

CAMBOURNE TO CAMBRIDGE BETTER PUBLIC TRANSPORT PROJECT

Report to: Greater Cambridge Partnership Executive Board

6th December 2018

Lead officer: Peter Blake – GCP Director of Transport

1. Purpose

- 1.1. This report provides an update on progress with developing the business case for the A428 Cambourne to Cambridge (C2C) Better Public Transport project.
- 1.2. The A428 Cambourne to Cambridge corridor is one of the key radial routes into Cambridge. It suffers considerably from congestion during peak times, particularly at the Cambridge end, at the junction with the M11. Modelling for the Greater Cambridge Partnership (GCP) has demonstrated that Madingley Road has seen significant increases in traffic over the last decade. The key current conditions on the corridor include; long delays on the eastbound A1303 up to the Madingley Road Park & Ride (P&R) site, and; significant journey time variability along the corridor, particularly eastbound in the morning peak and westbound in the evening peak.
- 1.3. There are also some large development sites on this corridor including the West of Cambridge site, Cambourne and Bourn.
- 1.4. The corridor has been identified by the Greater Cambridge Partnership's (GCP's) Executive Board, as a priority project for the first five years of the GCP.

2. Recommendations

- 2.1. The Executive Board is recommended to:
 - (a) Consider the outcome of the public consultation and the work to date developing the Cambourne to Cambridge Better Public Transport project;
 - (b) Endorse the key conclusions of the Interim Report and in relation to this:
 - (i) Agree that Phase 1, Phase 2 and a Park and Ride location continue to be developed towards an Outline Business Case for a High Quality Public Transport route between Cambourne and Cambridge;
 - (ii) For Phase 1, note that the recommended off-road route, defined as the Specific Route Alignment providing a new public transport corridor between Madingley roundabout and Grange Road best meets the strategic and policy objectives of the Greater Cambridge Partnership; and
 - (iii) Agree to develop Options for Phase 2 between Cambourne and Madingley roundabout for further Business Case assessment including a public consultation and that this section of the route and final recommendation for

a preferred Park and Ride site be presented in the final Outline Business Case;

- (c) That the outcome of further work required as a result of recommendation (b) above be included in the final Outline Business Case which will be presented for Board approval in accordance with the current programme (October 2019);
- (d) Request that officers develop detailed technology and design solutions and draw up landscaping and ecological design proposals which would enhance the potential impact of the off-road option solution on the rural environment and ensure maximum transport benefit;
- (e) Agree that cycle and pedestrian infrastructure improvements identified for Madingley Road are taken forward for delivery developed in detail as part of a separate project;
- (f) Agree that, following the review by the Combined Authority, proposals for the Cambourne to Cambridge High Quality Public Transport corridor align with the features of a rapid transit network (CAM);
- (g) Agree that through the CAM Programme Board, officers ensure that the interface point at the eastern end of the scheme aligns with the work on the tunnelled section of the CAM network; and
- (h) Agree that the ambition for the preferred mode for the scheme once open is an autonomous electric rubber-tyred metro, subject to final business case, and that any interim mode required will be an electric vehicle to ensure a beneficial impact on air quality.

3. Joint Assembly Feedback

- 3.1 The Joint Assembly had a lengthy debate on the proposals and expressed mixed opinions, with no consensus view emerging.
- 3.2 Some members spoke in support of the proposals and hoped that the Executive Board would progress this scheme. It was pointed out that the development strategy adopted by the GCP aimed to provide the 'best in class' public transport available and it was suggested that the proposals set out in the paper achieved this. There was a clear need for a major transport route that could cope with all the additional cars and meet the needs of the residents of the new houses. The potential impact on Coton was acknowledged, but the wider benefits and local plan requirements were recognised, which meant the public transport solution now needed progressing. The prospect of getting from Cambourne to Cambridge in 30 minutes was welcomed and it was suggested that this was the sort of step change people wanted to see. From a business perspective journey time was paramount.
- 3.3 Some members raised concerns about the proposals, referring to the possible introduction of an interim solution. As Cambridge Autonomous Metro (CAM) compliance was now a policy requirement there was a feeling that it was necessary to compare two schemes that were both compliant. Questions were asked about the choreography, process and timeframe for taking forward the proposals and it was suggested that an interim solution should be developed, leading to long term optimal alignment. This could cost significantly less and would allow more time for a longer term CAM system to be developed. If an interim solution looked attractive it should be pursued, even if it caused delay. Dealing with the urgent problem would buy time and that would be the best way to future proof any

decision taken. Concern about some elements of the planned mitigation was also expressed.

4. Context

- 4.1 This report provides a summary of the option assessment work carried out for development toward the Outline Business Case (OBC), since the presentation of the Strategic Outline Business Case (SOBC) in October 2016. The full OBC will present a single scheme between Cambourne and Cambridge for approval in October 2019 to progress to planning consent and powers for the construction of the works.
- 4.2 At this point in the development of the business case, work has focussed assessing proposed public transport infrastructure improvements on Phase 1 of the project between Madingley roundabout and Grange Road, Cambridge, in particular the on and off-road alignment options.
- 4.3 Phase 2 of the project (Madingley Roundabout to Bourn Airfield Roundabout) will form part of the full OBC, along with a final recommendation for a Park & Ride site along the route. A further public consultation on options for this section of the route is planned for early 2019.
- 4.4 The report includes input from the public consultation on Phase 1 which was carried out from November 2017 to January 2018, and subsequent ongoing technical work, the key outcomes of which are detailed in this report. Further information on this assessment work is contained within Appendix 1 (Interim Report).
- 4.5 A report seeking a final decision on the scheme, including both Phase 1 and Phase 2 route alignments, and Park & Ride site, will be brought to the Executive Board in October 2019.

Strategic Case

- 4.6 The C2C Better Public Transport project (“the project”) supports the Greater Cambridge Partnership (GCP) transport vision of delivering a world class transport network that makes it easy to get into, out of, and around Cambridge in ways that enhance the environment and retain the beauty of the city. Transport infrastructure is essential in supporting the delivery of sustained growth, prosperity and quality of life for the people of Greater Cambridge. Earlier work in the SOBC had identified a strong policy and strategic basis for delivering a High Quality Public Transport (HQPT) scheme between Cambourne and Cambridge and the strategic context assessment work has further reinforced this case. The project is part of the Greater Cambridge Partnerships programme using devolved City Deal funding. This is a comprehensive package of measures which aim to tackle congestion within Cambridge with the creation of a world class transport system, to achieve a reduction in peak-time traffic levels in Cambridge by 10-15% by 2031 on 2011 baseline.
- 4.7 Between 2011 and 2031 there are a planned additional 15,500 new homes and 20,000 new jobs in development locations to the west and south of Cambridge, at Cambridge Biomedical Campus, Cambridge Northern Fringe, Cambridge North West, Cambridge Southern Fringe, West Cambridge, Cambourne and Bourn Airfield. A significant proportion of new residents and new employees will need to travel between Cambourne and Cambridge.
- 4.8 As such to meet this growing demand the vision of the C2C Project as defined in the business case is:

“To connect existing and new communities along the A428/A1303 to places of employment, study and key services to enable the sustainable growth for Greater Cambridge. We will deliver this through improved, faster and more reliable HQPT services, together with high

quality cycling and walking facilities serving a new Park & Ride site to the west of Cambridge.”

- 4.9 The C2C Better Public Transport project therefore forms an important part of the overall GCP aim to develop a sustainable transport network for Greater Cambridge that keeps people, business and ideas connected, as the area continues to grow; to make it easy to get into, out of, and around Cambridge by high quality public transport, by bike and on foot.
- 4.10 The GCP delivery programme is based on the policy framework established by the local planning and transport authorities. These include the recently agreed Local Plans for Cambridge and South Cambridgeshire and emergent transport policy of the Cambridgeshire and Peterborough Combined Authority (CPCA) and in particular the compatibility of the project with the proposed Cambridge Area Metro (CAM) - a mass rapid transit scheme.
- 4.11 The Transport Strategy for Cambridgeshire and South Cambridgeshire (TSCSC) prepared in parallel with the recently adopted Local Plans was agreed in March 2014. The strategy provides a plan to manage the rising population and increasing demand on the travel network by shifting people from cars to other means of travel including public transport, walking and cycling. Policy within the TSCSC requires a range of infrastructure interventions on the St Neots and Cambourne to Cambridge corridor as a key part of the integrated land use and transport strategy responding to levels of planned growth. Cambourne to Cambridge is one of the key growth areas identified in the adopted Local Plan. The Local Plan policies for the strategic developments sites along the corridor requires High Quality Public Transport (HQPT) to link new homes to employment and services in and around Cambridge.

