Cambridgeshire County Council

MILTON ROAD

Strategic Outline Business Case

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1 BACKGROUND

1.1 SCHEME CONTEXT

1.1.1. The Greater Cambridge City Deal (GCCD) is a unique opportunity to support economic growth of the Greater Cambridge region and to enhance quality of life for people in Cambridge and South Cambridgeshire.

1.1.2. The Greater Cambridge Partnership (GCP) is the local delivery body for City Deal and aims to invest up to £1 billion over 15 years, to fund vital improvements in infrastructure, supporting and accelerating the creation of 44,000 new jobs, 33,500 new homes, benefitting those who live, work, study and visit Greater Cambridge.

1.1.3. The GCP is made up of a partnership of councils, business and academia working together, with local communities, to grow and share prosperity and improve quality of life for the people of Greater Cambridge, now and in the future. The five partners are:

- Cambridge City Council
- Cambridgeshire County Council
- South Cambridgeshire District Council
- University of Cambridge
- Greater Cambridge Greater Peterborough Local Enterprise Partnership

1.1.4. It is the largest of several City Deal programmes taking place in the UK and brings key partners together to work with communities, businesses and industry leaders to support the continued growth of one of the world's leading tourism and business destinations.

1.1.5. The Milton Road project supports the priorities of the GCP by seeking to achieve efficient and reliable movement between key existing, and future, housing and employment sites and is being delivered as part of the GCP's Tranche 1 infrastructure programme. In particular, the project will support the delivery of new housing at Northstowe, Waterbeach and on the northern fringe of Cambridge and will also provide improved links with employment sites such as the Science Park and Cambridge North Station, benefitting residents, commuters and business.

1.1.6. The Milton Road projects aims to provide improved infrastructure for buses, to improve service reliability and journey times and encourage greater patronage. It also aims to significantly enhance the quality and safety of cycling and walking facilities whilst also enhancing the quality of the streetscape, public realm areas and the environment. The project covers the length of Milton Road from the A14 interchange south to (but not including) the gyratory junction at Mitcham's Corner

1.1.7. In strategic terms the Milton Road scheme has a strong case for early delivery. The planned developments at Northstowe (up to 10,000 homes), Waterbeach (up to 10,500 homes) and Ely (2,000+ homes) all have the potential to increase bus service provision on routes into the north of Cambridge. Milton Road is expected to experience the greatest growth in bus patronage and to cater for more of the additional bus trips generated by these major development sites. The influence of Cambridge North station is also likely to be greater on Milton Road.

1.1.8. The Strategic Outline Business Case (SOBC) for the Milton Road scheme is presented within this report.

1.2 SCHEME HISTORY

1.2.1. The Milton Road scheme is intended to support the Greater Cambridge Partnership's transport vision of implementing Public transport improvements along Milton Road, which is a significant part of a wider public transport strategy to help support the feasibility of delivering proposed housing and employment growth at Cambridge Northern Fringe, Ely, Cambridge Science Park, Northstowe and Waterbeach (collectively around 27,000 new homes and 9,800 new jobs between 2011 and 2031).

1.2.2. Milton Road is one of the key radials into Cambridge and is identified as an increasingly important public transport corridor as part of the Transport Strategy for Cambridge and South Cambridgeshire (TSCSC) and Long Term Transport Strategy (LTTS). It suffers from congestion at peak times and bus reliability is poor.

1.2.3. A need for intervention has therefore been identified due to the likely impact of increased travel demand by 2031 and the desire to encourage a shift to more sustainable modes, it also looks to help address the current trend of cycle accidents on Milton Road.

1.2.4. The Milton Road project has the following key objectives.

- Comprehensive priority for buses in both directions wherever practicable;
- Safer and more convenient routes for cycling and walking, segregated where practical and possible;
- Enhance the environment, streetscape and air quality;
- Additional capacity for sustainable trips to employment/education sites;
- Increased bus patronage and new services; and
- Maintain or reduce general traffic levels.

1.2.5. The history of the schemes development, to meet these objectives, is set out below

'DO MAXIMUM' AND 'DO SOMETHING'

1.2.6. At its meeting in November 2015, the Executive Board initially considered a report on technical work undertaken by consultants WSP, to identify ideas for delivering the project objectives. Two options were put forward at this time:

- A 'Do Maximum' option comprising measures to provide the maximum benefit in terms of the project objectives but with a significant impact on the urban street scene and local access
- A 'Do something' option offering less overall benefit for bus movements (although journey time and reliability would still improve over that experienced currently), a similar level of improvement for cycling and walking but with less impact on the public realm.

1.2.7. The Board resolved to undertake consultation on the two options and as such a public consultation exercise for the initial project ideas was undertaken between 14th December and 15th February.

1.2.8. The consultation was strongly influenced by a large percentage of responses from those living along and close to the route with far fewer responses from outside the area and from other stakeholder groups. The initial ideas received a generally negative response although some aspects were received positively.

1.2.9. In July 2016, on the back of the public consultation, it was considered by the Board that the 'Do Something' option offered the best balance in terms of the project objectives and allowed the emerging design to respond positively to the key concerns that have been raised over the need for road widening and its impact on the street scene. Therefore, the board requested this scheme option should be taken forward for further design layout work to facilitate a second round of consultation.

1.2.10. To help facilitate scheme development, in August 2016, a Local Liaison Forum for the Milton Road project was established, with terms of reference agreed covering its remit and operation, in line with guidance provided by the Executive Board. Following its formation, the LLF submitted some initial resolutions to the Executive Board concerning the need for external expertise in public ream design, the approach to tree planting and need to avoid bus lanes on both sides of the road.

1.2.11. Between September and December 2016 a series of workshops were undertaken with the aim of facilitating local feedback on the preferred 'Do Something' option and exploring alternative ways of delivering the scheme objectives. Stakeholder participation at the workshops was agreed with the LLF.

'DO OPTIMUM' AND 'FINAL CONCEPT'

1.2.12. Initially, the agenda for the workshops was targeted at assessing the pros and cons of the 'Do Something' option, considering key aspects that stakeholders wished to challenge and reflecting on the need for mitigation measures. As the process unfolded the workshops determined that more time should be spent on developing an alternative design which the LLF has called 'Do Optimum'.

1.2.13. In considering how best to develop the 'Do Optimum' design into one which could meet all of the key objectives of this scheme, a 'Final Concept' scheme was developed by WSP which aimed to maintain as many as possible of the 'Do Optimum' ideas for pedestrians, cyclists and landscaping. The length and position of bus lanes has also been optimised to enable the required element of bus priority whilst also maximising the opportunities for landscaping and tree planting.

'PRELIMINARY DESIGN

1.2.14. In July 2017, the GCP Executive Board approved the 'Final Concept' design for Milton Road. Following further engagements and public workshops through the autumn of 2017, this final concept design has been developed by consultants WSP into a more detailed 'Preliminary Design' (see Appendix C) that sets out how the concepts plans might actually be delivered on the ground.

1.2.15. The ‘Preliminary Design’ incorporates improved cycle facilities in both directions (most of which are segregated and off-road) in addition to the provision of northbound and southbound bus lanes and public realm improvements. Initial cost estimates indicate that the scheme could be delivered for in the region of £16M.

1.3 STAKEHOLDER CONSULTATION

1.3.1. In line with the Executive Board decision of 3rd November 2015, a consultation exercise for the initial project ideas was undertaken between 14th December 2015 and 15th February 2016.

1.3.2. The aims of the stakeholder consultation were to:

- Engage with key stakeholders, the public and all interested parties in the consultation on proposals for bus priority, walking and cycling improvements.
- Ensure that messages reach the widest audiences and that all voices are heard and that channels are enabled for excellent two-way communications.
- Provide unbiased, appropriate, timely, and clear information in plain English on the proposed options for the routes.

1.3.3. As noted above, the consultation was strongly influenced by a large percentage of responses from those living along and close to the route with far fewer responses from those using Milton Road from outside the area and from other stakeholder groups. The initial ideas received a generally negative response although some aspects were received positively. The consultation events confirmed that there was a widespread support for some degree of improvements on Milton Road and a desire to avoid the impact of no mitigation.

1.3.4. Over half of all of the 2016 consultees felt improvements for cycling (60%) and street scene (50%) were most important on Milton Road. In comparison, 42% felt walking improvements important and 39% that bus improvements were important.

1.3.5. A number of additional stakeholders were consulted throughout the development of the scheme and more detail is provided in Section 2.9.

1.3.6. On the back of this first consultation, a Milton Road LLF was formed with local councillors to facilitate future local engagement and communication as the project developed further. Since this date, extensive debate and discussion has occurred with the LLF (as detailed in the Scheme History) to enable the development of the latest revised scheme, known as the ‘Preliminary Design’.

CURRENT STATUS OF THE SCHEME

1.3.7. Findings from the public consultation, along with analysis of observed data, extensive engagement with the LLF and consideration of the scheme objectives have helped to shape the initial scheme proposals into a single current ‘Preliminary Design’ (see Appendix C). This design aims to incorporate the desire to maintain and improve the public realm by preserving and replacing trees and enhancing green space whilst also providing safer facilities for vulnerable active modes (walking and cycling) and improving the reliability of bus services through the provision of bus priority measures. Key features of the scheme include:

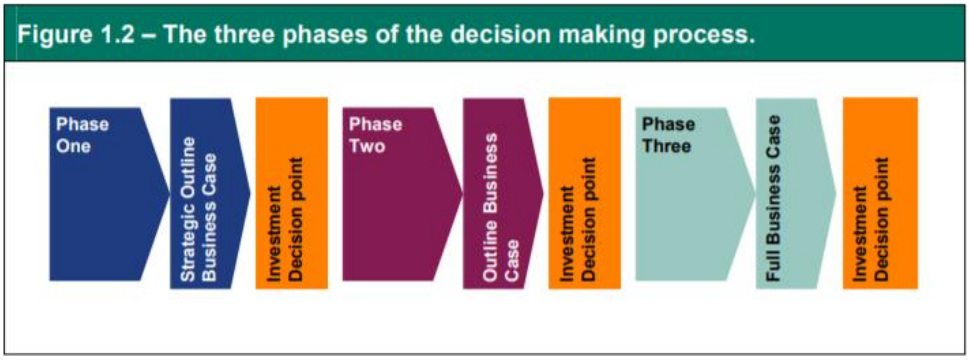
- Off-road or raised cycle ways in both directions from the Guided Busway to Mitcham’s Corner
- The removal of circa 200m of southbound bus lane and addition of circa 200m of northbound bus lane from Ascham Road to Elizabeth Way.
- The addition of circa 175m of northbound bus lane from Ramsden Square to Kings Hedges Road Junction.

1.3.8. This report aims to assess this current proposal via the Department for Transport recommended five case approach. This is intended to provide a holistic review of the latest proposals and provide an indication of their alignment with policy, value for money, commercial viability, affordability and deliverability. The process is described in further detail within the following section.

1.4 THE FIVE CASE APPROACH

1.4.1. The Milton Road scheme proposals are currently in the first phase of business case preparation, i.e. the Strategic Outline Business Case (SOBC) stage, as shown in the Department for Transport (DfT) diagram shown below in Figure 1.

Figure 1 – DfT decision making process



1.4.2. In accordance with DfT guidance, this strategic outline business case has been produced in line with the five case approach which is detailed by the DfT[1] as follows:

Business cases are developed in line with Treasury's advice on evidence-based decision making set out in the Green Book and use its best practice five case model approach.

This approach shows whether schemes:

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

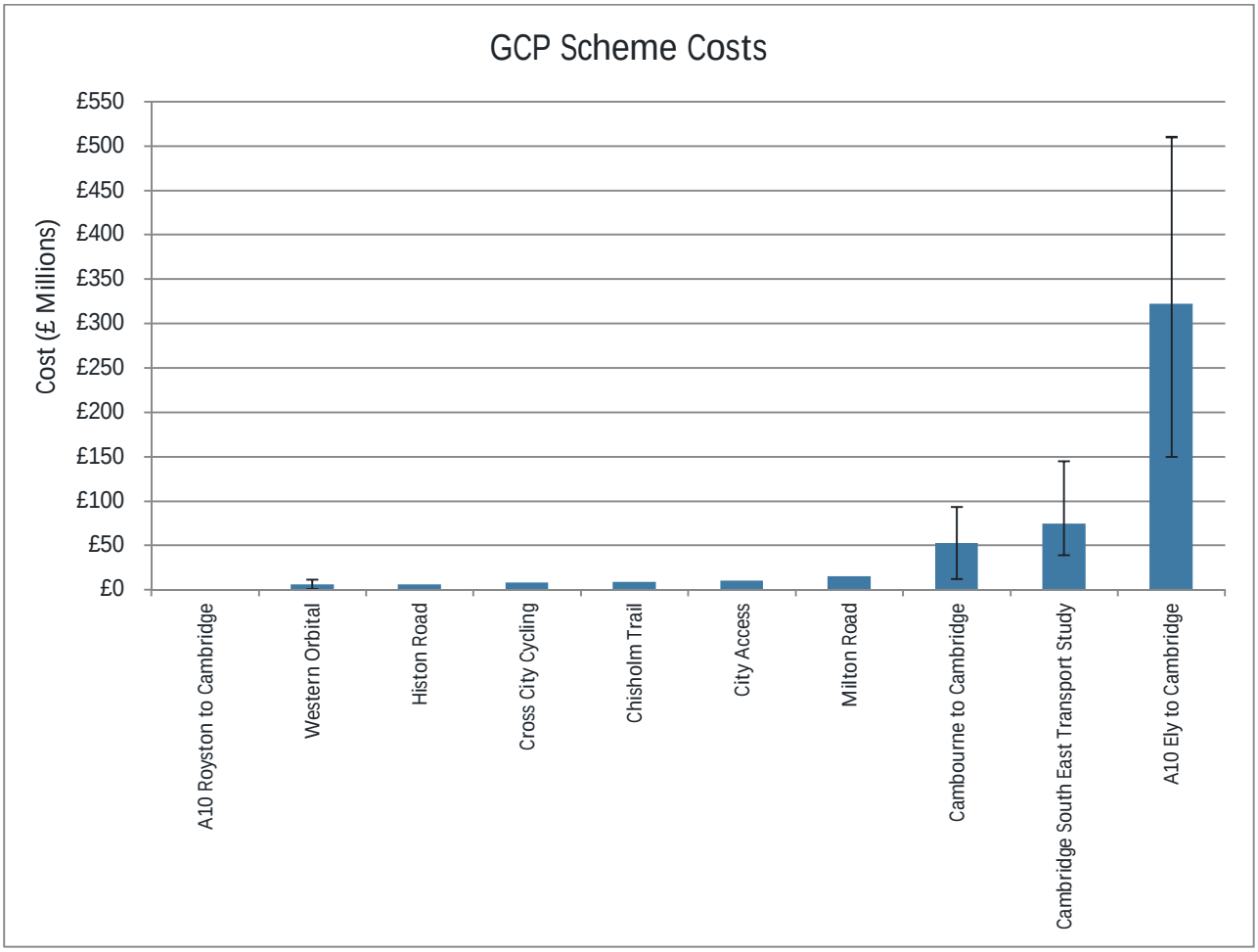
Ministers take into account the evidence in all five cases when making a decision. Guidance that sets out the detailed questions asked in each case is set out later in this document.

The degree of detail contained within the business case may vary depending on the level of investment or risk proposed to ensure that the appraisal process is proportionate.

1.4.3. In terms of cost, the Milton Road proposals are considered to be relatively minor compared to some of the larger Greater Cambridge Partnership schemes currently undergoing assessment. The current level of cost associated with a variety of GCP schemes are given in Figure 2 for context. The blue bars represent the latest estimated cost of the schemes (as reported on the GCP website) and the whisker bars show the range of costs where scheme options are being considered.

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/85930/dft-transport-business-case.pdf

Figure 2 – GCP Scheme Costs



1.4.4. The Milton Road scheme (see Appendix C) is estimated to cost in the region of £15 million which is relatively inexpensive compared to some of the major schemes being proposed on the A428, A1307 and A10 corridors. The lower cost of the Milton Road scheme is due to the smaller scale of the proposals which do not seek to provide additional highway or busways and instead aim to enhance the existing Milton Road facilities to the benefit of public transport and active mode trips.

1.4.5. As the scale of the project is relatively small, a proportionate approach has been taken throughout the production of this strategic outline business case (SOBC). This approach has been agreed with Cambridgeshire County Council and a number of business case elements have therefore been outlined rather than covered in detail. The approach adopted for each of the topics to be covered, as listed in the DfT Business Case document2, is summarised in Table 1

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/85930/dft-transport-business-case.pdf

Table 1 – Proportionate approach agreed with Cambridgeshire County Council

CONTENTS	AGREED REQUIREMENT
STRATEGIC CASE	
Business strategy	Complete
Problem identified	Complete
Impact of not changing	Complete
Internal drivers for change	Not required
External drivers for change	Not required
Objectives	Complete
Measures for success	Complete
Scope	Complete
Constraints	Outline
Inter-dependencies	Outline
Stakeholders	Complete
Options	Outline
ECONOMIC CASE	
Introduction	Complete
Options appraised	Complete
Assumptions	Complete
Sensitivity and Risk Profile	Not required
Appraisal Summary Table	Outline
Value for Money Statement	Outline
FINANCIAL CASE	
Introduction	Outline
Costs	Outline
Budgets / Funding cover	Outline
Accounting implications	Not required
COMMERCIAL CASE	
Introduction	Outline very briefly
Output based specification	Not required
Procurement strategy	Not required
Sourcing options	Not required
Payment mechanisms	Not required
Pricing framework and charging mechanisms	Not required
Risk allocation and transfer	Not required
Contract length	Not required
Human resource issues	Not required
Contract management	Not required
MANAGEMENT CASE	
Introduction	Outline very briefly
Evidence of similar projects	Complete
Programme / project dependencies	Outline
Governance, organisational structure & roles	Complete very briefly
Programme / project plan	Outline
Assurance and approvals plan	Outline
Communications and stakeholder management	Outline very briefly
Programme / project reporting	Outline very briefly
Implementation of work streams	Not required
Key issues for implementation	Not required
Contract management	Not required
Risk management strategy	Outline very briefly
Benefits realisation plan	Not required
Monitoring and evaluation	Not required
Contingency plan	Not required

2 THE STRATEGIC CASE

2.1 BUSINESS STRATEGY

2.1.1. The Greater Cambridge City Deal, one of a number of 'City Deals' agreed by central Government in 2013, is worth up to £500 million in funding to 2030 for transport infrastructure to boost economic growth. £100m of government funding has been made available for transport improvements until 2020. A further fund of up to £400m will be available if initial investments are successful in supporting economic growth.

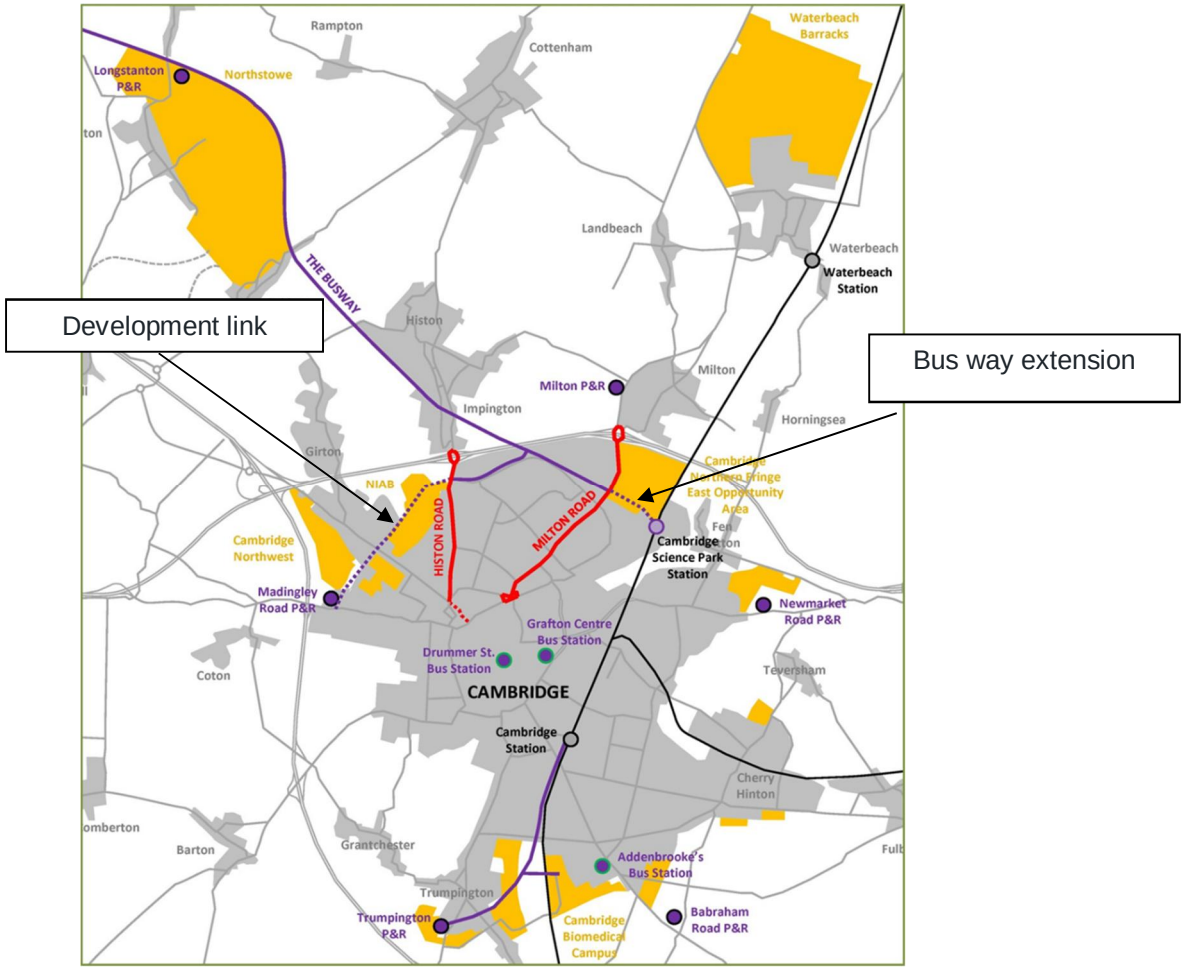
2.1.2. The Greater Cambridge Partnership (GCP) are responsible for coordinating the schemes being considered for City Deal funding in the Greater Cambridge area. The GCP's overarching vision is to *"unleash a second wave of the 'Cambridge Phenomenon', securing sustainable* economic growth and quality of life for the people of Cambridge and South Cambridgeshire."

