Waterbeach to Cambridge Public Transport Scheme

Outline Business Case

The Greater Cambridge Partnership

August 2023

2.0

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1. Introduction

1.1. About the scheme

Atkins has been commissioned by the Greater Cambridge Partnership (GCP) to undertake a study to explore the options to deliver the most effective public transport connections between the proposed Waterbeach New Town and Cambridge.

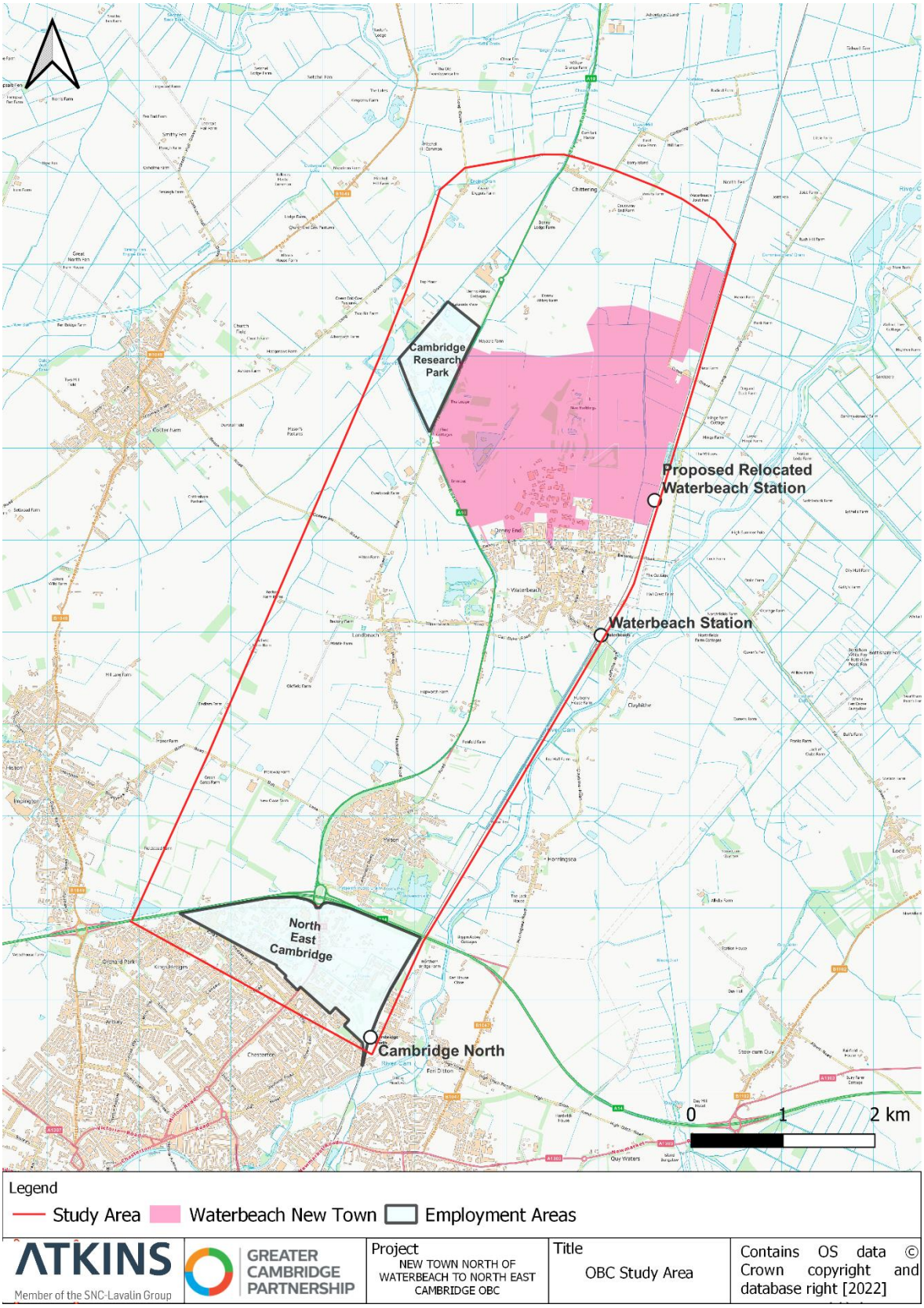
The objective of this study is to identify interventions in the corridor that contribute to local policy objectives to ensure that employment and residential growth can be accommodated without increasing motor traffic levels within Cambridge and the scheme area. The intention is to progress a busway scheme along the Waterbeach to Cambridge corridor. This element of the study includes preparation of an Outline Business Case (OBC) (this document) for this scheme, which builds upon the Strategic Outline Case (SOC), published in May 2021[1]. This OBC provides a detailed assessment of two route options identified through previous stages of work.

1.2. Scheme area

The scheme area was determined by GCP at the SOC stage and is shown in Figure 1-1. This study also takes account of schemes across a wider area where these could affect the deliverability or effectiveness of the scheme. Although options for a busway route on or east of the A10 were discarded at the SOC stage, the same study area has been retained in the OBC to focus the analysis and appraisal of the scheme within the identified Waterbeach to Cambridge corridor.

[1] Strategic Outline Business Case produced in May 2021 in line with TAG. This stage of scheme development is now called Strategic Outline Case (SOC) and will be referred to as SOC throughout this document.

Figure 1-1 - Study area



1.3. Structure and purpose of an OBC

The OBC is the second phase in the Business Case process. As defined by the Department for Transport's (DfT) '*Transport business case guidance*'[2] this document "*checks and, where satisfactory, reconfirms the conclusion made in the SOC and concentrates on detailed assessments of the short-listed options to find the optimum solution*".

An economic appraisal has been provided in line with the DfT's Transport Analysis Guidance (TAG) and HM Treasury's (HMT) Green Book guidance. Work undertaken prior to the commencement of the OBC has formed the basis for updating assumptions regarding uncertainty in the area, such as the proposed A10 scheme. These assumptions are set out in section 2.4. A comprehensive Value for Money (VfM) statement has been provided within the Economic Dimension, considering level 1, 2 and 3 benefits.

The Financial Dimension has been developed in line with TAG; it presents a full breakdown of the cost of the scheme including quantified risk. Budget and funding cover has also been considered.

The Management and Commercial Dimensions have also been updated since the SOC to reflect the advancement in scheme development. Elements of these dimensions that were covered at SOC stage such as the Procurement Strategy, Risk Management Strategy and the Project Plan have been updated with full details. Consideration has also been given to elements of these dimensions that will be addressed in full at the next stage of scheme development, the Full Business Case (FBC), to provide an indication of the full Commercial and Management issues related to the scheme.

With the above in mind, the primary aim of this document is to demonstrate that the scheme presents an economically and financially viable transport investment.

1.4. Structure of this report

The remainder of this report is as follows:

- Chapter 2 outlines the Strategic Dimension;
- Chapter 3 outlines the Economic Dimension;
- Chapter 4 outlines the Financial Dimension;
- Chapter 5 outlines the Commercial Dimension; and
- Chapter 6 outlines the Management Dimension.

[2] Department for Transport (2022), *Transport business case guidance,* https://www.gov.uk/government/publications/transport-business-case

2. Strategic Dimension

This chapter sets out the Strategic Dimension for the scheme. The objective of the Strategic Dimension is to provide evidence that an investment is needed, either now or in the future. At Outline Business Case (OBC) stage, the Strategic Dimension largely confirms and updates findings presented in the Strategic Outline Business Case (SOC) and provides more detailed assessment on the proposed scheme as it is developed. Table 2-1 sets out the guidance for Strategic Dimension content at OBC stage, as set out in the DfT guidance[3].

Table 2-1 - Elements included within the OBC as per the DfT guidance

Strategic dimension content	Contents in outline business case guidance	Status at OBC stage
Business strategy	A business strategy outlining the context for the Business Case	Update
Case for change	A section identifying the problem to be solved	Update
Growth and development	A section describing the impact of not changing from the existing conditions	Update
Scheme objectives	The objectives that will solve the problem identified	Update
	The measures that will define successful delivery of the objectives	Update
Scope of the scheme	The scope of the project and what is out of scope	Update
Risks and constraints	High level internal and external constraints	Complete
	Internal and external factors upon which the successful delivery of the project depends	Complete
Stakeholders	Main stakeholder groups and their contribution to the project, noting any potential conflict between stakeholders	Complete
Option development	The options identified to solve the problem and an evaluation of their impact on the proposal's objectives and wider policy objectives	Complete

2.1. Business strategy

2.1.1. The role of the Greater Cambridge Partnership

The Greater Cambridge Partnership (GCP) is the local delivery body for a City Deal with central Government, bringing powers and investment, worth up to £500 million over 15 years. The aim of the City Deal Fund is to:

[3] Department for Transport (2022), *Transport business case guidance,* https://www.gov.uk/government/publications/transport-business-case

- Deliver improvements in infrastructure, supporting and accelerating the creation of 44,000 new jobs, 33,500 new homes and 420 additional apprenticeships[4]; and
- Enable growth in the Greater Cambridge area, by investing in infrastructure to sustainably unlock housing and jobs, which would encourage economic development.

The GCP has developed an assurance framework which establishes the responsibilities, processes and principles that will underpin delivery of the City Deal transport schemes. The Greater Cambridge authorities will prioritise projects that will deliver against four key strategic objectives:

- *"To nurture the conditions necessary to enable the potential of Greater Cambridge to create and retain the international high-tech businesses of the future;*
- *To better target investment to the needs of the Greater Cambridge economy by ensuring those decisions are informed by the needs of businesses and other key stakeholders such as the universities;*
- *To markedly improve connectivity and networks between clusters and labour markets so that the right conditions are in place to drive further growth; and*
- *Ease the labour market by investing in transport and housing, in turn allowing a long-term increase in jobs emerging from our internationally competitive clusters and more university spin-outs."*[5]

This OBC, and in particular this Strategic Dimension, demonstrates that the proposed Waterbeach to Cambridge Public Transport Scheme supports all four strategic objectives.

GCP Network

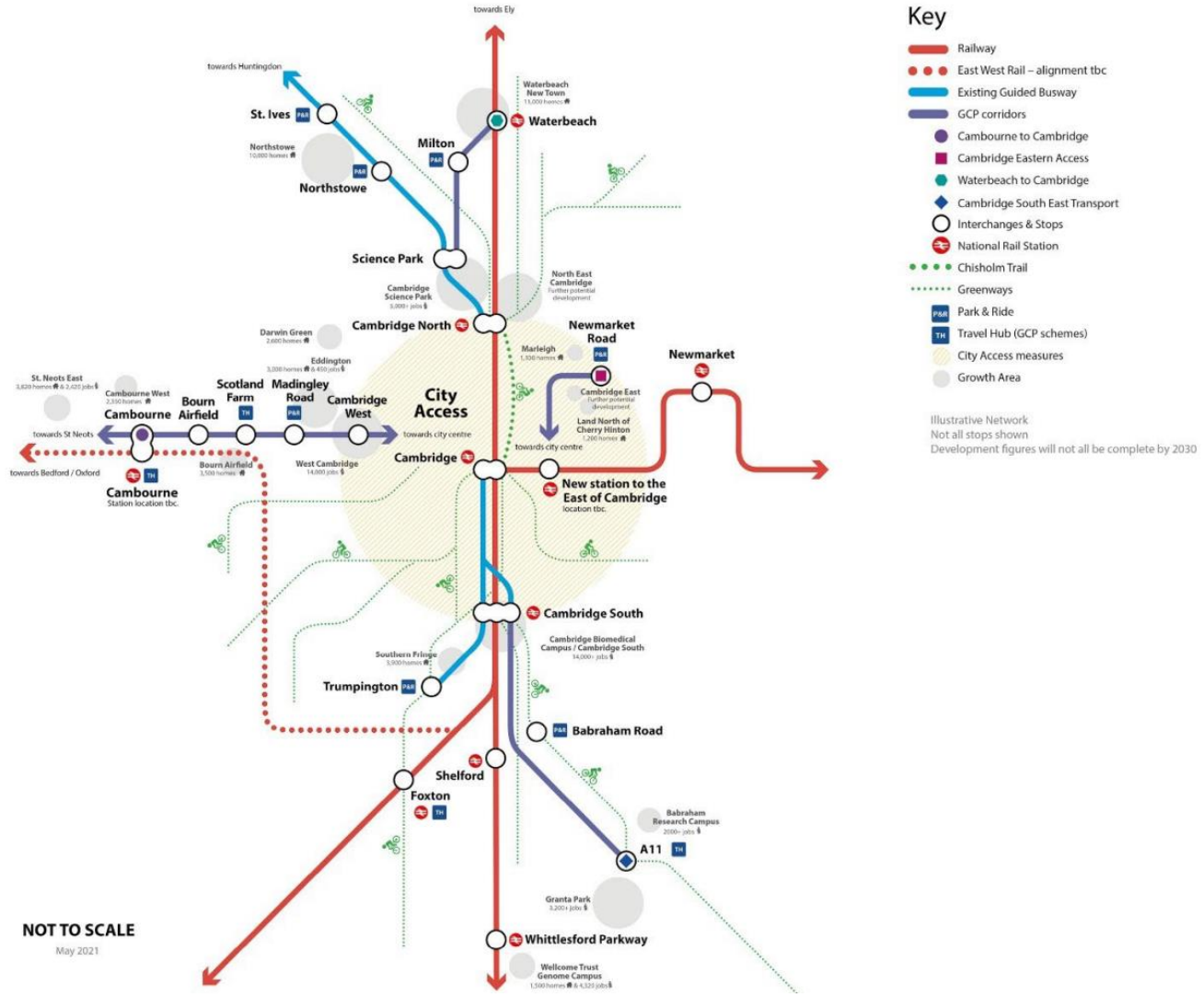
The GCP programme has been developed using an extensive evidence base and is designed to support sustainable economic growth and the accelerated the delivery of the Local Plan, as well as enabling a broader transformation in the way people in the Greater Cambridge area move and travel, supporting the transition to zero carbon and creating a more inclusive economy. The GCP's vision for a future travel network is particularly important in achieving a green recovery from the Covid-19 pandemic, with sustainable transport options vital to enable communities to access work, study and other opportunities the city-region has to offer.

To create a more sustainable network for the future, reduce congestion, improve air quality and reduce carbon emissions, significantly more people need to travel by public transport, cycling and walking with significantly fewer people travelling by car. Figure 2-1 sets out the future sustainable transport network for Greater Cambridge and how this will be substantially enhanced over the next decade, forming a cohesive network throughout Greater Cambridge and further afield.

[4] Greater Cambridge Partnership (2021) *Our Vision* https://www.greatercambridge.org.uk/ [Accessed 25.04.2022]

[5] Greater Cambridge Partnership (No Date) Governance-Assurance-Framework-2022 (greatercambridge.org.uk) *Greater Cambridge City Deal* [Accessed 27.09.2022]

Figure 2-1 - Greater Cambridge Network (2030) map[6]



2.1.2. GCP objectives

GCP's overarching objectives

The GCP has identified three key objectives to provide direction and framework for investment as well as addressing national, regional and local policy. These are as follows:

- Accelerate delivery of 33,500 planned homes;
- Deliver over 400 new apprenticeships for young people; and
- Create 45,500 new jobs.

Addressing the spatial challenge of Greater Cambridge through infrastructure investment is a top priority. Therefore, Greater Cambridge will undertake an ambitious programme to enhance transport capacity in the area. The backbone of the proposed strategy is a transport network to link areas of population and employment within the City Deal area. This will transform connectivity and will allow significant increases in bus and cycle use that will maximise the capacity for movement, particularly within the historic core of Cambridge.

[6] Greater Cambridge Partnership (No Date) Governance-Assurance-Framework-2022 (greatercambridge.org.uk) *Greater Cambridge City Deal* [Accessed 27.09.2022]

The proposed Waterbeach to Cambridge Public Transport Scheme supports these objectives, as the scheme would improve public transport capacity within the corridor, connect communities with jobs and education by quicker, more frequent and more reliable public transport journeys. It will enhance new and existing communities, including Waterbeach and Waterbeach New Town, by reducing emissions, car trips and ensuring the proposed routes are as safe as possible.

Summary of business strategy

To achieve the objectives outlined above, GCP has set a 10-15% traffic reduction target against 2011 traffic levels. They have a programme of sustainable transport interventions, comprising the proposed Making Connections package, four public transport corridor schemes and active travel schemes including the Greenways programme. This scheme is one of the four public transport corridor schemes and is supported by the Milton Road and Histon Road schemes which has aims to further increase sustainable travel in the southern part of the scheme study area. The scheme is part of a wider multi-modal corridor approach between Waterbeach and Cambridge, including a Greenway and the relocation of Waterbeach Railway Station, to maximise sustainable travel on the corridor. Therefore, the scheme is directly part of the overall strategy, delivering standalone benefits and also contributing to the success of the wider corridor package.

2.2. Policy background

A local policy review was conducted prior to the production of the SOC to understand the wider political context and support for interventions within the study area.

Policy background at SOC stage

The SOC review is set out in Appendix A of the Option Appraisal Report[7] (OAR). As part of this review, the following policy documents were reviewed:

- The South Cambridgeshire Local Plan (2018);
- The Cambridge Local Plan (2018);
- The Cambridgeshire and Peterborough Local Transport Plan (LTP) (2020);
- The Cambridgeshire and Peterborough Interim Local Transport Plan (2017);
- The Cambridgeshire Local Transport Plan 2011-2031 (2015);
- The Cambridgeshire Local Transport Plan 2011-2031: Long Term Transport Strategy (2015);
- The Transport Strategy for Cambridge and South Cambridgeshire (2014);
- The Waterbeach Supplementary Planning Document (2019); and
- The North East Cambridge Area Action Plan (2020).

The policy review showed that the Waterbeach to Cambridge Public Transport Scheme strongly supports local policy, as it will help to facilitate economic growth, create safer and more attractive communities, provide real transport choice through which to reduce reliance on the car and the impact of travel on the environment.

Updated policy since the SOC stage

New policies and strategies relevant to the scheme have been published following the publication of the OAR, namely:

- **England's Economic Heartland – Transport Strategy (Summer 2020)[8]**: A new sub-regional strategy to improve connectivity to support the 'Green Recovery' from the Covid-19 pandemic and to support new zero carbon emission targets. Some key aspects of the strategy include:
  - Harnessing the region's expertise in clean technologies to deliver a greener transport system;
  - Investment in East West Rail and mass transit systems such as the Milton Keynes Mass Rapid Transit system as a catalyst for transforming public transport across the Heartland;
  - Championing digital technologies to make transport smarter; and
  - Improving local and rural connectivity.

[7] Atkins (2020) New Town North of Waterbeach to North East Cambridge Public Transport Study. Option Appraisal Report

[8] England's Economic Heartland (2020) *Regional Transport Strategy* https://eeh-prod-media.s3.amazonaws.com/documents/Connecting_People_Transforming_Journeys_av.pdf

The Waterbeach to Cambridge Public Transport Scheme will provide improved connectivity for communities in the study area for onward travel throughout England's Economic Heartland.

- **Emerging New Joint Greater Cambridge Local Plan**: Following the adoption of both the Cambridge and South Cambridgeshire Local Plans, both authorities commenced a review and the production of a new joint Greater Cambridge Local Plan spanning both local authority areas, to plan and allocate sites more effectively over the region. The Plan is currently at the 'First Proposals' stage, with a public consultation undertaken in late 2021. The new Greater Cambridge Local Plan is for a period up to 2040, and possibly beyond[9].
  - **The Greater Cambridge Local Plan First Proposals** sets out Waterbeach New Town and North East Cambridge (NEC) as major development sites, with potential for intensification of development through faster housing delivery rates, in the next local plan period, strengthening the case for the scheme in order to achieve sustainable development[10].
- **National Bus Strategy: Bus Back Better (May 2021)**: The Department for Transport has previously published the National Bus Strategy which outlines the Government's vision to improve bus services in England in order to reverse the recently observed shift away from public transport. This requires Local Transport Authorities to work closely with local bus operators and communities to deliver high quality bus services. As such a Bus Service Improvement Plan (BSIP) outlines how Local Transport Authorities, local bus operators and communities will work collaboratively to improve and enhance their local bus service in line with the National Bus strategy objectives.
- **Cambridge & Peterborough Combined Authority (CPCA) – Bus Service Improvement Plan for Cambridgeshire and Peterborough**: In line with the National Bus Strategy the CPCA have derived a BSIP to ensure that everyone has an equal opportunity to travel. The key objectives of the CPCA BSIP are as follows:
  - Public transport should be an attractive mode of travel which competes with the private vehicle;
  - The bus network should support sustainable growth;
  - The bus network should support, protect and enhance the environment;
  - The bus network should support the health and well-being of the population; and
  - The bus network should provide equal opportunity to travel for all.
- **Cambridgeshire and Peterborough Combined Authority (CPCA) – Draft Local Transport and Connectivity Plan (May 2022)[11]**: In response to local and national changes in government and policy, the CPCA LTP, first published in 2020, was updated and re-issued as the Draft Local Transport and Connectivity Plan (LTCP) to acknowledge the role of digital connectivity in transport. The six overarching goals outlined in the LTCP are:
  - Productivity: giving employers and people the means to be more efficient and innovative;
  - Connectivity: people and communities are brought closer together, giving more opportunity for work, education, leisure and pleasure;
  - Climate: successfully and fairly reducing emissions to net zero by 2050;
  - Environment: protecting and improving green spaces;
  - Health: improved health and wellbeing enabled through greater access to healthier journeys; and
  - Safety: to prevent all harm by reducing risk and enabling people to use the transport system with confidence.

  Specifically in relation to Cambridge, the Draft Local Transport and Connectivity Plan identifies that the GCP Making Connection scheme as well as the corridor schemes, including Waterbeach to Cambridge are required to sustainably deliver planned growth. Together these schemes "*form the basis of developing a cohesive, people-focused sustainable transport system for the entire city*"[12]. The Plan emphasises the importance of a coordinated approach, identifying that demand management, delivered through the GCP's Making Connections proposals, will free up road space for public transport priority and active travel

[9] Greater Cambridge Shared Planning (2020) *The First Conversation* Page 4.

[10] Greater Cambridge Shared Planning (2021) *Greater Cambridge Local Plan* Page 31

[11] Cambridgeshire and Peterborough Combined Authority (2022) *Draft Local Transport and Connectivity Plan*

[12] Cambridgeshire and Peterborough Combined Authority (2022) *Draft Local Transport and Connectivity Plan Page 78*

infrastructure as well as generating revenue to allow further improvements to the number, quality and coverage of bus services, including reduced fares. This shows how a coordinated package of demand management and transport infrastructure intervention can provide the most effective network and lead to further improvements, funded by the demand management itself.

The scheme aligns with the overarching goals set out in the CPCA LTCP and the objectives of the CPCA BSIP, as it will provide segregated sustainable travel options in the corridor which will help to reduce reliance on private car use, increase healthier journeys and connect more settlements to major employment clusters in the area.

The CPCA LTCP sets out the following characteristics of an integrated transport system required to meet the goals set out above:

- Integrated and seamless interchanges between modes;
- Accessible travel and spatial planning;
- High-quality and effective digital connectivity through the region;
- Investment in high quality public realm;
- Safe and attractive walking and cycling infrastructure;
- Efficient highway network that accommodates the needs of all users;
- Accessible, affordable, reliable, and frequent public transport; and
- Innovative new transport modes.

Through effective stop placement and the provision of active travel along the corridor, including tie-in with Mere Way, Milton Park and Ride site, and upgrading links from key travel markets, it is considered that the scheme will represent a safe and attractive integrated travel option that accommodates the needs of all users.

The placement and the design of busway stops will be such that the scheme is accessible to all and will provide a reliable service by utilising the segregated busway corridor and bus priority in Cambridge and Waterbeach New Town, where possible.

- **Emerging Draft Active Travel Strategy for Cambridgeshire:** Cambridgeshire County Council (CCC), in agreement with CPCA, is developing an Active Travel Strategy for the County which will sit under the LTCP to provide policy guidance for future active travel schemes in the County.
  - **Policy AT05: 'Prioritisation of user hierarchy'** states that: 'active travel modes are at the top of the hierarchy and should be a focus of all policies and schemes, ensuring they are provided for appropriately and not adversely impacted'; and
  - **Policy AT06: 'All highway improvement schemes must consider active travel'** states that: 'along new transport routes such as major highway improvements, transport corridors and new busways, dedicated and generous parallel NMU (non-motorised user) facilities should be provided as standard along the full length, and connected to wider existing infrastructure.'

Policy conclusion

The review of the updated policy provides evidence that the Waterbeach to Cambridge Public Transport Scheme will provide improved connectivity for communities within the area for onward travel throughout England's Economic Heartland, aligns with the visions of the Emerging New Joint Greater Cambridge Local Plan and BSIP, and supports the overarching goals set out in the CPCA LTCP and Emerging Draft Active Travel Strategy for Cambridge. Therefore, demonstrating that the scheme is still viable in terms of the evolving policy and even more valuable under the emerging new local plan.

Policy growth areas

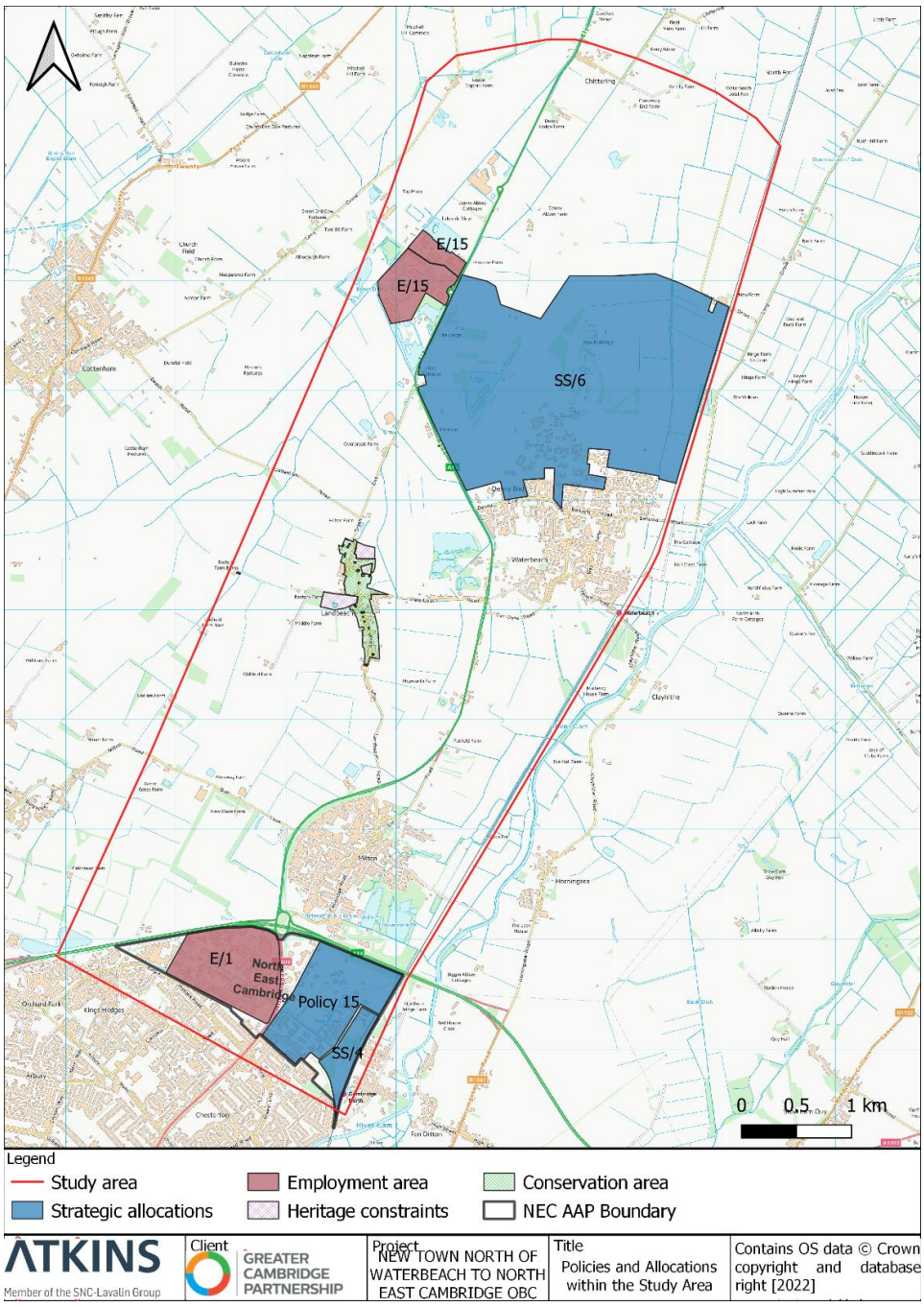
Extensive growth

A recurring theme area of these documents is the extensive proposed growth in the study area. The Cambridge and South Cambridgeshire Local Plans identify a need for 33,000 homes and 44,000 jobs by 2031 and the study area has been identified as a key area in which to contribute towards this growth. Development sites include:

- Waterbeach New Town (up to 11,000 homes[13]), identified under Allocation SS/6; and
- North East Cambridge (up to 17,000 new homes and 14,000 new jobs), identified under Allocation SS/4 and Policy E/1, which includes:
  - Redevelopment and intensification of existing employment centres in NEC (Cambridge Science Park, Cambridge Business Park, Trinity Hall Farm Industrial Estate, St John's Innovation Park); and
  - Mixed-use development of the Cambridge Waste Water Treatment Plant.

The locations of these sites and other relevant allocations and policies are shown in Figure 2-2. Further details on the major developments are in section 2.3.

Figure 2-2 - Location of key allocation and policy sites

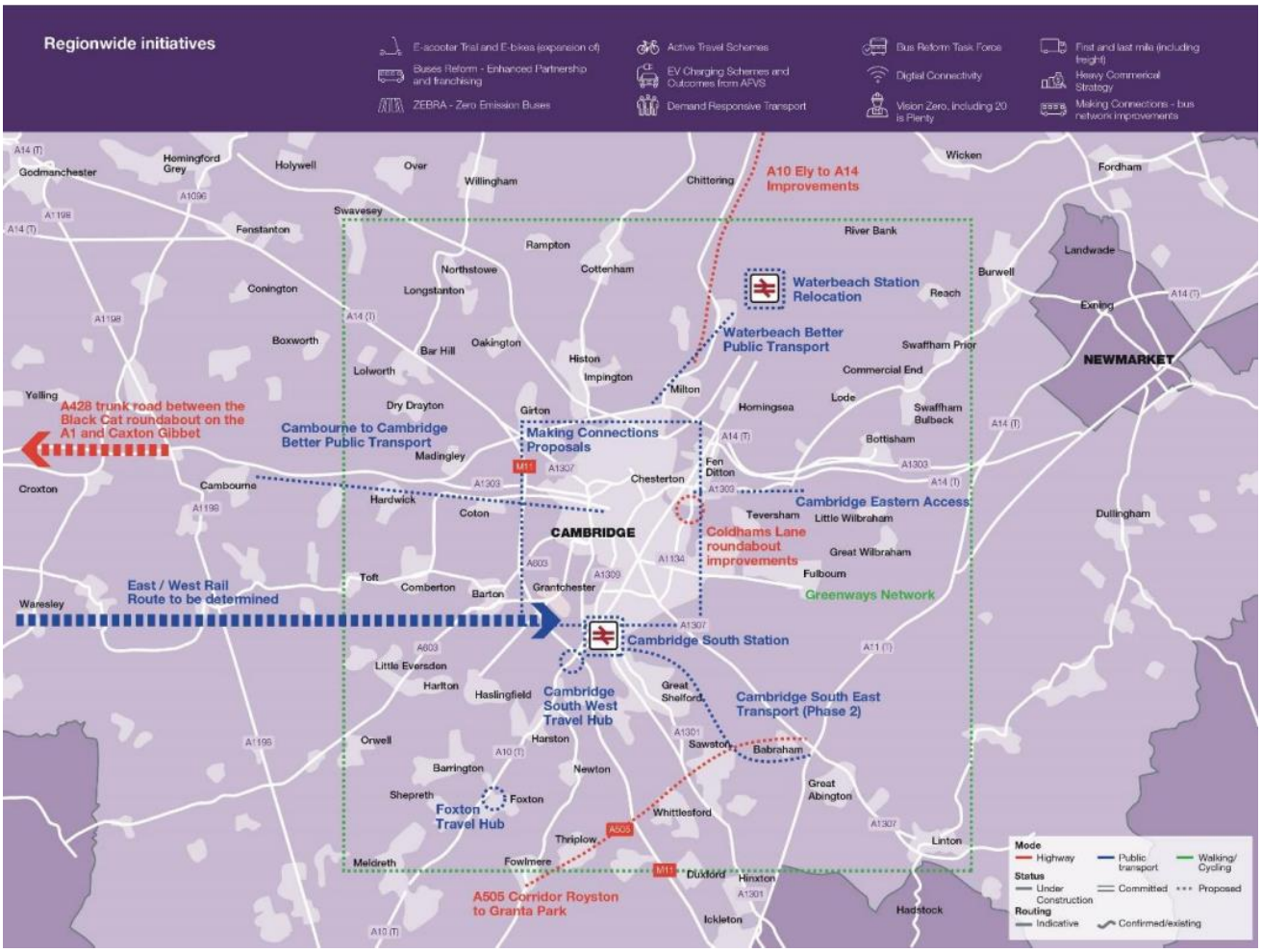


[13] Urban&Civic website: https://www.urbanandcivic.com/projects/strategic-sites/waterbeach-barracks/site-details and RLW estates website: http://www.waterbeach.co.uk/post.php?s=2018-06-05-planning-application-submitted-by-rlw-estates-for-up-to-4500-homes-at-waterbeach

Sustainable transport to solve existing problems

Another key policy area is the need for sustainable transport to solve existing congestion and connectivity issues in the study area, and to enable this growth to occur. The CPCA LTP identifies that public transport, walking and cycling need to be significantly upgraded to improve people's journeys into and around Greater Cambridge and reduce car dependency[14]. Figure 2-3 shows the key transport projects in Greater Cambridge from the CPCA Draft Local Transport and Connectivity (LTCP) that aim to overcome the challenges faced by the Cambridge region.

Figure 2-3 - Key projects in Greater Cambridge[15]



Public transport schemes are represented in blue and a new Park and Ride on the A10 is also identified in the LTP, as is an expansion at the existing Milton Park and Ride site. This shows that the Waterbeach to Cambridge scheme is a key part of the CPCA vision for Greater Cambridge in order to overcome existing challenges. The latest LTCP also recognises that the Cambridge Autonomous Metro (CAM) network will no longer be developed, therefore identifying the gap that needs to be filled by other sustainable transport infrastructure.

Decarbonisation

The strong message coming through all the policy documents published since the publication of the OAR is the impact that our transport network is having on our climate. The documents emphasise the need to decarbonise our transport network, which is the single largest contributing sector to Greenhouse Gas (GHG) emissions in the UK (27% of GHG emissions in 2019, excluding international aviation and shipping)[16].

[14] Cambridgeshire and Peterborough Combined Authority (2020) *The Cambridgeshire and Peterborough Local Transport Plan* [Page 94]

[15] Cambridgeshire and Peterborough Combined Authority (2022) *The Draft Local Transport and Connectivity Plan* [Page 82]

[16] *BEIS: 2019 UK Greenhouse Gas Emissions, National Statistics.*

For the UK to meet its commitment to limit GHG emissions as part of global efforts to limit climate change set under the Paris Agreement, rapid and significant reductions in transport carbon emissions will be needed over the next decade. For instance, the Climate Change Committee estimate that a 70% reduction in surface transport operational emissions will be required between 2019 and 2035 in order to meet the Government's most recent carbon reduction commitment.

In July 2021 the DfT published their Transport Decarbonisation Plan, 'Decarbonising Transport, a better, greener Britain', which sets out the industry's path to Net Zero supported by commitments, actions and a programme for its implementation. A number of these commitments align with the Waterbeach to Cambridge scheme objectives and show how the scheme can contribute to decarbonisation of transport in the Greater Cambridge region, as shown in Table 2-2.

Table 2-2 - How the Waterbeach to Cambridge scheme supports the DfT's decarbonisation commitments

Commitment	How the Waterbeach to Cambridge scheme supports the commitment
Increasing Walking and Cycling	
We will deliver a world class cycling and walking network in England by 2040	By providing LTN 1/20[17] compliant walking and cycling infrastructure alongside the busway and also connecting to key origins and destinations along the route
Zero Emission Buses and Coaches	
We will support delivery of 4,000 new zero emission buses and the infrastructure needed to support them	The vehicles proposed for the services are electrically powered
A zero-emission fleet of cars, vans, motorcycles and scooters	
We will ensure the UK's charging infrastructure meets the demand of users	EV charging infrastructure will be provided at Park and Ride sites
Multi-modal decarbonisation and key enablers	
We will take forward measures to transform 'last mile' deliveries	Park and Ride sites have potential to include 'click-and-collect' facilities and have the potential to act as hubs for delivery consolidation
Delivering decarbonisation through places	
We will support decarbonisation by investing more than £12 billion in local transport systems – including those related to decarbonisation such as reducing congestion and improving air quality	The core aims of the scheme to increase trips by sustainable modes, therefore reducing congestion and poor air quality from emissions, directly support the decarbonisation commitments

The Transport Decarbonisation Plan also provides Local Authorities with a framework for refreshing their Local Transport Plans. For example, the CPCA LTP is currently being refreshed to reflect a number of climate and sustainability related advances since the finalisation of the adopted LTP in 2020. The draft LTP:

- Recognises the importance of digital connectivity as well as physical connectivity through transport. Digital connectivity also plays a role in transforming our transport network in light of the climate challenge;
- Reflects the recommendations from the Cambridgeshire and Peterborough Independent Commission on Climate on how to decarbonise the region;
- Has a refreshed focus on sustainable economic growth;
- Reflects the DfT Transport Decarbonisation Plan; and
- Reflects the Governments national walking and cycling policies.

[17] Department for Transport (July 2020) *Local Transport Note 1/20 Cycle Infrastructure Design*

CCC have also set out their target to become Net Zero by 2045. One aspect of their vision is that "*Our health will be better, and we will have easy access to sustainable, local transport and green space*"[18]. To achieve this, a number of priority areas have been identified including "*Low Carbon Transport: prioritising walking, cycling and public transport, and supporting the uptake of electric vehicles"*[19]. This focus area is centred around the application of the Transport Hierarchy within the DfT's Decarbonisation Plan which places 'walking and wheeling', 'cycling', and 'public transport' at the top. An Action Plan[20] sets out measures that contribute to each of the priority areas. For transport this includes:

- Collaborative working between CPCA, CCC, GCP and the district councils to provide EV charging infrastructure to those without access to off-street parking; and
- Working in partnership with strategic transport partners to ensure that new schemes promote the travel hierarchy and contribute to carbon reductions.

The Waterbeach to Cambridge scheme is strongly aligned to the decarbonisation policy at both a national and local level. The aims of the scheme related to reducing car km travelled, levels of congestion and increasing use of sustainable modes, are at the core of national and local policy guidance. Alongside the overall aims of the scheme and the infrastructure itself, there is also scope for:

- Provision of EV charging points at Park and Ride sites to provide access for EV's for those who don't have charging infrastructure at their place of residence or work;
- Delivery consolidation points and click-and-collect services to reduce the number of vehicle trips on local roads;
- Flexible working space to reduce the need to travel; and
- Carbon reduction techniques and sustainable materials used for construction.

2.3. Growth and development

2.3.1. Committed and planned growth

Waterbeach New Town and NEC are two major mixed-used development sites located within the study area which would increase transport demand once constructed. There is an element of development dependency on the Waterbeach to Cambridge scheme. This is explored further in Appendix A.

Waterbeach New Town

A proposed Waterbeach New Town, which could accommodate up to 11,000 homes, is being delivered by two developers: Urban&Civic and RLW Estates. Outline planning permission has been granted for the Urban&Civic site, comprising up to 6,500 dwellings in addition to business, retail, community, leisure and sports uses, a hotel, new primary and secondary schools, and green spaces including parks, ecological areas and woodlands[21]. On 11th March 2020 a planning application for Key Phase 1[22], for the first 1,600 homes on the Urban&Civic site, was submitted and was approved in August 2020. A Design Code has also been approved for the development, which specifies the design requirements and guidelines for Key Phase 1[23].

On the 29th January 2021, South Cambridgeshire District Council (SCDC) approved RLW Estates' planning application for a 4,500-dwelling development with business, retail, community, leisure and sports uses, new primary and secondary schools and sixth form centre, and public open spaces including parks and ecological areas[24].

The proposed Waterbeach New Town represents around a third of the proposed development set out in the Local Plans and therefore will significantly increase demand along the A10 corridor. Without additional transport infrastructure to provide additional travel capacity, this development may be constrained. As such, it is

[18] Climate Change, Energy and Environment - Cambridgeshire County Council

[19] Climate Change, Energy and Environment - Cambridgeshire County Council

[20] Cambridgeshire County Council (2022) *Climate Change and Environment Strategy, Part 3, High Level Action Plan.*

[21] Planning application: S/0559/17/OL.

[22] Planning application: 20/01649/REM

[23] Planning application: S/4383/19/DC

[24] Planning application: S/2075/18/OL

envisaged that Waterbeach New Town will be serviced by quicker, more frequent and more reliable transport links, which are the subject of this scheme.

It is envisaged that the busway would serve the proposed Waterbeach New Town centre, continuing eastwards to the relocated Waterbeach Station when delivered[25]. It is also proposed that some busway services branch north to serve the Waterbeach New Town Travel Hub site and Cambridge Research Park. Busway services would have the flexibility to operate off of the dedicated infrastructure, so would also be able to serve other areas of the New Town.

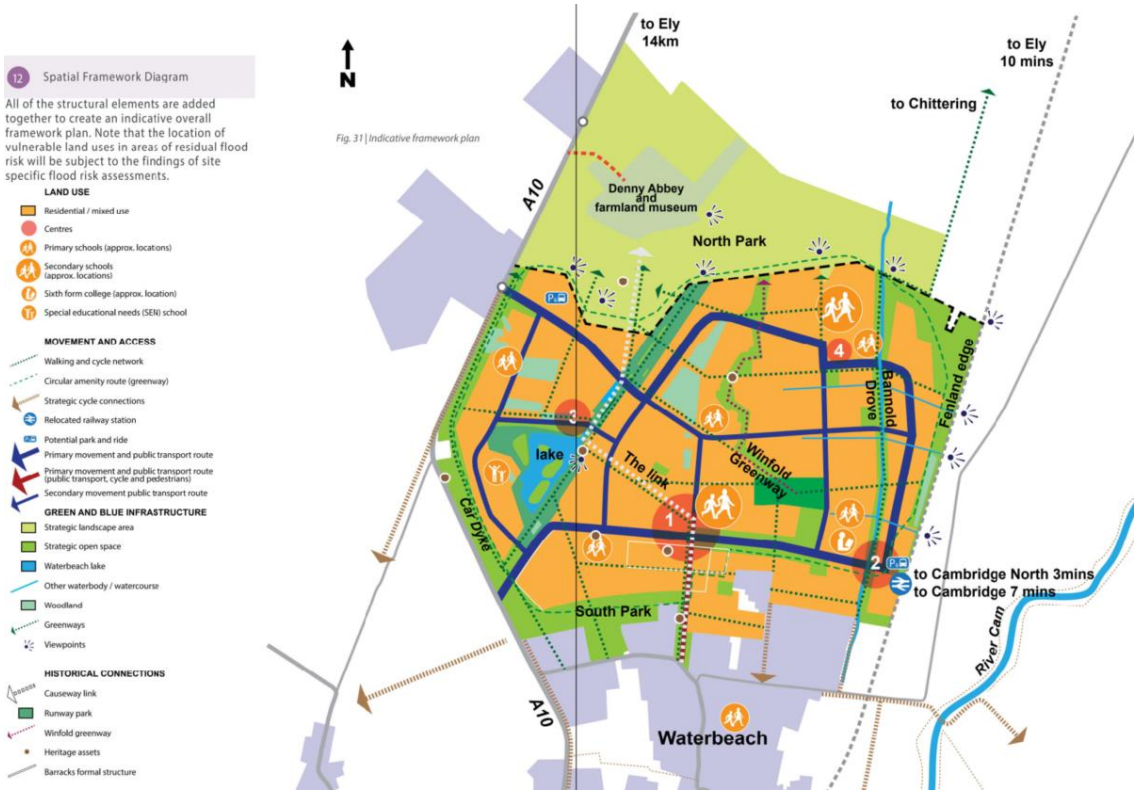
A high-level initial assessment has been undertaken of the most effective service routing at the northern end of the study area, including whether a service using the busway route should serve the relocated Waterbeach Station and/or Cambridge Research Park.

The assessment shows that, to maximise achievement of the scheme objectives to provide a quicker and more reliable services between Waterbeach and Cambridge, the preferred option for routing towards the north of the study area is to run a mix of direct services and services via the relocated station. This option would serve the main areas of demand with fast and direct services and provide connectivity to key transport hubs. A new public transport scheme would offer major benefits for commuters to and from Waterbeach New Town, therefore unlocking sustainable growth in this corridor.

It is proposed that two alternative services are provided; one that serves Cambridge Research Park directly and the other that terminates at the relocated Waterbeach Station. Connectivity between Cambridge Research Park and the relocated Waterbeach Station is likely to be covered by a local stopping service and/or the Research Park shuttle.

Figure 2-4 shows the spatial framework for the New Town. GCP are working with Urban&Civic, RLW and SCDC to develop internal site masterplans with segregated public transport connectivity to ensure that the route within the New Town leads to a continuation of the fast and reliable public transport services provided on the remainder of the route.

Figure 2-4 - Spatial framework layout for the proposed Waterbeach New Town[26]



[25] Following approval from the GCP Executive Board in June 2022, GCP are committed to deliver the new station at Waterbeach.

[26] South Cambridgeshire District Council (2019) *Waterbeach New Town: A Spatial Framework and Infrastructure Delivery Plan. Supplementary Planning Document* [Page 72-73].

NEC development

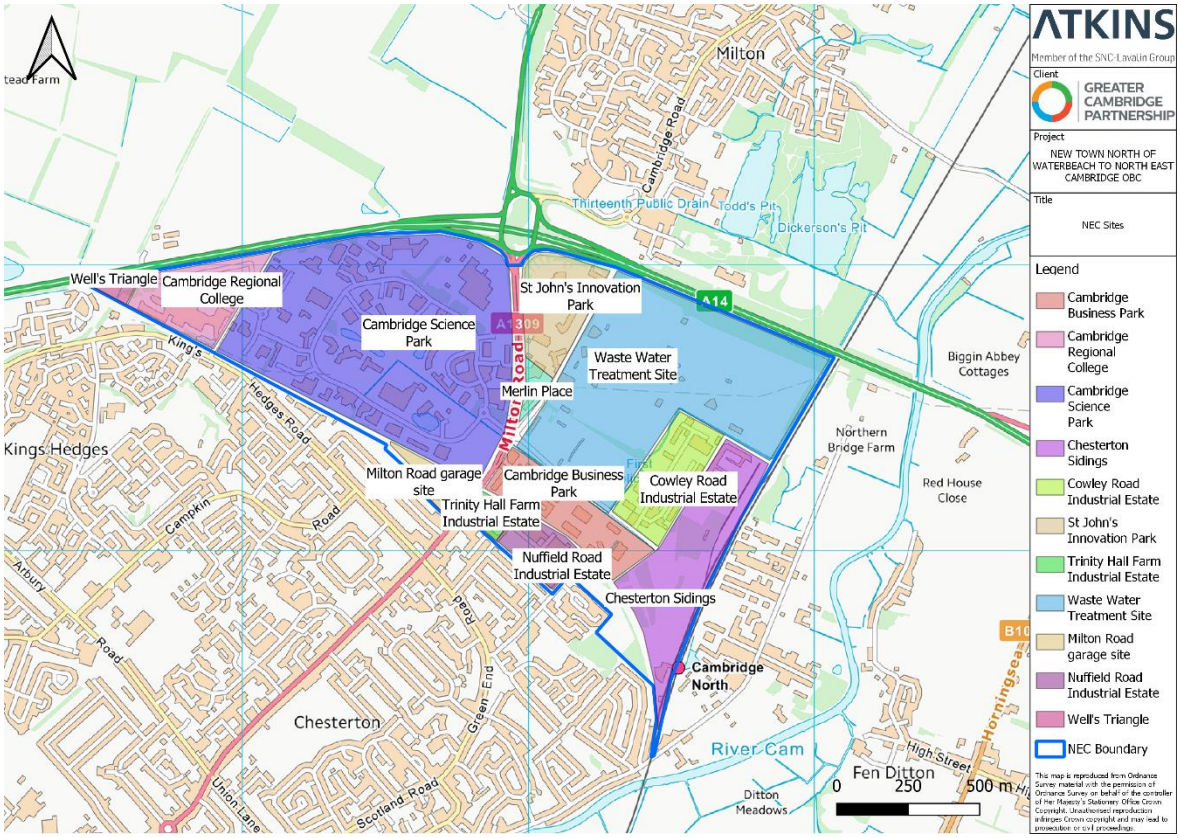
The NEC development currently comprises of several sites, including (landowner or developer shown in brackets):

- Cambridge Science Park (Trinity College);
- Cambridge Business Park (The Crown Estate);
- Trinity Hall Farm Industrial Estate (Brockton Everlast);
- St John's Innovation Park (St John's College);
- Chesterton Sidings (Network Rail / Brookgate / DB Cargo);
- Cambridge Regional College (Cambridge Regional College);
- The Cambridge Waste Water Treatment Plant (Anglian Water, plus some land owned by Cambridge City Council (CCiC)[27];
- Nuffield Road and Cowley Road Industrial Estates (various, including CCiC); and
- Merlin Place, Well's Triangle and Milton Road garage site (private ownership).

The Tarmac Aggregates facility lies within the NEC boundary but does yet not have any plans for redevelopment.

The existing site layout is shown in Figure 2-5.

Figure 2-5 - Existing sites in NEC proposals[28]



There are approximately 15,000 jobs across the existing sites. There are plans to intensify the area, providing an additional approximately 20,000 jobs and 8,000 dwellings[29]. As such, the NEC area could account for over half of job growth and a quarter of homes proposed in the Local Plan. Therefore, this area is susceptible to

[27] Proposed to be relocated outside of the NEC site

[28] Information provided by the GCP.

[29] Greater Cambridge Shared Planning – *'Draft North East Cambridge Area Action Plan'* pg.16

worsening congestion resulting in poorer air quality caused by slow moving traffic, should alternative sustainable travel options not be provided.

The NEC development is currently served by local bus services, including the Milton Park and Ride service, and is proposed to be serviced by new transport links which have been considered within this study. Figure 2-6 shows the latest indicative concept plan within NEC, which will interact with the proposed schemes set out in this study, from the Proposed Submission North East Cambridge Area Action November 2021[30].

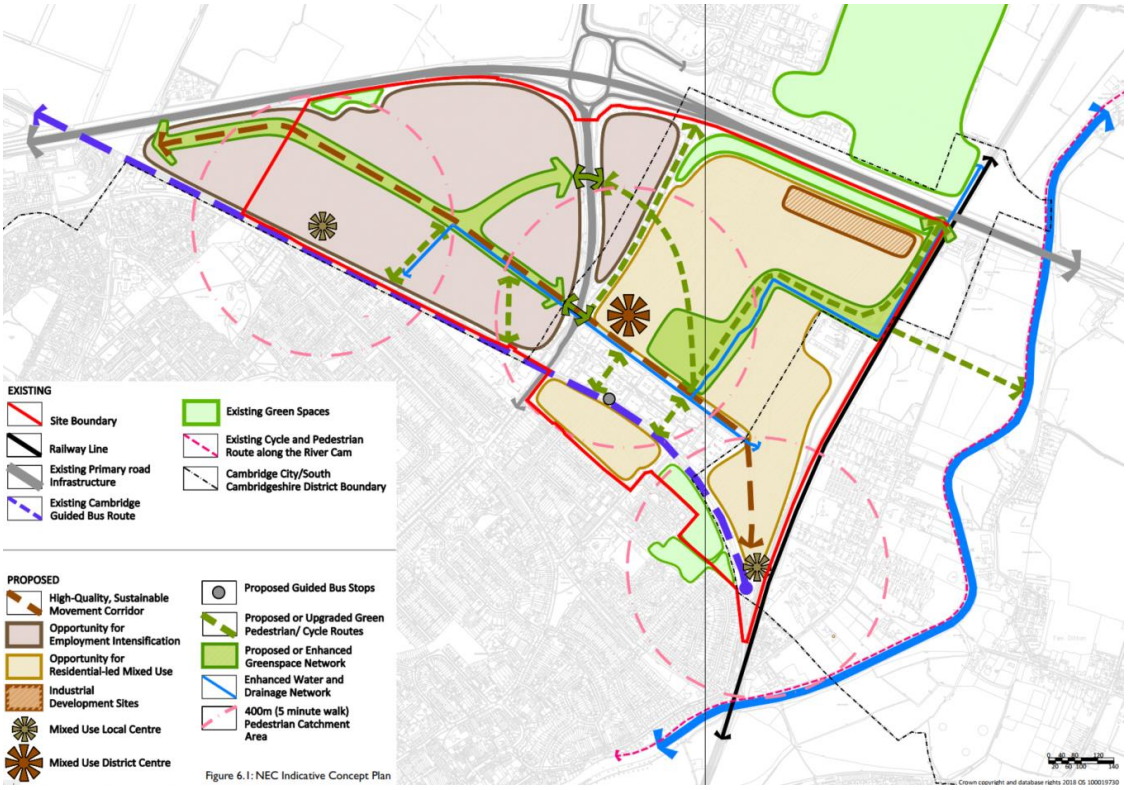
The owners of the Cambridge Science Park development aspire for the site to be redeveloped and expand. The developers are seeking to re-design the frontage of the site to abut the existing Cambridgeshire Guided Busway (CGB) alignment, with a view to increasing permeability to the site from the south. The vision is to make the NEC development a sustainable campus and therefore public transport is seen as a vital component.

All the options considered in this report would support achievement of the strategic vision of the NEC development by enabling quicker, more frequent, and more reliable public transport journeys to and from surrounding villages and Waterbeach New Town. It is expected that the CGB and Waterbeach to Cambridge service patterns would be integrated to maximise service frequency. This would be agreed with service operators at a later stage when the operational aspects are considered in detail. The Waterbeach to Cambridge busway would also form part of the mitigation strategy to ensure that the agreed vehicle trip budget (policy 22 of the of the Proposed Submission North East Cambridge Area Action November 2021) is not exceeded and therefore the opportunity for development would be maintained. Moreover, all options would support the delivery of economic growth in NEC within current traffic levels.

Providing sustainable infrastructure for NEC will provide access to jobs and education, whilst improving links to other local transport hubs such as Cambridge North Station and Milton Park and Ride for onward travel beyond the study area.

Moreover, additional transport links would support NEC growth aspirations by improving the transport capacity within the local area meaning more people can move between residential and employment areas.

Figure 2-6 - NEC indicative concept plan[31]



[30] Greater Cambridge Shared Planning '*Proposed Submission North East Cambridge Area Action Plan – November 2021'* Proposed Submission North East Cambridge Area Action Plan, Regulation 19. November 2021 (greatercambridgeplanning.org) Accessed 21st October 2022

[31] *Extract from North East Cambridge Area Action Plan – Issues and Options (2019)* [Pages 84 and 85].

2.3.2. Size of existing and future travel markets

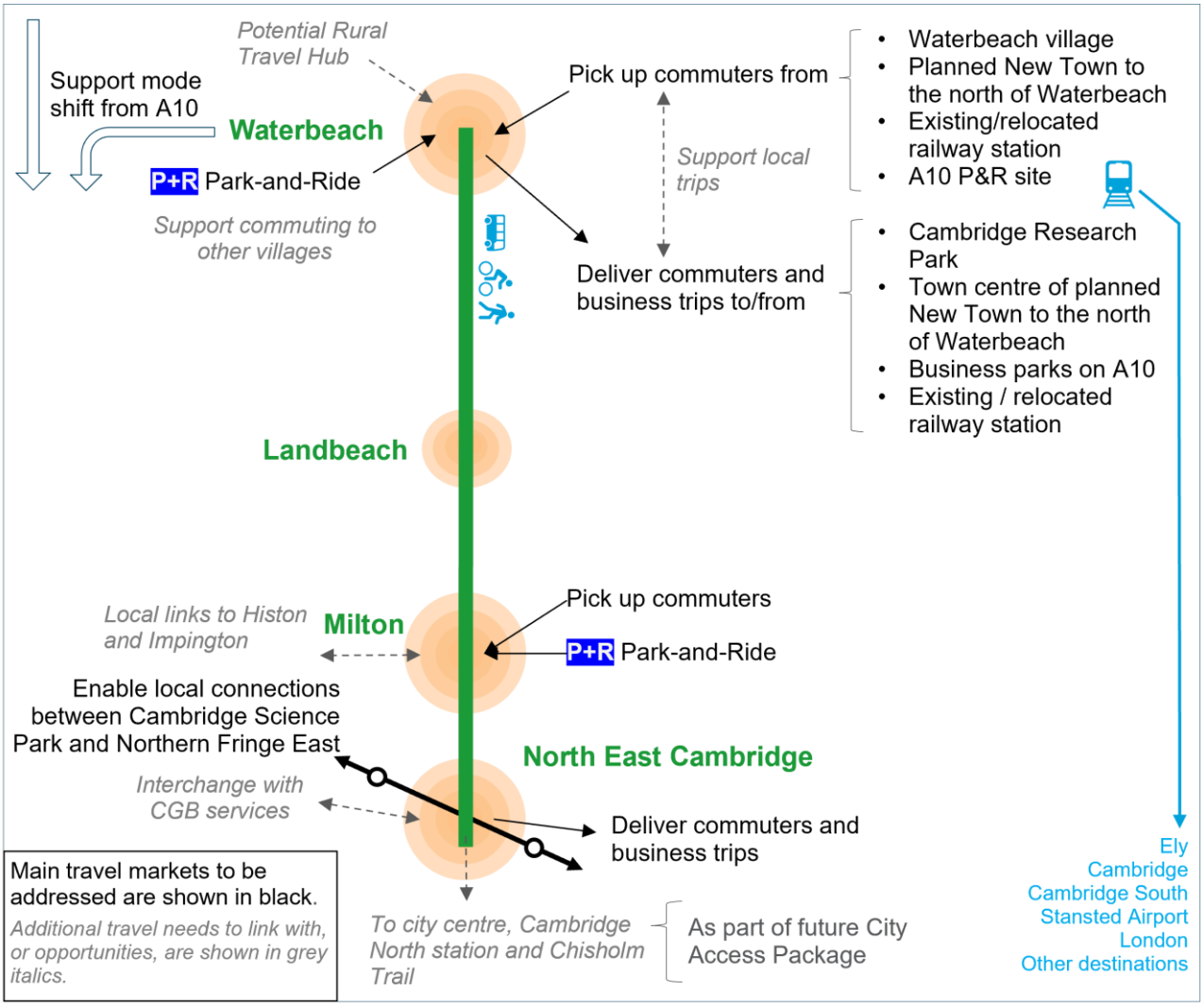
Several key travel markets have been identified, comprising existing communities and future developments. The largest markets are expected to be journeys to or from the following locations within the study area:

- Waterbeach (including the proposed Waterbeach New Town);
- Milton village; and
- The NEC development, including Cambridge Science Park and other employment centres.

Figure 2-7 highlights the travel markets that could be serviced by new transport links proposed as part of the scheme and summarises onward travel links. It should be noted that:

- The central green line shows the overall improved connections required from the project. The black lines and text show the main types of trips that these connections aim to serve;
- Figure 2-7 is not intended to imply that a single, linear intervention is preferred. The requirements could potentially be met through a combination of sustainable travel corridors and does not imply a single public transport route covers all markets;
- Orange circles represent key areas to be connected and not individual 'stops' or entry/exit points; and
- Dotted lines and grey italic text show potential additional synergies to be considered.

Figure 2-7 - Study area travel markets



As shown in Figure 2-7, the markets served by new transport links vary in size. The proposed Waterbeach New Town (11,000 dwellings and 40,000 sqm of employment use) and NEC area[32] (8,000 dwellings and approximately 330,000 sqm of employment use) represent the largest markets within the area.

Whilst the existing Waterbeach, Landbeach and Milton villages represent smaller markets, they account for approximately 4,000 dwellings in total and therefore proposed transport schemes should aim to service these villages where possible.

The scale of housing and employment for existing and future developments in the study area is shown in Table 2-3 and corresponds to the anticipated level of demand for transport services. As an indication of the relative scale of the commuter markets, Cambridge city centre has between 23,500[33] and 28,500[34] employees, which would equate to approximately 312,000 sqm of general office land use[35]. The figures provided have been obtained from a variety of sources including 2011 Census data and information provided by GCP.

Table 2-3 - Levels of housing and employment in existing and future developments

Development	Existing scale of development	Proposed scale of development
Waterbeach New Town[36]	Proposed development	11,000 dwellings 25,500 sqm retail 39,800 sqm employment use 21,235 sqm leisure and community use
Waterbeach village[37]	2,070 dwellings (2015)	No significant growth planned
Landbeach village	366 dwellings (2011 census)	No significant growth planned
Milton village	1,765 dwellings (2011 census)	No significant growth planned
Cambridge Research Park[38]	41,660 sqm employment	315 sqm retail 27,885 sqm employment
Wastewater treatment plant	Approximately 44 ha	5,500 dwellings 3,700 sqm retail 23,500 sqm employment 5,700 sqm community use
Cambridge Science Park	160,000 sqm employment[39]	1,000 sqm retail 109,969 sqm employment 100 sqm community use[40]
St John's Innovation Park	24,137 sqm employment[41]	100 sqm retail 35,000 sqm employment

[32] It should be noted that as NEC area covers a significant area (both east and west sides of Milton Road), a proposed scheme should seek to service multiple areas of the development.

[33] CSRM2 2015 estimate for jobs in the area roughly corresponding to the Cambridge 007 MSOA

[34] TEMPRO 2015 estimate for jobs in the Cambridge 007 MSOA

[35] Homes and Communities Agency (2010) *Employment Densities Guide* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/378203/employ-den.pdf Accessed 14th July 2020

[36] Planning applications S/0559/17/OL for Waterbeach New Town (west) and S/2075/18/OL for Waterbeach New Town (east)

[37] Waterbeach Parish Council (2019) *Waterbeach Neighbourhood Development Plan 2020 to 2031*

[38] Planning application S/4615/18/OL

[39] Odyssey, on behalf of Trinity College Cambridge and Cambridge Science Park (2018) *Cambridge Science Park Transport Strategy*

[40] Greater Cambridge Shared Planning (2020) *North East Cambridge Draft Area Action Plan*

[41] St John's Innovation Park (2020) *St John's Innovation Park: Buildings* https://www.sjip.co.uk/buildings/ Site accessed 14th July 2020

Development	Existing scale of development	Proposed scale of development
Cambridge Business Park	30,193 sqm employment[42]	500 dwellings 1,500 sqm retail 68,000sqm employment
Trinity Hall Farm Industrial Estate and Nuffield Road Industrial Estate	22,443 sqm employment	550 dwellings 1,500 sqm employment
Chesterton Sidings	Proposed development	730 dwellings 1,000 sqm retail 55,000 sqm employment 100 sqm community use

The residential developments alone could lead to an increased demand of between 15,000 and 20,000 person trips[43] in the AM and PM peak hours across all modes of transport. Whilst not all these trips will be to or from Cambridge or will use the full length of the corridor, a significant proportion are likely to do so. If no interventions to increase capacity are made, this will increase the demand in the corridor and could saturate areas of the existing transport network, such as the currently congested Milton Interchange.

Demand for travel in the corridor

At SOC stage, an assessment has been undertaken of the relative importance, in travel demand terms, of the key markets in the corridor. This analysis has been revisited and re-confirmed and is summarised below. Further detail, including the methodology and limitations is set out in the SOC.[44]

The travel markets assessed as part of this exercise are the same as those outlined in Table 2-3, although the NEC development has been divided into eastern and western sections (split at Milton Road) to better understand the impact of corridor options that only serve one side of the NEC development.

Development trips have been calculated using three TRICS[45] land use categories for residential, business and educational developments for the morning peak period (07:00-10:00), evening peak period (16:00-19:00) and daily trips (07:00-19:00). The trip rates are presented in the SOC.

The total number of trips estimated to be generated by each travel market in the study area has been estimated by multiplying the level of existing and proposed development (shown in Table 2-3), by the trip rates. To better understand the impact of the expected development on the number of trips, Table 2-4 presents the total number of trips for the existing travel markets in the study area. A summary of the forecast number of trips generated in the morning and evening peak periods and daily totals are shown in Table 2-5.

[42] Cambridge Business Park (2020) *Cambridge Business Park* https://www.cambridgebusinesspark.co.uk/ Site accessed 14th July 2020

[43] Based on estimates of trip rates from TRICS database, version 7.6.4.

[44] To reflect the inclusion of Landbeach as a key travel market for the scheme at OBC, trip generation and distribution analysis for Landbeach has been undertaken and is included within this section (but not the SOC), following the same methodology.

[45] TRICS is an industry standard software used to predict trip rates for certain types of developments. The software uses empirical data from assessment for new developments. TRICS v7.7.2 was used for this assessment.

Table 2-4 - Total number of trips for the existing travel markets within the study area[46]

Travel Market	Morning peak period 07:00-10:00			Evening peak period 16:00-19:00			Daily 07:00-19:00		
	Arr.	Dep.	Total	Arr.	Dep.	Total	Arr.	Dep.	Total
Cambridge Research Park	1,500	200	**1,700**	200	1,300	**1,500**	2,400	2,400	**4,800**
Waterbeach New Town	N/A								
Waterbeach village	1,200	3,100	**4,300**	2,800	3,100	**5,900**	7,400	7,900	**15,300**
Landbeach village	200	600	**800**	500	300	**800**	1,300	1,400	**2,700**
Milton village	1,000	2,700	**3,700**	2,400	1,200	**3,600**	6,300	6,700	**13,000**
NEC (incl. east and west)	3,600	1,500	**5,100**	1,500	700	**2,200**	3,500	3,800	**7,300**
Total	**7,500**	**8,100**	**15,600**	**7,400**	**6,600**	**14,000**	**20,900**	**22,200**	**43,100**

Table 2-5 - Total number of trips for existing and future travel markets in the study area[47]

Travel Market	Morning peak period 07:00-10:00			Evening peak period 16:00-19:00			Daily 07:00-19:00		
	Arr.	Dep.	Total	Arr.	Dep.	Total	Arr.	Dep.	Total
Cambridge Research Park	2,500	400	**2,900**	300	2,200	**2,500**	4,000	4,000	**8,100**
Waterbeach New Town	14,600	19,500	**34,100**	15,600	10,800	**26,400**	52,400	54,900	**107,300**
Waterbeach village	1,200	3,100	**4,300**	2,800	1,400	**4,200**	7,400	7,900	**15,300**
Landbeach village	200	600	**800**	500	300	**700**	1,300	1,400	**2,700**
Milton village	1,000	2,700	**3,700**	2,400	1,200	**3,600**	6,300	6,700	**13,100**
NEC (west)	9,800	1,400	**11,200**	1,200	8,500	**9,700**	15,700	15,600	**31,300**
NEC (east)	19,400	13,800	**33,200**	13,700	15,000	**28,700**	46,100	47,800	**93,900**
Total	**48,700**	**41,500**	**90,200**	**36,500**	**39,400**	**75,800**	**133,200**	**138,300**	**271,700**

Table 2-5 shows that Waterbeach New Town and the NEC development are likely to be the key drivers of demand in the corridor, with Waterbeach village, Landbeach village, Milton village and Cambridge Research Park making smaller contributions to overall trips in the corridor.

Estimates have been made on the geographical distribution of these forecast trips based on three categories:

- Those internal to the larger developments such as Waterbeach New Town;
- Those that use the corridor; and
- Those that do not use the corridor (for example, where Waterbeach New Town residents travel northwards or eastwards out of the corridor).

[46] A breakdown of the trips by TRICS category, for each market, by period is set out in the SOC.

The trip generation totals represent a future scenario in which all developments are built out. It does not reflect a specific time period.

[47] A breakdown of the trips by TRICS category, for each market, by period is set out in the SOC .

The trip generation totals represent a future scenario in which all developments are built out. It does not reflect a specific time period.

The trip distribution for each travel market was derived using trip origins and destinations from the 2011 Census travel to work dataset at the Lower Level Super Output Area level. For new developments, such as Waterbeach New Town, data from the most local postcode area was used (for example, CB25 data was used to calculate the Waterbeach New Town trip distribution).

The estimated trip distribution proportions for each travel market are summarised in Table 2-6. A detailed assessment of trip distributions is provided in the SOC.

Table 2-6 - Trip distribution for travel markets

Travel market	Internal (to development) trips		Trips using corridor (to/from the north)[48]		Trips using Corridor (to/from the south)[49]		Trips not using the corridor	
	Proportion of trips	Total daily Trips	Proportion of trips	Total daily trips	Proportion of trips	Total daily Trips	Proportion of trips	Total daily Trips
Cambridge Research Park	31%[50]	**2,500**	N/A	**-**	48%	**3,900**	20%	**1,600**
Waterbeach New Town	54%	**51,500**	N/A	**-**	22%	**20,800**	24%	**22,300**
Waterbeach village	27%	**4,100**	2%	**400**	43%	**6,600**	28%	**4,300**
Landbeach village[51]	27%	**700**	2%	**100**	43%	**1,200**	28%	**800**
Milton village	31%	**4,000**	12%	**1,600**	36%	**4,700**	21%	**2,700**
NEC (west)	15%	**4,800**	24%	**7,400**	N/A	-	61%	**19,100**
NEC (east)	29%	**26,800**	25%	**23,600**	N/A	-	46%	**43,600**

Table 2-6 shows 70,300 daily trips are likely to use the corridor (either northbound or southbound) travelling between travel markets.

The impact of future demand for travel in the corridor

The existing transport network currently accommodates travel to and from approximately 3,800 homes and 300,000m of employment space (see SOC for details); there are aspirations to increase this by up to 19,000 homes and 380,000m^2 of employment space. As noted in Section 2.3.2 the majority of this development is centred around Waterbeach New Town and the NEC development. As a result, the local transport network will experience increased demand when these developments are occupied. Without investment, it is likely that the local transport network, including the A10 and Milton Interchange, will experience significant congestion, causing journeys to become unreliable and slower. Furthermore, this will be put increased pressure on the local public transport network that is already reliant on an efficient transport network.

[48] Trips that access Waterbeach New Town and Cambridge Research Park from the north will not use the corridor as the sites are located on the northern side of the corridor.

[49] Trips that access NEC from the south will not use the corridor as the sites are located on the southern side of the corridor.

[50] Internal to CB24 and CB25 postcode.

[51] The trip proportions for Landbeach are the same as Waterbeach as they both fall within the CB25 postcode area

2.4. Existing and future transport

2.4.1. Existing transport networks

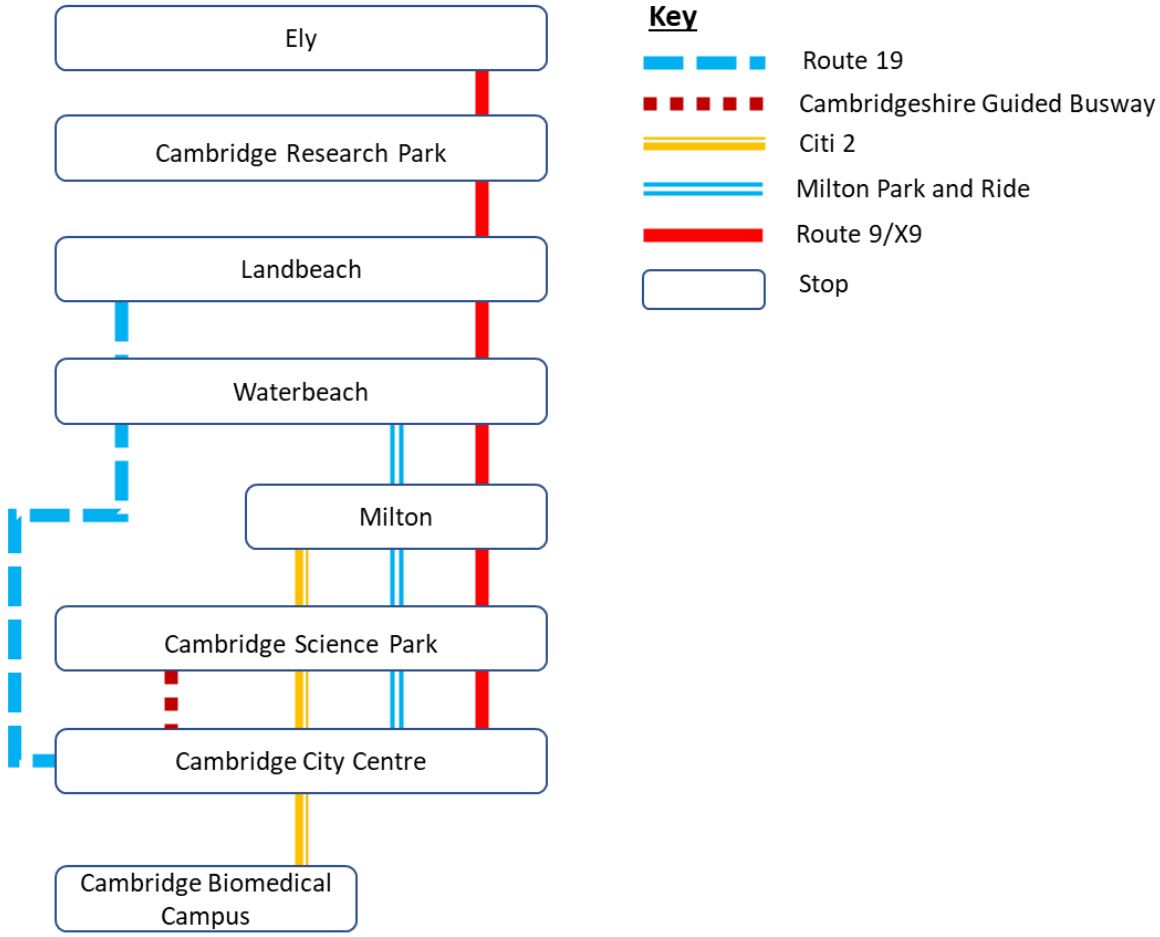
Local highway network

The local highway network includes the A10, which is the main highway connection between Waterbeach, the A14 and the NEC development. This route currently experiences considerable congestion during peak periods, particularly around Milton Interchange where the A10 and A14 converge. The new and improved section of the A14, as well as a new local access road (the A1307) opened for traffic on 5th May 2020[52].The 2019 CCC Traffic Monitoring Report[53] reports a two-way traffic flow of 26,327 vehicles on Milton Road to the south of the A14 across a 12-hour period.

