service Managers and Team Leaders, with clear message this is a priority scheme for the Council	14/10/2019	Open	H	L	3.00	20.0%	20	300	100	1	6	3	10	Internal and contractor costs	
13	Risk 13	If there are significant objections at the TRO stage to the proposed bus lanes as part of the wider programme, then this could delay complementary LGF measures.	P (Political)	TRO	Steve Riley	H	M	6.00	2020	Reduce	Ensure Ward Cllrs briefed on need for change. Seek designs that can include any appropriate mitigation. Seek to engage with affected parties early and highlight overall benefits.	14/10/2019	Open	H	L	3.00	5.0%				1	2	1	10		
15	Risk 15	If siting of drainage gulleys and connection to Wessex mains prove difficult, then this could result in delay and additional cost	C (Construction)	Construction	Nathaniel Davis	H	M	6.00	2020/21	Accept	Undertake drainage investigation surveys and make early contact with Wessex Water -work to be done	14/10/2019	Open	H	M	6.00	30.0%	10	100	50	2	6	4	6		
17	Risk 17	If there are incidents of ASB and/ or vandalism of site equipment and works, then there could be delay to the programme and additional costs	C (Construction)	Construction	Nathaniel Davis	H	M	6.00	2020/21	Avoid	Tender to specify site security.	12/05/2018	Open	M	L	2.00	5.0%				1	2	1	3		
18	Risk 18	If the works and on-site transport issues are not well defined, then there could be disruption to the Free School and Westbury-on-Trym Primary School during construction	O (Operational)	Construction	Nathaniel Davis	H	M	6.00	2020/21	Reduce	Clear coordination and communication with the schools. Adapt the programme accordingly (e.g. crossings)	14/10/2019	Open	L	M	2.00	12.5%				0.5	2	1	16	inc extra TM costs	
19	Risk 19	If there are negative political impacts of wider network disruption, then there may be a need to make adjustments to the programme	P (Political)	Construction	Steve Riley	H	M	6.00	2020/21	Reduce	Appropriate traffic management measures and regular communication on works and diversions. Have a full time traffic management operative.	14/10/2019	Open	M	M	4.00	15.0%				0.125	0.25	0.125	180		
20	Risk 20	If there are unexpected financial pressures, due to change in political priorities or financial challenges, then more internal funding may be required and reduce programme scope.	F (Financial)	Construction	Steve Riley	H	M	6.00	2020	Accept	Close monitoring and regular reporting of spend and status. Continuous need to highlight importance of project. Assess option to undertake an interim solution to a reduced budget that provides an extended delivery timescale, with budget subsequently re-instated	14/10/2019	Open	H	M	6.00	5.0%	8	16	8						
21	Risk 21	If contractor, consultants, or suppliers cease trading or change ownership, then this could cause increased costs and/or delays to the programme	O (Operational)	Construction	Steve Riley	H	M	6.00	2019	Avoid	Thorough vetting of contractors, consultants in line with BCC policies. Seek to use Framework suppliers, who have been assessed already.	14/10/2019	Open	H	L	3.00	5.0%	5	1000	30					£1m for main contractor	
22	Risk 22	If there were failure to complete procurement processes, then this could lead to certain elements of the work not being progressed, delaying project delivery	M (Management)	Construction	Steve Riley	H	M	6.00	2020	Reduce	Project Manager to ensure all necessary procurement identified. Use of existing Frameworks should assist in procurement.	14/10/2019	Open	H	L	3.00	5.0%				2	6	3	8		
23	Risk 23	If there are staff /skills shortages in the BCC Procurement / Legal team, then a lack of assistance in the tender process could lead to delays in letting the contract	M (Management)	Construction	Steve Riley	H	H	9.00	2020	Reduce	Identify staff with appropriate experience/ knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	14/10/2019	Open	H	M	6.00	10.0%				0.5	1.5	1	5	PM and procurement team	
24	Risk 24	If there were insufficient internal staff resources available to do development work, especially alongside other major schemes and other priorities, then scheme delivery may be delayed	M (Management)	Design/Construction	John Roy	H	H	9.00	2019/20	Reduce/ Fallback	1) Use of consultants. 2) Scheme is a priority project, given the potential safety aspects. Assess need for additional resource support, either internal or external. Escalate internally.	14/10/2019	Open	H	M	6.00	40.0%				4	16	6	15	internal and £12k external PM/month	
25	Risk 25	If there is a delay in letting the new professional services contract, then scheme delivery may be delivered using outdated rates	M (Management)	Design/Construction	Steve Riley	L	L	1.00	2019	Accept	Escalate with contract manager. Identify timeframes and schedule programme work accordingly. Understand possible alternatives, such as frameworks held by WECA.	14/10/2019	Open	L	L	1.00	5.0%	1	9	5						