2.1.3. The GCP hopes to achieve this vision by aiming to *"enable a new wave of innovation-led growth by investing in the infrastructure, housing and skills that will facilitate the continued growth of the Cambridge Phenomenon. It acknowledges the region's strong track record of delivering growth and seeks to support those existing, and new, businesses in achieving their full potential."*

2.1.4. Cambridge City Centre forms one of the key employment areas within Greater Cambridge and is connected to a number of other key employment sites at the Science Park, St Johns Innovation Centre and the Northern Fringe East sites via Milton Road. Key residential areas exist along Milton Road (Chesterton, Arbury and King's Hedges) and the proposed Waterbeach Barracks site which is anticipated to provide in the region of 8,500 new homes and 5,800 new jobs.

2.1.5. The Milton Road area has been identified by the GCP as a key area for potential growth in travel demand in the coming years due to its links with key employment areas and major new residential developments (see Figure 3 where Milton Road is highlighted in red). "Providing better, greener transport" which "connects people to homes, jobs, study and opportunity" is a core part of the GCP's goals and is something the Milton Road scheme is intended to contribute to.

Figure 3 – Milton Road in the wider area context



2.2 IDENTIFICATION OF PROBLEM

2.2.1. A number of factors that could impact economic growth and quality of life have been identified and can be categorised as either a national issue, a wider county issue as evidenced within the Local Plan, or a local issue relating to Milton Road specifically. Due to the large amount of housing and jobs growth planned for Greater Cambridge, Milton Road is one of a number of radial routes that is planned for enhancement in order to support growth (See Figure 3 above).

2.2.2. The following sections aim to summarise issues relevant to Milton Road on a national, wider-area and local level.

NATIONAL PROBLEMS

2.2.3. A number of national policies are relevant to this business case due to their focus on securing additional housing and economic growth. The following national transport policies help to highlight problems of national significance and also support the need for intervention on Milton Road.

National Transport Objectives

2.2.4. The national transport objectives, set by government, are:

- To ease congestion and **provide upgrades** on important national, regional or **local routes**
- To **unlock economic and job creation opportunities**
- To enable the delivery of **new housing** developments

2.2.5. The Milton Road scheme is intended to improve the transport network with a view to facilitating the creation of additional jobs and housing within the Greater Cambridge area. The scheme therefore contributes to the second and third National Transport Objectives.

Moving Britain Ahead – the Government's Transport Investment Strategy (TIS)

2.2.6. The government's strategy for transport investment, published in July 2017, sets out the case for continued investment in Britain's transport infrastructure. Through this investment, the government seeks to:

- create a more reliable, less congested, and better connected transport network that works for the users who rely on it
- build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities
- enhance our global competitiveness by making Britain a more attractive place to trade and invest
- support the creation of new housing.

2.2.7. The proposed scheme will help create a better connected, more reliable transport network for those who depend on it. It will also help to support local economic growth and development, make the area to the north-east of Cambridge more attractive to investment, and will help to improve journeys between proposed and existing housing and employment sites in Cambridge and at the Science Park.

2.2.8. In December 2017, the DfT published guidance on how the TIS should be reflected in a Strategic Case[3], together with a 'Rebalancing Toolkit' for assessment[4]. The toolkit is not binding, and intended as a proportionate tool used in major projects where rebalancing is an objective. It is mainly applicable to larger transport projects which enhance networks, and less applicable to small maintenance and renewal projects.

Creating Growth, Cutting Carbon – Making Sustainable Local Transport Happen

2.2.9. This government White Paper, published in 2011:

- Sets out the government's vision for "a transport system that is an engine for **economic growth**, but one which is also **greener, safer and improves quality of life** in our communities
- Highlights the need to make transport choices that support society as a whole, as well as needing to **reduce our carbon emissions** to meet national commitments
- Highlights the Government's commitment to more equal access to employment, education and healthcare by **increasing social mobility**
- Considers that better design and management of the local network can improve traffic flow and the attractiveness of the local environment

2.2.10. The Eddington Transport Study (2006) demonstrated that **a well-functioning transport system is key to continued economic success**. Without an efficient transport system, economic prosperity can be hindered by unreliable travel journey times, increased congestion and reduced accessibility, all of which affect productivity and business costs.

2.2.11. The proposed scheme will support local economic growth and development, by improving bus, walk and cycle trips along this key route into the City in terms of safety and journey time reliability.

The National Infrastructure Delivery Plan (2016 – 2021)

2.2.12. The Delivery Plan, published in March 2016:

- Outlines the Government's plans for economic infrastructure over the five year plan period to **support the delivery of housing** and social infrastructure
- Outlines the Government's commitment to providing a step change in the capacity of the SRN
- States that **local roads are a crucial element of the transport system**, and that their maintenance and improvement is the responsibility of Local Authorities

2.2.13. The scheme will help to improve this locally important road for commuters and residents whilst helping to facilitate growth aspirations.

[3] Strategic Case Supplementary Guidance: Transport Investment Strategy (DfT, December 2017)
[4] Strategic Case Supplementary Guidance: Rebalancing Toolkit (DfT, December 2017)

National Planning Policy Framework (NPPF)

2.2.14. The Government's National Planning Policy Framework (NPPF, 2012) emphasises the importance of rebalancing the transport system in favour of **sustainable transport modes**, whilst encouraging local authorities to plan proactively for the **transport infrastructure necessary to support the growth of major generators of travel demand**.

2.2.15. At the heart of the NPPF is the presumption in favour of sustainable development which is seen as 'the golden thread running through both plan making and decision taking'[5].

2.2.16. The scheme will support sustainable development to the north-east of Cambridge at sites such as Waterbeach New Town and the Cambridge Northern Fringe area, improving access to new housing and employment sites at the Science Park and Business Park. It will incorporate improved facilities for pedestrians and cyclists, and is a good fit with wider strategy to encourage sustainable access to new development.

WIDER AREA PROBLEMS

2.2.17. The Cambridgeshire Local Transport Plan 3 details eight challenges faced by the County, as follows.

- CHALLENGE 1: Improving the reliability of journey times by managing demand for road space, where appropriate and maximising capacity and efficiency of the existing network.
- CHALLENGE 2: Reducing the length of the commute and the need to travel by private car
- CHALLENGE 3: Making sustainable modes of transport a viable and attractive alternative to the private car
- CHALLENGE 4: Future-proofing our maintenance strategy and new transport infrastructure to cope with the effects of climate change.
- CHALLENGE 5: Ensuring people – especially those at risk of social exclusion – can access the services they need within reasonable time, cost and effort.
- CHALLENGE 6: Addressing the main causes of road accidents in Cambridgeshire
- CHALLENGE 7: Protecting and enhancing the natural environment by minimising the environmental impact of transport.
- CHALLENGE 8 Influencing national and local decisions on land-use and transport planning that impact on routes through Cambridgeshire.

2.2.18. The Milton Road corridor is sensitive to a number of these challenges, but of particular relevance are the improvement of journey time reliability (#1), making sustainable modes more attractive (#3) and safety improvements (#6). The latter two are of particular relevance given the high number of cycle accidents taking place along Milton Road.

2.2.19. The Local Plan also sets out the level of jobs and housing growth which is expected to be significant over the next 15 years due to the number of allocated development sites expected to come forward. These include a number of sites with good connectivity to Milton Road including Waterbeach Barracks, Ely North and Cambridge Northern Fringe.

2.2.20. The Transport Strategy for Cambridge and South Cambridgeshire (TSCSC) reiterates a number of these wider issues. Its vision is that "more people will use sustainable modes of transport, reducing car usage, protecting the environment and supporting forthcoming anticipated growth". The TSCSC also makes specific reference to improving bus services, encouraging cycling and walking and improving road safety which is well aligned with the objectives and design rationale for the Milton Road scheme.

2.2.21. The Greater Cambridge Partnership website summarises the level of growth in Greater Cambridge and the resulting challenge that this presents as follows:

- "The Greater Cambridge area is set to grow by up to 30% over the next 15 years – with the population rising by 65,000 to 338,000 by 2031 (from 273,000 in 2011).
- Population growth means trips on the transport network will increase by 25,000 by 2031 (from 101,000 in 2011 to 126,000).

[5] National Planning Policy framework, paragraph 14, page 4

2.2.22. If we carry on as we are by 2031:

- traffic in Cambridge will increase by over 30% in the morning peak
- traffic in South Cambridgeshire will increase by almost 40% in the morning peak
- the time spent in congestion will more than double."

2.2.23. It is clear that the level of proposed growth coming forward is significant and the transport network will need radically improving in order to cope with the increased demand. The Greater Cambridge Partnership transport schemes are being developed in reaction to this issue.

LOCAL PROBLEMS

2.2.24. The Transport Strategy for Cambridge and South Cambridgeshire (TSCSC) reiterates a number of these wider issues. Its vision is that "*more people will use sustainable modes of transport, reducing car usage, protecting the environment and supporting forthcoming anticipated growth*". The TSCSC also makes specific reference to improving bus services, encouraging cycling and walking and improving road safety which is well aligned with the objectives and design rationale for the Milton Road scheme.

2.3 IMPACT OF NO MITIGATION

2.3.1. A need for intervention has been identified due to a variety of factors relating to the impact of no mitigation. These factor range from safety to accommodation of future growth. Identification of these factors has been conducted through a number of channels including public consultation, Local Liaison Forum (LLF) workshops and engagement, local policy review and analysis of a number of observed data sets, as described within the following sections.

ACCIDENTS

2.3.2. Accident data was obtained for Milton Road between Mitcham's Corner and the Guided Busway spanning the five year period from August 2011 to July 2016 inclusive. During this period, 83 accidents were logged, of which there were 74 classed as 'slight', 8 classed as 'serious' and 1 fatality. Of the 83 accidents, 57 (70%) were found to involve a cyclist which represents in the region of 11 cycle accidents per year or almost 1 per month. Of the 57 cycle accidents, there was 1 fatality (2%), 6 serious (11%) and 50 slight (88%) accidents.

2.3.3. As the demand for travel along Milton Road continues to increase due to growth in jobs and housing, there is a risk that the cycle accident trend will continue or even worsen. The impact of not providing improved cycle safety is likely to be serious given that the problem is already significant and likely to get worse.

PRIVATE VEHICLE TRAVEL TIMES

2.3.4. TrafficMaster travel time data has been analysed (see Figure 4 and Figure 5) which has identified that current average speeds along Milton Road are roughly 11mph. This is significantly lower than the 30mph speed limit. Whilst the presence of some delay is to be expected due to the presence of a number of signalised junctions and the Elizabeth Way roundabout, an average speed of 11mph is low and indicates notable delay along the length of Milton Road.

2.3.5. Travel demand is anticipated to increase over the coming years and consequently there is a real risk that delays to both private vehicles, and buses in locations with no bus facilities, will worsen if no mitigation is implemented.

BUS TRAVEL TIMES

2.3.6. Bus travel time data has also been analysed (see Figure 6 and Figure 7) which has identified that the average bus speed (excluding stop time at bus stops) along Milton Road is roughly 16mph. This is faster than the equivalent general traffic speed due to the presence of some inbound bus lanes along Milton Road but it is still significantly lower than the 30mph speed limit.

2.3.7. As indicated above, travel demand and delays are likely to increase. If mitigation is not implemented, this will further affect bus speeds in locations where bus lanes are not present.

Figure 4 – Observed Average Weekday Speeds (AM Peak)

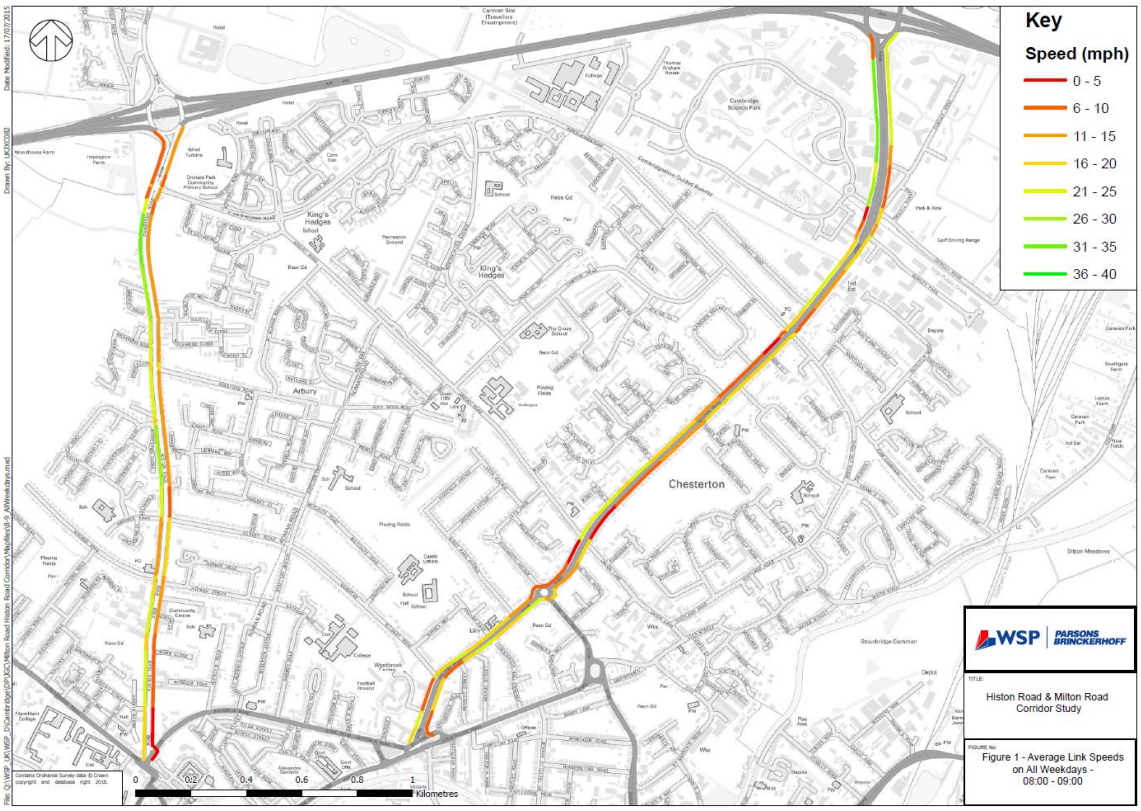


Figure 5 – Observed Average Weekday Speeds (PM Peak)

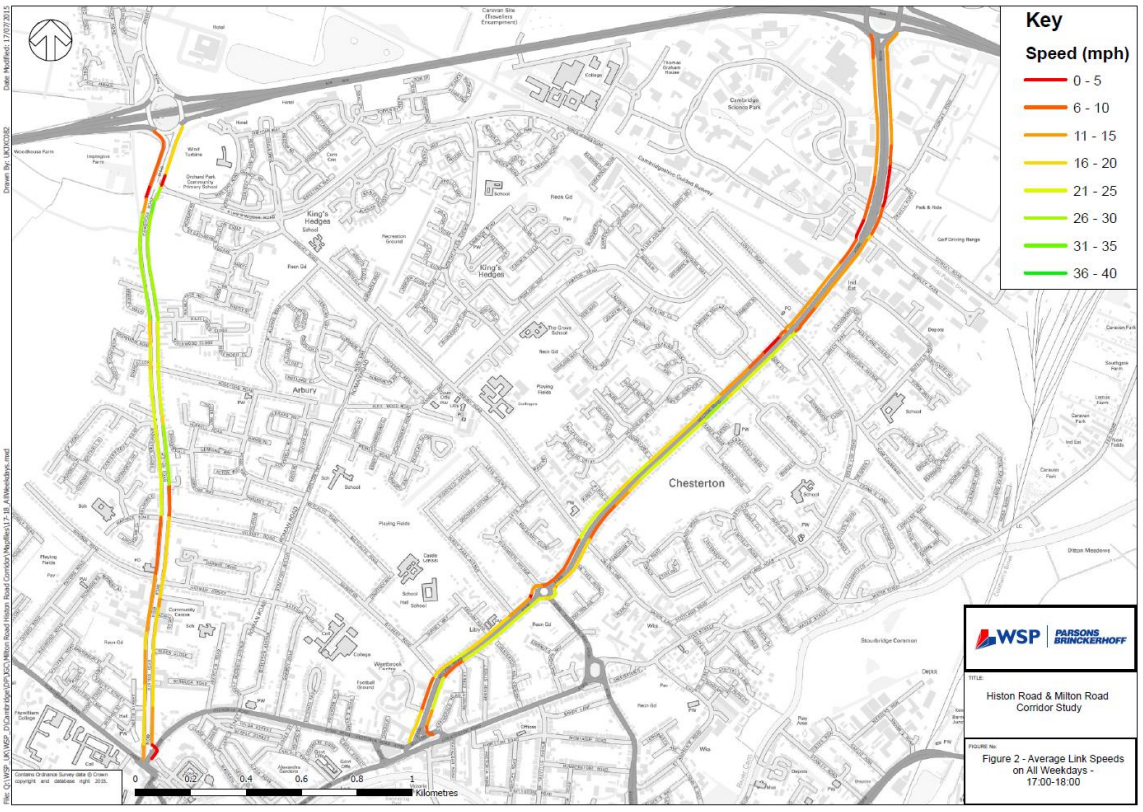


Figure 6 - Observed Average Weekday Bus Speeds (AM Peak)

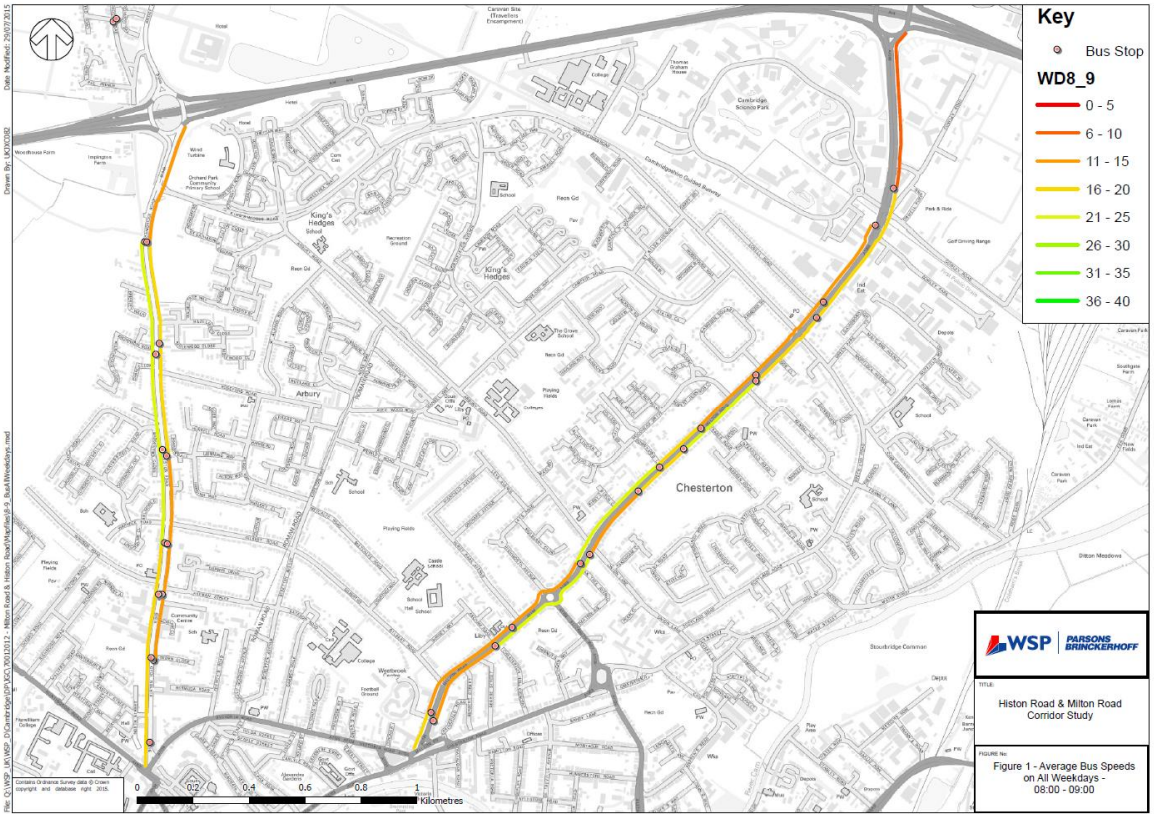
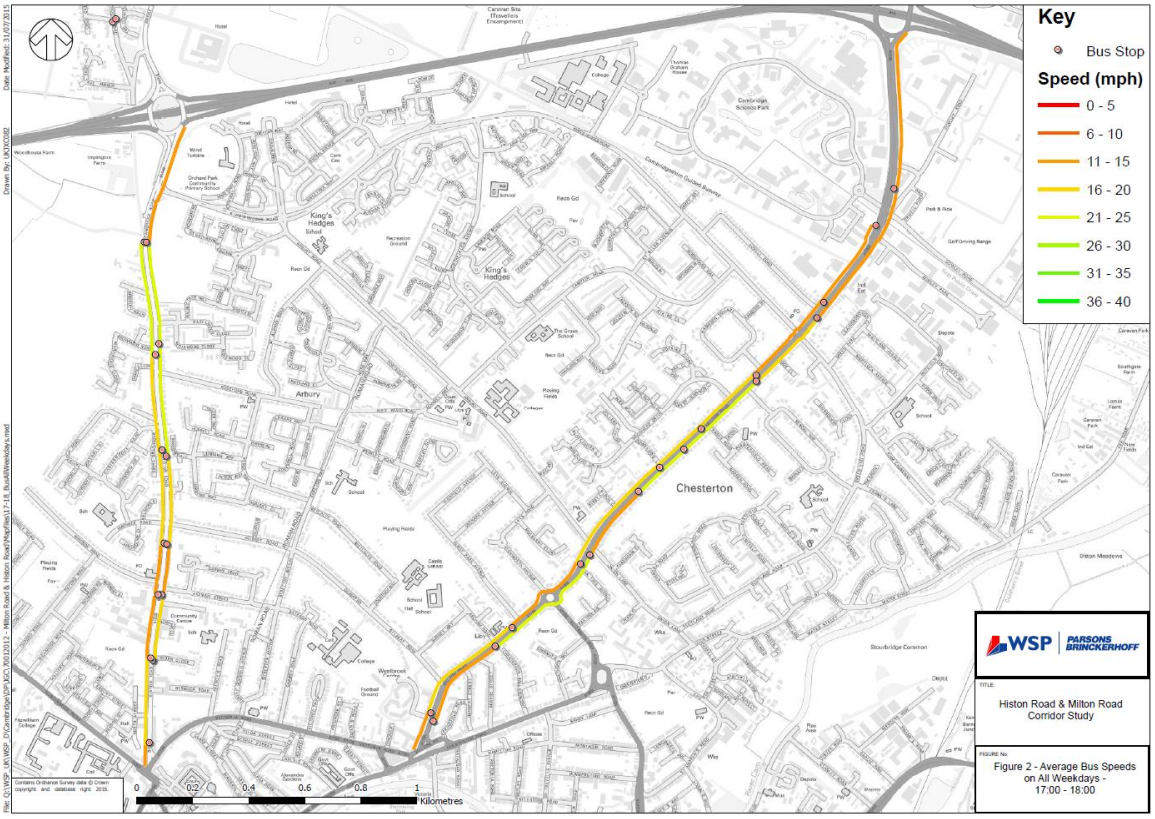