Local bus network

There are currently five services that stop in this corridor, as shown in Figure 2-8.

Figure 2-8 - Local bus network



There is currently no bus priority infrastructure on the A10 to the north of the A14. There are bus lanes in place on Milton Road and the GCP Milton Road scheme is currently being constructed. This will provide

[52] Highways England (No Date) *What We've Delivered*, https://highwaysengland.co.uk/our-work/a14-cambridge-to-huntingdon/what-we-ve-delivered/ [Accessed 27.07.2021]

[53] *Traffic Monitoring Report 2019*, Cambridgeshire County Council, https://www.cambridgeshire.gov.uk/asset-library/Traffic-Monitoring-Report-2019.pdf [Accessed 14.07.2020]

improvements to public transport journeys and walking and cycling. Benefits include faster and more reliable public transport journeys, better walking and cycling links, reduced congestion and improved air quality.

The CGB runs between St Ives and Cambridge North Station, and busway services A and D use this to serve Cambridge Science Park, Cambridge Business Park and Cambridge Regional College. The CGB also has a bridleway running adjacent to parts of the route which is widely used by non-motorised users. The Waterbeach to Cambridge Public Transport Scheme could utilise this bridleway, creating a continuous active travel route for trips such as Histon to Waterbeach.

All options considered in this study would increase the public transport capacity within the corridor and beyond. The scheme will give flexibility to services which can use part, or all of the infrastructure provided. This means that the scheme would allow for connections to other transport hubs, such as Cambridge North Station and Milton Park and Ride. Existing services, such as Route 9, could use the scheme, thus providing benefits to passengers to and from Chittering, Stretham and Ely.

Local rail network

Cambridge North and Waterbeach Railway Stations are located within the study area and provide connections to the wider UK rail network including London, Cambridge, Ely, Peterborough, Kings Lynn and Norwich. As part of the proposals for the Waterbeach New Town, the existing Waterbeach Railway Station is planned to be relocated further north to a site within the New Town. The full planning application for the new railway station was approved on 9th January 2020[54].

2.4.2. Transport improvements

There are several major transport schemes proposed for the local area to improve transport connectivity in the study area and beyond. These are summarised below.

Committed S106 schemes

Following the grant of outline planning permission for 6,500 dwellings as part Waterbeach New Town, the Local Planning Authority and Urban&Civic agreed a Section 106 agreement for a number of transport improvements including:

- **Milton:** Advisory cycle lanes, signage and hatch markings on Cambridge Road in Milton;
- **Mere Way cycleway:** A shared use path is currently being built along Mere Way and the Roman Road, passing through Landbeach and on to the A10, where a walking and cycling bridge will cross the A10 and connect with a shared use path into the New Town and to the Greenway through the existing village of Waterbeach;
- **Bus services:** Extension of the Milton Park and Ride bus service or a new service to link Waterbeach New Town and Cambridge, and a new bus service between Cambridge Research Park, Waterbeach Railway Station and Waterbeach New Town;
- **A10 signalisation works (Landbeach Road/Humphries Way Junction):** Traffic signals will be installed at the junction of the A10 with Landbeach Road and Humphries Road to manage demand. The A10 at the junction will also be widened to accommodate turning lanes; and
- **A10 improvements at Butt Lane and Milton Park and Ride enhancements:** Widening the southbound lane on the A10 south of Butt Lane.

Greenways and trails

There are several Greenway and trail schemes that are close to the study area:

- **Waterbeach Greenway:** The Greenway will connect Waterbeach to Milton and the NEC development, to the east of the A10 providing an alternative route to Cambridge from Waterbeach and Waterbeach New Town. An offline paved shared use path with a grassed area to one side for horse riders or walkers from Waterbeach to the north of Milton. Through Milton the shared use path will route alongside the High Street and a segregated pedestrian and cycle path will be provided along Cowley Road, south of the A14;
- **St Ives Greenway:** an active travel route to make it easier for walkers, cyclists and horse riders to travel from St Ives into Cambridge. The route utilises the existing CGB bridleway and also provides 4.6 miles of

[54] Planning application: S/0791/18/FL

new pathway. It will connect with the Waterbeach to Cambridge scheme on the CGB and also with the Waterbeach Greenway in NEC; and

- **Chisholm Trail:** A committed walking and cycling route between Cambridge Station and Cambridge North Station which would improve the link between the proposed NEC development and Cambridge Biomedical Campus. The southern end of the proposed busway corridor would connect to the Chisholm Trail, extending the reach possible for people walking or cycling along either route. Some parts of the Chisholm Trail are complete and open for use, including Chesterton Bridge.

Other Greenway projects are being proposed nearby, including the Horningsea and Swaffham Greenways. The Horningsea Greenway will start within four kilometres east of Waterbeach and would be an alternative route to the east of Cambridge via Fen Ditton.

Proposed A10 improvements

Several studies have considered improvements to the A10 to the north of Cambridge to increase capacity and improve journey time reliability. The seven options presented in the first round of public consultation for the A10 study are:

- Predominantly online full length dualling, bypassing the key pinch points west of Milton and at Stretham (western bypass) and Little Thetford;
- Predominantly online full length dualling, bypassing the key pinch points west of Milton and at Stretham (eastern bypass) and Little Thetford;
- Offline dualling of the southern section to Cambridge Research Park in addition to the junction improvements;
- Full length, offline dualling;
- Maximise the extent of online dualling, whilst bypassing the key pinch points at Stretham (western bypass) and Little Thetford;
- Online dualling of the southern section to Cambridge Research Park in addition to the junction improvements; and
- Junctions only improvements.

None of the options considered for this scheme are dependent on any of the A10 dualling proposals, although there may be interfaces if both a busway scheme and an A10 scheme come forward.

There is potential to share part of the busway corridor with the A10 dualling scheme. This could improve cost effectiveness and reduce any adverse impacts of the two schemes.

Milton Road upgrade scheme

Milton Road is a key arterial route into Cambridge city centre to the south of the study area. The road currently experiences congestion during peak periods, and this is expected to get worse in the future. The Milton Road project, which is currently under construction, aims to improve public transport, cycle and walking infrastructure to make these sustainable travel options a more attractive alternative to the car, and to encourage the continued economic growth of Greater Cambridge, without harming existing communities, and the environment. The Milton Road scheme includes:

- Public Transport priority measures that include new sections of outbound bus lane and new floating bus stops;
- Improved cycle facilities with segregated cycle provision along both sides of Milton Road and priority over side roads. This requires the removal of the existing pavement parking on Milton Road;
- Improved pedestrian and cycle facilities, including Copenhagen style priority crossings at side roads, segregated features at all main junctions, and the relocation of some crossings;
- Landscaping to areas where more greenery can be included; and
- The development of a traffic regulation order to ban all parking on verges.

The Waterbeach to Cambridge Public Transport Scheme would build on this scheme, creating a public transport priority corridor between Waterbeach and Cambridge city centre, via Milton Road. This will contribute to making sustainable travel more attractive for people working and living close to Milton Road, or using Milton Road for part of their journey.

Making Connections

The Making Connections scheme aims to reduce the traffic, congestion and pollution in and around Cambridge city centre. It is proposed that this will be achieved through a combination of:

- A new bus network, offering more frequent services, with longer operating hours, more rural connections and new routes into growing employment sites;
- Improving cycling and walking routes and high-quality public spaces; and
- Designing a potential charging zone, to raise revenue and create space for public transport.

The Waterbeach to Cambridge Public Transport Scheme would complement Making Connections by providing a public transport corridor to the north of Cambridge to provide an alternative high-quality sustainable mode of travel to private car and reducing the number of car trips being made into the city centre.

However, the effectiveness of the Waterbeach to Cambridge scheme is not dependent on Making Connections. The scheme has been designed to accommodate the extra buses needed if Making Connections or other bus investment comes forward, so that with or without a Sustainable Travel Zone, the busway can provide a sustainable and efficient alternative to driving into the Cambridge City area.

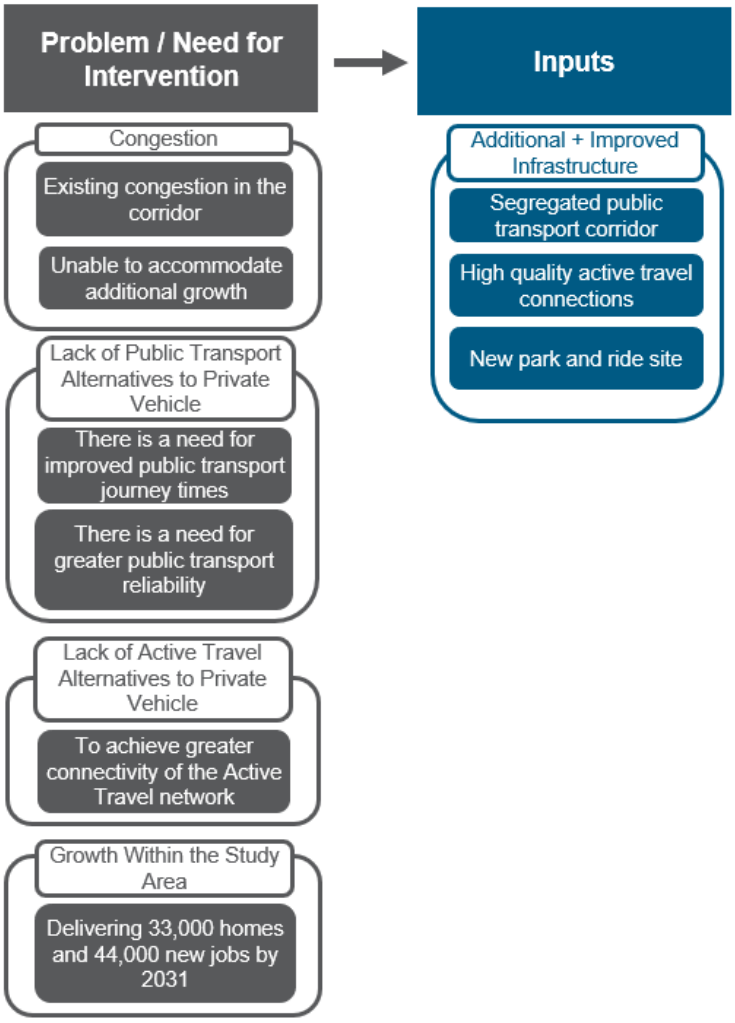
Sensitivity testing have been undertaken to assess the potential impacts of the scheme in a future scenario without Making Connections. The forecast bus patronage from the proposed new Park and Ride site remains stable between the with and without Making Connections scenarios. However, in the with Making Connections scenario, patronage of Milton Park and Ride decreases as a result of the Waterbeach to Cambridge scheme compared to without Making Connections, in which it is forecast that the scheme will lead to a large increase in bus patronage from Milton Park and Ride. This difference is likely due many people already utilising the Milton Park and Ride in the with Making Connections Do-Minimum scenario, whereas in a scenario without Making Connections it is likely that many new public transport users have switched from private vehicles. As expected, the impact of the scheme on mode shift from car is much higher in a without Making Connections scenario, at approximately a 3,500 daily person trip reduction. The economic performance of the without Making Connections scenario is assessed in section 3.11.4.

2.5. Case for change

The study area encompasses a transport corridor that already experiences congestion, as identified in previous studies[55]. This will worsen with significant housing (including the development of Waterbeach New Town) and employment developments (including NEC) at either end of the corridor without further transport capacity being provided. Significant transport intervention is required to facilitate growth in the corridor to ensure that transport connectivity does not become more constrained. The sections below outline the policies driving growth in the area and details of the existing transport networks, where current problems are forecast to become worse and new problems arise because of the growth strategy for the corridor. The first two columns of the logic map presented in Figure 2-9 further demonstrates the need for intervention by summarising the identified problems and proposed interventions (inputs) associated with the scheme. This sets out the need for change which is summarised further in the subsequent sections.

[55] Mott MacDonald, on behalf of the Greater Cambridge Partnership (2018) *Ely to Cambridge Transport Study: Preliminary Strategic Outline Business Case*

Figure 2-9 - Problems and inputs identified



2.5.1. Problems and opportunities

The key challenges in the study area, set out in Figure 2-9, are detailed below:

Problem 1: Congestion on the A10 corridor

Current congestion on the A10 causes journey time and reliability issues. Previous studies in the corridor, which are listed in section 2.5.2, suggest that this issue is likely to be exacerbated when additional development (such as Waterbeach New Town) is completed. These studies have identified that there will be significant additional delays at three junctions along the A10 in the vicinity of Waterbeach New Town, as well as at junctions on the A10/A14 to the north of the Science Park and Northern Fringe developments if there is no additional transport provision provided[56]. Congestion along and around the A10 corridor could stifle sustainable growth in this area and reduce productivity due to delays caused by congestion.

To overcome the existing issues within the study area, there are opportunities to:

- Provide a more resilient public transport network that is not dependent on the A10;
- Transform public transport to a high-quality, segregated attractive travel option along the corridor. This would make public transport a more attractive alternative for existing car travellers and as a result could help manage the impacts of growth;

[56] Mott MacDonald, on behalf of the Greater Cambridge Partnership (2018) *Ely to Cambridge Transport Study: Preliminary Strategic Outline Business Case*

- Provide sustainable infrastructure directly servicing new developments and key travel markets;
- Encourage mode shift from private car to sustainable modes;
- Improve journey times and reliability within the study area corridor by public transport; and
- Accommodate growing transport demand in a sustainable way (via increased public transport, walking and cycling links).

Problem 2: Lack of public transport alternatives to private vehicle

Due to a lack of quick, frequent, and reliable public transport links between Waterbeach and Cambridge, there is a dependency on private motor vehicles to make most journeys. This causes congestion and delays at pinch points (e.g., the A10 Milton Interchange).

GCP has set a target to reduce motor traffic levels by 10-15% in comparison to 2011 levels. Much-improved north-south public transport services and infrastructure, that are not dependent on the local highway network, would increase the resilience of the transport network and reduce reliance on use of private motor vehicles in the A10 corridor, helping to meet this target.

Problem 3: Lack of active travel alternatives to private vehicle

There is a lack of dedicated active travel links between Waterbeach and Cambridge, which results in further dependency on private motor vehicles due to a lack of viable alternative modes. This leads to congestion on the A10 corridor and is expected to worsen over time, with growth in the area, specifically at the New Town and Cambridge Science Park. Although the Mere Way and Waterbeach Greenway schemes will improve active travel connectivity in the corridor, the active travel route provided alongside the busway will provide additional capacity and make active travel a more attractive option, contributing to achieving GCP's traffic reduction targets.

Problem 4: Need to accommodate growth

The Cambridge[57] and South Cambridge Local Plans[58] have identified a need for 33,000 homes and 44,000 jobs to be delivered by 2031, as outlined in section 2.5 of the SOC, which would increase the number of daily trips made in Cambridgeshire. Along the Ely to Cambridge corridor alone, the average peak hour flow is expected to increase by over 10% due to the Waterbeach New Town development[59]. The journey time on key routes is also expected to increase with a resulting impact on bus journey times[60]. Therefore, whilst it is recognised that there is a need for growth, the existing transport network is unlikely to be able to accommodate this without new sustainable transport infrastructure to combat existing and exacerbated congestion issues.

2.5.2. Case for a public transport intervention

The case for intervention in the Waterbeach to Cambridge corridor has been made for over a decade with a number of studies identifying a need for a public transport system in some form:

- Bus Strategy – Bus Route Option Study (2009);
- A10 Transport Corridor Constraints Study (2012);
- Waterbeach Busway Options Study (2014);
- A10(N) Corridor Constraints Study (2016);
- Ely to Cambridge Transport Study – Preliminary Strategic Outline Business Case (2018); and
- Ely to Cambridge Transport Study: Strand 2 New Town North of Waterbeach Transport Report (2018).

Figure 2-10 shows a timeline of previous studies making the case for a public transport intervention.

[57] *Cambridge Local Plan* (2018)

[58] *South Cambridgeshire Cambridge Local Plan* (2018)

[59] Mott MacDonald, on behalf of the Greater Cambridge Partnership (2018) *Ely to Cambridge Transport Study: Preliminary Strategic Outline Business Case*

[60] Mott MacDonald, on behalf of the Greater Cambridge Partnership (2018) *Ely to Cambridge Transport Study: Preliminary Strategic Outline Business Case*

Figure 2-10 - Previous studies

2009 - Capita Symonds: Bus Strategy – Bus Route Option Study

- Report stated that without interventions such as improved public transport, journey times are likely to worsen on the A10 corridor with the forecast local growth of traffic, the committed developments in Ely, and potentially the proposed Waterbeach New Town development.

2018 - Steer Davies Gleave: Greater Cambridge Mass Transit Options Assessment Report

- Steer Davies Gleeve's report demonstrates that there is a need for a segregated system to deliver high quality, high frequency, reliable services that are attractive to car users and provide sufficient capacity for growth. It states that Transit Oriented Development should be flexible to adapt for the future and utilise emerging technology, including connected and autonomous vehicles.
- Large amounts of growth is expected within the corridor, most notably at Cambridge Science Park where AM peak trips are expected to increase from 11,200 in 2015 to 13,200 in 2031, of which 63% are predicted to be car trips.
- Some 59% of trips to the Science Park originate from outside of Cambridge city, with 29% from outside Cambridge and South Cambridgeshire. 30% of trips originate from East and North Cambridgeshire meaning the A10 is a key route for a number of employees.

2018 - Mott Macdonald: Ely to Cambridge Transport Study (Strands 1 and 2)

- Report provides further commentary supporting points in previous studies.
- The options modelling report (Strand 1) utilises the CSRM2 strategic transport model to determine the impacts of improvements schemes in the corridor. In summary the average peak hour flow is expected to increase on the corridor from 869 to 959 which is caused by the implementation of the Waterbeach New Town development.

A10 Transport Corridor Constraints Study

- This transport study provides a Corridor Constraints Assessment of the A10 (N) Ely to Cambridge Corridor to understand the implication of the development proposed in the current Local Plans on the functioning of the transport corridor.
- The report concluded that although there are restraints within the study area, transport intervention can be accomodated to serve the A10 (N) Ely to Cambridge corridor mitigating the impact of developments such as Waterbeach New Town.

Waterbeach Busway Options Study

- This study further assessed the preferred busway option from the 2009 Capita Symonds study.
- The preferred route option remained the same as the previous study however included some alterations to the alignment.

A10 (N) Corridor Constraints Study

- This study assessed the existing environmental, physical and planning constraints within and adjacent to the Waterbeach to Cambridge corridor.
- Constraints in the west and central corridor could be overcome through route alignment and detailed design however the revised eastern route option woud require further consideration.

Case for intervention made in this project

Since it was commissioned in 2019, the Waterbeach to Cambridge Public Transport Scheme project has assessed the case for change within the corridor. The SOC for the project determined that there was a clear case for change to:

- **Accommodate additional growth**: A new busway would not only accommodate additional growth but would do so in a sustainable way and support current and emerging environmental policy;
- **Reduce dependency on private motor vehicles**: A segregated busway would increase the resilience of the public transport network and reduce reliance on the use of private motor vehicles in the A10 corridor. Providing additional segregated active travel capacity in the corridor will also reduce dependency on private vehicles, particularly for shorter distance journeys; and
- **Supporting national and local policy and strategies**: Local plans and policies (both national and regional) identify a clear need to reduce congestion and carbon impacts and enable additional sustainable growth to be accommodated within the study area. The policies demonstrate that the Waterbeach to Cambridge corridor is a key economic growth area and should be supported by the appropriate level of infrastructure to ensure that the transport network has enough capacity to support the movement of people between residential and employment areas sustainably. Moreover, local and regional policies have set goals to reduce car dependence. For example, the GCP has a target to reduce motor traffic levels in Cambridge by 10%-15% compared to 2011 levels. To achieve this goal, investment is needed in sustainable transport modes to enable more people to travel by walking, cycling or public transport. A sustainable transport corridor between two major growth areas will reduce congestion and car dependence, connect more people to major employment areas, and enable the planned growth in housing to proceed.

2.5.3. Case for a busway

Given the case for change in the corridor, it is important to identify what type of public transport intervention is required to provide the best benefit to users. Local policy supports a busway as the most suitable solution but, to confirm this, a strategic option assessment was undertaken at SOC stage. Both the policy support for a busway and the strategic option assessment process are summarised below.

The case for change set out in the SOC is supported by evidence set out in historic reports and new assessments using the Cambridge Sub-Regional Model 2 (CSRM2), TRICS analysis and other supplementary existing data sets provided by GCP. The details of these assessments can be found in the SOC but have been summarised below:

- It is predicted that, with planned development, some 271,700 trips will be made daily[61], between 07:00-19:00 arriving and departing travel markets in the study area (see Figure 2-7), with the planned development generating 228,600 additional trips (see Table 2-5 and Table 2-4). This includes 107,300 to/from Waterbeach New Town and 125,000 to/from Cambridge Science Park (see Table 2-5). Trip distribution analysis suggests that around 27% of these trips will be made within the Waterbeach to Cambridge corridor, which is likely to exacerbate the already congested highway network (see Table 2-6);
- Market analysis shows that approximately 17,000 trips will be generated in the AM and PM peak hours by planned residential development alone in the corridor;
- A review of pre-Covid bus journey times showed that the journey between Waterbeach village and Cambridge city centre takes approximately 45 minutes. In comparison, the free-flow journey time via car is 18 minutes. Providing a segregated busway will enable bus services to provide more reliability and journey times comparable to private vehicles;
- The CSRM2 modelling results at SOC forecast that a significant change in demand has the potential to be achieved should a busway be provided along the Waterbeach to Cambridge corridor, reducing highway demand by up to 1,900 daily trips (12-hour period) and increasing public transport and Park and Ride trips by 900 and 2,450 respectively. The modelling clearly shows that a busway could have a large impact on highway demand which has been identified as a constraint in the corridor; and
- There are overall benefits in the corridor should a public transport scheme be implemented. The SOC presented a Benefit to Cost Ratio (BCR) of up to 1.135. The appraisal showed that a public transport scheme would improve the economic efficiency of the transport system for users, leading to an improved standard of living, demonstrating a case for change.

[61] The trip generation totals represent a future scenario in which all developments are built out. It does not reflect a specific time period.

Cambridgeshire and Peterborough Local Transport Plan (2020)

Extension of the busway network and creation of a segregated public transport corridor, more specifically provision of a busway between Waterbeach and Cambridge, is a long-held policy aspiration within Cambridgeshire, with reference to the scheme included within Cambridgeshire's 2015 (LTP) and subsequent LTPs for the area, previously envisaged as being part of the future CAM.

CPCA's LTP recognises that the A10 is one of the most congested routes in the region which means that users suffer from severe peak time congestion and poor road safety and therefore high-quality segregated facilities for public transport users is key to overcoming these issues.

CPCA's LTP states that a segregated public transport scheme would enable residents and visitors to travel quickly and easily across Greater Cambridge, providing better access to employment and education, broadening labour markets, and thereby supporting a dynamic economy. A scheme would also significantly improve the accessibility of new settlements (such as Waterbeach New Town), supporting the delivery of much-needed homes, and major employment clusters at the Cambridge Science Park, supporting productivity growth and the creation of skilled, well-paid jobs[62].

The LTP also states that a segregated public transport scheme between Waterbeach New Town and Cambridge will provide a real alternative to the private car, especially when supported by the Greenways and relocation of Waterbeach Station.

Finally, the LTP identifies a new Park and Ride at Waterbeach will help to limit the impact on Cambridge city centre of car-based trips originating from East Cambridgeshire.

Cambridgeshire and Peterborough Draft Local Transport and Connectivity Plan (2022)

The draft Local Transport and Connectivity Plan (LTCP) maintains direct support for a segregated public transport route between Waterbeach and Cambridge. The document states that CPCA will *"support the Greater Cambridge Partnership in the delivery of a new segregated public transport and active travel corridor between Waterbeach and Cambridge"*[63]. Although this policy is still in draft, it demonstrates the importance of the busway corridor for local growth.

Previous project assessments

The SOC assessed a range of options for delivering sustainable transport in this corridor both with and without a busway route. The assessment made a qualitative judgement on the impacts of each option in terms of:

- The transport outputs and outcomes from this study; and
- A sifting criteria that is consistent with that used by other GCP projects to assess their options which have been used for consistency throughout the GCP programme.

The following options were assessed:

- Improvements to bus services;
- Improvements to rail services;
- Improvements to the walking, cycling and equestrian network;
- Measures to manage the number of trips made and mode of travel (demand management);
- Park and Ride;
- A segregated busway route; and
- A combination of rail, bus, walking and cycling routes.

Each option has been assessed on a five-point scale including **major positive (dark green)**, **minor positive (light green)**, **neutral (grey)**, **minor negative (orange)** and **major negative (red)**. The results of the assessment are presented in Table 2-7.

Table 2-7 shows that a segregated busway, and improvements to walking, cycling and equestrian provision align best to the criteria and offer the biggest benefits compared to other options. Given the high levels of potential modal shift and environmental benefits arising from a reduction in car trips from these options, a

[62] Cambridgeshire and Peterborough Combined Authority (2020) *Local Transport Plan* [Paragraph 3.62].

[63] Cambridgeshire and Peterborough Combined Authority (2022) *Local Transport and Connectivity Plan p.79*

combination of the two performs best in achieving the overarching objectives of Waterbeach New Town to the NEC development.

The demand management and Park and Ride options score less well compared to other strategic options because they offer neutral benefits, whereas other targeted improvements or a segregated high quality public transport route offer major benefits across the criteria. Demand management and Park and Ride schemes have been politically opposed to in the past, meaning that there may be some minor negative impacts associated with them whereas the other measures offer strong positive impacts.

The combined improvement approach scored well, but only scored ‘minor positive’ on the public transport objectives because bus and rail services already exist. A new busway route scored better in this regard as new infrastructure could serve different markets (such as Cambridge Science Park and Cambridge Research Park) and provide fast, frequent, and reliable connections.

As a result of the strategic option assessment, it is concluded that a segregated busway route with accompanying walking, cycling and equestrian infrastructure would offer the best benefits compared to other options.

Table 2-7 - Strategic option assessment

	Improvements to bus services	Improvements to rail services	Improvements to walking, cycling & equestrian facilities	Demand management	Park and Ride	Segregated high Quality public transport route	Combined approach
Increase in public transport capacity							
Ability to contribute to 24% reduction in traffic levels							
Propensity to reduce congestion / delays							
Reduced journey times on public transport							
Increased reliability of public transport							
Ease of interchange							
Benefits to active travel							
Supports CAM							
Scale of catchment (jobs/housing)							
Ability to unlock growth							
Road safety							
Protection of green spaces							
Environment, air quality and carbon							
Quality of the public realm							
Severance							
Engineering constraints							
Environmental constraints							
Land ownership							
Planning							
Political / public acceptance							
Stakeholders' acceptance							

Key changes since the strategic option assessment

Since the strategic option assessment was undertaken, there have been a number of local and national changes which could have an impact on the case for a busway.

Cancellation of the Cambridge Autonomous Metro (CAM)

The decision by CPCA to cancel further work into developing the CAM scheme is not expected to impact on the ability for the scheme to deliver decongestion and sustainable travel improvements within the Waterbeach to

Cambridge corridor. Segregated public transport infrastructure will be provided from Waterbeach to NEC. Where buses were previously assumed to utilise CAM infrastructure from NEC, they will now instead utilise the improved infrastructure provided by the Milton Road and/or Histon Road schemes (depending on routing). This infrastructure provides bus priority measures into Cambridge.

The impact of Covid-19 on travel demand

The Covid-19 pandemic led to a large reduction in demand for bus travel and is still only at 73% of pre-pandemic levels within the Greater Cambridge area[64]. There is a considerable level of uncertainty regarding whether demand will fully recover in the future, however this scheme, along with other GCP projects will help to boost demand back to pre-pandemic levels. In addition to this, it is considered that the growth within the corridor over the next 20 years will still provide sufficient demand for the scheme to be effective.

The scheme modelling and appraisal will undertake sensitivity tests to assess the impact of lower demand on the demand and benefits delivered by the scheme.

Progression of the Making Connections scheme

Since the strategic option assessment, the Making Connections scheme has progressed further and as such has been included within the core modelling and appraisal scenarios. The measures proposed as part of the Making Connections scheme are as follows:

- Provision of new bus routes, more frequent, longer-running services and cheaper fares;
- Investment into other sustainable travel schemes, such as the active travel network; and
- Creation of a Sustainable Travel Zone in the form of a road user charge[65].

It is considered that this scheme strengthens the case for a busway as the busway will provide a sustainable and efficient alternative to driving into the Cambridge City area.

The Waterbeach to Cambridge Public Transport Scheme has been designed to accommodate the extra buses needed if Making Connections or other bus investment comes forward, so that with or without a Sustainable Travel Zone, the busway can provide a sustainable and efficient alternative to driving into the Cambridge City area.

Provision for equestrians on the scheme active travel route

Provision for equestrians was considered as part of the option development process but, as the scheme active travel route will be largely for commuting purposes and other nearby schemes will cater directly for equestrians, this element has been removed from the scheme. Where the scheme interfaces with bridleways and other equestrian networks, provision will be made to prevent severance to equestrian routes.

2.6. Scheme objectives

The scheme objectives set by GCP are as follows:

1. Provide additional sustainable transport capacity to provide for the transport demands of economic and housing growth;
2. More reliable journey times by public transport;
3. More journeys along the corridor being undertaken by public transport; and
4. More short journeys along the corridor being undertaken by walking and cycling (because people feel safer and have direct routes between origins and destinations).

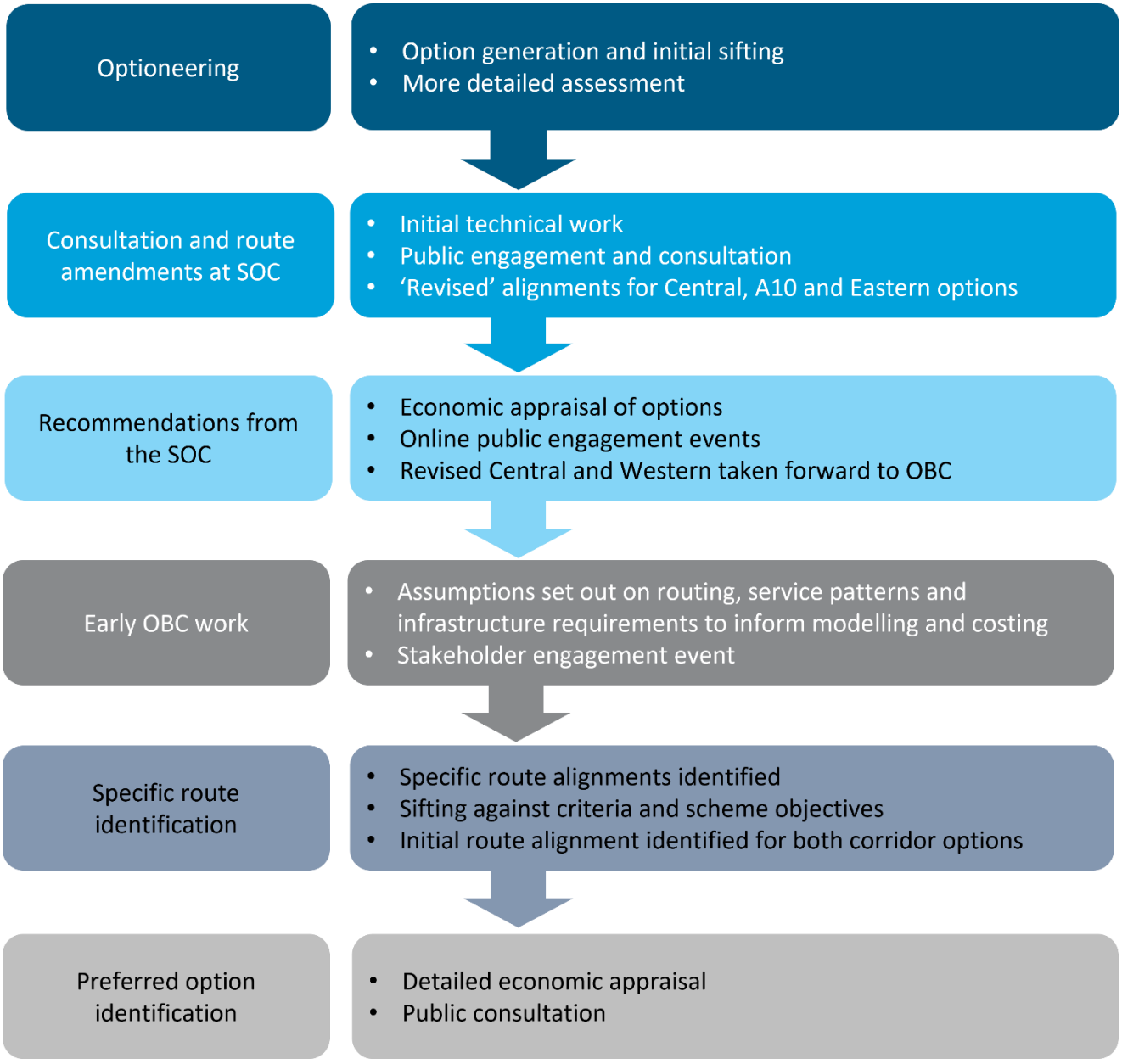
2.7. Busway option development

This section follows the option development for the scheme, from identification of a busway route as the preferred solution at the inception of the project through to the selection of a preferred route alignment as part of this OBC. Figure 2-11 shows a summary of this process in diagrammatic form.

[64] GCP (2022), *Making Connections Consultation Brochure*, p.6

[65] GCP (2022) *Making Connections Consultation Brochure,* p.4

Figure 2-11 - Option development summary



2.7.1. Optioneering

This section summarises the work reported in the OAR[66] and outlines the methodology and the findings of the option generation, sifting and assessment processes for the busway route plus walking, cycling and equestrian improvements option. The process consisted of three stages:

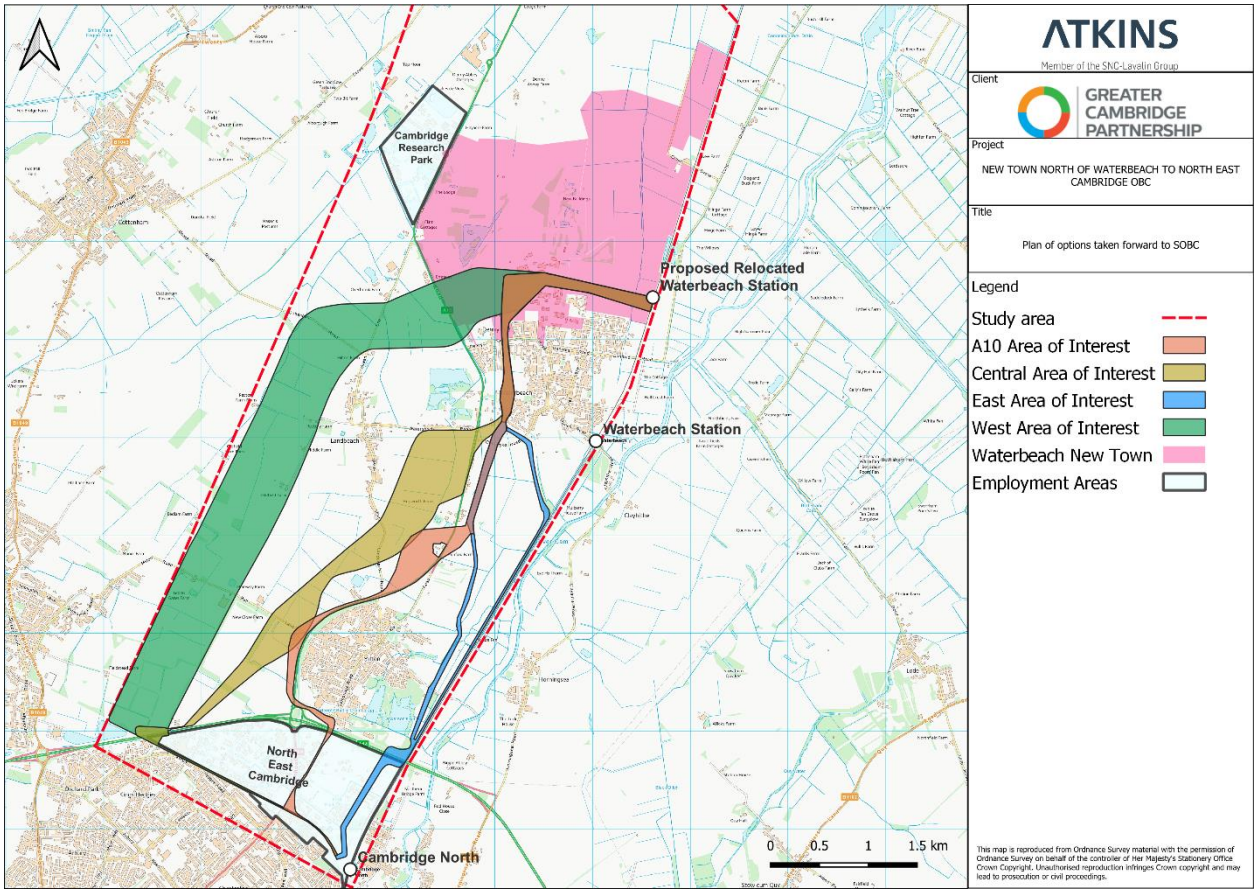
1. The **option generation** stage identified possible options that had the potential to meet the objectives and deliver the outcomes of the scheme. Option generation was not constrained by the findings of previous studies;
2. Identified options were **sifted** by assessing them using a criterion selected to ensure that the transport objectives of the scheme could be met. Options that were unable to meet these high-level criteria were discarded at this stage; and
3. In the final stage, a **more detailed assessment** of the remaining options was undertaken, assessing their fit against each transport objective and outcome, and engineering and environmental constraints. This assessment fed in to a Multi Criteria Assessment Framework (MCAF) to record the evidence and score

[66] Atkins (2020) *Options Appraisal Report*

each option against the criteria. From this, sets of options were considered in combination to provide corridor options for full connectivity to and from each end of the study area.

The results of the more detailed assessment yielded four options which were presented for consultation and taken forward for further assessment within the SOC. These are presented in Figure 2-12.

Figure 2-12 - Options taken forward to SOC



Further detail on each step is provided in Appendix B.

2.7.2. Engagement and consultation at SOC

This section outlines the engagement and consultation undertaken at SOC to gather stakeholder and the public opinions on the scheme. Further details on engagement and consultation at SOC are set out in Appendix C.

Stakeholder engagement at SOC

Throughout the SOC stage of the scheme, several stakeholder engagement exercises were undertaken including an initial engagement with stakeholders closely linked to the project in November 2019. Between January 2020 and September 2020, there was further engagement with individual stakeholders including politicians, council members and national bodies such as Highways England (now National Highways).

Public consultation at SOC

A public consultation on the four corridor options was held virtually between Monday 19th October 2020 and Monday 14th December 2021. Eight online briefings were held, one one-to-one session, four parish council meetings, three resident meetings and the pre-launch briefing with local district and county councillors. In addition, a social media campaign was undertaken including a Facebook live session with over 50 questions submitted.

The consultation findings showed that over half (52%) of respondents supported the busway proposals, with the western route alignment receiving the most support.

2.7.3. Route amendments at SOC

Following the consultation, engagement and technical work completed at the SOC stage, a review of the four corridor options was undertaken to determine which should be progressed to economic assessment. As a result of the review, amendments were made to three of the four corridor options, detailed in Table 2-8.

Further detail is provided in Appendix D.

Table 2-8 - Route amendments

Route option	Amendment
Western route option (not revised)	No alterations
Revised Central route option	Amendments included: • The same alignment as the original Central route option between Cambridge North Station to Landbeach Road to the north of Milton Park and Ride; • Then following a new alignment due north running between Landbeach village and the A10 avoiding private residences and commercial properties; • Running north-east then to a proposed roundabout at Waterbeach New Town on the A10; and • Then following the same alignment as the Western route option through Waterbeach New Town to the proposed relocated Waterbeach Station and Cambridge Research Park.
Revised A10 route option	Route amended to join Car Dyke Road from the south via Car Dyke Road and High Street through Waterbeach village centre and onward to Waterbeach New Town.
Revised Eastern route	The route was amended to join Car Dyke Road and run on-road to Waterbeach New Town as the Revised A10 corridor option.

2.7.4. Recommendations from the SOC

Based on the technical assessments and public consultation results, the SOC recommended that two corridor options should be carried forward to OBC for further assessment, the Western option and the Revised Central option. The Western option represented the best value for money, supported the scheme objectives and was well supported at public engagement. The Revised Central option represented a very similar level of value for money to the Western option, encouraged an increase in public transport trips and aligned well with the scheme objectives.

The Revised A10 route option was discounted due to cost and deliverability. The provision of new infrastructure to cross the A14 and Milton Interchange results in significantly higher costs than other options and presents significant deliverability challenges. The Revised Eastern was discounted as it offered the fewest transport benefits and did not adequately serve the whole NEC development.

2.7.5. Early OBC Work

Ongoing engagement

Throughout the OBC phase of the scheme, there has been ongoing engagement with relevant stakeholders, these are listed in Table 2-12. In addition to this, there has been engagement throughout with the developers of Waterbeach New Town to ensure that the proposals for the scheme align with the proposed developments.

Stakeholder engagement at OBC

Stakeholder event – February 2022

Representatives from the stakeholders listed in Table 2-12 were invited to a virtual stakeholder engagement workshop via Microsoft Teams on Wednesday 9th February 2022. The purpose of this engagement event was

to inform stakeholders of key assumptions that will inform the design, modelling and appraisal work for the OBC and to collect stakeholders' views on these.

During the engagement, stakeholders were informed of the background to the scheme, work undertaken to date and the conclusions drawn from analysis of areas that required further consideration since the conclusion of the SOC. The focus areas were:

- Waterbeach New Town;
- Park and Ride;
- Active Travel, including Mere Way; and
- Busway Stops and Facilities.

Feedback from the stakeholder event was analysed qualitatively via thematic analysis, which involves assigning a theme to comments raised from stakeholders for each focus area. Feedback received from stakeholders that has design or planning implications for the scheme is set out, by focus area, below.

Waterbeach New Town

- Stakeholders were generally in favour of having a segregated busway network within the New Town, or bus priority. This will be explored via continuing liaison with Urban&Civic; and
- Several stakeholders stated that, if a bridge were built to cross the A10, it should be similar in design to the Mere Way bridge crossing.

Park and Ride

- Several stakeholders suggested that the Park and Ride should provide electric vehicle (EV) charging ports and cycle/scooter hire docking stations to encourage sustainable travel. These will be considered further at a more detailed design stage.

Active travel and Mere Way

- There was divided opinion over the need for an active travel route alongside the busway due to route duplication with Mere Way. Following the event, Atkins re-confirmed the active travel requirements in the corridor and concluded that, in line with previous conclusions, there is a need for active travel infrastructure adjacent to the busway route as it serves different markets and users to that of other GCP schemes (Waterbeach Greenway), and upgrades associated with Waterbeach New Town (Mere Way and A10). Where the active travel route runs alongside Mere Way, segregated active travel infrastructure will not be provided to reduce scheme costs without compromising the quality of the provision; and
- Stakeholders felt that an active travel route alongside the busway should be lit for safety reasons but should be balanced with the issue of potential light pollution.

Busway stops and infrastructure

- Stakeholders generally considered that one busway stop serving Landbeach would be sufficient.

2.7.6. Specific route identification

Three route options for each corridor option were developed for detailed assessment and sifting. Details on the identification of the routes is included Appendix F. The six route options (three in each corridor) were identified based on the following general design principles and assumptions:

- Minimising land purchase by utilising publicly owned land (CCC);
- Minimise field separation and follow, where possible, field boundaries;
- Simplifying construction;
- Minimising costs, traffic management requirement and environmental impacts;
- Achieving Biodiversity Net Gain;
- Enhancing intermodal connections;
- Ensuring that the busway effectively serves assumed bus stop locations and that these have adequate provision;
- Provide adequate transition between the busway and the existing highway network;

- Avoidance, where possible of areas with significant flood risk; and
- Avoiding environmental and heritage constraints, and existing buildings, where possible.

The six route options were assessed against five overarching categories, each with several different elements that were considered, which have been developed based on the constraints commonly encountered in the area when designing schemes. These categories were:

- **Highway design** – horizontal and vertical design, safety and junction improvements;
- **Scheme wide objectives** – how well the option aligns with the scheme objectives;
- **Deliverability and stakeholders** – construction costs, buildability in terms of traffic management, land acquisition, impact on the existing network, utilities and businesses;
- **Environment and sustainability** – flood risk, ecology (potential for biodiversity net gain), landscape, visual impact and noise, and archaeology and heritage; and
- **Transport planning** – journey times, connections to travel markets and the existing transport network.

The six route options were considered by splitting the assessment into three sections. This allowed options to be mixed and matched if one section of one option and another section of another option performed strongest, providing the two options aligned at the section boundaries. The sections considered were:

- Section 1: From the CGB to Milton Road – all options;
- Section 2: From Milton Road/Butt Lane to the proposed Park and Ride adjacent to the A10; and
- Section 3: From the new Park and Ride, to the A10 and Waterbeach new town.

The best performing option from both the Revised Central and Western corridors were taken forward, forming the basis of further design, costing and appraisal work. These two alignments are shown in Figure 2-13.

In terms of the Revised Central option, the alignment taken forward provides:

- Direct connectivity with Milton Park and Ride;
- Preferrable bus stop locations, close to existing travel markets;
- Most preferrable connections in terms of active travel; and
- Connectivity with Park and Ride though segregation, providing resilience to the network.

There are a number of constraints to be considered further as the option develops, particularly how to integrate the option with Butt Lane and minimise the delay to buses and vehicles on Butt Lane.

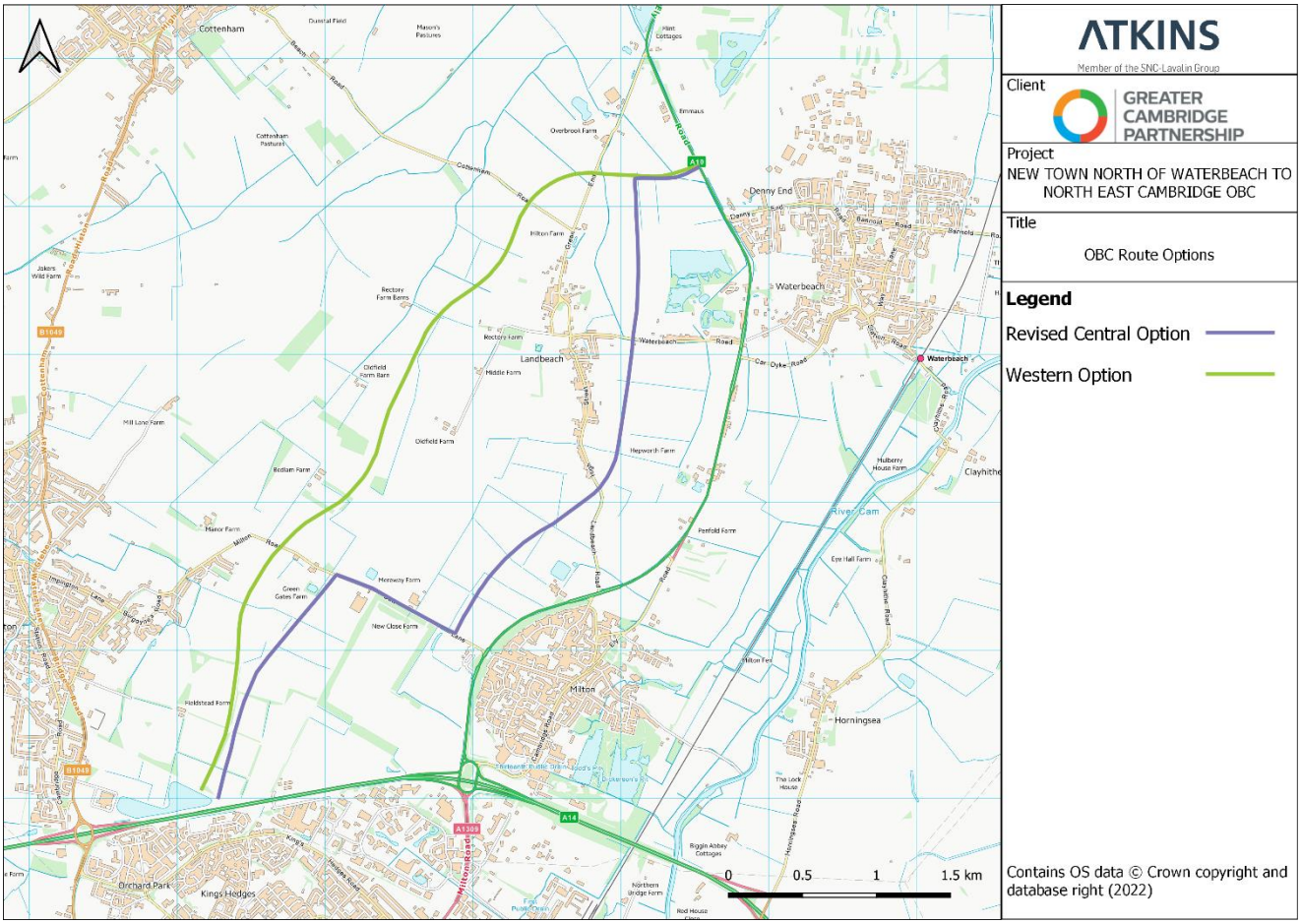
In terms of the Western option, the alignment taken forward provides:

- Less land purchase than other options considered;
- Straight alignment, which could allow for higher speeds;
- Fully segregated route, albeit with a diversion on Butt Lane to serve Milton Park and Ride; and
- Connectivity with Park and Ride though segregation, providing resilience to the network.

There are a number of constraints to be considered further as the option develops, particularly:

- How to integrate services with Milton Park and Ride;
- How to provide multi-modal access to bus stops; and
- Consideration of flood mitigation, specifically on the northern section of the route.

Figure 2-13 - Specific route alignments assessed in the OBC



2.7.7. Busway option comparison

The two options set out in Figure 2-13 have been assessed further through transport modelling, economic appraisal and environmental assessment. These assessments are set out in more detail in the Economic Dimension, Chapter 3.

Impact of options on transport patterns

The changes in traffic patterns as a result of both Western and Revised Central route options are aligned to the planned outcomes of the scheme. Both options provide improved journey times for public transport users, improve reliability for users and increase the connectivity of the active travel network within the corridor, by providing a high-quality link between Waterbeach and Cambridge. As a result of this, it is forecast that the scheme will lead to a net increase in public transport patronage and active travel usage. The mode shift is most pronounced in the AM and PM peaks, reflecting the tidal nature of commuting trips into Cambridge, which leads to higher levels of road traffic congestion during these times, and therefore users are more likely to consider alternative modes for all or part of their journey.

For both options, there is a forecast reduction in car journeys being made, compared to a without scheme scenario, associated with the provision of a new Park and Ride site and improved connectivity by public transport and active travel. Both options are expected to lead to a slight increase in highway journey times. This is due to delay caused by the addition of road crossings for the busway, as well as the provision of a Park and Ride site access on the A10 at Denny End Road. These junctions will be refined as the scheme design progresses to reduce additional delay where possible.

These impacts lead to associated economic benefits such as journey time savings, vehicle operating costs and journey reliability for users, which are set out further in section 3.6.

Environmental impacts

Environmental constraints assessment

An Environmental Constraints Assessment was undertaken for the Western and Revised Central route options. The assessment identified that the main constraints related to the Revised Central option were related to potential route options traversing the Milton Landfill site. As a result, these options were discounted early in the route identification phase. From a water environment the Revised Central option would be preferred, however further assessment would be necessary to determine the impact and mitigation required. From the perspective of other environmental topics (landscape and heritage, air quality, noise and geology), both options present constraints and mitigation requirements, although neither is identified as being more challenging than the other at this stage. It is recommended that further environmental assessments are completed to inform preliminary design of a preferred option.

Preliminary ecological assessment

A Preliminary Ecological Assessment has been undertaken for the Western and Revised Central route options. This included desktop appraisal and a scheme walkover. The assessments for both scheme options identified similar ecological features, with no specific differentiation between them. Both routes pass predominantly through arable fields, with some hedgerows and woodland blocks. Therefore, both assessments recommended specific ecological surveys at the next stage of scheme design.

Travel markets served

Travel markets served are ultimately at the discretion of bus operators, however, the infrastructure provided for both the Western and Revised Central route options would serve Waterbeach New Town, Waterbeach Relocated Station and destinations within Cambridge directly, adhering to the main objectives of the scheme. Both options would not directly serve Waterbeach and Milton but would be accessible via Waterbeach New Town and Milton Park and Ride, respectively. Bus services serving Waterbeach and Milton could utilise the busway infrastructure, particularly for the Revised Central option, and therefore benefit the users also. The Revised Central route provides greater connectivity and flexibility by providing links to Landbeach.

Journey times

The high-level journey time assessment undertaken for the SOC has been updated to reflect the specific route alignments for the Western and Revised Central route options. Methodologies to calculate journey times are consistent with other GCP projects as well as the estimates provided at SOC stage, using timetable data for existing services on rural and urban areas as well as on-street and on guided infrastructure.

Based on this approach, minimum and maximum journey time estimates for each option from Waterbeach Relocated Station to Cambridge city centre are shown in Table 2-9. For the Western option, estimates have also been provided where services call at Milton Park and Ride as well as direct services into Cambridge. This reflects the distance between the route alignment and Milton Park and Ride site, meaning that there is a potential that not all services will divert to serve Milton Park and Ride from the Western route.

Table 2-9 - Estimated journey times for each corridor option

Option	Estimated journey time range
Western route option (direct)	28 to 31 minutes
Western route option (via Milton Park and Ride)	33 to 36 minutes
Revised Central route option	30 to 33 minutes

The c. 30-minute journey time between Waterbeach and Cambridge city centre in the weekday morning peak compares with a pre-Covid bus journey time of around 45 minutes[67] for the same journey. **This represents a significant journey time saving (of around 15 minutes (33%)** between Cambridge Research Park and Cambridge city centre which further highlights the benefits of this scheme.

Moreover, the Waterbeach to Cambridge Public Transport Scheme would significantly increase journey time reliability as it is proposed that the majority of the route will be segregated from the rest of the A10 traffic. This,

[67] Information from timetables February 2020 for Citi 2, Route 9 and Route X9 services.

combined with the Milton Road improvement scheme, would mean that the vast majority of the route would not be subject to delays caused by general traffic. Existing services can experience delays between Ely and Cambridge as they are reliant on the existing non-prioritised highway network. Journey time reliability is further explored in Section 3.6.2 in the Economic Dimension.

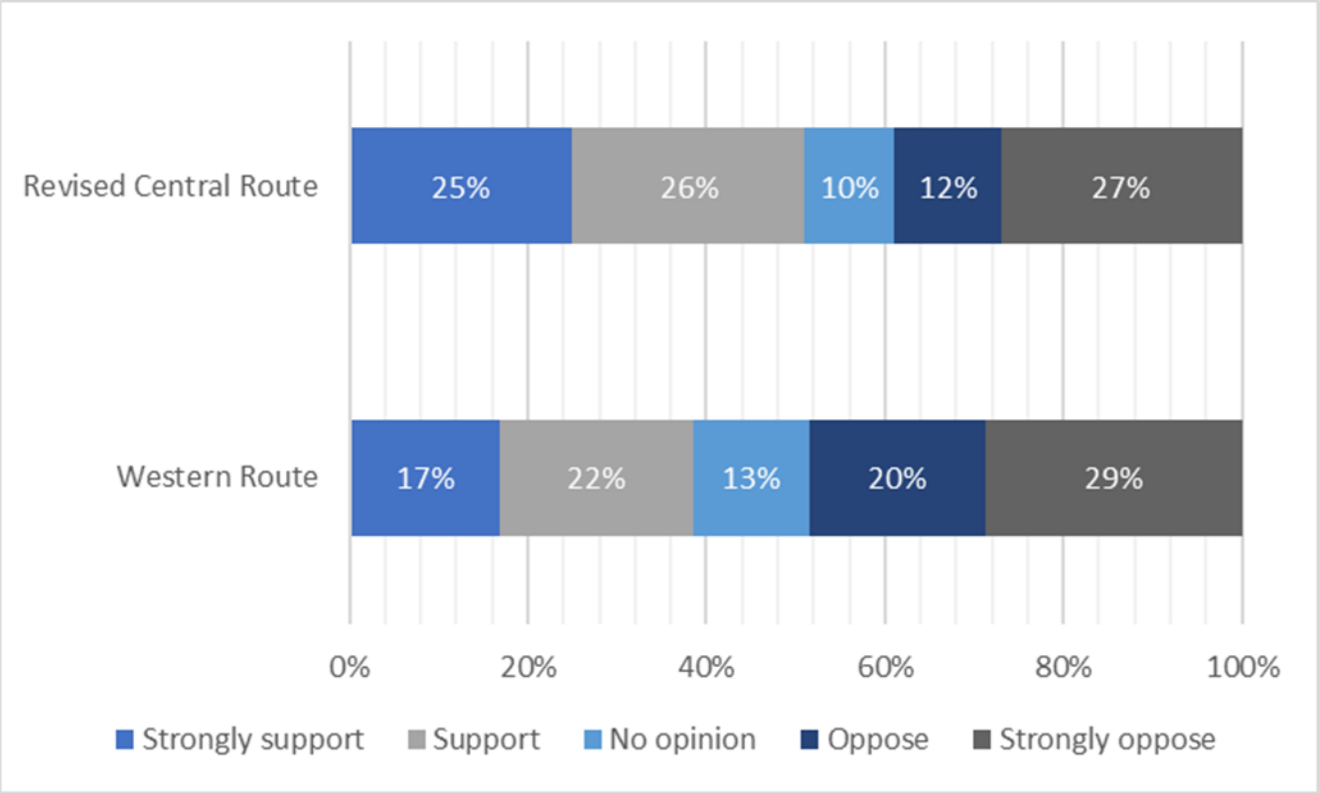
Public consultation: Busway Results

Following the completion of the technical work to inform the OBC, a second public consultation exercise was undertaken from January to March 2023 to gather feedback on the two route options appraised as part of this OBC. This section provides an overview of the consultation completed at the OBC stage, specifically related to the busway. Please refer to section 2.8.3 for responses related to Park and Ride and the Consultation report for further detail[68]. The responses to the consultation informed the identification of a preferred option and option development work going forward.

Quantitative data was recorded through a formal consultation questionnaire (online) with 388 complete responses recorded (377 individual respondents and 11 stakeholder groups). A significant amount of qualitative feedback was also gathered via the questionnaire and through emails, letters and social media.

Figure 2-14 presents the consultation responses regarding the preferred route alignment for the busway. The results show that the Revised Central route had the most positive response, with 51% of respondents supporting this route alignment, whereas only 39% of respondents supported the Western option. The Revised Central route also received the lowest opposition (39%), whereas just under half of respondents opposed the western route option (49%).

Figure 2-14 - Support for the proposed Revised Central and Western route options



[68] Greater Cambridge Partnership (2023) *Waterbeach to Cambridge 2023 Consultation: Summary Report of Consultation Findings*

Active Travel Infrastructure

When asked how far they supported or opposed the proposals for the active travel infrastructure alongside the busway, the majority of respondents supported these proposals (68%).

The key points raised by respondents included the following:

- The need for adequate lighting along the active travel route;
- The need for more active travel provision in the area;
- The need for the busway to be safely segregated from active travel provision;
- The need for active travel to be segregated by mode to improve safety;
- The need for paths to be of sufficient width;
- Concerns about whether the proposals were needed due to existing active travel and public transport infrastructure;
- The need to ensure equestrian users have access and suitable surfaces;
- Concerns regarding the potential duplication of active travel infrastructure on Mere Way;
- Which of the busway routes would provide better active travel provision;
- The need for suitable routes to be created to allow access to the busway active travel route;
- The need for further improvements to Butt Lane;
- The need for active travel routes to be high enough to allow drainage due to a risk of flooding in the area;
- Concerns the proposals would negatively impact the environment, greenbelt land and agricultural land;
- The need for the A10 to be improved instead of the current proposals;
- Whether the busway should be accessible to powered two-wheelers; and
- The need for ongoing maintenance.

Alignment with objectives

Section 2.2 provides an overview of how the project aligns with local and national policy. As the options are similar in nature, there is no specific differentiation between them in policy terms. This section therefore provides an overview of how well each option performs against the scheme objectives as summarised in Table 2-10.

Table 2-10 - Option alignment to scheme objectives

Objective	Western route option	Revised Central route option
Provide additional sustainable transport capacity to provide for the transport demands of economic and housing growth	Both options provide a new segregated public transport route, Park and Ride site and active travel route providing additional capacity for sustainable journeys by bus and active modes.	
More reliable journey times by public transport	Both options provide a segregated, traffic free route between Waterbeach New Town and Cambridge. Both route options interact with the highway network four times on the route, therefore experiencing the same potentially delays at junctions. Both options would also be required to use Butt Lane to access Milton Park and Ride, albeit the Western option could be used for a direct services between Waterbeach and Cambridge, therefore avoiding this on-road stretch.	

Objective	Western route option	Revised Central route option
More journeys along the corridor being undertaken by public transport	The Western option leads to a net increase of approximately 500 daily public transport trips in 2026 and approximately 550 in 2041. This is driven by people moving from car and rail to use the bus services that utilise the scheme.	The Revised Central option leads to a net increase of approximately 700 daily public transport trips in 2026 and approximately 750 in 2041. This is driven by people moving from car and rail to use the bus services that utilise the scheme.
More short journeys along the corridor being undertaken by walking and cycling (because people feel safer and have direct routes between origins and destinations)	The Western option leads to a net increase in active travel trips of 800 daily trips in 2026 and 1,200 in 2041. This is driven by people switching from other modes to use A10 Park and Ride as a Park and Active facility. Through effective and connected route design, it is likely that many of these trips could be made wholly by active travel in real life.	The Revised Central option leads to a net increase in active travel trips of 800 daily trips in 2026 and 1,400 in 2041. This is driven by people switching from other modes to use A10 Park and Ride as a Park and Active facility. Through effective and connected route design, it is likely that many of these trips could be made wholly by active travel in real life.

Table 2-10 shows that both options align with the scheme objectives as they both provide additional capacity for public transport and active travel usage within the corridor. The segregated nature of the busway provides more reliable journeys, regardless of incidents or congestion on the highway network. More detail on journey reliability benefits is set out in section 3.6.2. Both options are aligned with the scheme objectives regarding the uptake of public transport and active travel trips, as they are both forecast to lead to an increase in these trips. Overall, it is considered that the Revised Central option goes further in achieving the scheme objectives, due to the greater uptake of sustainable travel options compared to the Western option. More detail on the impacts of the scheme is set out in the Economic Dimension, Chapter 3.

2.7.8. The preferred busway option

The Revised Central option is identified as the preferred option for a number of reasons, including connectivity, sustainable transport trips and public support.

In terms of **connectivity**, the Revised Central option provides better connectivity with Milton Park and Ride, connecting with Butt Lane directly to the north of the site. This means that all bus services on the busway route would be able to easily service the Park and Ride, without impacting journey times, and improving the service offering at the site. The proximity of the route to Milton village also means that residents of Milton could access a higher frequency of services on the busway from Milton Park and Ride or Landbeach Road. The Revised Central route serves Landbeach village directly and its proximity to Waterbeach and Milton also provides the opportunity for service flexibility. This means that buses serving the villages directly could use the busway infrastructure for part of their journeys without significant diversions, contributing to improved journey times and journey reliability. Guidance infrastructure will be flexible at junctions to allow buses to turn off of and onto the busway.

The Revised Central option leads to increased **mode shift to sustainable transport trips** compared to the Western option. In 2041, the Revised Central option is predicted to lead to an additional 750 daily public transport trips (bus, guided bus and rail), compared to a without scheme scenario. The equivalent number for the Western option is a 550-trip increase. The Revised Central option also leads to a larger increase in active travel trips, compared to the Western option. In 2041, the Revised Central option is predicted to lead to an increase of 1,400 daily active travel trips compared to a without scheme scenario. The equivalent number for the Western option is 1,200. The increase in sustainable transport trips means that the Revised Central option leads to a decrease of 2,600 daily private vehicle trips on the highway network in 2041, compared to a without scheme scenario. This mode shift towards sustainable trips also leads to a reduction in Greenhouse gas emissions, which is greater for the Revised Central option than the Western option, as a result of the greater mode shift away from car.

Public consultation undertaken on the OBC route options, showed that there is **higher public support** for the Revised Central option with 51% of respondents 'strongly supporting' or 'supporting' the option, compared to 38% for the Western option.

2.8. Park and Ride option development

This section provides an overview of the development of the Park and Ride solution for the corridor, including the strategic solution for Park and Ride, and the option assessment for a new Park and Ride site at Waterbeach. More detail on this can be found in Appendix H and within the Park and Ride Report[69].

2.8.1. Park and Ride Strategy

The following strategic solutions for Park and Ride within the corridor were assessed:

- Retaining and potentially expanding the Milton Park and Ride site only;
- A new Park and Ride site at Waterbeach, with the Milton site being converted to other use;
- A combination of a Park and Ride at Milton and Waterbeach; and
- No Park and Ride infrastructure along the corridor.

The combination strategy was chosen as the preferred solution due to its' better strategic fit and its potential for accommodating the forecast demand for Park and Ride within the corridor.

2.8.2. Short-listed options

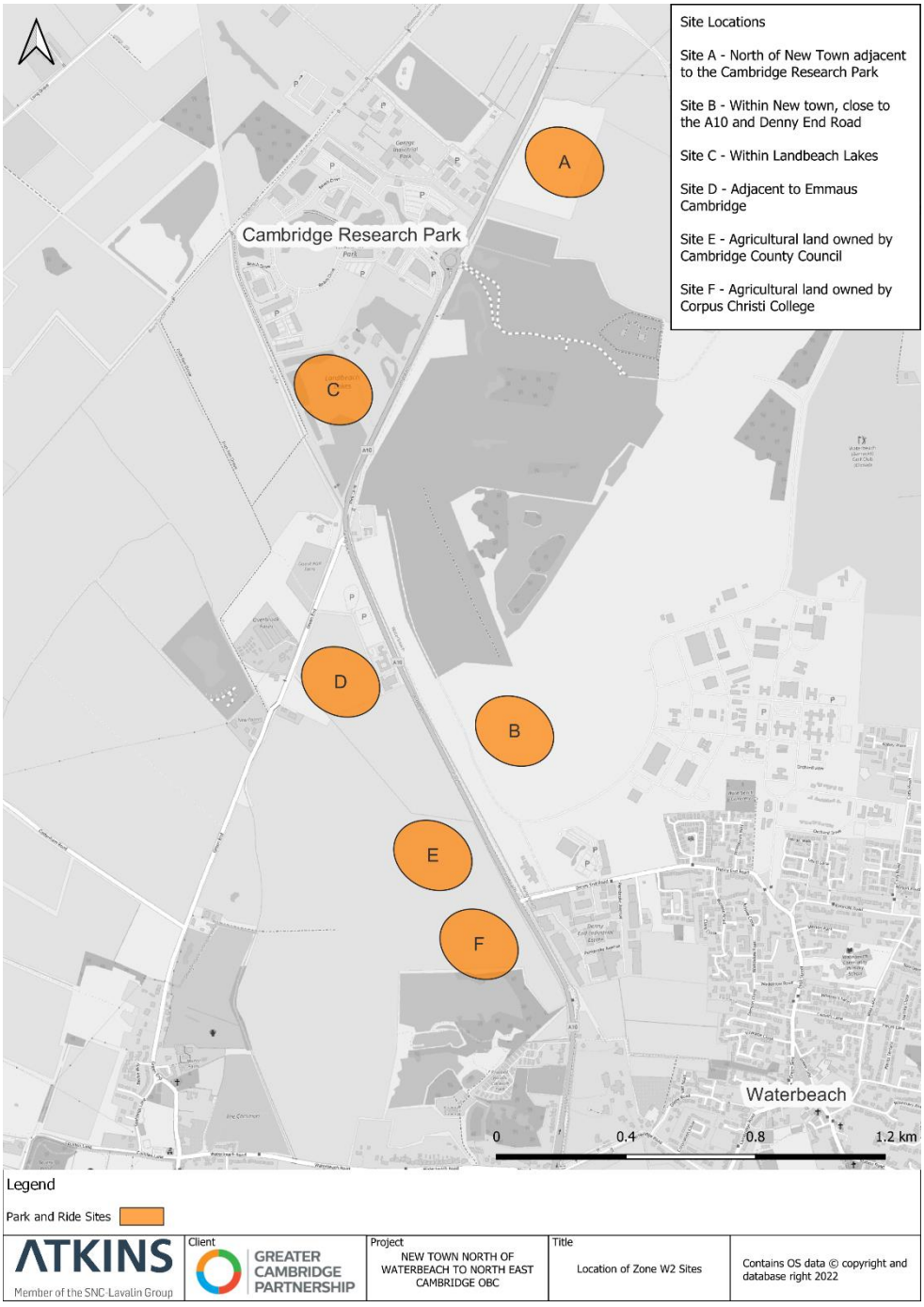
A long-list of options for a Park and Ride site at Waterbeach, shown in Figure 2-15, was developed and assessed against multiple criteria, including, but not limited to:

- Flood risk;
- Land ownership; and
- Land designations.

The four best performing options were assessed via a Multi-criteria Assessment Framework (MCAF). The MCAF criteria and ratings can be found in Appendix G.

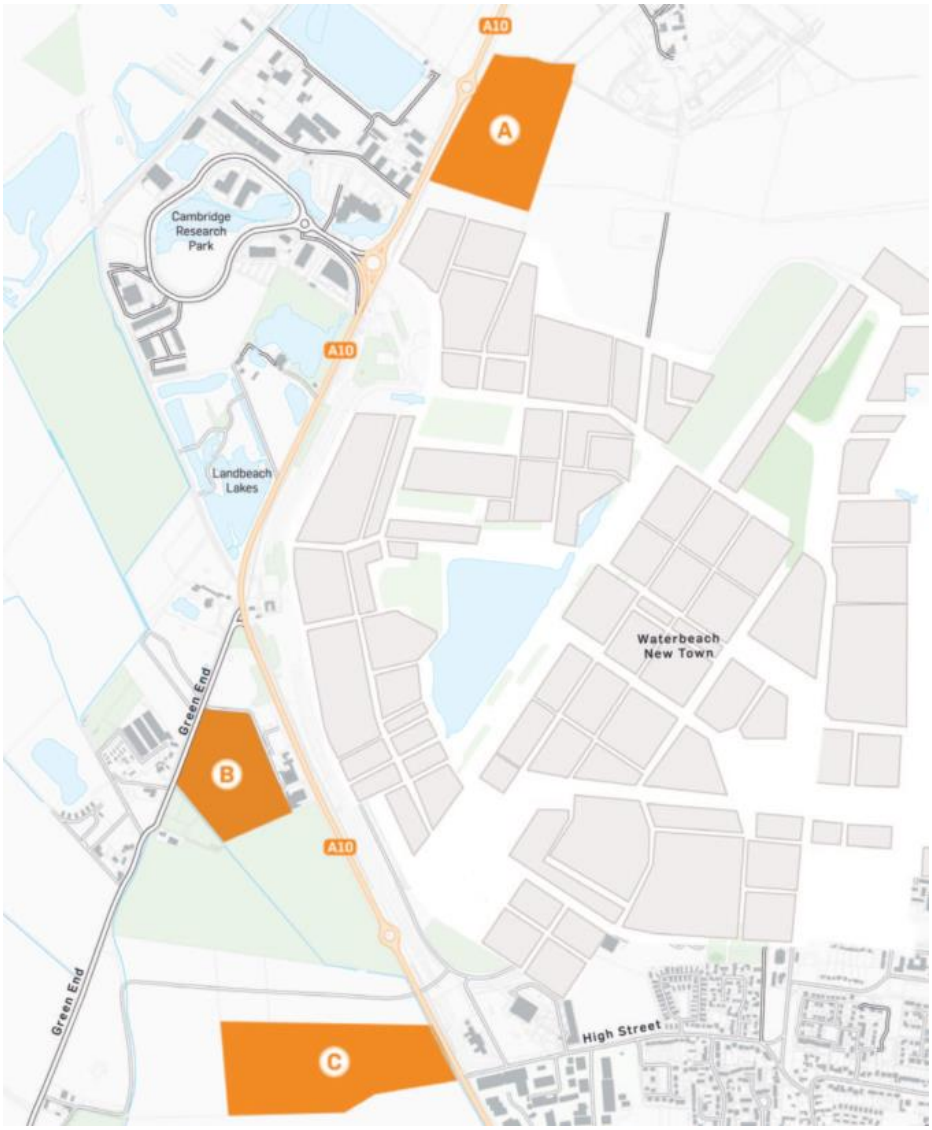
[69] Atkins (2023) *Waterbeach to Cambridge Public Transport Scheme Park and Ride Report*.