**A4018 Corridor Improvements - Risk Register and QRA**

Rev: v3 - 12 November 2019  
 Scheme: A4018 Corridor Improvements - 15143  
 Milestone: FBC  
 Works Cost: £3.3m  
 Cost of delay (k): Varied by risk

Resources  
 Business case  
 On-street effects  
 Legal / Process  
 Communications /  
 stakeholder challenge  
 Procurement  
 Political  
 Financial  
 Technical / Design  
 Construction  
 Operation

Likelihood		
	1 = Almost Certain	95.0%
Extreme Risk	2 = Likely	50.0%
High Risk	3 = Possible	25.0%
Medium Risk	4 = Unlikely	12.5%
Low Risk	5 = Rare	5.0%

**ENTER QRA QUANTITIES IN THESE COLUMNS**

No.	Risk Ref	Description	Category	Stage at which Risk occurs	Mitigation owner	Initial Risk			Proximity (date)	Approach Avoid, Accept, Reduce, Transfer	Mitigation Measures	DATE OF UPDATE	Status	Residual Risk			Likelihood (%)	Financial			Delay				Workshop Comments
						Impact	Prob.	RAG						Impact	Prob.	RAG		Min (£k)	Max (£k)	Likely (£k)	Min (mths)	Max (mths)	Likely (mths)	Delay Cost (£k)/Month	
27	Risk 27	If there is an attempt to deliver beyond initial objectives including in construction stage, then this will result in scope creep with associated cost increase	M (Management)	Construction	Steve Riley	H	M	6.00	2019	Avoid	Ensure close monitoring of design focuses on initial agreements. Seek to ensure engagement and consultation processes do not propose or offer significant extra items. Specify the project products in the PID and ensure there is sign-up via TDB.	14/10/2019	Open	M	M	4.00	12.5%	5	100	30	0.5	2	1	8	
28	Risk 28	If there is limited space immediately adjacent to the highway for replacement tree planting to match the BTRS, then the project could be criticised for not meeting its requirements	E (Environmental)	Design	Nathaniel Davis	H	M	6.00	2020/21	Reduce	Engage early with the arboricultural team to assess alternative locations away from the main road, especially any requested through local groups or the Tree Forum	14/10/2019	Open	H	L	3.00	70.0%				0.5	2	1	2	Comms resource and design
25	Risk 29	Pressure on internal design team due to other schemes, then scheme delivery may be delayed or delivered with the help of a consultant.	M (Management)	Design/Construction	Steve Riley	H	H	9.00	2019/20	Reduce	Recruit agency staff. Engagement between PM and engineering design.	14/10/2019	Open	M	M	4.00	30.0%				6	8	6	6	
30	Risk 30	Lack of sufficient internal comms resource due to other commitments (e.g. CAZ).	M (Management)	Design/Construction	Steve Riley	M	H	6.00	2019/20	Reduce	Early engagement with comms team on available resource and consideration of recruitment / agency staff.	05/11/2019	Open	M	M	4.00	50.0%	20	40	30					Agency comms staff
32	Risk 32	Hard materials (e.g. reinforced concrete), unknown amounts of material. Also costs of reinstatement.	C (Construction)	Construction	Nathaniel Davis	H	H	9.00	2020/21	Reduce	Engage early with the arboricultural team to assess alternative locations away from the main road, especially any requested through local groups or the Tree Forum	05/11/2019	Open	H	M	6.00	50.0%	150	300	200	1	6	3	15	
33	Risk 33	Hazardous materials found in SI and excavations (e.g. coal tar, asbestos)	C (Construction)	Design/Construction	Nathaniel Davis	H	M	6.00	2020/21	Reduce	Site investigations including cores to check for coal tar. Asbestos may be in Bristol Water pipes so need C2/C3 enquiries	05/11/2019	Open	M	L	2.00	25.0%	10	50	20	1	2	1	1	
34	Risk 34	Restrictions on permitted traffic management, including planned events and accidents - leading to delays to the scheme / increased cost	C (Construction)	Design/Construction	Nathaniel Davis	H	H	9.00	2020/21	Reduce	engagement with network management team / Highways England	05/11/2019	Open	M	M	4.00	60.0%				2	4	3	8	£5k/month TM
35	Risk 35	Impact on affected businesses	C (Construction)	Construction	Steve Riley	L	L	1.00	2020/21	accept	Stakeholder engagement	05/11/2019	Open	L	L	1.00	5.0%	5	40	10					
36	Risk 36	Unforeseen ground conditions e.g. in highway widening	C (Construction)	Construction	Nathaniel Davis	M	M	4.00	2020/21	reduce	site investigation	05/11/2019	Open	M	L	2.00	40.0%	15	55	35	1	3	2	4	
37	Risk 37	Brexit affecting contractor supply chain and costs.	C (Construction)	Tender/Construction	Steve Riley	M	M	4.00	2020/21	Accept		05/11/2019	Open	M	M	4.00	12.5%	30	90	60					based on 1%/3%/2% of civils costs
38	Risk 38	Dependencies on third parties (e.g. ClearChannel / Dynniq)	C (Construction)	Construction	Steve Riley	H	M	6.00	2020/21	reduce	Co-ordination with third party providers	05/11/2019	Open	M	M	4.00	50.0%				0.5	3	1	15	Internal, civils staff and TM
39	Risk 39	Additional inflationary increases for third party works (Bus shelters, Signals, street lighting) over and above the normal	C (Construction)	Tender/Construction	Steve Riley	L	M	2.00	2020	Accept		08/11/2019	Open	L	M	2.00	50.0%	3	9	6					These works sum £300k- minimum, likely, and max cost impacts at 1%, 2%, and 3% of this (3k, 6k, 9k)
40	Risk 40	The cost of street lighting may increase as the design has not yet been completed	C (Construction)	Design/Construction	Nathaniel Davis	M	M	4.00	2019	Accept		08/11/2019	Open	M	M	4.00	25.0%	15	45	22.5					Works sum £150k- minimum, likely, max impacts at 10%, 15%, and 30% of this
41	Risk 41	The cost of the trees may increase as the design has not yet been completed	C (Construction)	Design/Construction	Nathaniel Davis	L	M	2.00	2019	Accept	AIA underway and engagement with tree teams	08/11/2019	Open	L	M	2.00	25.0%	5	25	10					