Figure 7 - Observed Average Weekday Bus Speeds (PM Peak)



ECONOMIC GROWTH

2.3.8. A large amount of housing and jobs growth is planned to occur within and around the City (see Figure 3). In order to allow this to materialise, new trips must be able to use the transport network in a safe and sustainable manner. Given that a number of capacity and safety issues currently existing on Milton Road, the option to continue without mitigation does not help to support the delivery of planned growth. The delivery of a scheme on Milton Road, in collaboration with a number of other proposed GCP schemes, is therefore critical to ensuring economic growth.

IMPACT OF NO MITIGATION SUMMARY

2.3.9. The available data sources and stakeholder opinion both indicate a need for intervention. The impact of no mitigation is likely to mainly relate to a worsening of travel times for private vehicles and public transport services and an increase in the amount of accidents with a particular risk to cyclists. In order to support planned growth whilst maintaining/improving journey quality and the local environment, a Milton Road improvement scheme is required.

2.4 OBJECTIVES

2.4.1. The GCP Executive Board has set the following key objectives for the Milton Road scheme in order to guide the development of the proposals:

- Comprehensive priority for buses in both directions wherever practicable;
- Safer and more convenient routes for cycling and walking, segregated where practical and possible;
- Enhance the environment, streetscape and air quality;
- Additional capacity for sustainable trips to employment/education sites;
- Increased bus patronage and new services; and
- Maintain or reduce general traffic levels.

2.4.2. These objectives share similarities with the reasons for intervention defined above and should therefore help to address the identified issues. They broadly focus on improving bus journeys, the safety of active mode trips and the preservation / improvement of streetscape whilst aiming not to attract further traffic.

2.5 MEASURES FOR SUCCESS

2.5.1. The scheme objectives that have been set are directly measurable so it is anticipated that success should be straightforward to monitor. Appropriate questions to answer in order to measure the success of each objective are described in Table 2.

Table 2 – Objective measures for success

Objective	Measures for Success
Comprehensive priority for buses in both directions wherever practicable	Will the scheme include bus lanes / bus priority measures in all locations that are practicable?
Safer and more convenient routes for cycling and walking, segregated where practical and possible	Will the scheme include segregated or safer cycle facilities where practical and possible? Will the scheme include segregated or safer walking facilities where practical and possible?
Enhance the environment, streetscape and air quality;	Will the scheme maintain/reduce the amount of traffic on Milton Road? Will the scheme retain green spaces and trees? Will the scheme introduce streetscape improvements?

Additional capacity for sustainable trips to employment/education sites	Will the scheme enhance connections with employment and education sites? Will the scheme provide additional space / improved facilities for sustainable modes? Will the scheme actively discourage non-sustainable modes?
Increased bus patronage and new services	Will bus patronage increase as a result of the scheme? Will new public transport services be provided as a result of the scheme?
Maintain or reduce general traffic levels	Will the scheme reduce/maintain flows on Milton Road?

2.6 SCOPE

2.6.1. The geographical scope of the scheme is defined as the Milton Road area from the guided busway to Mitcham's corner. This area is generally built up so the scope for intervention is fairly constrained and has therefore been restricted to the current extent of road, cycle and footway space. All improvements will be within the highway and do not require the purchase of private land.

2.6.2. The scope of the problem to be addressed directly relates to the objectives. In other words, it looks to improve the quality of journeys made via sustainable modes on Milton Road (walking, cycling, and bus) with a view to increasing their uptake as demand continues to increase. The scope of the study therefore focusses on these modes whilst monitoring the impact on non-sustainable modes (cars).

2.6.3. The development of the scheme was conducted in line with the objectives. Both a 'Do Maximum' & 'Do Something' options have been considered and discounted as part of the scheme development process either due to public acceptance, deliverability or because they did not fully meet the objectives. The refined scheme coming out of these options in the 'Preliminary Design', which has been developed through extensive consultation with the Local Liaison Forum and ongoing workshop sessions with key technical stakeholders.

2.7 CONSTRAINTS

2.7.1. Economic growth in a successful area such as Greater Cambridgeshire is reliant on targeted investment in physical infrastructure that addresses key issues such as housing shortages and a congested transport network, in line with the vision for Greater Cambridgeshire and its policy framework.

2.7.2. Milton Road is heavily constrained by the presence of residential and commercial accesses and boundaries. Compulsory purchase of land has been discounted as an option and therefore the geographical extent of the scheme is well defined by the current extent of the highway.

2.7.3. The Milton Road streetscape is generally residential in nature with some smaller areas of retail and it is tree-lined along most of its length. As part of the scheme, the Project Team has made a commitment to replace every tree which needs removing, and aims to increase the overall number of trees on Milton Road.

2.7.4. Scheme objective number 3 states that the scheme will aim to 'enhance the environment, streetscape and air quality', therefore these is a commitment that trees currently lining Milton Road will either be retained or replaced. No net deficit in trees is proposed which helps to achieve objective number 3 but also acts as a constraint for the scheme.

2.7.5. The following types of constraint have been considered in developing the scheme:

Physical

- Available space due to the width constraints and the need to accommodate private accesses;
- The potential impact on, and need to divert, other types of physical infrastructure such as utilities (gas, water, electricity, fibre optic cable etc.); and
- Need to accommodate all modes / competing demand for space.

Environmental

- Built environment – where there are environmentally sensitive areas or potential conflicts with other transport system users;
- Desire to retain green space and an avenue of trees along Milton Road.

Capacity requirements

- If more efficient and sustainable modes of transport are not improved and provided, the available capacity on the transport network may constrain further high levels of growth and compromise the high quality of life that is enjoyed in Cambridge.

Financial

- Limited funding restricts the scale of mitigation that is achievable. See section 4.4 for detail.

Contractual

- Necessity to comply with contractual and procurement procedures. See section 5.2 for detail.

Public acceptability

- Need to balance conflicting preferences of stakeholders. See section 1.3 for detail.

2.8 INTER-DEPENDENCIES

2.8.1. The Milton Road scheme is closely linked to a number of Greater Cambridge Partnership schemes which are being developed in parallel with the Milton Road scheme.

2.8.2. Histon Road shares a similar purpose to Milton Road, connecting villages to the north of Cambridge and the A14 to Cambridge City. The Histon Road scheme has similar objectives to the Milton Road scheme and aims to encourage the use of sustainable modes.

2.8.3. The A10 Ely to Cambridge scheme meets Milton Road at its northern extent, linking Cambridge via Milton Road and the A10 to Waterbeach and Ely. The A10 also helps to connect places north of Cambridge with key locations at the northern extent of Milton Road such as the Science Park, Business Park, Cambridge Regional College and the proposed Cambridge Northern Fringe East site. The A10 scheme objectives focus on restricting further traffic growth and mileage on the A10 whilst improving the uptake and reliability of alternative modes.

2.8.4. The Histon Road, Milton Road and A10 schemes all aim to limit private vehicle use and promote sustainable modes. In order to achieve this, all three schemes must work in coordination with the City Access measures currently proposed which comprise of *'a package of eight measures to tackle congestion within Cambridge by the creation of a transport system that meets the needs of our growing, vibrant city. It plans to achieve a reduction in peak-time traffic levels in Cambridge of 10-15%, compared to 2011 levels, by 2031.'*

2.8.5. In order for the Milton Road scheme to succeed in preventing further growth in vehicular traffic a City wide approach to deterring cars will be required which is why the scheme's success depends on the successful implementation of the neighbouring schemes and the City Access measures.

2.9 STAKEHOLDERS

2.9.1. The full list of stakeholders who have been consulted during the development of the scheme is provided in Appendix A. These stakeholders can be categorised as follows:

- Local Councillors
- Emergency Services
- Transportation providers and groups
- Urban design
- Accessibility groups
- Education establishments
- Residents

2.9.2. A local Liaison Forum LLF has met regularly and has had input to workshops and seminars throughout the development of the 'Preliminary Design'. The Milton Road LLF includes local Councillors and representatives from local residents associations and is open to the public

2.9.3. Through this process a number of conflicting aspirations for the scheme have been identified. These conflicting views generally relate to the prioritisation of different modes relating to the interests of each stakeholder. Cycling interest groups were understandably keen to prioritise road space for cycling, whilst bus providers were keen to see road space allocated to bus infrastructure. Local businesses voiced concerns about accessibility and parking and residents of Milton Road were keen to see the preservation of trees and improvement of streetscape.

2.9.4. A focus on the objectives of the scheme have been used to help resolve conflicting preferences from stakeholders. Consideration has been given to these conflicting views and the scheme seeks to incorporate a balanced compromise so as to incorporate as much of these differing views as possible, while not conflicting with the scheme objectives.

2.10 OPTIONS

2.10.1. This section sets out a description of the current preferred 'Preliminary Design' scheme and how this compares against 'Do-Nothing'.

2.10.2. Table 3 below sets out a direct comparison of the latest iteration of the scheme (see Appendix C) against a 'Do Nothing' scenario and evaluates the impact on the proposal's objectives and wider public policy objectives. Risks associated with each option are identified, as are risks common to both options.

Table 3 – Option Comparison

Criteria	Do-Nothing	Proposed Scheme
SCHEME OBJECTIVES		
Comprehensive priority for buses in both directions wherever practicable	<u>Bus lanes southbound from:</u> - Kendall Way to Union Lane - Elizabeth Way to Mitcham's Corner.	<u>Bus lanes southbound from:</u> - Kendall Way to Union Lane - Ascham Road to Mitcham's Corner (200m shorter). <u>Bus lane northbound from:</u> - Kendall Way to the Busway (addition of 180m) - Ascham Road to Elizabeth Way (addition of 200m) <u>Bus priority measures:</u> Detectors incorporated into signalised junctions to detect buses approaching and prioritise green signals for this approach.
Safer and more convenient routes for cycling and walking, segregated where practical and possible	<u>Northbound cycle facilities:</u> - No cycle facilities: 535m - On-road cycle lane: 1030m - Raised cycle lane: none - Off-road cycle lane: 730m <u>Southbound cycle facilities:</u> - No cycle facilities: none - On-road cycle lane: 2175m - Raised cycle lane: - Off-road cycle lane: 120m	<u>Northbound cycle facilities:</u> - No cycle facilities: none - On-road cycle lane: none - Raised cycle lane: 240m - Off-road cycle lane: 2055m <u>Southbound cycle facilities:</u> - No cycle facilities: none - On-road cycle lane: none - Raised cycle lane: none - Off-road cycle lane: 2295m Copenhagen style crossings to give cyclists priority when crossing minor arms along Milton Road.

Criteria	Do-Nothing	Proposed Scheme
		Off-road cycle lanes bypassing key junctions to segregate cyclists from vehicular traffic.
Enhance the environment, streetscape and air quality;	Current trees lining Milton Road (some in a poor state of health). Grass verges Provision of green space at the Birch Close, Fraser Road and Kendall Way junctions.	Replacement of current trees lining Milton Road to ensure at least no net loss of trees with ambition to provide a net gain of trees that are more suitable for the given environment. Grass verges Public realm improvements at the Birch Close, Fraser Road and Kendall Way junctions. Additional green space at the Woodhead Drive junction. Road space prioritised for sustainable modes through the provision of more extensive cycle and pedestrian facilities. This should lead to a slowing of growth in vehicular traffic and a resulting improvement in air quality compared to the Do-Nothing situation.
Additional capacity for sustainable trips to employment/education sites	Capacity will remain the same for sustainable modes using Milton Road which acts as a key distributor link for jobs, schools and colleges.	<u>Cambridge Regional College:</u> Cycle access improved via provision of safer cycle facilities at the King's Hedges Road and Busway junctions which form the two main accesses to the college. <u>Science Park:</u> Cycle facilities along Milton Road improve sustainable trip access to employment. <u>Access to the City:</u> Cycle facilities along Milton Road improve sustainable trip access to a number of key employment sites in the city centre.
Increased bus patronage and new services	The attractiveness of buses along Milton Road will remain the same or potentially decrease due to delays at junctions and in areas without bus lanes.	The improved bus facilities are predicted to offer better bus journey times and reliability improvements which should help to actively encourage current users to continue using bus services whilst attracting new users. The presence of additional bus infrastructure should help to encourage the introduction of additional bus services as operators will experience better journey time reliability.

Criteria	Do-Nothing	Proposed Scheme
Maintain or reduce general traffic levels	Delays on Milton Road are present at most junctions during peak times, with the AM peak demonstrating the lowest average speeds. Despite the lack of reserve capacity, traffic flows are expected to increase due to growth in housing in jobs. Additional vehicles are likely to experience delays in excess of those currently experienced.	The reallocation of road space to active modes and public transport should seek to deter further growth in general traffic levels on Milton Road as delays for general traffic are anticipated to increase. The provision of better quality public transport and active mode facilities should encourage users to switch mode away from car, especially when the Milton Road scheme is coupled with the City Access measures.
POLICY OBJECTIVES – CAMBRIDGESHIRE LOCAL TRANSPORT PLAN		
Objective #1: Improvement of journey time reliability	Journey time reliability is likely to worsen over time due to growth in jobs and houses placing more pressure on an already strained transport network	Additional lengths of bus lane and implementation of bus priority will improve the reliability of bus journey times. Provision of a smooth, safer running surface for cyclists and the ability to bypass traffic signals via off-road cycle lanes should improve both average cycle speeds and journey time reliability.
Objective #3: Making sustainable modes more attractive	The attractiveness of active move and bus trips along Milton Road will remain the same or potentially decrease due to delays and increased safety concerns.	The improved bus facilities are predicted to offer better bus journey times and reliability which should help to actively encourage current users to continue using bus services whilst attracting new users. Improved cycle facilities should also help to encourage a shift to cycling due to the provision of faster, safer journeys.
Objective #6: Safety improvements	A large proportion of accidents (70%) along Milton Road involve cyclists. The most common reason for cycle accidents was found to be conflicts between vehicles using minor arms and cyclists crossing minor arms. The next most common problem related to cyclists using Elizabeth Way roundabout. As demand along the corridor increases these problems could become worse.	Copenhagen style crossings will give cyclists clear priority when crossing minor arms along Milton Road which should help to clarify who has priority and minimise conflicts. Elizabeth Way roundabout is proposed for signalisation which will remove the issue of human error when giving way. Cyclists will also be segregated from vehicles at this junction which should minimise the chance of cycle accidents at this location.

Criteria	Do-Nothing	Proposed Scheme
RISKS ASSOCIATED WITH EACH OTHER		
Economic Growth	Greater Cambridgeshire is predicted to see huge growth in jobs and housing over the next 15 years. In order to facilitate this growth, the transport network must be capable of allowing people to freely move across the City in a safe manner. The current transport network presents a number of barriers to this due to slow average speeds, unreliable journey times and safety problems.	The scheme aims to encourage trips of all purposes to shift to sustainable modes which should help to safeguard the ability of people to move around the City by making modes like cycling and public transport more attractive. Increased uptake of cycling is proven to reduce absences from work, reduce the number of years of life lost due to health reasons and help workers to access jobs. All of these things should help to facilitate Cambridge's ambitious economic growth plans.
Safety	The impact of not mitigating may directly impact the safety of both residents and those that travel along the Milton Road corridor due to the large number of cycle accidents.	The scheme is likely to significantly improve the safety of cyclists on Milton Road both now and for years to come.

3 THE ECONOMIC CASE

3.1 INTRODUCTION

3.1.1. WSP has conducted an economic appraisal of the benefits that could be realised by the provision of the Milton Road improvement scheme, focussing on improving journeys for bus users and cyclists. The latest iteration of the Milton Road scheme is known as the 'Preliminary Design' and is subject to change so this analysis may not represent a final assessment but will give a reasonable indicative estimate of the scale of benefits that could be achieved at this stage.

3.2 OPTIONS APPRAISED

3.2.1. The Milton Road 'Preliminary Design' scheme (see Appendix C) proposes the following changes:

- Off-road or raised cycle ways in both directions from the Guided Busway to Mitcham's Corner
- The removal of circa 200m of southbound bus lane and addition of circa 200m of northbound bus lane from Ascham Road to Elizabeth Way.
- The addition of circa 175m of northbound bus lane from Kendal Way to the Guided Busway.

3.2.2. In terms of the overall changes proposed on Milton Road, Table 4 summarises the lengths of cycleway and bus lane with and without the scheme.

Table 4 - Existing and proposed lengths of bus and cycle facilities along Milton Road

	Northbound		Southbound	
Facility	**Do Nothing**	**With Scheme**	**Do Nothing**	**With Scheme**
BUS FACILITIES (metres)				
No Bus Lane	2175	1795	910	1110
Bus Lane	120	500	1385	1185
TOTAL	**2295**	**2295**	**2295**	**2295**
CYCLE FACILITIES (metres)				
No Cycle Lane	535	0	0	0
Advisory Cycle Lane (painted)	1030	0	2175	0
Raised Cycle Lane	0	240	0	0
Off-road Cycle Lane	730	2055	120	2295
TOTAL	**2295**	**2295**	**2295**	**2295**

3.2.3. There are two key ways that transport benefits can be accrued for a scheme. Typically, a DfT Transport User Benefits Appraisal (TUBA) is undertaken to calculate monetised values of travel time savings, emissions savings and impacts on indirect tax revenues and operator costs. In addition to this, an active-mode appraisal can be undertaken using WebTAG values to monetise other forms of benefits associated with walking and cycling such as health benefits and reduced absenteeism.

3.2.4. Due to the nature of the scheme, the majority of benefits are likely to be health benefits associated with increased active mode uptake and travel time savings for public transport users and therefore both a TUBA and an active-modes appraisal have been conducted.

3.2.5. To conduct a TUBA, inputs from at least two different transport model years are required in order to allow interpolation of benefits to take place over time. At the time of writing, a second modelled CSRM2 year is not available and 2031 is the only forecast year available. Upon discussion with Cambridgeshire County Council, it was agreed that 2031 would be used to represent both 2031 and 2041 within TUBA as per the method previously used for the assessment of other Greater Cambridge Partnership schemes. This assumption is

likely to underestimate the benefits of the scheme as it effectively assumes there is no increase in the amount of demand benefitting from the improvements over time, i.e. the level of benefits are assumed to plateau.

3.2.6. The Milton Road scheme is assumed to be implemented alongside the City Access measures within CSRM2 which has resulted in a widescale model response. This is largely due to the presence of the City Access scheme which aims to reduce vehicle kilometres in Cambridge by 10-15%, compared to 2011 levels. When the City Access scheme is implemented within the model, a large number of vehicle trips change mode to bus, walk and cycle (as hoped) but a large number of trips also cease to exist (i.e. some people do not travel). TUBA interprets this reduction in trips as a large travel time saving as the total amount of hours spent travelling is reduced.

3.2.7. In transport terms, fewer trips on the transport network would be beneficial but the impact in terms of accessibility and social inclusion is less clear. As the majority of the TUBA benefits can be accounted for by the City Access scheme, a decision has been made to exclude the TUBA benefits from the overall economic assessment.