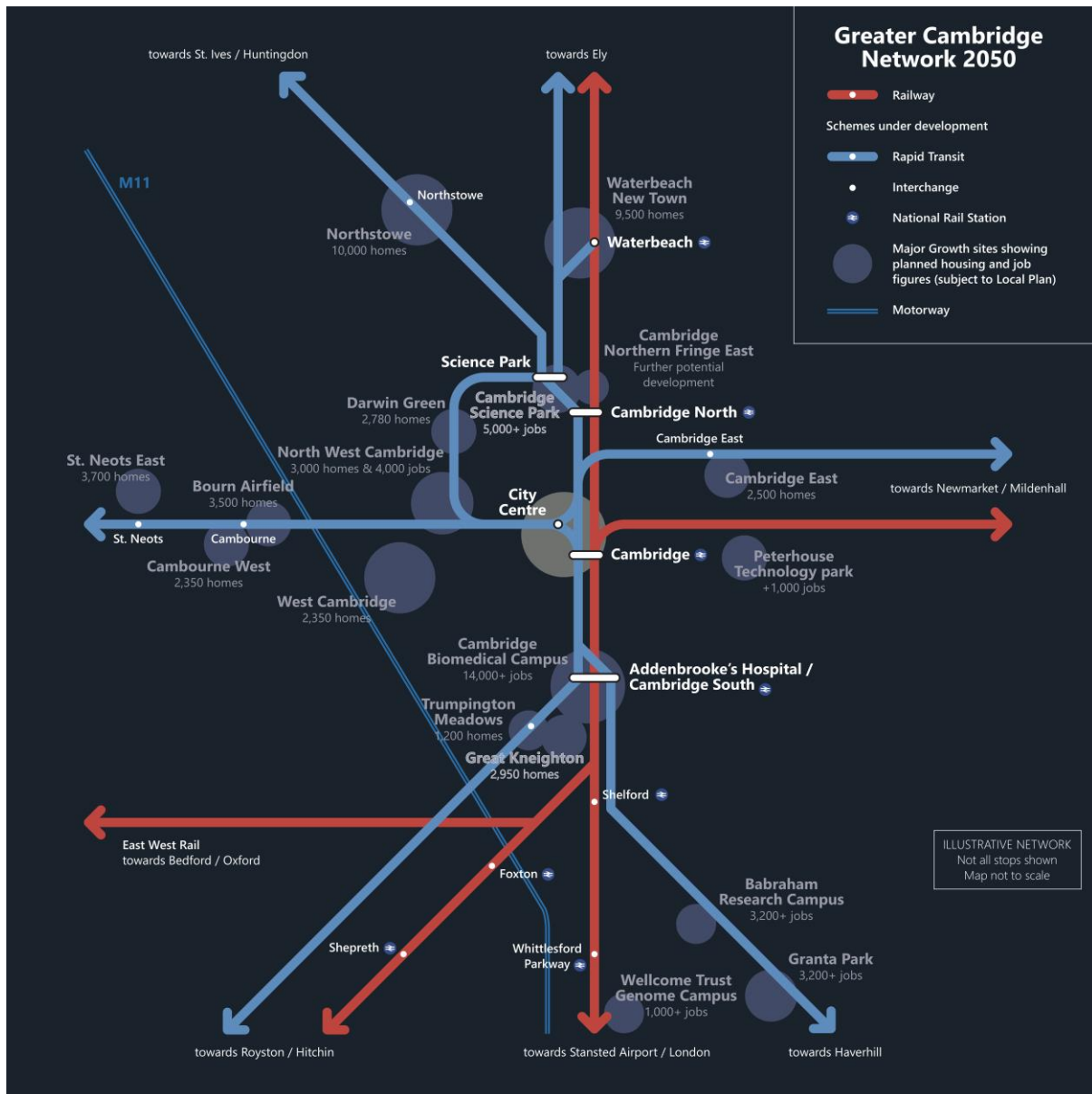


Figure 1– Potential GCP HQPT network

4.12 As set out in Figure 1 the C2C scheme, as part of the wider HQPT network including CAM network, will provide a step change in public transport accessibility, as well as safe and segregated cycling and pedestrian routes into key destinations in and around Cambridge. By reducing growth in congestion, offering environmental mitigation and enhancement and providing a realistic alternative for many car journeys, the scheme will result in a public benefit for new and existing residents.

National Infrastructure Commission (NIC)

4.13 The National Infrastructure Commission's (NIC) report on the Cambridge – Milton Keynes – Oxford Growth Corridor has concluded that improvements in east-west transport connectivity along the corridor are necessary to underpin the area's long term economic success, and alleviate the area's "chronic undersupply of homes [which] could jeopardise growth, limit access to labour and put prosperity at risk". It estimates that infrastructure investment could support the delivery of up to 1 million new homes in a broad corridor between Oxford and Cambridge. This level of development will inevitably place additional pressure A428/A1303 and surrounding routes. Calling for City-scale transport infrastructure to enable growth, the NIC focuses on:

“maximising the opportunities associated with the development of East West Rail and the Oxford-Cambridge Expressway – integrating mass rapid transit with these schemes to enable effective first/last mile connectivity, in a way that enhances the value of these strategic infrastructure projects”.

- 4.14 The NIC has identified the Cambridge – Milton Keynes – Oxford arc as a national priority stating that its world-class research, innovation and technology can help the UK prosper in a changing global economy.

East – West Rail

- 4.15 East – West Rail is a scheme to re-establish a rail link between Cambridge and Oxford and will improve rail services between East Anglia and central and southern England, including enhanced rail connections with national mainline services. Work has progressed on the western section between Oxford, Aylesbury and Bedford. The East – West Rail Company are currently working with Network Rail to develop route options between Bedford and Cambridge and expect to consult on preferred options in 2019. The scheme is expected to be built over the next decade, beyond the timetable for the C2C scheme.

Cambridgeshire and Peterborough Combined Authority

- 4.16 The Cambridgeshire and Peterborough Combined Authority (CPCA) was established in March 2017 and is led by an elected Mayor and Board comprising of the constituent local authorities. The key ambitions for the CPCA include:

- Doubling the size of the local economy;
- Accelerating house building rates to meet local and UK need; and
- Delivering outstanding and much needed connectivity in terms of transport and digital links.

- 4.17 The CPCA is responsible for transport infrastructure improvement and the Local Transport Plan. The existing Local Transport Plan 2011 to 2026 remains the existing key transport policy framework at this time which emphasises the need for new developments to be supported by sustainable transport measures such as HQTP.
- 4.18 In December 2017 Steer Davies Gleave delivered an options appraisal report jointly funded by the Combined Authority and the GCP on the possibility of developing a rapid mass transport network. This favoured a mass transit system in Greater Cambridge based on innovative rubber tyred tram like vehicles utilising autonomous technology as the preferred solution – described as CAM.
- 4.19 On 30 January 2018 the Combined Authority agreed to fund further development of the proposed CAM, a mass rapid transit network to Strategic OBC. The CAM proposal was formally accepted by the GCP on 8 February 2018. The Combined Authority resolved also to *“liaise with the GCP to ensure GCP’s current and future plans for HQPT corridors were consistent and readily adaptable to the emerging proposition for a CAM network.”*

4.20 The potential CAM network is set out in **Figure 2** and includes an alignment towards Cambourne.

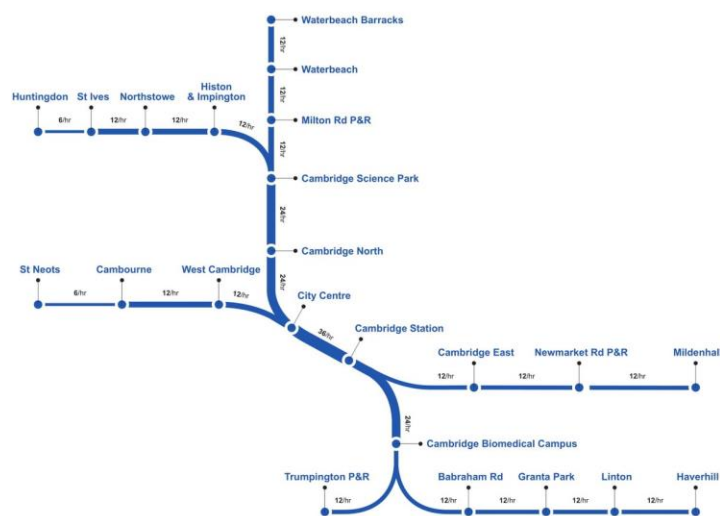


Figure 2– Potential CAM network

4.21 The CPCA has subsequently undertaken a review of alignment between the C2C scheme and the emerging CAM. The CPCA review, undertaken by consultants Arup, concluded the following key findings:

- The process undertaken to date to determine the route is robust and identified the optimal solution for the corridor;
- The route should be reclassified a CAM route;
- The vehicle operating along the route should comply with the principles of the CAM being a rubber tyred, electrically powered vehicle;
- The route must continue to be designed to align with the overarching CAM network; and
- The route is connected into a tunnelled CAM network thereby providing a high frequency, pollution free public transport option into and across Cambridge centre and the entire CAM network.

4.22 A report on the review undertaken by consultants Arup, is attached in Appendix 2.

4.23 In ensuring consistency with the CAM it is considered that the scheme developed by GCP will need to deliver:

- A HQPT system using rapid transit technology.
- High frequency, reliable services delivering maximum connectivity.
- Continued modal shift away from car usage to public transport.
- Capacity provided for growth, supporting transit-oriented development.
- State of the art environmental technology, with easily accessible, environmentally friendly low emission vehicles such as electric/hybrids or similar.
- Fully integrated solution, including ticketing and linkages with the wider public transport network to maximise travel opportunities.

4.24 At CPCA meeting on 31 October the Executive Board agreed to support the recommendations of the Arup report and agreed that the Cambourne to Cambridge scheme is aligned and should be progressed by the GCP.

5. Developing a Business Case

- 5.1 The C2C project was commissioned in 2014 with initial public consultation on high level options being undertaken in 2015. The method of progressing the project is via a 'business case' which assesses the overall case for public investment by measuring the public benefits and costs of different options. The business case is formed from 5 'cases' for investment in line with HM Treasury guidance and the Department for Transport's' Transport Assessment Guidance. Details of the Business Case stages and further work undertaken since the public consultation ending early in 2018 can be found in Appendix 1.
- 5.2 Following presentation of the initial stage of the business case the decision was taken by the GCP Executive Board in October 2016 to agree in principle to a segregated route given the wider economic benefits and undertake further work.

6. Further Business Case Development

- 6.1 Following the Executive Board decision of October 2016, the next stage of business case development has included the following work and activities to address the Board's specific decisions and instructions:

- Reviewing the strategic basis for the project.
- Developing specific route alignments within the previously agreed Catchment Area to identify the best alignment.
- Further development of 'on road' options to compare against an off road option including environmental assessments.
- Review of P&R sites along the route.
- Work with the GCP Greenway project teams to review cycling potential along the corridor.
- Engagement with third parties including developers along the route.

- 6.2 Updates were provided to the GCP Executive Board in July 2017 on the development of the Local Liaison Forum (LLF) "Option 6" and the further review of Park & Ride sites along the corridor. In October 2017 the GCP Executive Board agreed that public consultation be undertaken as part of the further development of the business case.