# **West of England**

## **Full Business Case Monitoring and Evaluation Plan**

*LGF Pinch Points Fund: A4018*

## 1. Scheme background and context

The A4018 corridor is an important radial route into Bristol providing a connection between the city centre and west of the city and the M5 motorway at Junction 17, as well as to the Cribbs Causeway shopping centre and nearby retail parks. As with much of the highway network within the city the A4018 experiences congestion during weekday peak traffic periods with queuing and delay on the approaches to a number of pinchpoint junctions along the corridor.

Alongside a wider package of improvements the objective of the A4018 Pinch Point project is to facilitate reliable, rapid and affordable alternatives to car use for both new and existing residents of the area. The scheme, along with other enabling infrastructure, could indirectly support unlocking of homes and jobs in the area, as it would reduce the network constraints and make the area more attractive for growth. While not dependent on the scheme the Cribbs Patchway New Neighbourhood (5,700 new homes) would also benefit from nearby strategic links with high-quality sustainable transport provision. The transport interventions within this project form part of a wider programme for the entire corridor including bus priority measures, upgrades to key junctions to improve traffic flow and the creation of new walking and cycling infrastructure.

The specific measures contained within this proposal include:

- Public transport improvements: Upgrading the outbound Brentry Lane bus stop along Passage Road (currently flag and pole) to a full modern bus shelter with real-time passenger information (RTPI).
- Safety improvements: Upgrading the existing signalised crossing on Passage Road immediately south of the Crow Lane Roundabout and installing a new signalised pedestrian crossing across Passage Road near the junction with Dragonswell Road. Installation of a school crossing near the junction of Passage Road and Shipley Road.
- Active mode infrastructure: Upgrading sections of the existing pedestrian pavement along the A4018 to facilitate the provision of a high-quality segregated cycle way.
- Variable messaging signs: Installing two variable messaging signs (one inbound-facing and one outbound-facing) along the A4018.