3.2.8. In addition to the TUBA, an active-modes appraisal has also been undertaken which assesses a range of other criteria in order to give a conservative estimate of the health, journey quality, journey time savings, absenteeism and marginal external cost benefits (reductions in congestion, air quality, noise and accident savings) that could be realised by the combined Milton Road / City Access scheme. This method makes use of the CSRM2 results to estimate the number of cyclists before and after the combined scheme is in place.

3.2.9. The model runs used to inform this assessment assumed that the Milton Road scheme would be implemented alongside the City Access proposals to form a package of measures that jointly discourage car use in the City Centre (City Access) and improve public transport and active-mode options (Milton Road). Where this specific chapter refers to 'the scheme', this includes both the City Access and Milton Road elements. As the benefits being produced on Milton Road result from both the City Access and Milton Road schemes, the costs being used for this economic appraisal also covers both schemes.

3.2.10. An initial cost estimate has been produced for the Milton Road scheme (£15.1M, including 15% optimism bias), but a detailed cost for the City Access measures is currently unavailable so costs for this element are assumed to be in line with the current level of funding allocation (£10M) plus 44% optimism bias.

3.2.11. A long term projection of the active mode benefits for both a 10 and 20 year appraisal period have been produced for each of the types of benefits calculated in the proceeding sections of this note. This provides a lower and upper bound estimate of the level of active mode benefits that may be realised as it is not clear how long the benefits of the scheme would continue to occur.

3.2.12. As per WebTAG guidance, all prices for benefits and costs have been adjusted to 2010 pounds (£.2010) and social time preference has been taken into account using the method of discounting detailed in HM Treasury's Green Book[6].

3.3 BENEFIT APPRAISAL

3.3.1. The benefit appraisal presented here is conducted in line with the guidance set out by the Department for Transport (DfT) in their active mode appraisal guidelines (WebTAG unit A5.1) and uses WebTAG Databook v1.9.1 (Dec 2017 release). This TAG unit sets out the various benefit types that should be considered when appraising schemes that impact walk and cycle trips. This includes improved health, journey quality, journey time savings, absenteeism and marginal external costs (congestion, air quality, noise, indirect tax revenue and accident savings). Each of these types of benefit is presented below with a detailed breakdown of the calculations undertaken. In addition to the active mode appraisal, an estimate of the journey time savings for bus users has also been produced.

HEALTH BENEFITS

3.3.2. The health benefits of the scheme resulting from a reduction in the number of years of life lost have been assessed using the Department for Transport's Active Mode Health Benefits Worksheet[7].

[6] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/639108/active-mode-health-benefits-worksheet.xlsx

3.3.3. The key inputs required were as follows:

- Number of new cycle journeys due to scheme: 11,224 (estimated from CSRM2)
- Number of new cyclists due to scheme: 6,106 (estimated from CSRM2)
- Number of new walking trips due to scheme: whilst the scheme will improve the pedestrian realm it is not anticipated to attract a significant number of new pedestrians as the overall pedestrian distance and travel time will remain the same. For the purpose of a conservative assessment, it is therefore assumed that no new pedestrians will materialise due to the scheme.
- Quality Adjusted Life Year (QALY) value, Department of Health: £60,000

3.3.4. The DfT's active mode health benefits worksheet predicts that the addition of 11,224 new cycle journeys due to the provision of the scheme should result in 42.38 fewer years of life lost every year. This equates to a saving of £1.9M during the opening year and gradually lower values over the preceding years due to social time preference which is taken account of in the discounting process.

3.3.5. This annual value has been projected and discounted for a 10-year and 20-year assessment period in the table below.

Table 5 – Health Benefits

Long Term Health Benefits		
	10 year assessment	20 year assessment
Total Health Benefits (£.2010)	£ 17.4M	£ 32.4M

JOURNEY QUALITY BENEFITS

3.3.6. The quality of a cycle journey, also referred to as journey ambience, is considered to be a perceivable benefit by the Department for Transport. The benefit of improved journey quality is quantified in table 4.1.6 of the WebTAG Databook (v1.9.1), shown below.

Table 6 – WebTAG Databook (v1.9.1) table 4.1.6

Table 4.1.6: Value of journey ambience benefit of cycle facilities relative to no facilities (2010 prices & 2010 values)		
Scheme type	**Value p/min**	**Source**
Off-road segregated cycle track	7.03	Hopkinson & Wardman (1996)
On-road segregated cycle lane	2.99	Hopkinson & Wardman (1996)
On-road non-segregated cycle lane	2.97	Wardman *et al*. (1997)
Wider lane	1.81	Hopkinson & Wardman (1996)
Shared bus lane	0.77	Hopkinson & Wardman (1996)
	pence	
Secure cycle parking facilities	98.14	Wardman *et al.* (2007)
Changing and shower facilities	20.82	Wardman *et al.* (2007)

3.3.7. This benefit is calculated based on the number of minutes spent using a particular type of cycle facility. In order to calculate the overall journey quality benefit, the proportion of the route spent using each type of facility had to be calculated. This then allowed an average value of journey ambience to be calculated for the existing and proposed layouts, by direction, as shown below.

Table 7 – Journey Ambience Values

Facility type	Value of journey ambience by type of facility (p/min)	EXISTING LAYOUT		PROPOSED SCHEME	
		Northbound	Southbound	Northbound	Southbound
Off-road segregated cycle track	7.03	32%	5%	90%	100%
On-road segregated cycle lane	2.99	0%	0%	10%	0%
On-road non-segregated cycle lane	2.97	45%	95%	0%	0%
No facilities	0.00	23%	0%	0%	0%
Average ambience value of route (p/min)		3.57	3.18	6.61	7.03

3.3.8. In order to calculate ambience benefits, the number of existing and new cyclists due to the introduction of the scheme have been estimated using the Cambridge Sub-Regional Model (CSRM2). As this number varies along the length of Milton Road, an average has been taken over all model links that form Milton Road and an assumption made that this average number all benefit from the full length of the scheme (from the Guided Busway to Mitcham's Corner). Weekend cyclists were then estimated using the ratio of weekend to weekday cyclists recorded in the National Travel Survey (2016)[8]. The average number of cyclists using Milton Road by 2031 is estimated to be as follows:

Table 8 – Estimated forecast cycle trips (CSRM2)

	Weekday		Weekend	
	Northbound	Southbound	Northbound	Southbound
Milton Road cycle trips, 2031 (without the scheme)	2093	1774	643	544
Milton Road cycle trips, 2031 (with the scheme)	7,211	7,880	2,214	2,419
Difference (increase due to scheme)	5118	6106	1571	1874

3.3.9. The amount of time spent cycling along Milton Road is also required to calculate the ambience benefits of the scheme. To calculate the travel time, an assumption has been made that without the scheme cyclists are likely to travel at 12kph (the default cycle speed assumption used in CSRM2) and with the scheme, an average speed of 20kph has been assumed. The latter is based on findings in Copenhagen which found that cyclists are able to travel at 20kph on well surfaced cycleways in order to take advantage of 'green waves' deliberately provided by signal controllers[9]. Cambridge is not dissimilar to Copenhagen in terms of terrain, so reaching average cycle speeds of 20kph on new infrastructure on Milton Road is felt to be a reasonable assumption.

3.3.10. The proposed scheme is likely to cause an increase in cycle speeds for the following reasons:

- The re-surfacing of cycle ways on Milton Road will help to provide a smoother, faster running surface.
- Formalising the space available to cyclists by implementing off-road and raised cycle lanes should improve cyclists' perception of safety and reduce the risk of vehicles passing too closely.

[8] https://www.gov.uk/government/collections/national-travel-survey-statistics#data-tables [Table NTS0504 accessed on 24th Nov 2017]
[9] http://www.copenhagenize.com/2014/08/the-green-waves-of-copenhagen.html [Accessed on 24th Nov 2017]

- The provision of Copenhagen style crossings should also provide better clarity for motorists and cyclists and will give cyclists priority to cross all minor arms along Milton Road. This should make cycle journeys smoother as the need to start and stop frequently to giveaway will be minimised, resulting in a higher average speed.
- Cycle improvements at the Gilbert Road signalised junction mean cyclists are able to benefit from increased amounts of green time due to the provision of advanced cycle stop lines and green signals which will help cyclists to gain priority and minimise delays.
- Cycle improvements at the Elizabeth Way roundabout help to provide off-road bypass lanes for cyclists which segregate them from motorised vehicles and allow them to avoid delays by bypassing the junction. Signalisation at this junction also helps to improve safety
- Cycle improvements at the Arbury Road and King's Hedges Road signalised crossroads which provides segregated cycle facilities.

3.3.11. The length of Milton Road from the Guided Busway to Mitcham's Corner is approximately 2.3km which is assumed to translate to an average travel time of 10.6 minutes without the scheme (assuming a mixture of 12kph advisory / no cycle lanes and 20kph off-road or raised cycle ways) and 6.9 minutes with the scheme (assuming a mixture of 20kph off-road or raised cycle ways).

3.3.12. To calculate the total benefit, the benefit per trip along Milton Road (both northbound and southbound) has been calculated and multiplied by the average number of trips. This was done for existing cyclists by calculating the proposed benefit and then subtracting the existing benefit. For new cyclists, all of the proposed benefit was assumed to be received. In accordance with WebTAG guidance, the rule of half has been applied. All values are rounded to the nearest penny.

Table 9 – Daily Ambience Benefits

Weekday Ambience Benefits		
Type of cyclist	Northbound	Southbound
Existing cyclists (with scheme benefit – without scheme benefit)	With-scheme benefit: 2093 cycle trips for 6.9 mins @ 6.61p/min = £476.16 Without-scheme benefit: 2093 cycle trips for 10.6 mins @ 3.57p/min = £396.91 Net ambience benefit for existing cyclists = With scheme – without scheme = £79.25 per weekday	With-scheme benefit: 1774 cycle trips for 6.9 mins @ 7.03p/min = £429.26 Without-scheme benefit: 1774 cycle trips for 10.6 mins @ 3.183p/min =£299.87 Net ambience benefit for existing cyclists = With scheme – without scheme = £129.39 per weekday
New cyclists (with scheme benefit)	With-scheme benefit: 5118 cycle trips for 6.9 mins @ 6.61p/min = £1,164.17 per weekday	With-scheme benefit: 6106 cycle trips for 6.9 mins @ 7.03p/min = £1,477.67 per weekday

Weekend Ambience Benefits		
Type of cyclist	Northbound	Southbound
Existing cyclists (with scheme benefit – without scheme benefit)	With scheme benefit: 643 cycle trips for 6.9 mins @ 6.61p/min = £146.16 Without scheme benefit: 643 cycle trips for 10.6 mins @ 3.57p/min = £121.84 Net ambience benefit for existing cyclists = With scheme – without scheme = £24.33 per weekend day	With scheme benefit: 544 cycle trips for 6.9 mins @ 7.03p/min = £131.77 Without scheme benefit: 544 cycle trips for 10.6 mins @ 3.18p/min = £92.05 Net ambience benefit for existing cyclists = With scheme – without scheme = £39.72 per weekend day
New cyclists (with scheme benefit)	With-scheme benefit: 1571 cycle trips for 6.9 mins @ 6.61p/min = £357.36 per weekend day	With-scheme benefit: 1874 cycle trips for 6.9 mins @ 7.03p/min = £453.59 per weekend day

3.3.13. The daily values of journey quality benefits calculated above were then multiplied by weekday and weekend annualisation factors respectively, to produce an annual benefit in 2010 prices. It was assumed that 253 average weekdays and 112 average weekend days occur per year.

Table 10 – Annualised Ambience Benefits

Combined Ambience Benefits		
Type of benefit	Northbound	Southbound
Weekday benefit	£1,243.42	£1607.07
Annual benefit (Weekday)	=£1,243.42 * 253 = £314,585.20	= £1607.07 * 253 = £406,587.95
Weekend benefit	£381.69	£493.31
Annual benefit (Weekend)	= £381.69 * 112 = £42,748.90	= £493.31 * 112 = £55,251.13
TOTAL ANNUAL BENEFIT (£.2010)	£ 819,173.18	

3.3.14. In accordance with WebTAG A5.1, benefits have been assumed to accrue over a number of years. A lower bound value, using a 10-year assessment period and an upper bound using a 20-year assessment period have both been produced as it is not clear how long the scheme would continue to realise benefits. The level of benefits presented below have been discounted over time as per WebTAG recommendations.

Table 11 – Long Term Ambience Benefits

Long Term Ambience Benefits		
	10 year assessment	20 year assessment
Total Ambience Benefits (£.2010)	£ 3.4M	£ 6.3M

ABSENTEEISM BENEFITS

3.3.15. WebTAG unit A4-1 recommends using the TfL (2004) method of estimating the benefits to business (increased productivity) that can be achieved by a reduced level of absenteeism due to increased levels of activity, such as cycling. As the scheme aims to deter car use and encourage cycling there is good potential for absenteeism benefits to be realised.

3.3.16. The recommendation in WebTAG (TAG Unit A4.1, paragraph 3.2.17) is to assume a reduction in short term leave (absenteeism) of 25% if physical activity exceeds 30-minutes. The first calculation needed, therefore, is to establish whether the Milton Road scheme is likely to attract new commuter cyclists with a travel time exceeding 30-minutes.

3.3.17. The 2016 National Travel Survey (NTS0410) indicates that the average cycle commuter trip length in Cambridge is 5.726km. To achieve the required 30-minutes of physical activity, an average cycle speed of 23kph or less would need to be achieved. As previously stated, the average cycle speed in Cambridge has been assumed to be 12kph with more efficient cycle facilities likely to achieve a value in the region of 20kph. Therefore, it is likely that the average cyclists using the Milton Road scheme would be meeting the required 30-minutes of activity that have been demonstrated to improve absenteeism.

3.3.18. In order to apply the 25% reduction in absenteeism, we first need to establish the anticipated level of absenteeism without the scheme. On average, employees take 4.3 days[10] of absence annually and 95%[11] of these are classified as short term leave. Therefore, 4.085 days of short-term leave are accrued per worker on average per year. Preventing 25% of this absence due to an increase in physical activity would therefore mean saving 1.02 days per active employee per year.

3.3.19. The WebTAG Databook v1.9.1 (table A1.3.1) provides a value of working time per hour, so to apply this value to the 1.02 days saved we first need to establish how many hours are worked per day. According to the Annual Survey of Hours and Earnings, the average time worked per week in Cambridge is 33.2 hours. Assuming the average employee works a 5 day week, the average time worked per day is 6.64 hours. This means a saving of 1.02 days translates to an annual saving of 6.78 hours per active employee.

3.3.20. The value of working time per hour (£.2010, market price, average of all modes) is £19.27 / hr. Applying this to the 6.78 hours saved, we achieve an annual absenteeism benefit to employers of £130.65 per active employee.

3.3.21. CSRM predicts that there will be approximately 2,207 new weekday commuter cyclists that use Milton Road as a result of the scheme, which equates to an annual reduced absenteeism benefit of £288,286.87. This annual value has been projected and discounted for a 10-year and 20-year assessment period in the table below.

[10] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/sicknessabsenceinthelabourmarket/2016

[11] https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-12-861

Table 12 – Long Term Reduced Absenteeism Benefits

Long Term Reduced Absenteeism Benefits		
	10 year assessment	20 year assessment
Total Reduced Absenteeism Benefits (£.2010)	£ 1.2M	£ 2.2M

GROSS CYCLING PRODUCT

3.3.22. Increased public spending due to an increased uptake of cycling is regarded as an additional source of benefits that can be associated with the introduction of a new cycling scheme. Grous (2011)[12] aims to 'chart the full extent of cycling's contribution to the British economy' in a measure termed the 'Gross Cycling Product'. Grous states that the average cyclist spends £230 on cycle related shopping annually.

3.3.23. The Milton Road scheme is anticipated to attract 2,207 new cyclists to the corridor, 841 (38%) of whom are commuter cyclists and expected to contribute to cycle spending in the manner described by Grous. In total this results in an additional £193,530.80 per year in 2010 prices. This annual value has been projected and discounted for a 10-year and 20-year assessment period in the table below.

Table 13 – Long Term Gross Cycling Product Benefits

Long Term Gross Cycling Product Benefits		
	10 year assessment	20 year assessment
Total Gross Cycling Product Benefits (£.2010)	£ 0.8M	£ 1.5M

JOURNEY TIME SAVING BENEFITS

3.3.24. At this stage, a broad estimate of the level of journey time savings has been produced to help with an initial estimate of the level of value for money that the Milton Road scheme may achieve. Ideally this style of assessment would be conducted using the Department for Transport's TUBA (Transport User Benefits Appraisal) tool which is able to take into account a number of modes (car, bus, rail, cycle etc.) and assess the travel time savings that could be achieved by the scheme, taking into account any mode shift. A process is currently being compiled to allow a full journey time savings assessment to be undertaken in TUBA using outputs from CSRM.

3.3.25. Whilst this approach is under construction, an alternative method has been used to provide a high level estimate of journey time savings. This method is not ideal for use at Strategic Outline Business Case stage but has been included temporarily whilst a more robust method of appraisal is identified and agreed upon. It is also worth noting that the journey time savings represent a small proportion (~3%) of the overall scheme benefits so the benefit-cost ratio is therefore insensitive to changes in journey time savings.

Cycle travel time savings:

3.3.26. As mentioned above, the existing average cycle speed on Milton Road is assumed to be approximately 12kph at present, whilst the provision of the scheme is estimated to increase this average speed to 20kph. This lead

[12] http://eprints.lse.ac.uk/38063/1/BritishCyclingEconomy.pdf

to the assumption that the existing journey time is approximately 10.6 minutes and the travel time anticipated by the scheme is 6.9 minutes. This means a 3.7 minute travel time saving for existing cyclists.

3.3.27. This level of travel time saving has been assumed to apply only to those cyclists that used Milton Road in the without-scheme scenario and continued to use Milton Road in the with-scheme. This translates to the following daily journey time savings for existing cyclists on Milton Road.

Table 14 – Cycle Journey Time Savings

Cycle Journey Time Savings (per day)		
Trip time and purpose	Northbound	Southbound
Weekday commuter	£495.25	£419.64
Weekend commuter	£55.05	£46.64
Weekday business	£28.33	£24.00
Weekend business	£2.81	£2.38
Weekday other	£353.89	£299.86
Weekend other	£155.56	£131.81
TOTAL DAILY BENEFIT (£.2010)	£1,090.88	£924.34
TOTAL ANNUAL BENEFIT (£.2010)	£ 227,130.11	

3.3.28. This annual value has been projected and discounted for a 10-year and 20-year assessment period in the table below.

Table 15 – Long Term Cycle Journey Time Benefits

Cycle Journey Time Benefits		
	10 year assessment	20 year assessment
Cycle Journey Time Savings (£.2010)	£ 0.9M	£ 1.7M

Public transport travel time savings:

3.3.29. A Paramics microsimulation model has been developed to allow a more detailed assessment of the Milton Road scheme to be undertaken with particular focus on the operational performance of the scheme. This model was used to identify the level of public transport travel time saving that could be expected due to the addition and re-allocation of bus lane on Milton Road. The model estimates the following bus journey times along Milton Road from the Guided Busway to Mitcham's Corner:

Table 16 – Bus Travel Time Savings

Milton Road bus travel time (minutes)	**Northbound** (Mitcham's Corner to Busway)		**Southbound** (Busway to Mitcham's Corner)	
	Without Scheme	**With Scheme**	**Without Scheme**	**With Scheme**
AM Peak	12.2	8.1	9.2	8.7
PM Peak	10.4	7.9	8.2	7.8

3.3.30. This level of travel time saving has been assumed to apply only to existing weekday peak period bus passengers i.e. those that use buses on Milton Road in the without-scheme scenario who continue to use buses on Milton Road in the with-scheme scenario. This translates to the following daily journey time savings for bus passengers on Milton Road.

Table 17 – Daily Bus Journey Time Benefits

Bus Journey Time Benefits (per day)	
TOTAL WEEKDAY BENEFIT (£.2010)	£ 1,702.50
TOTAL ANNUAL BENEFIT (£.2010)	£ 215,366.87

3.3.31. This annual value has been projected and discounted for a 10-year and 20-year assessment period in the table below.

Table 18 – Long Term Bus Journey Time Benefits

Bus Journey Time Benefits		
	10 year assessment	20 year assessment
Bus Journey Time Savings (£.2010)	£ 0.9M	£ 1.7M

MARGINAL EXTERNAL COSTS

3.3.32. WebTAG unit A5.4 details a way that road decongestion benefits can be quantified if multi-modal model analysis has not been possible. As a full TUBA run has not been conducted, this method has been adopted to take account of elements that have not been included in the assessment elsewhere. WebTAG describes the marginal external cost (MEC) calculation as follows:

The use of road vehicles incurs both private costs borne by the individual traveller (such as fuel costs and personal travel time) and external costs borne by others. For car use, these external costs include congestion, air pollution, noise, infrastructure and accident costs. The MEC method is based on the change in these external costs arising from an additional (or removed) vehicle (or vehicle km) on the network. These costs have been estimated from the Department's National Transport Model and Surface Transport Costs and Charges: Great Britain 1998.

3.3.33. The individual elements covered by the MEC calculations are listed in the paragraph above. It should be noted that the accident savings calculated here relate to a reduction in accidents due to fewer cars being present on the roads, whilst a reduction in cycle accidents due to the proposed scheme is covered separately in section 3.7.