Public Consultation

- 6.3 The public consultation was undertaken between 13 November 2017 and 29 January 2018. The consultation was quality assured by the Consultation Institute, an independent best practice Institute, promoting high-quality public and stakeholder consultation in the public, private and voluntary sectors.
- 6.4 The public consultation involved:
- Distribution of over 14,000 brochures.
 - 21 drop in sessions including both fixed exhibitions and road shows.
 - A series of focus groups.
 - Extensive use of social and traditional media to raise awareness.
- 6.5 Because of the range of developing strategic considerations, the consultation only included proposals for Phase 1 HQPT transport infrastructure options from Madingley roundabout to Grange Road and the final shortlisted Park & Ride sites.
- 6.6 Three route and two potential Park & Ride site locations were presented in the public consultation.

- 6.7 The public consultation achieved 2,049 complete responses. A significant amount of qualitative feedback was gathered via the questionnaire, at road-shows, via email and social media and at other meetings including the formal workshops.
- 6.8 A range of views were expressed during the course of the public consultation exercise, particularly against the off-road alignments by those residents living along the route.
- 6.9 In qualitative terms a majority of people did not support the off-road alignments, expressing concern regarding the environmental impact of the project, particularly around the Coton area and the West Fields location.

Response to Public Consultation

- 6.10 The objective of public consultation in the option development process is to help inform and understand stakeholder concerns, issues and opportunities and to feed these into the ongoing business case process. Public Consultation events and ongoing stakeholder engagement inform the emerging scheme and as such it would be expected that options will continue to develop following the public consultation.
- 6.11 The majority of respondents did not support the off road options, and therefore the concerns expressed should be reflected in the final proposals, either by the choice of proposal or the mitigation plan developed as part of the emerging proposals. In terms of mitigation on any off-road alignment this could include:
- Extensive landscaping and design proposals to minimise visual and environmental impact, this should include exploring the feasibility of developing environmental safeguards along any proposed routes, for example the development of a linear park (or similar).
 - High quality, environmental sustainable vehicles to improve air quality and reduce noise, e.g. electric/hybrids.
 - Infrastructure to reflect local requirements and the local surroundings.
 - Development of extensive walking and cycling facilities along any corridor.
 - Clearly demonstrate the scheme's connectivity to wider public transport network, including the CAM, and in particular, integration with the future tunnelled sections.

7. Technical Work - key findings

- 7.1 The technical work confirmed the earlier findings of the SOBC, namely that the need for a HQPT scheme is clearly identified and supported in policy given existing and rising congestion between Cambourne and Cambridge and the desire for economic growth stated in national and local policy.
- 7.2 The underlying causes, which together set out the need for intervention include:
- Population and housing growth.
 - Employment growth.
 - The increasing need for travel.
 - Levels of car ownership.
 - The quality of existing transport infrastructure.
- 7.3 Based on these causes the project objectives are:
- To achieve improved accessibility to support the **economic growth** of Greater Cambridge.

- To deliver a **sustainable transport network/system** that connects people between Cambourne and Cambridge along the A428/A1303.
- Contribute to enhanced quality of life, **relieving congestion** and improving air quality within the surrounding areas along the corridor and within Cambridge City Centre.

7.4 The project objectives are further amplified in the Defining a Transformational Public Transport paper on the Joint Assembly agenda, February 2018

7.5 A summary of existing congestion issues is set out in **Table 1**

Section of corridor	Issue
A428 between Caxton Gibbet and St Neots	<ul style="list-style-type: none"> • High journey time variability • Delays of up to 10 minutes eastbound in the AM Peak period • Delays of up to 3 minutes in the PM Peak period
The A1303 approach into Cambridge	<ul style="list-style-type: none"> • High levels of variability and congestion • Delays of up to 18 minutes travelling in to Cambridge in the AM Peak • Delays of up to 4 minutes travelling westbound in the PM Peak.
A1303 / M11 Junction	<ul style="list-style-type: none"> • Up to 80% of the route experiencing queuing in the AM Peak when travelling eastbound
Madingley Road Park & Ride site	<ul style="list-style-type: none"> • Interaction of traffic entering and leaving the well-used Madingley Road Park & Ride site, with the signalised junction here contributing to variability and delay.

Source: Trafficmaster

Table 1: Existing Congestion ‘hotspots’

7.6 Average speed data, demonstrating significant delay on the network is provided in **Figure 3**

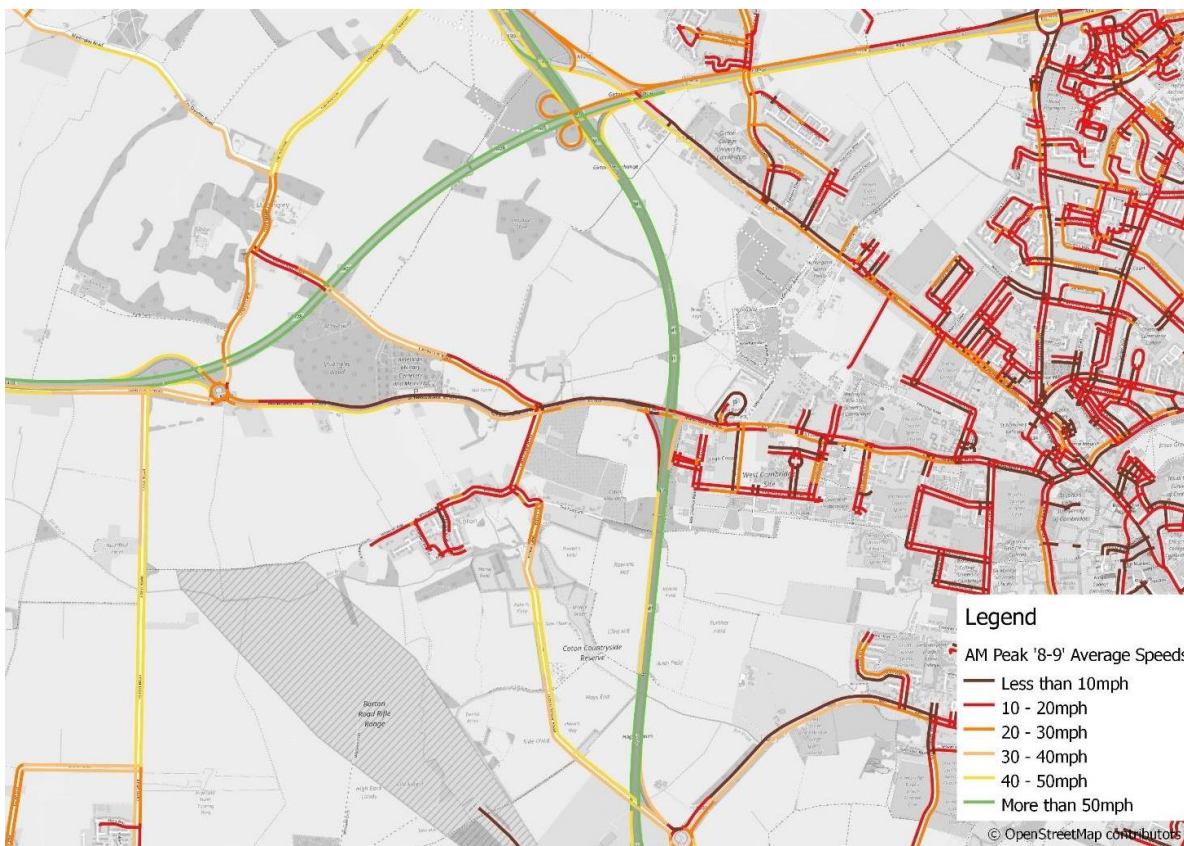


Figure 3 – Average Speed for traffic (AM Peak 2016)

7.7 Considering forecast growth, between 2011 and 2031, car trips along the A428/A1303 corridor eastbound are forecast to increase by:

- 45% in the AM Peak hour;

- 70% in the Inter-peak period, and;
- 50% in the PM Peak period.

- 7.8 The existing car mode share and car ownership within the A428/A1303 corridor is high, and future growth is expected to generate additional demand for car use in this area. Therefore, HQPT plus additional cycling and walking facilities has a key role in providing an attractive and competitive alternative to car use, which would alleviate, congestion, poor journey time reliability and delay. Crucially, such intervention will help to accommodate future growth planned to the west of Cambridge, improve access to housing and employment sites alike, and improve quality of life in the local communities.
- 7.9 Reviews of existing public transport provision identified that within the A428 / A1303 corridor, existing public transport infrastructure offers little or no competitive advantage over private cars. This has meant that car use is the dominant transport mode and as a result has caused congestion on the wider transport network. This in turn causes disruption to existing public transport routes.
- 7.10 The existing cycling network has sections of segregated links of uneven quality but is disconnected and does not in total provide a high segregated route between Cambourne and Cambridge which would cater for the potential high modal share of cyclists along the corridor.

8 Basis of Selecting an Option

- 8.1 As part of part of the OBC, the Strategic Case, has set out the strategic and policy context, and provided an assessment of the project options within the transport and wider policy context requirements for the delivery of sustained economic growth, reduction of traffic congestion and increased prosperity and quality of life for the people of Greater Cambridge.

Wider Economic Benefits

- 8.2 Greater Cambridge is one of the UK's fastest-growing and most productive cities and is a key hotspot for regional and national job creation. Between 2009 and 2016 total jobs growth in Cambridge was 17.6% (in absolute terms) compared to 12.0% regionally and 10.5% nationally.
- 8.3 Greater Cambridge, is a thriving economy and a key driver of the wider CPCA economy, representing 34% of its total population, 41% of total employees and 42% of all Gross Value Added (GVA). The Mayor and CPCA aspires to double GDP in the region.
- 8.4 The recently published final report, by the Cambridgeshire and Peterborough Independent Economic Commission provides the latest evidence that jobs growth in the area has been faster than anticipated and that future growth could, potentially outstrip national indicators. The report stated, "Rising costs from an infrastructure deficit that has built up over time threaten the ongoing success of the Cambridge Phenomenon, which represents 67% of the region's output. Infrastructure issues are most urgent in and around Cambridge and must be dealt with as a first priority..." This may further revise the estimates of economic benefits attributed to the proposed HQPT interventions. A key recommendation was that, "A package of transport and other infrastructure projects to alleviate the growing pains of Greater Cambridge should be considered the single most important infrastructure priority".
- 8.5 In developing the business case the different levels of public transport intervention were assessed for their impact on wider (non-transport) economic growth expressed as Gross Value Added (GVA). GVA measures the total value of goods and services. This assessment found that a new segregated off road alignment for public transport would have significant wider economic benefits.