The total project value is £4,060,091 delivering a high Benefit Cost Ratio of 3.1. The scheme is estimated to deliver 68 gross new jobs during the construction phase (34 direct and 34 indirect) and GVA of £1.6m. In the longer term the enhancements will help to deliver 124 additional homes and 26 new jobs.

The project is well supported by local policy including the emerging Bristol Transport Strategy and Joint Local Transport Plan 2019-2036. Both of these strategic documents highlight the need for a transformational sustainable change to the transport network to both accommodate the 105,000 new homes and 82,500 jobs that are expected to be created in the area by 2036 and a more sustainable way of travelling in the area. This M&E plan relates to Phase 1A of the scheme only.

<b>Milestone completion dates</b>	<b>Baseline</b>
<i>Outline Design and Programme Entry Approval</i>	November 2019
<i>Construction Design</i>	February 2020
<i>Secure statutory powers/CPO/Planning Consent</i>	June 2020
<i>Full Business Case Approval/Offer letter signed</i>	January 2020
<i>Procurement</i>	April 2020
<i>Construction Start on Site</i>	July 2020
<i>Construction Practical/Substantial Completion</i>	June 2021
<i>Operational</i>	July 2021

## 2. Scheme Logic Model

### Context and Rationale

The project is well supported by local policy including the emerging Bristol Transport Strategy and Joint Local Transport Plan 2019-2036. Both of these strategic

documents highlight the need for a transformational sustainable change to the transport network to both accommodate the 105,000 new homes and 82,500 jobs that are expected to be created in the area by 2036 and a more sustainable way of travelling in the area.

. The CPNN Development Framework (adopted March 2014) and the South Gloucestershire Council Local Plan also identify the need to provide high-quality alternatives to car travel in order to bring forward the development in a sustainable context.

The scheme should receive public funding as it represents a pre-emptive and proactive approach to supporting sustainable development that will help the sub-region meet its ambitious housing and employment targets. Without public funding to meet the shortfall, the necessary sustainable transport infrastructure will be delivered in a piecemeal and disjointed manner resulting in a poor quality offering to new and existing residents of the area.

Objectives	Resources/ Input	Activities	Outputs	Direct & Indirect Outcomes	Impact
<p>Provide high quality sustainable transport infrastructure to improve connectivity along the A4018 corridor into the City Centre.</p> <p>Ensure that the CPNN is developed in a sustainable context by providing viable alternatives to car use</p>	<ul style="list-style-type: none"> <li>Capital investment <ul style="list-style-type: none"> <li>LGF: £4,060m 2019-2021</li> </ul> </li> <li>Planning consent and related approvals</li> <li>Officer resource to develop and deliver the programme</li> <li>Input from specialist advisers</li> <li>Input from elected members and other key stakeholders</li> <li>Contractor time to deliver construction works</li> </ul>	<ul style="list-style-type: none"> <li>The programme will need to be progressed through the following stages: <ul style="list-style-type: none"> <li>Outline Design and Programme Entry Approval 05/19</li> <li>Detailed Design: 12/19</li> <li>Start of construction: 04/20</li> <li>Complete construction: 03/21</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Public Transport Improvements (Jun2020-Feb2021) <ul style="list-style-type: none"> <li>Upgrade the Brentry Lane bus top (currently flag and pole) to a full bus shelter with real time passenger information.</li> </ul> </li> <li>Safety improvements (Jul 2020-Feb2021) <ul style="list-style-type: none"> <li>Upgrade the existing signalised crossing on Passage Road (south of Crow Lane)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Direct and indirect benefits during the construction stage amounting to approx. <b>34 FTEs</b> and <b>£1.6m in GVA.</b></li> <li>Unquantifiable contribution to indirect benefits during the operational stage amounting to approx: <ul style="list-style-type: none"> <li>124 additional homes</li> <li>26 new jobs</li> </ul> </li> <li>Estimated <b>20% higher rates of walking and cycling</b> along new ped/cycle routes.</li> <li>Reduction in collisions</li> </ul>	<ul style="list-style-type: none"> <li>Improved access to Bristol City Centre and CPNN development along length of A4018</li> <li>Uplift in employment as a result of construction of the scheme</li> <li>Better access to sustainable travel options</li> <li>Reduced congestion, airborne pollutants and carbon emissions</li> </ul>