Figure 2-15 - Park and Ride site long-list



Sites E and F, which were merged to form one site, performed best in this analysis and therefore was the assumed Park and Ride location for the modelling and appraisal work undertaken to compare the busway options. All three sites were presented at public consultation for comment, and renamed to Site A, Site B (previously D) and Site C (previously E/F) for ease of communication (as shown in Figure 2-16. Here forth the sites will be referred to as A, B and C.

Figure 2-16 - Short-listed Park and Ride sites

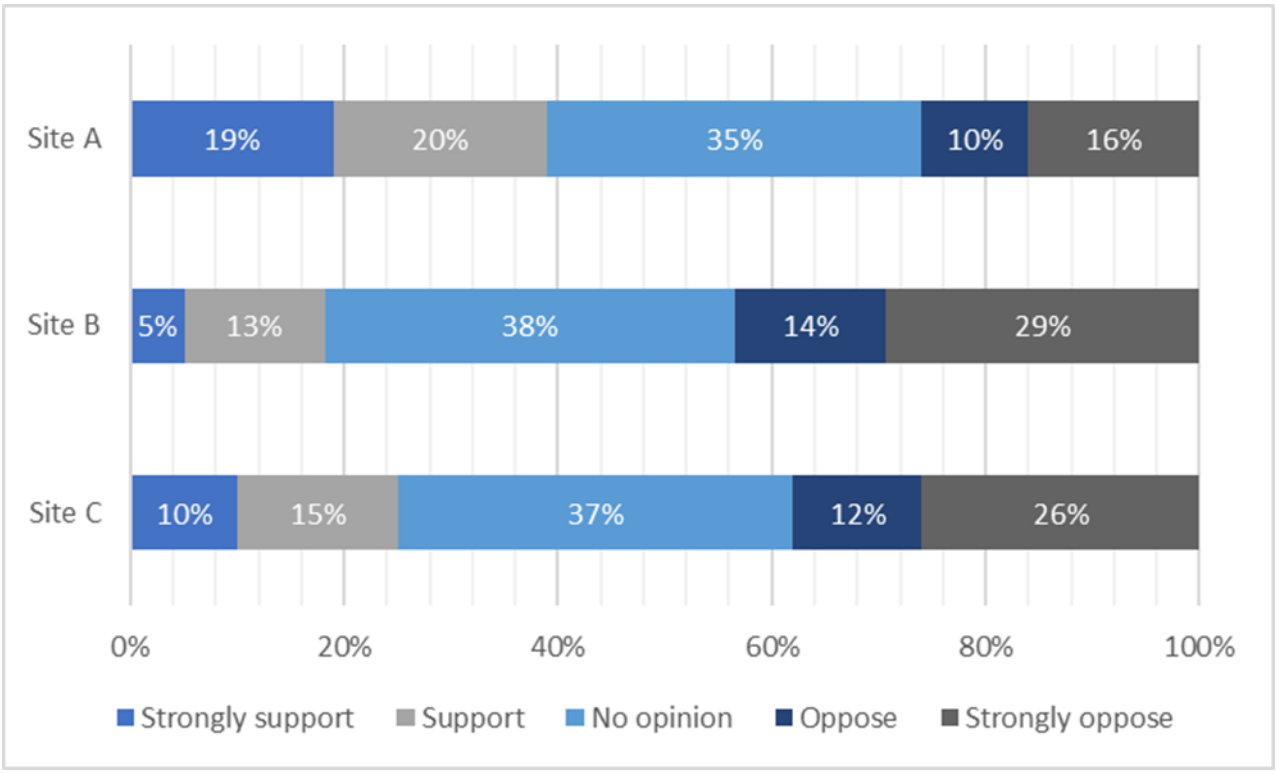


2.8.3. Public consultation: Park and Ride Results

Sites A, B and C were presented at public consultation for feedback. Figure 2-17 presents the responses received regarding how far respondents supported or opposed each of the locations for a new Waterbeach Park and Ride site. In general, the responses were fairly balanced and inconclusive with a large proportion of respondents having 'no opinion'. The following responses were received:

- Over a third of respondents had 'no opinion' on 'Site A' (35%), 'Site B' (38%), and 'Site C' (37%);
- Just under two fifths of respondents supported 'Site A' (39%);
- Just over two fifths of respondents opposed 'Site B' (43%); and
- Just under two fifths of respondents opposed 'Site C' (38%).

Figure 2-17 - Support for the locations of the new Waterbeach Park and Ride site



Respondents were also asked if they had any further comments on the various access options for either Site A, B or C. From the engagement, 101 comments were received, with the key comments including:

- Concerns about the access proposals for Site B negatively impacting traffic levels in the nearby area, negatively impacting nearby bridleways, and negatively impacting the nearby Emmaus community;
- Concerns about the access proposals for Site C negatively impacting traffic levels in the nearby area and the Park and Ride site itself being located too far south to improve existing congestion on the A10;
- Discussions about the suitability of Site A as it was located far enough north on the A10 to reduce congestion and had the least environmental impact of the three sites;
- Concerns about whether the proposals were needed due to the nearby location of the Milton Park and Ride and availability of existing public transport infrastructure;
- Concerns about not being able to find the relevant information on the access proposals to answer the survey and the lack of options provided to answer the question for site access for Site B;
- The need for active travel improvements, including improvements to a pedestrian bridge over the A10 and impact on Mere Way, to allow access to the Park and Ride sites; and
- Concerns about the negative environmental impacts of the proposals.

The consultation responses have been analysed fully and contribute towards the decision of a preferred option to be taken forward. Specific responses will also be used to develop the preferred option.

2.8.4. Further Park and Ride technical work

Overall, the consultation feedback for each of the three sites was inconclusive, with a large proportion of respondents not having an opinion on any of the sites, therefore further, more in depth, technical work has been undertaken in order to identify a preferred option. A note summarising the outcomes of the more detailed assessment is included in Appendix H.

The three Park and Ride sites were assessed further in terms of:

- Acoustics;
- Heritage;

- Landscape;
- Water;
- Flood risk;
- Land ownership and designation;
- Transport planning
- Transport modelling;
- Stakeholder and public support; and
- Costing.

For purposes of comparison, the sites have been RAG rated (Red, Amber, Green) based on the results of each assessment, as shown in Table 2-11.

Table 2-11 - Summary of Park and Ride assessments

Discipline	Site A	Site B	Site C
Acoustics			 *
Heritage			
Landscape			 *
Water			
Flood Risk	 *		
Land ownership			
Public support			
Transport Planning			
Transport Modelling			
Costs			

*Preferred option indicated by discipline teams

Overall, when considering the outcomes from all the assessments undertaken, Site C is identified highest performing option. Site B is clearly the weakest option, scoring lower than Sites A and C in the majority of the assessments. Site A has several significant drawbacks, particularly related to heritage, in terms of its proximity to Denny Abbey, and water, as it has the longest length of watercourse adjacent to the site and a principal aquifer within the immediate area.

2.8.5. Park and Ride preferred option

Park and Ride site C is identified as the preferred option for a Park and Ride near Waterbeach for a number of reasons, namely, transport connectivity, and environmental impacts.

In terms of **transport connectivity**, Park and Ride site C is preferred as a result of service pattern legibility, connectivity to a variety of transport infrastructure and origins and destinations. Located to the south of Waterbeach New Town, site C enables all services on the busway to access the site, without diversion. Other short-listed locations, particularly site A to the north of Waterbeach New Town would lead to services being split to serve the development, Park and Ride and Waterbeach Relocated Station. This would mean a reduced frequency and quality of service to the Park and Ride and Waterbeach New Town and less service legibility for users.

Park and Ride site C is located directly off the A10, via the Waterbeach New Town southern roundabout therefore not requiring an additional junction on the A10, which would cause additional delays for vehicles. It is located on the desire line for trips from the north, via the A10, and Waterbeach New Town towards Cambridge, therefore catering for both markets. Therefore, of the three sites considered, site C provides the fastest and most reliable journey times for Park and Ride buses. For active travel trips (Park and Active) site C is predicted to lead to the most trips, due to being closer to the destinations in Cambridge. It also has direct connectivity to the busway active travel route and Mere Way, and its proximity to the proposed A10 active travel bridge means that those residents of Waterbeach New Town located to the south west of the development could access the site by foot or cycle to catch specific services. The connectivity that site C affords leads to the greatest predicted Park and Ride usage along the corridor, compared to the other site options, 8,250 daily users (Park and Ride and Park and Active).

In terms of **environmental impacts**, site C is considered preferable in terms of noise impacts, heritage impacts, landscape and water impacts. Its proximity to the A10 means and distance from residential properties means that the noise and landscape impact of the site is considered neutral and can be mitigated. It is not considered to impact on designated heritage assets in the study area and would have the least impact on the water environment, and any impact though construction or operation could be mitigated.

2.9. Stakeholders

Table 2-12 summarises the key stakeholders as identified by GCP and any areas where they have a particular role within this study. These stakeholders, and the public, have had a direct influence on option development and identification of a preferred option for the busway and Park and Ride.

Table 2-12 - Summary of key stakeholders (listed alphabetically)

Stakeholder	Role within study
British Horse Society	Stakeholder
Cambridge Area Bus Users	
Cambridge Past Present and Future	
Cambridgeshire and Peterborough Combined Authority (CPCA)	Scheme will aim to satisfy key stakeholder policies As the Local Transport Authority (LTA), CPCA are a consultee with any proposed planning permission within the study area
Cambridgeshire County Council (CCC)	As the Local Highway Authority, CCC are a statutory consultee with any proposed planning permission in the study area.
CamCycle	Stakeholder
Connecting Cambridgeshire	
Ely Cycle	
Greater Cambridge Shared Planning	Consultee with any proposed planning permission in the study area.
Histon & Impington Parish Council	Statutory consultee with any proposed planning permission affecting the Parish.
Horningsea Parish Council	Statutory consultee with any proposed planning permission affecting the Parish.
Landbeach Parish Council	Statutory consultee with any proposed planning permission affecting the Parish.
Milton Parish Council	Statutory consultee with any proposed planning permission affecting the Parish.
South Cambridgeshire District Council (SCDC)	SCDC are a statutory consultee with any proposed planning permission in the study area.
Stagecoach	Local bus operator. Potential operator of the scheme.

Stakeholder	Role within study
Vectos	Consultancy representing Cambridge Science Park.
Waterbeach Bridleways Association	Stakeholder
Waterbeach Parish Council	Statutory consultee with any proposed planning permission affecting the Parish.
Whippet	Local bus operator. Potential operator of the scheme.
xlb Property	Developer representing Cambridge Research Park. Service could originate/terminate in Cambridge Research Park. Agreement to be sought regarding operations of potential scheme through land.

Details of the stakeholder management plan and a full list of stakeholder groups can be found in Section 6.8 of the Management Dimension.

2.10. Scope of the scheme

The scheme will take the form of a segregated busway including a new Park and Ride site at Waterbeach, with segregated infrastructure between the existing CGB in north Cambridge and the Waterbeach New Town. Alongside the carriageway, a maintenance track will be provided which will also serve as an active travel route.

The scheme is intended to directly serve the NEC area, the Milton Park and Ride site, Landbeach and Waterbeach New Town, although it is expected that other bus services will also be able to use the infrastructure. Service patterns and off-infrastructure service routes will ultimately be decided by bus operators and the local transport authority.

Where possible, the scheme will upgrade necessary infrastructure to ensure that onward travel from stops via sustainable modes is possible for users. However, this does not apply to areas outside the immediate catchment of the scheme. For example, the improvement of cycle links to Cottenham and Histon is not within the scope of the scheme.

2.11. Risks and constraints

This section sets out the key risks and constraints to achieving the scheme objectives set out in section 2.6 and the relevant mitigations that have been or will be taken. Full discussion of scheme risks and risk management is set out in Management Dimension, section 6.9.

The scheme requires public and political support to achieve its' objectives and become a success. To maximise support for the scheme there has been, and will continue to be, regular engagement and consultation, both formally and informally. The purpose of this is to provide greater detail to local residents, setting out the benefits that the scheme will bring and answering queries and concerns.

To achieve transport related economic benefits in the Greater Cambridge area, it is important that there is coordination between the scheme and other major projects in the area. This includes both transport schemes and developments such as the New Town and Cambridge Science Park. The full list of local projects that may represent a constraint or dependency to the scheme is set out in Table 6-5 in the Management Dimension. To manage this risk, there is regular engagement with developers and key stakeholders to enable the scheme to be a success.

2.12. Strategic dimension conclusion

The Waterbeach to Cambridge corridor experiences significant congestion, particularly during peak hours, and the A14 Milton Interchange acts as a significant pinch point to motor traffic travelling between Cambridge and the north of the region. Significant housing and employment growth is planning, and being built-out, at either end of the corridor, concentrated within Waterbeach New Town and NEC. There is clear need for significant change in terms of sustainable transport provision in the corridor to ensure that growth is accommodated sustainably. This is articulated in local and regional policy documents, including the CPCA Local Transport and Connectivity Plan. Table 2-13, sets out the case for change outlined in this Strategic Dimension.

Table 2-13 - Need for change

Area	Need for change
In its own right	Enables quicker, more frequent and more reliable public transport journeys for Waterbeach New Town, Waterbeach and Landbeach residents to and from Cambridge Science Park, Cambridge Research Park, Cambridge Regional College, City Centre, West Cambridge and the Cambridge Biomedical Campus (depending on service patterns, may be direct or via interchange) Residents of Milton may also experience the same benefits depending on service patterns
	More resilient public transport, which is less reliant on the A10
	Faster journey times – saving up to 15 mins between Waterbeach and City Centre
	Unlocks transformation of public transport into a high-quality, attractive travel option along the route for a wide range of people
	Supports access to education and jobs
	Supports access to existing and proposed leisure attractions
	Supports Milton Park and Ride users
	Expanded Park and Ride capacity that benefits existing and future users of the corridor
	Supports air quality goals
	Supports the delivery of economic growth in NEC within current road traffic levels
	Supports the Local Plan commitment to delivering necessary growth in a sustainable way, including Waterbeach New Town
	Potential to support additional sustainable growth locations, beyond the current local plan
Synergy with other schemes	Scheme builds upon the Milton Road and Histon Road Public Transport schemes, to create public transport priority corridor between Waterbeach and the city centre
	Options utilise the existing CGB and opens up options for cross-corridor services. For example Waterbeach to and from West Cambridge
	Supports delivery of the Greater Cambridge public transport network vision
	Generates further opportunities for Park and Ride and local active mode connections along the corridor, including with Mere Way and the Waterbeach Greenway
	Creates opportunity to connect high-quality public transport directly to Waterbeach Relocated Station.
Synergy for public transport users	Unlocks transformation of public transport into a high-quality, attractive travel option along the route
	Provides additional flexibility of core corridor routes and local village i.e. local buses have greater choice of routing
	Potential for being a local link to Cambridge North Station, as required over time and subject to service planning decisions
	Supports current Milton Park and Ride users, and potential future Park and Ride users
	Passengers from the wider area (such as Chittering, Stretham and Ely) would benefit from addition public transport connections
Synergy for walking, cycling and other active travel	Dedicated active travel link between Waterbeach and Cambridge
	Complements existing and planned Greenway projects. There is a choice of route depending on origin and destination
	Particular benefits include for commuting between Waterbeach and Cambridge Regional College or Cambridge Science Park, and for workers in Waterbeach

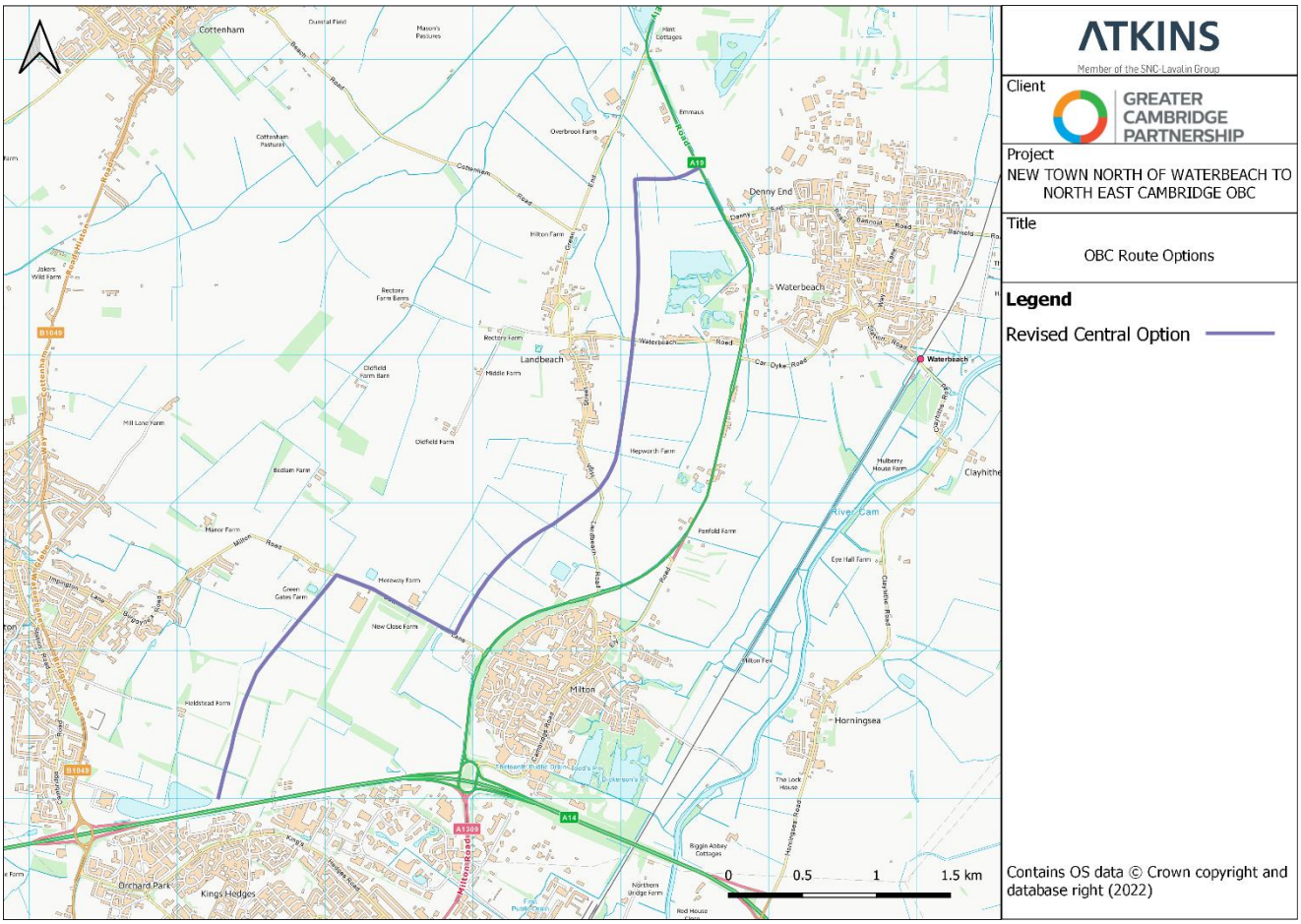
Area	Need for change
	Links with existing CGB bridleway, creating a continuous active travel route for trips such as Histon to Waterbeach, or Waterbeach to Northstowe
	Unlocks opportunities for additional active travel links between the corridor and the wider Greater Cambridge area

Planned transport improvements in the Greater Cambridge area aim to unlock sustainable growth. A number of GCP projects, including this scheme, Making Connections, Eastern Access, Cambourne to Cambridge and Cambridge South East Transport Study will provide high-quality, high frequency services in the Cambridge area (including NEC).

An option identification, sifting and assessment process has been undertaken as part of this Outline Business Case resulting in two options, the Revised Central and Western options, that were taken to public consultation in early 2023.

As a result of the further assessment work and the public consultation outcomes **the Revised Central option has been identified as the preferred option for the Busway, along with a Park and Ride to the West of the A10, at Site C.** The remainder of this Outline Business Case presents the technical work undertaken to demonstrate the identification of the preferred option, as summarised in the following sections. The preferred route for the scheme is shown in Figure 2-18.

Figure 2-18 - Preferred route option



Why is the Revised Central option preferred?

The Revised Central option is identified as the preferred option for a number of reasons, including connectivity, sustainable transport trips and public support.

In terms of **connectivity**, the Revised Central option provides better connectivity with Milton Park and Ride, connecting with Butt Lane directly to the north of the site. This means that all bus services on the busway route

would be able to easily service the Park and Ride, without impacting journey times, and improving the service offering at the site. The proximity of the route to Milton village also means that residents of Milton could access a higher frequency of services on the busway from Milton Park and Ride or Landbeach Road. The Revised Central route serves Landbeach village directly and its proximity to Waterbeach and Milton also provides the opportunity for service flexibility. This means that buses serving the villages directly could use the busway infrastructure for part of their journeys without significant diversions, contributing to improved journey times and journey reliability. Guidance infrastructure will be flexible at junctions to allow buses to turn off of and onto the busway.

The Revised Central option leads to increased **mode shift to sustainable transport trips** compared to the Western option. In 2041, the Revised Central option is predicted to lead to an additional 750 daily public transport trips (bus, guided bus and rail), compared to a without scheme scenario. The equivalent number for the Western option is a 550-trip increase. The Revised Central option also leads to a larger increase in active travel trips, compared to the Western option. In 2041, the Revised Central option is predicted to lead to an increase of 1,400 daily active travel trips compared to a without scheme scenario. The equivalent number for the Western option is 1,200. The increase in sustainable transport trips means that the Revised Central option leads to a decrease of 2,600 daily private vehicle trips on the highway network in 2041, compared to a without scheme scenario. This mode shift towards sustainable trips also leads to a reduction in Greenhouse gas emissions, which is greater for the Revised Central option than the Western option, as a result of the greater mode shift away from car.

Public consultation undertaken on the OBC route options, showed that there is **higher public support** for the Revised Central option with 51% of respondents 'strongly supporting' or 'supporting' the option, compared to 38% for the Western option.

Why is Park and Ride site C preferred?

Park and Ride site C is identified as the preferred option for a Park and Ride near Waterbeach for a number of reasons, namely, transport connectivity, and environmental impacts.

In terms of **transport connectivity**, Park and Ride site C is preferred as a result of service pattern legibility, connectivity to a variety of transport infrastructure and origins and destinations. Located to the south of Waterbeach New Town, site C enables all services on the busway to access the site, without diversion. Other short-listed locations, particularly site A to the north of Waterbeach New Town would lead to services being split to serve the development, Park and Ride and Waterbeach Relocated Station. This would mean a reduced frequency and quality of service to the Park and Ride and Waterbeach New Town and less service legibility for users.

Park and Ride site C is located directly off the A10, via the Waterbeach New Town southern roundabout therefore not requiring an additional junction on the A10, which would cause additional delays for vehicles. It is located on the desire line for trips from the north, via the A10, and Waterbeach New Town towards Cambridge, therefore catering for both markets. Therefore, of the three sites considered, site C provides the fastest and most reliable journey times for Park and Ride buses. For active travel trips (Park and Walk and Park and Active) site C is predicted to lead to the most trips, due to being closer to the destinations in Cambridge. It also has direct connectivity to the busway active travel route and Mere Way, and its proximity to the proposed A10 active travel bridge means that those residents of Waterbeach New Town located to the south west of the development could access the site by foot or cycle to catch specific services. The connectivity that site C affords leads to the greatest predicted Park and Ride usage along the corridor, compared to the other site options, 8,250 daily users (Park and Ride and Park and Active).

In terms of **environmental impacts**, site C is considered preferable in terms of noise impacts, heritage impacts, landscape and water impacts. Its proximity to the A10 means and distance from residential properties means that the noise and landscape impact of the site is considered neutral and can be mitigated. It is not considered to impact on designated heritage assets in the study area and would have the least impact on the water environment, and any impact though construction or operation could be mitigated.

3. Economic Dimension

3.1. Introduction

3.1.1. Background

The Economic Dimension sets out the extent to which each option provides good Value for Money (VfM) and the assessments underlying this, including monetised, quantified and qualitative impacts. A proportionate approach has been used to conduct an economic assessment, based on the current stage of scheme development (Outline Business Case (OBC)). This has provided analysis and evidence which has continued to be developed as information has become available (Table 3-1).

Table 3-1 - Economic Dimension Content

Economic Dimension Content	Adherence to DfT Outline Business Case Guidance	Status at OBC stage
Included in strategic dimension, see section 2.7 and 2.7.82.8	**Long-list appraisal** – assess the long-list of options (outlined in the strategic dimension) to a short-list of options and identify the preferred way forward	**Complete**
Methodology, assumptions and data – section 3.2	**Methodologies, assumptions and data** – set out the methodologies, assumptions and data that have been used to underpin any transport modelling and appraisal	**Complete**
Economic impacts – section 3.6	**Social cost-benefit analysis of short-list** – present and explore the main economic impacts associated with the intervention from a UK social welfare perspective	**Complete**
Distributional analysis - section 3.7	**Distributional analysis** – provide distributional analysis to understand the impacts on different social groups	**Complete**
Impacts of the proposed options – section 3.5	**Place-based analysis** – conduct place-based analysis where the proposal has geographically focused objectives or where impacts of national-level interventions may differ spatially (where this is proportionate)	**Complete**
Economic impacts - section 3.6	**Wider analysis** – include any extra analysis which provides useful insight to inform the decision-making process: this could include analysis of the various options' performance against the SMART objectives at the short-list stage. This analysis should be proportionate and consistent with the strategic dimension	**Complete**
Uncertainty analysis – section 3.11	**Uncertainty analysis** – analyse to understand how changes in different factors affect the value for money of the investment: this should show how likely it is that these changes may happen	**Complete**
Value for money – section 3.12	**Value for Money**	**Complete**
Appendix I	**Appraisal Summary Table**	**Complete**

3.1.2. Waterbeach to Cambridge Overview

As set out in section 2.5.1, the Waterbeach to Cambridge corridor currently experiences a high level of congestion and resultant delay to users making journeys within the corridor. In the future there will be significant growth in the corridor, with the development of the Waterbeach New Town and the expansion of the North-East Cambridge development, which will further exacerbate the transport issues within the corridor.

Currently, there are limited viable alternative modes of travel to private car within the corridor, due to a lack of dedicated public transport infrastructure. Many users of Milton Park and Ride have to sit in congestion both on the car leg of their journey and then again on the bus journey between the Park and Ride and their destination.

3.1.3. Scheme objectives

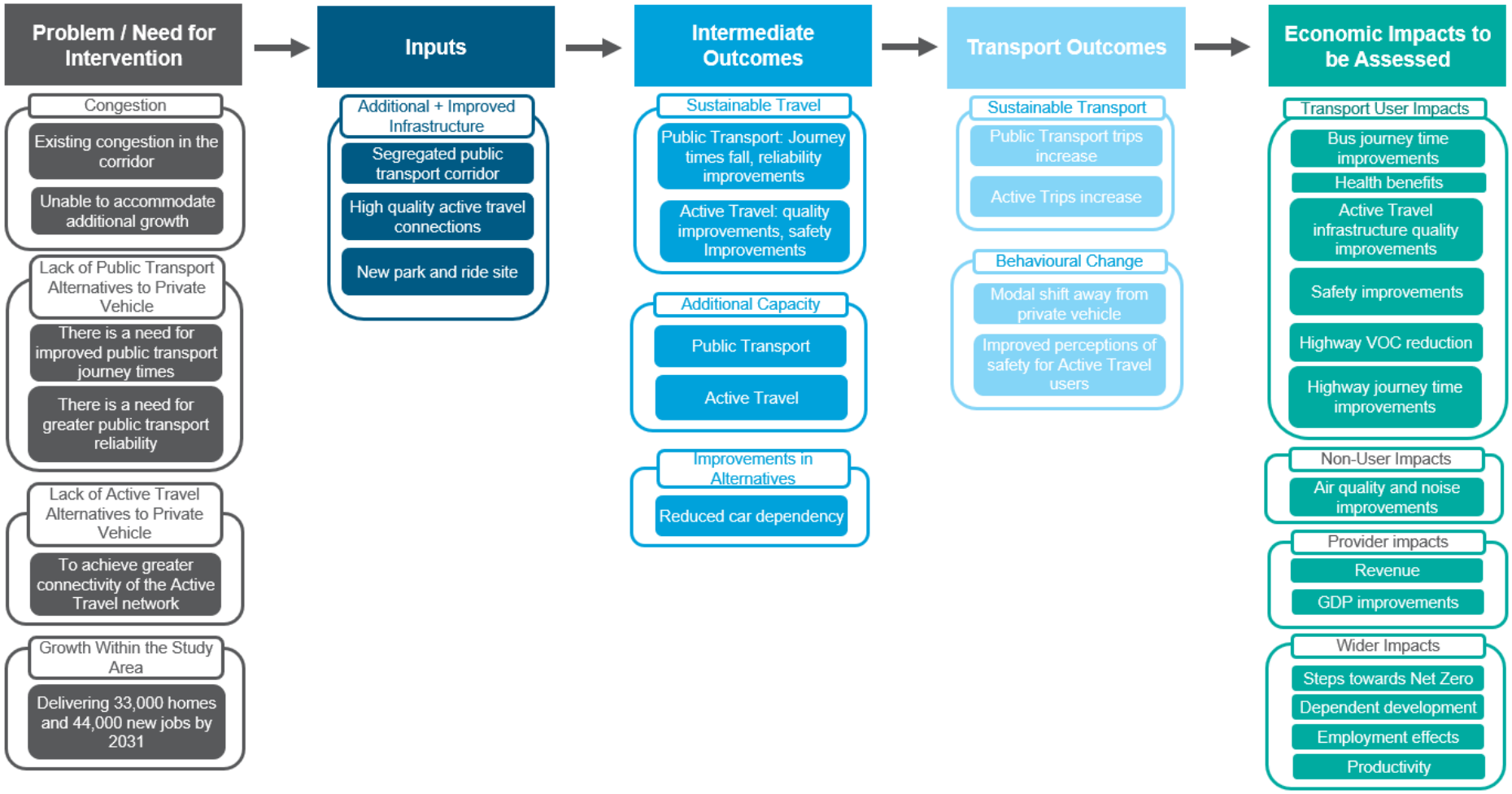
The scheme objectives set by the Greater Cambridge partnership (GCP) are as follows:

1. Provide additional sustainable transport capacity to provide for the transport demands of economic and housing growth;
2. More reliable journey times by public transport;
3. More journeys along the corridor being undertaken by public transport; and
4. More short journeys along the corridor being undertaken by walking and cycling (because people feel safer and have direct routes between origins and destinations).

3.1.4. Logic mapping

The logic map shown in Figure 3-1 presents the initial need for intervention, the proposed intervention (inputs), various outputs and the outcomes for users. From this understanding, economic impacts can be quantified or qualified in the subsequent stages of the appraisal.

Figure 3-1 - Logic map

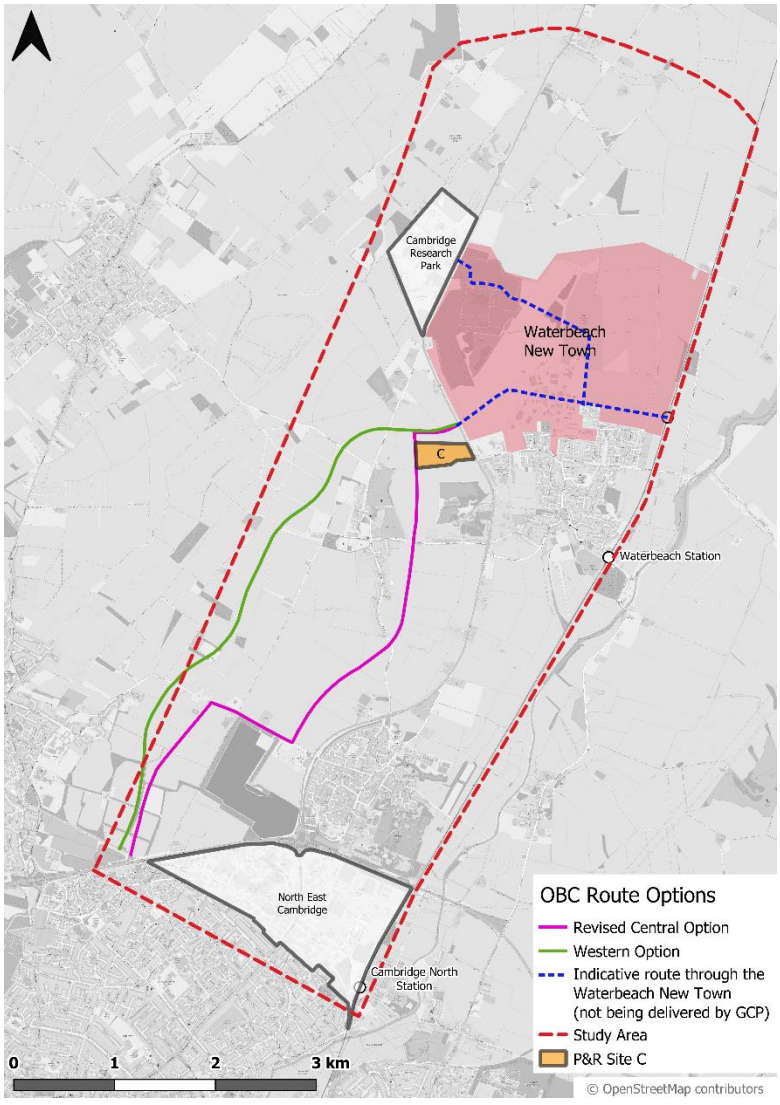


3.1.5. Options appraised within this Economic Dimension

The option sifting and selection process outlined in section 2.7, resulted in the identification of two route options for the busway scheme; one alignment within the Western corridor and one alignment within the Revised Central corridor. These options will be assessed as part of this Economic Dimension. Table 3-5 details the nature of these options. The assessment assumes that segregated infrastructure within Waterbeach New Town will be provided by the developers. Therefore modelling undertaken to inform this Economic Dimension includes segregated bus infrastructure connections to relocated Waterbeach Station, through Waterbeach New Town. The infrastructure to be provided by the Waterbeach to Cambridge Public Transport Scheme will commence at the CGB at its southern end and connect to the Waterbeach New Town southern access roundabout, at its northern end. Therefore, the scheme costs presented in the Financial Dimension and this Economic Dimension are for the infrastructure to be provided by this scheme only.

The Park and Ride MCAF assessment outlined in section 2.8 resulted in the identification of Park and Ride site C as the site to be used within the modelling and appraisal for the OBC. This site was selected as it performed strongest across a range of criteria and it formed a consistent basis on which to assess the busway options. Subsequent model runs and environmental assessment undertaken on the three Park and Ride sites, reconfirmed site C as the preferred option. Therefore this Economic Dimension presents an economic appraisal of the two busway options in combination with the preferred Park and Ride site, as shown in Figure 3-2.

Figure 3-2 - Options appraised within this Economic Dimension



3.1.6. Structure of the Economic Dimension

The remainder of the Economic Dimension is set out as follows:

- Section 3.2 outlines the methodology, assumptions and data used within the economic appraisal;
- Section 3.3 outlines the transport infrastructure interventions for each option;
- Section 3.4 outlines the two specific route options appraised as part of this OBC;
- Section 3.5 presents the forecast transport impacts from the options on different modes and user groups;
- Section 3.6 presents the economic impacts of the options;
- Section 3.7 presents a summary of the distributional analysis of the scheme impacts;
- Section 3.8 outlines the appraisal summary table and its purpose;
- Section 3.9 outlines the national impacts the scheme may have and potential future assessments of this;
- Section 3.10 summarises the relative performance of the two busway options and sets out the preferred route to be assessed further;
- Section 3.11 outlines the uncertainty analysis undertaken for the scheme, including uncertainty in modelling assumptions and appraisal sensitivity tests;
- Section 3.12 provides a statement of the likely value for money of each option; and
- Section 3.13 details appropriate steps to be taken at Full Business Case (FBC) to update the economic appraisal.

3.2. Methodology, assumptions and data

3.2.1. TAG and Green Book principles

The appraisal follows the principles detailed in the Department for Transport (DfT) guidance as of December 2022, with key elements of benefits appraisal utilising the May 2022 TAG Databook, version 1.18, which itself is based on principles set out in the HM Treasury Green Book. Scheme costs, which were revised further into the OBC development process, utilise the May 2023 TAG Databook, version 1.21.

All monetised costs and benefits are expressed as present values (PV) in 2010 market prices, discounted to 2010. This is in line with DfT and HM Treasury guidance.

3.2.2. Overview of Economic Appraisal approach

Costs

The present value costs (PVC) of each option are based on the following:

- Investment (capital) costs, estimated by the costing and design teams;
- Operating and maintenance (O&M) costs, derived from a bespoke spreadsheet tool; and
- The forecast impacts to Local Government revenues through changes to off-street parking and the number of people paying the Making Connections area charge that is included within the modelled scenarios.

The scheme will receive funding from the private sector in the form of developer contributions for various developments in the area. Some of these, such as for the Waterbeach New Town, have been secured via Section 106 (S106) agreements, whilst others are still unsecured. The sources of the contributions and their values are set out in Table 4-8 in the Financial Dimension. The schedule for developer contributions is yet to be confirmed, however it is currently assumed that the scheme will be funded by GCP, with annual developer contributions profiled evenly between the first year of construction for 15 years to partially backfill the impact on Local Government finances.

Any other relevant grants, subsidies and revenues that accrue to the public sector will be considered, if relevant, during the next stage of business case development.

A breakdown of the present value of costs (PVC) is set out in section 3.6.6.

Benefits

The benefits are estimated from several sources including:

- User benefits and revenue impacts on private sector providers, assessed using Transport User Benefit Analysis (TUBA);
- Impacts from changes to the number of accidents, assessed using COBA-LT;
- Greenhouse gas impacts assessed using TUBA;
- Local air quality and noise impacts estimated using marginal external costs (MECs);
- Physical activity impacts using the Active Mode Appraisal Toolkit (AMATs);
- Journey quality impacts using AMATs;
- Journey time reliability;
- Wider economic impacts, using Wider Impacts in Transport Appraisal (WITA) and bespoke spreadsheet tools;
- Environmental impacts; and
- Social impacts.

Results

The results from different elements of the appraisal are set out in four summary tables for each scenario:

- The Transport Economic Efficiency (TEE) Table (Appendix J);
- The Public Accounts (PA) Table (Appendix K);
- The Analysis of Monetised Costs and Benefits (AMCB) Table (Appendix L); and
- The Appraisal Summary Table (AST) (Appendix I).

For each scenario, a benefit-cost ratio (BCR) has been calculated.

Key Principles and Tools

This section categorises the economic impacts and sets out the transport modelling and economic appraisal tools used to quantify impacts from the proposed package options. The overall methodology is based on the following key considerations and principles:

- **Outcome-led scoping:** Scope of the economic impacts and selection of techniques are based on the transport outcomes outlined in the economic narrative. This forms the basis for assessment of the economic impacts of the scheme;
- **Selection of appropriate transport and economic modelling tools.** The existing Cambridge Sub Regional Transport Model 2 (CSRM2) was selected for the following reasons:
  - It has the ability to model changes to trip making decisions across relevant modes;
  - The model extent covers the full geographic area of interest; and
  - The model was developed in accordance with TAG guidance and has been successfully applied to develop transport evidence and support business cases, unlocking schemes in the region.
- **Derivation of scheme investment costs**: Scheme costs were estimated with an appropriate level of optimism bias applied in accordance with TAG and presented in 2010 Real Discounted Market Price Values;
- **Derivation of scheme operating, maintenance and renewal costs**: Operating, maintenance and renewal costs have been calculated for the full appraisal period and are presented in 2010 Real Discounted Market Price Values;
- **Collation of the Transport Economic Efficiency (TEE)**, **Public Accounts (PA), Analysis of Monetised Costs and Benefits (AMCB) tables and the Appraisal Summary Table (AST):** for supporting analysis;
- **Sensitivity analysis**: to assess the robustness of the scheme VfM; and
- **Value for money assessment following DfT guidelines**[70]: A progressive approach was followed, taking on board quantified impacts with varying analytical certainty as well as qualified impacts.

[70] DfT (2021) *Value for Money Framework* https://www.gov.uk/government/publications/dft-value-for-money-framework

Based on these principles, the modelling and analytical tools used in this Economic Dimension comprise:

- Cambridge Sub-Regional Transport Model 2 (CSRM2)
- TUBA (Transport User Benefit Analysis)
- AMAT (Active Mode Appraisal Toolkit)
- COBA-LT (Costs and Benefits to Accidents - Light Touch)
- WITA (Wider Impacts in Transport Appraisal)

The economic appraisal scope covers scheme costs, monetised and non-monetised (dis)benefits of individual options, in comparison to a reference scenario without interventions. The logic map in Figure 3-1 sets out the range of economic impacts to be assessed.

The remainder of this subsection covers in more detail the methodology for undertaking aspects of the economic appraisal:

- Appraisal period for different types of intervention;
- Monetisation of journey ambience and health benefits for active modes;
- Calculation of wider economic impacts; and
- Cost estimation and derivation of the Present Value of Costs (PVC).

Appraisal period

Transport impacts from the options were monetised across a 60-year appraisal period in line with TAG Unit A1.1 – Cost Benefit Analysis. This includes active travel journey quality and physical activity impacts in-line with the expected lifespan of these infrastructure elements.

Initially, the scheme opening year was assumed to be 2026 and appraisal commenced on this basis but has been revised to reflect outcomes of initial work to determine likely construction programme timescales, which indicates that the scheme will open in Q4 2028. For appraisal purposes, 2029 has been treated as the scheme opening year as this will be the first full year of operation. Therefore, the 60-year appraisal period is assumed to be between 2029 and 2088. To make this change in TUBA and WITA, a 63-year appraisal period was used, starting with the 2026 modelled year. The first three years of benefits were manually removed from the results to produce a 60-year total appraisal period.

It was not considered proportionate to update the accident analysis in COBA-LT to reflect the revised opening year, due to the limited impact that the scheme is forecast to have on safety with a 2026 opening year. The appraisal period of the data underpinning the social and distributional impact assessment was also not updated due to the results with a 2026 opening year not indicating a significant influence on the overall scheme Value for Money (VfM). Where a 2026 opening year has been retained for elements of the appraisal, this has been noted in the relevant sections throughout the remainder of the Economic Dimension.

Active Mode Appraisal

As detailed in section 2.10, a high-quality active travel route will run alongside the busway in both the western and Revised Central options. This has been assessed using the Active Mode Appraisal Toolkit (AMAT).

Journey ambience benefits were calculated using modelled link flows for walking and cycling along the scheme active travel infrastructure. Mode shift and health benefits were calculated based on a forecast overall change in walking and cycling trip numbers between the without-scheme and with-scheme model scenarios. For cycling trips, this also included the change in ‘Park and Active’ trips from Milton Park and Ride and the proposed A10 Park and Ride site.

Route segmentation

For the purposes of journey ambience appraisal, the active travel routes for the options assessed were segmented and a separate AMAT conducted for each segment where:

- The current or future level of active travel infrastructure provision differs to another part of the route; or
- There is an interface with the wider transport network, which could allow for a change in flow.

The length of each individual segment was used to inform the input information for the average proportion of a trip that will use the intervention.

Intervention details

For both options, a 60-year appraisal period was selected for the core appraisal. The 'local area type' was classified as 'Rural' in line with the MSOA lookups in the AMAT workbook.

In the Do-Minimum scenario, the proposed offline cycling infrastructure provision was classified as 'No provision' for all segments. For existing links, such as on Butt Lane, the baseline infrastructure provision was classified in line with the AMAT User Guide.

For the walking infrastructure interventions, the following inputs were set to 'Yes':

- Kerb level – it is expected that the scheme active travel route will provide level access crossing points;
- Pavement evenness – it is expected that the active travel route surface will be even; and
- Directional signage – it is expected that directional signage will be provided at key points along the route.

As a lighting strategy has not yet been undertaken for the scheme, for the purposes of the appraisal it has been assumed that there will be no additional lighting provision on the active travel route. Consideration of public consultation feedback and further technical work will be undertaken at the next stage to determine the level of lighting provision along the scheme.

Wider Economic Impact Appraisal

To inform the adjusted benefit cost ratio (BCR) for the scheme, Wider Economic Impact appraisal has been undertaken. This covers induced investment, employment effects and productivity. The assessment method for each of these impacts is set out in Table 3-2.

Wider economic impacts have been calculated for the whole UK, with masking applied to the results to avoid overestimating the wider economic benefits that the scheme will bring. In WITA, areas with high populations and employment external to the study area can have a large impact on results. This can be magnified further by small amounts of model noise. To reduce this impact, a study area covering the Cambridge City and South Cambridgeshire Local Authority Districts (LADs) has been selected, which is considered a conservative approach to wider economic benefits estimation.

Cost estimation – PVC

Derivation of the Present Value of Costs (PVC) follows the guidance in TAG Unit A1.2 – Scheme Costs. All costs in this case have been treated as per TAG guidance. Specifically, these include:

- Real cost inflation of 2.1% p/a applied up to build year;
- Optimism Bias (OB) adjustment:
  - Highway and active travel work: 23%;
  - Special structures (for the Park and Ride site building): 48%;
  - Land costs: 14%
- Conversion of monetary figures to 2010 price base;
- Calculation of the real discounted price using TAG compliant discount rates; and
- Market price adjustment.

In line with TAG Unit A1.2 (May 2022), the total OB was calculated and compared to the total value of the QRA (assumed P90 in line with GCP guidance). The value of OB was higher for both options (£22.1m and £22.7m for the Revised Central option and Western option, respectively, compared to £13.9m and £14.2 P90 QRA value) and therefore has been used within the PVC calculation for a more robust appraisal.

This section outlines how the PVC has been derived. Further details of costing assumptions, funding and derivation of outturn costs are provided in the Financial Dimension. The estimation of costs for the proposed interventions comprises investment / capital costs (both from public sector and transport operators).

Investment costs

For physical interventions, capital cost estimates were prepared using bottom-up estimates on a Bill of Quantities, based on the concept scheme designs.

Construction costs were estimated for individual corridor options in 2023 Q2 prices. An allowance for design, consultancy and project management fees was included as a 10% of this cost. The Financial Dimension provides further detail on the derivation of scheme cost estimates (section 4.2).

For Optimism Bias, a 23% uplift was applied to the highway and active travel works in accordance with the guidance for a Stage 2 project. For the Park and Ride structures and Land costs, uplifts of 48% and 14% were applied, respectively in line with TAG.

Operating and maintenance costs

Operating and maintenance costs were estimated for vehicles and the infrastructure. These were calculated following a first-principles approach. Bus operating costs were calculated by determining the vehicle requirement for services using the busway rather than conventional road network, based on the round-trip journey times and proposed service frequency. This fed into a calculation of total hours of operation over a year, as well as distance covered. A unit cost per hour and kilometre (received in 2022 prices) was applied to the calculations to give the incremental change in bus operating costs as a result of the scheme. Infrastructure maintenance costs were calculated on a unit cost per kilometre, applied to the length of the busway infrastructure in each option. The costs per year were then converted to 2010 real discounted market prices.

3.2.3. TAG categorisation of economic impacts

VfM has been assessed in line with TAG. Table 3-2 sets out a comprehensive range of economic impacts, from transport infrastructure investment in line with TAG guidance and the latest DfT VfM framework[71]. The economic appraisal scope for this business case is therefore founded on this basis but refined as shown in Table 3-2 to focus on the most relevant benefit streams reflecting the scheme objectives, outcomes sought and key economic impacts.

Table 3-2 – Economic impact assessment methodology

Economic Impact		Assessment Methodology
User and private sector providers impacts	Highway Journey Time and Vehicle Operating Costs (VOC) Savings	Monetised using TUBA
	Public Transport User Benefits – Time Savings	Monetised using TUBA
	Active Mode Users – Time Savings	Monetised using TUBA
	Active Mode users – Journey Quality	Monetised using AMAT
	Impacts on private sector providers (essentially public transport operators)	Monetised using TUBA
	Physical Activity Impacts i.e., absenteeism & avoidance of premature deaths	Monetised using AMAT
	Disruption impacts during construction and maintenance	Qualitatively
Non-user impacts	Local air quality and noise impacts	Qualitatively
	Greenhouse Gas Impacts	Monetised using TUBA
	Accident Cost Savings	Monetised using COBA-LT

[71] DfT (2021) *Value for Money Framework*

Economic Impact	Assessment Methodology
Journey reliability / resilience	Qualitatively
Wider economic impacts	Monetised using WITA
Induced housing or commercial supply - dependent development	Monetised using bespoke approach
Costs	Monetised using bespoke approach

3.2.4. Transport modelling

The existing Cambridge Sub-Regional Model 2 (CSRM2) is an appropriate model, being a strategic multi-modal model that encompasses all modes that are likely to be influenced by the proposed interventions. The CSRM2 is an evidence-based multi-modal transport model. Further information is provided in the User Guide[72], Development, & Validation Report[73], the Forecasting Report[74] and the public transport Model Calibration and Validation Report[75].

The CSRM2 is a proven tool, having been successfully applied for the previous stage of business case for this scheme, and for other similar proposals, such as the Cambridge South East Transport (CSET) scheme and the Making Connections Strategic Outline Case (SOC). In addition to this, the model was readily available to support the OBC. It is suitable to capture changes in trip making across different modes as a result of the proposed schemes. It has a wide geographical extent that covers the Cambridgeshire region and areas further afield to assess end to end impacts.

The CSRM2 has been used for the OBC to model and appraise the package options of interventions at a programme level. As the individual schemes progress towards delivery, it is expected that more detailed assessment and appraisal will be required and, if appropriate, localised junction and/or microsimulation modelling will be utilised. Appendix M presents the options as represented in the model.

Figure 3-3 shows the sectoring system used for the scheme user benefits appraisal.

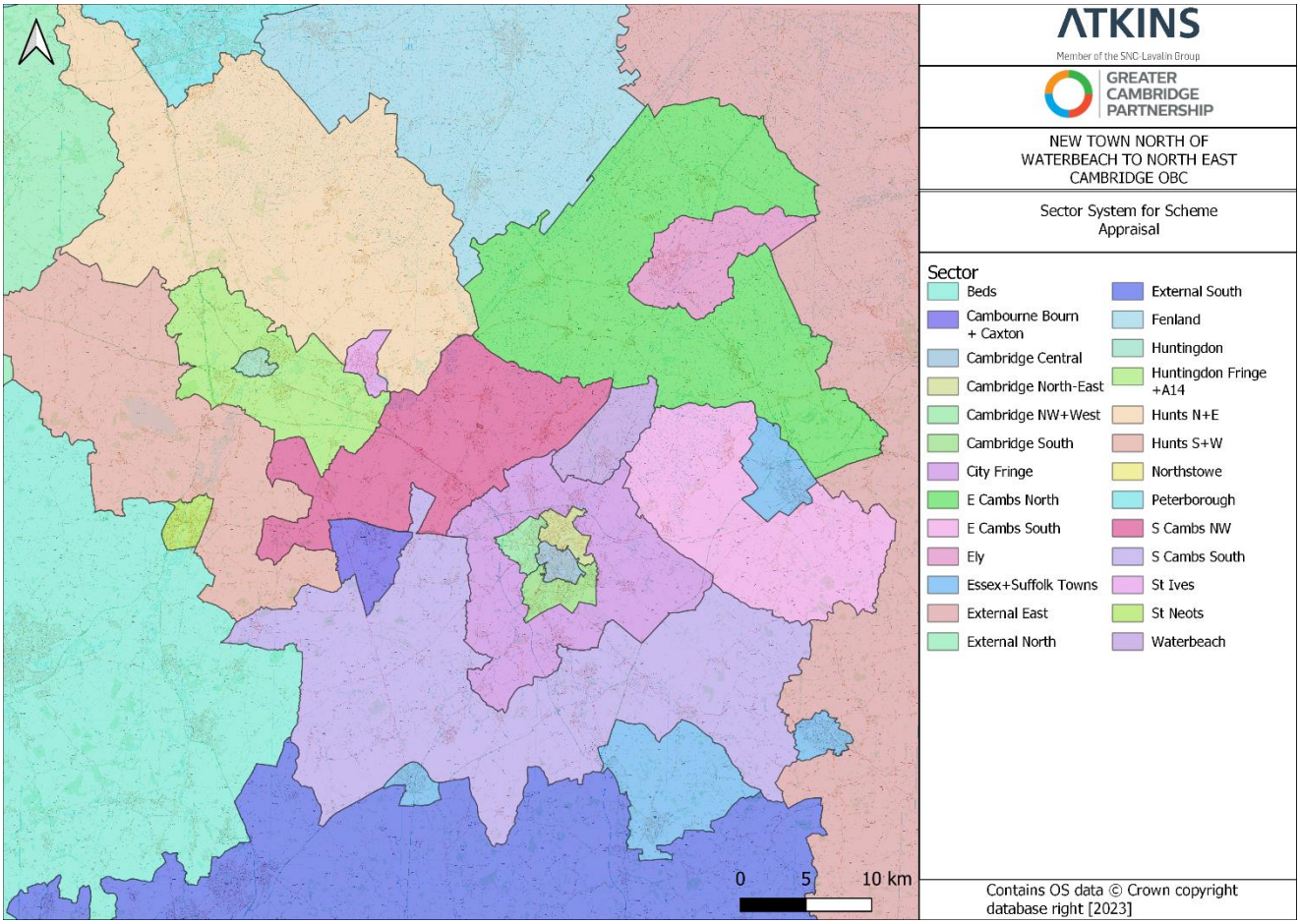
[72] Atkins (2023) *F-Series User Guide*

[73] Atkins (2021) *F-Series Highway Local Model Validation Report*

[74] Atkins (2022) *F-Series Model Forecasting Report*

[75] Atkins (2021) *CSRM2 F-series Transport Demand and Public Transport Model Development and Validation Report*

Figure 3-3 - Sector system for user benefits appraisal



Modelled time periods

Highway assignment modelled hours/periods are as follows:

- AM peak hour (08:00-09:00);
- Inter peak (IP) average hour (10:00-16:00); and
- PM peak hour (17:00-18:00).

The CSRM2 demand model outputs (used for all modes except highway) represent three-hour morning and evening peak periods and a six-hour inter-peak period. The SATURN highway assignment model reports single hours. Conversion factors to covert to modelled periods are included within the model and these factors have been adopted in the TUBA assessment to scale the single hour highway assignment model outputs to peak periods. These factors are shown in Table 3-3.

Table 3-3 - CSRM2 Hour to time period conversion factors

Time period	AM Factor	IP Factor	PM Factor
Commuting	2.506	6.000	2.348
Education	1.691	6.000	2.721
Business	2.964	6.000	2.883
Other	3.695	6.000	2.946

Forecast years and Annualisation

The model forecast years used for the scheme modelling were 2026 and 2041. Annual impacts were calculated for each modelled year, using an annualisation factor of 253 to convert the average weekday modelled values

to a representation of the number of average weekdays within a calendar year. Benefits for non-modelled years were calculated by linear interpolation between the modelled years of 2026 and 2041, and flat-line extrapolation beyond the final modelled year. However, the impact of discounting on estimated benefits means that the benefit 'curve' declines towards the end of the appraisal period. The 'rule of a half' was applied as appropriate.

Table 3-4 summarises the modelling strategies adopted, with limitations and scope for further improvement. To model and appraise the significant number of interventions across the CSRM2 modelling programme, a standard modelling strategy has been adopted for each of the types of the physical changes / inputs shown in the second column of the Logic Map in Figure 3-1. This ensures consistency for similar interventions across different corridors and provides a reasonable simplification in the time window available.

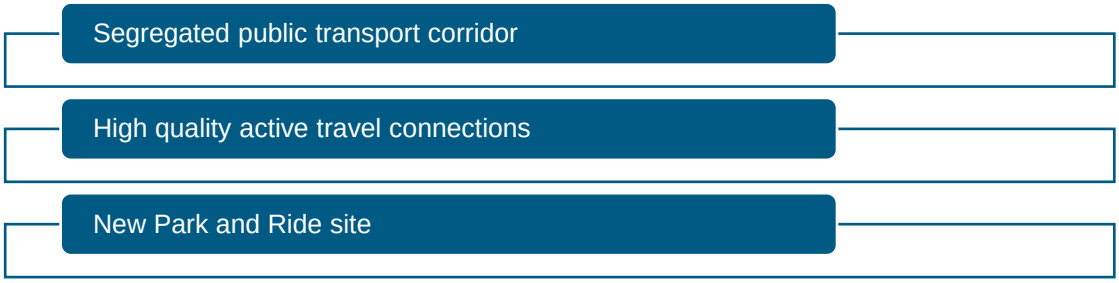
Table 3-4 - Modelling strategy and limitations for different intervention types

Intervention Type		Modelling Strategy	Limitations
Additional and improved infrastructure	Segregated public transport corridor	The services existing in the Do Minimum are in line with those proposed by the Making Connections scheme. No additional services are added in the Do Something. For both busway options, a bus-only link (with active travel alongside) running between the Park and Ride Site C and the Cambridgeshire Guided Busway has been added.	There are some limitations with the representation of bus services in the model. For example, stop locations are not accurately represented in rural areas where detail is sparse. However, these limitations apply in both the Do Minimum and Do Something scenarios and it is ensured that stops are accessible from the zone they serve. Therefore, it is considered that this does not have a significant impact on the economic appraisal.
	High quality active travel connections	For both busway options, a new active travel link has been added, running alongside the busway. In the north, these links connect to the Mere Way to the north of the Park and Ride site. In the south, the active travel link connects to the Cambridgeshire Guided Busway. Users can access or exit the active travel route where the scheme intersects with the existing road / active travel network.	Cycle speed in the model is fixed at 12kph, so does not reflect changes in quality that may enable faster cycling speeds. This could potentially limit the journey time benefits derived from cycling trips. However, this also means that the claimed journey time benefits associated with active travel trips are considered to be robust.
	New Park and Ride site	In both busway options, a new Park and Ride zone has been added in approximately the location of Site C. Access to the site for cars has been coded as a roundabout from Denny End Road, with buses using the proposed Urban&Civic roundabout to access the New Town site. Access to the site is subject to further design.	Usage of Park and Ride services is not constrained by parking capacity at the sites. However, modelled demand at the sites will feed into parking capacity and design work undertaken at future stages of scheme development. Junctions providing access to the Park and Ride site have not been tested through detailed local junction modelling, but have instead been proposed through professional judgement to ensure that no unreasonable delays are caused.

3.3. Transport inputs

The proposed interventions for each package are presented in Table 3-5. The following sections are presented in line with the Logic Map presented in Figure 3-1 and section 3.2 above.

3.3.1. Additional and improved infrastructure



To accommodate planned growth in the area, investment in sustainable transport infrastructure is required to increase capacity for all users. Improving the journey times offered by public transport services in the corridor, as well as improving the quality and frequency of services, will increase the viability of public transport as an alternative to private car use. This will contribute to local air quality improvements as the demand for car use is reduced.

Providing a step change in the availability and quality of active travel infrastructure in the Scheme corridor will increase the viability of active travel as a possible mode of travel, particularly for shorter journeys, having benefits for local air quality and health. This will encourage more end-to-end trips by walking and cycling, increasing the number of people using active modes to access public transport hubs.

3.4. Options appraised

The option sifting and selection process outlined in section 2.7, resulted in the identification of two route options for the Scheme; one following the Western route corridor and one following the Revised Central corridor alignment. The Park and Ride MCAF assessment outlined in section 2.8 resulted in the identification of Park and Ride site C as the site to be used within the modelling and appraisal for the OBC.

Table 3-5 - Options appraised in the OBC

Option Name	Description
Revised Central option with Park and Ride site C	Segregated busway route running between the existing Cambridgeshire Guided Busway and Butt Lane; with services running online along Butt Lane, and a new Park and Ride site at the location of site C. The segregated route re-starts from Butt Lane at the Park and Ride, running north-south between Milton Park and Ride and the proposed A10 Park and Ride via Landbeach.
Western option with Park and Ride site C	Segregated busway route running between the existing Cambridgeshire Guided Busway and Butt Lane; with an option to serve Milton Park and Ride, and a new Park and Ride site at the location of site C. The segregated route continues from Butt Lane close to Mere Way, running north-south between Milton Park and Ride and the proposed A10 Park and Ride to the west of Landbeach.

3.5. Impacts of the proposed options

The summary impacts of the two options on total trips by mode within the CSRM2 modelled area are presented in Figure 3-4 (percentage change in trips by mode) and Figure 3-5 (absolute change in trips by mode).

Figure 3-4 - Summary percentage change in trips by mode - 2041

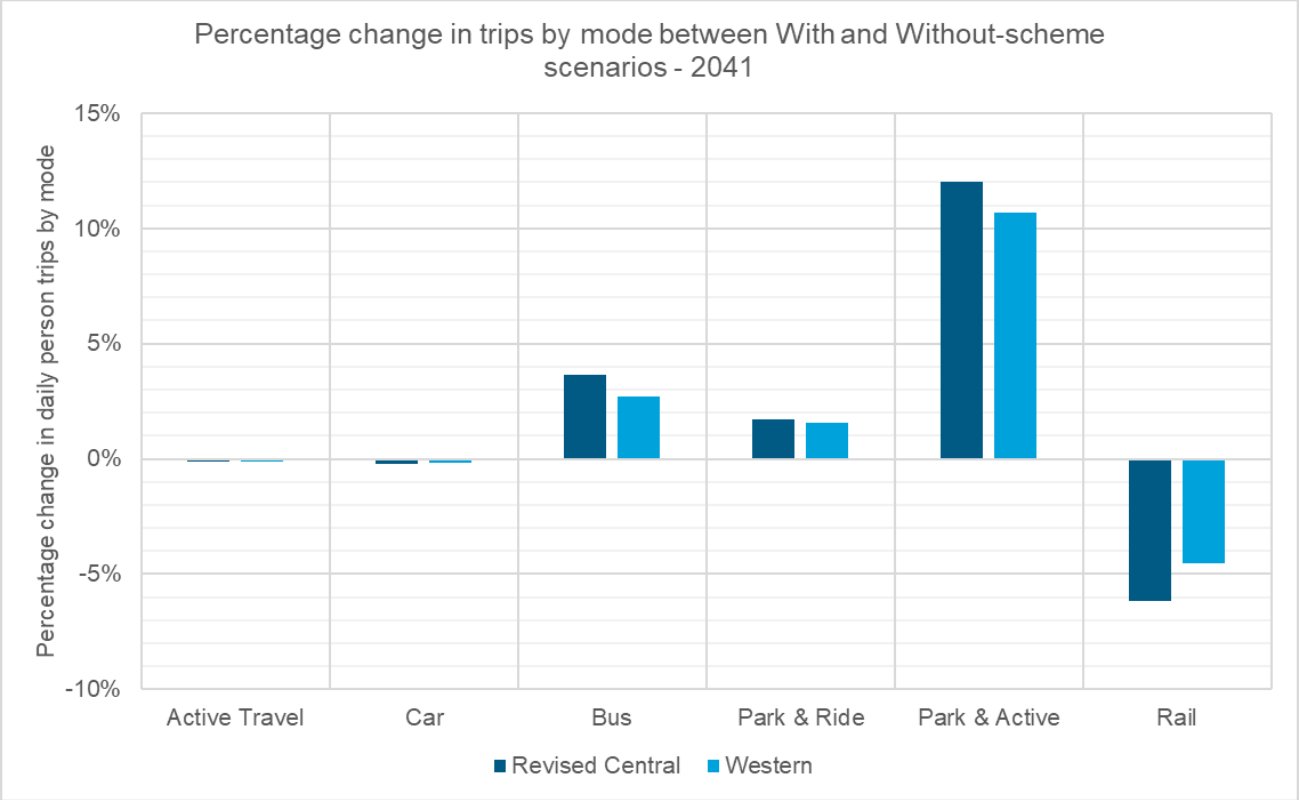


Figure 3-5 - Summary absolute change in trips by mode - 2041

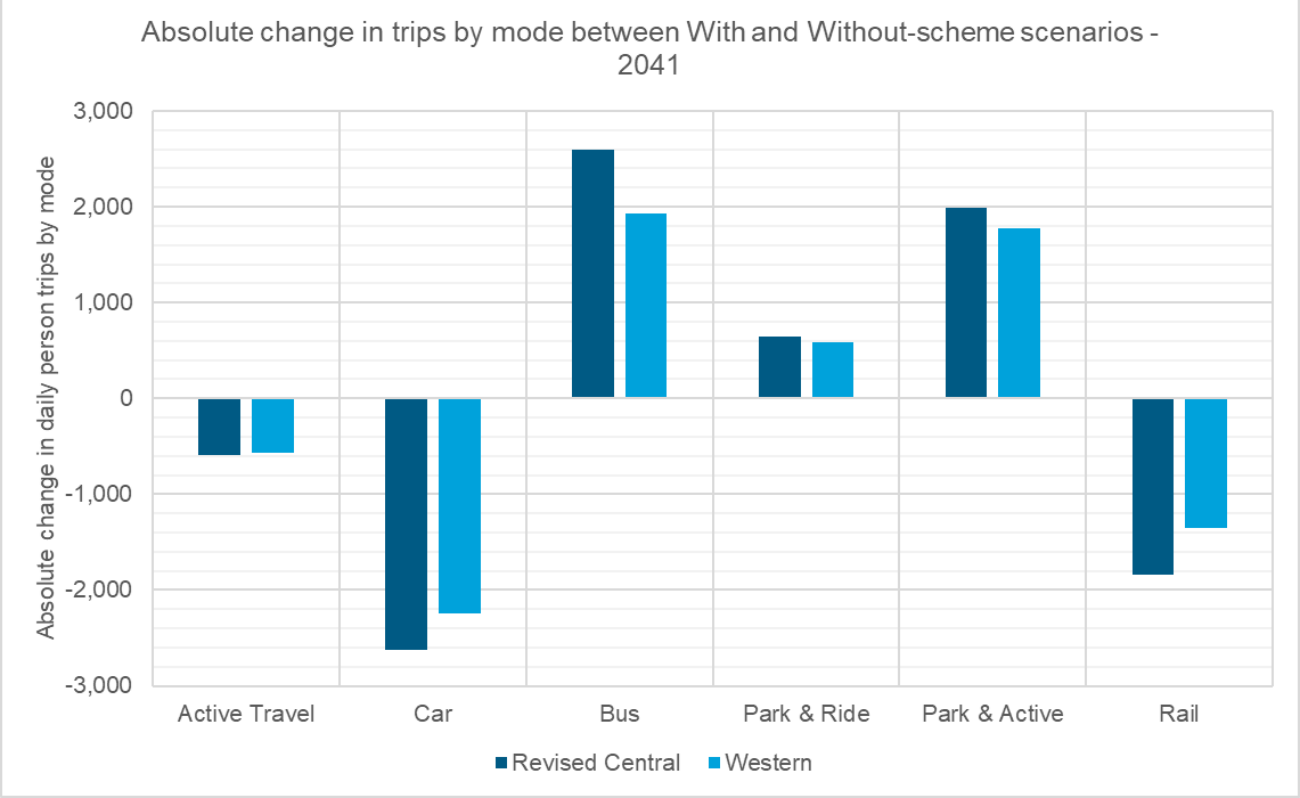


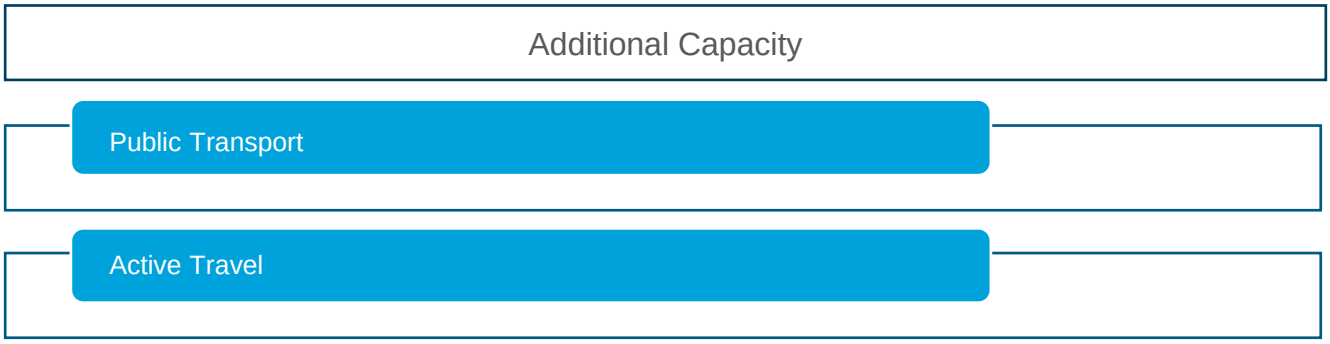
Figure 3-4 shows that the scheme leads to a slight decrease in trips being made wholly by active travel, this is due to Park and Active being made more attractive with the introduction of the A10 Park and Ride site. There is a reduction in trips made wholly by car as people are forecast to switch from car to using Park and Ride or Park and Active. However, this accounts for only a small fraction of the total car trips being made within the model. This may also be partly attributable to model noise, which can occur in large strategic models. Total Park and Ride trips are forecast to increase, this is driven by high forecast usage of the Waterbeach Park and Ride site and abstraction of users from car, rail and other Park and Ride sites. The introduction of a segregated busway makes bus an attractive alternative to other modes, particularly car and rail, as well as people who might, without the scheme, have driven to a Park and Ride site.

The impact of both options is considered against the intermediate outcomes and transport outcomes, detailed in full in Figure 3-1, in subsequent sections.

3.5.1. Additional sustainable transport capacity

This section details how the scheme options will ensure sufficient sustainable transport capacity in the corridor to accommodate current and future levels of demand.

The intermediate outcome related to additional capacity is outlined below:



Public transport

Although the scheme is not directly providing additional services (these are expected to already be in place, having been delivered through the proposed Making Connections scheme), it will enable increased capacity for buses within the corridor. By providing a segregated and reliable route, service operators will be able to provide additional services within the corridor in line with future levels of demand, without being impacted by any delays due to road congestion.

The Western option offers the fastest journey times for direct services between Cambridge and Waterbeach New Town but does not offer the same connectivity as the Revised Central option. The Revised Central option provides more effective connections to Milton Park and Ride, connectivity for residents of Landbeach and greater flexibility for bus services to access Milton and Waterbeach. For the Western option to provide faster, direct services between the Waterbeach New Town and Cambridge and serve the Milton Park and Ride site, it is likely that split services would be required to access Milton Park and Ride and bus services are less likely to serve villages directly. In summary, it is considered that the Revised Central option would be able to serve a wider range of travel markets, without the need for as many service patterns.

Active travel

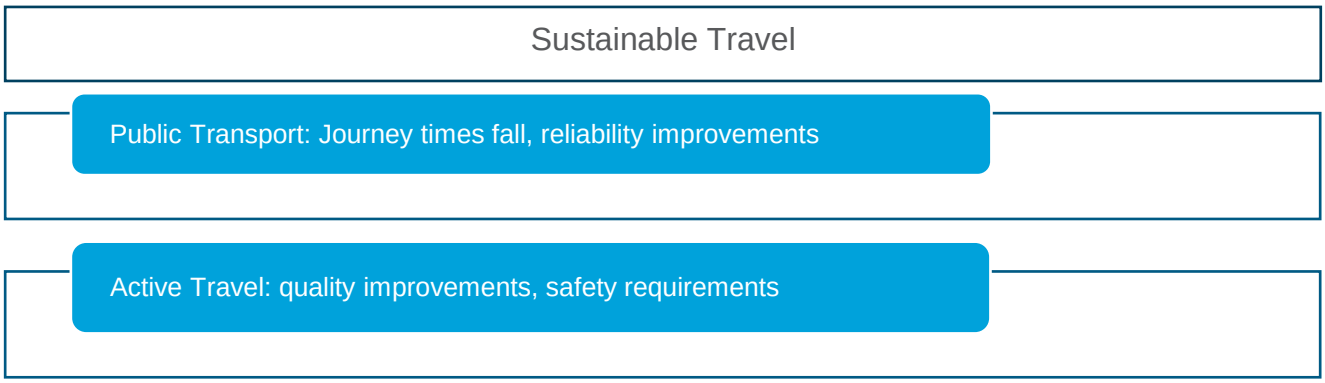
As part of the scheme options, a maintenance track will be provided alongside the busway which will also provide capacity as an active travel route. The active travel routes will increase north-south capacity, providing an alternative route to the Mere Way cycleway. The route will also increase active travel connectivity for people using only part of the corridor, such as residents of Cottenham. It is also proposed to upgrade Butt Lane/Milton Road to provide a continuous high-quality active travel route from the Cambridgeshire Guided Busway to Milton Park and Ride.

Both options would contribute to resolving the issue of a lack of dedicated active travel links between Waterbeach and Cambridge. Additional capacity for active travel trips will make active modes more attractive

for potential users. This additional capacity will therefore aid the easing of congestion on the A10, contributing to enabling local growth and achieving the GCP's traffic reduction targets.