- 8.6 The work done to date has identified the need for HQPT infrastructure to unlock economic growth by enabling the delivery of new housing and employment. The earlier stage of the business case in 2016 identified £680m of GVA attributable to a segregated public transport scheme between Cambourne and Cambridge which was significantly higher than options using the existing public highway.
- 8.7 The results from further GVA assessment show that an off-road solution between Cambourne and Cambridge has the potential to deliver a significantly greater level of Wider Economic Benefits at the local level for Greater Cambridge than the on road and offer a high ratio of return on investment. This is set out in Table 2

Benefit (£,000m)	Do Something 2a
GVA benefits – Greater Cambridge level	679,300
Present Value Costs (PVC)	184,586
OVERALL IMPACT	
“Local WEBs ratio”	3.68

Table 2: Analysis of Monetised Costs and Wider Economic Benefits at Greater Cambridge local level

- 8.8 **Figure 4** summarises the findings from the Value for Money assessment, and includes the relative benefits of the on and off road options against the current scheme costs to demonstrate how the off-road option has a greater value for money in delivering Wider Economic Benefits.

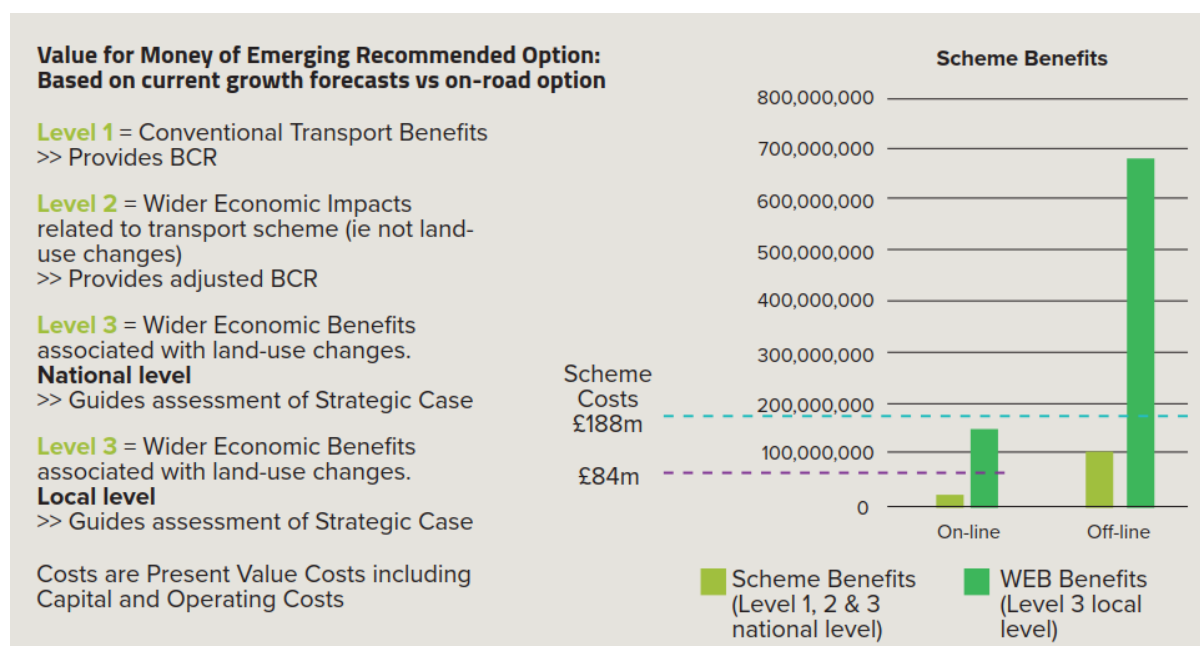


Figure 4 – On/Off Road GVA

- 8.9 The work concludes that both existing and emerging policy, as well as the specific objectives of the GCP, continue to support a recommendation for the need to significantly improve public transport and other sustainable modes between Cambourne and Cambridge.

Comparison of On vs Off Road Options between Madingley Roundabout and Grange Road

- 8.10 In addition, Option B in the public consultation included a ‘tidal’ bus lane which reversed bus travel direction depending on the time of day. There are no tidal bus lanes in the UK although there are a number of tidal lanes which are used for general traffic. The relative infrequency of buses adds a level of uncertainty for road users as to which direction to

expect on coming vehicles. Overhead gantries are required for tidal lanes for general traffic as set out in the Departments for Transport (DfT), Design Manual for Road and Bridges (BD51/98). It should be noted that current guidance refers to tidal lanes for general traffic: DfT guidance does not address on a central tidal bus lane of this type and so the Highway Authority may well wish to refer to DfT for approval which should not be taken for granted.

- 8.11 The 19 gantries would require a minimum height of 5.5 metres from the surface of the carriageway and a maximum height of 9m (Traffic Signs Regulations and General Direction (TSRGD) 2016). The spacing shown in the work associated with the September 2017 End of Stage Report provides useful guidance as to likely spacing. The frequency of these gantries would be a factor of local safety issues such as visibility along the road and the number of side roads/private entrances which would require movements across the tidal lane and would be refined during Road Safety Audits in dialogue with the Highway Authority and DfT.
- 8.12 The environmental impact of these gantries would not be in-significant in terms of visual intrusion as well as introducing large urban structures on a route of rural character into Cambridge.
- 8.13 In evaluating the overall cost/benefit of tidal lanes against the other options, the key conclusion was that the additional impacts and costs would not be outweighed by greater benefits for the business case.
- 8.14 One of the main outcomes of the consultation was the development of an “Optimised” on-road option. This came from the desire to have both inbound and outbound priority as proposed in option B but without the need for gantry structures and within the highway boundary. Following a workshop with community stakeholders the optimisation was modelled to assess the impact of the following changes:
- Westbound bus priority at Maddingley Roundabout.
 - Signalisation of Cambridge Road Junction.
 - Lane arrangement at the M11 Junction 13.
 - Layout of existing Park & Ride entrance and bus priority at High Cross Junction.
 - Signalisation of Grange Road Junction.
 - Removal of Bus lane from West Cambridge development to Storeys Lane.

Apart from Cambridge Road and Grange Road junction signalling, which showed no benefit when modelled, all the other optimisations were included as the ‘Optimised; final on-road option taken forward for further assessment.

- 8.15 Table 3 outlines a comparison of the ‘Optimised’; on and off route options between Maddingley Roundabout and Grange Road:

	PT Journey time	Reliability (AM Peak Journey Time variation)	CAM Future proofing	Patronage	PT Capacity	Benefits/disbenefits for other modes	Cycling
On Road	17 mins	14% reduction in Journey Time variability	Not suitable for CAM or tunnels	2,300-3,700 daily depending on final	Limited due to constraints of road network	Disbenefits other road users due to need to provide bus priority	Improvements to 3.4km of existing shared cycle lanes / footpaths
Off Road	12 mins	74% reduction in Journey Time variability	CAM compliant	scheme and park and ride options	High due to dedicated infrastructure	Low impact on other road users except where it crosses public highway. Significant cycling benefits	5km of new shared-cycle lanes / footpaths

Table 3: Key Transport Comparators On vs Off Road between Maddingley roundabout and Grange Road Cambridge

- 8.16 The Key Findings from the assessment Off-Road:

- Aligns better with transport policy.
- More reliable journey.
- Less disruption to existing roads.
- Policy compliance – Aligns with CAM.
- Better in terms of Heritage and biodiversity.

8.17 Key Findings from the assessment On-Road:

- Has less impact on Green Belt.
- Lower Cost.

8.18 The off road option is the only solution that presents the potential of a segregated route for mass rapid transit that is close to population centres, and with potential capacity to meet the development pressures along the corridor. It is the only solution that provides for delivery of the long term transport objectives of both the GCP and the Combined Authority, and it is the only option that is compliant with the emerging CAM concept.

Environment

8.19 Environmental considerations are summarised in Table 4, including key concerns raised in the public consultation which included the potential effect upon the landscape and ecology particularly near Coton. Natural England stated in regard to Madingley Wood , a Site of Special Scientific Interest (SSSI) that the, “off-line option appears to be sufficiently distanced from the designated site and therefore unlikely to have any adverse impact. Historic England considered that the effects of the off road route, “...could be minimised or avoided subject to a robust mitigation strategy.

8.20 The role of environmental impact assessment within the current stage of the business case appraisal process is to understand the overall benefits and disbenefits of each option, so that these can be taken into account when determining which option offers the greatest value for money. The next stage of the business case development will include further detailed assessment of environmental impacts.