			<ul style="list-style-type: none"> <li>• Install a new crossing point on Passage Lane (opp. Dragonswell Road)</li> <li>• Active Mode infrastructure (Jun 2020-Jul2021) <ul style="list-style-type: none"> <li>• Provide 825m metres of segregated path from Crow Lane to Charlton Road Junction</li> </ul> </li> <li>• Variable Message Signs (Apr 2020-Mar2021) Install 2 x Variable Message signs (inbound and outbound-facing)</li> </ul>	<p><b>Indirect and/or un-measurable outcomes</b> <i>(not measurable/distinguishable from background changes)</i></p> <ul style="list-style-type: none"> <li>• Estimated public transport journey time benefits of 43,196 minutes per annum</li> <li>• Estimated road safety benefits amounting to £1.4m over 60 years</li> <li>• Estimated active mode benefits (inc. congestion, accident, air quality, noise, GHG, reduced risk of premature death, absenteeism and journey ambience) of £7,120,919 over 20 years</li> <li>• Estimated VMS journey time savings amounting to £1,449,176 over 20 years</li> </ul>	
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### 3. Evaluation and design methodologies

## Key evaluation questions

**Year 1 Evaluation Report:** This report will answer the following questions and include the following content:

- Have outputs been delivered?
- Have measurable direct and indirect outcomes been achieved including:
  - Increased walking and cycling rates
  - Uplift in GVA and jobs in the construction phase of the project
  - Uplift in homes and jobs in the operational phase of the project
- Have any un-anticipated outcomes been achieved?
- What lessons have been learned about programme delivery, considering stakeholder, partner and beneficiary feedback?
- Outturn costs
- Delivery Programme
- Project Products
- Outstanding tasks, risk, issues and decisions
- Benefits realisation
- Lessons Learned

## Evaluation methodology

Evaluation will be undertaken by BBC's Transport Project Team (TPT) in consultation with the Traffic Data team. The project manager for the project will evaluate the benefits of the project by monitoring outcomes, using a combination of 'Process Evaluation', 'Outcome Evaluation' and 'Impact Evaluation.' Specifically this will include:

*Outcome Evaluation:* **Increase in walking and cycling rates:** measured using cycle count data (and where linkages can be made) the annual Travel to Work Survey. **Reduction in collisions** measured through STATs 19 data.

*Impact Evaluation:* **Jobs and GVA uplift:** estimated using project spend in line with 'Impact Guidance Note: A guide to estimating economic impact for infrastructure projects in the West of England.' **Operational stage homes and jobs:** measured using the BCC Valuation Office Agency to determine new homes and jobs in the "MSOA 001." Specifically this will include Council Tax data for new homes and Post code level Valuation Office Data used in

conjunction with Employment Density Guide to establish jobs. Active mode monetised benefits estimated using cycle/ped count data to feed into the Active Mode Appraisal Tool.

*Process Evaluation: Did the project meet key project milestones and delivered within time and budget:* measured through Highlight and Closure Report and included in Evaluation Reports.

#### Audience

The audience for the evaluation reports and medium of communication are set out below:

**WECA Infrastructure Board:** Quarterly reports, Yr 1 and Yr 3 Evaluation Reports

**Members:** - Yr 1 and Yr 3 Evaluation reports

**Public** – Yr 1 and Yr 3 Evaluation reports published at <http://travelwest.info/projects>

#### 4. Data requirements

Metric (inc. Target)	Unit	Frequency	Data source (& Responsibility)	Baseline date	Reporting to?
<b>Inputs</b>					
Expenditure Capital – LGF £4,060,091 2019-2021	£, by source	Quarterly	Supplier invoices; Quarterly grant claims – Programme Manager	FBC at full approval 01/2020	WECA highlight report; Project governance
<b>Outputs</b>					
<i>Type of infrastructure delivered – Segregated cycle path</i>	<i>km</i>	<i>B/A</i>	UA project lead reporting to Programme Manager	FBC at full approval 01/2020	WECA highlight report; Project governance
<i>Type of product delivered – bus stop</i>	<i>#</i>	<i>B/A</i>	UA project lead reporting to Programme Manager	FBC at full approval 01/2020	WECA highlight report; Project governance
<i>Type of infrastructure delivered – Pedestrian crossings</i>	<i>#</i>	<i>B/A</i>	UA project lead reporting to Programme Manager	FBC at full approval 01/2020	WECA highlight report; Project governance
<i>Type of infrastructure delivered – VMS signs</i>	<i>#</i>	<i>B/A</i>	UA project lead reporting to Programme Manager	FBC at full approval 01/2020	WECA highlight report; Project governance