3.5.2. Improvements to sustainable transport options

The intermediate outcomes related to sustainable travel are outlined below:



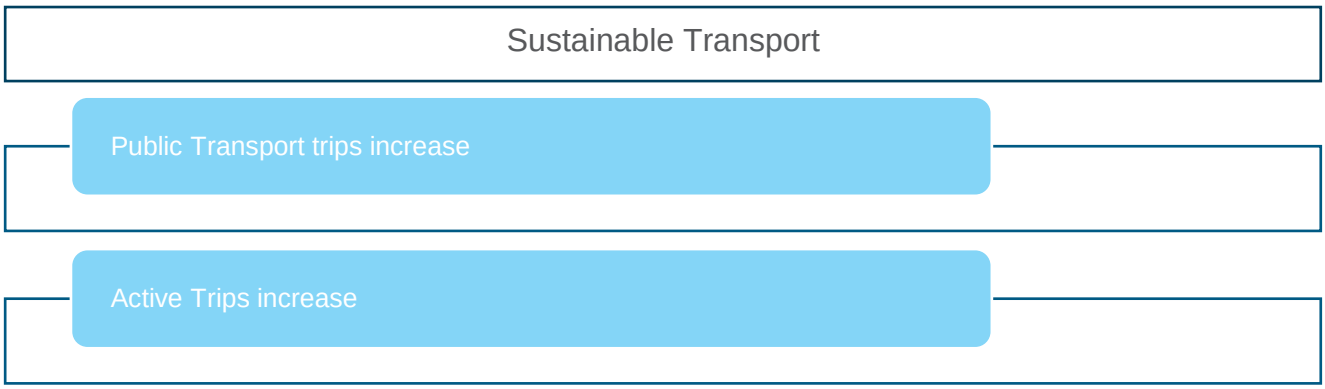
Public transport

The provision of a segregated busway link between Waterbeach New Town and Cambridge is expected to result in an improvement to public transport journey times and reliability, for both the Revised Central option and the Western option. Reliability improvements will be similar for both options, as proposed routes bypass congested areas of the A10. The Western option has the fastest journey times for direct services, but it does not offer the same level of connectivity as the Revised Central option.

Active travel

Active travel quality and safety improvements would result from the implementation of both options. Segregated spaces for pedestrians and cyclists, an enhanced ambience and routes close to the guided bus route will result in the provision of a safe and integrated active travel option of high quality.

The transport outcomes related to sustainable modes are outlined below:



Public transport

In terms of public transport trips, both options are expected to generate an increase, with the forecast change in trips remaining broadly constant from the first modelled year to the 2041 modelled year. The limited increase in public transport patronage forecast over time is due to decreasing highway vehicle operating costs as defined in the TAG databook, increased perceived value of time through time, in addition to inflationary increases to bus fares, which affects mode choice in the transport model. The combined effects of these makes Park and Ride and car trips more attractive as opposed to end-to-end public transport trips. The Revised Central option is forecast to generate the larger increase in all public transport trips, with 750 by 2041 compared to an equivalent without-scheme scenario. The forecast increase in daily person trips following the introduction of the scheme for the Western option is 550 in 2041.

A forecast overall increase in the number of public transport daily person trips can be attributed to the implementation of segregated bus provision, making journeys by this mode more attractive. As mentioned previously, the Revised Central option offers more connectivity across the study area than the Western option and so is forecast to generate a greater number of daily trips by public transport. Rail trips are predicted to reduce, likely due to bus services utilising the new busway and Park and Ride providing a more attractive alternative to rail users who have origins and/or destinations within the Waterbeach to Cambridge corridor.

Both options are forecast to generate a similar increase in daily person trips via Park and Ride. In 2041, it is forecast that the Revised Central option will generate a larger increase in the number of daily person trips over the without-scheme scenario; 650 in comparison to 600 by the Western option.

For both options, the proposed Waterbeach Park and Ride is responsible for generating an overall increase in trips by Park and Ride, 1,200 and 850 for the Revised Central and Western options, respectively based on a 2041 modelled year. The daily number of person trips associated with Milton Park and Ride sees a net decrease of 350 for the Revised Central option and 250 for the Western option compared to an equivalent without-scheme scenario in 2041. This means there is an overall increase in Park and Ride trips when considering both sites.

Active travel

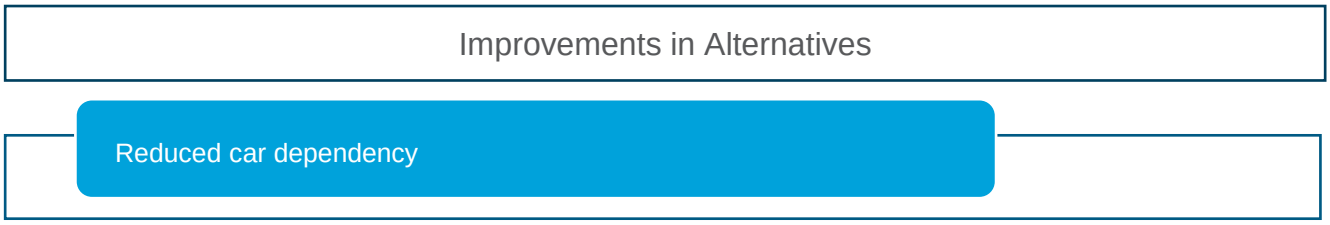
In 2041, both options are forecast to lead to an increase in active trips. It is forecast that the Revised Central option will generate more active trips, with an increase of 1,500 daily person trips over the without-scheme scenario, in comparison to a 1,200 increase for the Western option.

The forecast increase in active trips for both options is driven by an increase in Park and Active trips. New facilities will make active travel more attractive, as they allow for increased modal flexibility and will mean that active travel usage can be combined with private car trips. Therefore, there is increased scope for walking and cycling that wouldn't exist without the implementation of these facilities. The reduction in exclusive walking and cycling daily person trips can be associated with users increasingly combining car journeys with active travel. The reduction in exclusive walking and cycling trips, particularly where these have switched to Park and Active, may also be attributed in part to model noise, which can occur in large strategic models.

Perceptions of safety for active travel users will be improved, as explained in the intermediate outcomes analysis above.

3.5.3. Modal shift

The intermediate outcome related to a modal shift away from private vehicle usage is outlined below:

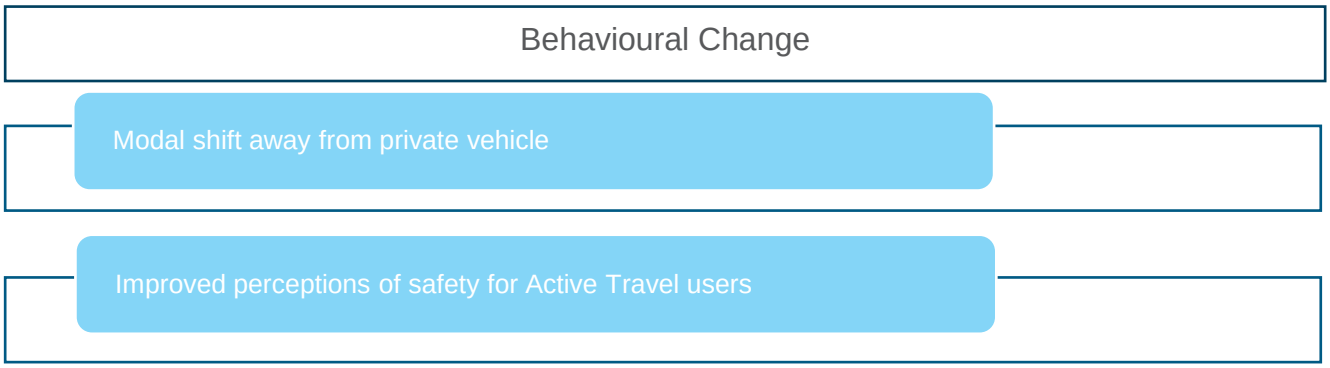


Reduced car dependency

Both options will result in decreased dependency on private car usage, as high-quality public transport and active travel provision will allow users to travel more effectively using alternative modes. Alternative modes that can utilise the scheme will be made more attractive, as they bypass congested areas of the A10, improving journey times and reliability. The subsequent decrease in car usage will ease the congestion issues for remaining users on the A10.

Of the two options, the Revised Central option is forecast to generate a greater reduction in highway trips and a greater increase in public transport and active travel trips. The Revised Central option offers greater connectivity across the study area and therefore offers more users an effective alternative to private car usage.

The transport outcome related to a modal shift away from private car usage is outlined below:



Modal shift away from private vehicle

As mentioned above, implementation of both options would see improvements to public transport and active travel provision and will encourage increased use of alternative modes to private vehicle. The forecast overall decrease in daily person trips via car is similar for both options. In 2041, the Revised Central option is expected to decrease car trips by 2,600 daily person trips compared to the equivalent without-scheme scenario; the Western option is expected to lead to a decrease of 2,250.

Both options forecast a decrease in journeys made wholly by private vehicle, however, the Revised Central option is forecast to lead to a larger amount of modal shift, with a greater reduction in private car trips and a greater increase in public transport and active travel trips.

As there is a significant increase in Park and Ride patronage following the scheme, it is likely that some of these journeys are still being made in part by car, with end-to-end car journeys being replaced by shorter distance car journeys to Park and Ride sites. It is also possible that there will be an increase in short distance car journeys due to users driving to the Park and Ride sites rather than boarding at local interchanges. This can be reduced through effective routing strategies and will be considered further at the next stage of scheme development, including liaison with local operators who will ultimately decide service provision in the area.

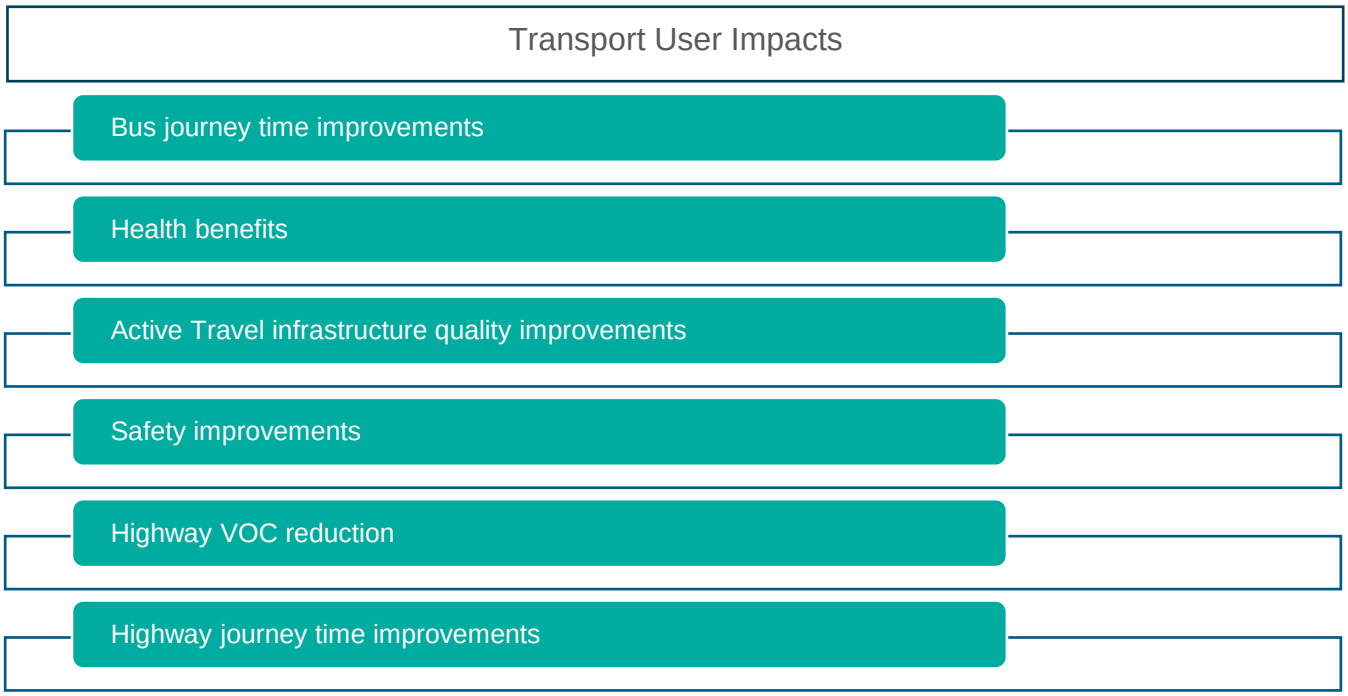
3.6. Economic impacts

3.6.1. Overview

This chapter presents the economic impacts of the different options, including the impacts on different benefit streams and the present value costs (PVC) for each option.

3.6.2. Transport user impacts

This section sets out the economic impacts to transport users of the two scheme options.



Public transport journey time improvements

Both the Revised Central option and the Western option offer positive public transport journey time savings as a result of segregating the majority of the route from the highway network, reducing the impact of congestion on journey times.

Table 3-6 - Public transport journey time benefits

£m's in 2010 prices and values	Revised Central option	Western option
Public Transport (excluding Park and Ride)	£37.8	£28.7
Park and Ride	£2.8	£3.0

The Revised Central option is forecast to generate greater public transport journey time saving benefits as the route alignment enables Milton Park and Ride to be served more effectively than in the Western option. Journey time savings in the Western option are diminished slightly as services that serve Milton Park and Ride have to travel down Butt Lane and go back on themselves to re-enter the segregated busway.

The monetised journey time savings are smaller for Park and Ride users, as the potential journey time saving offered by the scheme between Milton Park and Ride and Cambridge is limited. However, the 2041 modelled year includes dualling the A10, which would improve journey times for buses on the highway network in the without-scheme scenario. Therefore, it is considered that the forecast benefits to Park and Ride users is a conservative estimate.

The journey time benefits for Park and Ride and public transport users may also be diminished as the new Park and Ride site and guided busway provision will encourage journeys that would not be made in the without-scheme scenario. This can distort the journey time saving calculations calculated TUBA, calculated using the rule of a half, for certain origin-destination pairs for this mode. To prevent the inclusion of spurious benefits, journey time benefits where there is no modelled demand in either the with or without-scheme scenario have been excluded from the appraisal. These issues are expanded upon in section 3.11.

Health benefits

Table 3-7 presents the health benefits from the two busway options and their associated active travel infrastructure. They have been calculated using AMAT, following the method set out in section 3.2.2. These benefits are due to increased volume of active travel users. This provides health benefits to users in comparison to travelling by non-active modes, and therefore reduces the risk of premature death and absenteeism.

Table 3-7 - Health benefits

£m's in 2010 prices and values	Revised Central option	Western option
Reduced risk of premature death	£12.6	£13.1
Absenteeism	£1.2	£1.3
Health Total	**£13.9**	**£14.4**

The Western option yields marginally more health benefits than the Revised Central option. This is because there is a slightly higher number of active travel trips being made in the Western option compared to the Revised Central option in 2026, though the increase in both options round to 800 when rounding to the nearest 50 daily person trips.

Active travel infrastructure quality improvements

Table 3-8 presents active travel journey quality improvements resulting from the interventions proposed for each option. This benefit is a result of improvements to the quality of active travel provision. Improving the quality will consequently increase the attractiveness of active travel options as an alternative to private car use.

Table 3-8 - Active travel journey quality improvements

£m's in 2010 prices and values	Revised Central option	Western option
Journey Quality	£2.5	£4.8

The active travel improvements associated with the Western option are forecast to provide higher journey quality benefits for users than the Revised Central option. This is because the Western option active travel route provides a more direct link between the Waterbeach New Town and Cambridge than the Revised Central option. This means that the Western option active travel route is forecast to attract more users on the new infrastructure.

By contrast, although the Revised Central option encourages a similar overall increase in walking and cycling, as demonstrated by the similar health benefits between the two options, it is forecast that the scheme active travel route will not be as well utilised. This is because Mere Way provides a more direct route between Waterbeach New Town and Cambridge than the Revised Central option, leading to new Park and Active trips from the A10 Park and Ride site to use Mere Way instead of the scheme active travel route.

However, as set out in Table 3-4, the modelling does not reflect changes in cycling speed that enhanced quality of segregated routes may bring, therefore the forecast number of users on the scheme active travel route is considered to be conservative.

Safety improvements

The results presented in Table 3-9 show the expected economic impacts on safety as a result of the scheme, calculated using the COBA-LT software. The accident appraisal was based on default accident rates for the relevant road types within the study area. The accident appraisal is based on a 2026 opening year and a 60-year appraisal period and, due to the small size of the benefit stream as a proportion of the PVB, it was not considered proportionate to revise the appraisal opening year to reflect updated programme assumptions.

Table 3-9 - Accident impacts

£m's in 2010 prices and values	Revised Central option	Western option
Highway Accidents	-£0.6	-£0.7

Both route options are expected to generate a small accident disbenefit to highway users over the 60-year appraisal period. This is as a result of the scheme introducing new junctions for the Park and Ride access and for where the busway crosses the existing highway, therefore increasing the number of potential conflict points for vehicles. The Revised Central option is forecast to generate a marginally lower disbenefit than the Western option in terms of highway accidents, as it leads to a greater reduction in highway trips than the Western option.

The Park and Ride access junction will be revised and developed in further detail as the scheme progresses to a later stage of development.

Highway VOC improvements

Highway Vehicle Operating Cost (VOC) savings have been calculated using TUBA runs and the figures in Table 3-10 are the total of fuel and non-fuel operating costs across all modes.

Table 3-10 - Highway VOC

£m's in 2010 prices and values	Revised Central option	Western option
Vehicle Operating Cost Savings	£3.3	£2.2

The Revised Central option is forecast to generate higher benefits to VOC savings than the Western option. This is because it encourages a higher level of mode shift than the Western option, which means that users are able to save money on car running and maintenance costs by using alternative modes or making shorter journeys.

Highway journey time savings

Table 3-11 - Highway journey time savings

£m's in 2010 prices and values	Revised Central option	Western option
Highway Journey Time	-£4.4	-£4.8

There is an expected disbenefit to highway journey time in both options. This is due to the delay created by the Park and Ride access junction, as well as additional junctions at interfaces between the busway and the highway network, at Landbeach Road and Waterbeach Road for the Revised Central option, and at Cottenham Road and Green End for the Western option.

The Park and Ride access junction will be revised and developed in further detail as the scheme progresses to a later stage of development to mitigate the impact on the residual transport network.

Reliability impact on commuting and other users

Both options are expected to deliver journey time reliability benefits as they bypass the most congested areas of the A10 corridor. Improvements in the reliability and quality of services will increase the viability of public transport for all users as an alternative to private car use.

The benefits of the service will also be felt by the remaining commuting highway users, as implementation will result in reduced congestion along the A10 between Milton Park and Ride and Waterbeach New Town once the New Town has been developed further.

Upgrades in active travel infrastructure, in association with the connectivity of public transport services with new and existing Park and Rides, will mean that users have several reliable and sustainable modes to choose from. The provision of additional walking and cycling routes will provide an enhanced public realm and an improved ambiance for pedestrians and cyclists.

Spatial distribution of user benefits

To understand the spatial distribution of user benefits, benefits assessed in TUBA were sectored in accordance with Figure 3-3. Table 3-12 and Table 3-13 show the sector-to-sector movements with the largest associated benefits, for the Revised Central option and Western option, respectively. The values shown are annualised all-day benefits, for the 2041 modelled year only.

Table 3-12 - Largest sector to sector benefits - Revised Central option, 2041

Rank	Origin	Destination	Benefit (£)
1	Waterbeach	City Fringe	190,000
2	City Fringe	Waterbeach	160,000
3	Waterbeach	Cambridge North-East	130,000
4	Cambridge North-East	Waterbeach	110,000
5	Waterbeach	Cambridge Central	90,000
6	Waterbeach	Cambridge NW+West	90,000
7	Cambridge NW+West	Waterbeach	70,000
8	Waterbeach	South Cambs. NW	60,000
9	Waterbeach	East Cambs. North	60,000
10	South Cambs. NW	Waterbeach	50,000

Table 3-13 - Largest sector to sector benefits - Western option, 2041

Rank	Origin	Destination	Benefit (£)
1	Waterbeach	City Fringe	140,000
2	City Fringe	Waterbeach	120,000
3	Waterbeach	Cambridge North-East	110,000
4	Cambridge North-East	Waterbeach	110,000
5	Waterbeach	Cambridge NW+West	100,000
6	Waterbeach	Cambridge Central	80,000
7	Waterbeach	East Cambs. North	70,000
8	Cambridge NW+West	Waterbeach	60,000
9	Waterbeach	South Cambs. NW	60,000
10	South Cambs. NW	Waterbeach	50,000

In both options, the largest benefits are between the sectors of Waterbeach (including the part of the Waterbeach New Town development that is included within the model) and City Fringe, which includes Milton, Cambridge Regional College and Cambridge Science Park. Another movement that benefits from the scheme is between the Waterbeach sector and the Cambridge North-East sector, which includes the remainder of the North-East Cambridge development (NEC) that is not included within City Fringe. It also covers the Marshalls development and residential areas of north Cambridge, such as Chesterton and King's Hedges.

In both options, the top ten highest benefits are all trips between the Waterbeach sector and parts of Cambridge. The concentration of benefits between these destinations is consistent with the corridor nature of the scheme, providing improved journey times between large residential areas and key employment

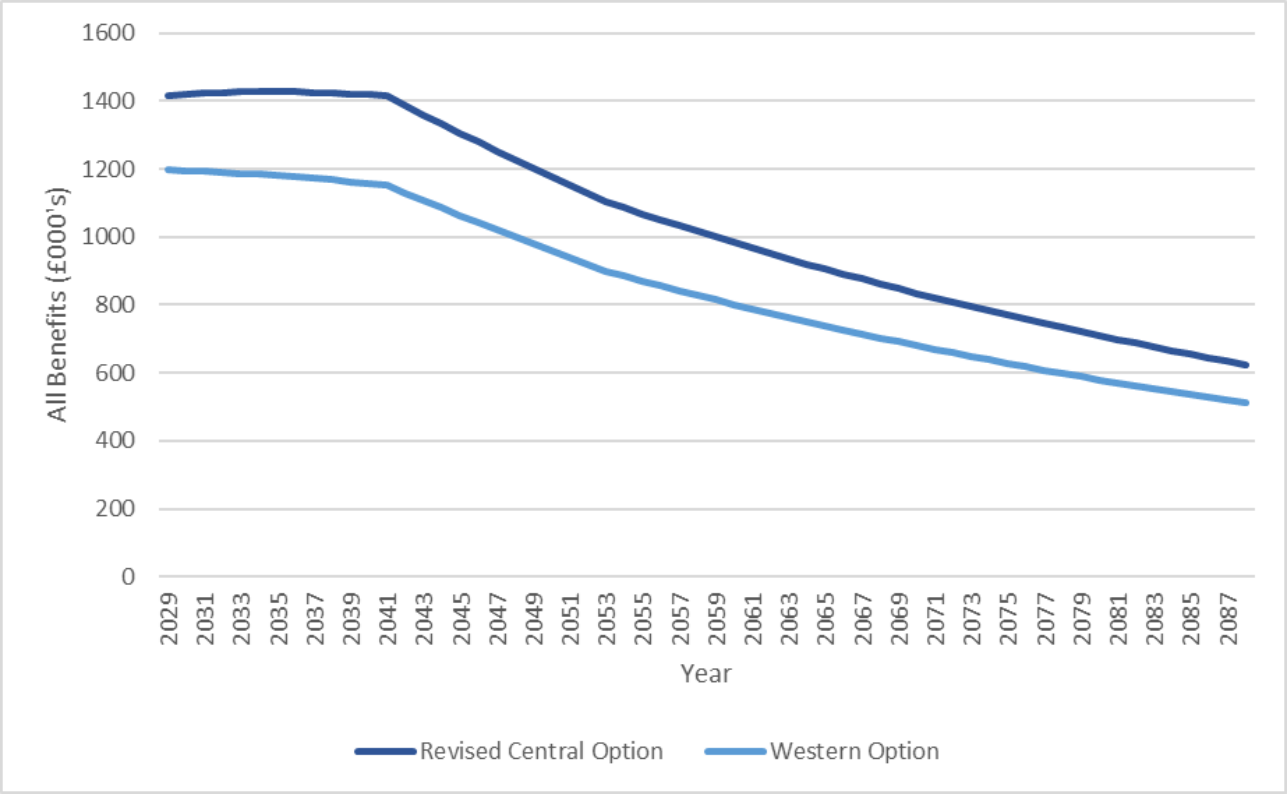
destinations. It also demonstrates the value of the scheme in accommodating growth, both at the Waterbeach New Town and at North-East Cambridge.

Although the spatial distribution of benefits is similar between options, the size of these benefits is greater within the Revised Central option. This is due to the advantages that this option has in terms of connectivity, as set out above. The difference in size of these benefits has subsequent influences on the different productivity impacts generated by the two scheme options, as set out in section 3.6.10.

User benefits over 60-year appraisal period

Figure 3-6 shows the forecast of the user benefits over the 60-year appraisal period for each option.

Figure 3-6 - Profile of user benefits over appraisal period



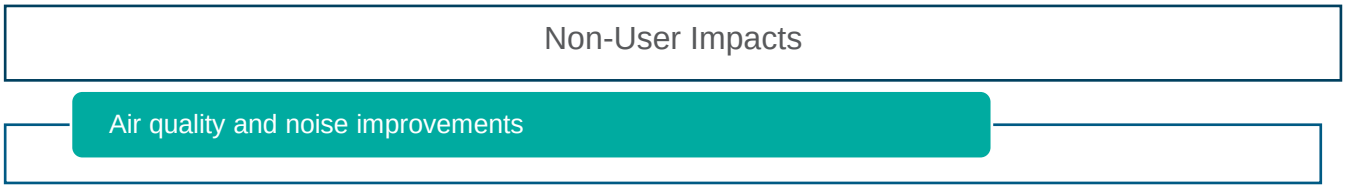
User benefits from the Revised Central option remain broadly constant in real discounted terms between 2029 and 2041, with the benefit increase offsetting the impact of discounting. This is driven by an increase in journey time benefits for public transport users, as well as Park and Ride users, as high levels of growth in the area will lead to higher patronage and also caused increased congestion, particularly at the A10 interchange with the A14. There are also increases in time benefits to users of Park and Ride and Park and Active. This can be attributed to the build-out of Waterbeach New Town, meaning the Park and Ride sites are able to serve a larger market.

User benefits from the Western option also remain relatively constant between 2029 and 2041, however there is a small decline as the period progresses due to the impact of discounting slightly outweighing the increase in benefits. Similarly, to the Revised Central option, there is an increase in journey time benefits to users of public transport, Park and Ride, and Park and Active between 2029 and 2041. However, there is a net journey time disbenefit to highway users in the 2041 forecast year. This is likely due to the inclusion of the dualled A10 in the later forecast year, which means that there is less existing delay on the surrounding road network in the without-scheme scenario.

Both options demonstrate a steady decline in benefits from 2041 onwards, where benefits are held constant in real terms, but decline in-line with discounting through the remainder of the appraisal period. Beyond 2041, there is no further build-out of the Waterbeach New Town site included within the model and a later forecast year is not available. However, in reality, the additional demand generated from continued development at the New Town site could significantly improve the economic performance of the scheme in future years. Therefore,

it is considered that this is a conservative estimate of the benefits generated over the appraisal period. More detail on this is provided within section 3.11.

3.6.3. Non-user impacts



Air quality and noise

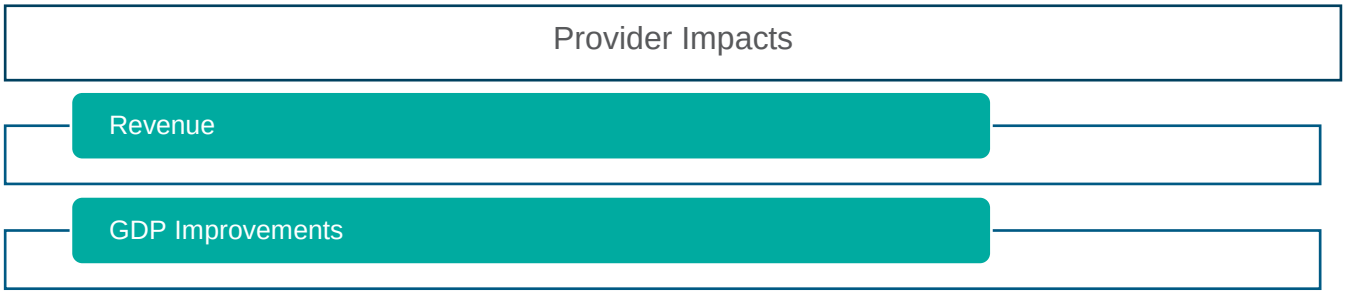
Impacts of the scheme on local air quality and noise have been assessed using a marginal external costs approach, in line with TAG A5-4. This approach uses the change in vehicle kilometres travelled between the with and without-scheme scenarios, split by car, LGV and HGV, and calculates the marginal impact to air quality and noise. These impacts are set out in Table 3-14.

Table 3-14 - Local air quality and noise impacts

£m's in 2010 prices and values	Revised Central option	Western option
Local air quality	£0.05	£0.04
Noise	-£0.02	£0.2

Both options have a small impact on both local air quality and noise. There is a small disbenefit to noise in the Revised Central option. This is driven by a slight increase in vehicle kilometres (+0.02%) driven by HGVs, as a result of re-routing to avoid delay caused by the additional scheme junctions. As these models are based on economic parameters, it is unlikely that the re-routing of HGVs due to these small changes in delay will be reflected in reality.

3.6.4. Provider impacts



This section provides an overview of the business impacts of the two options. Business impacts consist of business user impacts, private sector provider impacts and developer contributions. Business user impacts refer to the journey time, vehicle operating cost and fare savings experienced by users travelling for business. Private sector provider impacts, in the context of this scheme, refer to the increase in revenues and savings to operating costs that are realised by private sector service providers. Developer contributions are private sector contributions towards the cost of the scheme to enable a development to proceed. Further detail on the developer contributions for this scheme can be found in section 4.3. Table 3-15 summarises the net business impacts of the scheme.

Table 3-15 - Net business impacts

£m's in 2010 prices and values	Revised Central option	Western option
Business User Impacts	£3.7	£2.2
Private Sector Provider Impacts	£23.8	£21.6
Developer Contributions	-£5.1	-£5.1
Net Business Impacts	**£22.3**	**£18.6**

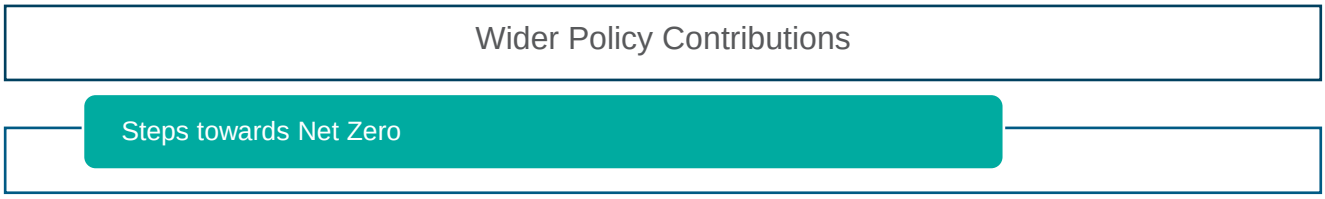
*Benefits are presented as positive values, with costs presented as negative values

Overall, the net business impacts generated by the Revised Central option are slightly more positive than those of the Western option.

The Revised Central option has greater business user benefits, consistent with the greater journey time and highway VOC benefits set out in section 3.6.2. The Revised Central option is also forecast to generate higher positive private sector provider impacts than the Western option. This is driven by the larger increase in revenues for the Revised Central option. Both options are forecast to lead to comparable savings in bus operating costs, with the Western option saving slightly higher than the Revised Central option. Developer contributions are the same for both options.

A more detailed breakdown of these impacts is provided in the PA table, included as Appendix K.

3.6.5. Wider policy contributions



Steps towards Net Zero

The monetised impacts on greenhouse gas user emissions has been calculated using TUBA. Table 3-16 sets out the impacts of both scheme options on monetised greenhouse gases.

Table 3-16 – Monetised greenhouse gas assessment

£m's in 2010 prices and values	Revised Central option	Western option
Greenhouse Gases	£2.8	£2.2

The Revised Central option leads to a slightly greater saving in Greenhouse Gas emissions, with a monetised saving value of £2.8m, compared to £2.2m for the Western option. This is a result of the increased mode shift away from car encouraged by the Revised Central option.

3.6.6. Costs – PVC

Costs for each option are presented in Table 3-17. Scheme costs were calculated in accordance with section 3.2.2. Revenue refers to the change in revenue accruing to the public sector as a result of the scheme. In this instance, this refers to the change in revenues from car parking and from the Making Connections area charge as a result of the scheme. Capital costs refer to the costs incurred in the delivery of the scheme. Infrastructure maintenance costs are the additional maintenance costs incurred by the public sector in maintaining the busway infrastructure. Developer contributions, described in section 3.6.4, are included here as a negative cost to the Broad Transport Budget and PVC.

Table 3-17 – Scheme costs (2010 Real Discounted prices)

£m's in 2010 prices and values	Revised Central option	Western option
Revenue	£4.4	£2.8
Capital costs	£59.8	£61.5
Infrastructure maintenance costs	£6.7	£5.5
Developer contributions	-£5.1	-£5.1
Total PVC	**£65.7**	**£64.6**

*Costs are presented as positive numbers and cost savings presented as negative values

Total scheme costs are very similar for both options. The Western option has marginally greater capital costs due to the slightly longer part of Butt Lane required to be upgraded for this option. The Revised Central option has marginally greater infrastructure maintenance costs as the busway element of the Revised Central option is slightly longer than the Western option. The infrastructure maintenance costs have been calculated for busway infrastructure only and do not include the upgrades to Butt Lane that are reflected in the capital cost estimate as this infrastructure is already existing and so already has associated maintenance costs.

Savings to bus operating costs and bus renewals costs as a result of the scheme, allowing for smaller fleet sizes and more efficient operations, are assumed to be realised by private sector operators and have therefore been included as private sector provider impacts in the Transport Economic Efficiency (TEE) table.

3.6.7. Transport Economic Efficiency (TEE) Table

A summary TEE table covering both options is presented in Table 3-18. Full detailed versions of the TEE tables in TAG format, for core scenarios tested, are included in Appendix J.

Table 3-18 – Summary of Transport Economic Efficiency (TEE)

£m's in 2010 prices and values	Revised Central option	Western option
Net Non-Business Benefits: Commuting	£19.7	£16.0
Net Non-Business Benefits: Other	£33.8	£27.0
Net Business Impact	£22.3	£18.6
Present value of TEE benefits (Total)	**£75.8**	**£61.5**

Of the two options, the Revised Central option generates greater TEE benefits. This is largely driven by the larger public transport journey time saving benefits generated by the Revised Central option, as set out in Table 3-6. Furthermore, as it encourages more mode shift to public transport over the Western option, this leads to higher operator revenues and increased benefits to users in the form of reduced highway vehicle operating costs.

3.6.8. Public Accounts (PA) Table

The summary details of the Public Accounts (PA) implications for each option are presented in Table 3-19. Full details of the PA figures, for core scenarios, are included within Appendix K.

Table 3-19 – Summary of Public Accounts (PA)

£m's in 2010 prices and values	Revised Central option	Western option
Net Local Government Funding Impact	£65.7	£64.6
Net Central Government Funding Impact: Transport	£0	£0
Broad Transport Budget	**£65.7**	**£64.6**
Net Central Government Funding Impact: Non-Transport	£5.1	£4.2
Wider Public Finances	**£5.1**	**£4.2**

*Costs are presented as positive numbers and cost savings presented as negative values

The impacts to the Broad Transport Budget consist of the components as set out in Table 3-17. The PA table splits these out by Local and Central Government. It is assumed that the costs associated with the scheme will be borne by Local Government, using funding acquired through the City Deal. The impact to wider public finances refers to the impact of the scheme on indirect tax revenues, such as fuel duty and other taxable goods. As the Revised Central option is expected to encourage more trips by public transport, the impact to wider public finances is greater than for the Western option, as a larger number of people are spending money on public transport fares, which are not subject to indirect taxation, which leads to a decrease in expenditure elsewhere in the economy. This, combined with higher overall highway VOC savings in the Revised Central option, results in a net loss to indirect tax revenues.

3.6.9. Analysis of monetised costs and benefits: Level 1 BCR

The Analysis of Monetised Costs and Benefits (AMCB) table for each option is presented in Table 3-20. This pulls together the details as set out in the TEE and PA tables, as well as other monetised non-TEE benefits. A fully detailed AMCB table is presented in Appendix L for all core scenarios.

Table 3-20 - Analysis of Monetised Costs and Benefits (AMCB) – Initial BCR

£m's in 2010 prices and values	Revised Central option	Western option
Noise	-£0.02	£0.2
Local Air Quality	£0.05	£0.04
Greenhouse Gases	£2.8	£2.2
Journey Quality	£2.5	£4.8
Physical Activity	£13.9	£14.4
Accidents	-£0.6	-£0.7
Economic Efficiency – Consumer (Commuting)	£19.7	£16.0
Economic Efficiency – Consumer (Other)	£33.8	£27.0
Economic Efficiency – Business Users and Providers	£22.3	£18.6
Wider Public Finances	-£5.1	-£4.2
Present Value of Benefits (PVB)	**£89.4**	**£78.2**
Broad Transport Budget	£65.7	£64.6
Present Value of Costs (PVC)	**£65.7**	**£64.6**
Net Present Value (NPV)	**£23.6**	**£13.7**
Initial Benefit to Cost Ratio (BCR)	**1.36**	**1.21**

The higher capital costs of the Western option are offset by the higher maintenance costs and Local Government revenue impacts of the Revised Central option. The NPV and BCR for the Revised Central option (£23.6m and 1.36, respectively) are greater than those for the Western option (£13.7m and 1.21, respectively). This is due to the greater journey time savings to public transport users offered by the Revised Central option as a result of the more effective tie-in with Milton Park and Ride.

3.6.10. Wider economic impacts

Induced investment

Induced investment refers to the change in location or level of private sector investment as a result of a transport intervention. This is made up of output change in imperfectly competitive markets and dependent development impacts; these are set out below.

Output change in imperfectly competitive markets

This impact refers to the welfare impact from increases in the output of goods and services being valued more highly by consumers than the cost of producing them. Using a simplified approach, it is estimated by using a value of 10% of the Level 1 business user benefits. As set out in Table 3-15, the business user benefits for the Revised Central option and the Western option are £3.7m and £2.2m, respectively. Therefore, for the respective options, the output change impacts can be estimated as £0.4m and £0.2m.

Dependent development

The dependency of the Waterbeach New Town on the delivery of the scheme has been estimated via a dependent development test. The full methodology and results of this test, including the economic narrative, are included within the dependent development technical note, provided in Appendix A.

The dependent development exercise concluded that there is strong overall economic narrative to support the wider growth and development in the area and that the scheme supports this ambition through the provision of new, faster and more reliable transport connectivity to an existing development. This case is further strengthened when considered alongside the proposed growth at Waterbeach New Town, with an estimated 25% of that development being dependent upon the transport scheme.

The overall dependent development valuation is based on the following components:

- Land value uplift – the change in the value of the land as a result of a change in land-use to residential;
- Other (health) benefits generated by increased social housing;
- Transport external costs – the impact of the development on existing users of the transport network; and
- Land amenity value – the value of the loss in function of the land (e.g., farming).

These components are expressed in the following formula to generate overall dependent development benefits.

$$Total\ Benefits = Land\ Value\ Uplift + Other - Transport\ External\ Costs - Land\ Amenity\ Value$$

The results of the dependent development test are set out in Table 3-21.

Table 3-21 – Dependent development summary

Factor	£m's in 2010 prices and values
Land Value Uplift (new – old)	£104.4
Other (Health)	£0.9
Transport External Costs	£43.2
Land Amenity Value	£2.1
Dependent Development Value	**£60.1**

Due to the large number of assumptions included within the dependent development test, as well as the uncertainty over appraising land-use change as a result of a scheme, the dependent development benefits have not been included in the calculation of an adjusted BCR. Only Level 2 benefits (those which assume fixed land use) will be added to the existing Level 1 PVB to form the adjusted BCR, in line with recommendations in the DfT VfM Framework.

Employment effects

Labour supply impacts have been calculated for both scheme options. Labour supply refers to the movement of people between the labour market and economic inactivity as a result of a transport intervention, with the resulting change in tax paid being the value of the labour supply impacts. The labour supply impacts of both options are presented in Table 3-22. As a land-use transport interaction (LUTI) model has not been utilised for this appraisal, impacts from movement to more/less productive jobs has not been included within this appraisal.

Table 3-22 - Labour supply impact (£m)

£m's in 2010 prices and values	Revised Central option	Western option
Labour supply impact	-£1.1	-£1.2

The scheme leads to a small disbenefit to labour supply in both options. This is due to the negative impacts to highway users as a result of additional junctions within the corridor, as the calculations for labour supply are weighted by mode. As highway trips make up a significant proportion of all trips in the model, the small disbenefit to these trips leads to a negative labour supply impact.

Productivity Impacts

Productivity impacts from agglomeration economies have been assessed for both options. Agglomeration refers to the process in which individuals and firms gain productivity benefits from locating in close proximity to other individuals and firms. Agglomeration impacts from static clustering, in which a transport scheme improves connectivity between clusters with no change to land-use, has been measured. As a LUTI model has not been utilised for this appraisal, the impact of dynamic clustering has not been included within this appraisal.

The agglomeration impacts of the scheme options, categorised by employment sector, are presented in Table 3-23.

Table 3-23 - Agglomeration impacts (£m)

£m's in 2010 prices and values	Revised Central option	Western option
Agglomeration – manufacturing	£0.7	£0.5
Agglomeration – construction	£0.5	£0.3
Agglomeration – consumer services	£2.9	£1.7
Agglomeration – producer services	£9.8	£6.0
Total	**£13.8**	**£8.4**

The Revised Central option presents the greater economic benefit from agglomeration across all employment sectors. Within this, the sector with the highest benefit is producer services, expected to generate £9.8m in agglomeration benefit.

3.6.11. Level 1 and 2 BCR calculation

Following the inclusion of wider economic impacts, the adjusted BCR is set out in Table 3-24.

Table 3-24 - Analysis of Monetised Costs and Benefits (AMCB) – Adjusted BCR

£m's in 2010 prices and values	Revised Central option	Western option
Initial Present Value of Benefits	£89.4	£78.2
Wider Economic Impacts[76]	£13.0	£7.5
Adjusted Present Value of Benefits (PVB)	**£102.4**	**£85.7**
Broad Transport Budget	£65.7	£64.6
Present Value of Costs (PVC)	**£65.7**	**£64.6**
Adjusted Net Present Value (NPV)	**£36.7**	**£21.1**
Adjusted Benefit to Cost Ratio (BCR)	**1.56**	**1.33**

3.6.12. Non-monetised Impacts

Overview

This section sets out the qualitative impacts of the two scheme options. These assessments cover impacts that are difficult, or not appropriate, to monetise or quantify at this stage. A full social impact appraisal has been undertaken, with full details included within the Social and Distributional Impact Assessment Report[77]. At this stage, a qualitative appraisal of the expected environmental impacts has not been undertaken. However, an assessment of likely environmental impacts has been undertaken and is considered proportionate for the purposes of comparing the scheme options.

Social Impacts

Social impacts cover the human experience of the transport system and its impact, both positive and negative, on social factors. The purpose of the Social Impact Appraisal is to evaluate these impacts so that they can be considered relative to other outcomes and, if required, mitigated where negative impacts are expected.

For the proposed intervention, a proportionate approach has been undertaken to deliver the social impact assessment. A qualitative assessment of each of the social impact indicators has been undertaken, supplemented by quantitative measures where appropriate.

The Social Impact Appraisal covers social factors that are not already considered as part of economic or environmental impacts, namely:

- Physical activity;
- Journey quality;
- Accidents;
- Security;
- Access to services;
- Personal affordability.
- Severance; and
- Option and non-use values.

Physical activity

The impact of the scheme options on physical activity have been monetised in the AMAT assessment and can be found in section 3.6.2.

[76] Wider economic impacts = agglomeration impacts, labour supply impacts & output change in imperfectly competitive markets

[77] Atkins (2023) *Waterbeach to Cambridge Social and Distributional Impact Assessment Report*

Journey quality

The impact of the scheme options on journey quality for active travel users has been monetised and is presented in section 3.6.2. For other users, the predicted impacts on journey quality have been assessed qualitatively in line with TAG Unit A4.1.

The scheme will provide key improvements in reliability and design improvements, and therefore the overall appraisal for journey quality is **moderate beneficial**.

Accidents

The accident cost savings for both options have been monetised and are presented in section 3.6.2.

Security

The impact of the scheme on security for users was assessed through a series of indicators, these are:

- Site perimeters;
- Entrances and exits;
- Formal and informal surveillance
- Landscaping;
- Lighting and visibility; and
- Emergency call provision.

For most of these indicators, it is expected that the scheme will have a neutral impact, with slight beneficial impacts to informal surveillance and landscaping. It should be noted that some specific details, such as the provision of lighting along the route, is yet to be confirmed and as such have been rated as neutral. Therefore, it is considered that a conservative approach has been taken to assessment. The overall impact on security at this stage is assessed to be **neutral**.

Access to services

It is expected that the scheme will provide accessibility benefits, enabling users to reach destinations and undertake activities that they would otherwise not do. In particular, the barriers to accessibility that the scheme has benefits for are:

- Accessing services and activities located in inaccessible places;
- Safety; and
- Expanding travel horizons.

For both options, an assessment rating of **slight beneficial** has been assigned.

Personal affordability

The TUBA analysis indicates that there are personal affordability benefits for non-business users in both options. This assessment is based on changes in vehicle operating costs, public transport fares and road user charges as assessed in TUBA.

It should be noted that business trips have not been included within this assessment as these impacts are experienced by businesses and not individuals.

On this basis, the overall impact on personal affordability is appraised as **slight beneficial** for both options given the beneficial impact on affordability per journey distributed over the 60-year assessment period.

Severance

There is very little variation in impact in terms of traffic changes between the two options being considered. As discussed above, overall, traffic changes are not expected to have a great impact to severance felt by the local communities. The scheme will deliver a new segregated public and active transport corridor, connecting north Cambridge to Waterbeach. The scheme includes dedicated walking and cycling paths alongside the public transport corridor, with appropriate and safe crossings provided at necessary locations and interactions with the highway network.

The nature and the design of the public transport corridor with pedestrian crossings and the introduction of new, segregated, and offline foot and cycle paths, means the overall assessment on severance is considered to be **slight beneficial** for both the options.

Option and non-use values

As it is proposed that the bus services that will utilise the busway will already be in place and there is other active travel provision within the corridor, the option and non-use values have not been included within this assessment.

Table 3-25 - Summary findings of the Social Impact Appraisal

Social Impact Indicator	Social Impact Appraisal Results	
	Revised Central option	Western option
Journey quality	Moderate beneficial	Moderate beneficial
Security	Neutral	Neutral
Access to services	Slight beneficial	Slight beneficial
Personal affordability	Slight beneficial	Slight beneficial
Severance	Slight beneficial	Slight beneficial

Environmental impacts

A high-level Environmental Constraints Assessment was undertaken to determine the likely issues that will require further consideration and assessment at the next stage of scheme design, as well as to identify issues and risks relating to either of the scheme options. The environmental constraints assessment assessed the two scheme options using a RAG rating, with the following classifications:

- Red – Significant impact expected with challenging mitigation;
- Amber – Potential significant impact, mitigation likely; and
- Green – No significant impacts expected, with or without minimal mitigation.

Noise

The scheme's monetised impact on noise has been appraised using an MEC approach, with the results set out in section 3.6.3.

For the Revised Central option, there are three Noise Important Areas (NIAs) within the Pangea (Atkins bespoke environmental assessment tool) defined search area[78] for the scheme. One of these is on the A14, close to the crossing with the Cambridgeshire Guided Busway (CGB) and the other two are on the A10. For the Western option, there is one NIA within the search area for the scheme, on the A14. With appropriate design and mitigation, it will be possible to prevent significant adverse effects, therefore the RAG rating for noise impacts has been designated as **Amber**.

A more detailed assessment of the scheme's expected impacts on noise, from both an appraisal and environmental assessment perspective, will be provided at the next stage of scheme development.

Air Quality

The scheme's monetised impact on local air quality has been appraised using an MEC approach, with the results set out in section 3.6.3.

For both options, there is an Air Quality Management Area (AQMA) on the A14 which falls within the search area of the scheme. In addition to this, there are two links on the A1309 which are included in DEFRA's Pollution Climate Mapping (PCM) model. The RAG rating for air quality impacts for both options has been designated as **Green**.

A more detailed assessment of the scheme's expected impacts on air quality, from both an appraisal and environmental assessment perspective, will be provided at the next stage of scheme development.

[78] The PANGEA tool defines buffer zones from the scheme for each type of environmental feature to be used as a 'search area' for impact assessment.

Greenhouse Gases

The impact of the scheme on greenhouse gas emissions has been monetised using TUBA and is presented, for both options, in Table 3-16.

Landscape

Both scheme options predominantly cover Grade Two and Grade Three agricultural classifications. At the next stage, a more detailed environmental assessment will take place which will consider the impact the landscape character and visual receptors and identify features for conservation or protection. The initial assessment has given a RAG rating of **Amber**.

Townscape

Due to the geographical scope of the scheme in a predominantly rural environment, the impact of the scheme options on townscape has not been considered.

Historic environment

There is one listed building which falls within the site boundaries for both route options. There are two conservation areas, many listed buildings and scheduled monuments within 300m of the site boundaries. At a later stage of scheme development, further assessment including consideration of the impact on designations and scope for mitigation, including scheduled monuments, conservation areas and listed buildings, and other heritage assets with reference to the Historic Environment Records will be undertaken. The initial assessment RAG rating for historic environment impacts is **Amber**.

Biodiversity

The Scheme boundaries fall within the SSSI risk zones for Histon Road SSSI. One local nature reserve is present on the site boundary of the western route option. The initial RAG rating for biodiversity impact is **Amber**. Preliminary ecological assessment (PEA) walkover surveys were undertaken for both scheme options. The key constraints identified for both options were areas of priority habitat, including grazing marsh, deciduous woodland and traditional orchards; priority plant species, and priority species such as badgers and commuting bats. For both options, it is recommended for further surveys to be undertaken. However, the PEA reports concluded that, based on the information gathered, either scheme option can be delivered given appropriate mitigation.

Water environment

Both scheme options include areas of Flood Zone 2 and 3 within the scheme boundaries. Any works that involve raising the ground level will require floodplain compensation. The Western option may require works to a watercourse and this will require further modelling and potentially additional compensation. The RAG rating for the water impact of both scheme options has been assessed as **Amber**, however the Revised Central option has been noted as preferred from this perspective.

Table 3-26 - Summary results of the environmental RAG assessment

Environmental impact indicator	Environmental RAG assessment results	
	Revised Central option	Western option
Noise	Amber	Amber
Air quality	Green	Green
Landscape	Amber	Amber
Historic environment	Amber	Amber
Biodiversity	Amber	Amber
Water environment	Amber*	Amber

*Revised Central option noted as preferred

Construction period impacts

It is anticipated that, for the majority of the construction period, there will be limited impact on the operation of the existing transport network. This is due to the fact that the majority of the new infrastructure will be offline to the existing network. There will be periods of delay on local roads when the scheme construction crosses or ties in with the road network, such as on Landbeach Road and Waterbeach Road.

There will be some impacts at Butt Lane due to the upgrading of the active travel route alongside the road and the need for haul roads within the area, which will lead to a temporary increase in HGV movements.

The impact of construction traffic and of temporary road closures and diversions will be assessed further at a later stage of scheme development, following further development of the construction programme.

3.7. Distributional analysis

Distributional impacts relate to the extent to which there are differences in the way impacts affect different groups in society. For example, the noise impacts of an intervention will affect different groups of households, with some experiencing increases, and others decreases.

In accordance with requirements set out in TAG unit A4-2, a three-step approach of screening, assessment and appraisal of impacts, has been applied to undertake the distributional impact appraisal of the Waterbeach to Cambridge scheme. The approach ensures that the DI appraisal is proportionate to the scale of the project and follow a process to ascertain whether a full DI appraisal is required. The eight indicators considered within the DI appraisal are:

- Accessibility;
- Collisions;
- Air Quality;
- Noise;
- Security;
- Severance
- Affordability; and
- User Benefits.

The assessment of noise and air quality for the purposes of the distributional impact assessment follows a different methodology to the MEC approach taken for appraising monetised impacts to noise and air quality as set out in section 3.6.3.

Accessibility

Overall, an assessment of **slight beneficial** is made for accessibility owing to the levels of vulnerable groups within the 400m catchment areas, which are mostly in line or slightly below the national rates, with the exception of households without access to a car. Without quantitative evidence, this assessment focuses on scheme design, alignment and connectivity elements to provide a qualitative assessment on accessibility.

As outlined above, the scheme will improve local access to jobs and services along the corridor. It will provide greater accessibility and connectivity to the wider area and region through interchange at rail stations and other transport corridors in Cambridge.

Collisions

A neutral impact is assessed for pedestrians, children, older people and most income deprived groups, due to:

1. The lower concentration of related casualties within the impact area in comparison to the national rate; and
2. No relevant recorded collisions occurring on links that are forecast to have an increase or decrease in collision rates.

In contrast, the assessment of collisions for other vulnerable users and groups has been considered as slight adverse. These groups all show at least one casualty along links with an increase in collision rate. Despite the overall casualty figures and the low number of links forecast to have a significant change in collision rate, the overall assessment for the scheme impact on collisions is **slight adverse**.

Air Quality

Overall, there was a **slight beneficial** impact on air quality as a result of the scheme. The public transport scheme is expected to have a positive effect in air quality terms, when assessed using changes in traffic flows as a proxy for estimates of $PM_{2.5}$ and NO_2. The mode shift towards sustainable and public transport modes and the presence of links with reduced traffic flow indicates that there is a net improvement in air quality as a result of the scheme.

Noise

The scheme is expected to have **neutral** noise impact due to the relatively lower percentage of vulnerable groups residing in the noise impact area and the limited highway impact expected.

It should be noted that this assessment does not take into account the impact of changing vehicle types in the future on noise such as the potential greater use of electric vehicles and hybrid vehicles which may be quieter in operation than petrol or diesel vehicles, however it is expected that the bus fleet along this route will be electrically powered.

Security

Women, children, older people, DLA claimants and BME are anticipated to experience slight beneficial impacts, considering the proportion of such groups residing in the impact area and the relative importance of security indicators for these sensitive groups. The overall scheme is appraised as **slight beneficial** owing to the proposed scheme design changes of relevance to security.

Severance

The public transport and active travel infrastructure included in the scheme are likely to mitigate against any adverse impact felt to vulnerable groups. As a result, the overall severance assessment is considered to be **slight beneficial**. Whilst there are links showing significant change in traffic, many of these are in locations which are interacting with the proposed route and where there will likely be measures in place to support cycling and pedestrian journeys and crossings.

User Benefits

Revised Central option

All income quintiles experience net benefits, ranging from slight to large beneficial. The impact on the lowest income quintile is expected to be moderate beneficial. An overall assessment of **moderate beneficial** is attributed to this option.

Western option

All income quintiles with the exception of income quintile 1 experience net benefits, but the assessment does suggest a moderate adverse impact for the lowest income quintile. However, due to the small margin of the disbenefit, and the fact that the model zones identified as representing areas of the lowest income quintile are largely out of the area directly affected by the scheme, that this result could be partially attributable to the underlying model structure. The other income quintile groups experience benefits ranging from slight to large beneficial. As a result, an overall assessment of **slight beneficial** is attributed to the Western option.

Affordability

Revised Central option

It is expected that there will be affordability benefits to the lowest income quintile, which is assessed as moderate beneficial. All other quintiles experience adverse affordability impacts, including to the highest income quintile which is assessed as large adverse. The overall impact on affordability is assessed to be **slight adverse**. This is likely as a result of more people utilising bus services as a result of the scheme and therefore an increase in the monetary cost of travel for some users (please note that this does not include the monetised value of time).

Western option

As with the Revised Central option, it is expected that there will be affordability benefits to the lowest income quintile, which is assessed as moderate beneficial. There are also slight beneficial impacts attributed to the second lowest quintile for the Western option. All other quintiles experience adverse affordability impacts, including to the highest income quintile which is assessed as large adverse. The overall impact on affordability is assessed to be **slight adverse**. Again, this is likely as a result of more people utilising bus services and therefore an increase in the number of fares paid by users.

Table 3-27 – Summary findings of the Distributional Impact Appraisal

Distributional Impact Indicator	Distributional Impact Appraisal Results	
	Revised Central option	Western option
Accessibility	Slight beneficial	Slight beneficial
Collisions	Slight adverse	Slight adverse
Air quality	Slight beneficial	Slight beneficial
Noise	Neutral	Neutral
Security	Slight beneficial	Slight beneficial
Severance	Slight beneficial	Slight beneficial
User benefits	Moderate beneficial	Slight beneficial
Affordability	Slight adverse	Slight adverse

3.8. Appraisal Summary Table (AST)

The appraisal summary table (AST) is provided as Appendix I.

3.9. National level impacts

The appraisal presented within this Economic Dimension so far has taken a place-based approach, reflecting the local impacts that the scheme will have in the Waterbeach to Cambridge corridor. As such, an assessment of impacts at a national level, such as direct contributions to Gross Value Added (GVA) and Gross Domestic Product (GDP), has not been undertaken for the scheme.

The Wider Economic Impact analysis undertaken in WITA has been masked to exclude areas external to the Cambridge City and South Cambridgeshire Local Authority Districts (LADs). As stated in section 3.2.2, this has been done so as not to claim any benefits potentially arising from model noise in areas unlikely to be affected by the scheme.

3.10. Preferred route identification

The performance of both options, in transport and economic terms, has been considered throughout this Economic Dimension using a wide range of assessment methods. The transport model results show that the Revised Central option is the more effective of the two options, leading to a greater reduction in private vehicle trips and a higher uptake of public transport and active travel trips. The analysis demonstrates that both options can contribute towards accommodating the high level of growth that is planned for the corridor, however the Revised Central option is more effective at this.

The better transport performance of the Revised Central option is mirrored within the economic appraisal results, generating approximately £10m additional NPV over the Western option. Both options are similar in terms of their cost and deliverability, with the Revised Central option being identified as the preferred option from a water environment impact perspective, which is a key consideration in this corridor. An assessment of the two scheme options against a range of criteria has been undertaken separately to the economic appraisal and is set out in section 2.7.1. The indicative journey time assessment showed that the Western option will provide a faster end-to-end journey time when not serving Milton Park and Ride, but the Revised Central is a faster route when stopping at Milton Park and Ride. In terms of travel markets, the Revised Central option has greater reach and is able to provide more flexibility for services wishing to serve Waterbeach village and Milton. This assessment concluded that both options align to the scheme objectives, but that the Revised Central option achieves these to a greater extent.

Based on the assessments presented thus far in the Economic Dimension, the Revised Central option has been identified as the preferred route. This option be taken forward for sensitivity testing for economic robustness and, if satisfactory, a recommendation will be made to proceed with this option for further development at FBC. This is set out in the remainder of this Economic Dimension.

3.11. Uncertainty analysis

3.11.1. Introduction

It is important to assess a wide range of future scenarios, including changes to economic growth and travel demand, to maximise the confidence that a scheme can provide Value for Money in the future. It is also important to understand the strengths and limitations of the analysis undertaken, which provides further insight as to whether realistic present and future scenarios are being assessed. Finally, it provides a greater understanding of some of the risks to the project so that, if necessary and possible, these can be mitigated and incorporated into the Value for Money assessment.

3.11.2. Uncertainty log

The uncertainty log records all the assumptions made regarding demand and supply within the transport model, such as growth sites and future transport network enhancements. The model assumptions for the core forecasts are set out in in the GCP Corridor Schemes Common Do Something Assumptions Technical Note[79].

In terms of the transport supply, it is assumed that the Making Connections area charging and bus provision scheme will be present in both forecast years. However, due to the synergies between the two schemes, a sensitivity test has been undertaken to assess the potential VfM implications of Making Connections not being delivered, this is set out in Table 3-31.

Another key uncertainty with implications for the performance of the scheme is the proposed upgrades to the A10 north of Cambridge. The second model forecast year, 2041, assumes an upgraded A10 in the form of a dual carriageway. However, recent policy changes have led to a revisit of the optioneering process for this scheme which is currently ongoing. The implications of no A10 upgrade being in place have not been assessed at this stage. However, it is likely that this will improve the economic performance of the scheme, as a more congested road network will encourage more people to switch to public transport or active travel. In addition to this, increased delay on the network will lead to larger changes between the with and without-scheme journey times for bus and Park and Ride users. Therefore, it is considered that the approach taken to representing road network upgrades in the area is conservative and robust.

In terms of future transport demand, a key driver of increased demand in the corridor is the build out of the Waterbeach New Town. However, by 2041, it is assumed that only approximately 42% of the total site will have been completed. The absence of a later forecast year means that the total potential demand from this site is not being captured within the modelling and therefore benefits may be understated. At the next stage of scheme development, consideration will be given to including a further forecast year to capture any additional benefits that the scheme will generate with continued growth beyond 2041.

3.11.3. Quality of the analysis

As set out in section 3.2.4, it is considered that CSRM2 is a suitable tool for assessing the impact that the scheme may have, both in terms of travel patterns and economic benefits. Table 3-4 sets out the modelling strategy and the potential limitations of the model and subsequent analysis pivoting from its outputs. As set out

[79] Atkins (2022) *GCP Corridor Schemes Common Do Something Assumptions v1.0*

previously, it is considered that a conservative approach to benefits estimation has been applied and therefore the VfM assessment is robust.

Appraising new modes and large cost changes in TUBA

As mentioned in section 3.6.2, the introduction of a new Park and Ride and guided bus provision in the corridor may attract users that may have previously used an alternative mode of transport. This may be reflected within the transport model outputs, with journeys being made by Park and Ride or public transport modes from origin-destination pairs that did not previously have any trips associated with them. TUBA calculates journey time savings using the 'rule of a half' calculation, which monetises the change in generalised travel cost, for each mode and each origin-destination pair, between the with and without-scheme scenario. However, if a trip is not being made in the without-scheme scenario, the travel cost is zero, leading to a distortion in the calculation of a journey time benefit, due to the generalised cost of the trip increasing in TUBA terms. To mitigate this issue, the TUBA input matrices were adjusted so that, wherever a time matrix has a zero value in one scenario and not the other (as a result on zero demand in one case), both values were set to equal to remove spurious benefits. The result of this means that not all possible benefits may have been claimed through the appraisal. However, it provides greater confidence in the accuracy of the benefits calculation and, as a result, allows for a more robust appraisal.

3.11.4. Sensitivity tests

A series of sensitivity tests have been undertaken to assess the potential impacts that different future scenarios might have on the scheme, including its VfM category. Sensitivity tests have been selected based on scenarios that could feasibly occur that are proportionate to assess at this stage. A proportionate approach has been taken to assessing sensitivities, meaning that only potential changes to initial BCRs has been considered. However, it can be inferred that an improvement in initial BCR will also lead to an improvement in adjusted BCR. The tests assess sensitivities in both the benefits and cost estimations and are set out in the remainder of this section.

High growth scenario

A high growth scenario sensitivity test was undertaken, using model data with background growth in line with the emerging Greater Cambridge Shared Planning (GCSP) Local Plan preferred option for Cambridge City and South Cambridgeshire, and with growth in Huntingdonshire and East Cambridgeshire based on the CSRM E-Series high growth forecast. This differs from the 'Core' model forecasts, which include background growth in line with the relevant existing Local Plans. The change in user benefits was assessed using TUBA and AMAT. As the impacts of the scheme on accidents is considered to be insignificant, and improvements to safety is not a scheme specific objective, a COBA-LT assessment has not been re-run for this test. The MEC assessment for the high growth scenario has also been retained from the core as the benefits are not a significant contribution to the overall PVB. Table 3-28 shows the summary comparison of the core scenario results against the low growth scenario results.

Table 3-28 - High growth scenario sensitivity test

£m's in 2010 prices and values	Revised Central option - core scenario	High growth - sensitivity test
Initial PVB	£89.4	£207.7
Initial BCR	1.36	3.15
Initial VfM category	Low	High

The high growth sensitivity test demonstrates that the scheme is effective at accommodating higher levels of growth, with the largest increase in benefits from the core scenario being driven by economic efficiency benefits to commuting and other users. Although this test reflects higher rates of background growth rather than changes to specific sites, it indicates that the impact of introducing another forecast year to account for higher growth at the Waterbeach New Town, as mentioned in section 3.11.2, could have significant impacts on the benefits delivered by the scheme.

Low growth scenario

A low growth scenario, with growth constrained in line with DfT's National Trip End Model (NTEM) v8.0 was also used in order to test the robustness of the scheme in lower-than-expected growth conditions. This

approach is also consistent with the approach recommended by DfT for assessing core scenarios, however it is considered an appropriate low growth test for the Cambridge area due to the high level of growth in the area in real-world conditions. Table 3-29 shows the summary comparison of the core scenario results against the low growth scenario results.

Table 3-29 - Low growth scenario sensitivity test

£m's in 2010 prices and values	Revised Central option - core scenario	Low growth - sensitivity test
Core Initial PVB	£89.4	£84.3
Core Initial BCR	1.36	1.28
Core Initial VfM category	Low	Low

The low growth sensitivity test shows that the scheme performance remains relatively unchanged in the face of reduced growth and hence, reduced travel demand. The VfM classification remains as 'Low' with a drop in benefits of approximately £5m. This test demonstrates that the scheme can be effective at tackling existing congestion within the corridor even if future growth was constrained.

The relatively small change in benefits in the low growth scenario lends further support to the assertions that the modelling and appraisal of the core scenario are conservative in nature. However, the higher growth scenario sensitivity test shows that there is significant potential to improve the economic performance of the scheme, and to demonstrate its strategic importance, if further growth in the area beyond 2041 is modelled.

Covid impact on demand

A low growth scenario sensitivity test has been undertaken with future growth constrained to National Trip End Model (NTEM) v8.0. Although this cannot be used for a direct assessment of Covid-19 impacts, it can be considered a suitable and proportionate proxy in the absence of more robust methods. At the next stage of scheme assessment, it is assumed that a new transport model, based to 2023, will be available. This will ensure that the appraisal reflects the impacts of Covid-19 on travel demand and, subsequently, Value for Money assessment.

Busway only scheme – no active travel

This sensitivity test assesses the impact of removing benefits to active travel user health and journey quality as a result of the scheme, as well as journey time benefits for those undertaking trips by walk and cycle.

As the scheme is required to provide a maintenance track, which can also be used as an active travel route, the scheme costs for this sensitivity test have not been altered. However, it is considered that the costs would be lower if the width of the scheme active travel route was to be reduced.

Benefits to Park and Active users have not been removed from this sensitivity test due to the presence of Mere Way making Park and Active a viable travel option even without the scheme active travel route. Table 3-30 sets out the PVB and resulting BCR when removing benefits to active travel users.

Table 3-30 - Busway benefits only sensitivity test

£m's in 2010 prices and values	Revised Central option - core scenario	Busway only - sensitivity test
Core Initial PVB	£89.4	£70.7
Core Initial BCR	1.36	1.08
Core Initial VfM category	Low	Low

Table 3-30 shows that, even when removing benefits to walking and cycling at a total value of ~£19m, the scheme VfM classification remains unchanged. As mentioned above, this is a worst-case estimate and, if this sensitivity became a core scenario then it is likely that the PVC would also be reduced.

Revised Central without Making Connections

A sensitivity test was undertaken to assess whether the scheme would be economically viable without the Making Connections scheme, which has been included within both the without-scheme and with-scheme

scenarios for the core assessments. For the core scenarios, it is assumed that the bus operations will already be present as part of the Making Connections scheme, with the marginal change in the costs and benefits occurring as a result of the scheme being appraised.

For the without Making Connections sensitivity test, the bus operating costs and investment costs fall to the Waterbeach to Cambridge scheme, which impacts the benefits to the private sector. However, without Making Connections included, there is a significantly higher level of highway congestion within the without-scheme scenario.

Table 3-31 shows the summary comparison of the core scenario results against the without Making Connections scenario.

Table 3-31 - Without Making Connections sensitivity test

£m's in 2010 prices and values	Revised Central option - core scenario	Without Making Connections - sensitivity test
Core Initial PVB	£89.4	£118.1
Core Initial PVC	£65.7	£61.8
Core Initial BCR	1.36	1.91
Core Initial VfM category	Low	Medium

Table 3-31 shows that the scheme's economic performance is improved when appraising a scenario that does not include Making Connections. This is due to there being a higher level of pre-existing congestion in the without-scheme scenario which generates greater journey time benefits for users as a result of the introduction of a segregated bus route.

There are also associated savings to highway VOC and greenhouse gases. However, elements of the PVB are reduced, such as the operating costs to private operators and capital expenditure for buses. These are significantly increased as the scheme is assumed to be providing new services rather than re-routing those provided by Making Connections.

Overall, it is considered that the scheme would operate effectively and provide VfM with or without Making Connections.

Increased Construction Cost Inflation Scenario

A sensitivity test has been undertaken to assess the impact of increased construction cost inflation rates on the VfM. For the core scenarios, a TAG recommended 2.1% real inflation has been applied to all costs. For this sensitivity test, a 4.1% real inflation rate has been applied to the scheme construction costs, with other cost inflation rates remaining the same. The results are set out in Table 3-32.

Table 3-32 – Increased construction cost sensitivity test

£m's in 2010 prices and values	Revised Central option - core scenario	High inflation - sensitivity test
Core Initial PVB	£89.4	£89.4
Core Initial PVC	£65.7	£69.8
Core Initial BCR	1.36	1.28
Core Initial VfM category	Low	Low

The results in Table 3-32 show that high inflation has a limited impact on the VfM of the scheme, with the classification remaining firmly within the 'Low' category but with a decrease in NPV of £2.2m and a decrease in BCR by 0.08. The limited impact is due to the deflation of costs to 2010 prices and the application of discounting in economic appraisal, which dampens the impact of a higher real inflation rate. The impacts of higher and lower than expected inflation rates on the outturn cost of the project are presented in the Financial Dimension, section 4.2.5 (Table 4-7).

SOC Level Optimism Bias

A sensitivity test has been undertaken which assesses the impact of increasing the scheme PVC in line with the optimism bias that would normally be applied at SOC stage. For the main scheme costs, a 46% OB uplift was applied, with 70% and 33% applied for the Park and Ride site building and land costs, respectively.

The comparison between the core scenario and the sensitivity test are set out in Table 3-33.

Table 3-33 - SOC OB sensitivity test

£m's in 2010 prices and values	Revised Central option - core scenario	SOC OB - sensitivity test
Initial PVC	£65.7	£76.8
Initial BCR	1.36	1.17
Initial Value for Money Category	Low	Low

Table 3-33 shows that, even with increased levels of OB applied, the VfM category remains unchanged. The level of costing uncertainty will decrease at the next stage of scheme development, when more detailed estimates can be made, however this test demonstrates that the scheme VfM is not sensitive to cost increases.

FBC Level Optimism Bias

A sensitivity test has been undertaken which assesses the impact of decreasing the scheme PVC in line with the optimism bias that normally be applied at FBC stage. For the main scheme costs, a 20% OB uplift was applied, with 44% and 0% applied for the Park and Ride site building and land costs, respectively.

The comparison between the core scenario and the sensitivity test are set out in Table 3-34.

Table 3-34 - FBC OB sensitivity test

£m's in 2010 prices and values	Revised Central option - core scenario	FBC OB - sensitivity test
Initial PVC	£65.7	£64.0
Initial BCR	1.36	1.40
Initial Value for Money Category	Low	Low

Table 3-34 shows that, when applying the recommended OB for FBC stage projects, the BCR increases to 1.40, with the VfM classification remaining as 'Low'. This is an indicator of potential improved economic performance that could be achieved at the next stage of scheme development. However, it should be noted that the cost estimates at the next stage will contain much more detail and it is not yet clear whether large cost allowances made at this stage will change.

Unsecured developer contributions

A sensitivity test has been undertaken to assess a scenario in which all developer contributions identified within the North East Cambridge Area Action Plan Infrastructure Delivery Plan80 as associated with the scheme are secured. This differs to the core scenario, which includes only those which have been secured to date. The values of these contributions, in 2019 prices, are provided in Table 4-8 and the impacts of their inclusion within the appraisal provided in Table 3-35.

[80] Stantec (2021) *North East Cambridge Area Action Plan Infrastructure Delivery Plan*

Table 3-35 - Unsecured developer contributions sensitivity test

£m's in 2010 prices and values	Revised Central option - core scenario	Unsecured developer contributions - sensitivity test
Core Initial PVB	£89.4	£55.5
Core PVC	£65.7	£31.8
Core Initial BCR	1.36	1.74
Core Initial Value for Money Category	Low	Medium

Table 3-35 shows that the inclusion of all the noted developer contributions for the scheme (both secured and unsecured) within the appraisal increases the VfM of the scheme. This is because there is a reduction in the PVB due to the net business impact of the scheme being reduced by the inclusion of further developer contributions. However, this is also noted in the opposite sign in the public accounts table, reducing the scheme PVC. As the relative difference between the PVB and PVC is reduced, the BCR and subsequent VfM category is improved. Therefore, future discussions with developers over provision of private sector contributions should be considered as it has a beneficial impact on the VfM of the scheme.

Switching values

A switching values analysis has been undertaken to show the marginal change required to increase or decrease the VfM category of each option. A qualitative assessment has been made of the perceived likelihood of these impacts, based on the outcomes of the core appraisal and the uncertainty analysis, including other sensitivity tests.