3.3.34. The marginal external costs are calculated using factors obtained from WebTAG (table A5.4.2) which are provided in pence per car kilometre. In order to calculate the magnitude of each benefit, an estimate of the reduction in car kilometres due to the scheme was required. CSRM was used to provide an estimate of the level of increase in cycle trips which are all assumed to have materialised as a results of trips shifting from car to bicycle. The National Travel Survey (2016) was used to inform the average distance travelled per cycle trip (5.7km). Using these values, an estimate of the total reduction in vehicle kilometres has been produced.

Table 19 – Marginal External Cost Calculations

	Without scheme	With scheme
Cyclists on Milton Road (7am-7pm, weekday)	1,475	5,755
Increase in cycling on Milton Road **(~ reduction in cars)** (with scheme – without scheme)	4,280	
Reduction in car kilometres Assuming average trip distance of 5.7km (7am-7pm, weekday)	-24,508 km	
Annual reduction in car kilometres	-6,200,648 km	
Annual Marginal External Cost Saving	£ 1,538,800	

3.3.35. This annual value has been projected and discounted for a 10-year and 20-year assessment period in the table below.

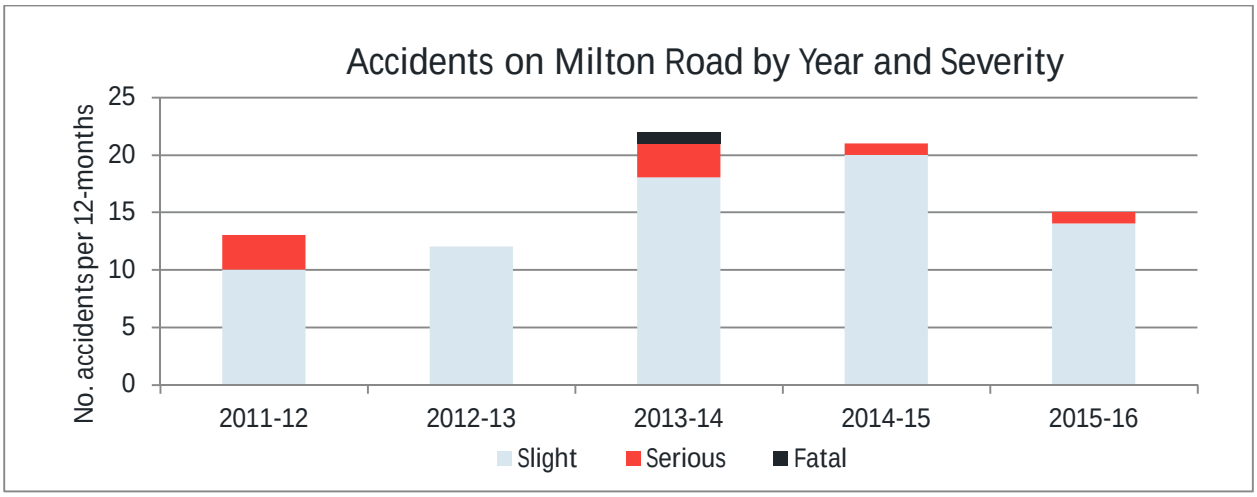
Table 20 – Long Term Marginal External Cost Savings

Marginal External Cost Savings		
	10 year assessment	20 year assessment
Marginal External Cost Savings (£.2010)	£ 6.8M	£ 13.1M

ACCIDENT SAVINGS

3.3.36. Accident data was obtained for Milton Road between Mitcham's Corner and the Guided Busway spanning the five year period from August 2011 to July 2016 inclusive. During this period, 83 accidents were logged, of which there were 74 classed as 'slight', 8 classed as 'serious' and 1 fatality. Analysis has been conducted on the data set to identify the number of accidents involving cyclists, the reason for the accident and whether or not the proposed Milton Road scheme could help to minimise these types of accident.

Figure 8 – Accidents on Milton Road by Year and Severity



3.3.37. As a key element of the Milton Road scheme is to provide better facilities for cyclists, the main focus of the accident analysis has been to look at accidents involving cyclists in detail. Of the 83 accidents logged, 57 (70%) were found to involve a cyclist which represents in the region of 11 cycle accidents per year or almost 1 per month. Of the 57 cycle accidents, there was 1 fatality (2%), 6 serious (11%) and 50 slight (88%) accidents.

3.3.38. Further analysis into the cause of each of the cycle accidents revealed that there were 15 broad reasons that could be attributed to causing cycle accidents, as shown in the chart below.

Figure 9 – Cycle accidents by type

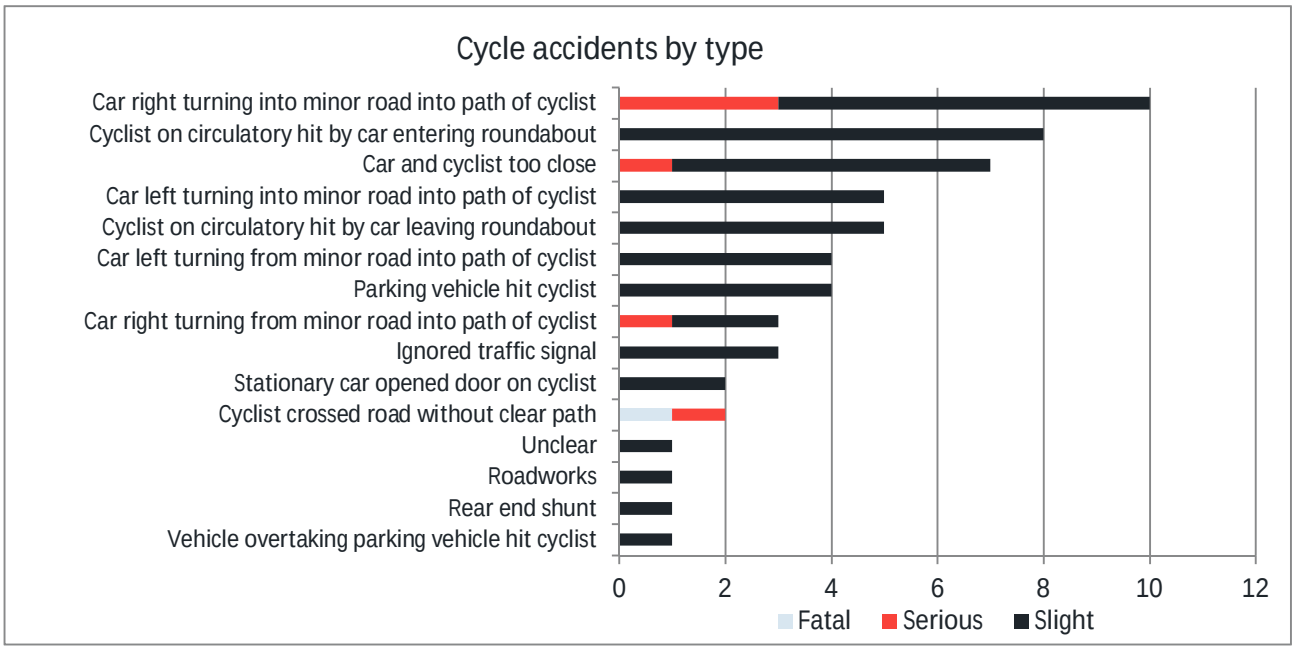
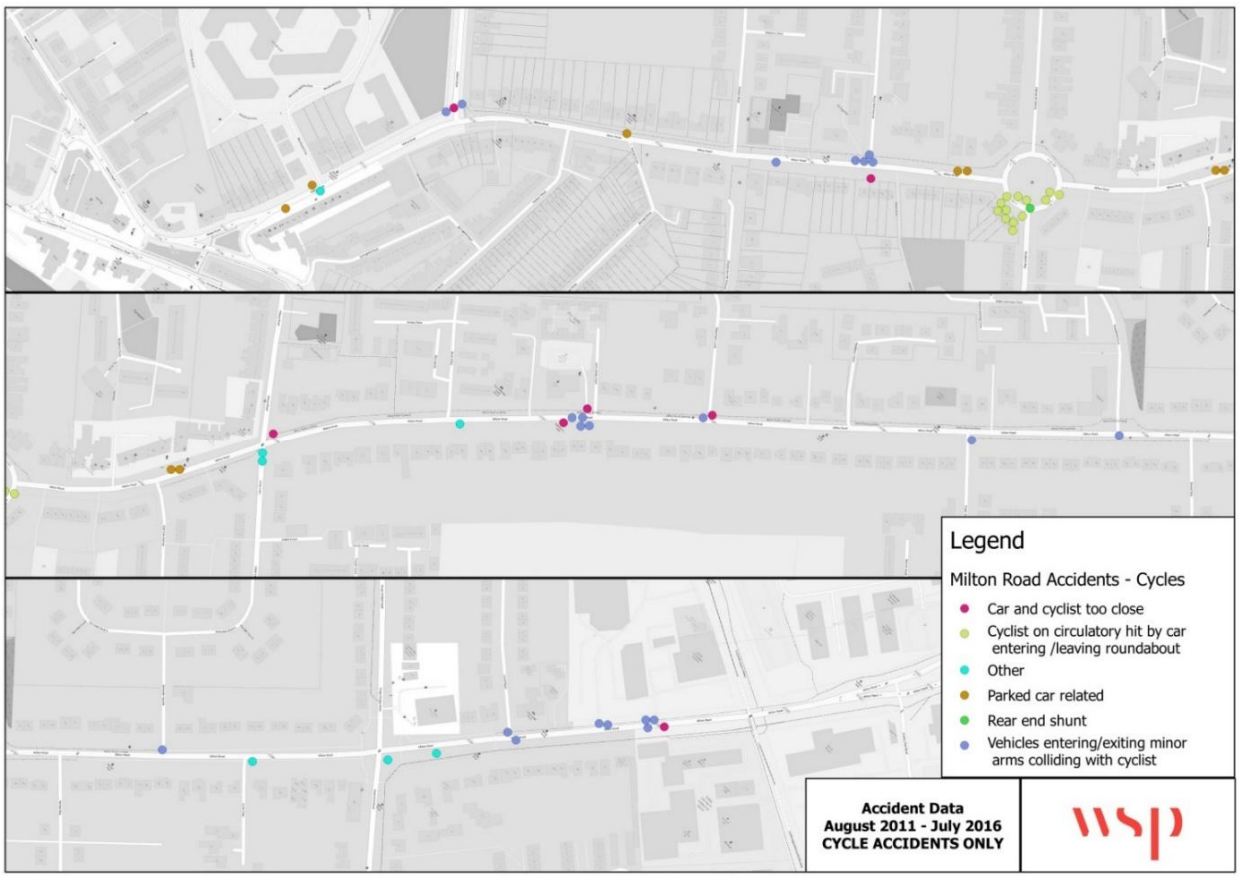


Figure 10 – Cycle accidents by location and type



3.3.39. Of the 15 broad reasons found to cause cycle accidents on Milton Road over the five year assessment period, the following four reasons could be attributed to 48 (84%) of the 57 cycle accidents;

- Twenty two accidents involved vehicles entering or exiting minor arms and colliding with cyclists using Milton Road (39%)
- Thirteen accidents involved vehicles entering or exiting the Elizabeth Way roundabout and colliding with cyclists already on the circulatory (19%)
- Seven accidents involved vehicles and cyclists travelling too close to one another (12%)
- Six accidents related to car parking along Milton Road and were either due to vehicles pulling over to park colliding with cyclists on their nearside or parked vehicles opening doors into cyclists.

3.3.40. The proposed scheme includes the provision of raised and off-road cycle ways in both directions on Milton Road in addition to the signalisation of the Elizabeth Way roundabout and a number of junction improvements that incorporate cycle bypass lanes. The majority of the proposed cycle improvements will help to segregate cyclists and vehicles with a view to minimising the conflict between the two modes.

3.3.41. One of the proposed cycle improvements is the provision of Copenhagen style cycle crossings (see Figure 11) at the majority of minor arms along Milton Road. This is intended to help to clarify who has priority. At present the priority markings at many of the minor arms are unclear which is felt to contribute to the high number of cycle accidents. Of the 22 minor road cycle accidents, 14 were located at junctions where Copenhagen crossings are proposed. It is felt that giving priority to cyclists and improving the clarity of road markings is likely to have prevented these 14 cycle accidents. In the event that this estimate is optimistic, this number has been halved later in this chapter to prevent the over estimation of benefits.

Figure 11 – Example Copenhagen style crossing in Walthamstow (Hoe Street / Granville Road) [13]

[13] Enjoy Waltham Forest website, https://www.enjoywalthamforest.co.uk/blended-cophenhagen-crossings/

3.3.42. The scheme also proposes to provide cycle improvements at the Elizabeth Way roundabout in the form of off-road cycle bypass lanes and signalisation. The segregation of cyclists and vehicles is likely to lessen the amount of conflict between the two modes and the signalisation should help to avoid driver error and hesitation at the roundabout entries. It is therefore felt that the scheme could have prevented the 13 cycle accidents at this location. In the event that this estimate is optimistic, this number has been halved later in this chapter.

3.3.43. The provision of raised and off-road cycle facilities along Milton Road is intended to minimise the conflict between vehicles and cycles. Based on the accident data descriptions it is estimated that four of the seven accidents that occurred due to the proximity of vehicles and cycles could have been prevented by the scheme. In the event that this estimate is optimistic, this number has been halved later in this chapter.

3.3.44. Finally, it is felt that the proposed removal of on-street and on-footpath parking at a number of locations along Milton Road is likely to minimise the number of accidents caused by vehicles manoeuvring to park and vehicles opening car doors on cyclists. Where on-street parking is proposed to remain, a buffer area between the parking bays and cycleway is proposed which should also help to minimise the issue of car doors opening into the cycle way. For these reasons, it is deemed that four of the parking related cycle accidents could have been prevented by the scheme. In the event that this estimate is optimistic, this number has been halved later in this chapter.

3.3.45. All of the accidents identified as likely to be prevented by the scheme are summarised in the Table below.

Table 21 - Accidents identified as potentially preventable by the scheme, by severity

	No. Preventable Accidents		
Accident type	**Serious**	**Slight**	**Total**
Vehicle overtook parking vehicle and hit cyclist		1	1
Car left turning into minor road into path of cyclist		2	2
Stationary car opened door on cyclist		2	2
Parking vehicle hit cyclist		2	2
Car right turning from minor road into path of cyclist	1	2	3
Car left turning from minor road into path of cyclist		3	3
Car and cyclist too close	1	3	4
Cyclist on circulatory hit by car leaving roundabout		5	5
Car right turning into minor road into path of cyclist		6	6
Cyclist on circulatory hit by car entering roundabout		8	8
Total	**2**	**34**	**36**

3.3.46. The scheme has therefore been estimated to be capable of saving 2 serious accidents and 34 slight accidents over a 5 year period. This equates to an average saving of 0.4 serious accidents and 6.8 slight accidents per year. As mentioned above, the number of accidents estimated to be prevented by the scheme is subject to optimism bias on the assessor's behalf so this number has been halved in the calculated monetised benefit in the table below.

Table 22 – Accident Savings by Severity

	Accident Savings by Severity		
	Fatal	Serious	Slight
Cost of a casualty (£.2010, WebTAG Databook)	£1,556,244.13	£ 174,878.26	£ 13,481.34
Number of cycle accidents that may have been prevented by the scheme (5 years)	0	2	34
Number of prevented cycle accidents per annum	0	0.4	6.8
Accident savings per annum, **Halved to prevent an over- optimistic assessment** (£.2010)	£ -	£ 69,951.30	£ 91,673.13
	£ 80,812.22		

3.3.47. This annual value of accident savings has been projected and discounted for a 10-year and 20-year assessment period in the table below.

Table 23 – Long Term Accident Savings

Long Term Accident Savings		
	10 year assessment	20 year assessment
Total Accident Savings (£.2010)	£ 0.3M	£ 0.6M

BENEFITS SUMMARY

3.3.48. The level of benefits over a 10-year and 20-year appraisal period are summarised below for each type of benefit identified. The total value of benefits (PVB) is presented and has been carried forward into the benefit-cost ratio calculation.

Table 24 – Long Term Benefit Summary

Benefit Streams	10yr appraisal	20yr appraisal
	Lower estimate	Upper estimate
Health benefits	£ 17.4M	£ 32.4M
Journey Quality	£ 3.4M	£ 6.3M
Absenteeism	£ 1.2M	£ 2.2M
Gross Cycling Product (GCP)	£ 0.8M	£ 1.5M
Cycle Journey Time Savings	£ 0.9M	£ 1.7M
Bus Journey Time Savings	£ 0.9M	£ 1.7M
Marginal External Costs	£ 6.8M	£ 13.1M
Accident Savings	£ 0.3M	£ 0.6M
Total Present Value of Benefits (PVB)	£ 31.8M	£ 59.6M

3.4 COSTS

3.4.1. The benefits of the Milton Road scheme have been estimated under the assumption that the Milton Road scheme is implemented alongside the City Access Measures. The costs that are required to implement the scheme should therefore include the cost for the Milton Road and City Access schemes combined.

3.4.2. The City Access measures are yet to be explicitly defined, but they aim to achieve a reduction in vehicle kilometres within Cambridge of 10-15% compared to 2011 levels, which has enabled the measures to be mimicked in the transport modelling that has been undertaken using CSRM. As the exact components that make up the City Access measures are not known, it is not possible to produce a cost estimate and therefore the currently allocated level of funding (£10M) has been assumed to be appropriate.

3.4.3. It is estimated that the Milton Road scheme will cost in the region of £15.1M. This figure covers all of the items listed in the itemised costing below but does exclude a number of items which could increase the cost of the scheme. The following items are excluded from the current cost estimate:

- Diverting and rerouting existing public footpaths
- Providing new public and private footpaths
- VAT.
- Any Ground Abnormalities.
- Design Team Fees.
- Planning and Building Control Fees and associated costs.
- No allowance has been made for tender price/building cost inflation.
- Diversion or lowering of existing utility services.
- Removal of asbestos containing materials.
- Land Purchase/Value or compensation costs.
- Out-of-hours working to avoid Traffic Disruption.
- Ongoing maintenance of Landscaped areas.
- Provision of new Statutory Services
- All other fees and survey costs
- All Water Authority Charges

3.4.4. Other Assumptions/Caveats:

- **All works:** Rate for disposal off site allows for clean inert material only - allowed at £25/m^3, unless otherwise advised
- **Main works:** Existing carriageway and footpath surfacing materials removed from site are deemed to be non-hazardous allowed at £65/m^3
- **Drainage Diversion:** Rates assume the work does not need to be carried out by a framework or water authority approved contractor. Standard industry rates have been applied. These rates may not be valid under a framework agreement with the Water Authority
- **Service Diversions:** All diverted services are in footway construction single trench ducts - combined trenches may be possible subject to locations phasings / programme constraints require full reconstruction of surface

3.4.5. A summary of estimated costs is provided below in Table 25:

Table 25 – Scheme Cost Estimate

Milton Road - Budget Cost Estimate Summary – Revision 1	
Series 100 : Preliminaries	See Below
Series 200 : Site Clearance	£141,199.09
Series 300 : Fencing	not required
Series 400 : Road Restraints Systems (Vehicle and Pedestrian)	not required
Series 500 : Drainage	£1,619,691.75
Series 600 : Earthworks	£519,555.67
Series 700 Pavements	£773,486.58
Series 1100 : Kerbs, Footways and Paved Areas	£1,592,732.06
Series 1200 : Traffic Signs and Road Markings	£197,262.83
Series 1300 : Road Lighting Columns and Brackets, CCTV Masts & Cantilever Masts	£345,000.00
Series 1400 : Electrical Work for Road Lighting and Traffic Signs	£129,930.00
Series 1500 : Motorway Communications	Excluded
Series 1600 : Piling and Embedded Retaining Walls	Excluded
Series 1700 : Structural Concrete	Excluded
Series 1800 : Steelwork for Structures	Excluded
Series 1900 : Protection of Steelwork against Corrosion	Excluded
Series 2000 : Waterproofing for Structures	Excluded
Series 2100 : Bridge Bearings	Excluded
Series 2300 : Bridge Expansion Joints and Sealing of gaps	Excluded
Series 2400 : Brickwork, Blockwork and Stonework	Excluded
Series 2500 : Miscellaneous Works	£78,260.00
Series 2700 : Accommodation Works, Works for Statutory Undertakers	£2,672,083.21
Series 3000 : Landscaping and Ecology	£295,409.00
Sub-total : Direct Works	**£8,364,610.19**
Additions	
Enhancement for working within lane closures ave 150m lengths: 15%	£1,254,691.53
Temporary works to maintain property accesses	£100,000.00
Prelims: Site Set up, Supervision, Overheads and other Associated Indirect HSEQ, and other Associated Indirect Costs : 15%	£1,457,895.26
Traffic Management: 10%	£971,930.17
Sub - Total (A)	**£12,149,127.15**
Profit : 8%	£971,930.17
Sub - Total (B)	**£13,121,057.32**
Risk / Contingency/Optimism Bias/Contingency : 15%	£1,968,158.60
Estimated Total Cost	**£15,089,215.92**

3.4.6. Direct works (£ 8.4M) are the main element contributing to the overall cost of the Milton Road scheme. This element mainly covers the provision of kerbs, footways and paved areas (£1.6M), pavements (£0.8M), earthworks (£0.5M), accommodation works and works for statutory undertakers (£2.7M) and drainage (£1.6M).

3.4.7. To take account of the optimistic nature of scheme costing, an optimism bias allowance has been applied. WebTAG recommends applying optimism bias rates based on the stage of the scheme, i.e. how advanced the scheme is in the planning process. Optimism bias rates of 15% have been applied to the Milton Road scheme costs (see above) and 44% to the City Access scheme costs. Inflation is not included so costs have been deflated to 2010 prices in line with the HM Treasury GDP deflator values (December 2017).The total costs are assumed to be incurred in 2030 (1 year before the assumed opening year of 2031) and therefore the costs have also been discounted to take into account social time preference.