Metric (inc. Target)	Unit	Frequency	Data source (& Responsibility)	Baseline date	Reporting to?
<b>Outcomes and impacts</b>					
<i>Direct and indirect benefits during the construction stage amounting to approx. 68 FTEs and £1.6m in GVA.</i>	# FTEs £ GVA	<i>Quarterly</i>	Supplier invoices; Quarterly grant claims – Programme Manager	FBC at full approval 01/2020	Yr 1 and 3 evaluation reports
<i>Estimated 20% higher rates of walking and cycling along new ped/cycle routes.</i>	#	<i>Annual (2021 and 2023)</i>	Traffic counts and/or travel to work survey were applicable - UA project lead reporting to Programme Manager	01/2020	Yr 1 and 3 evaluation reports
<i>Indirect benefits during the operational stage amounting to approx: 211 new homes</i>	#homes	<i>Annual (2021 and 2023)</i>	BCC Valuation Office Agency	01/2020	Yr 1 and 3 evaluation reports
<i>Indirect benefits during the operational stage amounting to approx. 44 new jobs</i>	# FTEs	<i>Annual (2021 and 2023)</i>	BCC Valuation Office Agency and Employment Density Guide	01/2020	Yr 1 and 3 evaluation reports
<i>Accident reduction</i>	#collisions	<i>Annual (2021 and 2023)</i>	STAT 19 – Programme Manager	01/2020	Yr 1 and 3 evaluation reports

#### 4.2 Data collection methods

- **FTE's and GVA:** established through project spend in reference to job and GVA benchmarks in '*Impact Guidance Note: a guide to estimating economic impact for infrastructure projects in the West of England.*'
- **Walking and cycling uplift:** measured using traffic counts (and where linkages can be made) annual Travel to Work Survey data. 2016 walking/cycling count to be used as Baseline.

- **Indirect benefits during the operational stage (homes/jobs):** measured using the BCC Valuation Office Agency to determine new homes and jobs in the “MSOA 001.” Specifically this will include Council Tax data for new homes and Post code level Valuation Office Data used in conjunction with Employment Density Guide to establish jobs
- **Safety Benefits:** measured through STATS 19 data set.

**5. Delivery plan**

M&E Delivery Plan	2019				2020				2021				2022				2023				2024							
Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4																				
Quarterly grant claims		■	■	■	■	■	■	■	■																			
Highlight reports		■	■	■	■	■	■	■	■																			
Cyc/Ped count					■					■											■							
Direct jobs/GVA benefits												■																
Indirect home and jobs benefits												■				■							■					
Travel to Work Survey baseline and follow-up						■																		■				
Yr 1 Evaluation Report													■															
Yr 3 Evaluation Report																								■				

*Note: consideration will be given as to whether future phases of works may necessitate deferring the Year 3 Evaluation Report and/or cycle counts*

**6. Resource**

The costs for monitoring the project are relatively modest standing at £900 for baseline/follow-up cycle/ped counts. The resource budget for M&E has been built into scheme 'Project Management' allocation and estimated at 3 days. Regular communication between the Project Manager and WECA point of contact will ensure that M&E is provided in a timely manner. The quality checking of this data will be undertaken by the SRO. .

Named M&E contact: Steven Riley, Project Manager A4018, 100 Temple Street, BS1 6HT, [steven.riley@bristol.gov.uk](mailto:steven.riley@bristol.gov.uk)

## **7. Dissemination**

The evaluation will be used to inform and improve future investment in sustainable transport projects. The impact and experience of users will inform future design and delivery of interventions.