Table 3-36 - Increase in initial PVB required for an initial VfM category improvement

VfM Category	Revised Central option					
	Cost			Benefit		
	Abs. Change (£m)	PC Change	Likelihood	Abs. Change (£m)	PC Change	Likelihood
High (2 – 4)	-£21.0	-32%	Unlikely	£42.1	47%	Possible
Medium (1.5 – 2)	-£6.1	-9%	Likely	£9.2	10%	Likely
Low (1 – 1.5)	£0	0%	Very Likely	£0	0%	Very Likely
Poor (0 – 1)	£23.6	36%	Unlikely	-£23.6	-26%	Unlikely

The switching values sensitivity test indicates that the Level 1 (Initial) BCR for the scheme falls firmly into the 'Low' VfM category. A 9% saving in PVC or a 10% increase in PVB would increase the initial VfM category to 'Medium'. It is considered likely that this can be achieved, particularly when considering the uncertainty over several conservative modelling assumptions as set out in section 3.11.2. It is also considered possible that this could also lead to a VfM category improvement for the resulting adjusted BCR.

It is possible that the Level 1 scheme benefits could increase by £42.1m (47%) due to the uncertainty of several schemes within the area, such as the A10 study, which has led to conservative modelling assumptions. The high growth and Making Connections sensitivity tests also demonstrate that the scheme has potential to deliver much larger benefits under different scenarios. It is considered unlikely that the scheme costs will reduce significantly enough to result in a 'High' VfM classification. Cost savings of this scale would likely be as a result of material changes to the nature of the scheme, which will have subsequent effects on the level of benefits that the scheme delivers too.

However, it is considered unlikely that, in the future, the scheme will fall into a lower VfM category as a result of increased cost. This is due to the large increase in PVC (36%) that would have to occur for there to be a change in VfM classification due to cost change. The costing undertaken at this stage is considered to be conservative in its allowances for elements of construction such as preliminaries and traffic management, with

these costs profiled over a conservative construction programme. At the next stage of assessment further certainty will be provided over these estimates, likely bringing the base cost estimate down, with uplifts for optimism bias also lowered in line with TAG recommendations.

It is also considered unlikely that there will be a reduction of 26% in the Level 1 benefits delivered by the scheme due to the modelling approach taken, as set out in section 3.11.2. Although a Covid-19 sensitivity test has not been undertaken, the low growth sensitivity test suggests that the scheme will still provide sufficient benefits to remain within the 'Low' VfM category. At this stage, it can be considered a suitable and proportionate proxy in the absence of more robust methods.

Summary

Overall, the sensitivity tests for the Revised Central option indicate that there are no significant risks to the VfM offered by the scheme from the selected possible scenarios. Scenarios expected to lower the BCR, such as the higher inflation sensitivity test and the low growth sensitivity, do not lead to a reduction in the initial VfM category, demonstrating that the scheme is resilient to uncertainties in the future. Further assessment will be undertaken at the next stage, when more data is available, to assess the potential impact that post-Covid-19 travel patterns may have on the performance of the scheme.

Sensitivity tests to assess potential positive impacts on the performance of the scheme, such as the high growth scenario, lead to VfM category increases and suggest that there is significant scope for the economic performance of the scheme to be improved.

This confirms that the Revised Central option is the preferred option going forward for further assessment, due to the robustness of the VfM assessment and its performance, both in economic and transport terms compared to the Western option.

3.12. Value for money

This section presents the VfM statement in line with the DfT's VfM Framework. It follows the HM Treasury Green Book method of cost-benefit analysis, by weighing the benefits against the costs and risks to indicate whether the scheme offers 'Value for Money'. Qualitative, quantitative and monetised information are used in preparing the statement. This VfM Statement in this section should be read in conjunction with the Transport Economic Efficiency table, Public Accounts table and Analysis of Monetised Costs and Benefits tables in Appendix J, Appendix K, and Appendix L. The additional qualitative assessment is contained in the Appraisal Summary Table in Appendix I.

The aim of the VfM assessment is to help decision makers judge whether the expected cost of the transport intervention is justified, using the expected monetised benefits to the public and society as well as non-monetised and qualitative analysis. The VfM categories as defined by the DfT are presented in Table 3-37.

Table 3-37 - Value for Money categories

Value for Money category	Implies
Very High	BCR greater than or equal to 4
High	BCR between 2 and 4
Medium	BCR between 1.5 and 2
Low	BCR between 1 and 1.5
Poor	BCR between 0 and 1
Very Poor	BCR less than or equal to 0

With Table 3-37 in mind, the VfM category when only considering the Level 1 benefits generated by the scheme is classed as **Low**, with a BCR of 1.36. However, when considering both Level 1 and 2 benefits, the VfM category rises to **Medium**, with a BCR of 1.56. Throughout the scheme development stages, a wide range of options have been assessed, which set out the need for a public transport intervention, see section 2.5.2. This was further refined to a busway study following a policy review and strategic option assessment, as set out in section 2.5.3. It is considered that a busway and accompanying interventions is the optimal way to balance the benefits with costs and risks, whilst maintaining a strong strategic fit with transport policy.

The cost to the Broad Transport Budget is £65.7m. This is largely driven by the scheme investment cost, with infrastructure maintenance costs and loss of public sector revenues also contributing. The largest benefits are

to economic efficiency savings, at a combined value of £75.8m, mostly consisting of journey time savings for both business and non-business users. Health benefits as a result of increased active travel also significantly contribute to the overall benefits total, at a value of £13.9m, as do agglomeration impacts arising from the scheme, valued at £13.8m.

The qualitative appraisal of social and distributional impacts and the initial assessment of potential environmental impacts do not produce any results that could significantly influence overall VfM or pose a significant risk to the delivery of the scheme, with many of the noted environmental constraints having suggested mitigation measures. Furthermore, the relative environmental impacts of the scheme options were considered as part of the preferred route identification exercise.

Switching values sensitivity testing has been undertaken to assess the size, and potential likelihood, of a change in costs or benefits required for a change in initial VfM category. This concluded that there is potential for the VfM category to improve in the future, however it is unlikely that the VfM category will be lowered following further assessment due to the conservative approach to estimating both benefits and costs at this stage.

Other sensitivity tests have been undertaken to assess the impact that a range of possible scenarios might have on the initial BCR. None of the scenarios tested led to a reduction in the initial VfM category, however there are scenarios which present an opportunity to increase the scheme VfM category, such as the high-growth scenario and the without Making Connections scenario. As set out in section 3.11.2, there are several uncertainties within the modelling assumptions which will influence the performance of the scheme and a conservative approach has been taken at this stage, presenting an opportunity to improve the performance of the core scenario at the next stage of scheme development.

At the next stage of scheme development, a more detailed assessment of the quantum and subsequent economic value of the dependent development will be undertaken. At this stage, Level 3 benefits have not been incorporated into the adjusted BCR, however there is scope to do this following further assessment. It is expected that the benefits arising from dependent development will be significant and will strengthen the overall VfM of the scheme.

In conclusion, the scheme produces an adjusted BCR of 1.56 following a conservative approach to modelling and appraisal. The non-monetised impact assessments do not indicate that any of the non-monetised impacts will have a significant influence on the overall VfM category. The sensitivity testing demonstrates that the VfM is resilient to cost increases and varying levels of demand, with significant potential to claim more benefits at later stages of scheme development. Therefore, in line with DfT guidelines, it is considered that the scheme provides **Medium** Value for Money.

3.13. Next steps

The appraisal demonstrates that there is an economic case for the scheme in the form of the Revised Central option, which will be taken forward for further assessment at FBC. It is proposed that the elements set out in this section will be investigated further.

3.13.1. Covid-19 impacts

At FBC, it is proposed to take full account of the impact of Covid-19 on travel demand and the subsequent benefits generated by the scheme. If the modelling is undertaken using CSRM2, with a 2019 Base Year, then trip matrix scaling factors will be derived to produce a lower demand scenario in line with post-Covid observed data. However, it is expected that the new transport model for the Cambridgeshire and Peterborough Combined Authority Area, CaPCAM, will be available for use. This model will be validated using post-Covid data and so will reflect any changes in travel demand due to Covid-19 within its Base Year scenario, without requiring any further editing.

3.13.2. A10 Park and Ride access

Further design work of the A10 Park and Ride site will be undertaken. From a modelling and appraisal perspective, this will enable more detailed cost estimates to be produced, reduce uncertainty and enable more accurate modelling to be undertaken. If appropriate, operational modelling will be undertaken in the form of junction or microsimulation modelling to test the impact of proposed accesses on the highway network.

3.13.3. New Town routing

Further consideration will be given to the routing of buses through the New Town. This will involve further engagement with Urban&Civic over the bus priority infrastructure that is proposed within the New Town.

4. Financial Dimension

4.1. Introduction

This chapter sets out the Financial Dimension for the scheme. The objectives of the Financial Dimension are to provide evidence as to the affordability of the proposal, detailing costs, budget and funding arrangements as well as highlighting technical accounting issues, if required. At the Outline Business Case (OBC) stage the DfT document '*The Transport Business Case*'[81] requires that the Financial Dimension contains the elements set out in Table 4-1.

Table 4-1 - Elements included within the OBC as per the DfT Guidance

Outline Business Case contents guidance	Status at OBC stage	Financial Dimension content
Introduction to affordability – outline the approach taken to assess affordability.	Completed	Introduction – section 4.1
Costs – provide details of the expected whole life costs, when they'll occur, breakdown and profile of costs by those parties on whom they fall, and any risk allowance that may be required.	Completed	Costs – section 4.2
Budget and funding cover – provide analysis of the budget and funding cover for the proposal: set out, if relevant, details of other funding sources (for example, third-party contributions, fees).	Completed	Budget and funding cover – section 4.3
Accounting implications – describe the expected impact on the organisation's balance sheet.	N/A	Accounting implications – section 4.4
N/A	N/A	Summary – section 4.5

4.2. Costs

This section outlines the various types of whole life costs that will be incurred by the scheme, including the following:

- The investment (capital costs), as estimated by the design teams for each element (section 4.2.1); and
- Estimated operation, maintenance and renewal costs over the 60-year appraisal period (section 4.2.2).

This section also identifies the income streams required to cover these costs (section 4.2.3) and the associated financial risk allowance (section 4.2.4).

4.2.1. Capital costs

Capital costs are the one-time costs incurred as part of delivering the scheme to an operable status. The capital cost estimates have been made based on the concept designs for the route and Park and Ride specifications. The capital costs do not include the section of the busway within the Waterbeach New Town, as this is being delivered separately as part of the New Town development.

Estimates of cost are based on current cost rates, unit prices for infrastructure, the associated works and are provided with quantified risk at a confidence level of P90. As is commensurate for this stage of scheme development, the cost estimates are subject to a number of assumptions and exclusions. Full details on these are provided in Appendix N, however the key assumptions and exclusions are set out as follows:

[81] DfT (2022) *The Transport Business Cases, , Table 5.1 – Contents of the Commercial Case*. assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918399/dft-transport-business-case.pdf

Key assumptions:

- Costs are based on concept scheme designs and early-stage Park and Ride specifications; and
- Where specifications to inform estimates are not yet available, estimates have been made based on desktop assessments and estimator experience.

Key exclusions:

- Potential additional infrastructure not currently specified within the design, including utilities diversions, flood mitigation and work associated with emerging drainage strategy.

Fees for further professional services, engineering work and early contractor involvement have been estimated as a proportion of the scheme cost. Land costs have been provided separately by Carter Jonas.

The initial cost per option is outlined in Table 4-2.

Table 4-2 – Base capital costs (2023 prices)

	Revised Central option (£m)	Western option (£m)
Sunk costs	£1.5	£1.5
Design and consultant costs	£9.4	£9.6
Land costs	£3.3	£3.3
Infrastructure cost	£46.4	£47.8
Preliminaries	£16.2	£16.7
Traffic management	£7.0	£7.2
Overheads & profit	£7.0	£7.2
Quantified risk	£13.9	£14.2
Total cost	**£104.7**	**£107.6**

A cost profile has been developed for this scheme; therefore, it has been assumed that the capital costs of the scheme will be incurred between 2023 and the opening year of late 2028. At this stage, the opening year assumption is conservative and will be confirmed as the design progresses. With that in mind, inflation has been applied to the scheme costs, profiled over the 7 year design and construction period. For construction costs, costs have been inflated in line with the BCIS Tender Price Index (TPI). The resulting outturn costs are presented in Table 4-3.

Table 4-3 - Outturn capital costs (outturn costs)

	Revised Central option (£m)	Western option (£m)
Sunk costs	£1.5	£1.5
Design and consultant costs	£9.9	£10.2
Land costs	£3.5	£3.5
Infrastructure costs	£51.6	£53.2
Preliminaries	£18.2	£18.2
Traffic management	£7.7	£8.1
Overheads & profit	£7.8	£7.9
Quantified risk	£15.5	£15.9
Total cost	**£115.8**	**£118.5**

It is expected that the Greater Cambridge Partnership (GCP) will be responsible for the capital costs of the scheme, retrospectively recouping a portion of the costs from the private sector through developer contributions. More information on this is set out in section 4.3.

4.2.2. Operating and maintenance costs

Following the completion of the scheme, the operating and maintenance costs will be incurred by the bus operators who will utilise the infrastructure, and the Cambridgeshire County Council who will be responsible for the maintenance of the infrastructure itself.

Vehicle operating and maintenance costs

There will be changes to the operating costs for buses utilising the corridor. These costs will be attributed to the day-to-day running of the service as well as the maintenance of the vehicles, in this instance, buses. The expected operating costs for the route options considered within this OBC have been calculated via a first principles approach to determine the fleet size requirements, the distance covered by the services and hours of operation multiplied by the per unit costs of operation. The resulting costs are outlined in Table 4-4. Operation and maintenance costs have been inflated in line with the Retail Price Index (RPI).

The general cost of providing the service will fall within the remit of the bus operators and not within the scheme costs, however it is important that the route is commercially and financially attractive to bus operators.

Table 4-4 - Vehicle operation and maintenance/renewal costs over 60 years (inflation applied annually)

Route option	Vehicle Operating costs (£m)	Vehicle Maintenance and renewals (£m)
Revised Central option	-£49.6	-£18.2
Western option	-£50.6	-£14.5

*Negative values represent cost savings

There is a significant reduction in the operating costs for the scheme compared to the Do Minimum scenario. This is a result of shortened journey times and the subsequent reduction in the size of the bus fleet required to provide the service. This reduction to the bus fleet size also is reflected in a reduced cost of maintenance and renewal costs of the fleet. These savings will be realised by the private sector bus operators.

Infrastructure maintenance costs

The maintenance of the infrastructure is expected to be the responsibility of Cambridgeshire County Council (CCC). Maintenance costs have been calculated via a first principles approach, considering the length of the segregated busway elements of the scheme options and the per km costs of maintenance. These are presented in Table 4-5.

Table 4-5 - Infrastructure - maintenance costs over 60 years (inflation applied annually)

Route option	Infrastructure maintenance costs (£m)
Revised Central option	£51.2
Western option	£41.8

The difference in the infrastructure maintenance cost is a result of varying length of segregated infrastructure between the two options, with the Revised Central option having slightly greater length of new dedicated infrastructure provision that would require ongoing maintenance. This will be assessed in greater detail at a later stage of scheme development.

4.2.3. Income streams

An increase in bus operator revenue is likely, due to the increase in patronage expected as a result of the implementation of the scheme. It should, however, be noted that there are currently no proposed parking charges to be enforced in the car park for the Park and Ride.

Current private sector revenue is estimated using TUBA results. A full revenue forecasting model would provide further detail; this will be considered at a later stage of scheme development.

4.2.4. Financial risks

At the OBC stage it is important to identify financial risks associated with the proposed scheme and who bears responsibility for these risks. In terms of responsibility, this depends on when the risk becomes significant. In this instance, pre-scheme opening risks are the responsibility of GCP, though this may change during construction depending on the procurement route chosen for the scheme. Post-scheme opening risks are expected to be borne by a combination of GCP and CCC in terms of maintenance of the infrastructure and by GCP and the bus operating company in terms of revenues and service operating costs. The most significant financial risks at this stage relate to increased construction costs over current estimates, the largest of these are listed below. In addition to this, a more comprehensive table of financial project risks is set out in Appendix O.

- Estimating uncertainty for significant construction elements such as earthworks and pavements;
- Technical uncertainty around optical guidance technology and the potential financial and programme implications of switching to kerb guidance;
- Additional rework and mitigation requirements due to lack of political or public support, or due to adverse impacts on the highway network; and
- The costs of utilities alterations and diversions within the corridor.

There are also financial risks that become significant after the scheme becomes operational. These include the recouping of developer contributions to backfill the capital spending on the project, as well as the risks surrounding changes in patronage and revenue on services as a result of the scheme.

A robust risk management strategy, as set out in section 6.9 of the Management Dimension, has been adopted to mitigate against these risks and minimise the impact should they come to fruition.

4.2.5. Sensitivity tests

Sensitivity tests have been undertaken to assess the impact of the use of alternative risk levels on the capital costs of the scheme.

Alternative quantified risk estimates

The core cost estimates for the scheme use a P90 confidence level as part of the quantified risk assessment. This means that there is an 90% probability that the quantified value of risk will not be exceeded. Table 4-6 shows the impact that using alternative confidence levels would have on the quantified risk value and therefore the anticipated cost of the scheme.

Table 4-6 - Quantified risk impact on scheme costs (outturn cost)

	Revised Central option (£m)				Western option (£m)			
	P90 (core)	P80	P50	PMean	P90 (core)	P80	P50	PMean
Sunk costs	£1.5				£1.5			
Design and consultant costs	£9.9	£9.7	£9.4	£9.3	£10.2	£9.4	£9.1	£9.6
Land costs	£3.5				£3.5			
Preliminaries	£18.2				£18.2			
Traffic management	£7.7				£8.1			
Overheads and profit	£7.8				£7.9			
Scheme costs	£51.6				£53.2			
Quantified risk	£15.5	£13.5	£9.6	£9.3	£15.9	£13.7	£9.7	£9.4
Total	**£115.8**	**£113.6**	**£109.4**	**£109.0**	**£118.5**	**£116.1**	**£111.7**	**£111.4**

High and low inflation

It is important to understand the possible implications that increased or decreased inflation could have on the costs of the scheme. Table 4-7 presents the outturn costs of the scheme for scenarios with 2% annual inflation above and below core inflation rates.

Table 4-7 - Impact of inflation rates on scheme costs (Outturn cost)

	Revised Central option (£m)			Western option (£m)		
	Low inflation	Core	High inflation	Low inflation	Core	High inflation
Sunk costs	£1.5	£1.5	£1.5	£1.5	£1.5	£1.5
Design and Consultant costs	£9.5	£9.9	£10.3	£9.8	£10.2	£10.6
Land costs	£3.4	£3.5	£3.7	£3.4	£3.5	£3.7
Preliminaries	£16.9	£51.6	£19.7	£17.2	£53.2	£19.3
Traffic management	£7.2	£18.2	£8.3	£7.4	£18.2	£8.7
Scheme costs	£48.1	£7.7	£55.3	£49.5	£8.1	£57.0
Overheads & profit	£7.2	£7.8	£8.3	£7.4	£7.9	£8.5
Quantified risk	£14.4	£15.5	£16.6	£14.8	£15.9	£17.1
Total cost	**£108.2**	**£115.8**	**£123.8**	**£111.0**	**£118.5**	**£126.4**

4.3. Budgets and funding cover

Funding for the scheme is expected to be sourced through the Greater Cambridge City Deal. The City Deal provides a funding framework for central Government and local partners to agree investment programmes, centred on the promotion of local economic growth and development. The Greater Cambridge City Deal is worth up to £500 million over 15 years for transport infrastructure and other investments to boost economic growth. It should be noted that an additional £500m could potentially be provided in match funding from private contributors.

£100 million of government funding was made available for the period to 2020. Following the recent successful 'Gateway review' of GCP by the Government, a further fund of £400 million is available up to 2030. The latter will be the scheme's main funding source.

To help meet the funding requirements GCP, in coordination with CCC, will recover a proportion of the scheme cost through local developer contributions, secured through the planning process. The value of secured and unsecured developer contributions are set out in Table 4-8. The unsecured local developer contributions are subject to ongoing discussions and their value may vary between options.

Table 4-8 – Developer contributions (2019 prices)

	Funding source	Contribution level (£m)
Secured funding	Waterbeach Development (6,500 dwellings)	£8.0
	Cambridge Research Park Phase 2	£0.38
Unsecured funding	127-136 Science Park	£0.17
	North East Cambridge Development	£55.0
	Waterbeach East RLW	£28.0

A funding profile has not yet been agreed between private developers and the GCP.

4.4. Accounting implications

The final accounting implications have not yet been calculated at this stage of project development. These will be calculated and presented at a later stage of scheme development.

4.5. Summary

This Financial Dimension has presented the capital, operating and maintenance costs of the scheme and identified potential income streams, financial risks, budget and funding as well as accounting implications.

The base costs for the Revised Central and the Western options are estimated to be £104.7m and £107.6m, respectively. Based on an assumed opening year of late 2028, the outturn costs are estimated to be £115.8m and £118.5m. The sensitivity tests undertaken indicate a potential outturn cost range of £108.2m to £123.8m and £111m to £126.4m for the Revised Central option and Western option, respectively.

The scheme is expected to cause a reduction in bus operating costs. Over a 60-year period, these savings are estimated at £49.6m for the Revised Central option and £50.6m for the Western option. The maintenance costs associated with the scheme are estimated at £51.2m for the Revised Central option and at £41.8m for the Western option. The difference in the maintenance costs between routes is due to the Western option being shorter than the Revised Central option.

A total of £8.38m in developer contributions has been secured for the scheme. There are also a number of other potential developments where there is unsecured funding potential, such as Cambridge Science Park North and the Waterbeach East RLW development.

Based on the cost estimates, it is considered that the two route options do not differ significantly in terms of financial costs, both capital and operating/maintenance. At a later stage of scheme development full financial performance will be assessed by undertaking revenue forecasting for the preferred option.

5. Commercial Dimension

This chapter sets out the Commercial Dimension for the Waterbeach to Cambridge Public Transport Scheme. At the Outline Business Case (OBC) stage, the DfT website '*Transport business case guidance'* [82] requires that the Commercial Dimension sets out evidence as to the commercial viability of the proposal and the procurement strategy that will be used to engage the market. The Commercial Dimension should clearly set out the financial implications of the proposed procurement strategy.

The DfT transport business case guidance states that the elements shown in Table 5-1 should be included at OBC stage.

Table 5-1 - Elements included within the OBC as per the DfT Guidance

Commercial Dimension content	Adherence to DfT Outline Business Case guidance	Status at OBC stage
Introduction	**Commercial approach –** outline the approach taken to assess the commercial viability.	Update
Output-based Specification	**Output-based specification -** summary of the requirements in terms of outcomes and outputs.	Completed
Procurement Strategy	**Procurement strategy –** detail the procurement and purchasing options including how they will secure the economic, social and environmental factors outlined in the economic dimension. **Sourcing options –** explain the options for sources of the provision of services to meet the business need.	Completed
Human Resource Issues	**Human resource issues –** describe any personnel, people management and trade union implications, where applicable, including TUPE regulations.	Update At the OBC stage there are currently no human resource issues.
Pricing and Payment	**Payment mechanism -** set out the proposed payment mechanisms that will be negotiated with the providers. **Pricing framework and charging mechanisms –** include incentives, deductions and performance targets.	Outlined
Risk Allocation and Transfer	**Risk allocation and transfer -** Present an assessment of how the types of risk might be apportioned or shared, with risks allocated to the party best placed to manage them subject to achieving value for money.	Outlined
Contract Length	**Contract length -** set out scenarios and rationale for contract length, including proposed key contractual clauses.	Outlined

[82] DfT (2022) *Transport business case guidance*

Commercial Dimension content	Adherence to DfT Outline Business Case guidance	Status at OBC stage
Contract Management	**Contract management -** provide a high-level view of implementation timescales: detail additional support for in-service management during rollout and closure and set out arrangements for managing the contract through project or service delivery.	Outlined It should be noted that on-going maintenance is to be completed by Cambridge County Council (CCC) highway maintenance contractors and therefore the contract type for this will be determined at the Full Business Case (FBC) stage.

5.1. Output based specification

This section of the Commercial Dimension sets out the objectives and intended outcomes for the scheme. There are seven key transport objectives that have been identified for the scheme, reflecting current issues, emerging goals and policies, supported by evidence in relation to the new travel choices and alternatives to the car. As such, the Waterbeach to Cambridge Public Transport Scheme will deliver a high-quality, segregated public transport route between Waterbeach New Town and Cambridge.

The outcomes agreed for this scheme, which reflect the scheme objectives, are as follows:

- A higher share of journeys along the corridor being made by public transport;
- A higher share of short journeys being made by walking and cycling;
- A smaller share of journeys in the corridor being made by private car;
- A reduction in congestion as a result of fewer vehicles driving into Cambridge (compared to 2011 levels); and
- Improved perceptions of safety.

Although this is a predominantly public transport-based intervention, the scheme will also support other users by:

- Reducing the amount of highway traffic seeking to use alternative and less appropriate roads – promoting opportunities to create more attractive walking and cycling routes within the town; and
- Maintaining and enhancing walking and cycling facilities through the design and delivery of the scheme.

In terms of infrastructure, the key characteristics and outputs of the proposed Waterbeach to Cambridge Public Transport Scheme are as follows:

- A segregated busway between Waterbeach New Town and North East Cambridge (NEC), connecting to dedicated public transport infrastructure within Waterbeach New Town to the north of the corridor and the Cambridge Guided Busway (CGB) to the south. The busway infrastructure will be flexible to allow buses off and onto the infrastructure from the existing road network and other dedicated infrastructure. This will allow bus operators the flexibility to use the busway for part of their service pattern when travelling between villages on the corridor, such as Milton, Landbeach and Waterbeach;
- Active travel infrastructure will be segregated from the busway, the scale and nature of which reflects other active travel routes in the corridor. The active travel infrastructure will also provide a maintenance track for the busway. Active travel infrastructure will provide connections to other existing and planned active travel routes including Mere Way and the Waterbeach Greenway;
- Widening of Butt Lane between Milton Park and Ride and the busway, alongside improvements to active travel infrastructure along Butt Lane;
- Improved Park and Ride provision within the corridor in the form of a new Park and Ride near Waterbeach which connects to the busway and provides access to Waterbeach New Town residents and vehicles on the A10; and
- The specification of the Park and Ride facilities are yet to be determined but could include cycle parking, electric vehicle charging, a waiting building with refreshment facilities, as well as space for future land uses bought forward by third parties.

This Commercial Dimension considers two route alignment options for the Waterbeach to Cambridge Public Transport Scheme, as described in the Strategic Dimension. Noting this, to identify an appropriate procurement strategy for the infrastructure (capital) outputs for these options, it is important to understand both the engineering and logistical complexities of each option. However, fundamentally the commercial approach will remain the same for either of these route options. Albeit different elements of the packages are likely to be implemented using different routes depending on the nature of the infrastructure delivered. This may include some measures being implemented by third parties, these are set out as follows:

- Waterbeach to Cambridge Public Transport Scheme construction;
- Third party construction (utilising S106 and S278 agreements);
- Bus operations, refer to Section 5.2.4; and
- Infrastructure maintenance.

5.2. Procurement strategy

The emerging procurement strategy has been prepared to identify the appropriate delivery model to deliver the Waterbeach to Cambridge Public Transport Scheme. It should be noted that at this stage, the emerging procurement strategy may be refined as the project develops. As such, the following section outlines the potential procurement and purchasing options, taking into consideration the potential output risks for the infrastructure options as identified in the strategic dimension, which are to be assessed in order to decipher which procurement strategy should be adopted by the Greater Cambridge Partnership (GCP) for this scheme.

The GCP is expected to procure many of its professional services through frameworks with suppliers that have been pre-selected by virtue of their capabilities, experience, capacity and behaviours. It should be noted that risks to operational performance should sit with the scheme promoter and the outline designer, whereas risk to time and costs, especially during implementation, would sit with the contractor.

Currently, operator involvement in providing infrastructure is generally limited and there are very few precedents of operator involvement in any public-private partnership infrastructure schemes or public transport infrastructure schemes in the UK. This is distinct from operators contributing to the capital or revenue costs of infrastructure, of which examples include an access charge on the CGB, contribution to capital cost (Leeds) or profit share mechanism such as the South East Hampshire Bus Rapid Transit Fareham-Gosport 'Eclipse'. Therefore, the procurement strategy for the Waterbeach to Cambridge Public Transport Scheme, has considered parallel procurement routes for both capital works and public transport services.

As set out in the Cabinet Office's 'Construction Playbook'[83] the correct delivery model for a project or scheme enables clients and industry to *"work together to deliver the best possible outcomes by determining the optimal split of roles and responsibilities"*. The emerging procurement strategy for the Waterbeach to Cambridge Public Transport Scheme will continue to develop so as to identify, utilising evidence and analysis, how GCP should structure the delivery of the project. As also set out in the Construction Playbook, the importance of this strategic decision cannot be underestimated.

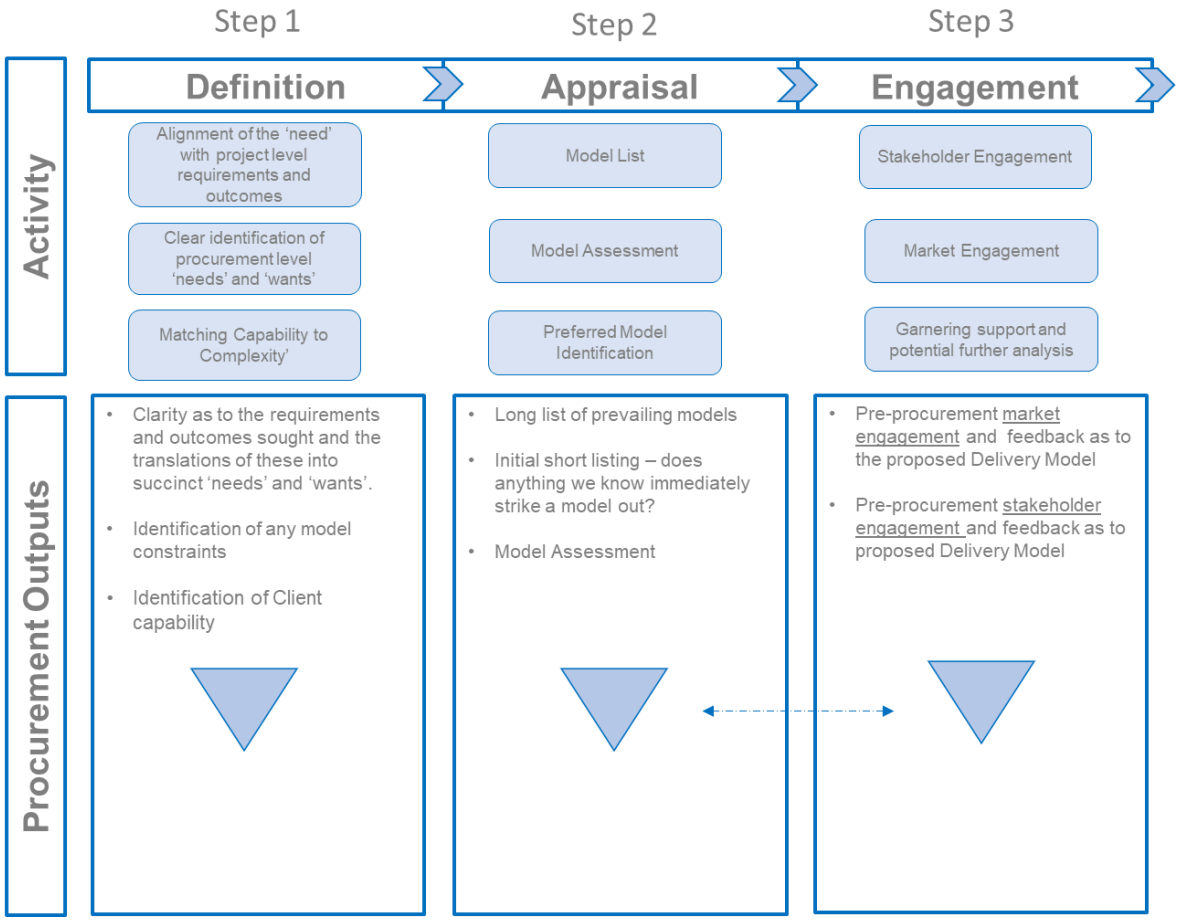
5.2.1. Methodology for procurement assessments

The methodology used for identifying the appropriate Delivery Model for the scheme is detailed in this section. Put succinctly, a three-step process is followed, albeit it is not fully sequential, focusing on the elements of Definition, Appraisal and Engagement. Figure 5-1 illustrates this model, outlining the activity and procurement outputs from each step. It should be noted that in terms of the Waterbeach to Cambridge Public Transport Scheme, step 3 'Engagement' will be completed at the FBC stage, therefore only the first two steps are considered as part of this OBC.

The initial Definition step sees the emergence of GCP's actual requirements and desired objectives. Having defined these aspects, consideration is then given to the models that may be used to bring about those requirements and objectives in the Appraisal stage. Finally, engagement with the market and wider stakeholders to determine the preferred model is to be completed at the FBC stage. It is expected that this engagement phase will be undertaken prior to development of the tender documents.

[83] The Cabinet Office (2022) *The Construction Playbook*

Figure 5-1 – Methodology for procurement assessments



The objectives and requirements have largely been framed, though it will of course be necessary as the project evolves to continually revisit the same.

5.2.2. Step 1 – Definition

At the first stage of the delivery method, outlined in this section, it is important to consider the procurement level needs of the Waterbeach to Cambridge Public Transport Scheme in terms of project objectives, risks, capacity and capability to deliver the scheme. From this a list of potential procurement models can be identified and assessed in the subsequent Appraisal step of the procurement assessment, refer to Section 5.2.3.

Project objectives

The GCP has identified three key objectives to provide direction and framework for investment as well as addressing national, regional and local policy. These are as follows:

- Accelerate delivery of 33,500 planned homes;
- Deliver over 400 new apprenticeships for young people; and
- Create 45,500 new jobs.

The scheme objectives set by GCP are as follows:

- Provide additional sustainable transport capacity to provide for the transport demands of economic and housing growth;
- More reliable journey times by public transport;
- More journeys along the corridor being undertaken by public transport; and
- More short journeys along the corridor being undertaken by walking and cycling (because people feel safer and have direct routes between origins and destinations).

Project risks

The scheme's key risks are considered as part of the first step of the procurement assessment to understand the complexity of the project and to determine which delivery model is robust enough to manage these and deliver the expected project outputs. The risks for the Waterbeach to Cambridge Public Transport Scheme at this stage include:

- Failure to identify key stakeholders affected by our works;
- Lack of support and engagement with landowners, developers and businesses;
- Land acquisition;
- Relations with and agreement from developers of Waterbeach New Town regarding the continuation services to be provided throughout the Waterbeach New Town site;
- Third Party Technical Approvals;
- Strategic conflicts between the Cambridge and Peterborough Combined Authority (CPCA) proposal to upgrade A10 and the GCP proposals;
- Failure to follow procedures on the EIA and TWA;
- Public perception of benefits;
- Continued availability of scheme funding and affordability of the preferred option;
- Interface with promoters of other transport schemes (GCP and CPCA);
- Environmental constraints;
- Potential delays in the supply of materials and/or plant;
- Client capacity and capability; and
- Market appetite and capacity.

Capacity and capability to deliver the scheme

Success on any major infrastructure project will not be forthcoming without the alignment and matching of capacity and capability to the project and delivery environment. Ultimately the Delivery Model and Contractual Model deployed must be deliverable in the face of the capacity and capability available.

During the next stage, it will be important to ensure that capacity and capability are aligned – as mentioned above. This will be progressed as the Commercial Dimension is developed through the FBC process.

5.2.3. Step 2 - Appraisal

Having established the project's characteristics in Step 1, appropriate evaluation criteria have been used to assess the potential delivery models. The delivery models assessed in this OBC include the following:

- Traditional 1;
- Traditional 2;
- Design and Build 1;
- Design and Build 2;
- Multiparty Early Contractor Involvement (ECI); and
- Alliancing Model.

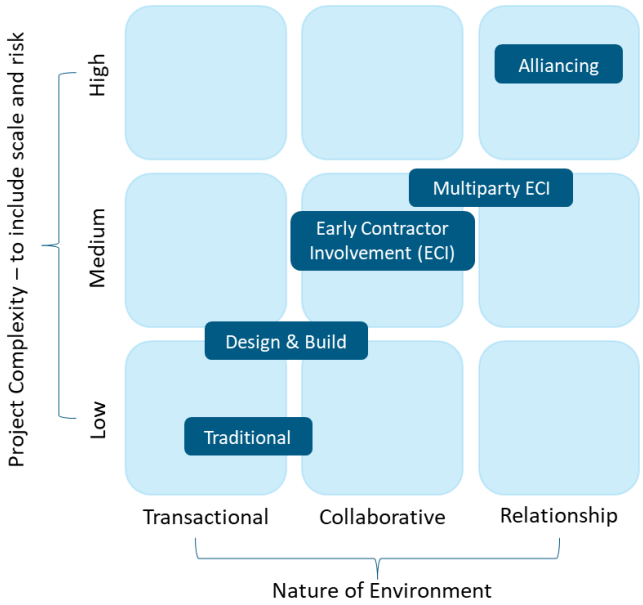
It should be noted that the Alliancing Model has been included in this assessment as a reference point for GCP but is not considered a potential delivery model for this project. The 'Delivery Model Options Report'[84] (presented in Appendix P), a document commissioned by GCP which has been applied across the four current busway schemes in the corridor, is of the view that it is highly likely that the Alliancing Model may be raised by stakeholders, given its use by National Highways, as well as the drive by some industry / representative bodies to advocate this model. However, the Alliancing Model is highly complex which requires legally binding contractual agreements between all parties. The time and resources required for the procurement and inception of such agreements, in terms of legal input and governance, is disproportionately high for a scheme of this scale and complexity. Likewise, the client resources required to manage an Alliancing Model for the project would be significantly higher than other models. Therefore, the Delivery Model Options Report is of the view

[84] GCP (2022) *Delivery Model Options Report*

that the Alliancing Model is not appropriate for the delivery of the Waterbeach to Cambridge Public Transport Scheme, and as such it has not been included in this assessment.

Figure 5-2 illustrates the project complexity and commercial environment best suited to each delivery model.

Figure 5-2 - Delivery models



There are two models for Traditional, and two models for Design and Build (D&B) considered within this assessment. These are defined as:

- **Traditional 1:** this model sees the appointed Contractor being responsible for construction only, with all key risks (e.g., physical conditions, statutory authorities and weather) being allocated/ transferred to the Contractor;
- **Traditional 2:** this model sees the appointed Contractor being responsible for construction only, with all key risks being allocated to GCP;
- **D&B 1:** this model sees the appointed Contractor being responsible for detailed design and construction; and
- **D&B 2:** this model again sees the appointed Contractor being responsible for detailed design and construction, however it envisages an early phase of ECI advice.

The criteria which have been used to assess each model are outlined in Table 5-2.

Table 5-2 - Appraisal criteria

	Criteria detail
C1	Will the Delivery Model deliver within the project's funding constraints?
C2	Will the Delivery Model deliver within the project's programme constraints?
C3	Can the Model deal with the complexity of the project as it now stands?
C4	Does the client have the resources in-house to manage the Delivery Model – given the proposed model's complexity/will the organisation be acceptant of the model on day one?
C5	Will the Delivery Model provide clarity around the key risk of design responsibility?
C6	Does the Delivery Model typically see an equitable and palatable allocation of key risks – physical conditions, weather, programme risk pertaining to statutory authorities, scope creep and scope change?
C7	Given the current position of the project within the project lifecycle, is the Delivery Model capable of taking on the project in its current state?
C8	Is the Delivery Model going to deliver on local and national policy objectives, e.g., Social Value, the use of Modern Methods of Construction (MMC), Digitalisation, Net Zero etc.?
C9	Is the Delivery Model capable of managing change should it be required – for whatever reason, be that technical, stakeholder driven, legislative driven etc.

Each Delivery Model was considered against each of the criteria presented in Table 5-2, with a score of High (5), Medium (3) or Low (1) being given.

The analysis of each Delivery Model was conducted twice. Firstly, it was done based on 'principle' knowledge around the models – essentially the establishment of a baseline position for each model. Thereafter the assessment was repeated, calibrating the scoring to take account of material factors also set out in Table 5-3.

Table 5-3 - Calibration - material factors

	Material factor detail
MF1	Market intelligence – knowledge of the civil/infrastructure sector and what is and is not palatable in the market at present.
MF2	Market intelligence – knowledge of the behaviours prevalent across the civil/infrastructure sector at present.
MF3	Market intelligence – is true delivery against policy aspirations likely to materialise.
MF4	Likely perception around the model, not only in the marketplace, but also at local/central government level across England and Wales – particularly should the Project be audited at a local or national level.
MF5	Client risk appetite (consideration being given to GCP appetite for risk of this scheme).

The results of this assessment are presented in Table 5-4.

Table 5-4 - Evaluation of procurement strategy results

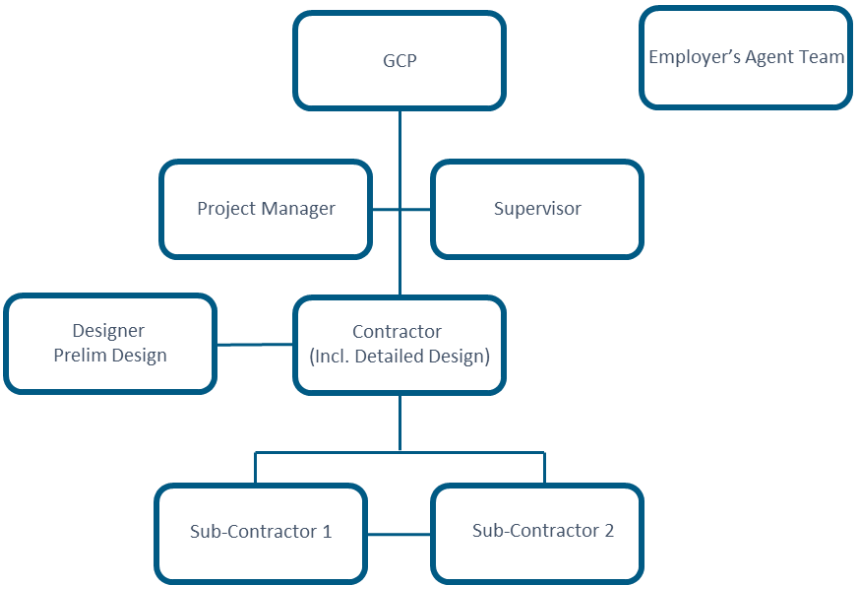
Project	Traditional 1	Traditional 2	Design and Build 1	Design and Build 2 (w ECI)	Early Contractor Involvement	Multiparty (ECI)
Waterbeach to Cambridge Public Transport Scheme	9	15	25	31	N/A	29

From the results of the assessment, it is recommended that the project progresses utilising the “Design and Build 2” delivery model.

Design and Build 2 delivery model

The Design and Build 2 delivery model, is illustrated in Figure 5-3, extracted from the ‘Delivery Model Options Report’.

Figure 5-3 - Design and Build model structure



As detailed in the Delivery Model Options Report, the general approach taken in the Design and Build model is the main contractor has responsibility for both the detailed design and construction. Preliminary design is a separate activity to the main contractor and will either be carried out in house by GCP, or by engaging consultants directly. However, it is also typical for the contractor to take on responsibility for the preliminary design work on appointment, the contractor would then develop and complete the detailed design.

The Design and Build 2 model is a variation of the standard Design and Build Model, therefore the same principles detailed above would apply, in that GCP would develop the Preliminary design inhouse or with an appointed consultant. In this variant a Contractor would also be appointed to provide ECI advice, typically including constructability and programme advice to assist in the design development. The Design and Build model 2 would then follow as previously described. Typically, an Employer’s Agent (“EA”) would be appointed to help assist and likely administer the contract on the client side. The EA has no contractual link with the contractor.

There are numerous benefits of a Design and Build Model including the following:

- Provides cost certainty and benefits, value for money decisions can be optimised and unlike the traditional approach constructability will be a key factor in design decisions;
- There is a single point of responsibility, so fewer disputes and minimised design/construction interface risks such as design errors and omissions;
- Statutory approvals are the responsibility of the contractor, unless GCP choose to retain the risk;
- Innovative design solutions and standardisation to maximise project benefits, the contractor and supply chain are engaged directly after contract award;
- The contractor generally warrants the design is fit for purpose; however, this will need to be clearly defined in the contract; and
- Speed of delivery – the design and construction stages can be overlapped to enable an earlier on-site start date and earlier completion date which would not be feasible in the traditional model.

Initial discussions with GCP indicate that the preferred delivery model should incorporate Early Contract Involvement (ECI) and therefore the Design and Build 2 is considered to be the most appropriate delivery model for the Waterbeach to Cambridge Public Transport Scheme.

The rationale for discounting the remaining models is detailed in Table 5-5.

Table 5-5 - Rationale for discounting the alternative models

Procurement model	Rationale
Traditional 1 and 2	Due to the risk appetite of the client, the delivery models Traditional 1 and 2 have not been selected. This conclusion has been drawn as a result of client engagement with the GCP which has made it clear that an 'all-risk' traditional delivery model would not be accepted for the delivery of this scheme. GCP need to be clear as to the extent of design risk they are willing to adopt. In turn this will need to be set out in the conditions of contract.
Early Contractor Involvement (ECI)	ECI has not been considered at this stage as the concept design is already complete. Therefore, it is considered that ECI would not offer the best value for money. It should be highlighted that in this context, ECI refers to a pure ECI model, whereby the contractor leads from the concept stage, which in this case as surpassed.

In summary, the Design and Build 2 Model has therefore been identified as the appropriate model to deliver the Waterbeach to Cambridge Public Transport Scheme because it is acknowledged that there are likely to be programme efficiencies achieved through the Design and Build delivery model. This is due to the potential for overlap between the completion of detailed design and the construction stage. The Contractor is likely to progress with pre-construction activities, mobilisation and early works while the design is being finalised.

5.2.4. Operational public transport procurement strategy

The public transport procurement strategy will be heavily influenced by the Transport Act 1985, which deregulated the provision of bus services outside of London. Any licensed bus operator is able to provide whichever bus service it chooses on a commercial basis, with the freedom to determine routes, frequencies, fares and vehicle type provided that it complies with relevant legislation and accepts any local or national requirements for concessionary travel. Stagecoach currently provides travel along the A10 corridor via the Citi2, Route 9 and Milton Park and Ride services.

This regime has been modified by subsequent legislation: Transport Act 2000, Local Transport Act 2008, and Bus Services Act 2017. Each one of these pieces of legislation provides local transport authorities with the means of influencing the provision of bus services.

Local authorities also have other duties to consider in developing their procurement strategies. They have a legal duty to consider what, if any, additional services are required to supplement those provided commercially, and a related requirement under the Equality Act 2010, to ensure that no one group of people is disadvantaged by their actions.

The procurement strategy may also be influenced by the ongoing engagement taking place between the GCP and bus operators, along with CCC and the CPCA. Successful partnerships with Stagecoach and Whippet Coaches on the CGB are testament to this engagement. At this stage, and subject to any changes arising from the Cambridge and Peterborough Combined Authority Bus Reform Strategy[85], it is considered that an arrangement similar to the CGB, where CCC own the infrastructure and provide access to operators, would be appropriate for the Waterbeach corridor. However, it should be noted that as part of the Bus Reform Strategy, CPCA are currently considering potential franchising options which would only allow bus operators to provide services under contract to the local transport authority. The decision regarding access and operating arrangements for the Waterbeach to Cambridge Public Transport Scheme will be determined at a later stage closer to scheme completion. It is worth noting that the bus services will potentially already be implemented as a result of the Making Connections scheme, also being implemented by the GCP. Should it come to fruition, bus services to Waterbeach and Milton Park and Ride would seek to utilise the Waterbeach corridor.

[85] CPCA (2021) *Bus Service Improvement Plan for Cambridgeshire and Peterborough*

5.3. Sourcing options and payment mechanisms

5.3.1. The contract suite to be used

The NEC suite of contracts tends to be the predominant form of contract used to deliver infrastructure across the UK (Highways England, Homes England, HS2, Heathrow etc. all advocate its use). As such it is recommended that the NEC4 suite of contracts is used to deliver the Waterbeach to Cambridge Public Transport Scheme. Its use will allow flexibility and agility and will stimulate good management across the project.

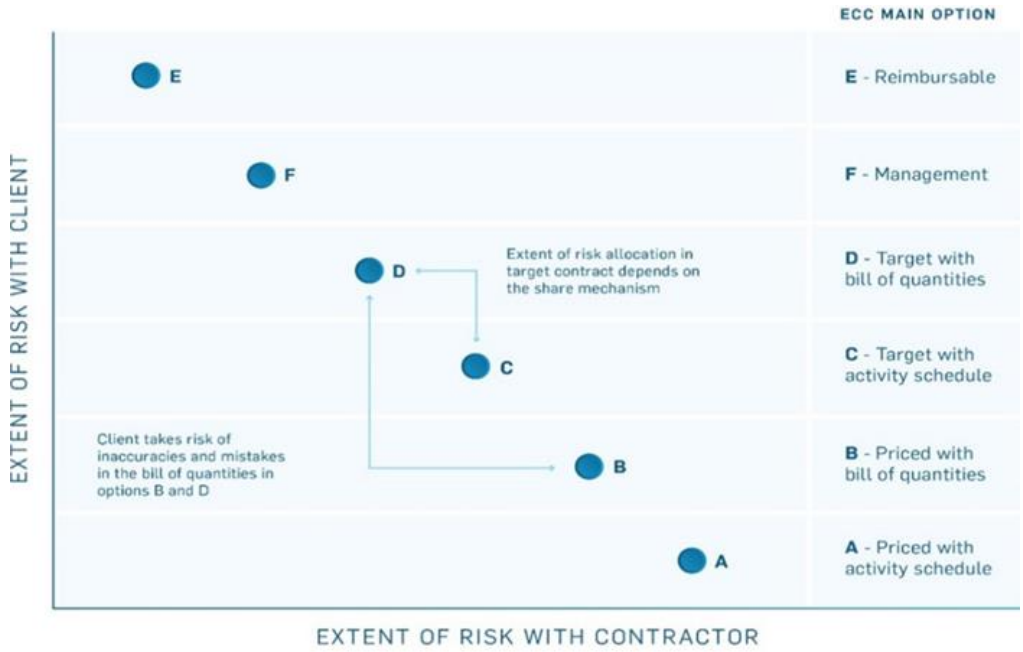
5.3.2. The contractual forms to be used

A list of the available NEC4 contracts together with brief guidance on when each is typically used can be found in the guidance to the NEC suite (please note that this guidance is not reproduced but can be provided if required). However, the Engineering and Construction Contract (ECC) should be used for the appointment of a contractor for engineering and construction work, including any level of design responsibility.

The need to establish an appropriate risk profile that is acceptable to all parties is critical to the success of the project. Neither success in procuring or delivering will be forthcoming if the balance of risk is incorrect. Having determined the contractual form to be used, it is now necessary to identify the appropriate main payment option – the correct selection is critical as it is this main provision that largely dictates the extent of risk that sits with the contractor and the extent of the risk that sits with the client.

As can be seen in Figure 5-4, 'Option A' sees the majority of risk being the responsibility of the contractor, whereas in 'Option E' the majority of the risk is the responsibility of the client. Put succinctly the former being appropriate for use when there is clarity and certainty as to the exact requirements and the latter being when the extent of the work is not fully defined.

Figure 5-4 - Analyses of risk



For a project of this scale and complexity it would be recommended to use an Option C (Target cost with Activity Schedule) contract, where the risk is shared through the pain-gain mechanism. This is justified for the Waterbeach to Cambridge Public Transport Scheme because the scope will be defined enough for a Contractor to price the Works, but the pain-gain mechanism will incentivise the Contractor to drive value for money through the detailed design and construction stages. Risk can be shared as there is an open book policy to defined costs incurred by the Contractor through the contract.

5.3.3. Contract drafting – key clauses

Having considered the contract suite and form to be utilised, the key contract clauses that are to feature need to be considered further at the next stage. It should be noted that the intention is to stress test the

appropriateness (or not) of these provisions as part of the project's market engagement exercise, which at the OBC stage is still to be developed.

5.4. Public procurement

5.4.1. Current position in England

Since leaving the EU the UK is no longer subject to EU procurement law. The UK is however still subject to the World Trade Organization's Government Procurement Agreement (GPA). The GPA requires the majority of contracts to be open to the EU and other trading partners, with transparent award procedures and remedies being available.

In order to ensure compliance with the GPA, and to safeguard against disruption, the 2015 Public Contracts Regulations continue to apply – this will be the case until they are formally repealed and replaced with longer term, UK specific arrangements.

In December 2020 the Cabinet Office set out its proposals for shaping the future of public procurement legislation with the publication of its Green Paper: Transforming Public Procurement.

On the 6th of December 2021 the Cabinet Office published feedback it had received to its proposals. The Cabinet Office have confirmed that given the timescale around the legislative process, any new procurement regime is unlikely to come into force until 2023 at the earliest. As such, existing legislation will be followed until further notice.

5.4.2. Procurement route procedures

There are several procurement route procedures that could be utilised for the procurement of the Waterbeach to Cambridge Public Transport Scheme, detailed below. Although the GCP procure many of its professional services through frameworks (section 5.4.3), it is important to not discount alternative routes to market which are also available (section 5.4.4).

5.4.3. Frameworks

The term 'framework agreement' is regularly used within the context of project/programme development and delivery, across multiple markets. As set out in UK Government guidance "*a framework agreement is a general phrase for agreements with providers that set out terms and conditions under which agreements for specific purchases (known as call-off contracts) can be made throughout the term of the agreement. In most cases a framework agreement will not itself commit either party to purchase or supply, but the procurement to establish a framework agreement is subject to the EU procurement rules*"[86]

From a programme's perspective, a framework agreement can feature:

- As a legitimate delivery and contracting model (e.g., analysis could show that an arm's length, non-committal framework arrangement should be utilised, enabled via a bespoke drafted framework agreement); and
- As a route to market (e.g., analysis could show that an alliance model and contract should be used, but ultimately there would be no need to procure the same in open competition via OJEU/GPA; reliance being able to be put on an already established framework such as one owned by CCS, EHA, Pagabo etc.).

Ultimately, establishing the correct delivery and contract model is different to determining the right route to market – one follows the other:

- Step 1 – determine the correct delivery and contractual model; and
- Step 2 – decide on the appropriate route to market, i.e., reliance on pre-existing framework or stand-alone procurement.

The use of already existing framework agreements may well be an appropriate route to market, and an analysis of such a route will be carried out immediately following the identification of the appropriate delivery model and

[86] Crown Commercial Service (2018) *The Public Contracts Regulations 2015 and The Utilities Contracts Regulations 2016* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/560268/Guidance_on_Frameworks_-_Oct_16.pdf

contracting model as part of the emerging Procurement Strategy. An example of that 'type' of analysis (using agreements prevalent in the UK market) is set in Table 5-6.

Table 5-6 - Advantages and disadvantages of existing framework contracts for appointment

Framework	Advantages	Disadvantages
Eastern Highways Alliance (EHA)	Cambridgeshire County Council is a member of the EHA Framework is tried and tested in Cambridgeshire. The Framework is designed to meet the requirements of current and potential future Alliance members for project delivery, such as cost, quality and timescales.	The Framework contract is due to expire on 31/03/24 though advised this will be re-tendered, extending beyond this date. Framework is designed to deliver construction projects costing between £2m and £30m. Estimated construction cost of all the options are in excess of £95m. Schemes exceeding £30m might be acceptable subject to approval by the EHA Board. CCC has a limit on value of work it can procure through this framework.
SCAPE Civil Engineering Construction Framework	The Framework is available to local authorities and public sector bodies. The SCAPE Group Ltd is an organisation originally established by numerous Local Authorities in 2006 delivering greater value for money within the procurement of major building works. Since then, they have diversified within other areas establishing frameworks for services, for example; QS services & project management. Each designed Framework can accommodate construction projects costing between £50k & exceeding £100m plus. Furthermore, these are free to employers. Savings via financial and time are achieved by not conducting an OJEU procurement exercise. Ability to leverage same advantages of ECI; however, with only on supplier (Balfour Beatty).	Framework based on a single source direct appointment (Balfour Beatty), i.e., no competitive tender. By awarding a single supplier there is a potential the value for money main construction contract will be impacted. Lack of competition when the design and build contract is let. Restricts evaluation of approaches achieved via OJEU tender.
Cambridgeshire County Council's Highways Service Contract	The delivery programme can be communicated to existing framework contractor (Milestone) and they can mobilise accordingly. Economies of scale / efficiencies resulting from long-term understanding of local needs and policies. Direct award on agreement of target cost thus increased efficiency in procurement process.	Limited incentives and opportunities for the contractor to create efficiencies in delivery, thereby leading to limited cost savings for GCP. Less direct control in relation to appointment of sub-contractors and suppliers.

Framework	Advantages	Disadvantages
Hampshire Generation 4 Framework Contract	This Partnership Framework helps local councils to retain their distinctiveness while providing a framework, ensuring opportunities for the communities to work collaboratively towards their priorities. Ensures local resources are used efficiently and delivering value for money. The Framework is designed to deliver construction projects between £8m to £150m.	The Hampshire G4 Framework is a long-term partnership, as such this can sometimes be challenging to manage. A framework can provide restrictions for new suppliers that wish to provide e.g., innovative ideas etc. Levy charge for using framework.
Pagabo Framework Contract	A fast, fully OJEU compliant contracting mechanism for public sector organisations. Transparency and value for money through Pagabo actively performance managing framework partners. A no project, no fee approach from Pagabo, who do not charge a fee on pre-construction service agreements – only once your project officially starts on site.	Frameworks are unresponsive to change. There may be new suppliers and/or new solutions within the market that were not included when the agreement was set up. Levy charge for using framework.
Crown Commercial Service (CCS)	Ensures supply chains are engaged from the earliest stages of the project. Ensures transparency and collaborative values flows down the supply chain to produce a supply chain that clients have confidence in.	No guarantee of business even if a supplier is selected as an approved supplier. Frameworks are unresponsive to change. There may be new suppliers and/or new solutions within the market that were not included when the agreement was set up.

5.4.4. Routes to market

In general, the four recognised routes to market available for the procurement for the project include:

- Open procedure– Notice issued inviting all interested Contractors / Suppliers to submit a tender for consideration. Selection criteria can be included in the notice to identify the appropriate suppliers at the outset;
- Restricted procedure – Notice issued inviting all interested Contractors to express interest in submitting a tender. A Selection Questionnaire (SQ) is issued to a restricted number of suppliers/interested parties and evaluated prior to issuing formal Invitation to Tender;
- Competitive Dialogue procedure – Designed primarily for complex Private Finance Initiative (PFI), Public-Private Partnership Model (PPP) and major infrastructure projects. Contract requirements, procedures and proposed solutions can be discussed with short-listed tenderers (minimum 3) who meet initial contract notice criteria; and
- Competitive Negotiated procedure – Terms of contract can be negotiated with chosen Contractors following a competitive tender process.

As regards the standard debate Open v Restricted Procedure, it is well understood that there is a relatively buoyant civils market within the UK; however, that market is very competitive. As such organisations do pick carefully which opportunities they bid.

It is known that those organisations capable of delivering major infrastructure projects are reluctant to bid in an Open Procedure environment (some may not even secure clearance to do so from an internal governance perspective). Ultimately, they have no issue with bidding in an environment of 5 or 6 contractors; however, they are highly unlikely to expend the necessary bidding costs if they find themselves in a pool of 10/ 15 bidders, particularly if contractors not fully versed in major projects are bidding – such contractors may (intentionally or unintentionally) misprice such major projects.

5.4.5. Recommended route to market

Once the correct delivery and contracting model is arrived at (utilising the methodology set out in section 5.2.1) a decision then has to be made as regards the route to market to deliver that contracting model, i.e. an answer is required to the simple question – how can we appoint someone to deliver the work on the basis of the delivery model and contract model we've identified?

The current view is that the project should be procured using the Restricted Procedure. Table 5-7 sets out the high-level structure of a Restricted procurement, and also sets out the list of documents necessary to be drafted at advert publication.

The restricted procedure is the recommended route to market as the current anticipated programme for the project will allow the required timeframe and will most likely offer best value for money owing to the introduction of a competitive tendering stage for the detailed design and construction stages.

Further discussion around the use of existing frameworks should be considered if constraints around the programme increase and as a consequence reduces the procurement time. In this instance a framework may become the preferred option – i.e., if the work in the overall GCP programme needs to be staggered to enable delivery.

Table 5-7 - The restricted procedure

Procedure	Any limitation/ constraint to using the procedure	Stages	Minimum number of candidates	Likely level of competition	Key documentation for drafting
Restricted	None. Procedure can be used for all purchasing activity including works of the nature of the Project.	Prequalification/ selection Tender and evaluation	All interested parties can submit expressions of interest (i.e., submit a PQQ/ SQ). At least 5 pre-selected candidates to submit a tender	Prequalification likely to be high	Project Advert (PIN) PQQ ITT Project Background NEC4 ECC NEC4 Scope NEC4 Activity Schedule/ BoQ

5.5. Risk allocation and transfer

This section sets out the types of risks and how these will be shared amongst relevant stakeholders. At this stage of the project, prior to any procurement process, all liabilities and risks rest with GCP.

The preferred option, Option C – Target Cost Contract with Activity Schedule, is the form of contract recommended in the procurement strategy, see Section 5.3.2, which allows GCP to share the risk. The ownership and management of risks will be distributed to appropriate work package leads with a requirement to report and escalate to the Project Manager as necessary. At contract award, the D&B contractor will be responsible for managing risks that encompass design, appropriate planning conditions, estimations of the quantities, mitigation measures and resources.

GCP will continue to take responsibility for risks that encompass land, residual planning and environmental permissions. Included is the responsibilities of preparing Compulsory Purchase Order and attending Public Inquiry. However, the risks on cost overruns are shared with GCP due to the pain-share mechanism. The key to successful risk management is to allocate risk to that party which is best placed to manage it.

The key risks identified in the risk register that are relevant to the Commercial Dimension have been summarised in Table 5-8.

Table 5-8 - Key risks identified

Risk	Risk Event	Consequence	Mitigation
Programme Risk	The construction of the scheme (in terms of assets) is not completed on time or to specification.	The asset delivered is either late or not of sufficient quality leading to delays whilst issues are rectified. Additional cost to GCP and loss of reputation.	Ensure a comprehensive monitoring process is agreed and is in place. Contracts should stipulate shared risks and consequences. Appoint a suitably qualified Project Manager to manage outputs.
Procurement Risk	Procurement may not be successful or is delayed.	Delivery of the project cannot progress without a contractor in place. Scheme progression is delayed.	Starting the procurement process early and consider market testing.
Cost Risk	Scheme costs (e.g., price of materials) increase beyond the agreed budget.	GCP required to cancel the scheme or agree to additional borrowing either through internal or external means.	Regular cost reviews should be held and ensure that value engineering is undertaken at key stages of the project. Programme management teams should regularly correspond to understand price for materials, labour and consultancy.
Provider Risk	Sub-standard contractor performance.	Scheme experiences delays during detailed design or construction due to inadequate performance or management of the D&B Contractor. Loss of reputation for GCP and contractor.	Ensure that contractor has adequate expertise in scheme development. GCP should undertake robust tendering process and reviews of quality outputs to ensure that the provider to delivering to brief.
Supplier Risk	Low level of participation in procurement process.	Unable to deliver competitive procurement.	Early contractor involvement to encourage participation.

5.6. Contracts

This section outlines details associated with the contract length and how the contract could be managed. It is recommended that in advance of the contract, a tender period of 12-16 weeks is included in the programme for this project at the D&B stage. This will give GCP enough time to robustly engage with the market and review tenders. It is likely that Waterbeach to Cambridge Public Transport Scheme could procure services from more than one type of contract in the future.

5.6.1. Contract length

The proposed contract to use for this project have been set out in Table 5-9.

Table 5-9 - Proposed contract for use on Waterbeach to Cambridge

Contract type	Stage	Length
Cambridgeshire County Council Professional Services Framework	Design (Infrastructure)	36 months initial term, with 2 12-month extension options
Restricted procedure, OJEU, Public Contracts Regulations (NEC4 Option C)	Detailed Design and Construction (Infrastructure)	27 months[87]
To be confirmed at FBC stage	Maintenance	On-going maintenance is to be completed by CCC highway maintenance contractors.

5.6.2. Contract management

The construction contract is proposed to be a NEC4 (Option C) Contract. The NEC suite of contracts are well understood and are a tried and tested set of contracts used on large scale construction schemes. In addition, the implementation of NEC contracts has resulted in major benefits for projects both nationally and internationally in terms of time, cost savings and improved quality. NEC contracts have been uniquely designed using the following three key unique characteristics:

- Proven contract arrangement with many projects successfully being delivered in terms of time, cost savings and improved quality;
- NEC contracts facilitate a good working relationship between the two parties and enable good management of the project; and
- NEC contracts can be utilised in various commercial situations.

GCP currently have a Professional Services in place which is due to expire in 2026. As this framework would be in place throughout the duration of the design, mobilisation and start of the construction phases of the Waterbeach to Cambridge Public Transport Scheme, it could be used to appoint an NEC4 Project Manager and Supervisor to undertake the following roles during construction of the scheme:

- Coordination and liaison with the main works contractor and their design partners and provision of any support and background information required;
- Establishment of procedures and protocols for the management and review of the ongoing site work and the administration of the contract;
- Provision of a permanent site presence to manage the NEC4 contract communications, (RFIs, Early Warnings and Compensation Events etc.);
- Maintenance of site records (including photographic record);
- Liaison with the contractor and the designer to monitor that the construction works are being executed generally in accordance with the contract documents and with good engineering practice;
- Liaison with key stakeholders including adjacent landowners throughout construction; and
- Assessment and reporting on payment certificates and compensation events.

In addition, the Project Manager would:

- Liaise with and advise GCP on current contractual, commercial, programme and risk activities;
- Represent GCP as required at meetings and be a core member of the management team;
- Liaise with and advise on changes or additions to the contract, current contractual, commercial, programme and risk activities;
- Manage the Supervisor's site and office teams; and
- Ensure that Health and Safety legal and site-specific requirements for safe operating and duty of care are implemented throughout.

[87] This is the current estimate for design and build contract.

5.6.3. Design and construction

During the design period, the project management team, who would be appointed through the Professional Services contract, will work closely with the contractor and their designer to identify design issues and develop mitigation strategies. The design will also be monitored as it is developed to identify any aspects which may impact the cost of the project and keep the scheme promoter fully advised of any changes, as well as their impact.

If appointed, the project management team would remain available to provide technical assistance and review throughout the design process. Review and comment on the completed design will be provided to ensure that the contractor has a robust design and specification that is compliant with the scope. Design statements and design risk assessments will also be reviewed to confirm that the design can be implemented safely. Regular meetings will also be convened with the contractor's designer to ensure that the requirements within the scope are being delivered.

During the construction period, the project management team will administer the contract, ensuring compliance and effectively managing risk and programme. The key responsibilities of the project management team during the administration of the contract are:

- Issuing all instructions, notifications and communications under the contract;
- Discharging all financial commitments under the contract, including monitoring the measurement of the works and certifying payments;
- Monitoring and reporting on early warnings and compensation events as well as the project risk register;
- Monitoring the works for compliance with the scope and specification, including the identification of non-conforming elements if required; and
- Reviewing and commenting on the contractor's construction methodology, programme, method statements, inspection and test plans and risk assessments.

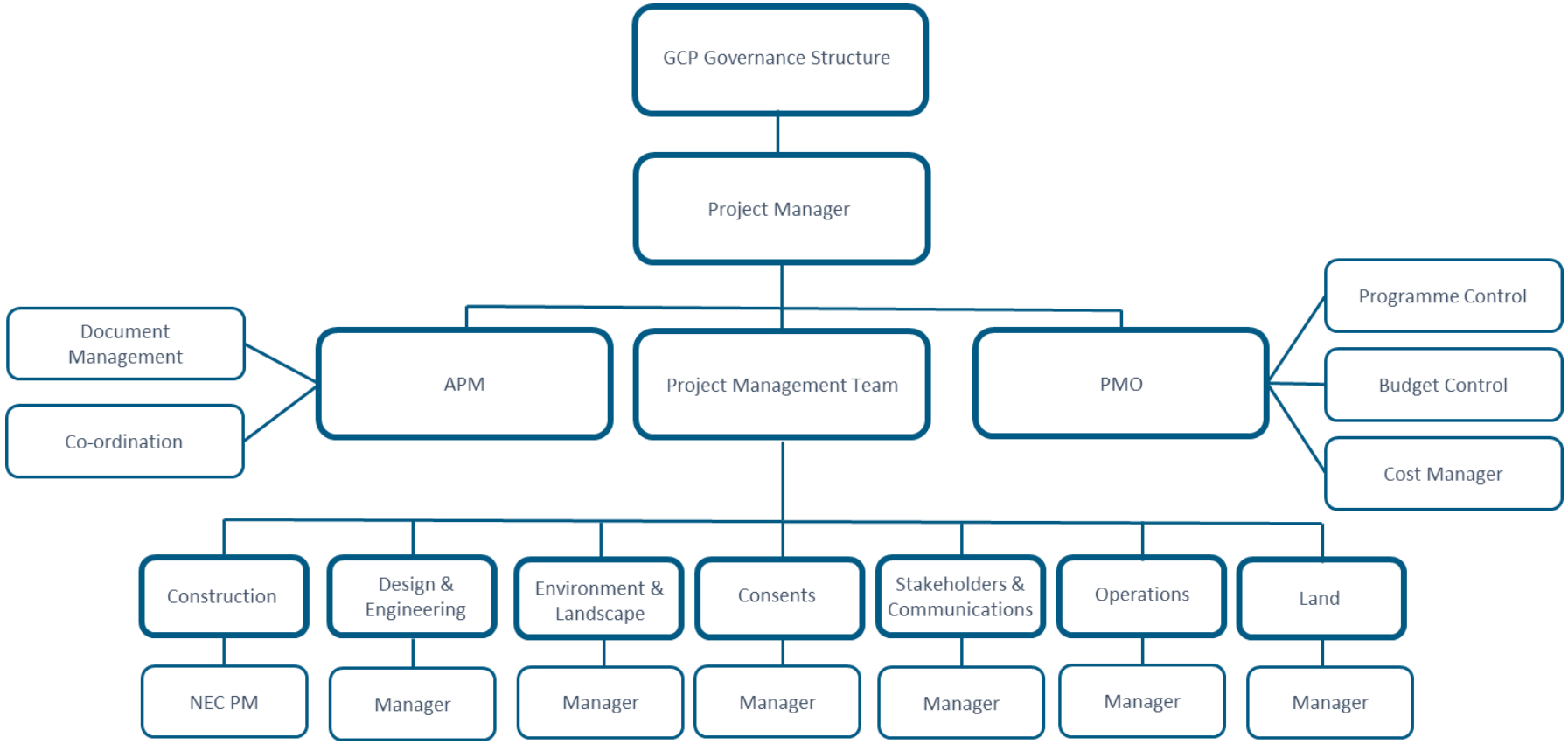
5.6.4. Project governance, roles and responsibilities

GCP has effective management and governance arrangements in place to ensure effective delivery of projects, including an established project management toolkit based on the PRINCE2 methodology.

The Waterbeach to Cambridge scheme shall also undertake the Infrastructure and Project Authority's Project Initiation Routemap, utilising its associated tools and following its approach.

The Waterbeach to Cambridge project delivery team structure is shown in Figure 5-5. This structure adopts an integrated team approach meaning roles are not duplicated between supplier and client. Some of the workstream manager roles could be filled by the supply chain and the workstream managers together. Operations would include technology, agreements with operators, asset management and handover into operation.

Figure 5-5 - Waterbeach to Cambridge project delivery structure



5.7. Commercial dimension summary

This Commercial Dimension has demonstrated the commercial viability of the Waterbeach to Cambridge Public Transport Scheme and has identified a suitable procurement strategy which will be used to engage with suppliers in the market.

Several procurement strategies, methods, frameworks and contract types have been assessed for the project, with the advantages and disadvantages of each evaluated to arrive at an emerging preferred procurement route for delivery of the scheme.

The preferred tendering procedure is Restricted Procedure as this gives bidders a well-defined and structure package to price for, although alternative solutions will be considered.

It is recommended that the project progresses utilising the “Design and Build 2” delivery model which should involve Early Contractor Involvement advice (ECI) given the volatile markets.

It is recommended that the NEC4 suite of contracts is used to deliver the project. Its use will allow flexibility and agility and will stimulate good management across the project. In addition, NEC4 is recommended by the Cabinet Office, this encourages co-operation between parties and has an ‘Early Warning’ feature to promote a proactive approach to risk resolution. Finally, for a project of this scale and complexity it would be recommended to use an Option C (Target cost with Activity Schedule) contract, where the risk is shared through the pain-gain mechanism.

It is recommended that an NEC Project Manager and Supervisor are appointed, with their main roles focused on coordination and liaison with the works main contractor and design partners, establishment of procedures and protocols, provision of a permanent site presence to manage the NEC4 contract communications and maintenance of site records. Liaison with key stakeholders including landowners alongside GCP should also be considered as a key role.

6. Management Dimension

This chapter sets out the Management Dimension for the Waterbeach to Cambridge Public Transport Scheme. The purpose of the Management Dimension is to assess if the proposal is deliverable. At the Outline Business Case (OBC) stage the DfT request, through their '*Transport Business Case Guidance*'[88] that the Management Dimension contains the elements set out in Table 6-1.