	Key Concerns	Environmental Considerations	
		On Road	Off Road
Designated Environmental Sites	Concerns that the on-road Route A option would impact on the SSSI.	Passes SSSI at Madingley Wood	Does not directly pass these sensitive sites
Green Belt	Impact of the off-road route on the Green Belt, particularly at the West Fields and at the two proposed Park & Ride sites.	Requires modification to existing highway in green belt	Is in undeveloped green belt land - Potential effect on openness of Green Belt
Ecology	Concerns that the off-road route would impact on wildlife sites close to Coton.	Some loss of habitat due to road widening – less potential for mitigation or enhancement (including SSSI)	Loss of agricultural land with habitat – significant potential for enhancement

Noise/ Air Quality	Concerns relating to noise, and to a lesser extent air quality, from the buses, where routes passed residential areas and at housing close to the proposed Park & Ride sites.	Marginal – existing busy highway – low number of bus movements Mitigated by low emission hybrid electric HQPT vehicles	Marginal – low numbers of bus movements Mitigated by low emission hybrid electric HQPT vehicles
Visual Impact	Concerns relating to light pollution where the routes passed residential areas and for housing close to the proposals Park & Ride sites. Concerns relating to the visual impact of the gantries proposed in Route B, the Waterworks site due to the topography and to a lesser extent, Scotland Farm.	Widening of existing carriageway and loss of road side vegetation. Gantries required Less opportunity for mitigation	the alignment of route using topography integrates into landscape Visual impact can be more effectively mitigated
Landscaping	Damage to the landscape.	Loss of vegetation, including trees, next to highway - less potential for mitigation due to adjoining properties	Loss of vegetation, including trees. Potential for overall increase in native hedgerow and trees
Social benefits (access to education, leisure, employment)	Waterworks site had better access to employment sites south of Cambridge. Although the off-road route was the most expensive, it was considered to be more future proofed to upcoming housing and employment sites.	Some improvement to bus and cycle accessibility	Significant improvements to bus and cycle accessibility
Community Impacts	The off-road route would not benefit residents in Coton as there was no planned stop. For on road option Route A, there were concerns regarding the impact on Clare Hall.	No HQPT public transport service or direct access to walking or cycling infrastructure	Cycling and walking alignment closer to Coton village.

Heritage	Concerns that the on-road Route A option would impact on conservation areas, such as the American Cemetery Memorial.	Passes American Cemetery	Does not directly pass the site Potential effect on archaeology
Flood Risk	Impact of the off-road route on properties close to the West Fields part of which is the Bin Brook flood plain.	Neutral effect	Neutral effect – Bin Brook crossing can be designed to have no negative effect on flood risk
Land & Property	Permanent loss of residential property or garden.	May require loss of residential property or garden Requires verge hedgerow and tree belt	Does not require residential property or garden Requires mainly agricultural land

Table 4: Other comparators On – Off Road

- 8.21 Impacts could be mitigated by creating landscape and ecological mitigation areas balanced with preserving the existing open landscape. There is also an opportunity to enhance local landscape and integrate the new route with existing features.
- 8.22 The off road route could apply a “green lane” design treatment along its length to enhance biodiversity through the creation of habitats. This would include the planting of new trees and native species hedgerow along the route.
- 8.23 A stop at Coton could be considered as part of the CAM scheme.

Summary

- 8.24 The Strategic Case demonstrates a proposed off road segregated alignment for HQPT will provide significant transport benefits over bus priority on the existing highway and is consistent with the CPCA’s CAM proposal. While both options would have environmental impacts, the proposed specific route alignment has higher potential for mitigation measures and environmental enhancement. Hybrid Electric vehicles (Euro V1 or better) will address concerns regarding noise and air pollution.
- 8.25 Definition of the specific route alignment will require further environmental assessment in the form of an Environmental Impact Assessment (EIA) by which the anticipated or potential impacts on the environment of the emergent scheme would be assessed and measured. The appraisal towards the Final Outline Business Case requires further detailed assessment including further site surveys to identify the potential scope of these impacts in order to understand them and inform the design development for avoidance, mitigation and enhancement measures, reflecting public concerns, as outlined above.
- 8.26 This should continue to be considered, in parallel with development of the Phase 2 route alignments, for a final Executive Board decision in October 2019.

9. Specific Route Alignment (SRA)

- 9.1 Having established the economic and strategic business case for an off road option and considered the issues around delivery, further analysis and technical review of the off-road route and the SRA options has been undertaken.
- 9.2 The design approach and quality of new segregated HQPT infrastructure has and will continue to be informed by the principles agreed by the GCP Executive Board in October 2016 – namely:
- Location of public transport infrastructure – respecting the urban and rural context for example through assessing proximity to and the relationship with the existing built up areas.
 - Testing accessibility from the start to the end of journeys through the centres of employment (e.g. Cambridge West) and housing (e.g. Bourn Airfield) and the environmental effects with a view to integrating with existing infrastructure and minimising impacts.
 - Siting – positioning of infrastructure to minimise visual intrusion on the existing landscape through considering issues such as ground levels, slopes and other natural features and also minimising impact on important features such as ecological and heritage assets.
 - Design – the materials, features and introduced landscaping that will form the new infrastructure and achieve high quality design, minimising environmental impacts consistent with delivering the scheme’s objectives, and integration with existing infrastructure and the ends of the route and along it.
- 9.3 Extensive design and mitigation work would be undertaken as part of the emerging scheme development to avoid or minimise the impacts of the scheme and be subject to the full Environmental Impact Assessment as part of any process to seek planning consent and powers. The Arup review considered some options which will be evaluated as part of the final scheme design process.
- 9.4 In order to assess a Specific Route Alignment (SRA) for the off road option the area has been divided into 5 sequential sections to assist comparison as set out in **Figure 5**.

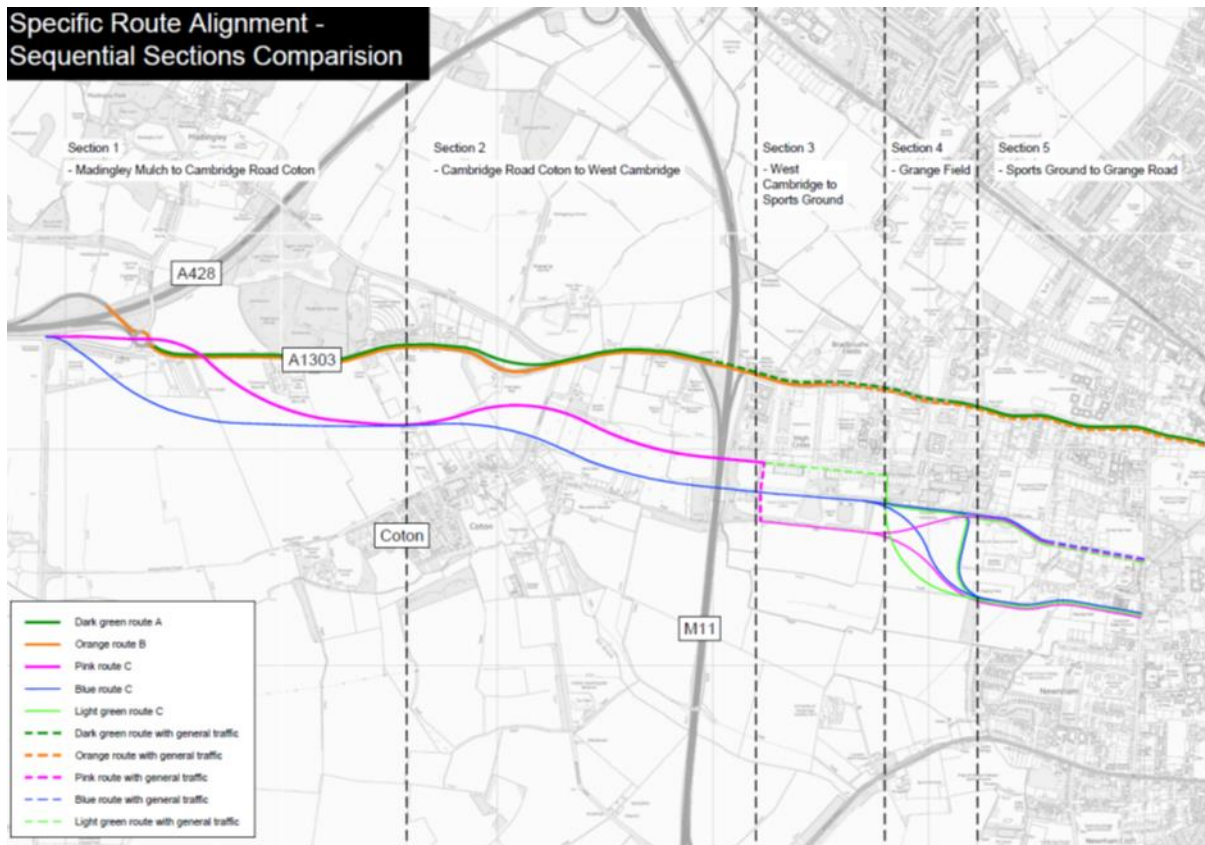


Figure 5 – SRA route assessment sections

9.5 The assessment outputs are set out in Figures 6 to 10

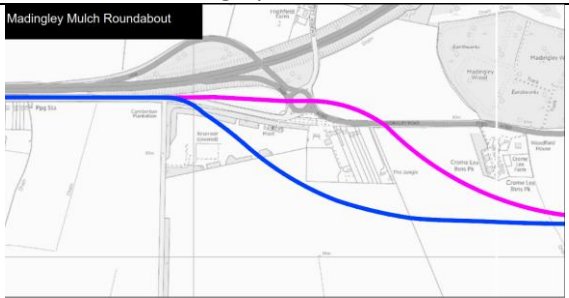
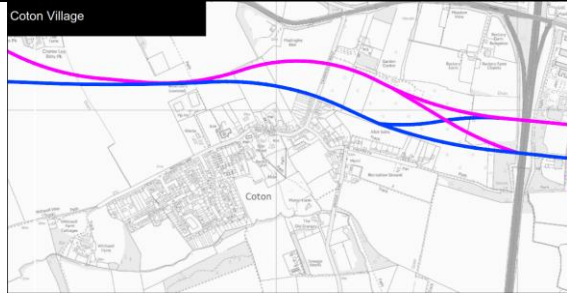
Section 1 – Madingley Hill	
 <p>Transport Issues</p> <ul style="list-style-type: none"> • Blue route is less disruptive to public to build. • Blue route is segregated from other traffic • Provides improved pedestrian and cyclist facilities. • Pink route is segregated but has interactions with other traffic at busy road junctions (including exit from A428 Trunk Road) 	<p>Environment Issues</p> <ul style="list-style-type: none"> • Blue Route can be better incorporated within the existing landscape because it follows a lower, less prominent alignment • Pink route less sympathetic to topography • Pink closer to SSSI cemetery <p>Planning/Property Issues</p> <ul style="list-style-type: none"> • LDA assess that the eastern section of the Pink Route may have moderate impact upon the Green Belt, as the steeper slope may require a degree of cut & fill • Pink Route cuts across Chrome Lea field making it less viable for current agricultural use.