Option No.	Option description	Strategic Case		Management Case		Initial sift	Taken forward to Phase 2?	Economic Case			Financial Case	Overall success/fail	Taken forward?	Comments
		Improves journey quality	Supports project objectives?	Timescales	Deliverability	Success/fail		Economic Growth	Environment	Wellbeing				
1	Do Nothing: don't mitigate existing or new housing and don't make any upgrades along the A4018 corridor	Fail	Fail	Pass	Pass	Fail								Does not support project objectives and is not politically viable
2	Do Minimum: signalise Crow Lane roundabout to allow better vehicle access to residential developments, including CPNN	Pass	Pass	Pass	Fail	Fail								Has limited support of project objectives (though not all) and unpopular with local residents and with local ward councillors.
3	Put in place Metrobus-quality BRT route along the length of the A4018 from the city centre to CPNN	Pass	Pass	Fail	Fail	Fail								Would represent a positive upgrade but is not within scope and is not financially deliverable.
4	Put in place mass transit route, such as metro route or tram route	Pass	Fail	Fail	Fail	Fail								Not possible to deliver this within the financial constraints of the project, but possible that the mass transit feasibility study will feed in to further improvements in this area.
5	Upgrade existing light railway connections (Henbury Loop) to improve sustainable journey availability	Pass	Pass	Fail	Fail	Fail								Not possible to deliver within timescales, but is within scope of MetroWest programme so improvements are possible alongside the A4018 improvements.
6	Upgrade existing bus infrastructure, such as bus shelters and RTI to improve quality of journey and attractiveness for bus passengers	Pass	Pass	Pass	Pass	Pass	Yes	3	1	2	3	Pass	Yes	There is significant scope to improve bus infrastructure in this area, with flag and pole bus stops, unsuitable shelters, and lack of RTI; these upgrades will be relatively low cost for a significant benefit.
7	Bus priority measures such as bus lanes, bus gates and priority at signalised junctions.	Pass	Pass	Pass	Fail	Pass	Yes	1	1	1	3	Fail	No	BCC have identified this idea as a positive step to be taken forward as part of the wider programme, but the economic benefits for this specific project hasn't been established; as a result, this isn't something we are able to progress within this bid.
8	Build a new park and ride in the local area to improve availability of sustainable journeys in and out of the city centre.	Pass	Pass	Fail	Fail	Fail								Positive improvement, but land negotiation and planning don't fit bid timescales; in addition, not possible to fit in with financial constraints.
9	Road widening along the A4018 corridor to provide additional capacity	Pass	Fail	Pass	Pass	Fail								Although it would improve journey quality, it would have limited benefits for non-car modes and would be very expensive; as a result, it hasn't been taken forward to Phase 2
10	Reduce number of turning opportunities to increase traffic flow along the A4018 itself	Pass	Pass	Pass	Fail	Fail								Potentially a positive improvement, but unpopular with local people and with local ward councillors.
11	Improving active travel infrastructure, such as shared or segregated walking and cycling improvements	Pass	Pass	Pass	Pass	Pass	Yes	2	2	3	3	Pass	Yes	This idea has been taken forward as fully segregated walking and cycling infrastructure wherever possible, to enable high-quality active travel choices.
12	Improving road safety for all users (including pedestrians) of the A4018 corridor to reduce accidents and increase the attractiveness, especially for schoolchildren	Pass	Pass	Pass	Pass	Pass	Yes	2	3	3	2	Pass	Yes	We propose taking this forward and including two new crossings and an upgraded crossing, to enable all users (especially schoolchildren) to make use of the road safely and easily.
13	Soft measures including travel plan work with local businesses and behaviour change	Pass	Pass	Pass	Pass	Pass	Yes	1	0	2	-1	Fail	No	Although this is possible for us to fund in the short-term, benefits realisation from this aspect would require significant long-term revenue funding which isn't possible.
14	Increase reliability and punctuality of general journeys throughout the corridor with network management infrastructure	Pass	Pass	Pass	Pass	Pass	Yes	3	1	1	3	Pass	Yes	Although benefits are specific to journey times, we are taking this forward as a good value for money improvement as part of the wider project and the programme.
15	Reduce the impact on Westbury village of new developments by reducing through traffic through the village	Pass	Pass	Pass	Fail	Fail								Although a positive change, this needs a different project approach due to local opposition to original design; this means that it will be usefully taken forward separately as part of the wider programme funding to ensure a successful outcome
16	Tying in to the council aspiration to put in place a leisure cycle route on the Downs, to increase attractiveness of active travel	Pass	Pass	Fail	Pass	Fail								Although a positive change, this needs to be progressed with the Downs Committee and so cannot be delivered within timeframes. Taken forward as part of the wider programme
17	Signalisation of junctions to improve network management and reduce accidents	Pass	Pass	Pass	Pass	Pass	Yes	1	1	2	1	Fail	No	Although this passes the cases, it doesn't meet the high financial standards required for inclusion in this bid - however, it's being taken forward with other funding as part of the wider programme.