Table 6-1 – Elements included within the OBC as per the DfT guidance

Management dimension content	Contents in outline business case guidance	Status at OBC stage
Introduction	Outline the approach taken to assess if the investment is deliverable.	Revisit, reconfirm and update if appropriate.
Previous similar projects	Provide evidence of similar projects that have been successful to support the recommended project approach.	Revisit, reconfirm and update if appropriate.
Governance, organisational structure and roles	Describe key roles, accountabilities, roles and responsibilities and how they are resourced.	Revisit, reconfirm and update if appropriate.
Reporting and change control	Describe the reporting arrangements included delegated authorities, exception reporting, tolerances and change control.	Completed.
Work breakdown	Summary of the key-work packages, product and work breakdown structures for executing the work.	Completed.
Project plan	Outline a plan with key milestone, progress and include a critical path.	Completed.
Assurance	Assurance strategy and plan with key assurance and approval milestones.	Revisit, reconfirm and update if appropriate.
Dependencies and constraints	Set out the deliverables and decisions that are provided/received from other projects and any constraints.	Completed.
Stakeholder engagement and communications	Set out the communications strategy and plans that account for all stakeholders, aligning with those outlined in the Strategic Dimension.	Completed.
Risk and issues management	Provide arrangements for risk management and issues that are likely to affect delivery and implementation.	Completed.
Lessons management	Produce a strategy and plan for learning from other proposals, learning thought the proposal and sharing lessons with other teams.	Completed.
Data and information security	Explicitly address the protection of critical systems, digital assets and commercially sensitive data.	Completed.
Benefits management	Produce a long-list of prioritised benefits and Benefits Logic Map to show how benefits contribute to strategic options.	Completed.
Monitoring and evaluation	Set out the approach to managing the realisation and a credible plan for the evaluation of benefits including a set of Benefits Profiles.	Revisit, reconfirm and update at OBC stage if appropriate.

[88] DfT (2022) *Transport Business Case Guidance*

Management dimension content	Contents in outline business case guidance	Status at OBC stage
Project closure	Summarise arrangements for project closure and how data will be captured for future benchmarking.	Revisit, reconfirm and update at OBC stage if appropriate.
Summary	n/a	n/a

6.1. Previous similar projects

6.1.1. Cambridgeshire Guided Busway

The Cambridgeshire Guided Busway (CGB) is a 42 kilometre long, open access route with high levels of segregation along most of its length. The CGB provides a high-quality public transport connection between Huntingdon and St Ives, to the north-west of Cambridge, and Addenbrookes Hospital and Trumpington to the south of Cambridge, with direct access to Cambridge city centre.

The route comprises of 25 kilometres of kerb guided busway and 17 kilometres of on-street routes incorporating bus priority. Benefits of the scheme include travel time savings and road decongestion, modal shift in an area where the car is dominant, improved journey time reliability and increased interchange opportunities. The CBG also improves access to key services in rural areas, generates construction and operational jobs and enables development that was identified in the Regional Spatial Strategy[89] and Structure Plan[90] at the time. A four-metre-wide bridleway runs alongside the guided busway sections of the route and has contributed to a significant level of benefits from improved walking, cycling and equestrian trips.

Construction began in March 2007 and the busway opened on 7th August 2011 with 2.5 million journeys in the first year of operation, this being approximately 40% above the forecasted number of journeys. Whilst there are lessons learnt from the difficulties encountered, including track construction methodology and contract specification, the system delivered the desired outcomes in terms of service levels, service quality, mode shift and patronage. These benefits have been identified in the 'Cambridgeshire Guided Busway Post-Opening User Research Report' produced by Atkins[91] in 2012. Key findings include:

- In terms of modal shift, 24% of CGB users previously made all/part of their journeys by driving and 13% car shared/were given a lift;
- Service levels have been increased twice since opening (in both September and October 2011) and at the time of writing the service consisted of 12 busway services and 2 conventional road services leaving St Ives between 07:30 and 08:30[92]; and
- In terms of service quality 92% of passengers considered the CGB to be comfortable, 74% said that using the CGB was quicker than a vehicle.

The commercial response by the operators has also been very positive, with very high frequency services being operated and additional connecting routes provided to destinations such as Peterborough and Royston.

In June 2022, Cambridgeshire County Council (CCC) published the outcomes of an independent safety review of the northern and southern sections of busway[93]. This review highlighted several lessons which are reflected in the initial design work for the Waterbeach to Cambridge Public Transport Scheme, including speed limits, segregation of pedestrians and cyclists and further separation of active travel infrastructure from the busway.

Many of the elements of the CGB are directly comparable with the Waterbeach to Cambridge Public Transport Scheme, in that they provide a shared corridor for public transport users and active travel users. More recent sections of the busway close to Cambridge North Station have been delivered with an alternative approach to enforcement and track design based on a bus-only road with guiderails at the entry and exit to the route. The

[89] Government Office for the East of England (May 2008) *East of England Plan: The revision of the Regional Spatial Strategy for the East of England*

[90] Cambridgeshire County Council (2003) *Cambridgeshire and Peterborough Structure Plan*

[91] Atkins (2012) *Cambridgeshire Guided Busway Post-Opening User Research Report*

[92] Stagecoach timetables as of December 2022 include seven services (A/B/C) departing St Ives between 07:30 and 08:30

[93] Mott Macdonald (2022) *Northern Busway Section Road Safety Assessment* and Mott Macdonald (2022) *Southern Busway Section Road Safety Assessment*

overall success of the delivery of the CGB therefore provides confidence that the Waterbeach to Cambridge Public Transport Scheme can be delivered.

Delivery achievements

- Due to successful management of the procurement routes selected for the delivery of the scheme, contractor selection and compression of the design stages of the scheme, the CGB was delivered on time and before the Luton Busway;
- Early integration of RTPI was very positive; and
- An attractive urban streetscape was successfully delivered including shelters and CCTV etc.

Lessons learnt

- The usage factor was far higher than originally expected which resulted in operators needing to increase the bus fleet therefore ensuring that this is as accurate as possible during the design stage of the programme would reduce the risk of this occurring;
- Risk balance – the procurement strategy sought to transfer a lot of risks to the contractor who were not best placed to manage them. Risks can become amalgamated if not managed well. Therefore, from experience gained on this project, it is recommended that a clear and transparent risk management process is adopted which, if required, could be managed by the contractors;
- It was noted that some aspects of design were not fully up to date prior to the delivery, this can cause delay to the delivery of the project. As such it is recommended that the design is completed to avoid this risk;
- Flood risk discharges were not agreed prior to delivery and should not be passed on to the contractor before being signed off. Full flood modelling should be completed and also made available to designers and contractors as early as possible;
- The Planning Inspector sought to pass responsibility back to the Local Flood Authority (LFA), whereas LFA sought to receive information;
- Decisions should be made regarding design elements, such as streetlighting, as early as possible as Local Authorities will likely seek to progress these through the planning process. Delays to this can cause delays to the delivery of the overall scheme;
- Construction and partial design in construction phase can potentially cause significant delays;
- Desire to explore different ticketing solutions led to complications with the bus companies. As such developing early strategies of how this will be management would reduce the risk of complication and delay; and
- Early procurement of information has a large upfront cost to the project, but it reduces risk further down the line and makes it easier to hold. However, be selective with the data required.

6.1.2. Greater Cambridge Partnership corridor schemes

The Waterbeach to Cambridge Public Transport Scheme will form part of the wider strategy to be delivered under a coordinated framework, with elements common to all corridors being proposed to form a region-wide network.

Delivery achievements

The Greater Cambridge Partnership (GCP) undertook a gateway review in May 2020 and as a result of the 'significant success and progress' that the Partnership has made, the Government have unlocked a further fund of up to £400 million for the GCP to create better transport infrastructure, support housing delivery and build sills for the future. Successes that contributed to this review are as follows:

- Construction had commenced on the Histon Road scheme (see Section 6.1.3), creating a new bus lane and significantly improved walking and cycleways to make it quicker and easier for people to travel into the city from the A14;
- Construction of the Milton Road scheme (see Section 6.1.4) would commence upon completion of the Histon Road scheme and will provide improved public transport, walking and cycling connections along the corridor;

- The Abbey Chesterton Bridge, a key part of the Chisholm Trail that will provide a mainly off-road walking and cycling link between Cambridge Station and Cambridge North Station, would be installed later in 2020; and
- Upgrades have been made across the proposed Greater Cambridge Greenways network, and Cross City Cycling schemes have been opened to improve cycle connectivity.

Lessons learnt

Several of the GCP schemes such as Cambourne to Cambridge Better Bus Journeys and the Cambridge South-East Transport Study are more advanced in their programme than the Waterbeach to Cambridge Public Transport Scheme. Therefore, this provides an opportunity to share key lessons learnt from other GCP schemes to help improve the Waterbeach to Cambridge Public Transport Scheme and further streamline the programme. These include:

- Building more detail into later stages of the project programme based on other projects;
- Early structured and measured stakeholder, developer and public engagement to help secure buy-in as early in the process as possible – develop a robust communications strategy;
- Defining assessment criteria early to allow scrutiny; and
- Early identification of developer funding streams to allow for conditions to be made at the right planning stage.

The Cambridge Eastern Access Study is running in parallel to this scheme. This provides opportunity for joined up thinking and processes at several stages of the project including stakeholder engagement, option development and design. Design coordination meetings are being held with representatives from each of the corridor schemes are programmed to share lessons learnt and best practice.

6.1.3. Histon Road

The GCP Histon Road scheme, completed in 2021, provides new pedestrian, cycling and public transport infrastructure including new footpaths and cycle lanes, new bus lanes and bus stops, additional pedestrian crossings and associated landscaping. Benefits of the scheme include encouraging more people to walk, cycle or take the bus along Histon Road, helping to reduce congestion and improve air quality.

Of particular relevance to the Waterbeach to Cambridge Public Transport Scheme, the Histon Road scheme provided 540 metres of new bus lanes to improve bus priority and therefore journey times and reliability along the radial route. It also removed on-street parking on the narrow southern section of the route which also helps the flow of traffic including buses and cycles. In regard to the Waterbeach to Cambridge Public Transport Scheme, there is potential synergy between the schemes, however this is dependent on the actual bus service patterns delivered.

Delivery achievements

Upon reflection, the Histon Road scheme was delivered on time and the budget performance was largely good with some explained and agreed cost increases.

Lessons learnt

As the Histon Road scheme has been delivered, there are several key lessons learnt that may be beneficial to reflect on in the context of the Waterbeach to Cambridge Public Transport Scheme. These include:

- Frequent and relevant meetings with the design team were beneficial to keep abreast of proposals and designs;
- Ensure that appropriate time is spent focusing on details at the preliminary design stage to avoid costly and abortive work at the later detailed design stages;
- Introduce the various teams working on the project as early as possible to coordinate work and approaches;
- Ensure appropriate weight is given to stakeholder feedback and ensure that stakeholders are involved early in the concept design stages of the project;
- Early contractor involvement enabled input to the designs to help reduce eventual construction costs; and

- A flexible construction programme.

6.1.4. Milton Road

The GCP Milton Road scheme, currently under construction, will provide improvements to public transport journeys and walking and cycling. Benefits include faster and more reliable public transport journeys, better walking and cycling links, reduced congestion and improved air quality. Similarly to the Histon Road scheme, the Waterbeach to Cambridge Public Transport Scheme will utilise the improvements on Milton Road to access Cambridge city centre.

Delivery achievements

As this scheme is yet to be completed, the delivery achievements have not been monitored thus far but will be monitored at the appropriate time.

Lessons learnt

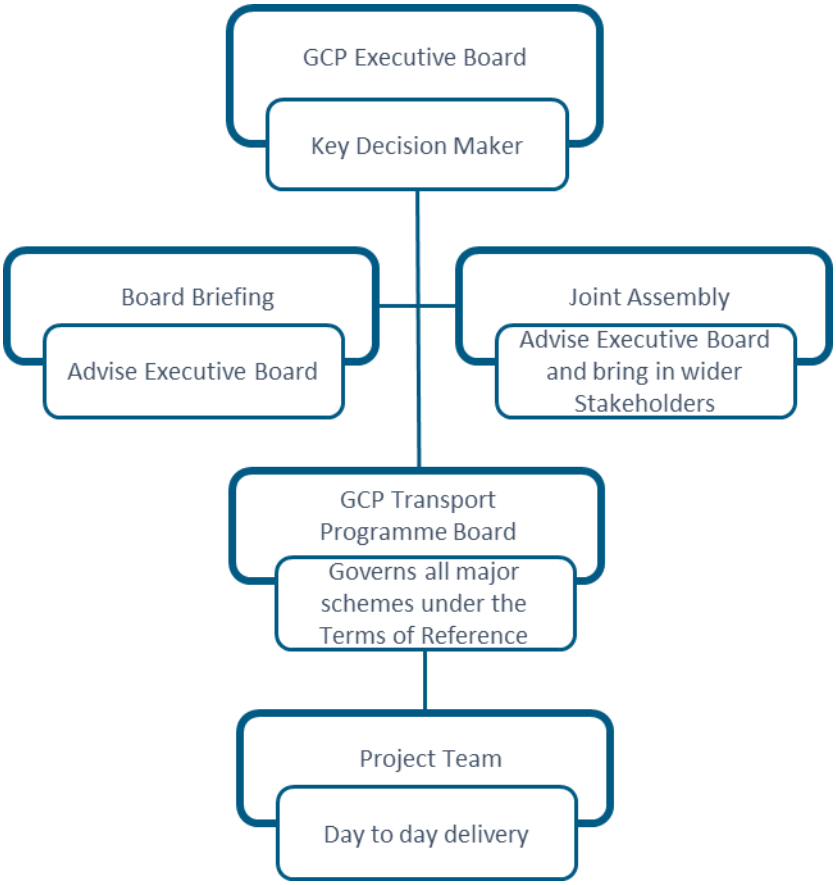
Lessons learnt following the design stage of the Milton Road scheme has identified some key learnings which may be of relevance to the Waterbeach to Cambridge Public Transport Scheme including the following:

- Frequent and relevant meetings with the design team were beneficial to keep abreast of proposals and designs;
- Ensure that appropriate time is spent focusing on minute details at the design stage as some aspects may be subject to change at a later stage and therefore work may be adapted/aborted;
- Introduce the various teams working on the project early in order to coordinate work and approach; and
- Ensure appropriate weight is given to stakeholder feedback and ensure that stakeholders are involved early in the concept design stages of the project.

6.2. Governance, organisational structure and roles

This section describes the key roles and lines of accountability and how they will be resourced. The project processes and resources are set out in a separate Project Management Plan (PMP) and Project Initiation Document (PID) agreed by the Project Board. These set out the overall approach to the project management of the development of the scheme, the existing information, including studies already undertaken, and the overall aims and objectives of the scheme. They help form the initial project brief. The organisation structure for the Waterbeach to Cambridge Public Transport Scheme is illustrated in Figure 6-1.

Figure 6-1 - The governance structure and responsibilities for the project



The high-level role and responsibility of each of these groups is as follows, with more detail is provided in subsequent sections:

- The overall scope of the project is set by the GCP Executive Board;
- The project is governed by a Programme Board that will receive reports on project activity including spend, quality, programme and risks;
- The Programme Board can request from the Project Manager all the information required for it to perform its governing role;
- The Project Manager must present all information to the Programme Board that is required for the Board to perform their governing role; and
- The Project Manager has full day to day responsibility for delivery of technical work streams and is employed by GCP.

The two key project governance documents are the PMP and PID. These were produced by GCP at the outset of the project. They set out the need and aims of the project and the method for achieving the outcomes.

Executive Board

The GCP Executive Board consists of the Leader, or equivalent of each of the partner organisations, as the key decision-making group, illustrated in Figure 6-2. The Board meet at least four times a year to discuss the major schemes being completed by GCP.

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

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

For the Waterbeach to Cambridge Public Transport Scheme the Executive Board will:

- Consider the options and approval to consult on initial options (Strategic Outline Business Case);
- Approve the preferred option following consultation with agreement to enter relevant statutory processes and the preparation of a full business case (Outline Business Case); and
- Approve the final design, agreement to construct and Full Business Case (Full Business Case).

Joint Assembly

There is also a Joint Assembly with appropriate representation from the Local Authorities and other Stakeholders which meets at least four times a year and plays an advisory and scrutiny role in decision making. The CCC, Cambridge City Council (CCiC) and South Cambridgeshire District council (SCDC) each have representatives on the Assembly, detailed in Figure 6-2, with political balance in each Authority's membership reflecting the balance of the political parties on the relevant Council. The other places on the Assembly are filled by members representing various stakeholder groups.

For the Waterbeach to Cambridge Public Transport Scheme the Joint Assembly will advise and make recommendations to the Executive Board and bring in wider stakeholders.

Programme Board

GCP is focussed on both programme and project level governance with the principle that issues of key importance are addressed at the highest levels of governance and that issues of a more technical nature are addressed by officers.

At the GCP Transport programme level, an officer technical group (Programme Board) made up of key officers, including the Transport Director, Strategic Finance Manager, Assistant Director Place & Economy, City and the Access Programme Director as well as stakeholders. The Programme Board seeks to develop the overall scheme prioritisation and to manage programme level risks and capture shared benefits. This Board, in consultation with Chief Executives, meets monthly to raise programme level issues with the GCP Executive Board and Joint Assembly as required.

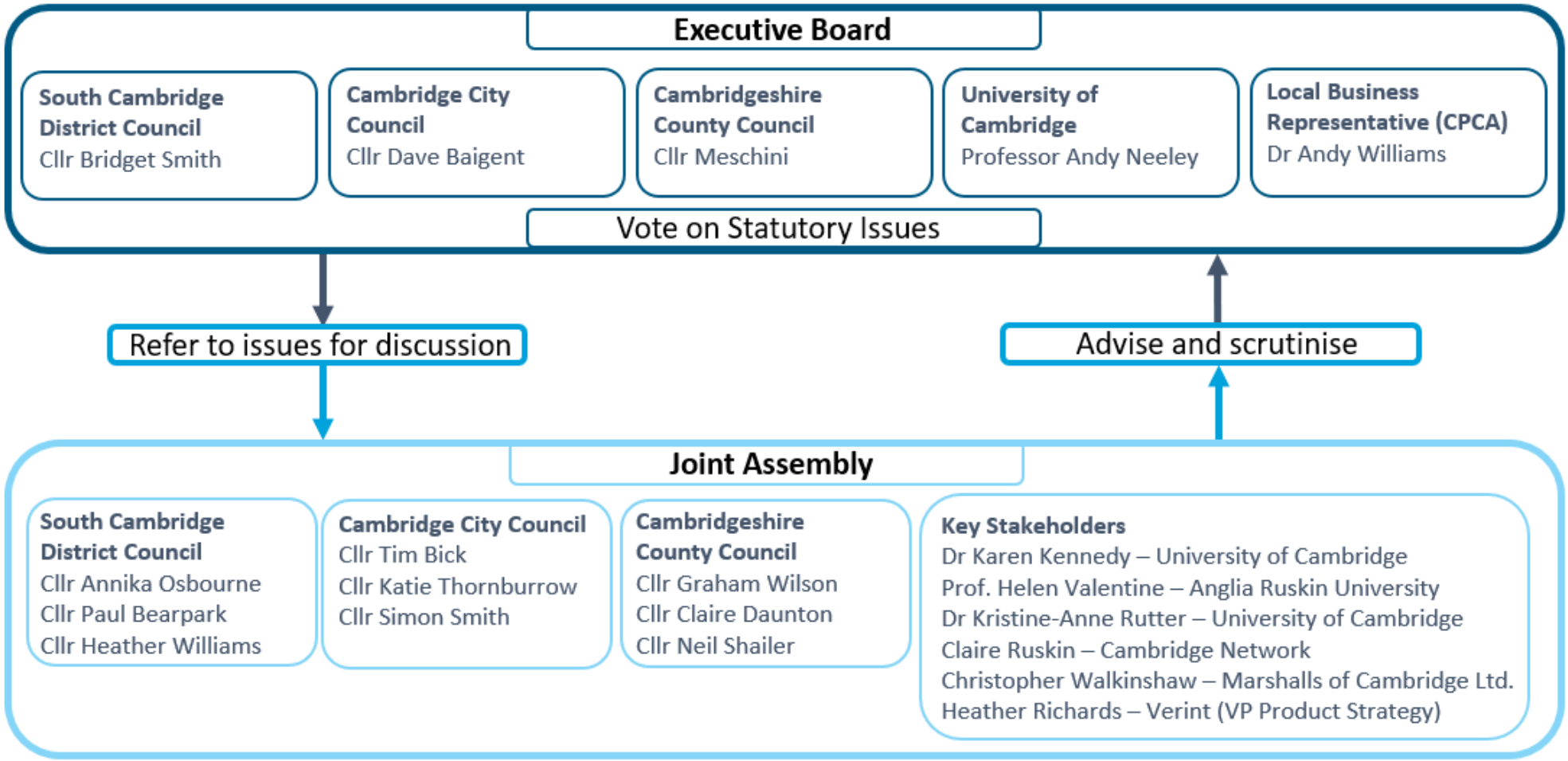
For the Waterbeach to Cambridge Public Transport Scheme the Programme Board discuss and advise on any exceptional items of progress. These may include:

- The project not delivering the objectives agreed with the Executive Board;
- The forecast overall cost of the project exceeds what has been reported to the Executive Board;
- The forecast completion of the project exceeds the date reported to the Executive Board;
- When a key decision milestone is forecast to be missed by 3 months (in line with the Executive Board cycle of meetings); and
- A project being at risk of causing significant reputational damage to GCP or its partners.

Project Team

At the project level a Project Team works up the scheme details and reports to the Client Project Manager who reports directly to the Programme Board which will guide the overall development of the project at the technical level. At key project milestones, reports are made to the Executive Board on progress to seek decisions on key matters to allow the project to progress, Figure 6-2 sets out the GCP Governance Structure for making decisions.

Figure 6-2 - GCP governance structure[94]



[94] Style from: Tetra Tech (2021) *Cambridge Eastern Access Strategic Outline Business Case Part 5: Management Case* Page 18 (Figure 4.2).

6.3. Reporting and change controls

The Project Manager and the delivery team will continue to report to the Project Board and GCP Executive Board as described in the Section 6.2 and provide regular updates to the GCP website. The Consultant Project Manager will produce monthly project progress reports containing key activities undertaken and planned for the upcoming period, a budget update and a risk review as well as identifying any changes requiring early warnings or compensation events. The Client Project Manager will then produce monthly project reports to inform the Programme Board and escalate the early warnings and/or compensation events as necessary. Subsequent change following these events is identified by the consultant and client Project Managers during regular project meetings and updates from the technical disciplines. As such the Client Project Manager determines which of the following four categories a decision is classified as:

Key decision: these decisions are major gateway decisions to allow the project to continue. These decisions form the outer scope of the project and define the 'project parameters'. Key decisions are the sole responsibility of the GCP Executive Board with advice provided from the GCP Assembly and Chief Executives.

3. **Scope change decisions:** these decisions take the project out of scope of the 'project parameters' agreed at the key decision-making stage. They will impact on cost, quality time and/or will require a change of the PID. As such, these decisions are the sole responsibility of the GCP Executive Board with advice provided from the GCP Assembly and Chief Executives;
4. **Major decisions within scope:** these decisions are within the 'project parameters' but are still considered major decisions because they have an impact on cost, quality time and/or will require a change of the PID. A major decision is the sole responsibility of the Project Board; and
5. **Project management decisions:** these are decisions which do not impact cost/quality or time for example, a technical decision on detailed options. These decisions include moving budget between work streams and are the responsibility of the Project Manager.

6.4. Work breakdown

The work breakdown is based on the delivery of a series of key work packages as set out in Table 6-2. These reflect the dependencies as set out in Section 6.7.

Table 6-2 - Key design and delivery

Key work package	Work package description / location	Delivery/Planning	Responsibility/Project interface
Strategic Outline Case (SOC) (complete)	Initial optioneering Demonstrating need for a transport scheme	Planning	GCP / Consultant
Outline Business Case (OBC) (current phase)	Concept design Identification of preferred option	Planning	GCP / Consultant Engagement with interfacing project teams and developers
Full Business Case (FBC)	Preliminary design Development of preferred option	Planning	GCP / Consultant Technical engagement with interfacing project teams and developers
Planning application	Planning TWAO	Planning	GCP / Consultant
Detailed design	Detailed design	Planning	GCP / Consultant / Contractor
Consultation	Consultation on SOC options Consultation in OBC options	Planning	GCP / Consultant
Construction of segregated busway and active travel infrastructure	Between the existing CGB and Butt Lane	Delivery	GCP with engagement with landowners.
	Between Butt Lane and Waterbeach Park and Ride	Delivery	GCP
	Within Waterbeach New Town	Delivery	Urban&Civic with engagement from GCP on design and integration with the busway route and the relocated Waterbeach Station
Construction of connection to A10 roundabout access to Waterbeach New Town	Connection for buses, and potentially other vehicles, to the A10 roundabout	Delivery	GCP in coordination with Urban&Civic
Construction of Park and Ride at Waterbeach	Provision of a new Park and Ride near Waterbeach New Town	Delivery	GCP with coordination with Urban&Civic to integrate proposals in this area
Operation		Operation	Cambridgeshire County Council and operators

6.5. Project plan

This Section sets out the high-level approach to project planning with key milestones and progress, including the critical path. At this stage of the programme, the detailed scheme specific project plan has been developed. The project will be governed using the PRINCE 2 project method and will pass through a number of gateways to ensure that progress is approved. The gateways are, as a minimum, in line with GCP key decision points.

The Project Board may, at its discretion, create additional gateways if it considers this necessary for the effective governance and delivery of the project.

As such the project is divided into six phases that broadly align with the five key decisions and the construction phase as follows:

- Phase 1 – work needed to establish the project (leading to Key Decision 1) – complete (2018);
- Phase 2 – work needed to identify outline concepts (leading to Key Decision 2) – complete (2021);
- Phase 3 – work needed to identify a preferred option (leading to Key Decision 3) – ongoing;
- Phase 4 – work needed to achieve Full Business Case and Statutory Approvals (leading to Key Decision 4) – ongoing;
- Phase 5 – work needed to achieve the final design scheme for approval (leading to Key Decision 5) – ongoing; and
- Phase 6 – work needed to construct the scheme and hand over to a final operator – ongoing.

Phases 2, 3, 4 and 5 are the main technical stages of the project and these are being taken forward using the DfT TAG major scheme development methodology. TAG sets out the scope of the two main assessments – OBC and FBC. As such, Phases 2, 3, 4 and 5 are themselves split across the following TAG related Stages:

- Stage A – high level options assessment – identify feasible options;
- Stage B – identify preferred option on the basis of OBC;
- Stage C – FBC on preferred option; and
- Stage D – Approval of preferred option.

The relationship between Phases, Stages, key technical outputs and Key Decisions is shown in Table 6-3.

Table 6-3 - Relationship between project and TAG stages

Project phase	1	2	3	4	5	6
TAG Stage	A	A	B	C	D	D
Key Work Package	Options assessment report identifying a range of feasible concepts for assessment	SOC recommending feasible options for further work	OBC for feasible concepts with recommended preferred option	FBC for preferred option	Detailed Design	Construction and handover to final operator
Key Decision	Post Key Decision 1	Leading to Key Decision 2	Leading to Key Decision 3	Leading to Key Decision 4	Leading to Key Decision 5	

Table 6-4 shows the indicative project programme in line with the project Phases and work breakdown.

Table 6-4 - Project programme by phase

Phase	Completion / Target completion date
Phase 1: Work needed to establish the project	
Agree the scope of the project	2018 – 2019
GCP Executive Board approval	**11/10/2018**
Phase 2: Work needed to identify outline concepts	
Option generation and initial sifting	Q4 2019
Further option assessment	Q4 2019 – Q1 2020
Engagement on options	Q3 2020
Strategic Outline Business Case (SOBC)	Q2 2020 – Q2 2021
SOBC consultation	Q4 2020
GCP Executive Board approval	**01/07/2021**
Phase 3: Work needed to identify a preferred option	
Option development and assessment	Q3 2021 – Q1 2023
Public consultation	Q1 2023
Identification of a preferred option	Q3 2023
GCP Executive Board approval (for approval of preferred options)	**Q3 2023**
Phase 4: Work needed to achieve Full Business Case and Statutory Approvals	
Design development	Q3 2023 – Q1 2024
Environmental surveys	Q4 2023 – Q2 2024
Environmental Impact Assessment (EIA) Consultation	Q2 2024
GCP Executive Board approval (for submission of TWAO application)	**Q3 2024**
TWAO application	Q4 2024
Public inquiry (if required)	Q1 2025
Secretary of State decision	Q4 2025
Procurement	Q4 2025
Phase 5: Work needed to achieve the final design for the scheme	
Detailed design	Q2 2026
Full Business Case	Q2 2026
GCP Executive Board approval of Full Business Case	**Q3 2026**
Phase 6: Work needed to construct the scheme and hand over to a final operator	
Scheme construction	Q4 2026
Hand over	Q4 2028
Scheme opening	Q4 2028

The programme presented in Table 6-4 is current at the time of writing. Should the programme change, this would be communicated from the scheme Project Manager to the Project Board, through a monthly highlights report, for agreement.

6.6. Assurance

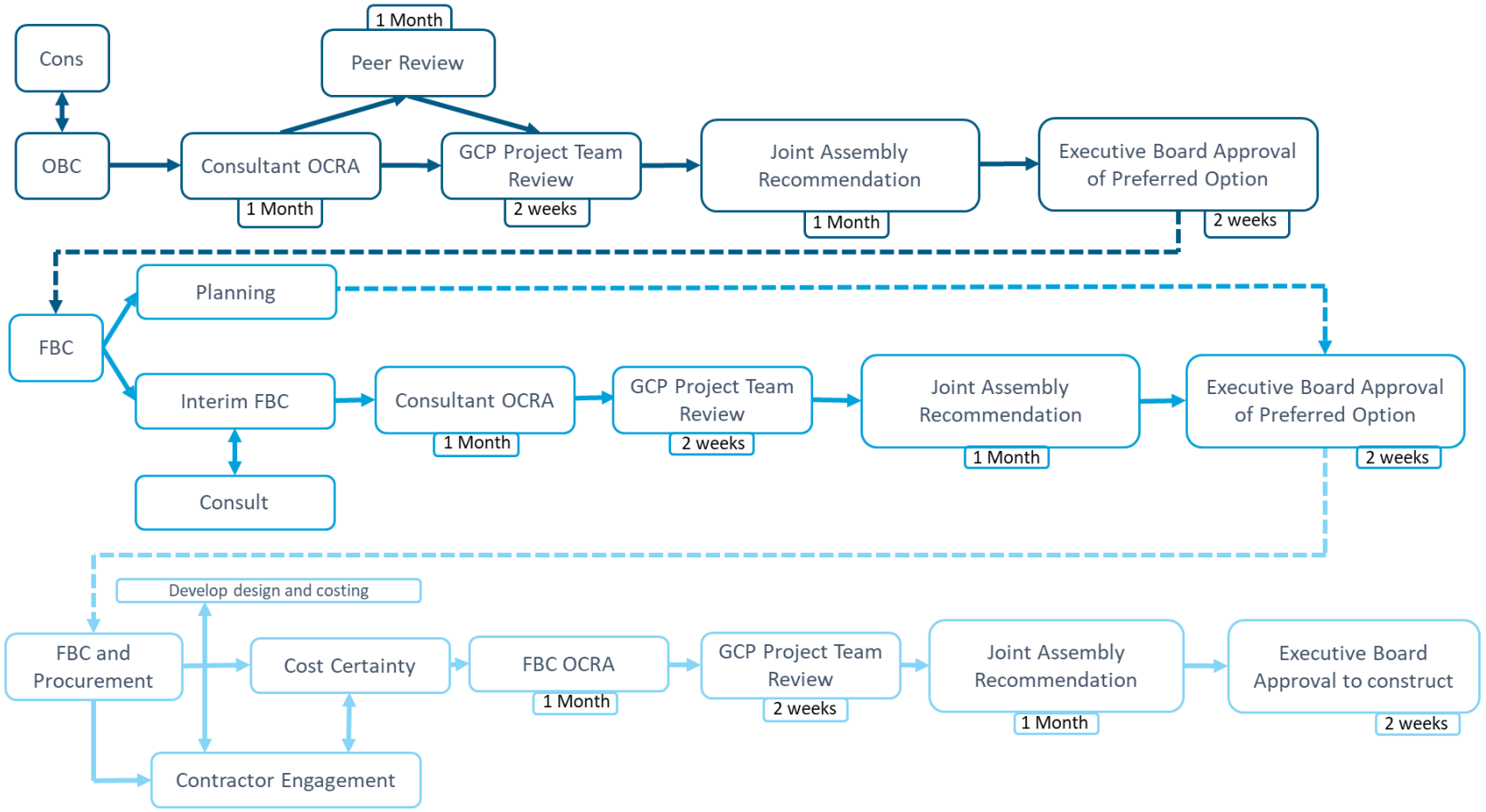
There are several key milestones in the Project Plan where internal and/or external approvals will be required in order for the project to progress. As described above, the project will go through several key decision gateways to ensure that progress is approved, these are detailed in Table 6-4.

The GCP have developed a Local Assurance Framework (LAF)[95] for the Greater Cambridge City Deal that outlines the proposed membership, responsibilities, processes, and principles to deliver a robust transport infrastructure programme as part of the overall City Deal's aim to integrate transport and strategic 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. The Framework ensures compliance with DfT's minimum requirements for Assurance Frameworks.

To comply with the LAF, peer reviews will be completed by WSP and regular design co-ordination meetings will be held to review assumptions, lessons learnt and best practice.

[95] GCP (2022) *Local Assurance Framework* - Governance-Assurance-Framework-2022 (greatercambridge.org.uk)

Figure 6-3 - Project assurance processes[96]



[96] Please note that timescales are indicative. OCRA – Originate, Check, Review and Authorise.

6.7. Dependencies and constraints

Given the strategy coordination between GCP schemes and planned and consented development in the region, the Waterbeach to Cambridge Public Transport Scheme has a number of programme and project dependencies. These are outlined and considered in terms of scheme risks in Table 6-5 and are captured along with their impact and mitigation measures in the scheme risk register in Appendix Q.

Table 6-5 - Project dependencies

Project	Dependency	Risk for Waterbeach to Cambridge Public Transport Scheme
North East Cambridge (NEC) redevelopment	Developers may choose to provide a bus route through the site. Current plans suggest that development will also front onto the existing CGB, therefore increasing the visibility of the busway and increasing footfall along the active travel route.	Different route options through the site may emerge based on the redevelopment. Current assumptions for the Waterbeach to Cambridge route are for the services to run on the existing CGB therefore this dependency presents limited risk to the project.
Milton Road	Bus lanes and bus priority infrastructure on Milton Road.	Required to continue the journey time and reliability benefits of the scheme to the south of NEC into Cambridge city centre. Construction has commenced (July 2022) therefore this dependency presents little risk to the Waterbeach to Cambridge Public Transport Scheme.
Waterbeach New Town	Developers are to provide a corridor within their site masterplan for the transit route.	Discussions with Urban&Civic and RLW during this phase of works have added more certainty over the segregated bus corridor along the alignment of the east-west spine road through the development. Segregation is important for the Waterbeach to Cambridge Public Transport Scheme in this area to provide reliable journeys to and from Waterbeach Relocated Railway Station and the Waterbeach New Town centre. Ongoing discussions with developers and inclusion with Design meetings going forward will help integrate the public transport scheme with the developments.
Mere Way	Busway route is required to cross the Mere Way and active travel infrastructure will connect with Mere Way to cross the A10.	Should the Mere Way scheme not be delivered the Waterbeach to Cambridge Public Transport Scheme would be required to provide an active travel crossing of the A10 near Waterbeach New Town. Engagement with Urban&Civic is minimising this risk.
Waterbeach Greenway	The Greenway is a walking, cycling and equestrian route to the east of the study area which could align with the A10.	The current proposals for active travel infrastructure alongside the busway could be required to change to reflect the development of the Waterbeach Greenway. Should the Revised Central option be taken forward, the presence of the Greenway in the same corridor could remove the need to provide active travel infrastructure alongside the busway.

Project	Dependency	Risk for Waterbeach to Cambridge Public Transport Scheme
A10 Improvements	Any A10 route option that involves dualling the highway would require a crossing point for the busway options. Offline dualling would likely interact with the options.	The uncertainty around the A10 dualling programme means that the A10 scheme would likely be required to make provision for the busway, depending on the route that comes forward. Considerations to the A10 options have been made when developing options for the Waterbeach to Cambridge Public Transport Scheme so as not to preclude any of the A10 options.
Waterbeach Relocated Station	Busway route is to terminate at the Waterbeach Relocated Station.	Should the station not come forward the busway route could terminate within Waterbeach New Town at an appropriate location. Engagement is ongoing with Urban&Civic, RLW and the station team regarding the infrastructure to enable the busway route to serve the station.
NIAB / Darwin Green Bus Priority	Providing a segregated / priority public transport corridor to West Cambridge should bus operators choose to serve West Cambridge from the busway scheme.	Services to West Cambridge become less viable, or less attractive over the private car, if buses are required to run on road through the development.
Making Connections	Demand management measures proposed as part of the Making Connections project likely to restrict or charge vehicles accessing Cambridge city centre.	Demand management measures are likely to have an impact on the attractiveness of the public transport scheme, active travel infrastructure and Park and Ride sites. This could reduce the number of vehicles accessing the city and therefore the level of congestion on the A10.
Optical Guidance Trials	Assumption of an optically guided system for the busway.	Optical guidance is unproven and has yet to be safety tested at the operational speeds required for the scheme. As such, the transitway will be designed to also accommodate 'traditional vehicles' as well as being adaptable to future technologies.

The dependencies and associated risks, outlined in Table 6-5, are potential constraints as the delivery of these schemes may impact the Waterbeach to Cambridge Public Transport Scheme. For example, programme delays on complementary schemes may result in a delay to the Waterbeach to Cambridge programme.

There are also environmental constraints to consider within the remit of the scheme which may become risks to the programme, construction, cost and route design/alignment. A particular environmental constraint for the Waterbeach to Cambridge Public Transport Scheme is flood risk. As such flood risk assessments will be completed at the next stage to determine mitigation measures as required.

6.8. Stakeholder engagement and communications

The communications and stakeholder management plan for the project is set out in the following section and summarises the engagement and consultation undertaken so far.

The Communication and Engagement Plan (included in Appendix R) ensures that all internal and external stakeholders are informed of relevant project information and that timely and accurate messages about the project are disseminated to a range of identified stakeholder groups.

The Communication and Engagement Plan sets out the key communication objectives of the project:

- Provide all relevant stakeholders with clear, well-structured details of the GCP vision, project objectives and possible options, as well as being clear about what this project will not cover;
- Create opportunities for stakeholders to express their opinions freely and openly, and encourage the opportunity to impact the outcome of the project;
- Use an appropriate methodology for collecting the stakeholder responses and analysing them;

- Ensure wide feedback from the public and stakeholders across the relevant areas to assist in decision making;
- Create a consistent message across all projects to ensure stakeholders are aware that the north east Cambridge to Waterbeach public transport scheme is part of a wider vision set forward by the GCP;
- Identify advocates for the project;
- Manage any reputational risks associated with the project; and
- Raise the profile of the GCP and its work.

The plan also sets out key messages in relation to the project processes and progress as well as interfaces with other projects and processes including the GCP Making Connections and Greenways Projects, the Cambridge City and South Cambridgeshire Local Plan, A10 project and progress of developments with the corridor.

The plan summarises the stakeholders and their interests in relation to the Waterbeach to Cambridge Public Transport Scheme as well as provides a summary of completed engagement and consultation in terms of its outcomes and key feedback. The remainder of this section summarises these elements and documents planned engagement and consultation to be completed to the end of the project.

6.8.1. Stakeholder list

Key stakeholders have been 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 those living, working, using services and doing business in the local area. Such engagement has included informing, consulting with, involving, collaborating with and empowering stakeholders to understand the issues to enable them to make informed choices. Table 6-6 sets out the stakeholder groups identified and the main organisations within them.

Table 6-6 - Waterbeach to Cambridge stakeholders

Stakeholder group	Stakeholders	
Transport providers	National Highways	National Express
	Network Rail	Greater Anglia
	Stagecoach	Cross Country Trains
	Whippet	
Local Authorities	Cambridgeshire County Council	East Cambridgeshire District Council
	Cambridgeshire and Peterborough Combined Authority	Greater Cambridge Shared Planning
	South Cambridgeshire District Council	Greater Cambridge Partnership
	Cambridge City Council	
Elected Members	Members of Parliament	
	District and Local Councillors	
	Parish Council Representatives	
Developers	Waterbeach New Town	
	Cambridge Research Park	
	North East Cambridge	
Business networks	Cambridge Ahead	FSB Connect
	Cambridge SSCI	Cambridge BID
	Cambridge Network	
Service providers	Anglian Water	Virgin Media
	Openreach	UK Power networks
	Cadent Gas	Cambs Police

Stakeholder group	Stakeholders	
	City Fibre	Cambs Fire
	National Grid	Cambs NHS
Interest groups	Cambridge Connect	Cambridge Past, Present and Future
	Cambridge Area Bus Users	Environment Agency
	Camcycle	Historic England
	Ely Cycling Campaign	National Trust
	British Horse Society	Natural England
	Waterbeach Bridleways Association	RSPB
	Sustrans	Cambridgeshire ACRE
	Camsight	Wildlife Trust for Beds, Cambs and Northants
	AgeUK	Residents Associations
	Cambridge Conservation Initiative	
Other groups and organisations	Libraries	Religious organisations
	Nurseries, Schools and Colleges	Cambridge University
	Youth Groups	Anglia Ruskin University
	Cambridge Sports Lakes	Local Businesses
	Landowners	Commuters
	Media	

The Communication and Engagement Plan includes details of the communication aims and approach to engaging with the stakeholder groups. In summary, a variety of communication aims have been employed on the project so far, as follows:

- Project, Programme and Executive Boards;
- Meetings and briefings;
- Email updates;
- Site visits;
- Technical workshops;
- Reports;
- Website;
- ‘Place-based’ engagement;
- Brochure / Information pack;
- Press releases;
- Interviews;
- Videos;
- Community meetings/forums;
- Social media;
- Public Engagement vents (online and in person);
- Stakeholder Engagement Events (online and in person); and
- Public Consultation Events (online and in person).

The project management and communications team will continue to employ a variety of engagement approaches as the project continues to suit the needs of the variety of stakeholder groups. Details on planned engagement and consultation is included in Section 6.8.3.

6.8.2. Completed engagement and consultation

Table 6-7 shows a summary of engagement and consultation undertaken so far on the project. The Communications and Engagement Plan in Appendix R details the content and outcomes of these engagement activities.

Table 6-7 - Stakeholder engagement overview

Phase	Time	Activity	Events
Pre-consultation engagement			
Phase 1 (complete)	November 2019-December 2019	Re-engagement with stakeholders important to the delivery of the project	Pre-consultation Workshop 1: 27th November 2019
Phase 2 (complete)	January 2020 – September 2020	Light engagement during options stages with politicians/members, specialist audiences and national bodies (including those critical to the delivery of the project)	Meetings between project team and identified stakeholders
	6th July – 31st July 2020	Pre-consultation engagement ConsultCambs	No events planned due to Covid-19 restrictions – consultation to be online only
Consultation engagement (8 weeks)			
Phase 3 (complete)	October 2020 – December 2020	Public Consultation with all audiences	Online consultation
Post-consultation engagement			
Phase 4 (complete)	Early 2021	Publish consultation results	Results to be taken to Joint Assembly and Executive Board along with recommendations for next steps
OBC engagement			
Phase 5 (complete)	Late 2021 - 2022	Targeted stakeholder engagement to support development of OBC.	Stakeholder Engagement Event – Wednesday 9th February 2022 via Microsoft Teams
OBC Preferred option consultation			
Phase 6	30th January 2023 – 24th March 2023	Public consultation on preferred options for busway route and initial consultation on Park and Ride location	Three face-to-face events and five virtual events

Throughout the development of the SOC and OBC (Phase 2 and Phase 5) a number of ad-hoc or targeted engagement activities took place. The Project Manager maintains a Communications Log, alongside detailed meeting minutes, for the lifetime of the project including the following information regarding engagement:

- Meeting purpose;
- Date;

- Attendees;
- Subject matter; and
- Organisations represented.

6.8.3. Future engagement and consultation

Table 6-8 shows the planned engagement and consultation expected until the opening of the scheme.

Table 6-8 - Future engagement and consultation

Phase	Estimated dates	Activity	Events
Development of Full Business Case			
Phase 7	Autumn 2023 – June 2025	Stakeholder engagement to support development of full business case	TBC
Phase 8	2024	EIA (Environmental Impact Assessment) consultation	TBC
Construction			
Phase 9	Late 2025 – Mid 2026	Stakeholder Engagement to support pre-construction work	TBC
	Mid 2026 – Late 2028	Stakeholder Engagement to support construction work	TBC
Phase 10	Late 2028	Stakeholder Engagement around opening event	Opening Event

It is expected that engagement and consultation will continue using the same channels and methods as used to date. Targeted engagement will continue to inform scheme development, particularly with developers, landowners, operators and technical teams leading other schemes within the corridor.

6.8.4. Phase 6 consultation

Following the completion of the technical work to inform the OBC, a second public consultation exercise was undertaken to gather feedback on the two route options appraised as part of this OBC. This section provides a high-level overview of the consultation methodology and findings as reported in the Waterbeach to Cambridge 2023 Consultation report[97].

Consultation completed to date

The public consultation for the Waterbeach to Cambridge Public Transport Scheme, launched on the 30th January 2023 for the duration of eight weeks, before concluding on the 24th March 2023. The consultation adopted a multi-channel approach to promote and seek feedback from the public and key stakeholders.

During the consultation period, there were three online meetings and five in-person meetings, as well as additional daytime flyer distribution at a central shopping centre and at selected Park and Ride sites during the morning commuting period. In addition, the consultation was advertised in local newspapers and community magazines, as well as in the wider travel to work area. It was also advertised at main and regional railway stations, bus stops and on Park and Ride buses. The consultation itself was held primarily online via

[97]Greater Cambridge Partnership (2023) *Waterbeach to Cambridge 2023 Consultation: Summary Report of Consultation Findings*

ConsultCambs and GCP social media channels, with hard copies of consultation materials available on request.

Quantitative data was recorded through a formal consultation questionnaire (online) with 388 (377 individual respondents and 11 stakeholder groups) complete responses recorded. A significant amount of qualitative feedback was also gathered via the questionnaire and through emails, letters and social media.

The consultation strategy was designed by GCP's communication team and referenced the County Council's Consultation Guidelines.

The consultation was open for anyone to contribute towards. However, the key target audience was individuals or organisations that are interested because they might be impacted by the proposals. This included, but was not limited to:

- Members of the public;
- Elected representatives;
- Businesses;
- Transport providers;
- Statutory consultees;
- Campaign groups; and
- Wider stakeholders.

The findings for the consultation are summarised in sections 2.7 and 2.8 of the Strategic Dimension and provided in full in the Consultation Report.

6.9. Risk and issues management

The standard risk management process employed on this project is:

- Planning;
- Identification;
- Assessment;
- Evaluation; and
- Treatment.

The remainder of this section will take each of these processes in turn and describe how they have been undertaken on the project.

Planning

The scheme project manager is responsible for planning the risk management process. This was defined at project inception and is in line with the GCP Governance structure. Risks are identified and captured at a project level and escalated through the Governance structure to the project and programme board and the Executive Board as required. Projects across the GCP portfolio use the same risk template for consistency. Within the register, risks are quantified in accordance with their likelihood and impact on cost and project duration. There are nine types of risk:

6. Governance;
7. Consultation / communications;
8. Design;
9. Stakeholders;
10. Project funding;
11. Project scope;
12. Scheme development;
13. Statutory processes; and
14. Supply chain issues.

The Waterbeach to Cambridge Public Transport Scheme risk register template was set up at the project inception and is owned by the GCP Project Manager, Paul van de Bulk.

Identification

It is the responsibility of all project team members to identify and report risks throughout the project lifecycle, whether that be on project team calls, through Project Management workshops or whilst undertaking technical work.

The risks to project delivery are captured within the project risk register. It is the responsibility of the client and consultant project manager to ensure that the risk register is up to date by allowing technical teams the time and opportunity to raise risk items that need to be added. To date on the Waterbeach to Cambridge Public Transport Scheme this has been done at bi-weekly technical project team meetings and weekly Project Management meetings. A wholesale review of the project risk register has been undertaken twice, once at the start of the Outline Business Case phase and most recently in November 2022 and fed into the Quantified Cost Risk Assessment (QCRA). These updates recognised that the scheme had progressed and were commensurate with the project stage and level of scheme development.

The first review workshop was led by Faithful and Gould Risk Management Team and was attended by key members of the technical and Project Management team. Existing risks were reviewed, and new risks added. Specific risks were identified by discipline leads using their knowledge of the project stage and experience of similar projects.

The second review was undertaken independently by discipline leads and culminated in a Quantified Cost Risk Analysis (QCRA) workshop (see Evaluation).

Assessment

Risks are assessed in terms of their likelihood and impact. Impact is assessment based on the likely time and/or cost effect if the risk comes to fruition. Finally, the impact is classified as effecting the ‘start of works date’ i.e., the risk impacts the planning stage of the project. Or the ‘end of works date, i.e., the risk impacts the construction phase of the project.

Impact is assessed on a scale from 1 – 5. A score of 1 is means that the impact is negligible and therefore has no impact on programme, minimal inconvenience to the end user, no environmental impact, no reputation impact or little to no financial loss. A score of 5 means that the risk impact is catastrophic and therefore results in huge programme delay, critical disruption to front line services, customers badly impacted, serious environmental or reputational damage, risk of legal challenge and huge financial impact.

Likelihood is also assessed on a five-point scale, from 1 (very low likelihood) to 5 (very high likelihood). The average of the impact and likelihood score provides an overall risk score.

The assessment of risks is undertaken by the person or team who has identified the risk. This is then verified during the risk workshop, the latest which was undertaken in September 2022. New risks are assessed and verified by the wider project team and existing risks are revisited to understand whether the impact or likelihood has changed as the project has progressed.

Risks are also re-assessed following the identification of mitigation measures and actions (see Treatment) to provide a residual risk rating.

Evaluation

The risk register has been subject to a QCRA which consists of the following steps:

- Estimating the minimum, likely and maximum impact of the risk on time and cost;
- Verifying the estimates of time and cost impacts with the project team at a workshop;
- Undertaking an estimating uncertainty assessment to understand the uncertainty attached to project cost assumptions, commensurate with the stage of the project; and
- Undertaking Monte Carlo model to assesses the risk register to provide the QCRA. The overall QCRA value is then considered in the Economic Appraisal.

Treatment

A mitigation measure and subsequent action is identified for each risk, and the actions allocated an owner. Mitigation measures are identified at the ‘identification’ stage and revisited as the risks are assessed to understand the impact of the mitigation and to assign actions. Mitigation measures often lead to the

identification of additional work required, engagement with stakeholders necessary or additional assessments to be factored into future stages of the project. These measures could then become project changes and follow the governance arrangements for reporting and capturing change as identified in section 6.3.

Continual review

The risk register will continue to be monitored and, if necessary, updated at regular workshops and meetings. Roles, responsibilities and reporting lines for risk management are clearly defined within the project team, with the client Project Manager and consultant Project Manager responsible for regularly reviewing the register, and discipline leads required to provide update as new risks are identified or existing risk change. As such the risk and issues management procedure detailed in the LAF will be followed. This will include a highlight report being provided to the client project manager and the implementation of mitigation measures if required.

Risks are already being mitigated, where possible, through early engagement with key stakeholders, technical experts and project teams on those projects which the northeast Cambridge to Waterbeach Public Transport scheme has dependencies.

A summary of the most significant risks (in terms of impact) are included within Table 6-9. The current project risk register and QCRA is in Appendix Q.

Table 6-9 - Key risks

Risk	Impact	Mitigation
Poor communication when transferring the design to the contractor	Longer handover period Increased costs associated with extended duration and liaison with contractor	Early contractor engagement during production of Preliminary design
Discovery of uncharted services	Redesign, relocation of services, repair and compensation could impact costs and project timescales	Early desktop utilities searches, stakeholder engagement and site investigations.
The project is predicated on immature technology. Optical guidance is unproven.	Redesign and consultation to accommodate proven technology	Review state of the art technology areas and establish maturity at early stage. Avoid relying on emerging technologies unless risk can be managed. Design transitway to accommodate 'traditional vehicles' as well as being adaptable to future technologies.
Short-listed options are not supported by the public or politically	Rework to revisit options, redesign and resubmit planning documents	Regular engagement will take place with local residents through both formal and informal consultation. Ensure that local residents receive detailed information about the scheme which covers the benefits and mitigation measures. Ensuring that early public engagement takes place to get buy-in from the public for the principle of enhanced public transport route.
Lack of coordination and synergies between the project and other major developments/projects in the area.	Programme delays and potential access issues to be resolved. Redesign and additional engagement required.	The communications strategy includes third parties with appropriate engagement strategies developed. A land consultant has been appointed for specific landowner engagement. Regular engagement ongoing with developers and key stakeholders Stakeholder list maintained and updated regularly.

6.10. Lessons management

The following section sets out the strategy to ensure that lessons learnt from this, and other proposals will be logged and shared with the client and associated project teams. To keep a record of this, an overarching lesson learnt log has been created since the project inception and is regularly maintained by the project management team to ensure that lessons learnt are captured throughout each stage. Lessons will be shared in the following ways:

- Project team meetings with other scheme project managers, lead designers and planners;
- As part of the Joint Professional Services Framework (JPSF), Lunch & Learn sessions will be held to showcase lessons learned from the Waterbeach to Cambridge Public Transport Scheme and others within the Framework; and

- Regular project meetings with the client will ensure that lessons are shared and reported across multiple schemes associated with the client.

6.11. Data and information security

To ensure that data and information is secure during and after the project has been delivered, GCP relies on CCC to provide IT and systems which include processes for the protection of critical systems, digital assets and commercially sensitive data.

6.12. Benefits management, monitoring and evaluation

For any project, it is important for benefits to be effectively managed and evaluated to ensure that a scheme will be delivered on time and on budget, delivering its' forecast benefits. This section sets out the expected benefits of the scheme and the strategy to ensure they are effectively measured and fully realised. Following on from this, the monitoring and evaluation methods to ensure the success of the scheme are outlined.

The DfT guidance 'Monitoring and Evaluation Framework for Local Authority Major Schemes'[98] forms the basis of this monitoring and evaluation strategy, alongside GCP's Assurance Framework, referenced in the preceding sections. The DfT guidance outlines three tiers of monitoring and evaluation, they are:

- Standard monitoring (all schemes);
- Enhanced monitoring (schemes above £50m or which are anticipated to have a significant impact on particular indicators); and
- Fuller evaluation (schemes above £50m and where the scheme is considered to be either innovative, have an adjusted BCR of less than 2, or significant potential risks and sensitivities that may impact delivery or the realisation of benefits. The generation of evidence to inform key evidence gaps is also a criterion for fuller evaluation).

It is currently recommended for the Waterbeach to Cambridge Public Transport Scheme to broadly follow the DfT's enhanced monitoring practice as the total scheme cost, from inception in 2019 through to completion in 2026, of £115.8 (P90) exceeds the £50m mentioned in the DfT framework. The methodology recommended to follow the DfT guidance is shown in Table 6-13.

Following the enhanced monitoring guidance, the scheme will be monitored by GCP against a set of standard measures. The various monitoring measures are considered in terms of the key stages of the scheme, in line with the logic map presented in the Economic Dimension section 3.1.4 and in Table 6-10. These include the following:

- Inputs (i.e., what is being invested in terms of resources, equipment, skills and activities undertaken to deliver the scheme);
- Outputs (i.e., what has been delivered and how it is being used, such as infrastructure built, bus services delivered);
- Outcomes (i.e., intermediate effects, such as changes in traffic flows, modal shifts); and
- Impacts (i.e., longer-term effects on wider social and economic outcomes, such as supporting economic growth).

6.12.1. Benefits realisation

The anticipated benefits to be realised by the scheme have been presented in the economic dimension in section 3.6 and are summarised in Table 6-10. Furthermore, the potential data sources and methodology for measuring and monitoring these benefits is outlined in Table 6-12.

[98] Department for Transport (2012) *Monitoring and Evaluation Framework for Local Authority Major Schemes*

Table 6-10 – Expected benefits to be delivered by the scheme linking to the project Logic Map

Intermediate outcomes	Transport outcomes	Economic impacts
Sustainable Travel: • Public Transport – decrease in journey times and improved reliability; and • Active Travel – quality and safety improvements. Capacity: • Additional capacity on both public and active travel network. Alternatives • Improved alternative travel options will result in reduced dependency on private vehicles.	Sustainable Transport: • Increase in the number of public transport trips; and • Increase in the number of active travel trips. Behavioural Change: • Modal shift away from private vehicle use; and • Improved perception of safety for Active Travel users.	Transport User Impacts: • Bus journey time improvements; • Health benefits; • Active Travel infrastructure quality improvements; • Safety improvements; • Highway VOC reduction; and • Highway journey time improvements. Non-User Impacts: • Air quality improvements; and • Noise improvements. Provider Impacts: • Revenue; and • GDP improvements. Wider Impacts: • Steps towards Net Zero; • Dependent development; • Employment effects; and • Productivity.

6.12.2. Strategy

To evaluate the success of the scheme and whether the objectives defined for the Waterbeach to Cambridge Public Transport Scheme have been met, a structured outline monitoring and evaluation plan has been established which is divided into two parts and will be the responsibility of the GCP to maintain:

- Monitoring of project delivery, which focuses on scheme inputs and outputs outlined in the logic map; and
- Monitoring of the achievement of the scheme objectives, which focuses on impacts and outcomes.

The GCP Executive Board will need to agree the proposed plan as part of the 'sign off' process and ensure that subsequent evaluation is undertaken in line with guidance and will have a role in the scrutiny and review of findings. To evaluate the impact and understand the effectiveness of the scheme in meeting its objectives, GCP will arrange to collect and publish relevant data, comparing the conditions before and after scheme opening.

Monitoring of the achievement of the scheme objectives

The methodology for monitoring the achievement of scheme objectives is set out in Table 6-12. However, further work to develop a benefit monitoring strategy would be undertaken at FBC stage to confirm data sources and approach.

Monitoring of project delivery

The methodology to monitor the project delivery pre-construction is set out in Table 6-11, and seeks to ensure the delivery of the scheme inputs, as outlined in the logic map in Section 3.1.4 of the Economic Dimension, to timeframe, within budget and specification.

Table 6-11 - Monitoring of project delivery

Aspect of project delivery	Method of monitoring	Timeframe
Delivery of Waterbeach to Cambridge to timeframe	• Programme/project plan assessment; • Review of risk register and assessment of impacts; • Project review during scheme design and build; and • Site inspections.	Ongoing throughout project lifecycle
Delivery of Waterbeach to Cambridge to budget	• Programme/project plan assessment; • Change control; • Analysis of risk in the project costs; • Project review during scheme design and build; and • Site inspections.	Ongoing throughout project lifecycle
Delivery of Waterbeach to Cambridge to specification	• Programme/project plan assessment; • Review of risk register and assessment of impacts; • Project review during scheme design and build; and • Site inspections.	Ongoing throughout project lifecycle

Table 6-12 - Methodology for monitoring scheme outcomes against scheme objectives is detailed in the logic map

Scheme impacts	Scheme outcomes	Methodology	Timeframe
Transport user impacts	Bus journey time and reliability improvements	RTPI data	Baseline data collection: Prior to or during delivery Post-opening data collection and analysis: One to five years post opening
	Highway journey time improvements	Transport data collection	
	Health benefits	Quantity of active travel users Air quality monitoring	
	Active travel infrastructure quality improvements	Asset surveys	
	Safety improvements	Accident data	
Non-user benefits	Air quality and noise improvements	Air quality and noise improvements	Baseline data collection: Prior to or during delivery Post-opening data collection and analysis: One to five years post opening
Provider impacts	Revenue	Operator reporting/ticket data	Baseline data collection: Prior to or during delivery Post-opening data collection and analysis: One to five years post opening
	GDP improvements	Economic data	
Wider impacts	Steps towards Net Zero	Regional carbon monitoring	Baseline data collection: Prior to or during delivery Post-opening data collection and analysis: One to five years post opening
	Dependent development	Quantum of additional employment unlocked	
	Employment effects	Quantum of additional employment unlocked	
	Productivity	Economic data	

6.12.3. Monitoring and evaluation reporting

The outcomes of the monitoring will be communicated through post-opening reports. Usually, the first of these reports is released one-to-two years after the scheme opening and details the conclusions of the project delivery, budget management and an initial evaluation of the level of benefit realisation. The Final Report is to be produced five years after scheme opening, which provides a full assessment of the economic, social and environmental benefits delivered by the scheme.

Data collection may involve using nationally purchased datasets such as Trafficmaster and data provided by bus operators, as well as specifically commissioned surveys near sites of influence. For each objective, at least one method of monitoring the performance of the scheme over time is proposed, as set out in Table 6-13.

Upon the development of final scheme specifics at FBC stage, the monitoring and evaluation plan will be reviewed and re-confirmed.

Table 6-13 - Components of enhanced monitoring and reporting

Item	Stage	Type of information provided	Data collection timing	Reporting	Rationale
Scheme build	Input	Programme/project plan assessment Stakeholder management approaches A review of the risk register and assessment of the impacts	During delivery	'One year after' report only	Knowledge
Costs	Input	Outturn investment costs Analysis of risk in the elements of investment costs Identification of cost elements with savings Analysis for cost elements with overruns Outturn operating costs Outturn maintenance or other capital costs	During delivery / post opening	'One year after' report and Final report	Accountability
Delivered scheme	Output	Full description of scheme outputs Identification of any changes to scheme since funding approval Identification of any changes to key assumptions Assessment of whether the scheme has reached the intended beneficiaries Identification of changes to any scheme mitigation measures	During delivery / post opening	'One year after' report only	Accountability
Scheme objectives	Output / Outcome / Impact	Identification of the main objectives	During delivery / post opening (up to 5 years)	'One year after' report and Final Report	Accountability
Travel demand	Outcome	Junction delay across the network Patronage of the public transport system in the area Counts of pedestrians and cyclists	During delivery / post opening (up to 5 years)	'One year after' report and Final Report	Accountability

Item	Stage	Type of information provided	Data collection timing	Reporting	Rationale
Travel times and reliability	Outcome	Travel times in the corridors of interest Junction delay across the network	During delivery / post opening (up to 5 years)	'One year after' report and Final Report	Accountability / Knowledge
Impact on the economy	Impact	Travel times / accountability changes to businesses Employment levels Rental values	During delivery / post opening (up to 5 years)	'One year after' report and Final Report	Accountability / Knowledge
Carbon	Impact	Effect of the scheme on carbon in the area of interest	During delivery / post opening (up to 5 years)	'One year after' report and Final Report	Accountability / Knowledge
Noise	Impact	Effect of the scheme on noise levels at key receptor locations	During delivery / post opening (up to 5 years)	'One year after' report and Final Report	Accountability / Knowledge
Local Air Quality	Impact	Effect of the scheme on local air quality in the area of interest and at key receptors	During delivery / post opening (up to 5 years)	'One year after' report and Final Report	Accountability / Knowledge
Accidents	Impact	Effect of the scheme on accidents in the area of interest	During delivery / post opening (up to 5 years)	Final Report only	Accountability / Knowledge

6.13. Project closure

The arrangement for the project closure and how data will be captured for future benchmarking is set out in the following section.

The scheme will be monitored to evaluate the success of the project and to understand to what extent the objectives have been met. As such an outline monitoring and evaluation plan has been established, as detailed in 6.12.

Data will also be captured using a lessons learnt log which will be shared with other projects to use as a potential benchmark for future similar projects, detailed in 6.10.

The Executive Board are responsible for the formal closure of the project following the consideration of the Project Review Report.

Appendix A. Dependent development note

1. Introduction

The purpose of this note is to set out the assessment of the impacts that the Waterbeach to Cambridge Public Transport Scheme ('the scheme') is expected to deliver in terms of releasing Dependent Development, set against the broader economic narrative and context of the area.

1.1. Scheme overview

The Greater Cambridge Partnership (GCP) is proposing a public transport scheme to improve connectivity between Waterbeach New Town and Cambridge city centre, creating a busway link to support economic and housing growth, provide more reliable journeys by public transport and to increase the uptake of sustainable travel in the corridor. This technical note presents the two route options assessed in the Outline Business Case (OBC): the Revised Central option and the Western option, as illustrated in Figure 1-2.

1.2. Scheme objectives

The objectives for the Waterbeach to Cambridge Public Transport Scheme are set out below:

1. Provide additional sustainable transport capacity to provide for the transport demands of economic and housing growth;
2. More reliable journey times by public transport;
3. More journeys along the corridor being undertaken by public transport; and
4. More short journeys along the corridor being undertaken by walking and cycling (because people feel safer and have direct routes between origins and destinations).

1.3. OBC route options

There are two route options for the Waterbeach to Cambridge Public Transport Scheme being assessed as part of the OBC, the Western option and the Revised Central option, illustrated in Figure 1-2.

1.4. This assessment

This assessment is based upon the principles of TAG Unit A2.2 and follows the steps below.

Figure 1-1 - Dependent Development Assessment Steps

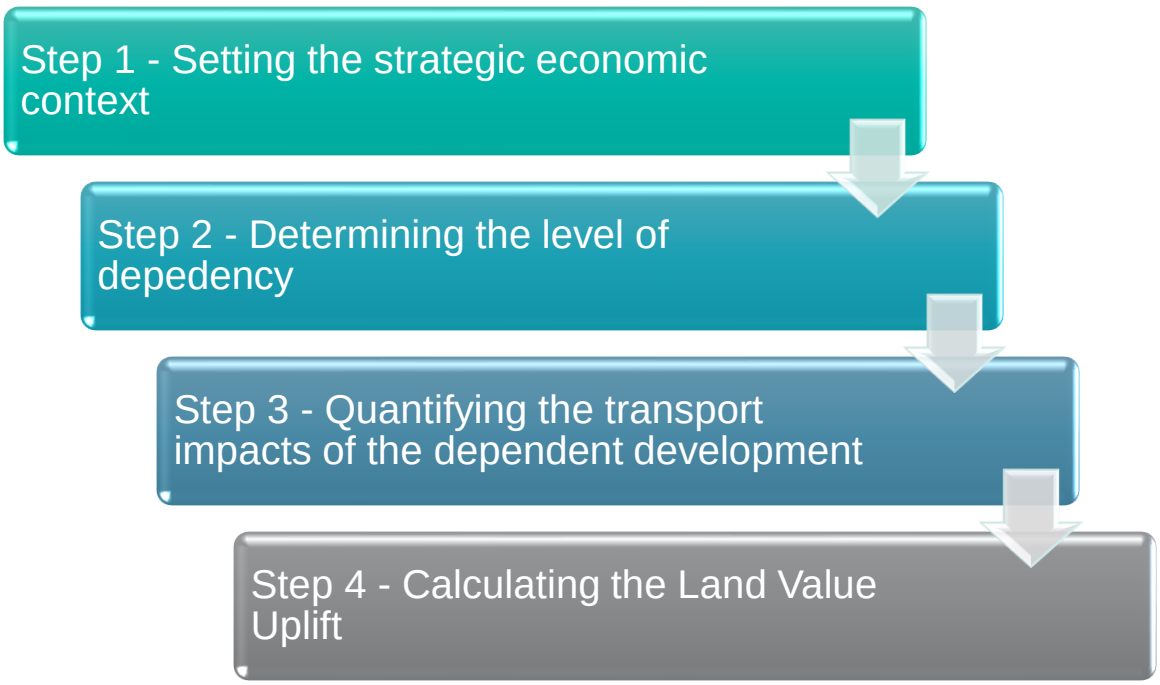
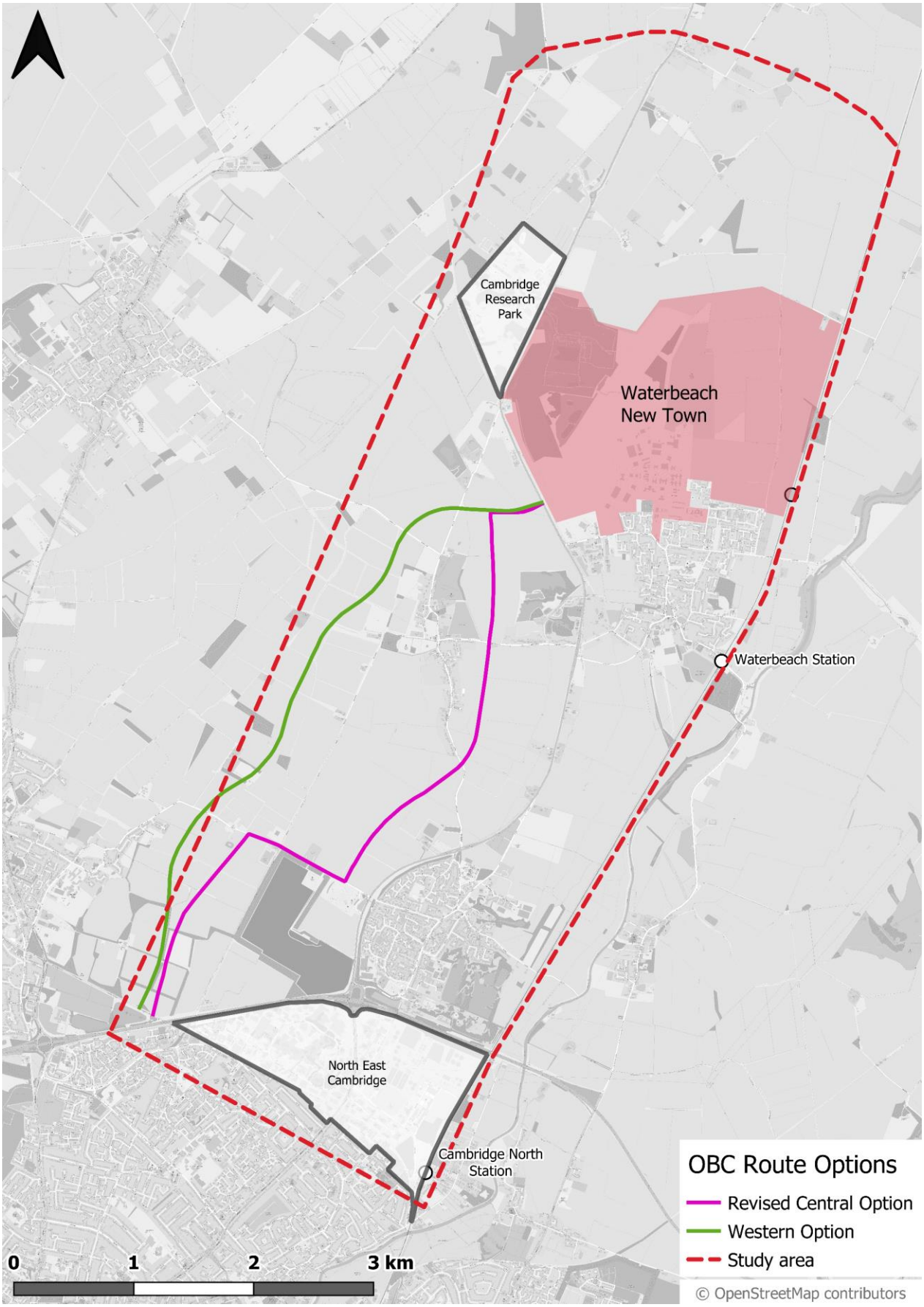


Figure 1-2 - Route alignment options assessed in the OBC



2. Approach to economic appraisal

2.1. Introduction

The economic appraisal has been carried out in line with the Department for Transport (DfT) Transport Analysis Guidance (TAG) to produce a robust Value for Money (VfM) assessment for the scheme.

The Economic Dimension for the scheme concludes with a VfM assessment that incorporates both the monetised impacts and the non-monetised assessment of the proposals. The approach to the economic appraisal is set out below.

2.2. Transport appraisal guidance

The HM Treasury (HMT) Green Book provides central government guidance on how to appraise and evaluate public policies, projects, and programmes using the Five Case Model. TAG, which largely aligns with the Green Book approach, is the Department's guidance on modelling, appraisal and evaluation. The OBC for this scheme is considered to be consistent with TAG and, where relevant, the Green Book.

The Economic Dimension for the scheme includes Cost-Benefit Analysis (CBA) of user and non-user impacts (e.g., changes in travel costs and times, and decongestion), changes in the externalities associated with car use (e.g., emissions and accidents), and changes in operating costs and revenue to the public and private sector. These, under an assumption of no changes in land use, are all termed Level 1 impacts. When set against a scheme's projected capital and operating expenditure, these result in an initial Benefit-Cost Ratio (BCR). User benefits (in the form of monetised generalised travel cost savings) are typically the principal effect of a transport improvement and form the core of an economic appraisal, but there is wide agreement that they fail to capture the full impact of major projects.

Through the consumer surplus theory, user benefits are assumed to act as a proxy for conventional economic impacts (e.g., changes in GDP or GDV and the associated job gains and productivity uplifts). In practice, however, because of the presence of market failures, the benefits accruing to users may only partially account for the benefits of a transport improvement.

To account for this, TAG sets out an assessment of Wider Economic Impacts (WEIs) in TAG units A.2.1-A.2.4 and TAG unit M5.3. This guidance seeks to capture the net additional impacts (at the UK level) that can arise as the impact of the transport improvements are transmitted into the wider economy, beyond those businesses and passengers that are directly affected by the transport change.