Figure 6 – Section 1 SRA considerations

Section 2 - Coton



Transport Issues

- Blue Route is better aligned for a more accessible potential future bus stop to serve Coton

Environment Issues

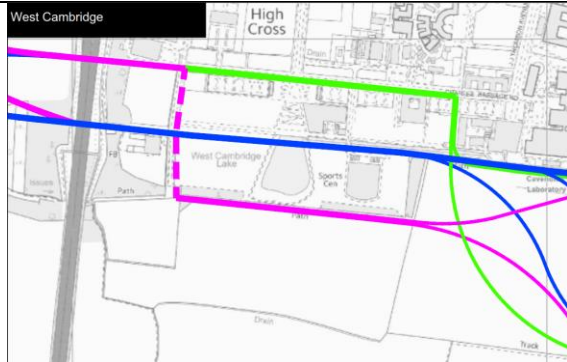
- Pink Route more visible from Coton Village and Red Meadow Hill as it is on higher ground even with mitigation
- Blue Route less visually intrusive as it can be encompassed within the field edge with landscaping.
- Pink route and bridge over the M11 is more visible from Rectory Farm and bisects City Wildlife site
- Any potential future bus stop on Pink Route at Coton would be more intrusive within the landscape

Planning/Property Issues

- Pink Route has greater impact on the orchard and juicing business on site.
- LDA assesses Pink Route more intrusive on Green Belt openness as further from the urban area

Figure 7 – Coton

Section 3 – West Cambridge



Transport Issues

- Blue Route would be fully segregated
- Segregated green route along Charles Babbage likely to have greater conflict with pedestrians and cyclists
- Pink route does not serve the campus
- Blue and Green Routes have good penetration of the West Cambridge development.

Environment Issues

- Blue Route has environmental (vibration etc.) impacts on “Titan” microscope (could be mitigated)
- Pink Route impacts most on the green belt
- Green route along Charles Babbage mitigates vibration impact concerns

Planning/Property Issues

- Blue and Green routes require high value development land from the University of Cambridge, and changes to the master plan.

Figure 8 – West Cambridge

Section 4 – Grange Field

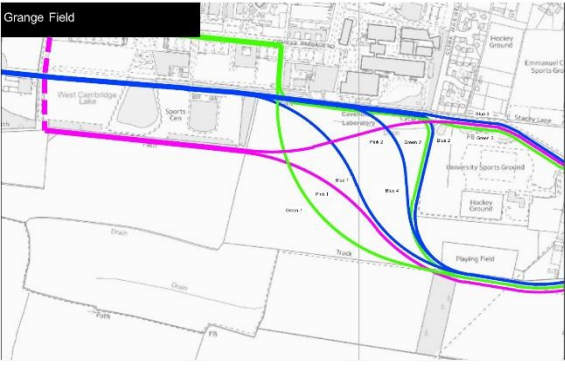
 <p>Transport Issues</p> <ul style="list-style-type: none"> Revised alignment for blue route in order to maintain network efficiency and minimise impact on Grange Field 	<p>Environment Issues</p> <ul style="list-style-type: none"> Of the southern routes, the Pink and Green have the greatest potential impact on the green belt Alignments heading to Adams Road or running around field edge have higher ecological impact <p>Planning/Property Issues</p> <ul style="list-style-type: none"> All route options will impact on Grange Field, with the amended blue route leaving the largest area to the south and minimising impact on the Green Belt and agriculture Pink route has greatest impact on West Fields
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Figure 9 – Grange Field

Section 5 – Grange Road & Beyond

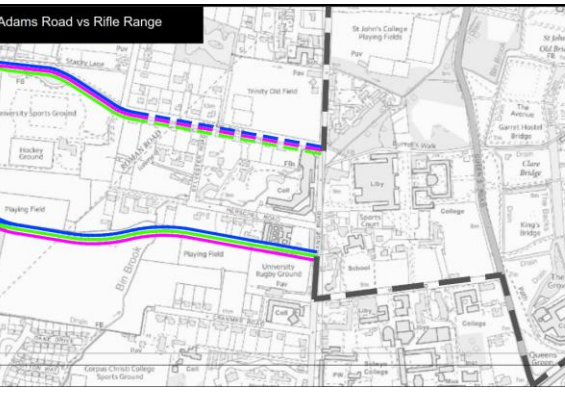
 <p>Transport Issues</p> <ul style="list-style-type: none"> Adams Road option will require a new signalised junction at Wilberforce Road. Rifle Range allows for segregated rapid transit infrastructure Rifle Range provides additional cycling and walking capacity to support West Cambridge. 	<p>Environment Issues</p> <ul style="list-style-type: none"> Adams Road offers less segregation and creates potential conflicts with cyclists and residents. Adams Road route may have an impact on the areas of high ecological value (e.g. ponds with possible newts). Rifle Range may have adverse impact on Trees (including 3 TPOs) and existing Landscape Local concern regarding potential flooding at Bin Brook (can be mitigated) <p>Planning/Property Issues</p> <ul style="list-style-type: none"> Rifle Range option requires a small part of the training area of the university rugby club. land owners St Johns College supports the Rifle Range option.
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Figure 10 – To Grange Road and beyond

10. Recommended Route Alignment

- 10.1 The summary conclusion of the assessment has concluded that, in considering the overall strategic objectives of the scheme which seeks to achieve HQPT while ensuring that local environmental quality is maintained and the applicants obligations are met to avoid, mitigate negative impacts and enhance the environmental where possible, the most effective SRA is as set out in **Figure 11**.

- 10.2 Landscape character and quality were carefully considered as part of the SRA assessment. Particular attention was paid to the West fields, which forms an important and sensitive part of the Greenbelt around Cambridge as part of this Assessment. So far as possible, the route follows the boundaries of the established open field pattern and integrates with the former Rifle Range tarmac track leading to Grange Road. The SRA route from Grange Field to the former Rifle Range track is recommended as a suitable merger of both landscape and ecological considerations. We recognise the need to mitigate ecological impacts and enhance biodiversity whilst retaining land use and landscape character, so far as possible. The final exact alignment will need to be subjected to further work with CPCA regarding the development of CAM and a detailed assessment as part of the EIA work, which would definitively assess the impact and potential benefit of mitigation options [shown as a dotted blue line on figure 11].
- 10.3 The SRA from Grange Field to the former Rifle Range track is required to attain consent to build and operate the proposed scheme (including integral cycle and walking provision) in its first year of opening of 2024. Further phased extension of the public transport network through the business case for CAM (anticipated SOBC from the CPCA due January 2019) would by means of a separate but complementary consent provide for tunnelled sections, which once in place would combine to provide even greater capacity and connectivity for Greater Cambridge residents, by public transport, walking or cycling.
- 10.4 This approach was endorsed by the independent review of the scheme by the Combined Authority subject to further work on the tunnel portal.

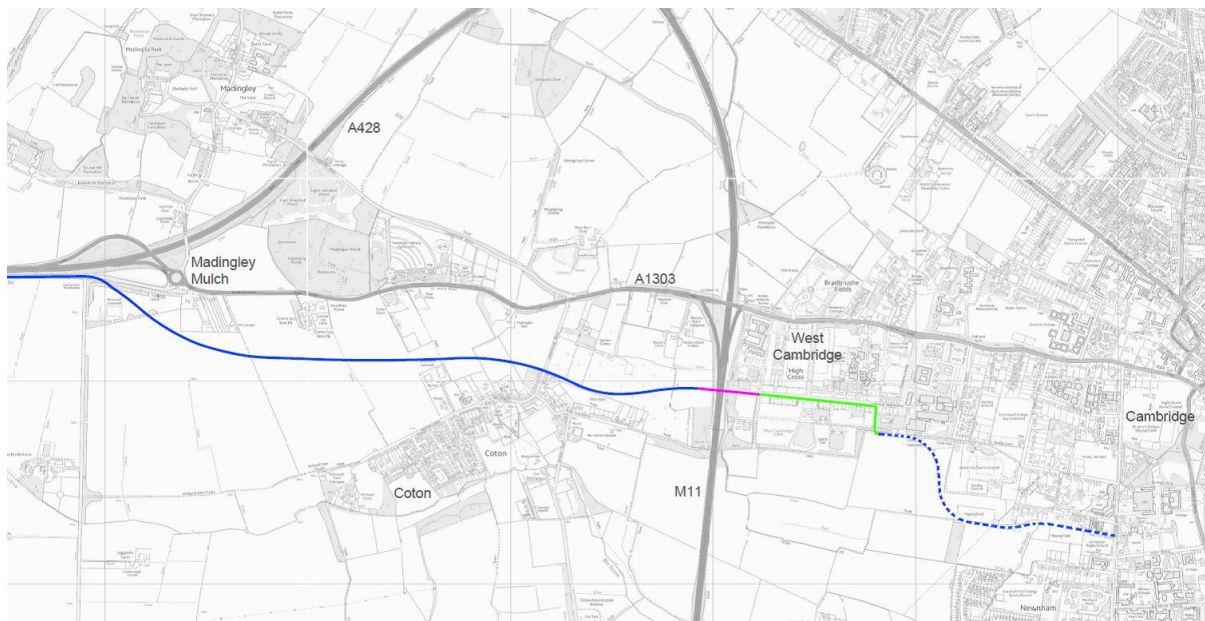


Figure 11 – Recommended Specific Route Alignment

11. Phase 2

- 11.1 There is planning policy requirement for new strategic high quality segregated public transport alignment through Bourn Airfield as part of any proposed new development of that site which is currently subject to a live planning application with the Local Planning Authority.
- 11.2 The Cambourne West development was approved in 2016. Cambourne West forms the western extent of the project and in partnership with Development Control officers in the Local Planning Authorities, the project team have worked with the Cambourne West

developer and local stakeholders to identify potential public transport improvements within Greater Cambourne to support current and future public transport services,

11.3 The catchment area identified for Phase 2 has been assessed as a new segregated public transport alignment. However, it may be feasible to deliver similar benefits using measures along the existing St Neots Road highway and as such, similar to Phase 1, a comparative assessment between on and off road options should be undertaken and offered for public consultation. This consultation would be based on 3 broad options and potential sub-option depending on further design. The broad options would be:

- A segregated HQTP route between Bourn Airfield roundabout and Madingley roundabout to the same or similar design specification as that proposed for Phase 1.
- On road bus priority measures including bus lanes and or gates in one or both directions along this section.
- A hybrid of both segregated and on road measures.