Table 26 – Summary of Scheme Costs

Scheme	Estimated Cost
City Access Measures	£14.4M (currently allocated level of funding, liable to change as measures are developed + £4.4M optimism bias @ 44%)
Milton Road Scheme	£15.1M (includes additional cost for utilities and optimism bias @ 15%)
TOTAL COSTS (£.2018)	**£29.5M**
TOTAL COSTS (£.2010) (includes inflation adjustment and discounting)	**£13.5M**

3.4.8. The total 2010 cost associated with the implementation of the City Access and Milton Road schemes is estimated to be **£13.5M**, and it is this figure which is used for the purpose of calculating a Benefit Cost Ratio.

3.5 SUMMARY

The benefit-cost ratio has been calculated based on the benefit and cost calculations presented in this note. Given the level of uncertainty at this stage of the project, a lower and upper value have been presented for a 10 year and 20 year assessment period, in accordance with WebTAG guidance. The benefits have been calculated in a conservative manner and the costs include an optimism bias and the whole City Access scheme cost despite the benefits not including all of the City Access benefits. The benefit-cost ratios presented below are therefore felt to be conservative in nature.

Table 27 – Benefit to Cost Calculations

BENEFITS (£M, 2010 values and prices)	10 year appraisal	20 year appraisal
Health benefits	£ 17.4M	£ 32.4M
Journey Quality	£ 3.4M	£ 6.3M
Absenteeism	£ 1.2M	£ 2.2M
Gross Cycling Product (GCP)	£ 0.8M	£ 1.5M
Cycle Journey Time Savings	£ 0.9M	£ 1.7M
Bus Journey Time Savings	£ 0.9M	£ 1.7M
Marginal External Costs	£ 6.8M	£ 13.1M
Accident Savings	£ 0.3M	£ 0.6M
Total present value of benefits (PVB)	£ 31.8M	£ 59.6M
COSTS (£M, 2010 values and prices)	**10 year appraisal**	**20 year appraisal**
Total present value of costs (PVC)	**£ 13.5M**	**£ 13.5M**

	LOWER ESTIMATE	UPPER ESTIMATE
NET PRESENT VALUE (benefits – costs)	**£ 18.4M**	**£ 46.1M**

BENEFIT - COST RATIO	**2.4**	**4.4**

3.6 APPRAISAL SUMMARY TABLE

3.6.1. An Appraisal Summary Table (AST) is included in Appendix B which shows a number of factors which are considered to be beneficial. The only adverse impact of the scheme currently logged in the table is the reduction in indirect tax revenue that is likely to be experienced as a result of less fuel being used due to fewer vehicle kilometres being driven.

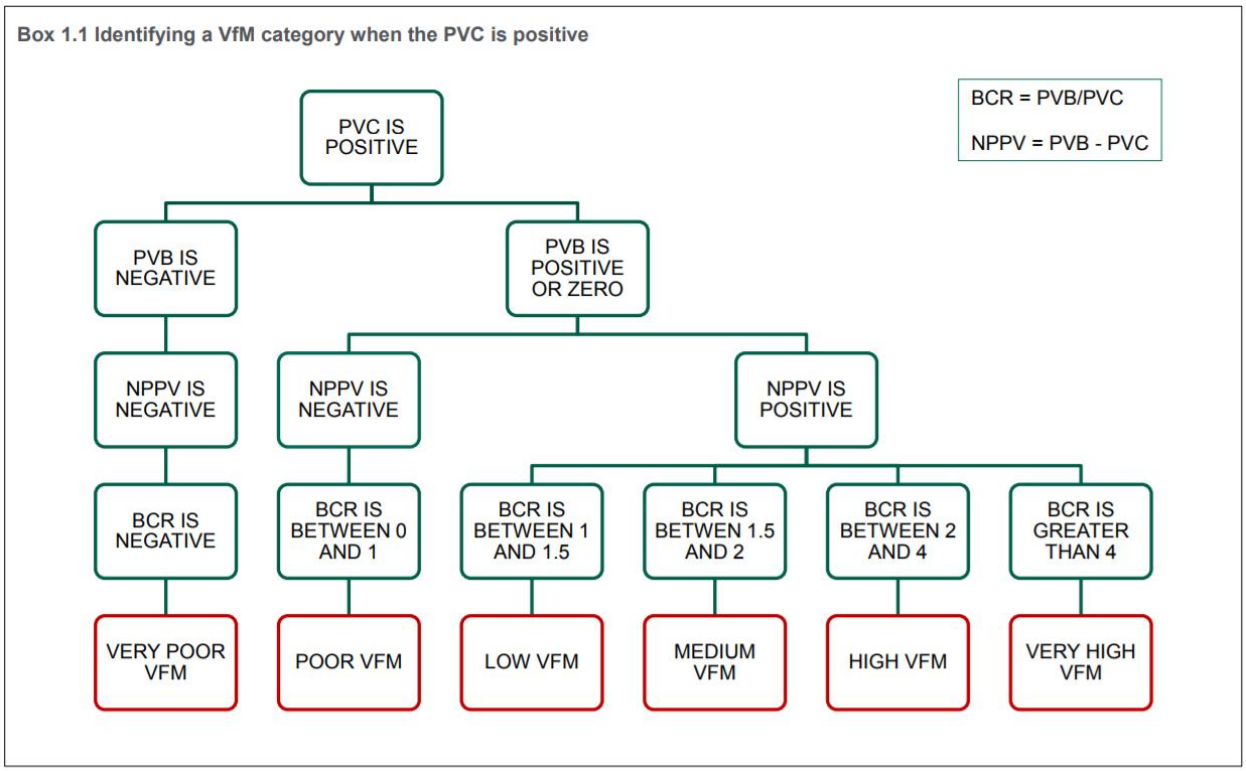
3.7 VALUE FOR MONEY STATEMENT

3.7.1. The Department for Transport requires a Value for Money (VfM) statement to be prepared which summarises the overall assessment of the scheme in economic terms. This VfM statement has been prepared based on the guidance within the DfT's Value for Money Framework document.

3.7.2. A value for money category can be assigned to a scheme based on the benefit-cost ratio (Benefits / Costs) and the net present value (Benefits - Costs). The Value for Money supplementary guidance document[14] provides the following flow chart to help practitioners to categorise their schemes.

[14] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627490/value-for-money-supplementary-guidance-on-categories.pdf

Figure 12 – Value for Money Categorisation



3.7.3. As summarised above, the Milton Road scheme has a positive Present Value of Costs (£13.5M), a positive Present Value of Benefits (£31.8M - £59.6M) and a positive Net Present Public Value (£18.4 - £46.1M) which means the Value for Money category is based on a benefit-cost ratio of **2.4 – 4.4**.

3.7.4. This process indicates that the Value for Money category of the Milton Road scheme, combined with the mode shift influence of the City Access measures, is **High to Very High.**

4 THE FINANCE CASE

4.1 INTRODUCTION

4.1.1. This chapter presents the Financial Case for the Milton Road Improvement Scheme, and provides a high level assessment of the 'Preliminary Design' preferred option. The total outturn costs of the option is presented. A full option description is presented in the Strategic Case and full cost analysis is provided in the Economic Case.

4.1.2. The investment and whole life costs of each of the options have been estimated, and internally reviewed by a number of technical specialists and are based on high level information on the Preliminary Design option.

4.1.3. The costs estimate is based on scheme opening year of 2021. It should be recognised that any delay to scheme opening is likely to result in an increase in costs from those forecast here.

4.2 CAPITAL COSTS

4.2.1. A construction cost estimate has been derived from the high level 'Preliminary Design'. As the construction costs were calculated with a 2010 price base, historic inflation based on the GDP deflator values obtained from the WebTAG databook has been applied to bring values up to current prices.

4.2.2. The capital cost excludes the following:

- Diverting and rerouting existing public footpaths
- Providing new public and private footpaths
- VAT.
- Any Ground Abnormalities.
- Design Team Fees.
- Planning and Building Control Fees and associated costs.
- No allowance has been made for tender price/building cost inflation.
- Diversion or lowering of existing utility services.
- Removal of asbestos containing materials.
- Land Purchase/Value or compensation costs.
- Out-of-hours working to avoid Traffic Disruption.
- Ongoing maintenance of landscaped areas.
- Provision of new Statutory Services
- All other fees and survey costs
- All Water Authority Charges

4.2.3. Additionally, broad assumptions/caveats considered in the cost estimate include:

- **All works:** Rate for disposal off site allows for clean inert material only - allowed at £25/m^3, unless otherwise advised
- **Main works:** Existing carriageway and footpath surfacing materials removed from site are deemed to be non-hazardous allowed at £65/m^3
- **Drainage Diversion:** Rates assume the work does not need to be carried out by a framework or water authority approved contractor. Standard industry rates have been applied. These rates may not be valid under a framework agreement with the WA
- **Service Diversions:** All diverted services are in footway construction single trench ducts - combined trenches may be possible subject to locations phasings / programme constraints require full reconstruction of surface

4.2.4. Based on the above assumptions and exclusions, the cost estimate for the Milton Road scheme has been produced by WSP's quantity surveyors, which estimates the present day scheme cost to be in the region of **£15.1M**. This includes the following breakdown.

Table 28 - Capital Cost Estimate breakdown

Work Element	Preliminary Design Cost Estimate
Civil Engineering Works	£5.6m
Utility Diversion	£2.7m
Enhancement for working within lane closures average 150m lengths @ 15%	£1.3m
Temporary works to maintain property accesses	£0.1m
Prelims: Site Set up, Supervision, Overheads and other Associated Indirect HSEQ, and other Associated Indirect Costs : 15%	£1.5m
Traffic Management: 10%	£1m
Profit : 8%	£1m
Risk / Contingency/Optimism Bias: 15%	£2m
Estimated Total Cost	**£15.1**

4.2.5. The detailed breakdown of costs can be seen in the Economic Case (Chapter 3). The largest contributory factor to the cost is the need to divert or sink existing utilities (gas, water, electricity, and telecommunication) at a number of locations along Milton Road, which is currently estimated to contribute £2.7M to the overall present day cost. Other large contributors to the cost include drainage (£1.6M) and kerbs / paving / footways (£1.6M).

4.2.6. A C3 utilities survey has been undertaken at this stage of the design process which has identified a number of services that would need diverting. The level of risk associated with this cost is likely to reduce as more detailed design information enables more accurate estimate of required diversions and therefore greater certainty of cost.

4.2.7. Costs are expected to come forward in line with construction commencing late 2019 and being completed before the end of 2021.

4.3 ALLOWANCE FOR RISK

4.3.1. Due to the early 'Preliminary Design' level of the scheme design at this stage, a percentage based approach to determining a weighted risk allowance has been taken in quantifying the risks to the potential schemes.

4.3.2. Therefore, as set out above, the high level cost estimates include an optimism bias of 15% and a site specific assumption on utilities risk.

4.4 BUDGET AND FUNDING

4.4.1. The Greater Cambridge City Deal is one of a number of 'City Deals' agreed by central Government in 2013 and is worth up to £500 million in funding to 2030. City Deals provide a funding framework for central government and local partners to agree investment programmes, centred on the promotion of local economic growth and development.

4.4.2. The Greater Ccambridge Partnership (GCP) has created an investment fund for the five year period 2015/16 to 2020/21 - which consists of £100 million from the government (£20 million per year). In addition, Greater Cambridge partners have pledged to invest over £500 million from a range of sources. The £100m of government funding is therefore available for GCP transport improvement schemes until 2021. A further fund of up to £400m will then be available if it can be shown that initial investment was successful in supporting economic growth.

4.4.3. The GCP has produced a Future Investment Strategy, which serves as an overarching view of the growth and development delivery for 2021 and beyond. The Future Investment Strategy covers all work strands of the GCP, and highlights key delivery areas for infrastructure, housing and skills.

4.4.4. Full funding for the Milton Road Improvement scheme is currently available from the CP, who are responsible for allocating the funds awarded as part of the Greater Cambridge City Deal. Specifically, the current level of funding allocation available for the Milton Road scheme is £23M which covers the current estimated scheme cost, including optimism bias.

4.4.5. The GCP will also generate local funding, for example through Section 106 agreements with developers, and explore private funding opportunities. The local developer contributions are dependent upon on-going negotiations. However at the time of this appraisal being undertaken the recovery values are unknown and therefore, for the purposes of the appraisal only, the recovery value has been set as zero.

5 THE COMMERCIAL CASE

5.1 INTRODUCTION

5.1.1. The main purpose of the Strategic Outline Business Case is to set out the need for intervention and define a preferred way forward. At SOBC stage, the Commercial Case is therefore typically presented as a high-level outline, which will be further developed as the scheme becomes more defined and the decision-making process reaches the Outline Business Case stage

5.1.2. Going forward into the development of an OBC this Commercial Case will be further expanded/refined to cover the following:

- **Output based specification** – summary of requirements in terms of timescales and key milestones
- **Procurement strategy** – details of procurement options
- **Sourcing options** – overview of sources of provision of services
- **Payment mechanisms** – mechanisms that will be negotiated with the providers
- **Pricing framework and charging mechanisms** – describes incentives and deductions
- **Risk allocation and transfer** – assesses types of risks and how they might be shared
- **Contract length** – outlines proposals for contract length and respective rationale
- **Contract management** – high level outline of management arrangements through delivery

5.2 OUTLINE OF PROCUREMENT OPTIONS

5.2.1. Further work by GCP on the preferred procurement route for the on the ground delivery of the Milton Road scheme is currently still being undertaken but could include appointment via:

- The County Council's Highways Service Contract
- The Eastern Highways Alliance or other Framework
- Potential open invitation to tender (OJEU procurement) to select a contractor for the works from the open market

5.2.2. The advantages and disadvantages of these procurement routes, will be considered in more detail as the Milton Road scheme continues to move through the Business Case process.

5.2.3. In deciding on the final form of contract, a number of arrangements for the delivery of the scheme will be considered. Specific factors pertaining to the scheme, including construction risks, the stage that the project is at in its development and importantly, the level of risk in the project and the appetite to accept or transfer it to a contractor will be considered. The importance of understanding the risks in delivery and ensuring that the contractual arrangement places risks with the party best placed to deal with them will be a key consideration.

5.2.4. Forms of contract that could be considered are:

- a traditional arrangement, where one contract secures a detailed design and specification for the construction, which is then tendered as a separate contract;
- a single stage Design and Build contract, where the design and construction are tendered as one package, with the successful contractor providing the detailed design., and;
- an ECI Two Stage Design and Build contract, where the design and build are again tendered as one package as in a single stage contract. However, this differs from a single stage Design and Build contract as there is potential to review the contractor's performance and construction target cost and stop the process at the end of the design phase if necessary.

5.2.5. Each of these arrangements has advantages and disadvantages, as outlined below.

Traditional separate contracts for design and construction

5.2.6. The traditional arrangement allows close control of the design process by the client. However, as the construction contract is awarded on the basis of the completed design, there is limited opportunity for the successful contractor to influence it into the design to reduce risks and cost. Although contractor input can be brought in during the design stage, it may not be relevant as the same contractor may not undertake construction.

5.2.7. This form of contract can also limit the contractor's ability to use innovative construction methods which could result in in savings and increased performance of the finished scheme. Separate contracts between the client and the parties providing the design and construction results in risks from any issues arising from the design

resting, at least initially, with the client. This arrangement is more suitable for schemes that are well developed and hold lower or easily identified risks.

Single Stage Design and Build

5.2.8. A single stage Design and Build contract places the design and construction in one package. The contract is awarded on the basis of a cost for the design and construction of the works, based on an outline or design. This arrangement does offer an incentive for the contractor to ensure that the design is buildable and can facilitate a quicker start on construction as work can commence before the design is complete, so long as it is sufficiently advanced. However, as the contractor must estimate the cost at tender stage based on preliminary design information, there is a risk that the actual cost for construction is significantly different with the potential for contractual claims and disputes.

ECI Two Stage Design and Build

5.2.9. This is a collaborative form of contract, which brings the contractor into the project team early, with the team working together through the design and construction phases. This provides benefits of ensuring that the contractor can use their experience in the design phase to reduce overall project risk and ensure buildability. There are some significant differences compared with the single stage approach however, that provide a greater level of cost control and certainty.

5.2.10. Although the contract is awarded for design and construction, the process is divided into two parts, the first phase covering the detailed design and consents process, with construction as a second phase. There is a presumption that the scheme will be delivered as a single package, but there is no guarantee that the contractor will move directly from detailed design to construction. This would be conditional on satisfactory performance and agreement of a construction target price. The contract will give ownership of the design to the County Council, so that in the rare event that a target price cannot be agreed, it may be used to re-tender the construction.

5.2.11. The ECI two stage approach also mitigates against cost and programme overruns as there is much greater certainty over the design and understanding of the risks at the point the construction target price is agreed (when the detailed design is sufficiently advanced). Developing this understanding can result in a longer contract period, but one that is likely to be more realistic as to cost and risk. A situation where construction commences before a design is sufficiently advanced would also be avoided.

5.3 RISK ALLOCATION AND TRANSFER

5.3.1. A risk register has been produced. Given the current 'Preliminary Design' stage of the scheme, these risks are high level.

5.3.2. Subject to scheme development the key risks are thought to be:

- Difficulties with ground conditions and levels;
- Diversion or protection of statutory undertakers' plant and services.
- Ecology
- Heritage
- Tree removal

5.3.3. With the exception of diversion of statutory undertakers' services, and some exceptional weather and flooding events, the above risks would all be best placed with a contractor who will have the necessary experience to manage them and coordinate construction activities with third parties appropriately.

5.4 TIMESCALES

5.4.1. An indicative timeline for delivery of the Milton Road scheme has been provided in the management case section to this report. However, a more detailed program of the emerging preferred design will need to be developed as it is progressed within detailed design. This will include consideration of the following matters:

- Risk identification, allocation/transfer between the authority and contractor
- Timescales for procurement
- Contractor management strategy
- Payment mechanisms and arrangements should there be cost overruns

5.4.2. These issues will all be refined as the schemes move through the Business Case process, with full details being required at the Full Business Case stage.

6 THE MANAGEMENT CASE

6.1 INTRODUCTION

6.1.1. The Milton Road Improvements Scheme has undertaken an iterative process of design and consultation to develop it to the current stage of 'Preliminary Design' and has yet to reach detailed design.

6.1.2. At this early stage in the Business Case cycle, the management case is therefore high-level only. It is, however, considered important that programme-level oversight across the development and delivery of the scheme is retained and the recommended governance and management structures proposed in this section provide a commencement point for doing this.

6.2 EVIDENCE OF SIMILAR PROJECTS

6.2.1. Cambridgeshire County Council has experience of delivering public transport & walk/cycle way corridor infrastructure improvements, of a similar scale, such the cycleway improvements along Hills Road and Huntingdon Road. There are important lessons learnt in the delivery of these projects, which will be carried forward in the delivery of the Milton Road Scheme.

6.3 PROGRAMME / PROJECT DEPENDENCIES

6.3.1. The Milton Road proposals form part of the Greater Cambridge Partnership's wider strategy working with partners to create better and greener transport networks. A number of schemes are closely linked to the Milton Road Improvement Study and therefore closely considered. These include the City Access Study, Histon Road Improvement Study and A10 improvement scheme. Cambridge City Council's aspirations for improvements to Mitcham's Corner have also been considered. Consultation has been held with residents groups and City Officers in order to consider the aspirations for improvements to Mitcham's Corner.

MITCHAM'S CORNER GYRATORY

6.3.2. Mitcham's Corner is identified by the City Council through the draft Local Plan as an 'Opportunity Area' with a policy objective of improving the public realm of this district centre. The City Council will be preparing and consulting on a master plan to help deliver significant public realm improvements, in cooperation with the County Council and local stakeholders. Close collaboration between the Councils (and these projects) is already established which is important to the success of both the City Deal and the development of a master plan for Mitcham's Corner. The southern extent of the Milton Road scheme has been designed to allow tie-in with the latest Mitcham's Corner plans.

CITY ACCESS STUDY

6.3.3. The City Access project aims to improve travel within Cambridge by tackling congestion and significantly improving public transport, cycling and walking trips, as well as air quality. It looks to achieve a reduction in peak-time traffic levels in Cambridge by 10-15% below 2011 levels by 2031 and, in doing so, would improve the flow of bus services in the centre.

6.3.4. The improvements to public transport, cycling and walking along Milton Road will help directly contribute to the City Access Study achieving its mode shift aims.

HISTON ROAD

6.3.5. Histon Road is a popular residential area and a key gateway into Cambridge, especially for commuters travelling from the towns and villages to the north, and off the A14

6.3.6. The Histon Road scheme will help to accommodate these extra trips whilst upgrading the road to a safe, pleasant and connected community for local residents and businesses. To achieve this, the scheme aims to improve public transport journey times, as well as cycling and walking facilities, to encourage people to use sustainable modes of transport as an alternative to the car.

This project is being developed with reference to the Milton Road scheme, as both roads are key routes from the A14 into the city.

ELY TO CAMBRIDGE A10 TRANSPORT STUDY

6.3.7. The Ely to Cambridge Transport Study is a wide-ranging multi modal study which has made recommendations on the transport schemes needed to accommodate the major development planned at a new town north of Waterbeach, Cambridge Northern Fringe East (CNFE) and the Cambridge Science Park (CSP).