The DfT's latest guidance on WEIs, published in May 2018, identifies three 'levels' of impact and these have been incorporated into the VfM assessment. These include:

- **Level One – User Benefits:** direct effects which comprise the savings in time, vehicle operating costs, and other elements of generalised travel cost associated with better transport. The Level 1 BCR also includes some monetised externalities to society and the environment. The assessment of Level One benefits assumes fixed land use;
- **Level Two – Connectivity impacts:** changes to productivity (static clustering), employment (labour supply impact) and induced investment (output change in imperfectly competitive markets). These impacts also assume fixed land use; and
- **Level Three – Structural and context specific impacts:** the result from the potential for transport to alter patterns of private sector investment and employment, and thereby land use. This is a complex area of debate given transport links are but one factor shaping the location decisions for firm's investment. The concepts of additionality, displacement, and the social value of investment are important. These effects are also 'indicative' monetised impacts and can involve dynamic land use scenarios (in response to changes in transport supply).

Dependent development impacts falls in to the Level Three benefits category, whereby there is a proportion of a development which can only proceed on the basis of a transport scheme being delivered to alleviate network performance deterioration brought about as a result of the development. This applies to this scheme, as currently there is a proportion of the development that has been approved without improvements to the transport network. The remainder of the development could therefore be classed as dependent on a transport network improvement such as this scheme. Therefore, we need to assess the potential benefits that could be unlocked by our scheme in relation to this dependent of the development.

The transport impacts (Level 1) of the shortlisted scheme options, such as travel time savings, vehicle operating costs and health benefits were monetised. These were set against the project's estimated expenditure, which resulted in an initial Benefit-Cost Ratio (BCR) for the short-listed options. A further assessment of the options was undertaken against a wider range of monetised impacts, such as impacts on employment and productivity, to provide an adjusted BCR (Level 2). By combining the BCR results with the outputs of the qualitative assessment of the options, against a range of assessment criteria, an overall assessment of the options' VfM was made. This resulted in the identification and selection of the Revised Central option as the preferred option. Given that there is no formal dependency specified in planning terms between the development and this specific scheme, although dependency on 'a' scheme is noted, it was not considered appropriate to undertake the dependent development assessment on the basis of informing the preferring option. Therefore, the resulting dependent development analysis (Level 3) has therefore used the Revised Central option as the basis for the assessment.

This dependency unlocks significant benefits for increased land value but needs to be considered alongside the impact of additional travel demand on the existing users of the transport network. The total benefits for dependent development are quantified as:

$$Total\ Benefits = Land\ Value\ Uplift + Other - Transport\ External\ Costs - Land\ Amenity\ Value$$[1]

3. Local economic narrative (Step 1)

To fully understand the background to the development being required and why a development in a non-dependent area could not be brought forward, it is important to understand the local economic context within which the development and transport scheme sit.

3.1. Employment

Cambridge city and the surrounding area ('Greater Cambridge') is a highly successful region of the UK, with thriving economic success. This is, in part, driven by a growing technology and biotechnology sector which has been developing since the 1960s. This sector is a fundamental part of what is called the 'Cambridge Phenomenon'.

Cambridge is grounded around one of the nation's most prestigious universities: the University of Cambridge. The University brings people in from a global pool of talent, fostering their abilities and encouraging innovative business and technological development. As such, Cambridge is at the forefront of cutting-edge technologies within fields such as drug modelling, DNA sequencing and alternative fuels.

Further to this, the Cambridge sub-region is a centre for the life sciences. The Cambridge Biomedical Campus, located towards the south of the city, is centred around world-class health provision facilities at Addenbrookes Hospital and the recently relocated Royal Papworth Hospital, which is internationally recognised for its heart and lung treatments. Other research centres within the life sciences are located around South Cambridgeshire at the Wellcome Genome Campus, Babraham Research Campus, and Granta Park.

Towards the north of Cambridge, there is the Cambridge Science Park, which is one of Europe's largest centres for commercial research and development.

Whilst Cambridge has long been attractive for start-ups and entrepreneurs, it is increasingly finding itself as a destination for well-renowned multi-national corporations as well. As well as AstraZeneca, who have chosen Cambridge for its global research and corporate headquarters, major companies such as Amazon, Intel, Microsoft, Qualcomm, and Samsung all have a major presence within the city and are key sources of employment for residents.

Overall employment within Cambridge is considered highly productive due to the high concentration of aforementioned high-skill knowledge-based employment centres within the city. Cambridge being a centre for high-skill, high-wage employment is also shown by the fact that 63.51% of the working age population hold an NVQ4 equivalent qualification or higher[2].

[1] "Non-Transport Complementary Interventions" have been classified as negligible impact for the purpose of this assessment and are assumed to be captured by the Land Value Uplift.
[2] Centre for Cities (2021) Centre For Cities: Outlook Data Tool *[Accessed 05/06/2023]*

The economic success of Cambridge means that its housing market is under strain, increasing house prices. The average price of a house in Cambridge city is £591,400 (2021)[2] compared to the UK average of £274,000 (2022)[3]. House prices in the region are also increasing at a faster rate compared to the rest of the UK.

3.2. Housing

Growth targets for Greater Cambridge are set out in the Cambridge City Council Local Plan[4] and South Cambridgeshire District Council Local Plan[5], which were both adopted in 2018. The proposed housing and employment growth detailed in the local plans are presented in Table 3-1. There is also the new Greater Cambridge Local Plan, which is being consulted on by Greater Cambridge Shared Planning (GCSP) and is expected to be adopted in 2024/2025. GCSP plans expand on the Cambridge City Council and South Cambridgeshire District Council Local Plans, with 19 new sites which may be suitable for additional development to meet the needs for Greater Cambridge up until 2041.

Table 3-1 - Proposed Local Plan Development

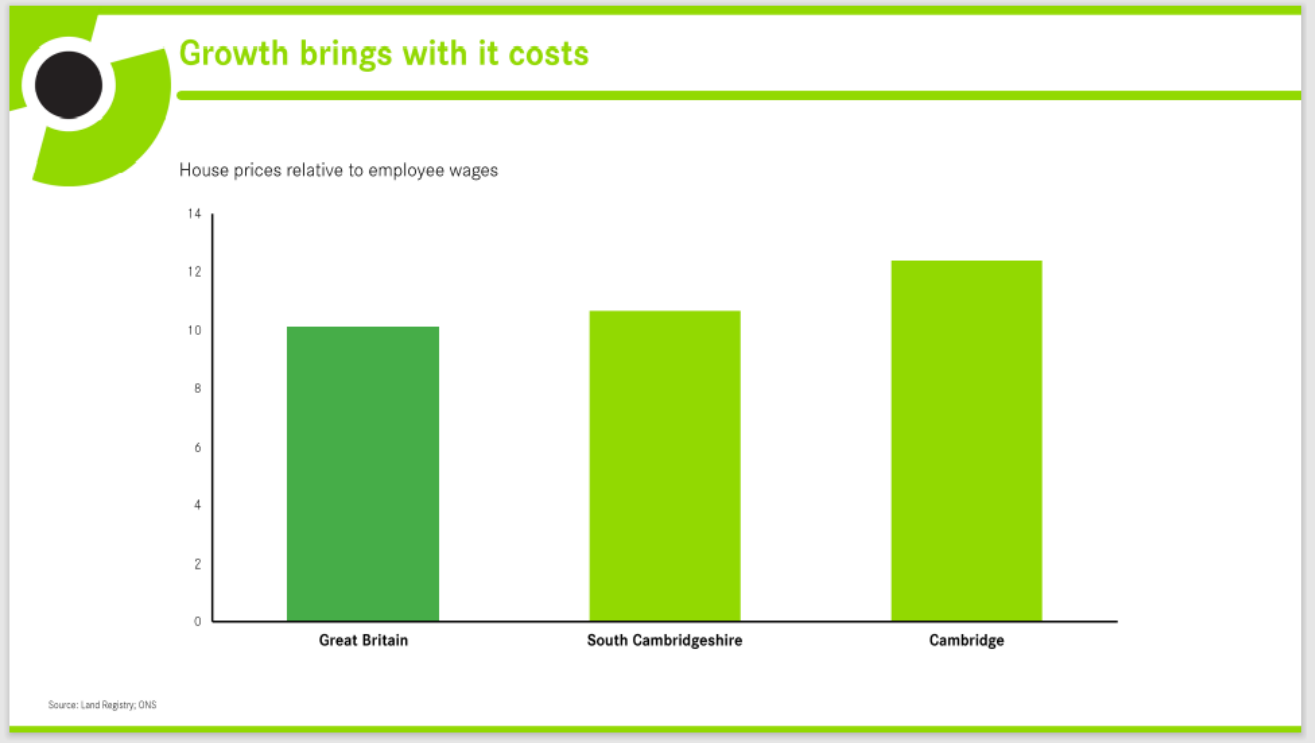
	Housing growth (2011 – 2031)	Employment growth (2011 – 2031)
Cambridge Local Plan (2018)	14,000	22,100
South Cambridgeshire District Local Plan (2018)	19,500	22,000

High house prices, especially within the city itself, are driving people to look further afield to areas like Cambourne, St Neots, Huntingdon, and Waterbeach. This puts increasing pressure on routes connecting those towns to Cambridge, as an increasing number of people are commuting to the high-skill employment centres within the city.

The Cambridge and Peterborough Independent Economic Review (CPIER) final report[6] published in September 2018, highlights risks to the future growth of Cambridge due to an interlink of housing pressure, employment, and transport constraints. It states that if house prices and rents were to increase further, along with an increase in the number of commuters leading to extra delays, wages demanded by workers could have to increase to compensate for difficulties with getting to work. The CPIER suggests that Cambridge might not be able to maintain its present high levels of growth given current infrastructure constraints and local plans; growth could start to slow down as house prices, office rents, and congestion make the area an unsuitable place for many to live and/or work. House prices relative to employee wages, across Cambridge, South Cambridgeshire and Great Britain, are presented in Figure 3-1. This further demonstrates the high house prices, relative to wages, in Cambridge and South Cambridgeshire compared to national averages.

[3] Office for National Statistics (2022) UK House Price Index - Office for National Statistics (ons.gov.uk) *[Accessed 05/06/2023]*
[4] Cambridge Local Plan (2018)
[5] South Cambridgeshire District Council Local Plan (2018)
[6] Cambridge and Peterborough Independent Economic Review (2018) *Final Report*

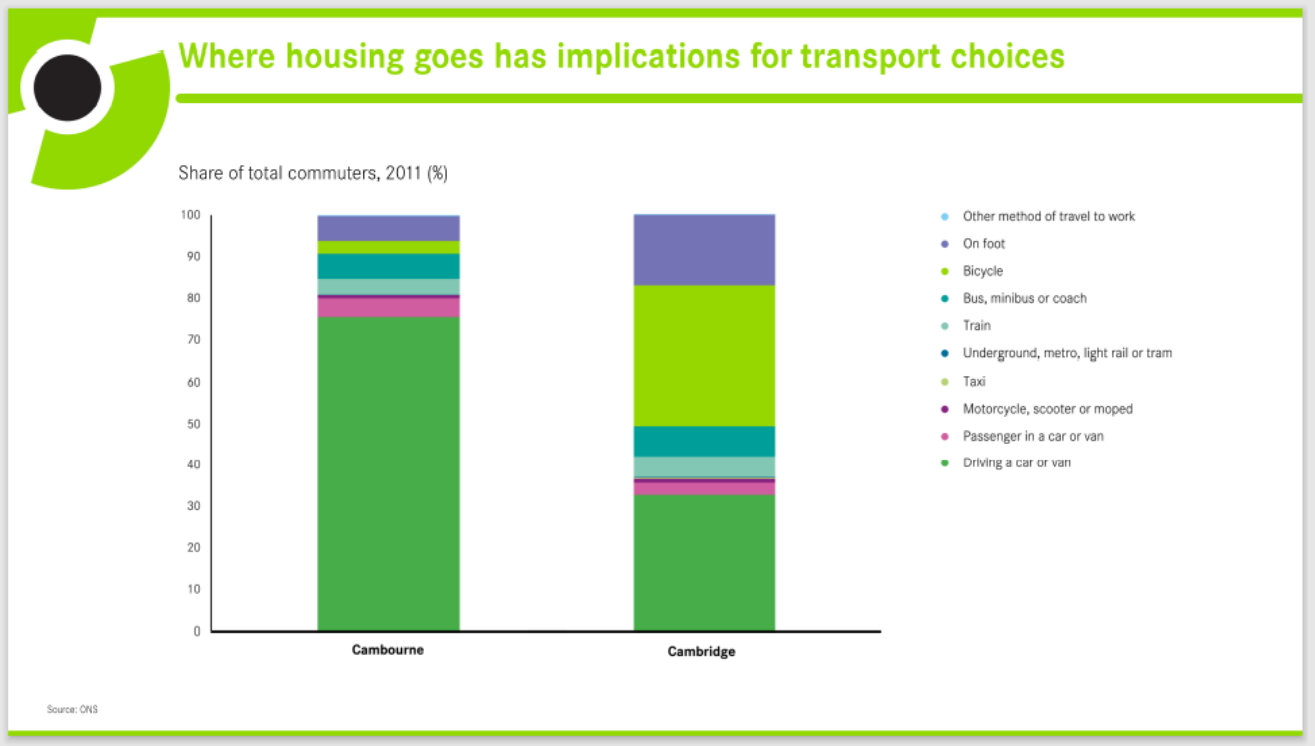
Figure 3-1 - House prices relative to employee wages[7]



Greater Cambridge is responding to the challenges surrounding its housing supply, as it is a UK leader for year-on-year growth in housing stock. Whilst some of this housing stock is being built within Cambridge City itself, South Cambridgeshire is also seeing a high level of growth, particularly within new towns and communities already built (Cambourne), currently being built (Northstowe and Waterbeach New Town), or going through various stages of planning (North East Cambridge). The location of these developments could have a knock-on effect on the transport issues and constraints already seen within and around Greater Cambridge, with those who live in communities separated from Cambridge City by the green belt overwhelmingly choosing to commute into Cambridge by car as opposed to a more sustainable methods of transport such as bus or train. This is presented in Figure 3-2 and discussed further in Section 3.3.

[7] *Centre for Cities: PowerPoint Presentation (centreforcities.org)*

Figure 3-2 - Modal split of commuters[8]



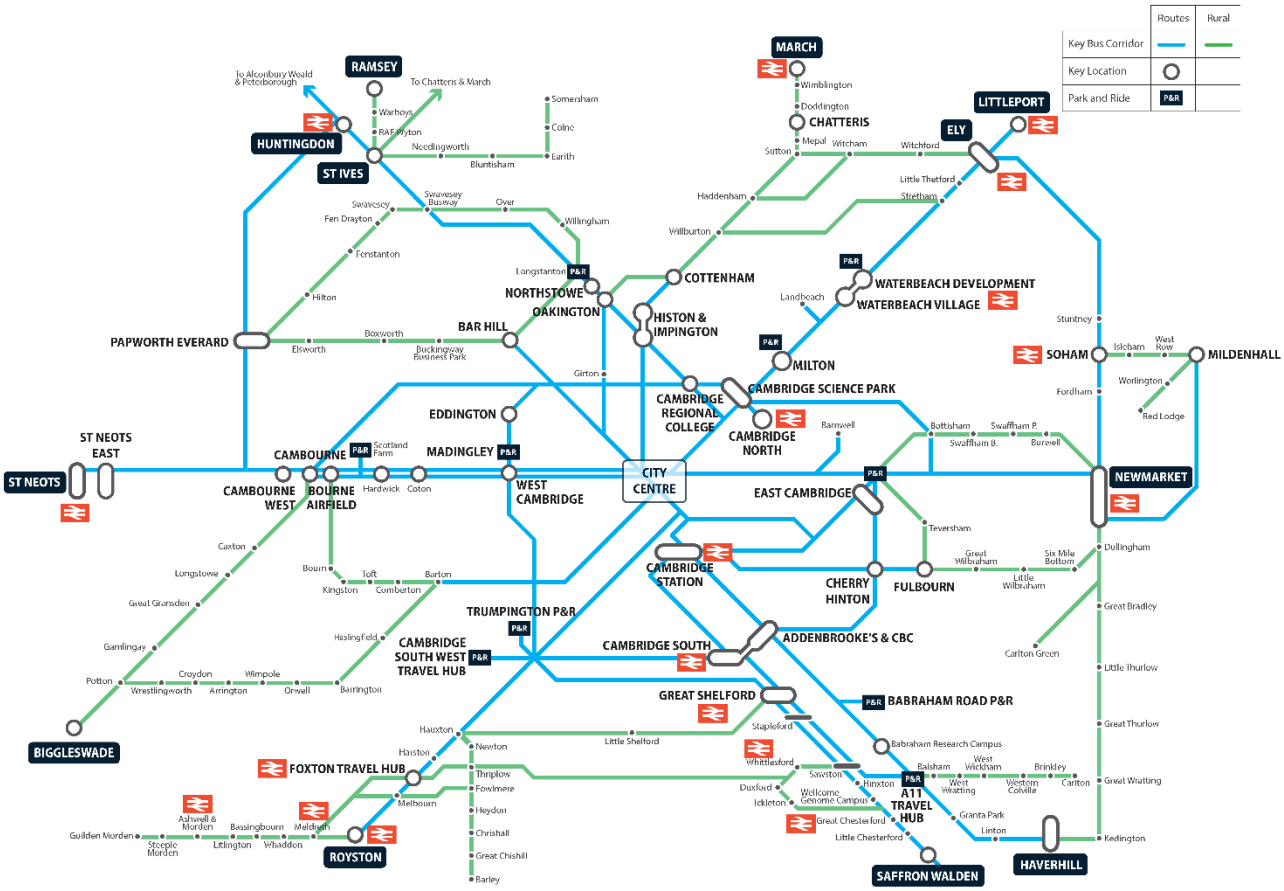
3.3. Transport

Adequate transport infrastructure is fundamental to the future growth of Greater Cambridge; not finding solutions to the current problems the network currently faces threatens to undermine the ambitious growth plans which the GCP and the Cambridge & Peterborough Combined Authority (CPCA) have for the area. However, appropriate investment into modern, sustainable, and convenient transport options away from the car could unlock the potential of Greater Cambridge.

The GCP and CPCA have outlined a number of key bus corridors to focus investment on, as presented in Figure 3-3. The Waterbeach to Cambridge corridor forms one of these areas of focus.

[8] *Centre for Cities: PowerPoint Presentation (centreforcities.org)*

Figure 3-3 - GCP corridor schemes[9]



At the fringes of Cambridge City, there are a number of Park and Ride sites designed to capture car drivers using these routes, encouraging them to use the more sustainable bus within city limits. There is also the Cambridgeshire Guided Busway (CGB), a segregated busway route serving St Ives (with some buses travelling beyond to Huntingdon) and the northern fringes of the A14 corridor, with longer-distance Park and Ride facilities located in St Ives and Longstanton. Cambridge is served by rail connections both to the north (Ely, Peterborough, and Kings Lynn) and to the south (London Kings Cross and London Liverpool Street). There is infrequent service to Newmarket and other destinations to the east, and there is also the potential of a western rail link in the medium-to-long term as part of the East-West Rail project, connecting Cambridge with Cambourne, St Neots, Bedford, Milton Keynes, and Oxford with new rail infrastructure.

Cambridge's transport facilities need improvement. Many of the roads within Cambridge city are functioning at or above capacity. Outside of Cambridge city itself, key routes such as the A428 and A10 can experience significant congestion.

Key routes to Park and Ride facilities are also heavily congested, due to the growth of the city in recent years. These further increases Park and Ride journey times could make use of these facilities less attractive. The construction of new communities without further investment in public transport and active travel infrastructure will put further pressure on already congested roads.

[9] Greater Cambridge Partnership - Public transport schemes (greatercambridge.org.uk) *[Accessed 05/06/2023]*

Table 3-2 - Park and Ride capacity[10]

Park and Ride Site	Capacity
Milton	792
Newmarket Road	873 (259 front car park / 614 rear car park)
Babraham Road	1,548
Trumpington	1,600
Madingley Road	930

To alleviate these issues, the GCP proposes a series of new Park and Ride facilities which are further away from Cambridge and function in a similar way to Longstanton and St Ives. They will be built on corridors already served by an existing Park and Ride site, but at a location aimed at collecting longer-distance commuters such as those travelling from Cambourne or Ely. They are not intended to replace existing provisions, but rather work in tandem with them to alleviate pressure both within their respective transport corridors and Cambridge city as a whole. The proposed new Park and Ride sites and the corridors they will serve are presented in Table 3-3.

Table 3-3 - Proposed new/relocated Park and Ride sites

Corridor	Existing Park and Ride Provision	New Park and Ride Provision
A10N	Milton	Waterbeach
A14E & A11	Newmarket Road	Newmarket Road (relocated)
A1307	Babraham Road	A11 Travel Hub, Babraham
M11	Trumpington	South West Travel Hub
A10S		
A428	Madingley Road	Scotland Farm

3.4. Waterbeach New Town

Waterbeach New Town is a planned new development located to the north of the existing village of Waterbeach, built upon the former Waterbeach Barracks (Waterbeach New Town West) as well as land to the east of them (Waterbeach New Town East). There are planned to be a total of 11,000 homes when complete (6,500 at Waterbeach New Town West, 4,500 at Waterbeach New Town East) located alongside the A10, with the development aiming to be a satellite settlement of Cambridge which promotes active travel and public transport use instead of the car.

South Cambridgeshire District Council has approved various plans in order to reduce car reliance in the new town. Improvements of existing cycle infrastructure, as well as a new rural cycle path along Mere Way, are planned to be developed. New active travel routes linking Cambridge and Waterbeach New Town will connect to over 20km of cycle routes within the first phase of Waterbeach New Town West. It is also proposed to relocate Waterbeach Railway Station, from its current location on the south-east of Waterbeach Village to a new site further north on the Fen Line. This new station is planned to be located as part of a higher density neighbourhood of Waterbeach New Town East, with the aim of better serving the existing Waterbeach village and the New Town together. Facilities at the station are also to be improved, allowing for twelve-carriage trains to serve the station and encourage more people to use the train as a form of transport to and from Cambridge and beyond.

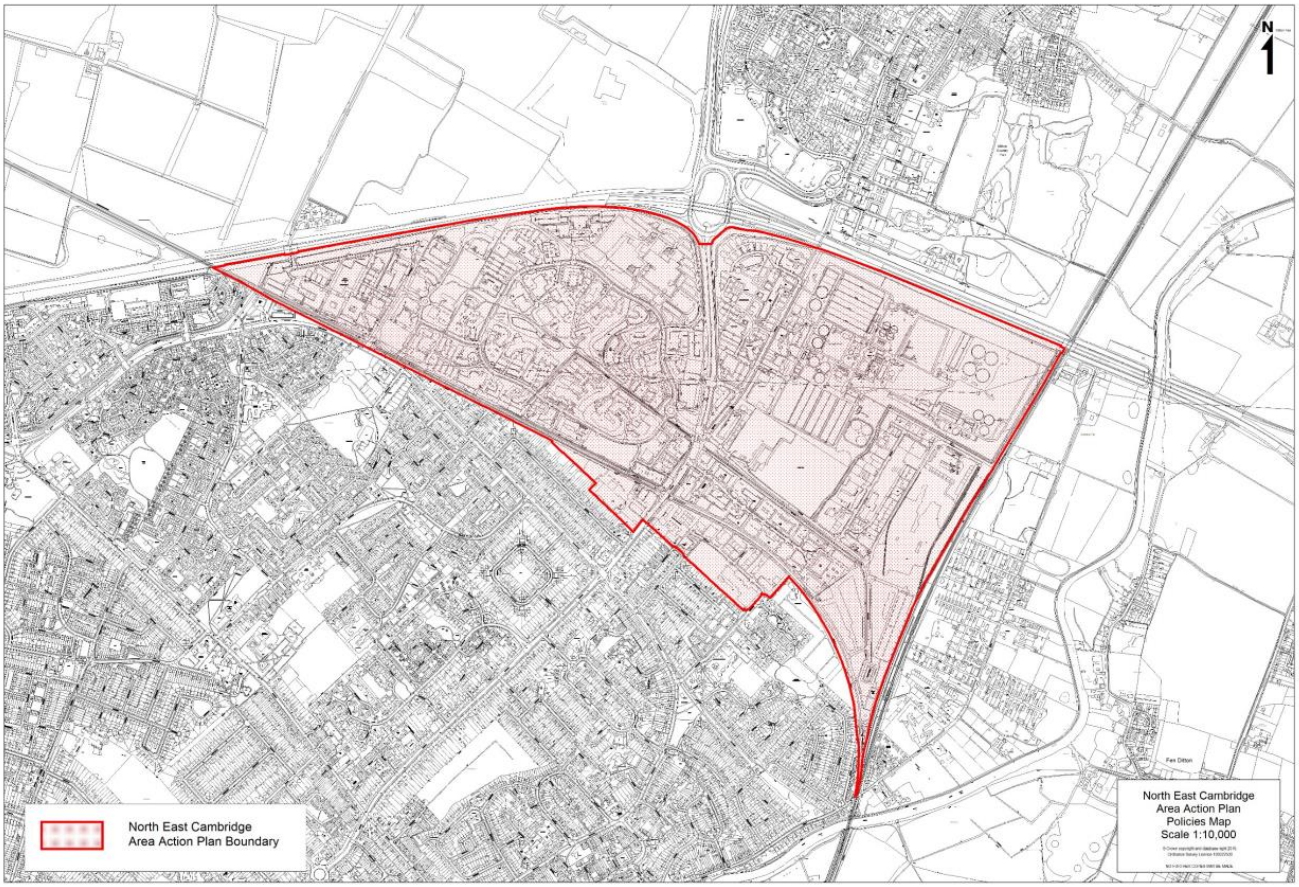
Within the development of Waterbeach New Town, a local bus service is to be provided. It is planned to comprehensively serve both Waterbeach New Town East and West, with stops at higher-density neighbourhoods located throughout including the new Station Quarter. This will allow for a rapid public transport system.

[10] Data retrieved from Parking list (smartcambridge.org) and Cambridge park & ride (cambridgeparkandride.info)

3.5. North East Cambridge

The North East Cambridge Area Action Plan, illustrated in Figure 3-4, covers an area to the north of Cambridge, either side of Milton Road, encompassing the Science Park as well as brownfield land around the existing water treatment plant, which is identified as a potential location for development into a new, mixed-use community. It is anticipated to be a low-carbon district, with current plans aiming to provide 8,000 dwellings as well as supporting an additional 20,000 jobs on top of the approximately 15,000 there currently[11].

Figure 3-4 - North East Cambridge Area Action Plan[12]

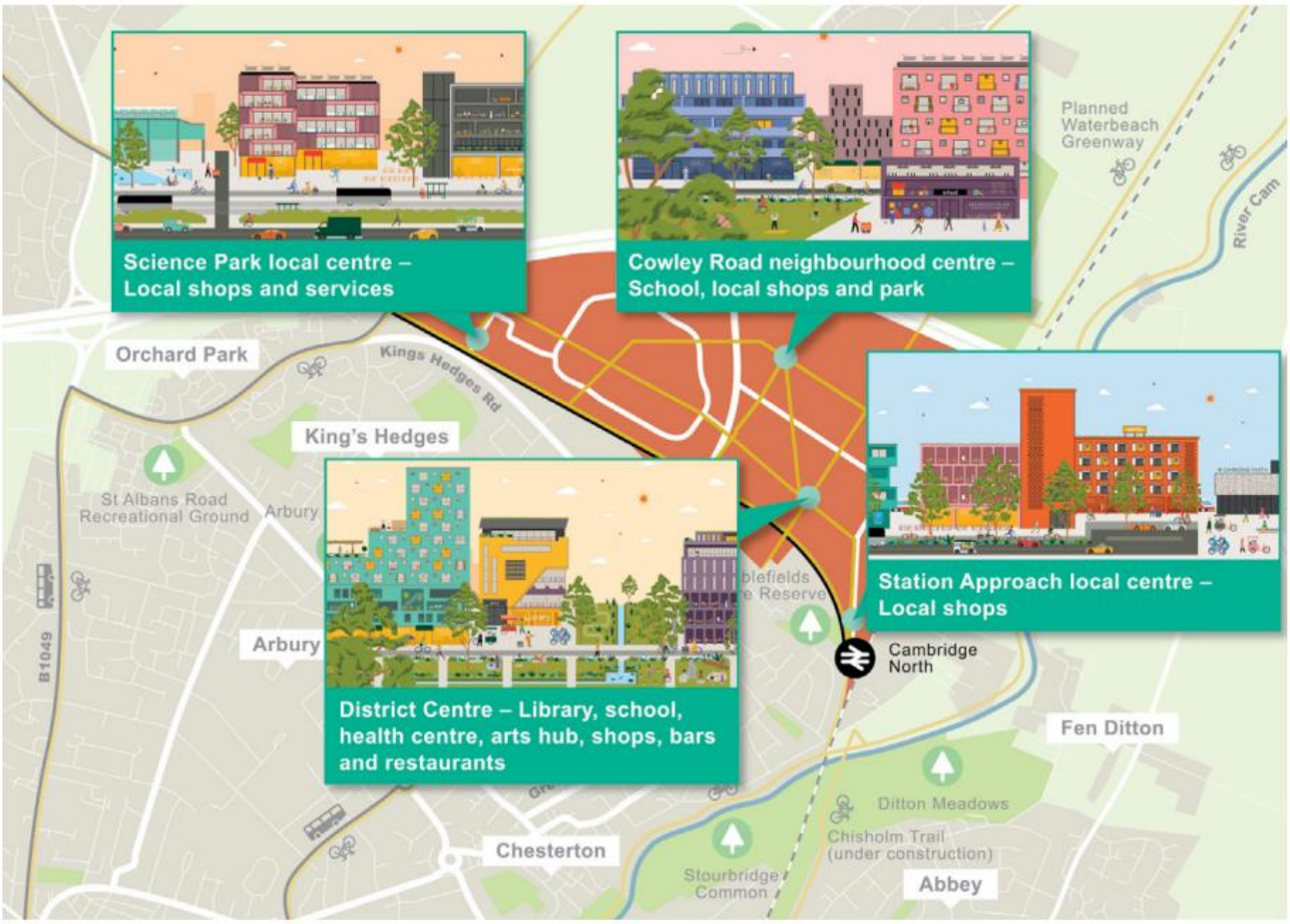


It is anticipated to be a low traffic neighbourhood, taking advantage of its location connected to a number of public transport links. The area is close to the recently opened Cambridge North Station, with services to Ely, Cambridge, and onwards to London. The development is intended to transform Cambridge North Station into a transport hub for the city, with the new 'Station Approach local centre' planned to contain housing, offices, hotels, and other local services. It also serves as a terminus for the CGB, which will see services to St Ives as well as the city centre increased in frequency as development gets underway.

However, the connections from the development to other areas needs supporting by improving upon this public transport connectivity, as highlighted by the A10 Corridor Study.

[11] Greater Cambridge Shared Planning (2022) – *North East Cambridge Area Action Plan*
[12] Greater Cambridge Shared Planning (GCSP) - North East Cambridge Area Action Plan Proposed Submission Policies Map: *NECAAPSDPoliciesMap202v22021.pdf (greatercambridgeplanning.org)*

Figure 3-5 - Planned Local Centres included in the North East Cambridge Area Action Plan[13]



As well as its connections promoting sustainable transport use, the neighbourhoods will be built in such a way that it will not be necessary to own a car – in fact, there will only be one car parking space built per two dwellings. Outside of primary throughfares, roads will be built based upon the Dutch 'Woonerf' concept of living neighbourhoods, characterised by shared space, traffic calming, and low speed limits, with more space allocated to pedestrians, buses, and cyclists than car drivers.

Green space is forming a fundamental part of the development, with the area of parkland dramatically increased in response to the first public consultation. Currently, the action plan points to two primary pieces of parkland: the Cowley Triangle and 'Linear Park' alongside the first public drain towards the River Cam. In addition, there will be numerous smaller pieces of public space, ensuring that all residents are no longer than 5 minutes' walk away from green space.

[13] Greater Cambridge Shared Planning – *Draft North East Cambridge Area Action Plan* Draft North East Cambridge Area Action Plan - download version.pdf (greatercambridgeplanning.org) *(Page 15)*

4. Dependent development analysis (Step 2)

This section presents the work to identify if any of the development is dependent on transport network improvements. If this is the case, then tests are undertaken to establish the quantum of development that is dependent, based on a tipping point whereby increased development levels trigger transport conditions where the network no longer provides a 'reasonable level of service'. This is identified where the delay at known pinch points on the network is seen to drastically increase with marginal development level increases.

This test is looking specifically at Waterbeach New Town. The transport model used to assess the impacts was the Cambridge Sub-Regional Model (CSRM2 (F-Series)), which provides a forecast of the development level up to 2041. Therefore, this test establishes the proportion of the 2041 development level that is dependent on transport network improvements.

4.1. Methodology for identification

Analysis was undertaken to understand how the development at Waterbeach New Town could impact the highway network performance as well as wider connectivity. This was completed by creating a range of forecast scenarios in 2041 with a varying quantum of development in the Waterbeach zone at 10% intervals within the Cambridge Sub-Regional Model (CSRM2 (F-Series)). This was based on the Waterbeach to Cambridge 'Do Minimum' (DM) scenario which excludes the Waterbeach to Cambridge Public Transport Scheme infrastructure. This provides a series of snapshots, or 'keyframes,' which can be used to understand the likely performance of the highway network and key junctions/nodes within the network in relation to different quantum of development at Waterbeach New Town, in search for an appropriate level of 'development dependency'. Once this process was completed, a new 'Do Minimum' scenario (Scenario P) was found at which the transport network can accommodate the new development without exceeding an acceptable level of service. This scenario can then be used in the subsequent process to identify the welfare impacts of the volume of new development that is judged to be dependent on transport intervention.

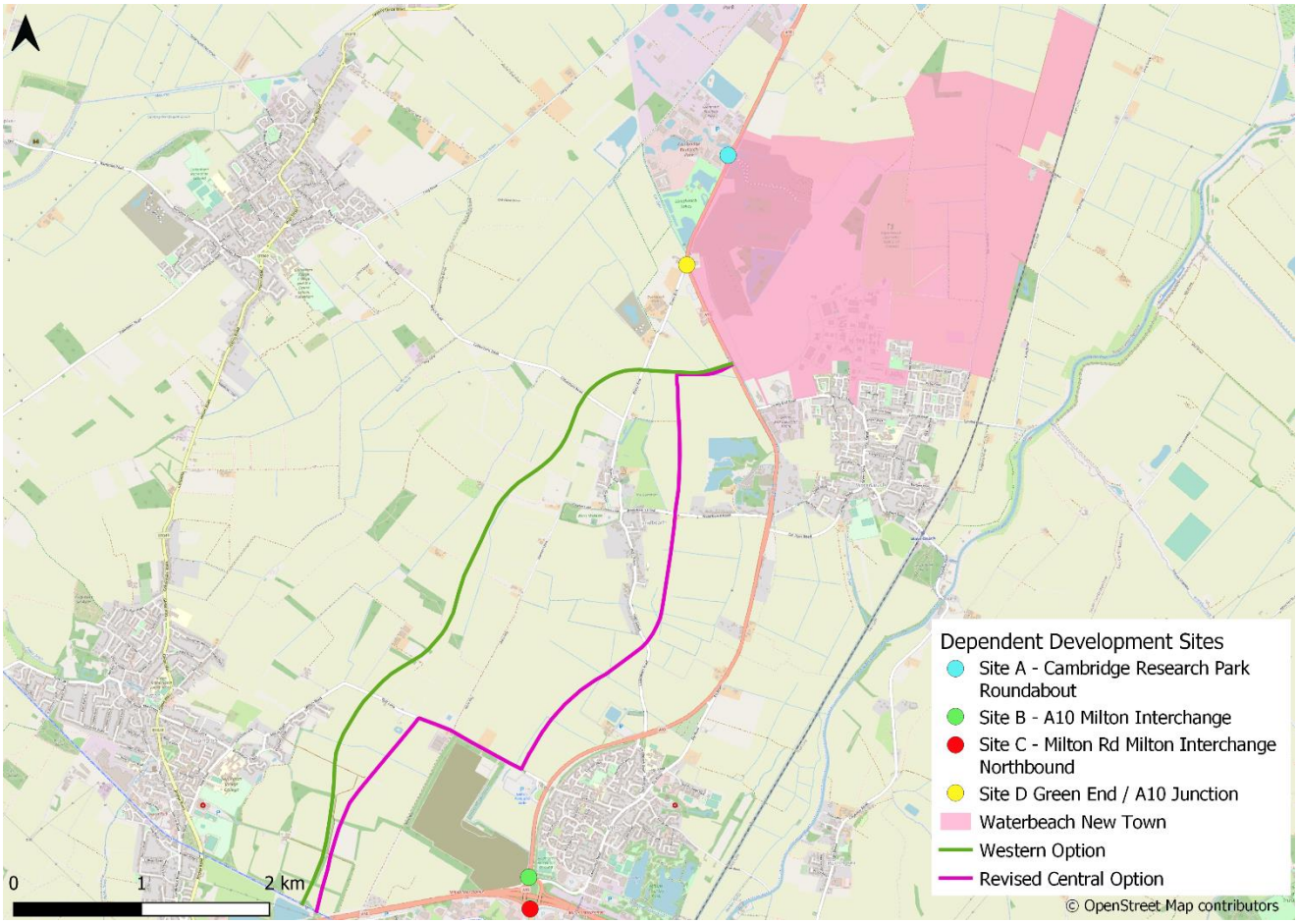
To find the most critical junctions on which to focus the analysis, delays at certain junctions were observed during the AM and PM peaks for the DM runs with the Waterbeach zone both activated (developed and built out, as per the 2041 forecast specifications) and deactivated (totally undeveloped within the model) (Table 4-1). Delay at these junctions was compared between the activated and deactivated runs to analyse whether any significant changes occurred between the two. In this first comparison, it was noted that there were a number of nodes which could be further analysed due to an increase in delay and/or V/C (vehicles transiting through the junction expressed as a percentage of the assessed operating capacity of the junction). The difference in the forecast user delay is solely attributed to the varying quantum of housing and development at Waterbeach New Town.

The four junctions which were identified for further analysis due to the potential impact of the Waterbeach New Town development are detailed in Table 4-1 and illustrated in Figure 1-2.

Table 4-1 – Summary of junctions identified for delay and V/C analysis

Junction	Description	Time Period	Zone Status	Delay (s)	Volume to Capacity Ratio
A	Cambridge Research Park Roundabout	AM	Deactivated	12	58%
			Activated	155	82%
B	A10 / Milton Interchange	AM	Deactivated	132	102%
			Activated	181	104%
C	Milton Road / Milton Interchange (Northbound)	PM	Deactivated	82	76%
			Activated	123	76%
D	Green End Junction / A10 junction	PM	Deactivated	136	104%
			Activated	832	118%

Figure 4-1 – Dependent Development delay and V/C nodes



Junction A is the roundabout connecting the Cambridge Research Park to the A10, during the AM peak. This roundabout will also be the northern entrance to Waterbeach New Town – as such, it experiences a significant rise in the number of vehicles transiting through as the quantum of development in the Waterbeach New Town zone is increased and, in turn, a rise in both delay and V/C is observed.

Junction B is the node linking the A10 to Milton Interchange on the A14, during the AM peak. Milton Interchange is a major connection between traffic to/from the north (A10), east and west (A14), and the city of Cambridge, and is already considered to be highly congested. Waterbeach New Town is situated within the A10 corridor and potentially would be a large generator of trips which would use the interchange; as such, it was deemed necessary to analyse further.

The third junction chosen is the link between Milton Road and Milton Interchange northbound during the PM peak. This interchange is also congested during the PM peak (but in the opposite direction), and the impact which Waterbeach New Town could have on the function of it during this time period was also deemed important to understand further.

Junction D is the junction between Green End and the A10 during the PM peak. This is due to the significant increases in both V/C and delay occurring between the two scenarios on this section of highway, which would have an impact not only on those commuting back to Waterbeach New Town but also those travelling further afield, to Ely and Littleport.

Once the junctions were identified, Delay (s) and the Volume to Capacity ratio (%) (V/C) was calculated over the 10% interval sensitivity test runs to analyse how delay could evolve and increase as Waterbeach New Town is developed. The forecast delay patterns were then used to assess a suitable level of development dependency of Waterbeach New Town on the Waterbeach to Cambridge Public Transport Scheme.

4.2. Junction A – Cambridge Research Park Roundabout

Junction A at the Cambridge Research Park Roundabout experiences an increase in both delay and V/C between the deactivated and activated scenarios, with delay increasing from 12s to 155s and V/C increasing from 58% to 82%, as presented in Table 4-2. The V/C increases in a linear fashion, refer to Figure 4-3, representing a steady increase in traffic as Waterbeach New Town is developed. However, delay increases incrementally between 0-50% development before rapidly increasing thereafter, see Figure 4-2. This suggests that the local highway network hits an inflection point where adding small numbers of vehicles has a disproportionately large impact on delay.

Table 4-2 – Dependent Development delay and V/C results for Junction A

% Completion	Delay (s)	V/C (%)
0%	12	58%
10%	13	60%
20%	13	63%
30%	14	65%
40%	16	68%
50%	20	71%
60%	47	73%
70%	76	75%
80%	98	77%
90%	126	79%
100%	155	82%

Figure 4-2 – Junction A potential delay (s) associated with completion (%) of the Waterbeach New Town Development

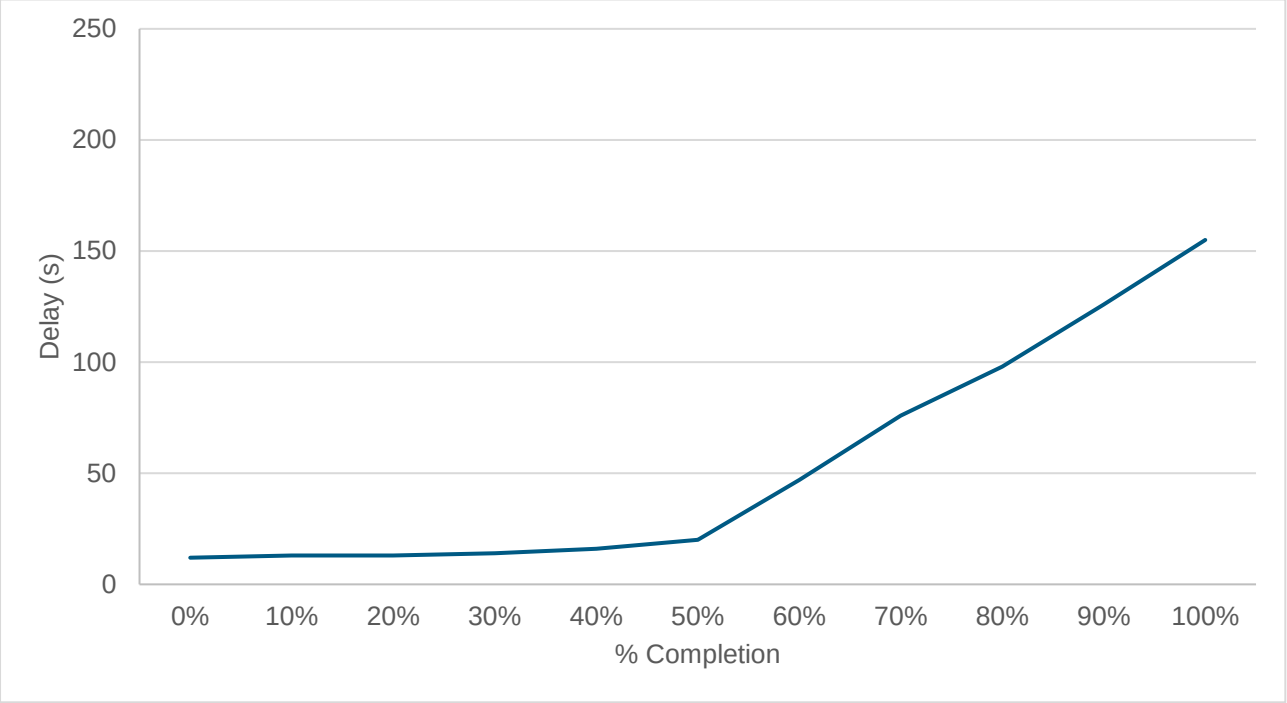
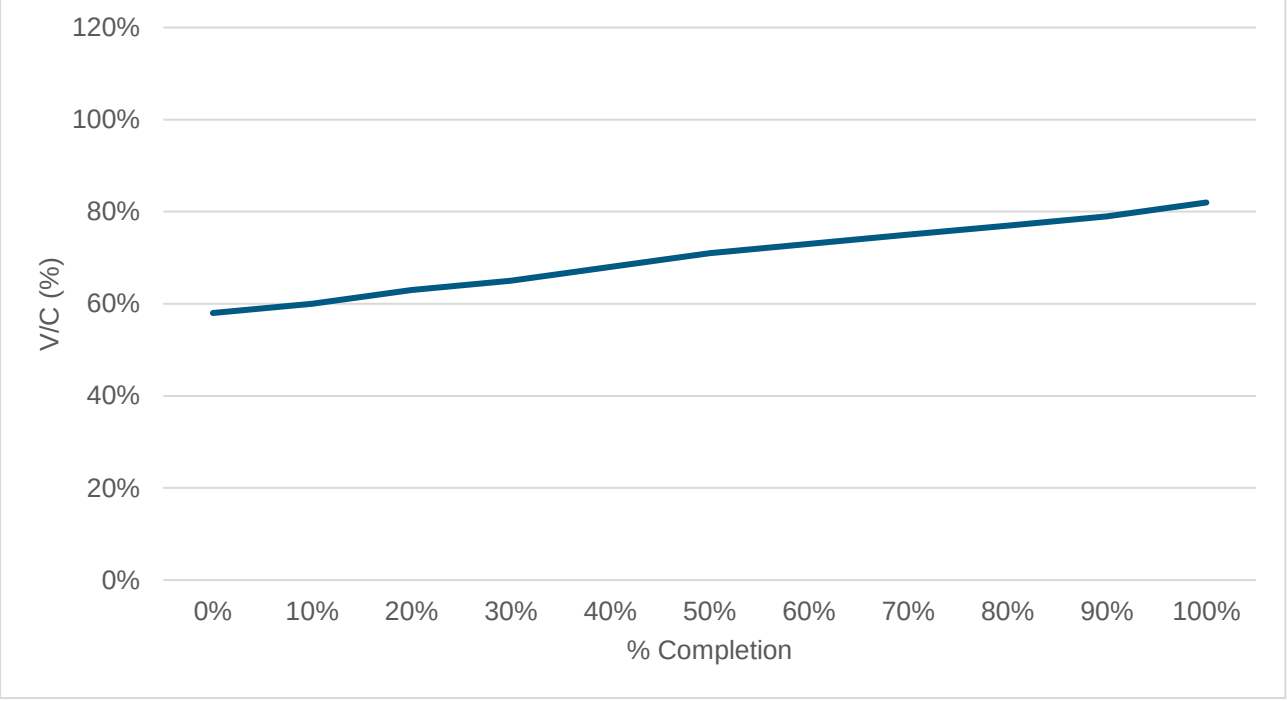


Figure 4-3 – Junction A potential V/C associated with completion (%) of the Waterbeach New Town Development



4.3. Junction B – A10 / Milton Interchange (Southbound)

This junction is already slightly beyond capacity without the development of Waterbeach New Town, as indicated by the V/C percentage exceeding 100% in the base-level run, 0% development, with the Waterbeach New Town zone deactivated, refer to Table 4-3. As the build-out within the model increases between 0-40%, delay increases, refer to Figure 4-4. Past 40% development the delay remains at approximately 3 minutes, which suggests some rerouting around the network or a transfer to other modes of transport. Rerouting away from the A10 main road is particularly undesirable as it leads to increased traffic on local roads going through small towns and villages. This would suggest that the highway network in the area can no longer provide an acceptable level of service. V/C remains relatively steady with a maximum increase of 2% between 0% and 100% development, refer to Figure 4-5.

Table 4-3 – Dependent Development delay and V/C results for Junction B

% Completion	Delay (s)	V/C (%)
0%	132	102%
10%	146	102%
20%	159	103%
30%	173	104%
40%	188	104%
50%	192	104%
60%	194	104%
70%	184	104%
80%	184	104%
90%	182	104%
100%	181	104%

Figure 4-4 – Junction B potential delay (s) associated with completion (%) of the Waterbeach New Town Development

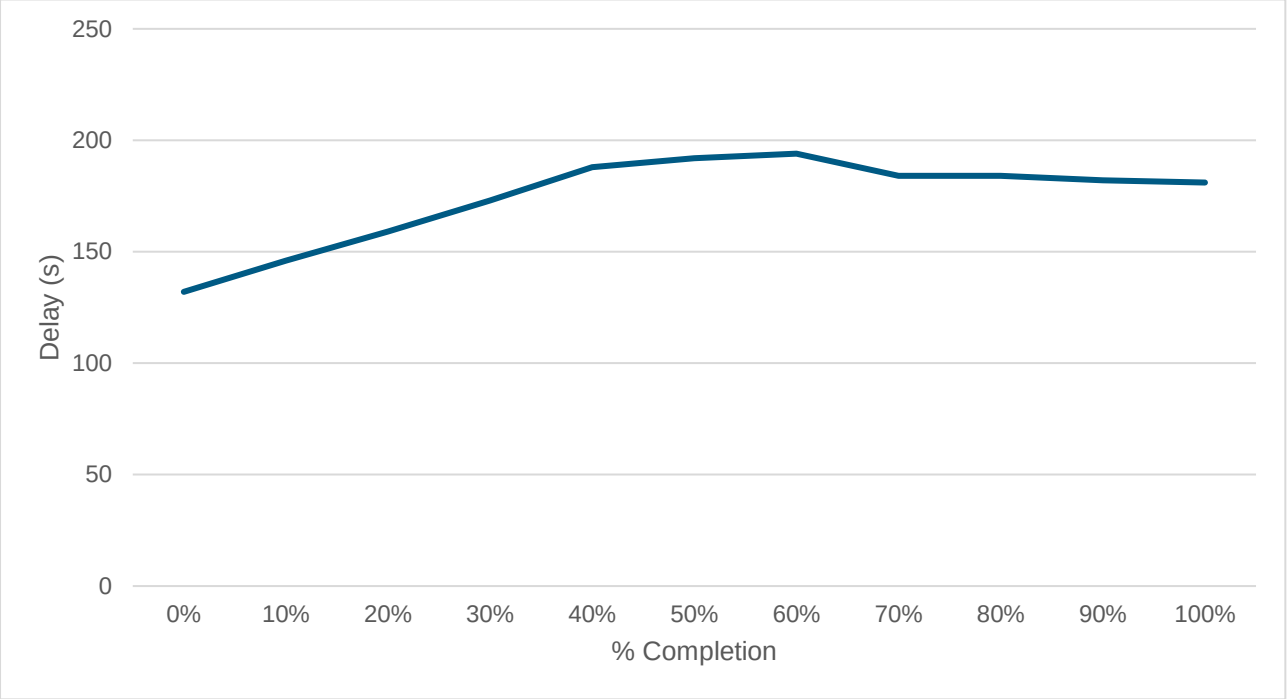
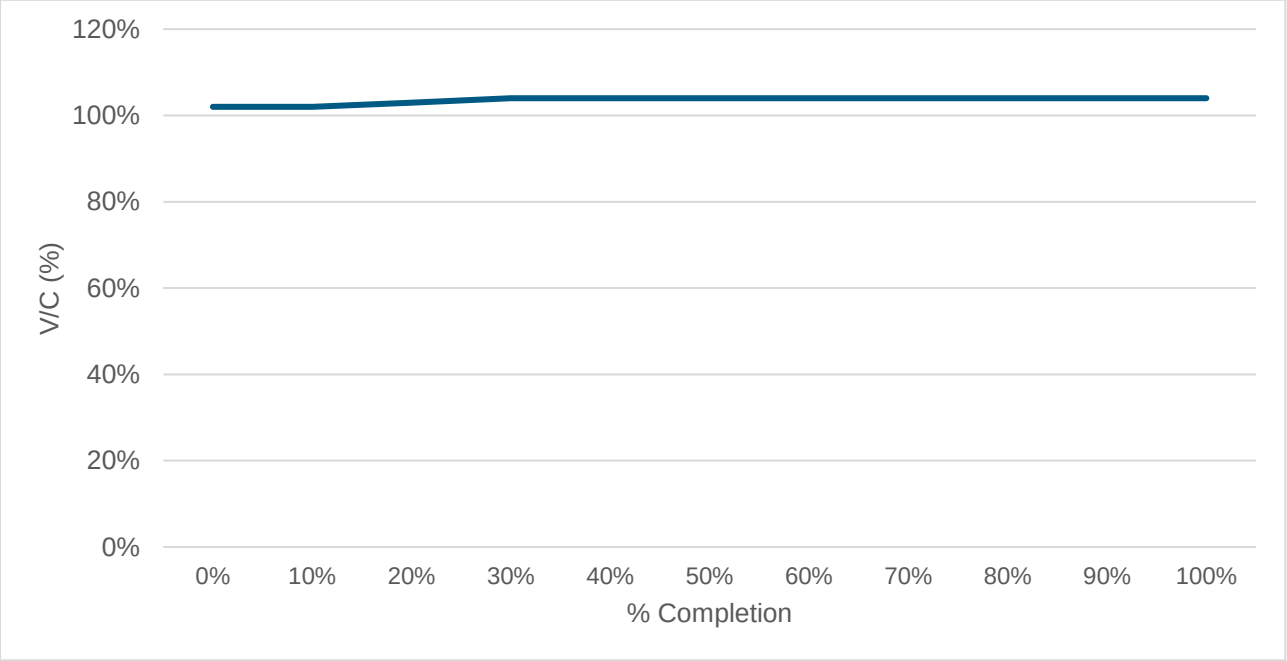


Figure 4-5 – Junction B potential V/C associated with completion (%) of the Waterbeach New Town Development



4.4. Junction C – Milton Road / Milton Interchange (Northbound)

Junction C, at the junctions between Milton Road and Milton Interchange during the PM peak, experiences an increase in delay, Figure 4-6, but not V/C, Figure 4-7, which remains between 76-77%, see Table 4-4. This suggests that, whilst the node does not experience an increase in the number of vehicles utilising it, there is still an increase in delay due to changes in traffic patterns. This suggests that routing and its associated lane choice is likely increasing delay for a specific movement, whilst the overall performance of the junction remains constant.

Table 4-4 – Dependent Development delay and V/C results for Junction C

% Completion	Delay (s)	V/C (%)
0%	82	76%
10%	84	76%
20%	87	77%
30%	89	77%
40%	90	77%
50%	91	77%
60%	93	77%
70%	101	77%
80%	109	77%
90%	116	76%
100%	123	76%

Figure 4-6 – Junction C potential delay (s) associated with completion (%) of the Waterbeach New Town Development

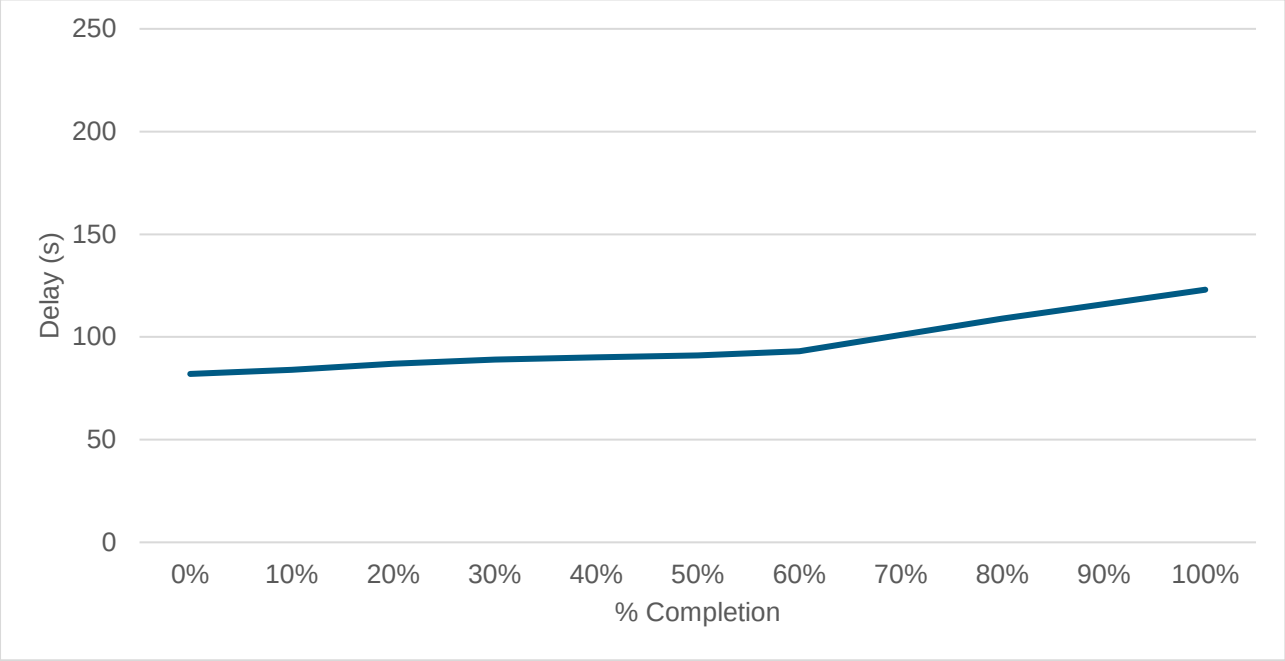
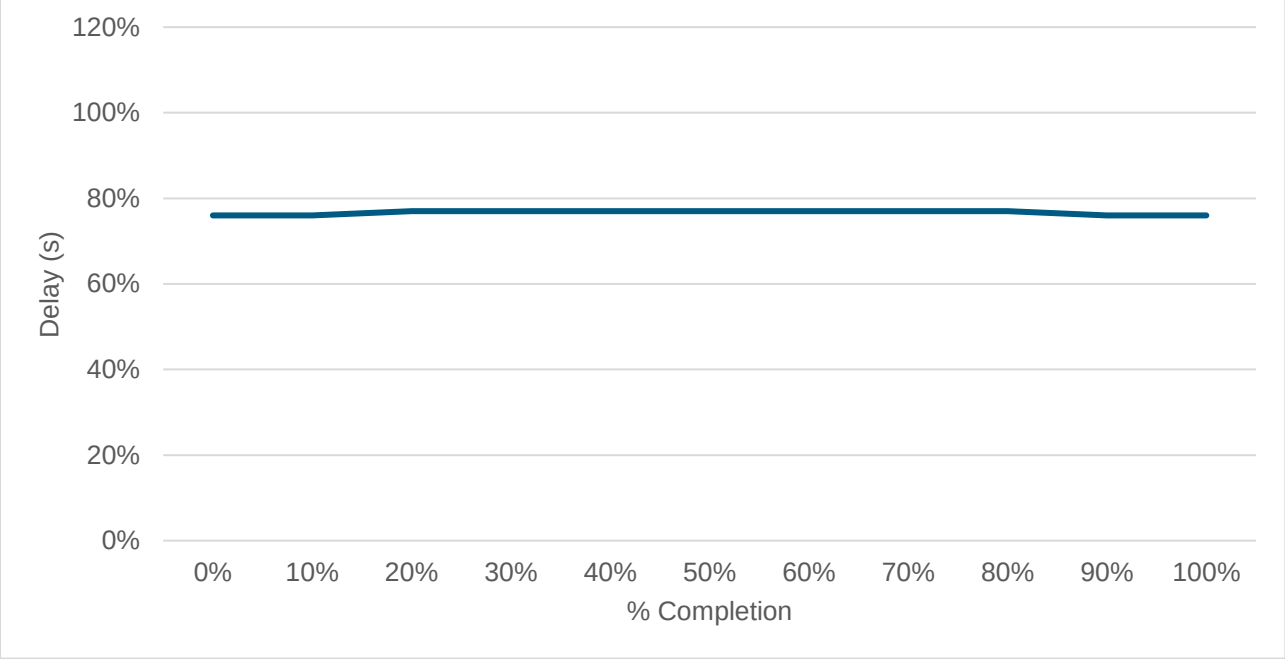


Figure 4-7 – Junction C potential V/C associated with completion (%) of the Waterbeach New Town Development



4.5. Junction D – Green End / A10 Junction

At Junction D, Green End / A10 Junction, the V/C is already over 100% and therefore exceeding capacity prior to the development of Waterbeach New Town, refer to Table 4-5. This suggests that the junction does not have the capacity to facilitate any increases in use that would result from local development, including trips produced from Waterbeach New Town. However, the Waterbeach New Town development only increases the V/C by 14% once completed, refer to Figure 4-9. On the other hand, the increase in delay at the junction is significantly greater with delays increasing from 136 seconds (c. 2 minutes) to 832 seconds (c.14 minutes), refer to Figure 4-8, which is typical of a transport model response when forecasting delays in an over-capacity situation. There may be low-cost schemes (signalisation for example) that could be deployed to help improve the performance of this junction, which may make it less relevant for the dependency assessment.

Table 4-5 – Dependent Development delay and V/C results for Junction D

% Completion	Delay (s)	V/C (%)
0%	136	104%
10%	233	108%
20%	330	111%
30%	422	114%
40%	515	117%
50%	589	119%
60%	602	117%
70%	646	117%
80%	701	117%
90%	772	117%
100%	832	118%

Figure 4-8 – Junction D potential delay (s) associated with completion (%) of the Waterbeach New Town Development

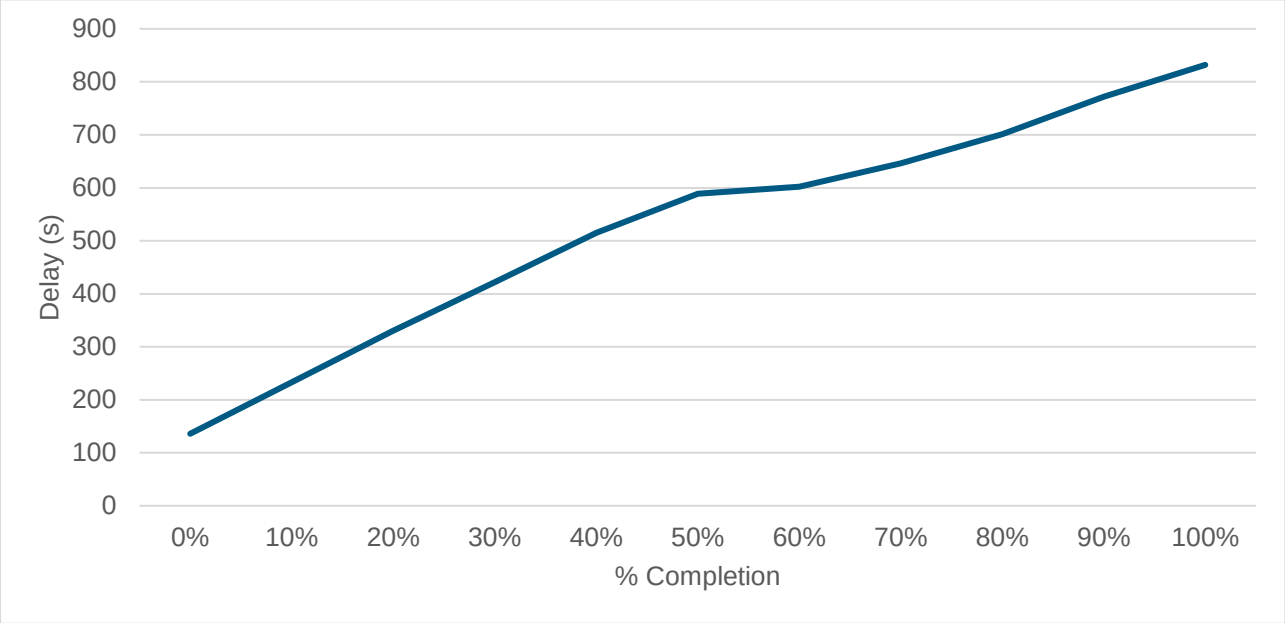
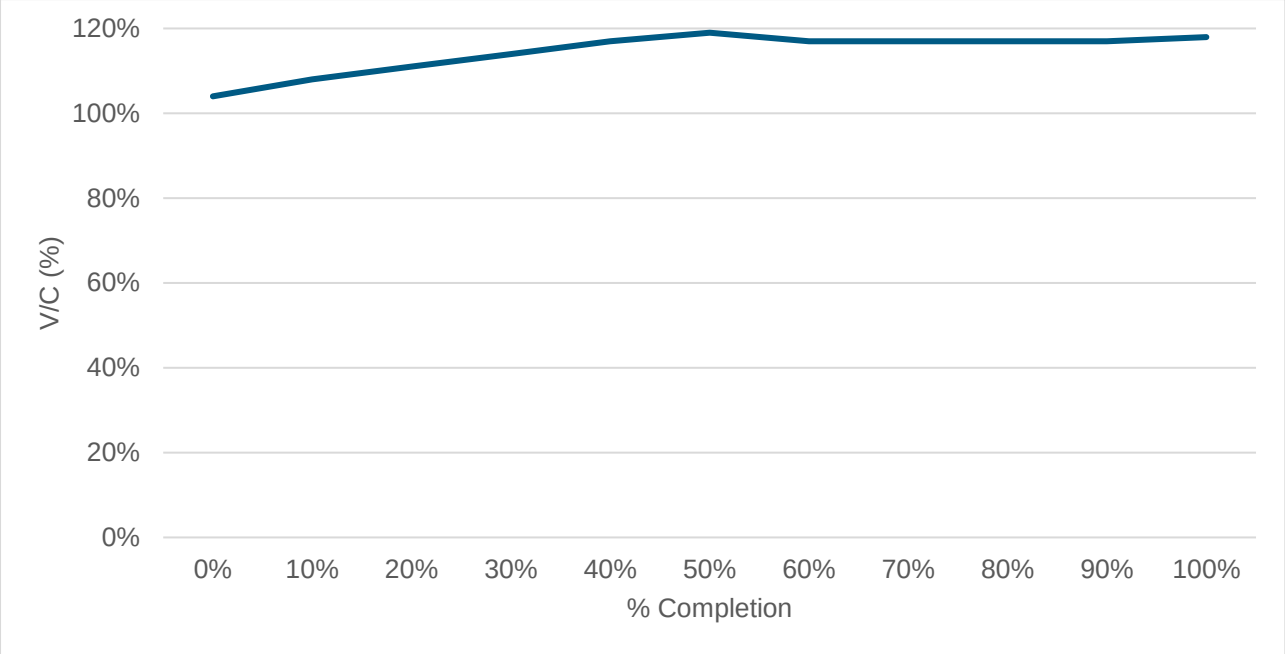


Figure 4-9 – Junction D potential V/C associated with completion (%) of the Waterbeach New Town Development



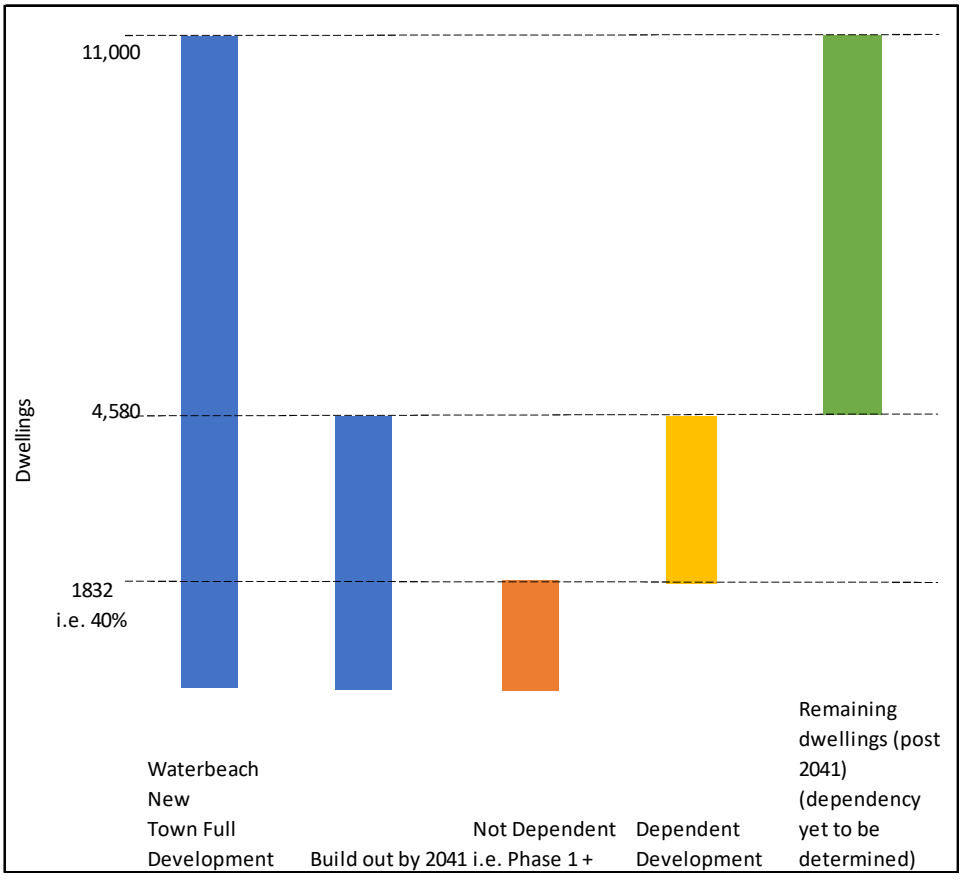
4.7. Assessment Summary

There are different responses to the development of the Waterbeach New Town zone between the four junctions. However, there are broad patterns of similarity which can be seen. Firstly, and perhaps primarily, is the fact that the development of Waterbeach increases strain on the highway network as dwellings are built and jobs are generated. This is particularly acute at junctions which are already congested where small changes in the volume of traffic can create disproportionately large amounts of delay. Secondly, three of the four junctions saw a change in how they behaved at inflection points between 40% to 60%, with these changes marking a deterioration of conditions beyond into further developed scenarios. As such, it was determined that development up to 40% could be considered feasible without leading to an unacceptable level of service on the existing highway network. Therefore, 40% of the development as represented in the model can be considered as deadweight, with the remaining 60% considered dependent on the existence of a transport scheme. Comparisons against the 'with scheme' model runs demonstrate that the Waterbeach to Cambridge Public Transport Scheme is a way to partially mitigate the impacts on the highway network.

It must be noted that, within the core 2041 forecast scenario for CSRM2, Waterbeach New Town is not coded as having its full allocation of up to 11,000 dwellings (6,500 across Waterbeach New Town West, Urban&Civic; 4,500 across Waterbeach New Town East, RLW Estates); it is instead coded as containing 4,580 dwellings. This means that the 60% figure obtained as dependent development is 60% of what is coded (i.e., 1,832 dwellings are not dependent and 2,748 are) and not 60% of the final total allocation. There is the potential for additional dwellings on top of the allocated number within the model to also be dependent**.** Further testing of the impact of these dwellings being delivered would be required to confirm any additional level of dependency and if the Waterbeach to Cambridge Public Transport Scheme would alleviate the additional transport impacts of the development.

Given the areas of scheme design still to be developed an improved and the uncertainty over the impacts of the full development on the transport network, it has been assumed that when accounting for the total allocation of dwellings in Waterbeach, the dependency on the Waterbeach to Cambridge Public Transport Scheme is 25%. Further dependency of the development level beyond 2041 is not tested here, but could increase the level that the scheme unlocks provided that this scheme is able to mitigate these impacts. This will be investigated further at the next stage of the study. This is summarised in Figure 4-10.

Figure 4-10 – Dependent Development Level Summary



5. Transport impacts (Step 3)

Having established the level of dependency, the best step is to quantify the impacts of the dependent development on the transport network to establish the relevant benefits. Two different TUBA analyses have been undertaken to assess the transport impacts of different development scenarios, compared to the core model runs for the OBC:

1. Comparison of the with and without transport scheme case, with no dependent development; and
2. Comparison of the with transport scheme case, with and without the dependent development assessing the impact on the non-dependent development transport users.

5.1. Scenario S - P

TUBA analysis was undertaken to compare the impacts of the transport scheme in a scenario without any dependent development, defined as Scenario S. This is compared to a scenario in which neither the dependent development, nor the scheme, are included. This is defined as Scenario P. This test therefore demonstrates the impact that the transport scheme would have should this not come forward, showing the Value for Money that a scheme would bring in such circumstances.

The assessment of the TUBA results, as presented in the TAG Transport Economic Efficiency (TEE) and Public Accounts (PA) tables, is summarised below in the Analysis of Monetised Costs and Benefits (AMCB) table and compared to the core scenario:

Table 5-1 - Analysis of Monetised Costs and Benefits – Dependent Development Scenario S - P

	Core Revised Central (£m)[14]	DD Scenario S – Scenario P (£m)[15]
Noise	-£18	-£18
Local Air Quality	£52	£52
Greenhouse Gases	£2,756	£2,938
Journey Quality*	£2,487	£2,487
Physical Activity*	£13,886	£13,886
Accidents*	-£565	-£565
Economic Efficiency: Consumer Users (Commuting)	£19,725	£16,430
Economic Efficiency: Consumer Users (Other)	£33,768	£25,952
Economic Efficiency: Business Users and Providers	£22,320	£4,274
Wider Public Finances (Indirect Taxation Revenues)	-£5,055	-£4,881
Present Value of Benefits (see notes) (PVB)	£89,356	£60,555

**Note that these metrics have not been recalculated for the no Dependent Development tests on the grounds of proportionality of the appraisal process.*

All values are £000's in 2010 prices, discounted to 2010

This demonstrates that the benefits afforded by the scheme drop by around 30%.

5.2. Transport external costs calculation (Scenario S – R)

This scenario was derived to demonstrate the impact of the dependent development on the existing transport users, to then adjust the overall dependent development benefit position. This test compared the travel times

[14] £m, 2010 prices, discounted to 2010.
[15] £m, 2010 prices, discounted to 2010.

and distances for transport users between the with and without dependent development scenarios, both with the scheme in place. These are referred to as scenario R and scenario S, respectively.