The range and type of interventions that could be considered for Phase 2 are summarised in Figure 12.

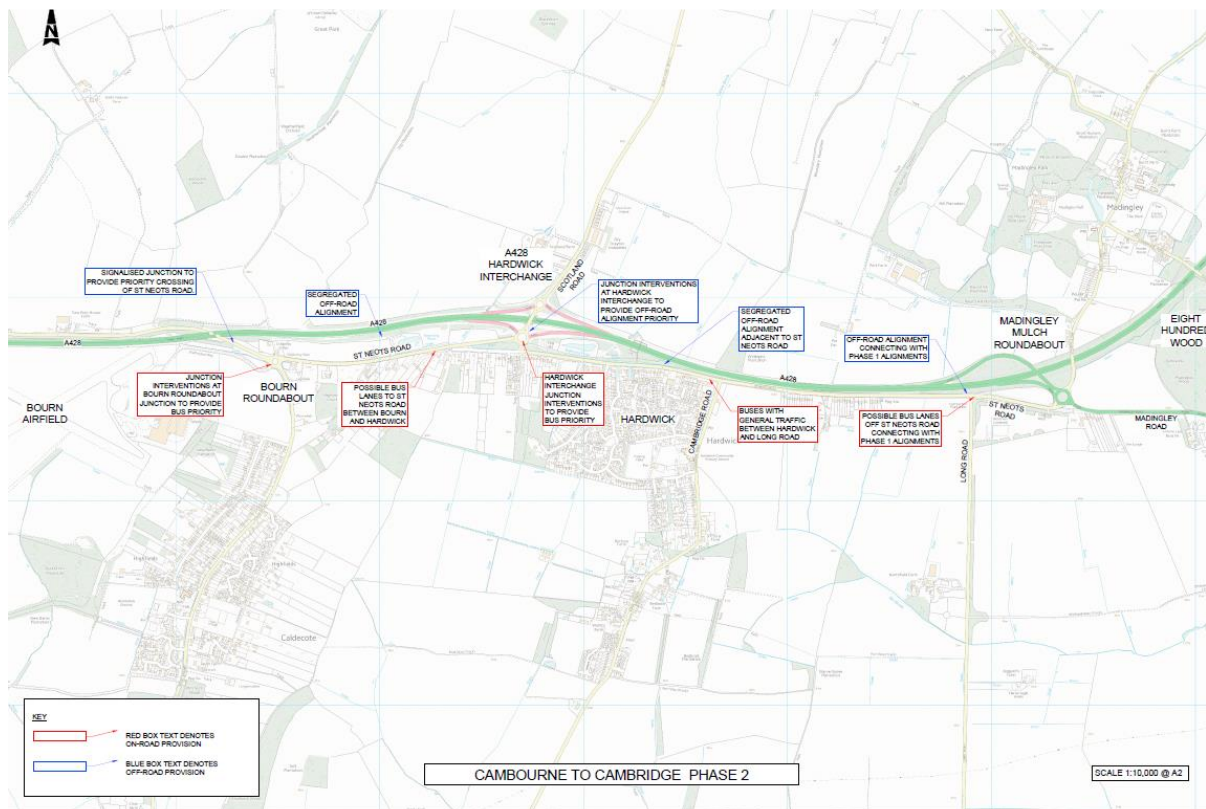


Figure 12 – Potential interventions Phase 2

11.4 A public consultation setting out options for Phase 2 is planned for early 2019. These options are summarised in Figures 13 to 15 below:

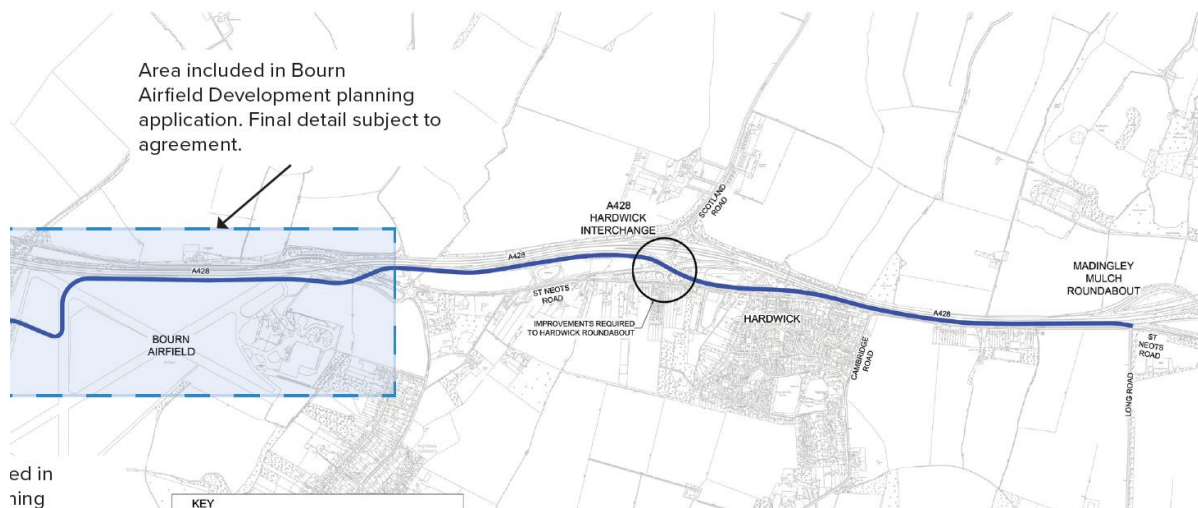


Figure 13 – Phase 2 Option 1 – Off Road Segregated Route from Bourn to Madingley Roundabout

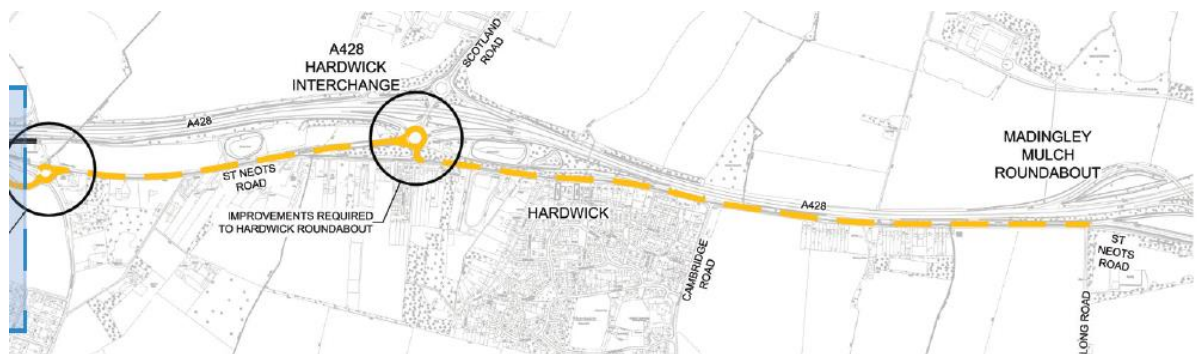


Figure 14 – Phase 2 Option 2 – Public Transport vehicles running with general traffic between Bourn and Madingley Roundabout

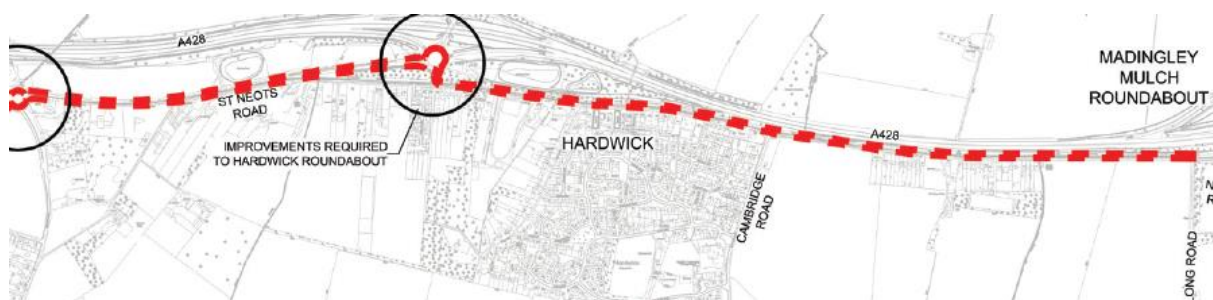


Figure 15 – Phase 2 Option 3 – Bus Lanes for Public transport vehicles between Bourn and Madingley Roundabout

11.5 The response received from the Phase 2 public consultation, will assist the further technical assessment of the available options and will inform the Full Outline Business Case to the Board.

Park & Ride

11.6 The existing Park & Ride on Madingley Road, close to M11 Junction 13 as a stand-alone service been very successful, showing consistent growth in patronage. Surveys undertaken for the SOBC suggest that the facility captures up to 45% of “in-scope” traffic passing the site. This indicates that the P & R service is attractive to car drivers because it provides a public transport option into Cambridge albeit from quite close in which is not the case with bus services that come from the Cambourne direction. The P & R service is however,

reaching capacity and passengers are increasingly experiencing difficulties in accessing the site due to its location and existing congestion on Madingley Rise and the M11.