6.3.8. The study has three strands:

- Strand 1 looks at the overall transport requirements on the corridor
- Strand 2 looks at the specific requirements for growth at Waterbeach
- Strand 3 looks at the specific requirements for growth at CNFE/CSP

6.3.9. Milton Road leads on from the A10 to Cambridge City Centre, so the outcome of this study and the measures being implemented to the A10 will have direct impact on vehicle traffic reaching Milton Road from the Strategic Road Network.

6.4 GOVERNANCE, ORGANISATIONAL STRUCTURE & ROLES

6.4.1. To date, the development of the proposed scheme for Milton Road has been overseen by the following structure.

- The overall scope of the project is set by the City Deal Executive Board;
- The Project Manager has full day to day responsibility for delivery of technical work streams and is employed by Cambridgeshire County Council (CCC).

6.4.2. The overall project management structure is set out hierarchically in the table below:

Table 29 - Overall Project Management Structure

Body	Function
GCP Executive Board	Overall Strategic Direction of the Greater Cambridge Partnership (GCP)
GCP Assembly	Strategic and local advisory body for Greater Cambridge Partnership (GCP)
Infrastructure Steering Group	GCP officer level programme board
Programme Manager	Technical and procedural oversight of projects
Project Manager	Day to day management of each project.

6.4.3. At the City Deal level the GCP Executive Board consists of the Leader or equivalent of each of the partner organisations, as the key decision-making group. There is also a 17-person Assembly with appropriate representation from the Local Authorities and other stakeholders, which plays an advisory and scrutiny role.

6.4.4. A key role of the Executive Board is to agree and oversee the delivery of a programme of major schemes that will help to achieve the GCP aims and support the sustainable growth and continued prosperity of the Greater Cambridge city-region, in line with national and local policy objectives and the LEP's overarching economic strategy for the area. In particular the Executive Board:

- Takes responsibility for ensuring Value for Money is achieved;
- Identifies prioritised list of investments within the available budget;
- Makes decisions on individual scheme approval, investment decision making and release of funding, including scrutiny of individual scheme Business Cases;
- Monitors the progress of scheme delivery and spend; and
- Actively manages the budget and programme to respond to changed circumstances (scheme slippage, scheme alteration, cost increases, etc.).

6.4.5. CCC, Cambridge City Council (CaCC) and South Cambridgeshire District Council (SCDC) have three representatives on the Assembly, with political balance in each Authority's membership reflecting the balance of the political parties on the relevant Council. The other three places on the Assembly are filled by members representing various stakeholder groups.

6.4.6. The GCP is focused on both programme and project level governance with the principle that issues of key important at both the programme and project level are addressed at the highest levels of governance but that for other issues of a more technical nature, officer level structures at the project and programme level are empowered to guide development.

6.4.7. At the Programme Level an officer technical group made up of key officers and stakeholders develops the overall scheme prioritisation and seeks to manage programme level risks and capture shared benefits. The Project Manager in consultation with the Programme Manager raise programme level issues with the GCP Executive Board and Joint Assembly as required.

6.4.8. At the project level a Project Team, works up scheme details and reports to a Project Manager which guides the overall development of the project at the technical level, in combination with key officers. At the project gateways reports are made to the City Deal Executive Board on progress and seek decisions on key matters which are project related.

6.5 LOCAL LIAISON FORUM (LLF)

6.5.1. The LLF is made up of local elected Members and stakeholders and acts as a formalised process for capturing local views and delivering locally acceptable designs. While not able to work outside of the scope of the key decision made by the GCP Executive Board, the LLF can form technical working parties to consider project specific issues in more detail and agree resolutions which form part of the Project Boards considerations.

6.5.2. The following forms of engagement have been used to work with the LLF to-date:

Table 30 - LLF Engagement Methods

Type of Engagement	Key Benefits / Features
LLF workshop	• Enables wide capture of full LLF input into key design areas • Short introductory presentation on key deliverables to be achieved in the session • Typically run as interactive small groups, with facilitators who then report back at the end of the session to wider group • Typical attendee number 25, majority LLF
Task and finish groups	• Small focused group looking at refining details rather than broad concepts • Group made up of around 10 participants focused on experts in field of topic areas. 1 or 2 key representatives from LLF.
LLF public meetings	• Enables presentation and reporting back on progress, explanation of design elements, enable wider questions to be asked and wider opinions to be gained • Run as a presentation with questions rather than an interactive design session • Open to public so attendees can be expected to be 30+

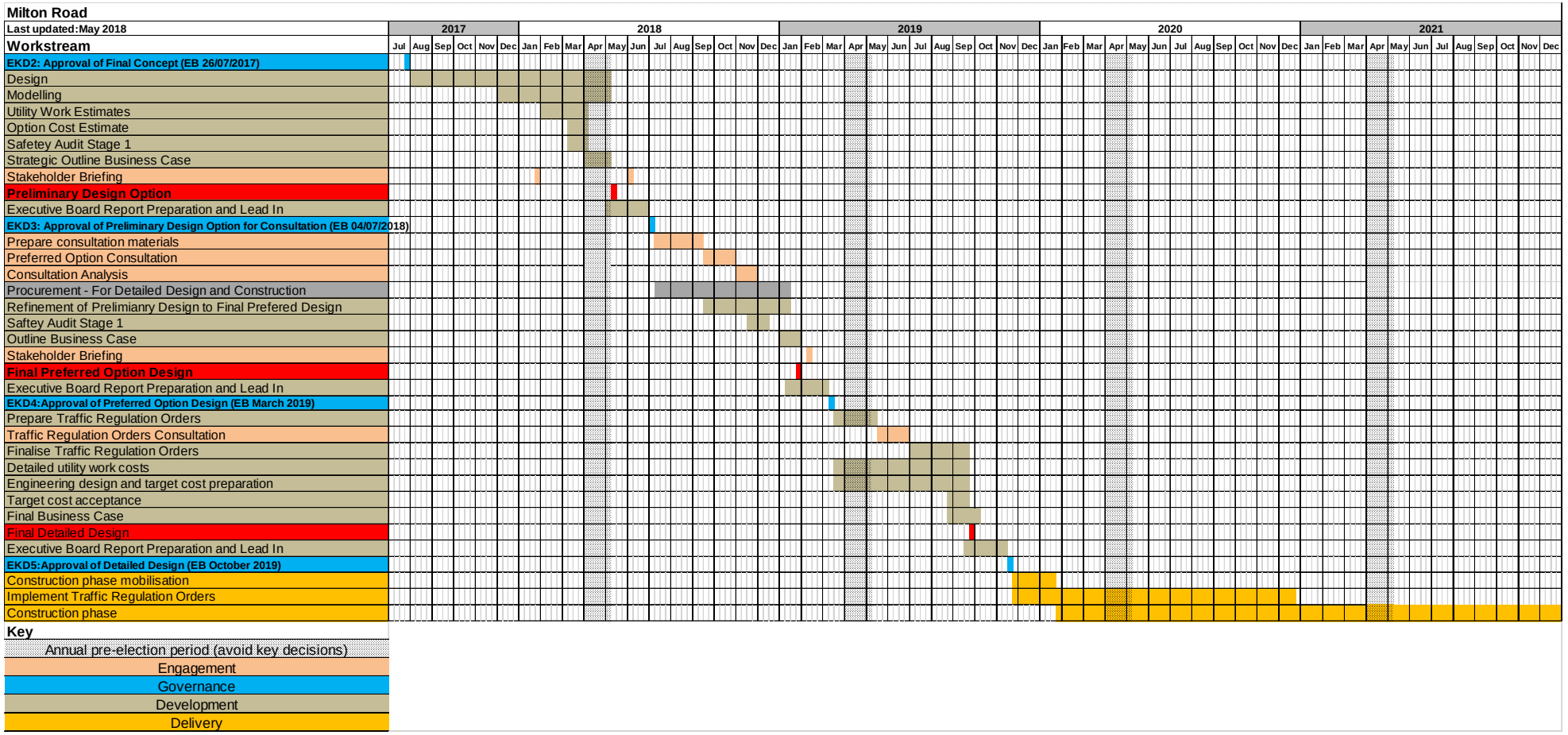
6.6 PROGRAMME / PROJECT PLAN

6.6.1. This section sets out the project plan with key milestones and progress, including the critical path. It also includes project dependencies as well as decision and reporting milestones.

6.6.2. The project has been governed using the PRINCE 2 project method. It will pass through a number of gateways to ensure that progress is approved, which are as a minimum, the GCP key decision points. The Executive Board may at its discretion create additional gateways if it considers this necessary for the effective governance and delivery of the project.

6.6.3. The overall scheme programme including indicative timescales is set out below:

Figure 13 - Milton Road Project Plan



6.7 ASSURANCE AND APPROVALS PLAN

6.7.1. There are a number of key milestones in the Project Plan where internal and/or external approvals will be required in order for the project to progress. As noted above, the project will pass through a number of gateways to ensure that progress is approved.

6.7.2. The Greater Cambridge Partnership have developed an assurance framework for the Greater Cambridge City Deal that outlines the proposed membership, responsibilities, processes and principles that will be in place for agreeing and overseeing the delivery of a robust transport infrastructure programme as part of the overall City Deal goals of integrating transport and strategic spatial planning. Local partners are committed to ensuring that robust systems and processes will be in place in line with DfT guidance to develop and agree a deliverable programme that offers value for money.

6.7.3. The framework ensures compliance with DfT's minimum requirements for Assurance Frameworks

6.8 COMMUNICATION AND STAKEHOLDER MANAGEMENT

6.8.1. This section sets out the strategy for developing communications and stakeholder management on the project. Effective communication is critical to the success of the project. All communication activities will be signed off by the Project Manager. The Communications Plan is guided by the principle of the City Deal wide communication strategy. The strategy outlines how the project will ensure that all internal and external stakeholders are informed of relevant project information. The purpose of the strategy is to ensure that accurate and timely messages about the project are disseminated to a range of identified stakeholder groups. Project communication is governed through the Communications Plan as follows:

Table 31 - Communication Methods

Audience	Tyoe of Communication	Frequency	Responsibility
General Public	Formal Consultation Regular website updates on project progress Public LLF meetings	At least 2 formal consultations As Required As Required	CCC Communications Team
Technical officers CCC	Project Team Meetings Ad Hoc technical meetings	Regular Meetings As Required	Project Manager
Other Key Stakeholders / LLF	Ad Hoc Meetings as agreed with LLF	As Required	Project Manager
Members	Reports Briefing Sessions	As per Programme milestones	Project Manager
General Correspondence	Letters, Emails, Social Media	As Required	Project Manager / CCC Communications Team

6.8.2. Key stakeholders will be identified and involved in the delivery of the project in a number of ways. Public and stakeholder engagement is an important means of solving problems and making decisions that directly impact upon living, working, using services and doing business in the local area. Such engagement may include informing, consulting with, involving, collaborating with and empowering stakeholders to understand the issues to enable them to make informed choices.

6.8.3. The key objectives of the scheme's stakeholder management are to:

- Keep stakeholders aware of the schemes progression and give an opportunity for feedback to help gain scheme approval;
- Give an opportunity for stakeholders to provide views and recommendations for improvements so that the scheme meets stakeholder requirements as far as is practical;
- Meet statutory requirements;
- Increase public and stakeholder awareness of the scheme;
- Provide consistent, clear and regular information to those affected by the scheme, including the nature of any scheme-related impacts and when and how it will affect people of groups both during delivery and once operational; and
- Address perceptions of the scheme where these are inconsistent with the scheme objectives and forecast outcomes

6.9 PROGRAMME / PROJECT REPORTING

6.9.1. The fundamental process of regular project reporting is through the Project Managers Report. The Project Managers Report is presented at relevant meetings of the GCP Executive Board and GCP Assembly, as identified with the project programme. The Project Managers Report summarises progress and change on the project.

6.9.2. The following is the typical format of the Project Managers Report:

- Activity Report – progress of work streams;
- Key activities in the forthcoming period;
- Budget update;
- Review of strategic risks/ issues;
- Identification of Key decisions required from the GCP Executive Board.

6.10 RISK MANAGEMENT STRATEGY

6.10.1. This section sets out the arrangements for risk management and the effectiveness of the strategy so far. Risks are events that have not happened but may happen whereas issues are known to have happened. Broadly speaking there are two types of risks in the context of this project , which are as follows:

- Strategic Risks – these are presented in the Project Managers report and are those risks which impact the overall delivery of the project scope; and
- Technical Risks – these are associated with specific work streams and are managed by the Project Manager.

6.10.2. The risk register sets out the following:

- Details of the risk or issue;
- If a risk if it is likely to happen or not;
- The impact of the risk or issue;
- The mitigation strategy, including risk owners and target completion date; and
- An overall assessment of the current status of the risk or issue which will be one of the following categories:
  - Red – significant and live risk/issue with high potential to occur and to impact project delivery either at the strategic or technical level;
  - Amber – risk and issue that has lower potential to occur and lower impact;
  - Green – risk is unlikely to occur and or has no major impact.

6.10.3. Risk management processes will be employed and recorded throughout the project lifecycle. The risk register will be monitored and, if necessary, updated at regular workshops and meetings. The Project Manager has responsibility for overseeing the Risk Management process. DfT Major Scheme guidance will be followed in order to identify, assess and mitigate risks. A Quantified Risk Assessment (QRA) identifies the appropriate level of contingency to add to base scheme costs. Roles, responsibilities and reporting lines for risk management should be clearly defined within the project team.

6.10.4. A key strategic project level risk in the next stage of the project will be the appointment of a contractor prior to full completion of statutory processes and formal approval. Mitigating this risk will be a key issue within the contractual arrangements.

6.10.5. Potential key risks include (but are not limited to):

- Lack of well-considered procurement strategy;
- Failure to put in place a good quality contractor at the right time;
- Need to manage the interface between 'design' and build;
- Failure to identify best practice in the field;
- Inappropriate contractual arrangements between client and provider;
- Lack of robust delivery performance framework;
- Failure to identify economies of scale at the project and programme level;
- Poor client provider relationships;
- Lack of quality control in implementation stage;
- Lack of clear lines of responsibility;
- Clearly these risks could present potential cause for project failure including;
- Loss of project credibility:
- Loss of political/ stakeholder support;
- Financial, time and quality scope impacts.

6.10.6. The current project risk register is set out below:

Table 32 - Risk Register

Details	Risk or Issue	Likelihood	Impact	Mitigation & Commentry	RAG
Degree of opposition may impact deliverability of some design details within the scheme and delay project programme	Issue	Medium	High	Ensure that due process is followed and that effective engagement with LLF is maintained through remainder of programme.	R
Interaction of different GCP schemes may impact the Milton Road Scheme e.g. City Centre Access Study	Risk	Medium	High	Programme level consideration of developing options and schemes to reduce impact	R
Obtain key decision agreements as required	Risk	Medium	High	Focus on scheme development method to provide clear and supportable recommendations	R
Availability of modelling resources across GCP	Risk	High	High	PM to participate in GCP programme level modelling resources conflict resolution group	A
Conflict between different factors of GCP strategic aspirations and limited timescales & funding constraints to achieve all schemes	Risk	Medium	High	This will need to be made clear throughout the key decision process. Milton Road is on track for delivery and a relatively lower cost GCP project so f felt to be at lower risk of funding constraints	A
Securing construction resources to build scheme	Risk	Medium	High	Early procurement planning to identify most effective route of procuring final scheme construction.	A
Lack of political understanding of scheme development method	Issue	High	Medium	Continued use of LLF meetings, key decision reports and other engagement activities to promote awareness of process.	A

Interaction with other-GCP schemes such as the A10 which may impact modelling or delivery	Risk	Medium	Medium	Ensure ongoing liaison with other GCP scheme Project Managers and their Consultants.	A
Lack of control on future frequency and service level of buses along Milton Road	Risk	Medium	Medium	Maintain close engagement of bus operators through development of the scheme to ensure buy-in to Public Transport priority measures	A
Lack of control on scale and delivery timing of significant development using the corridor, presenting strategic challenges to ensure scheme is future proof (e.g. delivery of 10,000 homes at Waterbeach)	Risk	Medium	High	Work closely with planning authorities to ensure that appropriate engagement takes place with all relevant development parties	A
Increase in scheme cost due to the need to relocate or sink key utilities along the corridor	Issue	Medium	High	Look to design out the need to relocate significant utilities within the scheme. Maintain ongoing engagement with utility provides as scheme design progresses to gain greater certainty of cost implications as the scheme enters detailed design.	A

6.11 SUMMARY OF MANAGEMENT CASE

6.11.1. An appropriate governance structure is essential to the delivery the scheme. GCP has therefore established an Executive Project Board and Assembly aligned with best practice guidance on scheme management. The Board's primary function is decision-making and review. A Project Manager, reporting to the Programme Manager and ultimately the Board, is in place to deal with the day to day planning and delivery of the project.

6.11.2. A project programme has been developed for this Business Case setting out all the key project tasks and their duration and interdependencies, key milestones and gateways. It will act as a live document, with progress being monitored on a weekly basis by the Project Manager.

6.11.3. Key stakeholders have been identified and a stakeholder management plan has been adopted, making best use of LLF consultation, consistent with other GCP projects, over the development of the scheme.

Appendix A

STAKEHOLDER LIST

STAKEHOLDERS
Local Councillors
Cambridge City Council (East Chesterton)
Cambridge City Council (West Chesterton)
Cambridge City Council (King's Hedges)
South Cambridgeshire District Council (Milton)
Cambridgeshire County Council (Chesterton)
Cambridgeshire County Council (Kings Hedges)
Cambridgeshire County Council (Castle)
Cambridgeshire County Council (Arbury)
Milton Parish Council
Orchard Park Community Council
Emergency Services
Cambridgeshire Police
Cambridgeshire Fire
Cambridgeshire Ambulance
Transportation
Stagecoach
Tower Transit
Cambridgeshire Campaign for Better Transport
Campaign for Better Transport
Cambridge City Licensed Taxis (CCLT)
Cambridge Licensed Drivers' Association
Cambridge Hackney Carriage Association
Camcycle
CTC Cambridge
Sustrans
Smarter Cambridge Transport
Urban Design
Living Streets
Cambridge Past & Present
Accessibility Groups
Cambridgeshire Deaf Association
Cambridge Forum of Disabled People
Disability Cambridgeshire
Camsight
COPE
Red2Green
Education
Orchard Park Community Primary School
Impington Village College
Mayfield Primary School
Cambridge Regional College
The Grove Primary School
North Cambridge Academy
Shirley Community Primary School
St. Luke’s C of E Primary School
Milton Road Primary School

Chesterton Community College
Arbury Primary School
University of Cambridge Estate Management
Residents Associations
FECRA
Mitchams Corner Residents' and Traders Association
Hurst Park Estate Residents Association
Milton Road Residents Association
Old Chesterton Residents Association
Mulberry Road Residents Association
Milton Road Local Liaison Forum
Histon Road Local Liaison Forum
Business
Crown Estates Commissioners
Bidwells
Savills
Local Enterprise Partnership
Chamber of Commerce
Federation of Small Businesses
Cambridge Ahead
Local Councils
Cambridge City Council
South Cambridgeshire District Council
Cambridgeshire County Council
Utility Companies
UKPowerNetwork
BT Openreach
Cambridge Water
Virgin Media
Cadent Gas
Fibernet
Vodafone
Verizon

Appendix B

APPRAISAL SUMMARY TABLE

Appraisal Summary Table

Date produced:	17 May 2018

Contact:	
Name	SL
Organisation	WSP
Role	Promoter

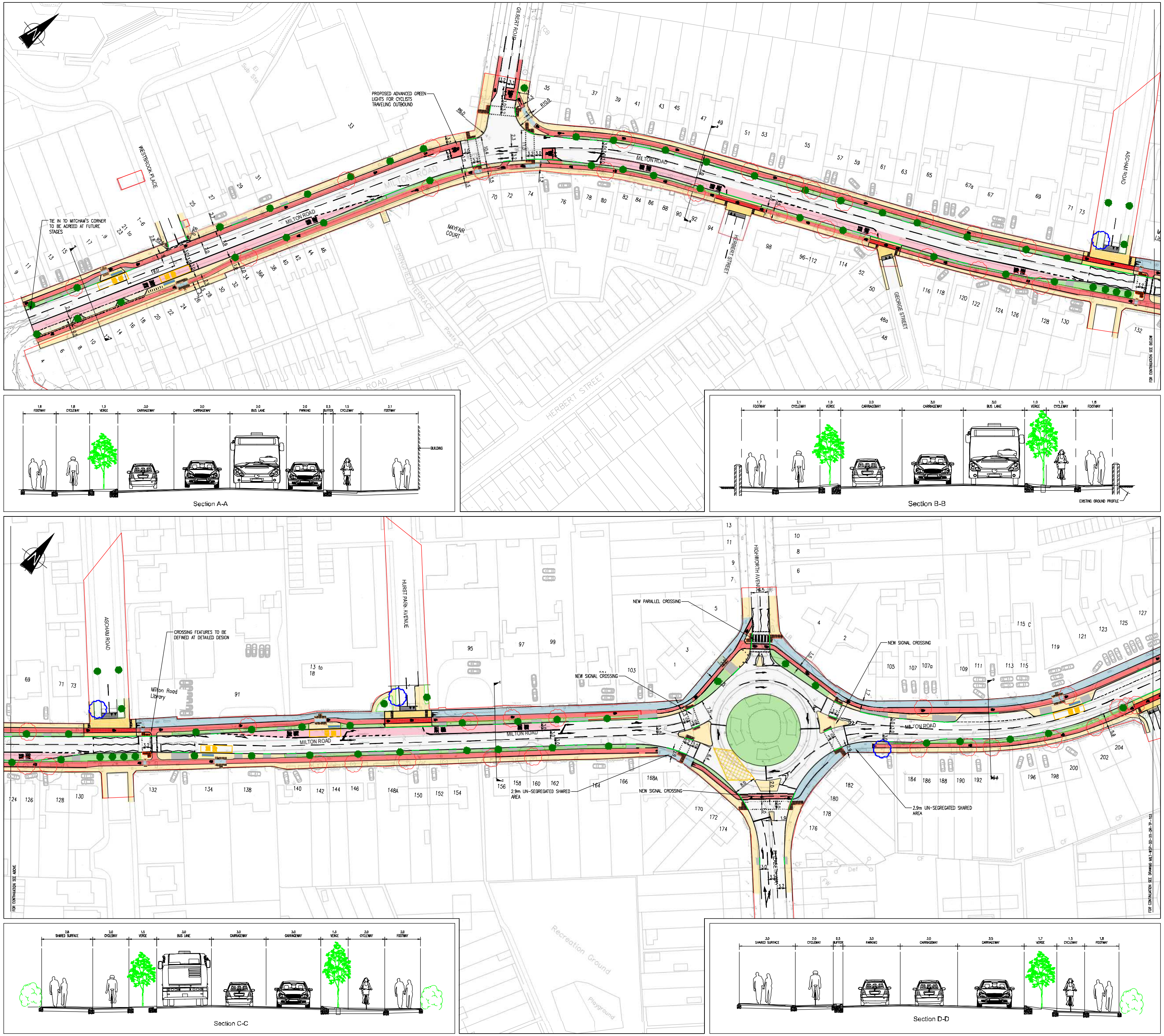
Name of scheme:	Milton Road (Greater Cambridge Partnership Scheme)
Description of scheme:	Addition of bus lanes, bus priority measures, cycle infrastructure and public realm improvements