Transport Planning Objectives

TPO1 To improve journey quality for all users of the corridor, especially in order to facilitate reliable, rapid and affordable alternatives to car use for new and existing residents

TPO2 To improve the safety of all users, including those in non-car modes, along the A4018 corridor

TPO3 To improve the attractiveness of active travel mode infrastructure along the A4018 corridor

E17044 A4018 Corridor Improvements Phase 1 - Engineering Design Project Programme 25th November 2019

ID	Task Mode	Task Name	Duration	Start	Finish	Half 2, 2019					Half 1, 2020					Half 2, 2020					Half 1, 2021					Half 2				
						J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J		F	M	A	M
1		Preliminary Design Agreed/Complete - Project Team, QA 2 and RSA 1	111 days	Mon 17/06/19	Mon 18/11/19																									
2		NRSA C3	40 days	Mon 21/10/19	Fri 13/12/19																									
3		Site Investigation	20 days	Mon 06/01/20	Fri 31/01/20																									
4		<b>Traffic Regulation Orders</b>	<b>145 days</b>	<b>Mon 18/11/19</b>	<b>Fri 05/06/20</b>																									
5		Drawings	15 days	Tue 26/11/19	Mon 16/12/19																									
6		Process	130 days	Tue 17/12/19	Mon 15/06/20																									
7		Construction Design	59 days	Tue 26/11/19	Fri 14/02/20																									
8		NRSA C4	25 days	Mon 24/02/20	Fri 27/03/20																									
9		Prepare Tender documentation	35 days	Mon 06/01/20	Fri 21/02/20																									
10		QA 3	0 days	Mon 17/02/20	Mon 17/02/20																									
11		Tender period	20 days	Mon 24/02/20	Fri 20/03/20																									
12		Tender evaluation and recommend contractor	5 days	Mon 23/03/20	Fri 27/03/20																									
13		Contract sealing - BCC seal for construction contracts over £500,000	20 days	Mon 30/03/20	Fri 24/04/20																									
14		Appoint contractor	0 days	Mon 27/04/20	Mon 27/04/20																									
15		Mobilisation period	35 days	Mon 27/04/20	Fri 12/06/20																									
16		Tree and vegetation clearance	20 days	Mon 03/02/20	Fri 28/02/20																									
17		<b>Construction Lot 6</b>	<b>15 days</b>	<b>Mon 27/07/20</b>	<b>Fri 14/08/20</b>																									
18		Passage Road (Westbury on Trym Village) Zebra Crossing	15 days	Mon 27/07/20	Fri 14/08/20																									
19		<b>Construction Lot 7</b>	<b>275 days</b>	<b>Mon 15/06/20</b>	<b>Fri 02/07/21</b>																									
20		<b>South of Crow Lane to North of Charlton Road</b>	<b>275 days</b>	<b>Mon 15/06/20</b>	<b>Fri 02/07/21</b>																									
21		South of Crow Lane to South of Brentry Road	170 days	Mon 15/06/20	Fri 05/02/21																									
22		South of Brentry to North of Charlton Road	105 days	Mon 08/02/21	Fri 02/07/21																									

Project Number: E17044  
 Project Title: A4018 Corridor Impr  
 Date: 25th November 2019

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only			
Summary		Inactive Task		Duration-only		Finish-only			



To whom it may concern,

In my capacity as the Chief Financial Officer (s151) of Bristol City Council, the sponsoring body of this bid to the West of England LEP for the A4018 scheme, I confirm that:

- i) I approve the final Full Business Case for submission to the West of England Combined Authority and LEP, for:
  - a) A total scheme cost, inclusive of BCC match funding, of £4,060,091
  - b) Of which the funding bid to the LGF is for £3,448,916
- ii) All relevant financial approvals are in place within Bristol City Council to deliver the project as set out in the Full Business Case.
- iii) All appropriate financial due diligence has been undertaken by the Bristol City Council in respect of the Full Business Case.
- iv) I am accountable for ensuring good value for money in the use of public resources.

Signed: .....

Date: .....

29/11/19

Denise Murray

Director: Finance, Chief Financial Officer (S151)