- 11.7 The work to date assessed 2 potential locations for a P&R sites. The public consultation set out a clear majority of respondents in favour of Scotland Farm.
- 11.8 There remain a number of strategic issues which require fuller understanding before a final location is recommended as part of the emerging scheme for detailed development. These are:
- The specific interventions on Phase 2 and in particular the access and egress arrangements from the sites including interaction with the existing road network for both general traffic, P&R users and public transport vehicles including a potential traffic calming of St Neots Road.
 - The ongoing development of the CAM proposal and its integration with existing and new transport infrastructure.
- 11.9 On the basis of interdependency between the Phase 2 proposals and the P&R sites, it is considered that any final decision on the location of a Park & Ride should be made as part of the overall final defined scheme presented in the OBC.

12 Other Considerations

Madingley Road Cycling Improvements

- 12.1 As part of the public consultation the consultees suggested that there should be better walking and cycling provision along this section of the route therefore improved cycle provisions have been included as part of the post consultation do minimum option. This is also in line with the Local Transport Plan has a policy to improve cycling priority along Madingley Road.
- 12.2 The subsequent occupation of the Eddington site as well as potential expansion of the West Cambridge site also increase the case for complementary cycling improvements along Madingley Road, building on those already secured via the planning process.
- 12.3 As such, in the context of adherence to policy and as a response to the public consultation, it is proposed to develop a cycling project for Madingley Road and to develop proposals to improve the cycling network within the area. Officers will present a separate report on it to the Board for approval. Stakeholders proposed that any cycling and pedestrian improvements be entirely within the public highway with no third party land requirements. A series of concepts for further development are set out in **Figure 13**.

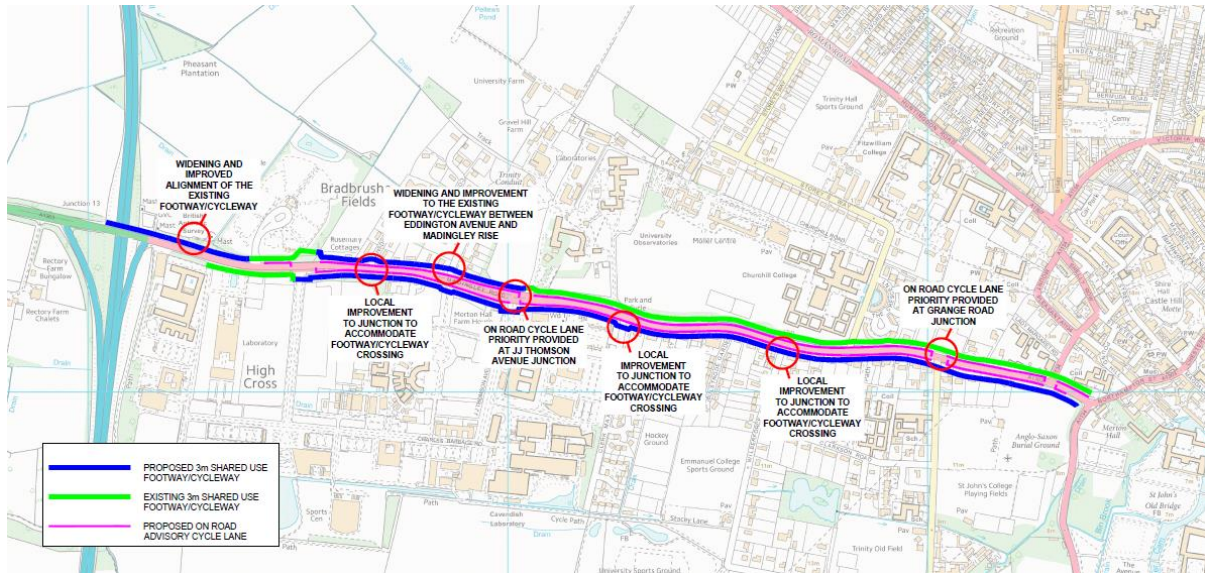


Figure 13: Concepts for cycling and pedestrian improvements along Madingley Road

13. Delivering a Scheme

Financial Case

- 13.1 Further refinement of option costs has been carried out since the SOBC and 2017 stage of project development. The current estimated capital cost of the current off-road option is £157.8m. The predicted costs and third party contributions are shown in Table 8 and builds upon the estimates previously provided for the Phase 1 works.
- 13.2 It should be noted that the financial case does not include Optimism Bias (currently 44%), which is used within the economic appraisal, but does include a risk allowance of 20%.

Cost Summary	SOBC Cost	Current estimate
Total Inc. Inflation	£141,700,000	£157,800,000
Developer Contributions	£0	£38,000,000
Net Total	£141,700,000	£119,800,000

Table 8: C2C Scheme Costs current vs SOBC

13.3 The estimated high level scheme costs at this stage of the project’s development are based on a number of assumptions and exclusions, which are detailed within the technical assessment work reported under Appendix 1 (The Interim Report). As would be expected there are some differences to the costs that were presented in the SOBC and subsequent reports, there are multiple reasons for this which include the following:

- Level of detail of schemes – the options have been developed further enabling the costs to be further refined;
- Option alignment work for Phase 2 (formally Option 3a) which has implications on costs; Optimised On Road (low cost comparator) which has a revised scope than previously costed;
- Information and data – further information on utilities, land assembly has been obtained; and
- Further indicative design work specifically related to the recommended option .

Funding

- 13.4 Funding for the project is intended to be sourced through the GCP and third party developer contributions through S106. 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. The total scheme costs for the scheme of £158m are deemed affordable based on successfully securing funding from the identified funding sources.
- 13.5 The estimated developer contributions shown above are dependent upon on-going assessments and negotiations and so are indicative at this stage. However, it is currently anticipated that between 20% and 25% of the scheme costs can be attributed to development.

Commercial Case

- 13.6 The Commercial element of the business case covers a range of commercial factors related to delivery of options. Examples are the issues associated with procurement, contractual risk etc. In the SOBC it was concluded that these commercial factors did not significantly differentiate between the options.
- 13.7 An initial procurement work stream has commenced for each option as currently defined there is a clear commercial strategy for the range of options currently under consideration. The procurement strategy will be influenced by further developments in options for example around vehicle guidance technology which would be further developed at the OBC stage in order to establish the applicable process for the application of powers and consents.
- 13.8 Operation and maintenance considerations also form part of the Commercial Case but at this stage do not offer a basis of differentiation between options.

Management Case

- 13.9 The Management section of the business case focuses on project delivery and management/governance arrangements in place. The management case also considers the planning process and legal powers necessary to undertake to build a scheme.
- 13.10 Broadly, as stated in the SOBC, the management case does not differentiate in terms of the options under consideration. This is based on a review of previous projects delivered by GCP authorities such as Cambridgeshire County Council and lessons learnt.
- 13.11 The GCP includes a governance structure via the Executive Board and a standard approach to project management including a standard project control framework. A project management team exists with defined roles and responsibilities. A series of commercial contracts are in place with third party suppliers (designers, consultants, legal advisors etc.) which are managed by the project team. The GCP Assembly reviews projects at the strategic level prior to recommendations being presented to the Executive Board. An Assurance Framework exists between central Government and GCP in terms of project prioritisation and delivery.
- 13.12 The management case also identifies the key risks and mitigations for the project.

Public Consultation and Engagement

- 13.13 The management case reviews the process of public consultation and engagement. Public and stakeholder consultation is essential to ensure that the various aspirations of the general public and key stakeholders are taken into account throughout development and delivery of the project and to manage the communication and flow of information relating to

the project. A communication plan sets out how this process is managed, identifying key stakeholders and how engagement is managed including the facilitation of a project specific Local Liaison Forum.

- 13.14 There have been 2 major public consultations as part of project development to date and the details of this and how it has informed the option assessment process are set out further in Appendix 1.

14 Summary

- 14.1 This report updates on the ongoing development of the Business Case toward a recommended Option for the C2C project. The report has detailed the outcomes of the public consultation on developing options in 2017-18 and the technical assessment work carried out in the context of the '5 Cases' business case methodology.
- 14.2 The ongoing business case assessment reaffirms the findings of the previous stages, that there remains a strong strategic case to undertake a major transport infrastructure project from Cambourne to Cambridge based on both current and projected transport demand along the corridor, given the GCP objectives to promote sustainable economic growth and reduce congestion.
- 14.3 The report has also identified a recommended alignment for a rapid transit route for Phase 1 between Madingley Roundabout and Grange Road. The route alignment from Grange Field to Grange Road passes through the West fields a sensitive part of the Greenbelt around Cambridge which will be reflected in the further design development of the scheme and subject to ongoing dialogue with the CPCA as part of the development of the CAM network.
- 14.4 Further assessment work and refinement is required and as such further business case development to the OBC will continue and be aligned with CAM.

15 Next Steps and Milestones

- 15.1 This report has updated the Joint Assembly on the ongoing development of the Business Case toward a recommended Option for the Cambourne to Cambridge Better Public Transport Project. The report has detailed the outcomes of the public consultation and stakeholder engagement on developing options in 2017-18 and the technical assessment work carried out in the context of the WebTAG '5 Cases' business case methodology.
- 15.2 The ongoing work for the project would include the following key elements as set out in Table 9 below, this includes a formal scheme consultation in 2019.
- 15.3 A report seeking a final decision on the scheme, including both Phase 1 and Phase 2 route alignments and the Park & Ride location will be brought to the Board in October 2019.

Task	Commentary	Timescale
CAM SOBC	Complete the SOBC evaluation	Jan 2019
Public Consultation	A public consultation on the options for Phase 2 including a P&R location.	Early 2019
OBC to Executive Board	The Board will be presented with the Full OBC for selection of a single option between Cambourne and Cambridge and P&R site.	October 2019

Prepare and submit application for statutory consent	The power to construct the scheme is likely to come from a Transport and Works Act Order which would be determined by the Secretary of State for Transport. This process is likely to include a Public Inquiry directed by an independent Inspector	Submit application Mid 2020 with a determination period estimated of around 18 months – completed in late 2021
Seek authority to construct project	Following the completion of the statutory permissions stage, the Board will be presented with the Final Business Case for approval. This will trigger the construction of the project.	2021 depending on statutory powers process
Opening of the scheme to operational services	Planned opening	Planned for 2024

Table 9 – Indicative Programme