Impacts		Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	Businesses will benefit from reduced absenteeism as a result of employees cycling more for commuting (£2.1M over 20yr active mode appraisal period). All business travellers using the road network will benefit from reduced traffic (compared to the do-nothing) as a result of transfer from car trips to bus, walking and cycling. These benefits have been quantified, but not split between business and other users. The total monetary benefit for journey time savings is reported under "Commuting and Other" users	**Value of journey time changes(£)** N/A **Net journey time changes (£)** 0 to 2min: N/A; 2 to 5min: N/A; > 5min: N/A	Large beneficial	£2.1M	Not assessed
	Reliability impact on Business users	Travellers switching to bus and cycle will benefit from more reliable journey times due to the provision of bus lanes, bus priority measures and segregated off-road cycleways allowing cyclists to bypass on-road signals.	In 2031 AM peak, the outbound bus journey time is improved by 33% and the inbound bus journey time is improved by 15%. The outbound bus reliability is improved by 73% and the inbound bus reliability is improved by 56%. In 2031 PM peak, the outbound bus journey time is improved by 24% and the inbound bus journey time is improved by 6%. The outbound bus reliability is improved by 62% and the inbound bus reliability is improved by 5%.	Large beneficial	N/A	
	Regeneration	Milton Road provides a key link between Cambridge City Centre, settlements to the north of Cambridge (including Waterbeach new town) and a number of areas of employment (Science Park, Business Park, Cambridge Regional College). It is therefore key to ensuring that planned levels of growth in jobs is supported.		Slight beneficial	N/A	
	Wider Impacts	Agglomeration benefits (the aglomeration of firms and labour markets in a cluster) will be small, but improved transport facilities will help to bring forward housing and jobs, thus increasing the labour market for businesses.		Slight beneficial	N/A	
Environmental	Noise	Reducing the level of traffic (compared to the do-nothing scenario) will have associated noise reduction benefits. There may be an increase in the number of bus services as a result of improved bus infrastructure but this is not anticipated to be significantly above the number of services currently operating which is already quite high. The mode shift from car to cycle is likely to result in a net benefit in terms of noise.	6.2 million fewer car kms per year due to the shift from car to cycling.	Moderate beneficial	£84K	Not assessed
	Air Quality	Reduced vehicle kilometres will result in fewer harmful emissions	6.2 million fewer car kms per year due to the shift from car to cycling.	Slight beneficial	£9K	Not assessed
	Greenhouse gases	Reduced vehicle kilometres will result in lower emissions of greenhouse gases	Change in non-traded carbon over 60y (CO2e) N/A Change in traded carbon over 60y (CO2e) N/A	Large beneficial	£430K	
	Landscape	All improvements will be within the highway and do not require the purchase of private land. As part of the scheme, the Project Team has made a commitment to replace every tree which needs removing, and aims to increase the overall number of trees on Histon Road.		Neutral	N/A	
	Townscape	The proposed scheme includes improvements to streetscape and pedestrianised areas.		Slight beneficial	N/A	
	Historic Environment	No formal assessment - impact assumed to be neutral		Neutral	N/A	
	Biodiversity	No formal assessment - impact assumed to be neutral		Neutral	N/A	
	Water Environment	No formal assessment - impact assumed to be neutral		Neutral	N/A	
Social	Commuting and Other users	Travel time savings due to the scheme have been estimated for existing public transport users and all cyclists.	**Value of journey time changes(£)** £2M **Net journey time changes (£)** 0 to 2min: N/A; 2 to 5min: N/A; > 5min: N/A	Large beneficial	£2M	Not assessed
	Reliability impact on Commuting and Other users	Travellers switching to bus and cycle will benefit from more reliable journey times due to the provision of bus lanes, bus priority measures and segregated off-road cycleways allowing cyclists to bypass on-road signals.	In 2031 AM peak, the outbound bus journey time is improved by 33% and the inbound bus journey time is improved by 15%. The outbound bus reliability is improved by 73% and the inbound bus reliability is improved by 56%. In 2031 PM peak, the outbound bus journey time is improved by 24% and the inbound bus journey time is improved by 6%. The outbound bus reliability is improved by 62% and the inbound bus reliability is improved by 5%.	Large beneficial	N/A	
	Physical activity	Will lead to higher levels of physical activity through increased participation in cycling. This gives significant benefits in terms of reduced mortality and absenteeism from work		Large beneficial	£34.6M	
	Journey quality	There will be significant improvements in journey quality for cycles through the provision of improved cycle lane facilties		Large beneficial	£6.3M	
	Accidents	The scheme will lead to a move away from on-road to off-road cycling and the clarification of priorities on a number of minor arms where cycle accidents are common. The scheme is therefore anticipated to lead to fewer cyclist casualties. This more than offsets any increase in casualties from higher levels of cycling. There will also be a reduction in road accidents generally following a reduction in car traffic compared to the do nothing scenario.	7 fewer cyclist accidents per year	Large beneficial	£620K	Not assessed
	Security	Impact assumed to be neutral		Neutral	N/A	Not assessed
	Access to services	Scheme will improve accessibility for those without access to a car due to improved walk, cycle		Slight beneficial	N/A	Not assessed
	Affordability	Neutral - no significant change in the cost of travel by different modes		Neutral		Not assessed
	Severance	The provision of toucan crossings at many of the signalised junctions and Copehagen style crossings across minor arms on Milton Road may help to improve crossing facilities and therefore reduce severance slightly.		Slight beneficial	N/A	Not assessed
	Option and non-use values	No formal assessment - impact assumed to be neutral		Neutral	N/A	
Public Account	Cost to Broad Transport Budget	The Milton Road scheme will cost £15.1M in current day prices or £6.9M (2010 market prices discounted to 2010) to implement (including 15% optimism bias)		Moderate adverse	£6.9M	
	Indirect Tax Revenues	A reduction in car travel will lead to a loss of indirect tax revenues from duty and VAT from fuel	6.2 million fewer car kms per year due to the shift from car to cycling.	Large adverse	- £1.45M	

Appendix C

SCHEME DRAWINGS

DO NOT SCALE



LEGEND:

- CARRIAGEWAY FINISH
- GRASS VERGE
- CYCLEPATH
- FOOTWAY
- BLOCK PAVING RED
- PAVING SLABS
- HARD LANDSCAPING
- SHARED SURFACE
- RAISED CYCLE LANE
- RAISED ACCESS JUNCTION
- PRIVATE VEHICULAR ACCESS
- TACTILE PAVING – RED
- TACTILE PAVING – BUFF
- BUS STOP CAGE
- BUS SHELTER
- TREE TO BE KEPT
- TREE TO BE REMOVED
- PROPOSED TREE
- PROPOSED RAMP
- DROPPED KERB
- HIGHWAY BOUNDARY

REV	DATE	BY	DESCRIPTION	CHK	APP
P03	23/05/2018	AKN	SUBMIT FOR CONSULTATION	AKM	NP
P02	16/05/2018	MO'D	CAD AMENDMENTS	AKM	NP
P01	08/05/2018	GRJ	FIRST ISSUE	AKM	NP

DRAWING STATUS: S2 - FOR INFORMATION

wsp

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wsp.com

CLIENT: GREATER CAMBRIDGE PARTNERSHIP

ARCHITECT:

PROJECT: MILTON ROAD IMPROVEMENT SCHEME

TITLE: GENERAL ARRANGEMENT SHEET 1

SCALE @ A0: 1:500	CHECKED: AKM	APPROVED: NP
PROJECT No: 70012012	DESIGNED: GRJ / DRAWN: GRJ	DATE: May 18

DRAWING No: MILT-WSP-00-XX-DR-TP-102 REV: P03

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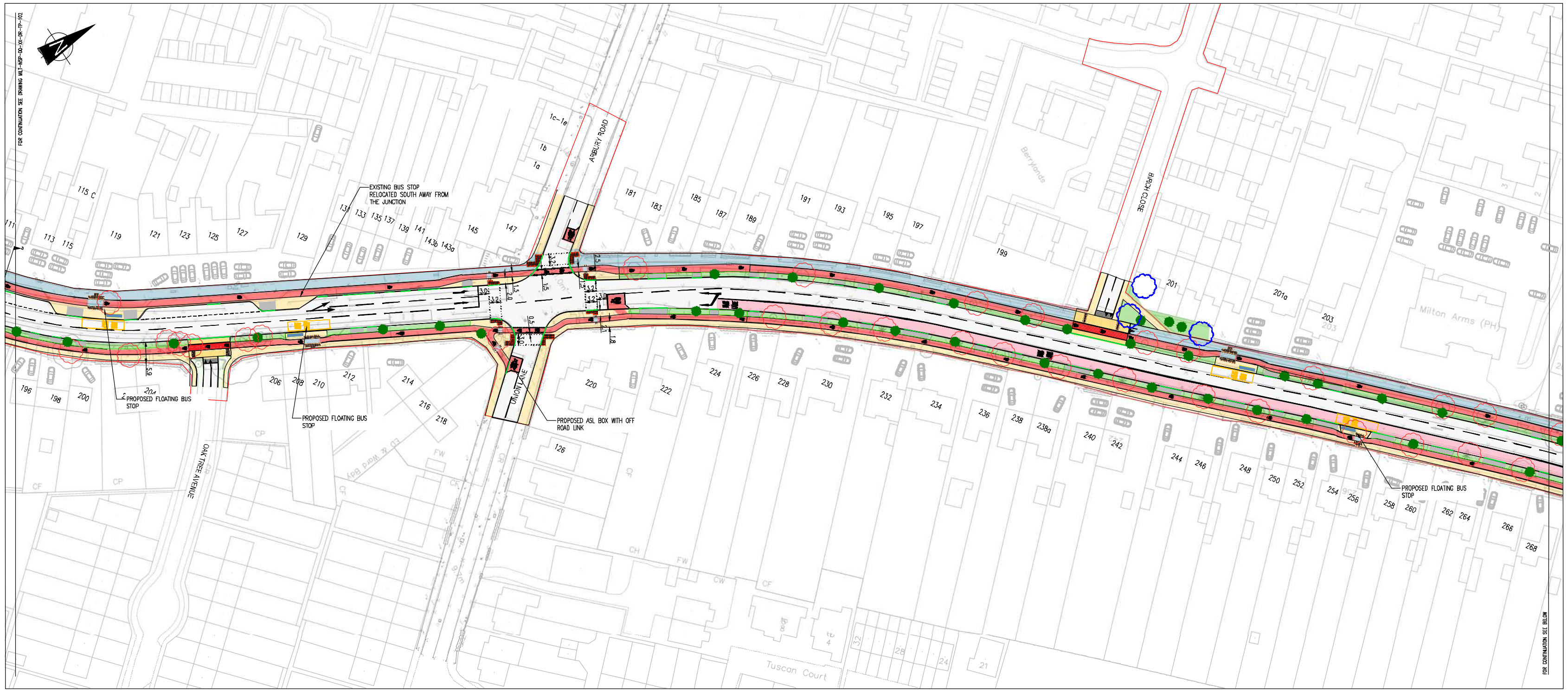

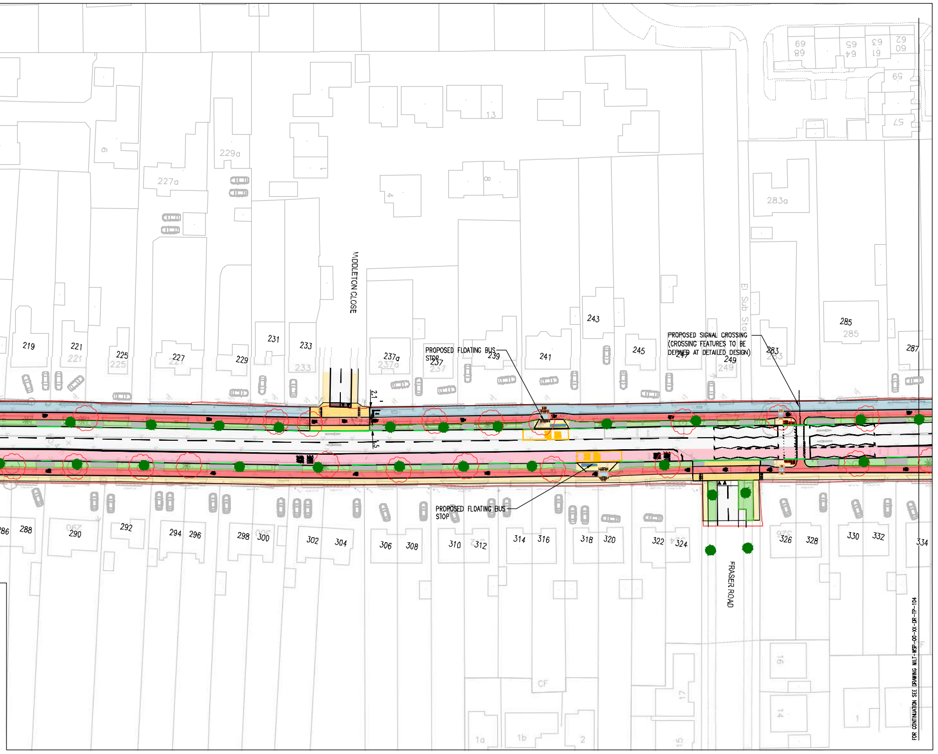

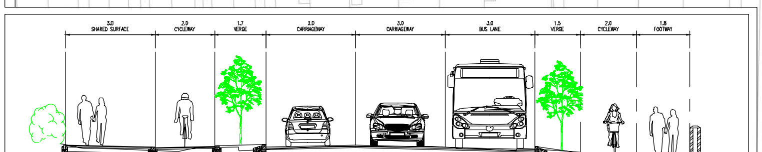

Section E-E

LEGEND:

CARRIAGEWAY FINISH	TACTILE PAVING - RED
GRASS VERGE	TACTILE PAVING - BUFF
CYCLEPATH	BUS STOP CAGE
FOOTWAY	BUS SHELTER
BLOCK PAVING RED	TREE TO BE KEPT
PAVING SLABS	TREE TO BE REMOVED
HARD LANDSCAPING	PROPOSED TREE
SHARED SURFACE	PROPOSED RAMP
RAISED CYCLE LANE	DROPPED KERB
RAISED ACCESS JUNCTION	HIGHWAY BOUNDARY
PRIVATE VEHICULAR ACCESS	

REV	DATE	BY	DESCRIPTION	CHK	APP
P03	23/05/2018	AKM	SUBMIT FOR CONSULTATION	AKM	NP
P02	18/05/2018	MO'D	CAD AMENDMENTS	AKM	NP
P01	08/05/2018	GRJ	FIRST ISSUE	AKM	NP

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ARCHITECT:

PROJECT: MILTON ROAD IMPROVEMENT SCHEME

TITLE: GENERAL ARRANGEMENT SHEET 2

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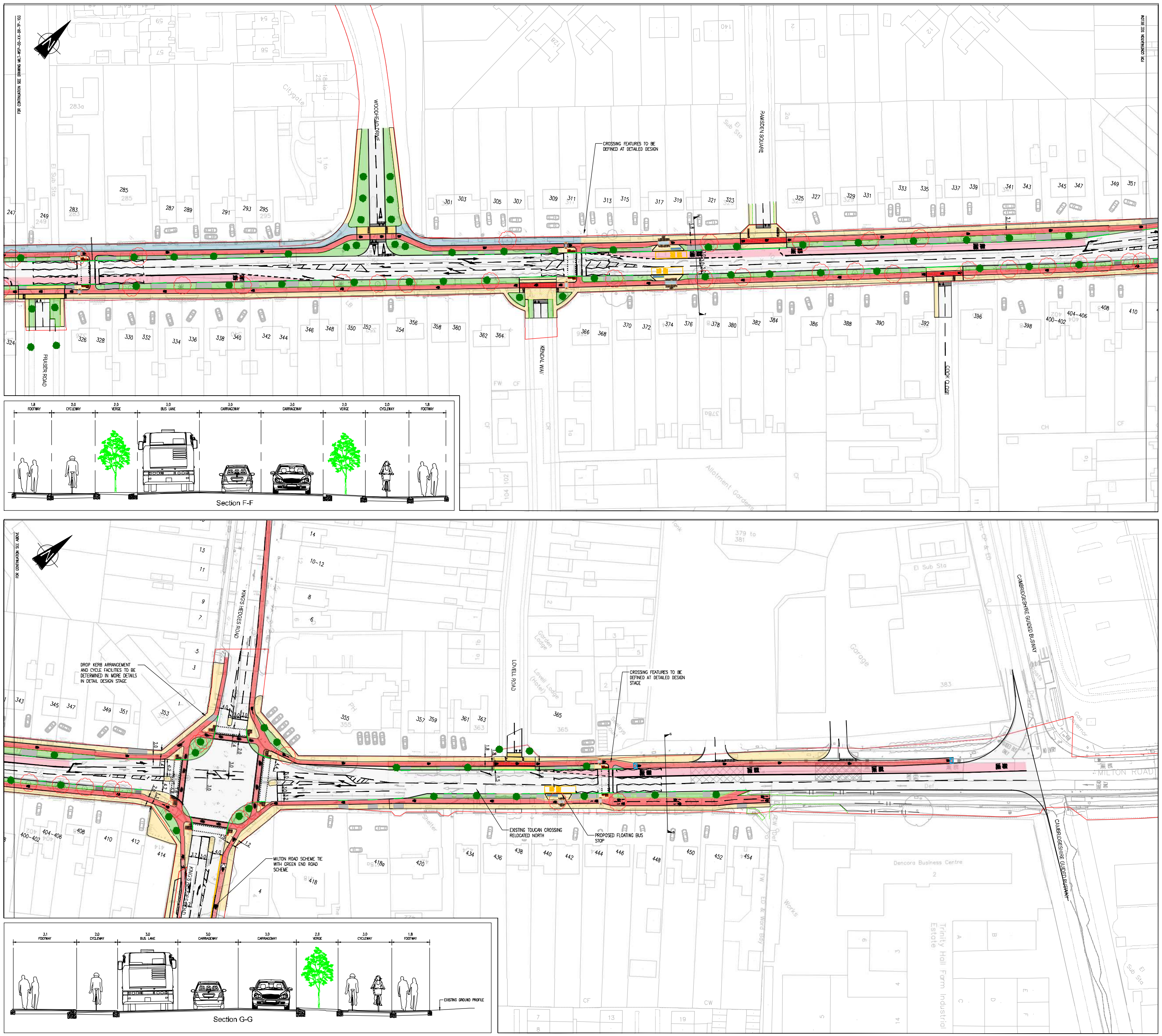
PROJECT No: 70012012	DESIGNED: GRJ	DRAWN: GRJ	DATE: May 18

DRAWING No: MILT-WSP-00-XX-DR-TP-103 REV: P03

DO NOT SCALE



LEGEND:

CARRIAGEWAY FINISH	TACTILE PAVING - RED
GRASS VERGE	TACTILE PAVING - BUFF
CYCLEPATH	BUS STOP CAGE
FOOTWAY	BUS SHELTER
BLOCK PAVING RED	TREE TO BE KEPT
PAVING SLABS	TREE TO BE REMOVED
HARD LANDSCAPING	PROPOSED TREE
SHARED SURFACE	PROPOSED RAMP
RAISED CYCLE LANE	DROPPED KERB
RAISED ACCESS JUNCTION	HIGHWAY BOUNDARY
PRIVATE VEHICULAR ACCESS	

REV	DATE	BY	DESCRIPTION	CHK	APP
P03	23/05/2018	AKN	SUBMIT FOR CONSULTATION	AKM	NP
P02	18/05/2018	MO'D	CAD AMENDMENTS	AKM	NP
P01	08/05/2018	GRJ	FIRST ISSUE	AKM	NP

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ARCHITECT:

PROJECT: MILTON ROAD IMPROVEMENT SCHEME

TITLE: GENERAL ARRANGEMENT SHEET 3

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PROJECT No: 70012012	DESIGNED: GRJ / DRAWN: GRJ	DATE: May 18

DRAWING No: MILT-WSP-00-XX-DR-TP-104 REV: P03

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