Using the transport demand patterns and volumes from scenario S, a TUBA analysis was used to demonstrate the impact that the changes to travel times and distances would have upon those users already using the transport network. The table below summarises the TUBA results showing the impact of this scenario test, compared to the core Revised Central option.

A 30-year assessment has been undertaken to enable this to be used alongside the 30-year appraisal of the land value uplift benefits.

Table 5-2 - Analysis of Monetised Costs and Benefits – Transport external costs (Scenario S – R)

	DD Scenario S – Scenario R (£m) [16]
Greenhouse Gases	£128
Economic Efficiency: Consumer Users (Commuting)	-£31,589
Economic Efficiency: Consumer Users (Other)	-£19,163
Economic Efficiency: Business Users and Providers	£2,850
Wider Public Finances (Indirect Taxation Revenues)	£4,560
Present Value of Benefits equating to Transport External Costs	-£43,167

All values are £000's in 2010 prices, discounted to 2010

6. Land Value Uplift (Step 4)

6.1. Introduction

This section summarises the Land Value Uplift that has been assessed for the Waterbeach to Cambridge Public Transport Scheme, determined in line with Transport Analysis Guidance (TAG) unit A2-2 'Wider Economic Impacts' section 4.3.

The following presents the key aspects of the methodology employed to evaluate the increase in land value as a result of the development being unlocked:

- The land value uplift impacts relate to the increase in land values along the corridor due to the land's conversion into more productive uses;
- The land value uplift analysis only includes the development of Waterbeach New Town; and
- The land value uplift impacts are assessed in line with the Department for Levelling Up, Housing and Communities (DLUHC) Appraisal Guide (updated March 31st 2023; previously DCLG Appraisal Guide), and TAG units A2-1 'Wider Economic Impacts' and A2-2 'Appraisal of Induced Investment Impacts.

The assessment considers a 30-year appraisal period in line with current guidance, with values reported in 2010 prices, discounted to 2010.

[16] £m, 2010 prices, discounted to 2010.

6.2. Indicative monetised benefits

Table 6-1 presents the overall results of the preferred option from the Waterbeach to Cambridge Public Transport Scheme, based upon 25.0% of the development being dependent on the transport scheme.

Table 6-1 - Land Value Uplift Summary for Waterbeach New to Cambridge Public Transport Study

Factor	Value (£m)[17]
Land Amenity Disbenefit (for loss of farmland)[1]	£2.06
Existing Land Value[2]	£0.51
Health Benefit (creation of social housing)[3]	£0.89
New Land Value[4]	£104.95
Total Assessment (3+4-1-2)	**£103.27**

6.2.1. Amenity Disbenefit

The amenity disbenefit value has been calculated to account for the loss of land currently used for farming. This was determined at £6,366 per hectare per annum in 2016 prices. It should be noted that the western part of the Waterbeach New Town development is located upon the disused Waterbeach Barracks (formerly RAF land); hence it has been presumed that the amenity disbenefit for this section of Waterbeach New Town is nil.

6.2.2. Existing Land Value

The existing land value has been calculated from the April 2023 Property Cost Estimate by Carter Jonas for South Cambridgeshire. This was determined to be £25,946 per hectare for arable farmland in 2023 prices. The western part of the Waterbeach New Town development is located upon the disused Waterbeach Barracks site, and there exists no such land value estimate for a disused RAF site; hence it has been assumed that the existing land value for this section of Waterbeach New Town is equivalent to the east of the site.

6.2.3. Health Benefit

The health benefit value is derived from the creation of affordable housing in the development, at a value of £125 per dwelling per year in 2019 prices. Urban&Civic has stated that, for Waterbeach New Town West, there will be ‘at least’ 40% affordable housing, allowing for a figure of 2,600 affordable homes to be estimated. RLW has determined that there will be ‘at least’ 1,300 affordable homes in Waterbeach New Town East. It is unknown what proportion of these will be released for social rent, shared ownership, or other types of affordable housing. Given that the Dependent Development analysis will not be used in the formal Level 2 BCR, health benefits are presented here to articulate the potential additional benefits that could be captured from a health perspective

6.2.4. New Land Value

The new land value was calculated on a per hectare basis, using values from MHCLG for Greater Cambridge and Peterborough (South Cambridgeshire), at £5,300,000 per hectare in 2023 prices for residential development at approximately 40 dwellings per acre. The has been calculated based on the area of developable land outlined within the Supplementary Planning Document[18] for Waterbeach New Town based on an 11,000 dwelling development size, excluding land reserved for strategic landscape areas, land used for education, primary road infrastructure, land for SUDS, public transport and Park and Ride.

6.2.5. Development Dependency

TAG guidance states that the land value uplift appraisal should take into account the dependency of the development upon the transport scheme(s) being evaluated. Development has been assessed to be at 25.0% dependent on the relevant transport scheme; this has been applied to the final assessment for land value uplift.

[17] £m, 2010 prices, discounted to 2010.
[18] Waterbeach New Town SPD, waterbeach-new-town-spd-low-res-feb-2019.pdf (scambs.gov.uk), Table 2, Page 65

7. Summary

There is strong overall economic narrative to support the wider growth and development in the area. This transport scheme supports this ambition through the provisions of new, faster and more reliable transport connectivity to an existing development. This case is then further strengthened when considered alongside the proposed growth at Waterbeach New Town, with 25.0% of that development being dependent upon the transport scheme.

This dependency unlocks significant benefits for increased land value but needs to be considered alongside the impact of additional travel demand on the existing users of the transport network. The total benefits for dependent development are quantified as:

$$Total\ Benefits = Land\ Value\ Uplift + Other - Transport\ External\ Costs - Land\ Amenity\ Value$$[19]

Table 7-1 summarises the overall assessment of the dependent development impacts for Waterbeach New Town on the Waterbeach to Cambridge Public Transport Scheme.

Table 7-1 – Dependent Development Summary for Waterbeach New to Cambridge Public Transport Study

Factor	Value (£m)[20]
Land Value Uplift (new – old)	£104.44
Other (Health)	£0.89
Transport External Costs	£43.17
Land Amenity Value	£2.06
Final Assessment	**£60.10**

The assessment shows the valuation of the dependent development is £60.10m in 2010 market prices, discounted to 2010, assuming a 30 year appraisal period. This represents significant benefits that can be attributed to the transport scheme based on the understanding that the scheme delivery will unlock this development. This assessment will be combined into the overall business case.

[19] "Non-Transport Complementary Interventions" have been classified as negligible impact for the purpose of this assessment and are assumed to be captured by the Land Value Uplift.
[20] 2010 market prices, discounted to 2010.

Appendix B. Optioneering

This Section summarises the work reported in the OAR[99] and outlines the methodology employed and the findings of the option generation, sifting and assessment processes for the busway route plus walking, cycling and equestrian improvements option. The process had three stages:

1. The **option generation** stage identified possible options that had the potential to meet the objectives and deliver the outcomes of the scheme. Option generation was not constrained by the findings of previous studies;
2. Identified options were **sifted** by assessing them using a criterion selected to ensure that the transport objectives of the scheme could be met. Options that were unable to meet these high-level criteria were discarded at this stage; and
3. In the final stage, a **more detailed assessment** of the remaining options was undertaken, assessing their fit against each transport objective and outcome, and engineering and environmental constraints. This assessment fed in to a Multi Criteria Assessment Framework (MCAF) to record the evidence and score each option against the criteria. From this, sets of options were considered in combination to provide corridor options for full connectivity to and from each end of the study area.

B.1. Option generation[100]

The initial option generation stage was informed by, but not constrained to, previous studies, proposed developments and driven by existing policy. All options with the potential to meet the transport objectives were considered.

Initial options were generated by the wider project team (including Atkins consultants and GCP officers), all of whom were familiar with the study area and the existing issues present within it. Different concepts for connections were considered, such as maximising the use of existing infrastructure, connecting all possible markets together via an indirect route, or providing the most direct end-to-end connectivity. Options that cross known constraints that would be too difficult to mitigate or avoid were not progressed, as they were not considered feasible.

B.2. Option sifting[101]

An options sifting process reviewed and sifted the identified options that had been generated in the previous stage. Each option was assessed against three overarching criteria of Effectiveness, Feasibility and Acceptability. The assessment used a Red, Amber, Green (RAG) approach as follows:

- Green represented meeting each criterion individually;
- Amber represented a challenge to meeting the criterion that could be mitigated or overcome; and
- Red represented options that were unfeasible, unreliable, ineffective or unacceptable on a particular criterion.

Table B-1 outlines the sifting assessment criteria and the key issues considered under each criterion that reflect the transport objectives and outcomes.

[99] Atkins (2020) *Options Appraisal Report*
[100] Atkins (2020) *Options Appraisal Report* [Page 32]
[101] Atkins (2020) *Options Appraisal Report* [Page 34]

Table B-1 - Sifting assessment criteria

Sifting criterion	Elements considered within each criterion
Effectiveness	Additional sustainable transport capacity
	More reliable public transport journey times
	More public transport journeys in the corridor
	More journeys by walking and cycling
Feasibility	Engineering constraints
	Environmental constraints
	Planning requirements
Acceptability	Stakeholder views
	Alignment with local and regional policies

GCP determined that a reliable system was key and that if options could not improve reliability, then they should be discounted at this stage. If links were online (with traffic) and there was not an option to provide public transport priority, these were discounted as they could not guarantee reliability. Exceptions are very short sections of highway with low traffic volumes that connect two other key pieces of proposed infrastructure.

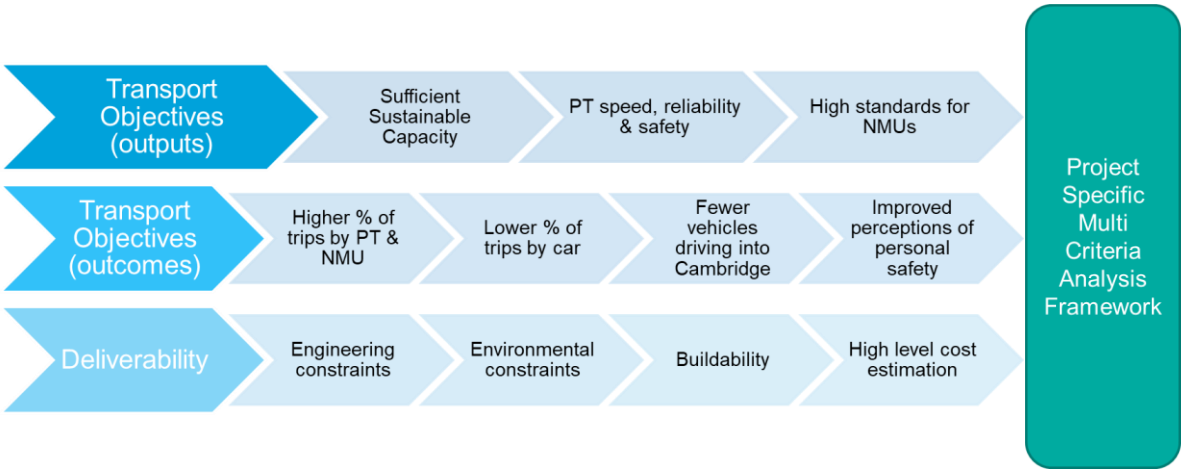
If an option received one red rating or three amber ratings, it would normally be discounted. However, this was not rigidly applied, and certain options were retained following further assessment. For example, an online option using Milton Interchange was rated red for feasibility due to engineering constraints, however it was retained at this stage as it was considered too early to remove options that used the existing main north-south transport infrastructure. It was also found that some options became obsolete after other options were sifted out, so these were also removed at this stage.

Options that crossed or came close to environmental or heritage constraints, such as Waterbeach Abbey site to the south of Waterbeach, were discounted as the potential negative impact would not be acceptable on planning and environmental grounds. Options on the eastern side of Waterbeach parallel to the railway were discounted due to the land constraints and the complexities of interaction with Clayhithe Road and its level crossing.

B.3. More detailed assessment[102]

The More Detailed Assessment (MDA) considered the options that were carried forwards from the previous stage (option sifting). A summary of the assessment criteria used is provided in Figure B-1.

Figure B-1 - MDA criteria



[102] Atkins (2020) *Options Appraisal Report* [Page 38]

In Figure B-1, "*Higher % of trips by Public Transport and Non-Motorised User*" are shown together for convenience but were treated as separate criteria. This means there were a total of twelve criteria. Options were assessed using the criteria through desktop studies by specialists in each discipline who were as follows:

- Planning Lead: buildability;
- Environment Lead: environmental constraints;
- Highway Design Lead: engineering constraints, buildability and high-level cost estimation; and
- Transport Planning Lead: transport objectives (both outputs and outcomes).

To summarise the assessments, and to allow intuitive comparison of relative performance, each option was scored against the 12 criteria, using a four-point scale (0 to 3). Scores from each criterion were combined to provide overall informative scores for:

- Transport planning (the eight criteria covering transport objectives);
- Deliverability (the four criteria in this area); and
- All criteria.

A workshop followed where the assessment was presented to GCP officers who provided feedback and approval on the process and outcomes.

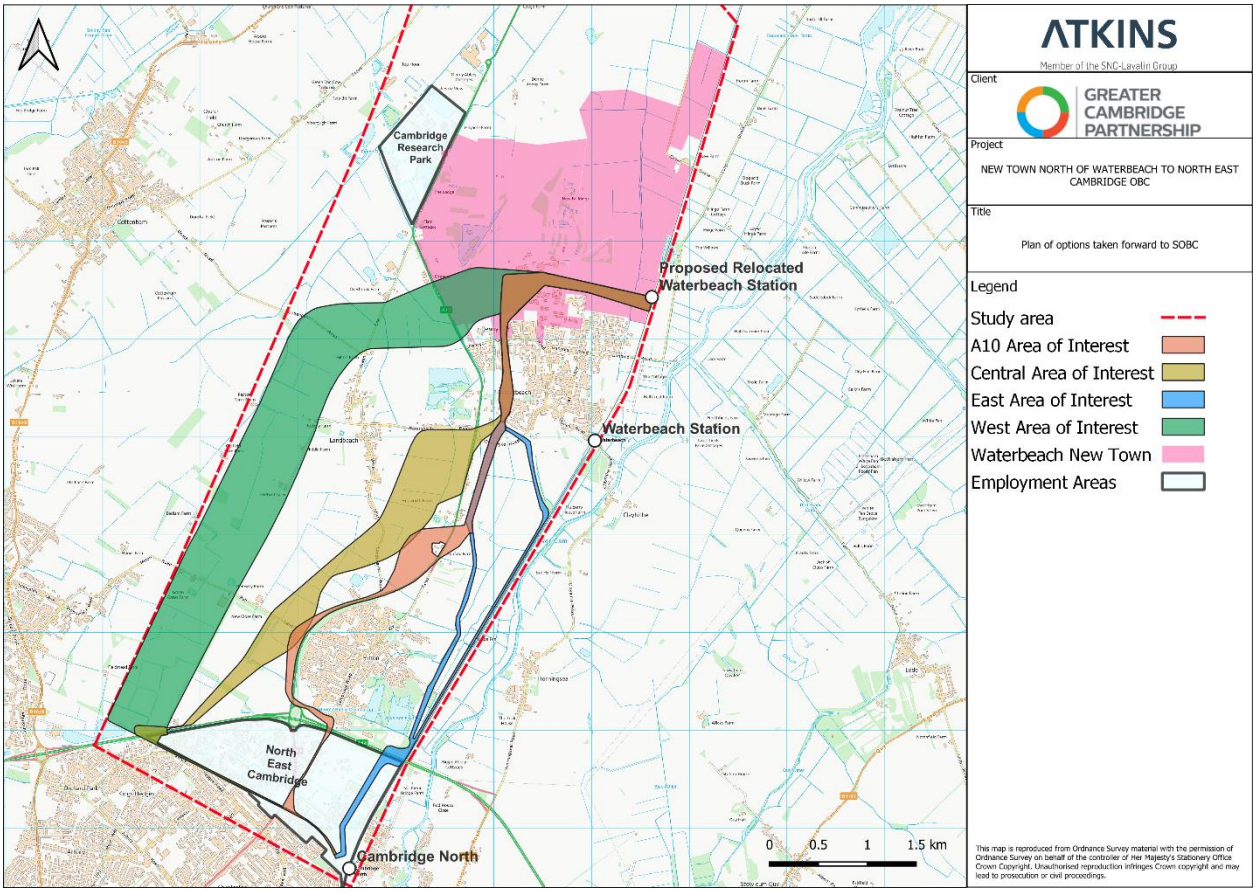
Following the MDA, corridors were identified holistically, drawing together appropriate combinations of better-performing options and nodes in order to create coherent and mutually distinct corridors. These better-performing options were agreed with GCP and are described in Table B-2 and shown in Figure B-2. These options were presented at public engagement in July 2020, the results of which are summarised in the following Section.

Table B-2 - Corridor options presented at the July 2020 public engagement

Option name	Description	Key option-specific issues considered at SOC stage
Western route option (green)	The Western route option originates near Cambridge North Station and follows the CGB under the A14, then turns northeast and continues to the west of Mere Way. The route then bears east north of Landbeach and crosses the A10 at the proposed access roundabout to Waterbeach New Town.	• Interaction with Mere Way; and • Interaction with A10 at the access roundabout.
Central route option (yellow)	**Short Term** The short-term option could be provided prior to the redevelopment of the NEC development and would service the periphery of the Cambridge Science Park. This option originates near Cambridge North Station and follows the CGB under the A14, where it then turns east and traverses the agricultural land between Landbeach and Milton. The route crosses the A10 southwest of Waterbeach at Cambridge Road, then bears north, crossing Denny End Road to Waterbeach New Town. **Long Term** The long-term option could be provided following the redevelopment of the NEC, subject to agreement with the landowners. Instead of using the CGB, this route would use an offline route through the NEC and would cross the A14 at a new crossing north of Cambridge Science Park. This would improve the route's ability to serve employees on site.	• Interaction with allotments at Cambridge Road, Waterbeach; • Interaction with properties adjacent to allotments; • Interaction with the landfill west of Milton; • Interaction with A10 at staggered crossroads (A10, Car Dyke Road, Waterbeach Road), southwest of Waterbeach; and • Whether duplicating CGB infrastructure on a new parallel route through the Cambridge Science Park is necessary.

Option name	Description	Key option-specific issues considered at SOC stage
A10 route option (orange)	The A10 route option originates near Cambridge North Station and travels along Cowley Road to Milton Road. From here, the route bears north and crosses the A14 at a new crossing near Jane Coston Bridge, then bears west to the south of Milton Tesco supermarket. The route crosses the northern arm of the Milton Interchange before bearing north to the west of the A10. The route crosses the A10 southwest of Waterbeach on Cambridge Road then bears north through to Denny End Road and continues north to Waterbeach New Town. There is potential for a more direct routing using a segregated alignment along Milton Road and through Milton Interchange. However, this is assumed to only be practicable if there were separate proposals for highway changes in this part of the A10 corridor that could enable such a routing. This possibility will be reviewed as the current A10 study progresses.	• Interaction with allotments at Cambridge Road, Waterbeach; • Interaction with A10 at staggered crossroads (A10, Car Dyke Road, Waterbeach Road), southwest of Waterbeach; and • Design of route where it crosses the A14 from the eastern side of the NEC development and A10 at Milton interchange.
Eastern route option (blue)	The Eastern route option originates near Cambridge North Station and bears north through the eastern side of NEC, crossing the A14 south of Milton Country Park. The route traverses the borders of the Country Park on the eastern side, before heading north to the west of the proposed sports lake development and east of the existing Footgolf area. The route reaches Waterbeach at Car Dyke Road, then continues through to Denny End Road, and continues north to Waterbeach New Town.	• Interaction with the NEC development; • Interaction with the proposed Waterbeach Greenway, including the Greenway underpass of the A14; • Interaction with the sports lake complex; and • Interaction with residential properties and allotments on Cambridge Road in Waterbeach.

Figure B-2 - Plan of options taken forward to SOC



Appendix C. Engagement and consultation at SOC

C.1. Stakeholder engagement at SOC stage

Throughout the SOC stage of the scheme, a number of stakeholder engagement exercises were undertaken. This included an initial engagement with stakeholders closely linked to the project in November 2019. Between January 2020 and September 2020, engagement with individual stakeholders was undertaken, including politicians, council members and national bodies such as Highways England (now National Highways).

C.2. Consultation at SOC

A public consultation on the four corridor options was held virtually between Monday 19th October 2020 and Monday 14th December 2021. All events were online/virtual due to Covid-19 restrictions on face-to-face contact at that time. The consultation adopted a multi-channel approach to promote and seek feedback, including the wide-spread distribution of around 6,000 consultation booklets and online media.

Eight online briefings were held, one one-to-one sessions, four parish council meetings, three resident meetings and the pre-launch briefing with local district and county councillors. In addition, a social media campaign was undertaken including a Facebook live session with over 50 questions submitted. There were over 3,000 visitors to the dedicated website and over 1,000 documents (maps, information, and copies of the booklet) were downloaded. All parish councils and schools in the SOC study area were contacted. Adverts were also placed in local newspapers, at local railways stations and at Milton Park and Ride site.

Quantitative data was recorded through a formal consultation questionnaire (online and hard copy) with 570 complete responses in total recorded. A large amount of qualitative feedback was also gathered via the questionnaire, email and social media. The GCP also received 72 written responses.

The consultation strategy has allowed a wide variety of people to engage within this public consultation, therefore mitigating the lack of face-to-face events as a result of the coronavirus restrictions.

C.2.1. Consultation findings

This section summarises the findings in the public consultation report. The full public consultation report can be found on the GCP website[103].

Public opinion and support

Over half (52%) of respondents supported the busway proposals and 36% opposed. The most supportive groups were those who usually travel in the area by cycle (63% support, 29% oppose), along with those whose usual destination is North Cambridge (64% support, 29% oppose) or South Cambridge (62% support, 31% oppose). Figure C-1 shows level of support for each of the four corridor options.

[103] https://www.greatercambridge.org.uk/public-transport-schemes/waterbeach-to-cambridge

Figure C-1 - Support for proposals amongst respondents[104]

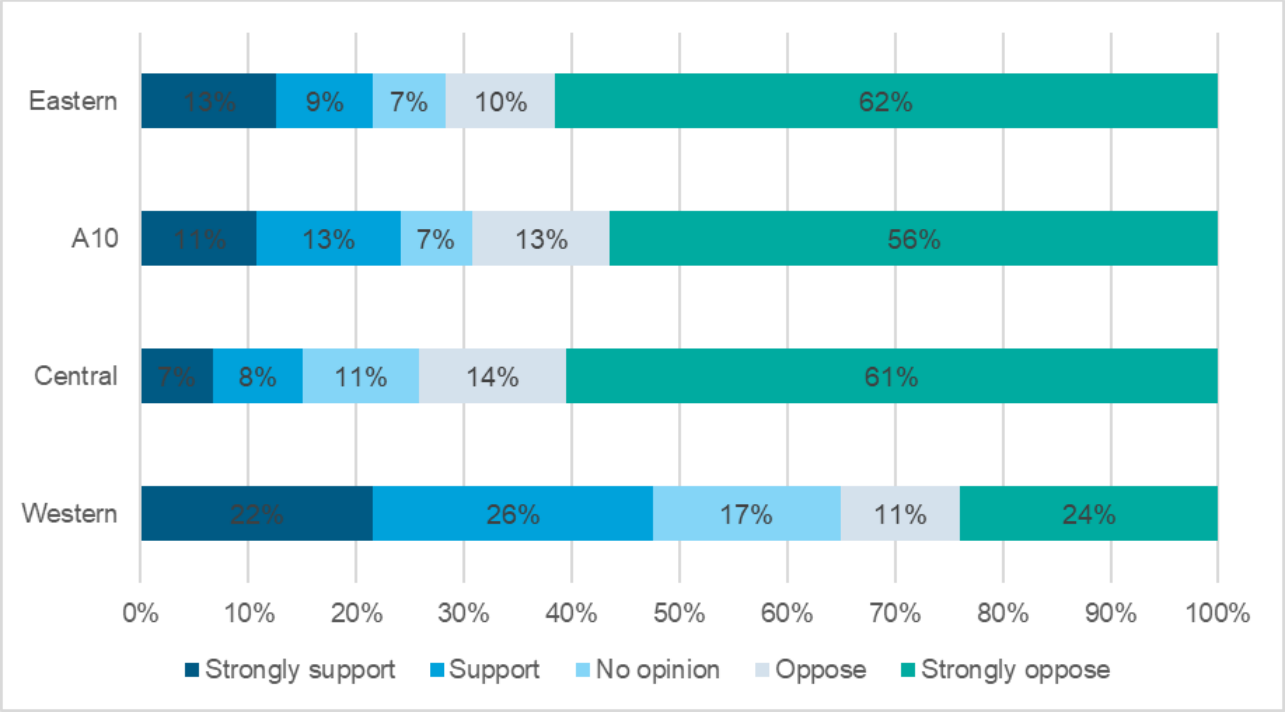


Figure C-1 shows that the Western route option had the most positive response (48% supported proposals), however there was strong opposition to the Central, A10 and Eastern route options (75%, 69% and 72% strongly oppose or oppose the options respectively).

When asked which markets should be served, half the respondents in indicated that Waterbeach village (50%), Waterbeach new town (50%) and the relocated Waterbeach Railway Station (49%) should be given 'somewhat high' or 'very high' priority on the route which supports the end-to-end objectives of the schemes. Moreover, respondents considered that the provision of connectivity to key markets was more favourable than achieving faster journeys. With this in mind, the emerging service patterns should seek to mix a fast service for end-to-end journeys whilst other services should seek to serve local centres to maximise demand and therefore patronage. Service patterns are not restricted to the infrastructure that could be provided as part of the scheme and it is possible for alternate services to run to reach different users. This will be investigated further during the next stage of scheme development.

The GCP received a number of detailed comments, from which the most common areas of discussion were:

- Concerns about the loss of housing / personal property;
- Concerns about negatively impacting the local environment;
- Further improvements to active travel in the area;
- Use of existing infrastructure, and the linkages with the potential duelling of the A10 route; and
- Concerns about connections to and from Waterbeach, and loss of existing bus services.

Some responses raised opposition to proposals that could potentially result in the loss of housing / personal property, which contributes to the overall levels of support of the Central, A10 and Eastern route options.

Respondent profile

The respondent profile has been summarised below:

- Just over half (51%) of respondents stated that they were a resident of Waterbeach, whereas 28% regularly travel in the area;
- Cambridge, Milton and Landbeach residents made up 24% of respondents;

[104] Cambridgeshire County Council (2021) Waterbeach to Cambridge: Summary Report of Consultation Findings Figure 10 Page 21

- Up to 79% of respondents usually travel by car, whilst 52% travel by bicycle and 44% walk[105];
- Nearly one in five (18%) of respondents stated that they would use a scheme like the one being proposed on a daily basis; and
- 21% of respondents stated they would not use the proposed infrastructure.

[105] Percentages do not total 100% as some respondents travel by more than one mode.

Appendix D. Route amendments at SOC

Following the consultation exercise technical work completed at the SOC stage, a review was undertaken of the four corridor options to determine which should be taken forward to economic assessment.

As a result of the review, amendments were made to three of the four corridor options, as described below.

D.1. Western route option (not revised)

Initial technical work did not indicate any concerns with the performance of this option. The Western route option was also the most publicly supported option. As a result, no alterations were made to this option.

D.2. Revised Central route option

Initial technical work indicated that the Central route option alignment could cause severe traffic congestion issues at the Car Dyke Road, Waterbeach Road A10 junction, as the scheme would require an additional set of signals, increasing queue lengths and journey times. Moreover, there was strong public opposition to where the potential route traversed Cambridge Road and ran north through the Waterbeach allotments. Finally, the tight alignment around the allotments could present some possible engineering constraints.

A Revised Central route option was developed to mitigate these issues. The key features of this option are as follows:

- The same alignment as the original Central route option between Cambridge North Station to Landbeach Road to the north of Milton Park and Ride;
- Then following a new alignment due north running between Landbeach village and the A10 avoiding private residences and commercial properties;
- Running north-east then to a proposed roundabout at Waterbeach New Town on the A10; and
- Then following the same alignment as the Western route option through Waterbeach New Town to the proposed relocated Waterbeach Station and Cambridge Research Park.

D.3. Revised A10 route option

This option in its original form ran around the Waterbeach allotments via Cambridge Road; however, there were operational concerns around the tight geometry of this part of the route. Furthermore, the responses to the public consultation did not support this alignment.

The route of this corridor option was amended so that it joined Car Dyke Road from the south and ran via Car Dyke Road and High Street through Waterbeach village centre and onward to Waterbeach New Town.

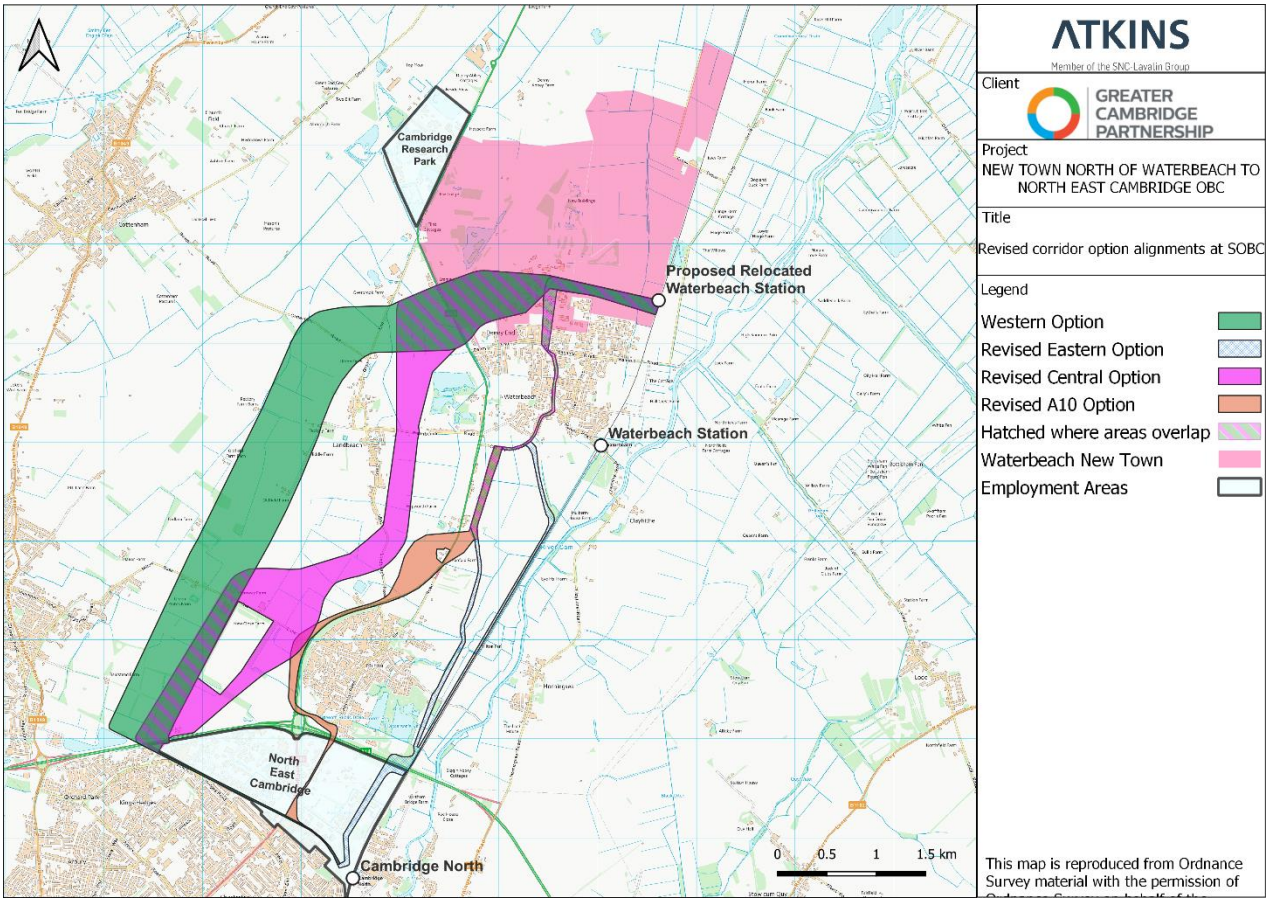
This new alignment would not achieve the high-speed and reliable service that a wholly offline service would provide. However, it would mitigate the concerns raised during public consultation.

D.4. Revised Eastern route option

As with the Revised A10 corridor option, the alignment around the Waterbeach allotments was not supported by the public and there were operational concerns associated with the geometry of that part of the route. As such, the option was amended to join Car Dyke Road and run on-road to Waterbeach New Town as the Revised A10 corridor option.

The new proposed alignments are shown in Figure D-1.

Figure D-1 - Revised corridor option alignments



The impacts of the revised options were forecast using the Cambridgeshire sub-regional transport model (CSRM2). The assessment showed that the shift away from car use was forecast to be higher in the Revised Central route option than the Western route option, but less than in the Revised A10 route option. This is due to increased connectivity and service frequency to Milton Park and Ride which is more attractive for users in the Revised Central option. Overall scheme patronage is comparable for the Western route option and the Revised Central route option.

Appendix E. Early OBC Work

Prior to the commencement of the OBC, work was undertaken to check and update any assumptions that underpin the design, costing or modelling work for the scheme. The outcomes and conclusions of the early OBC work are set out in the remainder of this section.

E.1. Milton landfill site

Prior to the commencement of the OBC, work was undertaken to understand in more detail the transport, costing, environmental and engineering issues of the routing options of traversing or not traversing the Milton Landfill site. The key findings of the report for each discipline were:

- **Transport**
  - Minimal difference between traversing / not traversing in regard to journey times or distance covered.
- **Costing**
  - Traversing the landfill could approximately double the cost of the scheme (up to around £106m from £53m[106]) based on the Revised Central route option's most likely cost forecast, however there is significant cost risk associated with any option that goes over the landfill.
- **Engineering**
  - Traversing the landfill is technically possible but extensive work prior and post construction would significantly extend the scheme programme.
- **Environmental**
  - Negligible difference between not/traversing in regard to ecology, air quality, noise, water, landscape, geotechnical or heritage factors.

The report concluded that, given the cost and timescale risks identified with crossing the landfill, and the relatively limited differences in environmental and transport planning terms, the next stage of developing the Revised Central route option should focus on sub-options that avoid the landfill. Therefore, the section of the Revised Central route option that traverses the Landfill was discounted from routing considerations for the OBC.

E.2. Off-infrastructure routing

Early OBC work was undertaken to update assumptions for the routing of busway services when not using the dedicated infrastructure provided by the scheme or by the CGB. The overall principle was flexibility – the infrastructure provided will allow services to turn onto and off of the highway network. Examples of locations where this flexibility will be applied are shown in Figure E-1. Therefore, the route that services take when not on the dedicated infrastructure will be at the discretion of the operators who run services on the corridor, as well as any funding bodies.

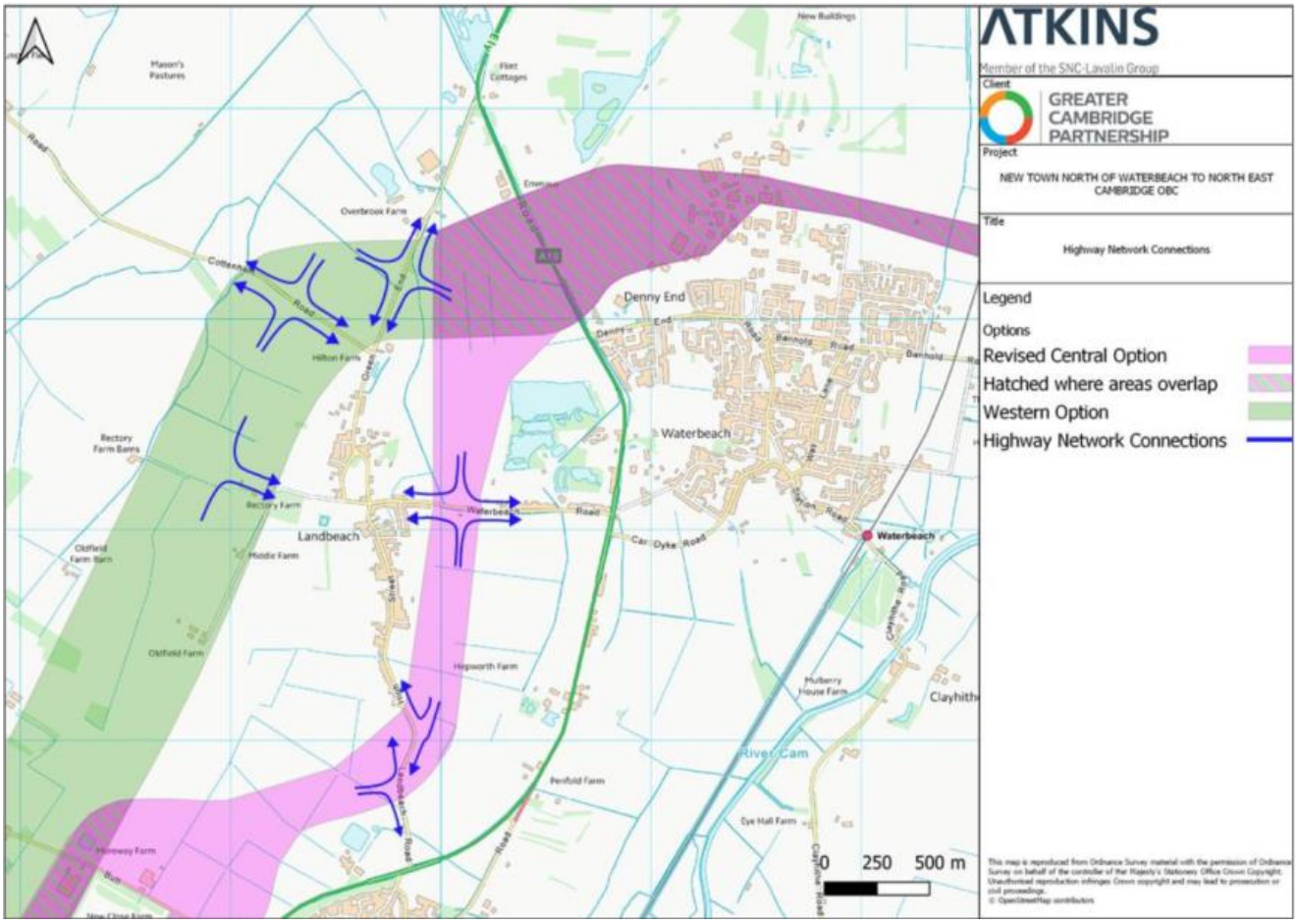
The conclusions of this analysis and the subsequent assumptions for off-infrastructure routing are set out, by area, below:

- Waterbeach New Town:
  - Segregated public transport corridors through Waterbeach New Town, provided as part of the development, between the southern access roundabout and the relocated Waterbeach Station, and between the Principal Centre and Cambridge Research Park roundabout.
- Villages within or close to the scheme corridor:
  - For the purposes of modelling assessment, services primarily associated with the Waterbeach to Cambridge Public Transport Scheme are assumed to not directly serve surrounding villages directly. However, infrastructure flexibility will allow bus operators to use the busway to serve routes to surrounding villages if desired.
- Cambridge:

[106] Based on the SOC estimate of scheme cost

- For the purposes of modelling assessment, services primarily associated with the scheme are assumed to:
  - Serve Cambridge Science Park and NEC via the CGB before continuing into Cambridge city centre via Milton Road;
  - Serve West Cambridge via Orchard Park;
  - Not continue West along the CGB, however interchange facilities on the CGB will be provided for this; and
  - Not directly serve Cambridge North Station on the CGB.

Figure E-1 - Highway network connections



E.3. Stop infrastructure and locations

Work was undertaken in the form of a Position Statement to set out assumptions for the design of at-stop infrastructure and the location of busway stops to further inform subsequent costing, modelling and engineering work.

The Position Statement concluded that stop infrastructure will be designed in-line with national and local policy and professional guidance and will broadly align with the facilities proposed for the Cambridge South East Transport scheme (CSETS).

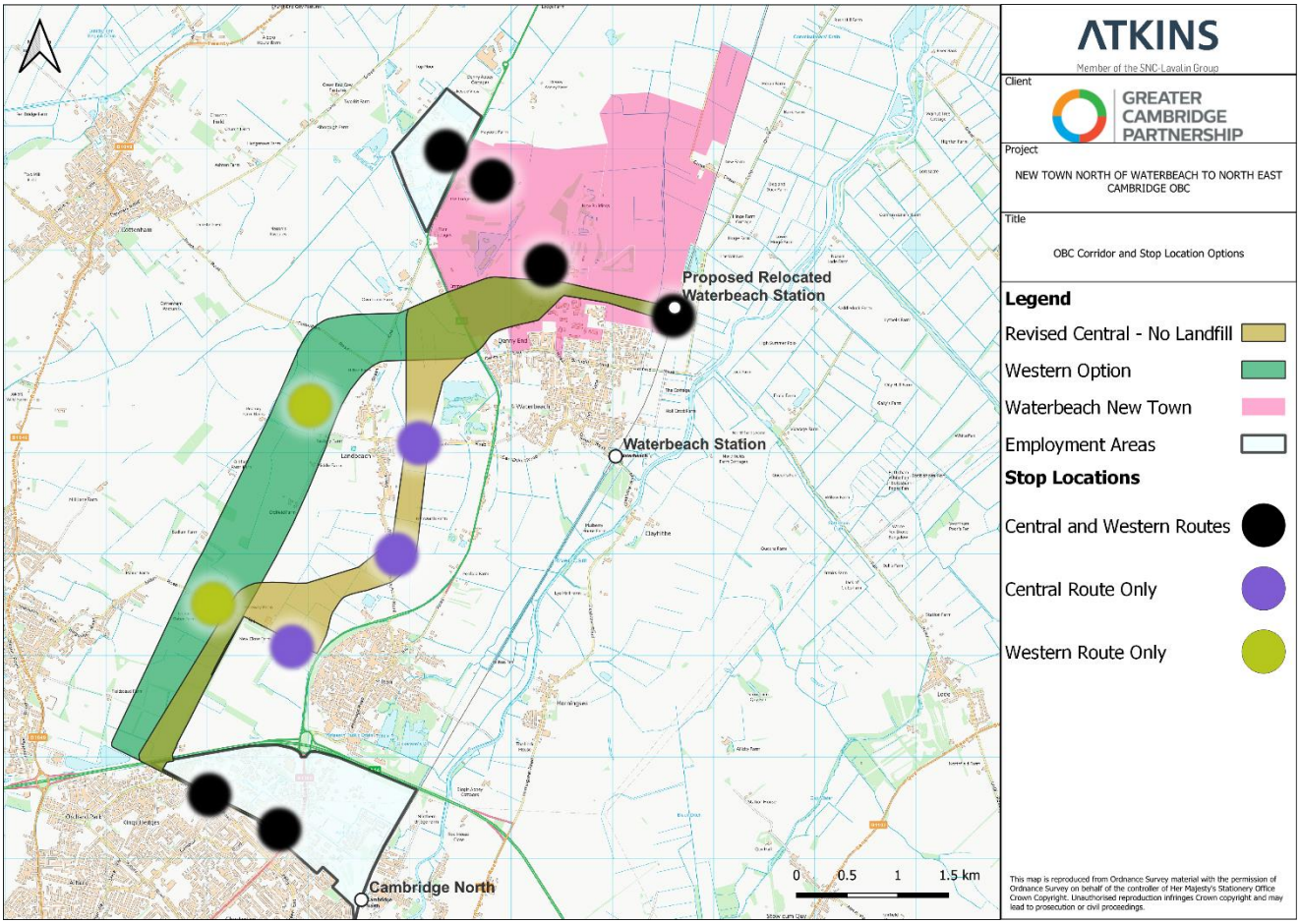
Busway stops will be located close to existing highways, active travel routes and bus stops for onward travel and will be located close enough to their intended market to encourage active travel to and from stops. For the purposes of costing, modelling and appraisal at OBC, it is assumed that there will be busway stops at the following locations:

- Existing stops along the CGB at Cambridge Regional College and Cambridge Science Park;
- In the area of Milton Park and Ride;
- Landbeach (number of stops TBC);

- Within Waterbeach New Town (number of stops TBC);
- Waterbeach New Town Travel Hub;
- The relocated Waterbeach Railway Station; and
- Cambridge Research Park.

The revised corridor alignments and indicative stop locations as a result of the early OBC work are set out in Figure E-2.

Figure E-2 - OBC route corridors and indicative stop locations



E.4. Active travel provision

An active travel path alongside the length of the busway was assumed for all options at SOC stage. To reflect more detailed routing and design considerations required for the OBC stage, work was undertaken prior to the commencement of the OBC to understand the expected demand for an active travel path alongside the scheme and its' role in enhancing active travel connections in the Waterbeach to Cambridge corridor.

This analysis concluded that an active travel route alongside the scheme would not be overproviding provision in the corridor as it serves different markets to other GCP schemes, such as the Waterbeach Greenway, and provides a higher quality commuter route than Mere Way. The infrastructure would also provide a maintenance track for the busway.

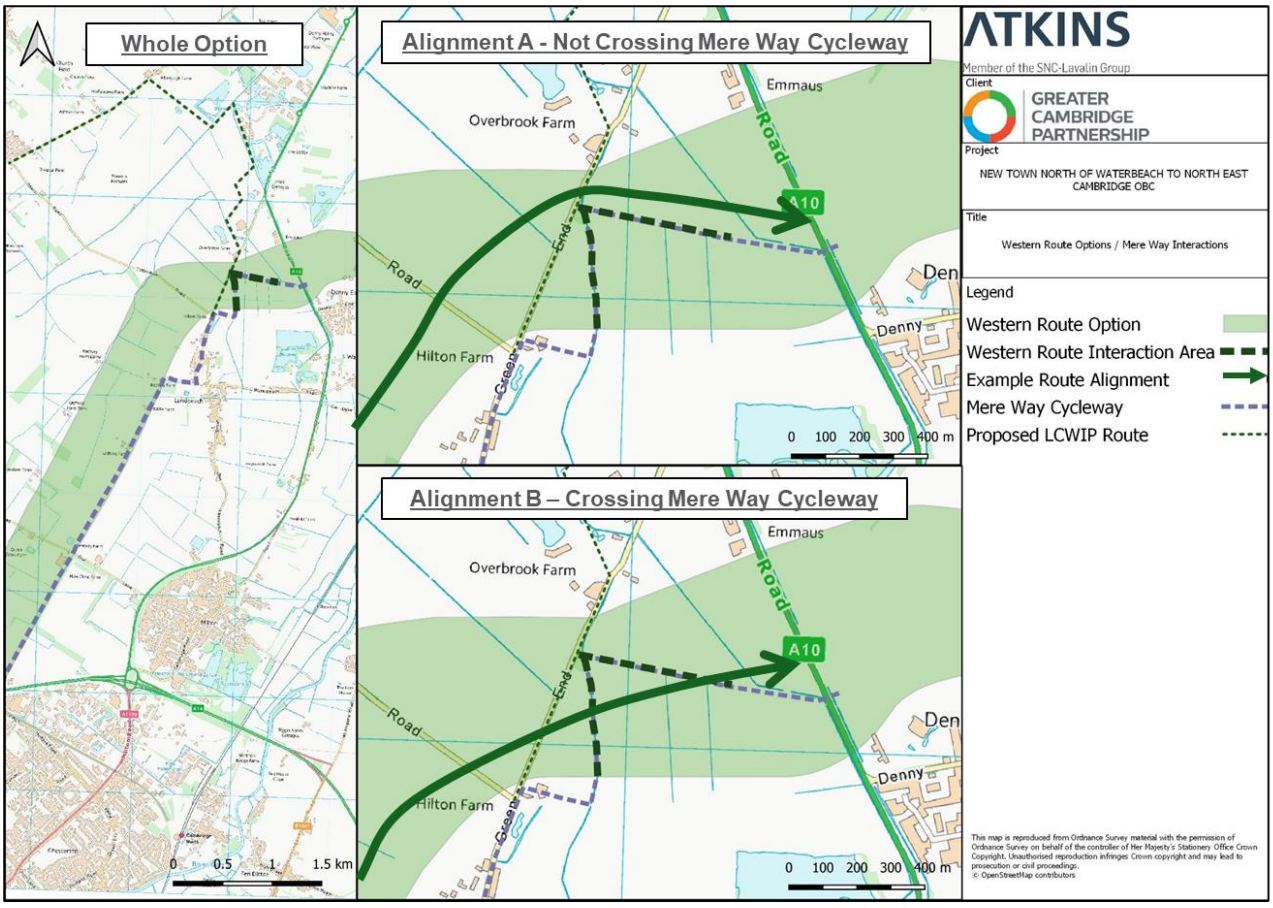
Where the scheme runs parallel with Mere Way, a footway will not be provided as part of the scheme active travel route in order to reduce costs. For the Western option, the footway will join the scheme from Mere Way to the north of Landbeach heading north towards the New Town. For the Central route option, footway provision will be shared with Mere Way between Cambridge and Butt Lane.

E.5. Mere Way integration

Atkins have considered the interaction between the Waterbeach to Cambridge Public Transport Scheme and the Mere Way. There are two potential crossing points within the study area, one to the north of Landbeach, where the Western and Revised Central route options may cross and Butt Lane where the Revised Central route option may cross. The detail of the proposed integration is set out below:

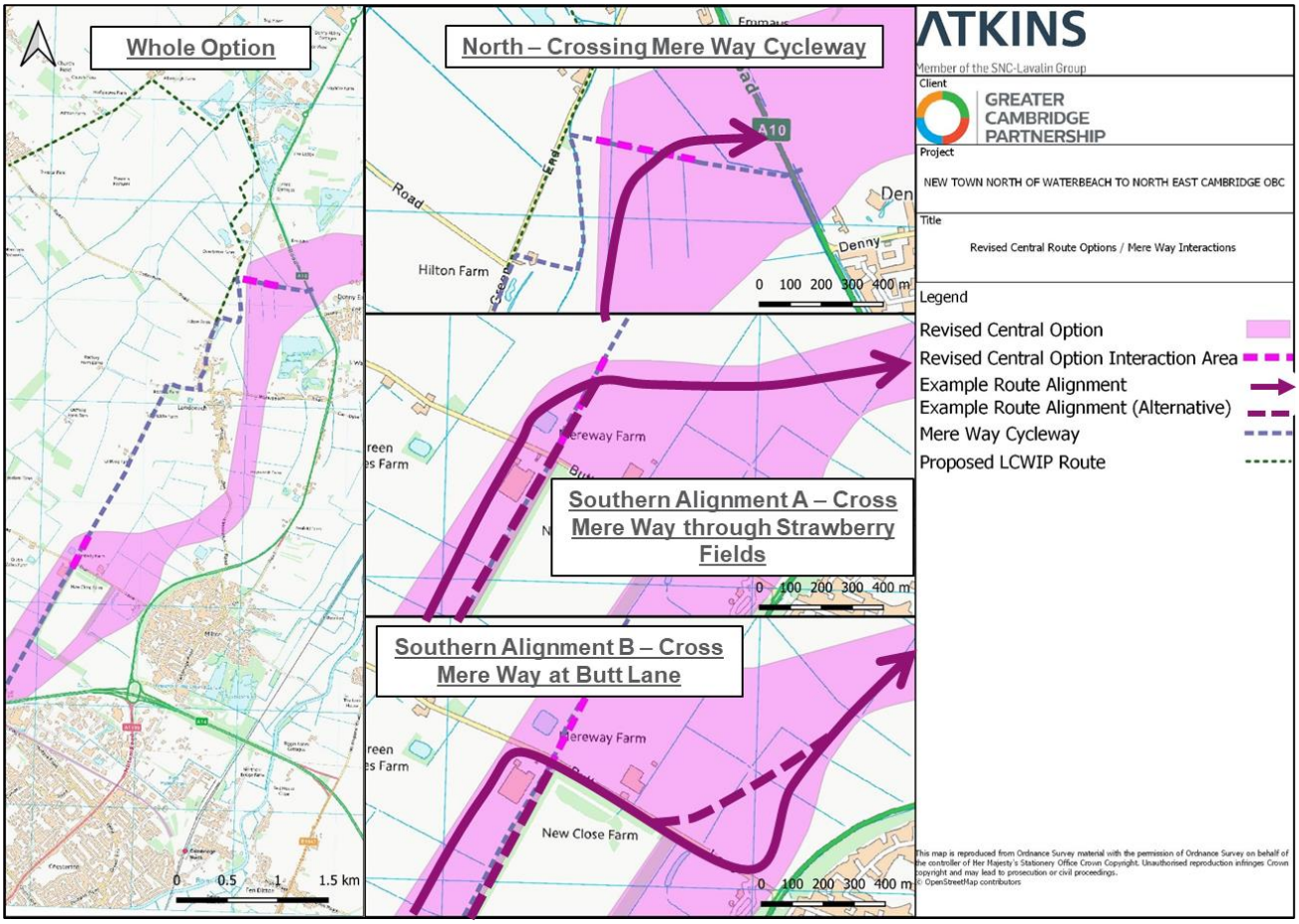
- **Western option interaction point – north of Landbeach** (Figure E-3): There are two possible alignments that interact with the Mere Way Cycleway to the north of Landbeach. Alignment A (not crossing the cycleway) causes less disruption as it avoids the cycleway infrastructure, whereas Alignment B provides a more direct route. Active travel provision will be provided from the A10 bridge to the cycleway dog-leg so it is not required along the Waterbeach to Cambridge scheme at this point. Active travel provision could be provided as the Waterbeach to Cambridge scheme heads south to provide a faster route for users travelling between Waterbeach and Cambridge, avoiding Landbeach altogether; and
- **Revised Central option interaction points – north of Landbeach and at Butt Lane** (Figure E-4): There are two interaction points with the Mere Way Cycleway to the north of Landbeach and at Butt Lane. It is likely that the Revised Central option will have to cross the Mere Way cycleway near the A10 bridge and will aim to avoid any conflict with the embankment. There are two alignment options where the Revised Central option crosses Butt Lane. Alignment A (crossing Butt Lane then crossing the Strawberry Fields) is likely offer slightly quicker journey times as it is more direct, whereas Alignment B could serve Milton Park and Ride by running along Butt Lane. It is considered that all alignment options would include for active travel provision, as the Revised Central option is located away from the Mere Way Cycleway when not interacting at these points.

Figure E-3 - Mere Way interaction with Western option[107]



[107] Waterbeach to Cambridge alignments are indicative

Figure E-4 - Mere Way interaction with Revised Central option[108]



[108] Waterbeach to Cambridge alignments are indicative

Appendix F. Specific route identification

F.1.1. Route option design principles

In order to identify a specific route alignment for each corridor option, three route options for each corridor option were developed for detailed assessment and sifting. The six route options were identified based on the following general design principles and assumptions:

- Minimising land purchase by utilising publicly owned land (CCC);
- Simplifying construction;
- Minimising costs, traffic management requirement and environmental impacts;
- Achieving Biodiversity Net Gain;
- Enhancing intermodal connections; and
- Avoiding environmental and heritage constraints, and existing buildings, where possible.

The full route options are described in Table F-1.

Table F-1 - Specific route options

Route option	Option ID	Description
Revised Central route option	1	Route starting with a priority junction from CGB until Butt Lane. Improvements proposed along Butt Lane considering carriageway widening, and active travel provision in the north section. Staggered junction (left-right) with Milton Park and Ride. Route finishes south of Mere Way Bridge.
	2	Corridor starts with 90D junction at CGB, follows the proposed central corridor footprint with some bends between Mere Way and Landbeach Rd. Link road to provide connectivity with Milton Park and Ride through a (left-right) staggered junction.
	3	Corridor starts with 70D junction at the CGB then follows the central corridor footprint minimising the impact on the greenhouses. Route finishing south of Mere Way Bridge. NMU link to join proposed Park and Ride with Mere Way approach.
Western route option	1	Starting approx. 250m west of the A14 underpass. Running through the middle of the fields between Impington and Mere Way. Running West of the green houses. At grade crossings with Cottenham Rd and Green End Rd. Entering the Park and Ride from the west.
	2	Corridor starts with 70D junction at CGB, then at grade crossing at Milton Rd. Running west but not close to the greenhouses. Entering north of the Park and Ride via three-arm roundabout.
	3	Corridor starting with a 70D junction at CGB. Running in the middle of the green housing. At grade crossings with Cottenham Rd and Green End Rd. Finishing north of Park and Ride.

F.1.2. Sifting criteria

The sifting criteria used five overarching categories which have been developed based on the constraints commonly encountered in the area when designing schemes. Each category considered a number of elements which are set out below:

- Highway design:
  - Horizontal alignment - higher score for options with direct routes (straight sections) and wider radii curves to maintain vehicle speed;

  - Junctions with existing roads - higher score for options that interact less with existing highway as this will require less realignment; and
  - Interface with field access - higher score for least number of field crossings to be provided.
- Scheme wide objectives:
  - Bus services - higher score awarded based on proximity of bus stops to user desire lines and impact of the route on the service provided by bus;
  - Connectivity with Milton Park and Ride - higher score for options that are located to Milton Park and Ride;
  - Connectivity with proposed Waterbeach Park and Ride - higher score for options that are located to the proposed Waterbeach Park and Ride;
  - Route performance - higher score for options that achieve average speed closer to design speed; and
  - Active travel - higher score for higher levels of active travel provision.
- Deliverability and stakeholders:
  - Construction costs and buildability - higher score for no foreseen constraints;
  - Land acquisition - higher score for options that require less land take;
  - Impact on existing network during construction - higher score for options that disrupt the existing highway network less during construction;
  - Impact on utilities - higher score for options that have a lower impact on existing utilities; and
  - Impact on business activities - higher score for neutral or positive impacts on business in the immediate vicinity of the proposed busway.
- Environment and sustainability:
  - The criteria has been categorised by the following: 1 point – significant negative impact 3 points - slight negative impact 5 points - neutral or positive impact.
    - Flood risk;
    - Landscape and visual impact;
    - Archaeology & Heritage; and
    - Noise (proximity to houses).
- Transport planning:
  - Resilience – higher score for where routes are fully segregated with highway network interactions only at crossing points;
  - Connections to Markets – higher score for options that have more direct connections to Milton Park and Ride and close to Landbeach village, with possible connections to other villages outside of the study area;
  - Journey times – higher score for options with shorter journey times;
  - Physical Integration with the transport network – higher score for options that connect directly with the maximum number of other schemes, including at transport interchanges with additional interchange facilities, and allows for the more direct journeys; and
  - Connection to A10 Park and Ride near Waterbeach – higher scores for schemes that directly serve the A10 Park and Ride therefore no detour is required which as an impact on journey time and bus operations.

Each option was scored against the criteria set out above with a score of 1-5 being given where 5 is the best and 1 is the worst. The summary results are shown in Table F-2.

Table F-2 - Sifting results overview

	Revised Central route option			Western route option		
Categories	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Highways Design	68	50	**70**	**90**	68	64
Scheme wide objectives	**186**	174	108	**94**	**94**	92

	Revised Central route option			Western route option		
Deliverability & Stakeholders	**36**	28	34	**74**	68	62
Environment & Sustainability	**72**	52	60	40	**48**	36
Transport Planning	**23**	**23**	17	**15**	13	11
TOTAL	**405**	331	301	**325**	303	277

Table F-2 shows that overall option 1 for both the Revised Central and Western route options are the preferred options as they score higher than options 2 and 3 for both corridors.

The Revised Central route option introduces more complexity in the design hence the lower scoring in the Highway Design and Deliverability & Stakeholders categories. The connectivity with Milton Park and Ride and other travel markets and the route resilience drives the higher scores for Revised Central options 1 and 2.

The Western route option scores higher as there is less land purchase requirements and less disruption to the network as it is removed from the existing highway network. The Western route options are generally longer routes and would likely have a higher cost than Revised Central route options.

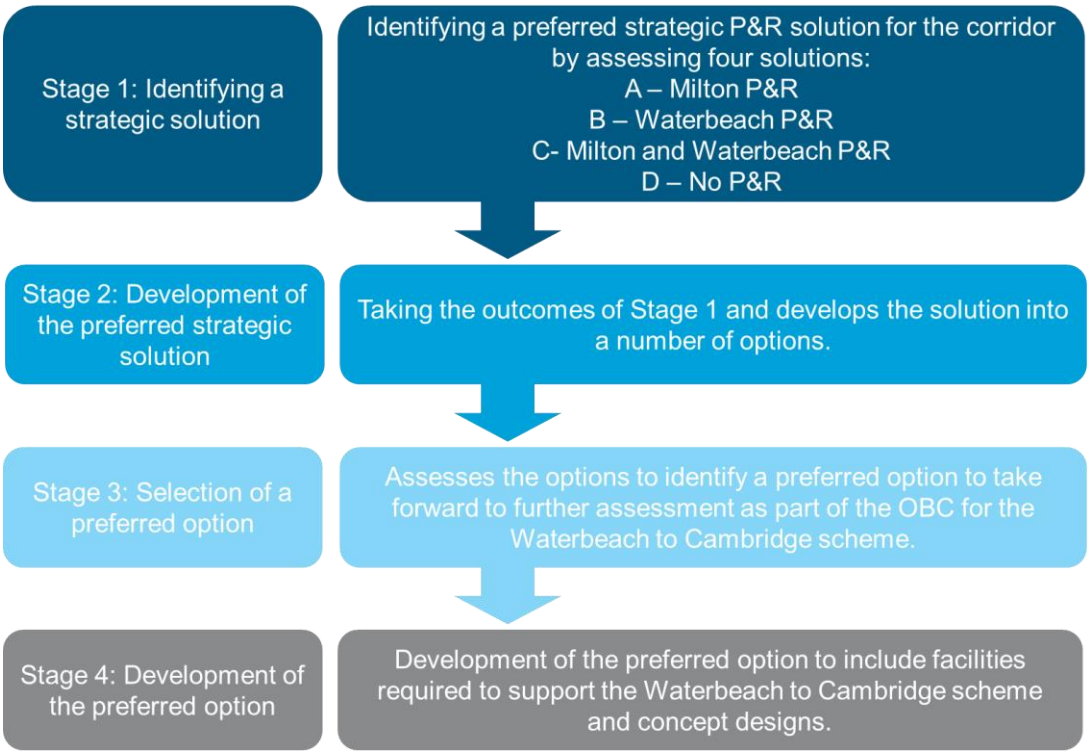
In terms of environment, the Revised Central route options score higher compared to Western route options due to their impact on the flooding zones.

Appendix G. Park and Ride Strategy

In addition to Milton Park and Ride, the need for a new Park and Ride facility has been identified through the Cambridgeshire and Peterborough Local Transport Plan[109]. The following summarises the work undertaken to consider the future status of Milton Park and Ride and the need for a new Park and Ride near Waterbeach.

The process for identifying the optimum Park and Ride strategy for the corridor is set out in Figure G-1 and summarised below.

Figure G-1 - Park and Ride optioneering methodology



G.1. Stage 1: Identifying a strategic solution

The first stage in the Park and Ride option development process requires a preferred strategic conceptual solution to be determined. The assessed solutions are:

- A - Milton Park and Ride site only;
- B - New Park and Ride site at Waterbeach;
- C - A combination of both the above solutions; and
- D - No Park and Ride infrastructure along the route i.e., Milton Park and Ride is decommissioned and no replacement Park and Ride provision is provided.

Option C was identified as the preferred strategic solution for enhancing Park and Ride provision in the study area.

The patronage at Milton Park and Ride, with the additional site in option C, is reduced by approximately 14%. This provides an opportunity and scope for supporting the NEC Transport Strategy in that future existing and future public transport and active travel links between Milton Park and Ride and NEC could make parking provision at Milton Park and Ride a more viable option for employees at NEC.

[109] Cambridgeshire and Peterborough Combined Authority (2021) The Cambridgeshire and Peterborough Local Transport Plan

Option A would require additional capacity, as without the site at Waterbeach this concept does not have as great a potential for additional capacity in the corridor to support the NEC.

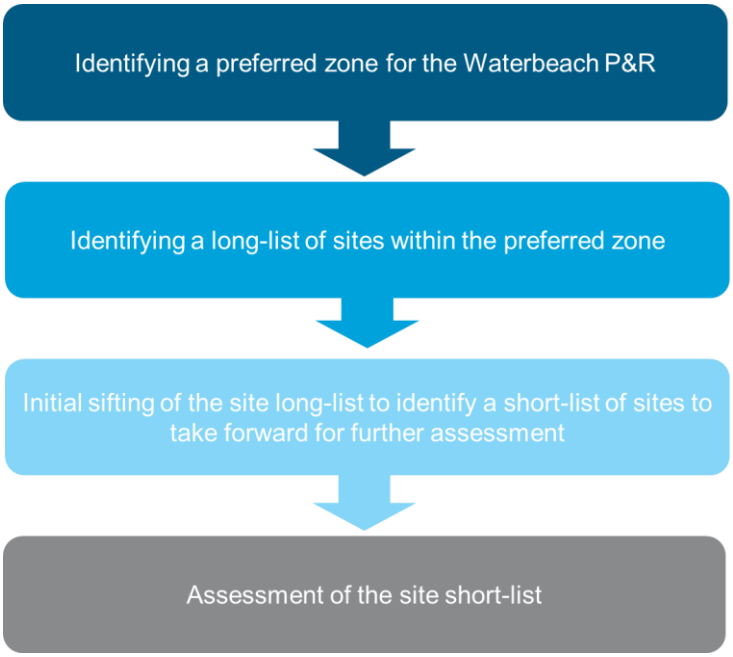
Each of the two strategic locations, Milton and Waterbeach, serve trips from different geographical areas. Thus, the provision of a double site, with option C, has the potential to produce significantly greater patronage than just one.

The removal of Milton Park and Ride site would incur a capital cost. Thus, retaining the site at Milton is anticipated to be more cost effective, being less expensive and more attractive, than a single site at Waterbeach as well as providing benefits discussed above for connectivity to NEC.

G.2. Stage 2: Development of the preferred solution

Upon establishing Milton Park and Ride and a new Waterbeach Park and Ride (C) as the preferred strategic solution in Stage 1, the next stage is to develop this solution further. The process for doing so is shown in Figure G-2.

Figure G-2 - Development of the preferred strategic solution



Three zones were established for site locations:

- W1 – east of the A10;
- W2 – directly adjacent to the A10; and
- W3 – west of the A10.

The three zone options were subject to a high-level assessment based on land access and land impacts of Park and Ride site operation. This assessment ranked the zones from most preferred to least preferred based on these criteria. The results of this assessment are summarised in Table G-1, with the Zone W2 ranking as the preferred zone due to its proximity to the A10.

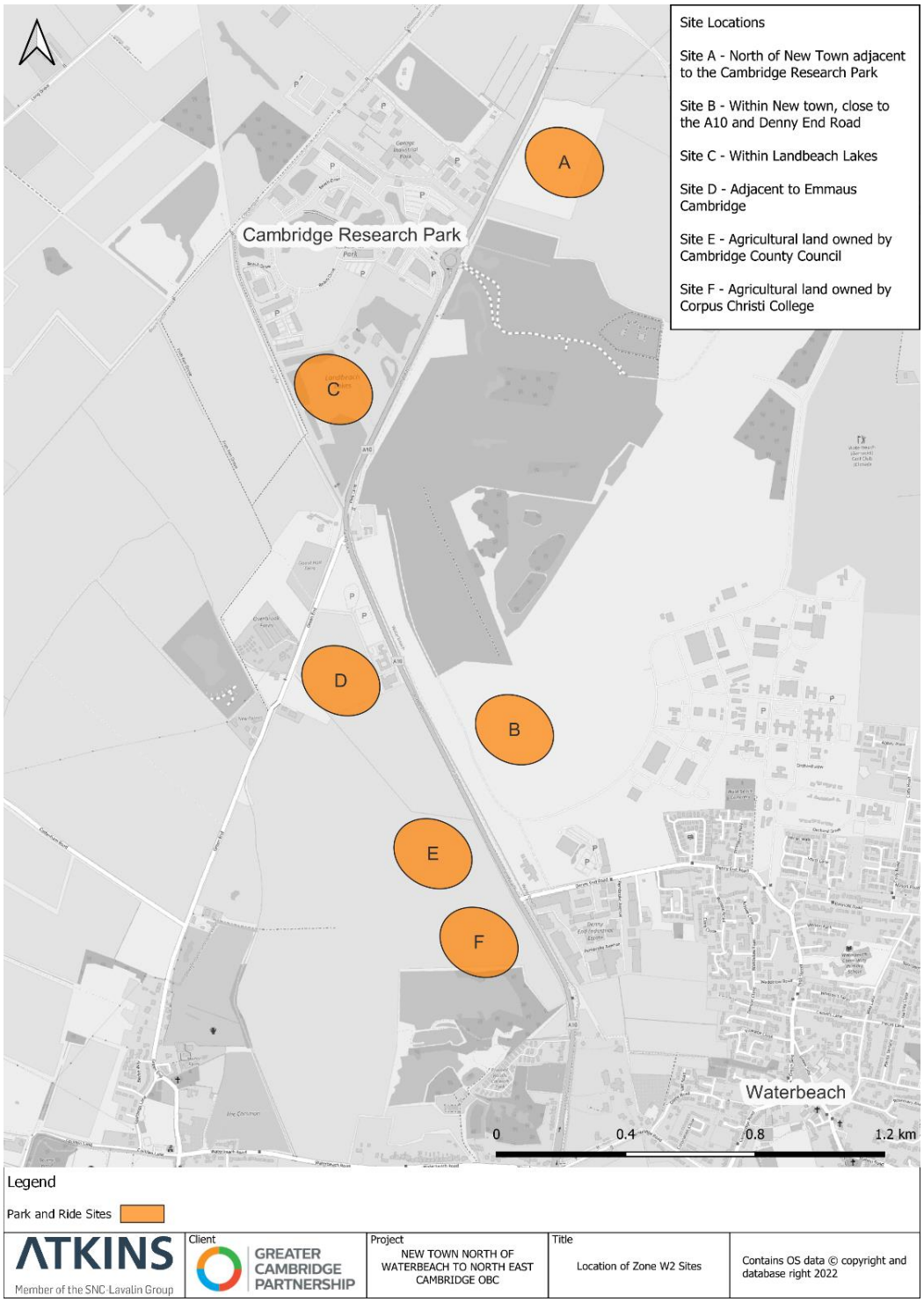
Table G-1 - Ranking of zone options

Zone option	Land access	Land impacts	Rank
W1	Longer access to and from the A10 for cars and buses and to the busway	Potential high impact if a site the size of Milton Park and Ride is developed in close proximity to, or within the red line boundary of, the New Town	3
W2 (Preferred option)	Good access to the A10	Generally agricultural land	1
W3	Longer access to and from the A10 for cars	Land currently agricultural	2

Zone option	Land access	Land impacts	Rank
	and buses and poor access from the New Town		

The following six sites shown in Figure G-3 have been identified within the preferred Zone W2. As shown, all sites sit within close proximity to the A10.

Figure G-3 - Location of zone W2 sites[110]



An initial sift has been undertaken on the six sites identified in Figure G-3 to short-list sites for further assessment. The sifting criteria is based on known key constraints as follows:

1. Flood risk;
2. Land ownership; and
3. Green Belt designation.

[110] Size of site is approximate, based on the area occupied by Milton Park and Ride.

A high-level assessment of these key issues allows for the discounting of site options which cannot be delivered because of significant constraints as summarised in Table G-2. It ranks the long-list of sites based on these considerations, alongside commentary on access arrangements.

Table G-2 - Ranking of long-list of site options

Option	Flooding	Land Ownership	Green Belt	Transport Access	Overall Ranking	Short-List?
Site A	Subject to flood risk	CCC ownership	Not in Green Belt	Access from CRP Junction for cars, buses access via New Town	3	Yes
Site B	No / low flood risk	Private ownership	Not in Green Belt	Access for cars and buses via New Town	6	No
Site C	Subject to flood risk	Private ownership	Not in Green Belt	Access via CRP for cars-buses access via New Town	5	No
Site D	Subject to flood risk	CCC ownership	Not in Green Belt	Access from Green End for cars, buses direct from busway south of crossing to the New Town	4	Yes
Site E	Subject to flood risk	CCC ownership	Not in Green Belt	Directly from A10	1	Yes (combined with Site F)
Site F	No / low flood risk	Private ownership	In Green Belt	Directly from A10	2	Yes (combined with Site E)

Sites A, D, E and F are taken forward to the short-list assessment on the grounds that if flood risk can be mitigated, all sites can be delivered as they are not in the Green Belt (except Site F) and do not require land acquisition. Site F does sit within the Green Belt but can be taken forward together with Site E so that a combination of the two sites could provide an acceptable option in terms of meeting all the considerations covered in Table G-2, particularly in relation to providing options to alleviate flood risk.

These short-listed options will be presented for comment at public consultation in early 2023. For the purposes of assessing the busway options as part of the OBC, a single Park and Ride option is assumed to enable a consistent basis for assessment of the other variable aspects of the scheme. Therefore, the short-listed sites have been assessed further in Stage 3 to identify a site to feed into the OBC assessment.

G.3. Stage 3: Selection of a preferred option

Sites A, D, E and F have been taken forward to form a short-list of options for the location of the Waterbeach Park and Ride site. For the purposes of identifying a preferred option to take forward for business case assessment a Multi-criteria Assessment Framework (MCAF) has been undertaken based on criteria of:

- Existing and future uses of the sites;
- Environment;
- Links to existing and future land uses on the corridor;

- Scope for links to other transport networks; and
- Deliverability.

Figure G-4 shows the MCAF criteria and the parameters used to assess each.

Figure G-4 - MCAF criteria and parameters

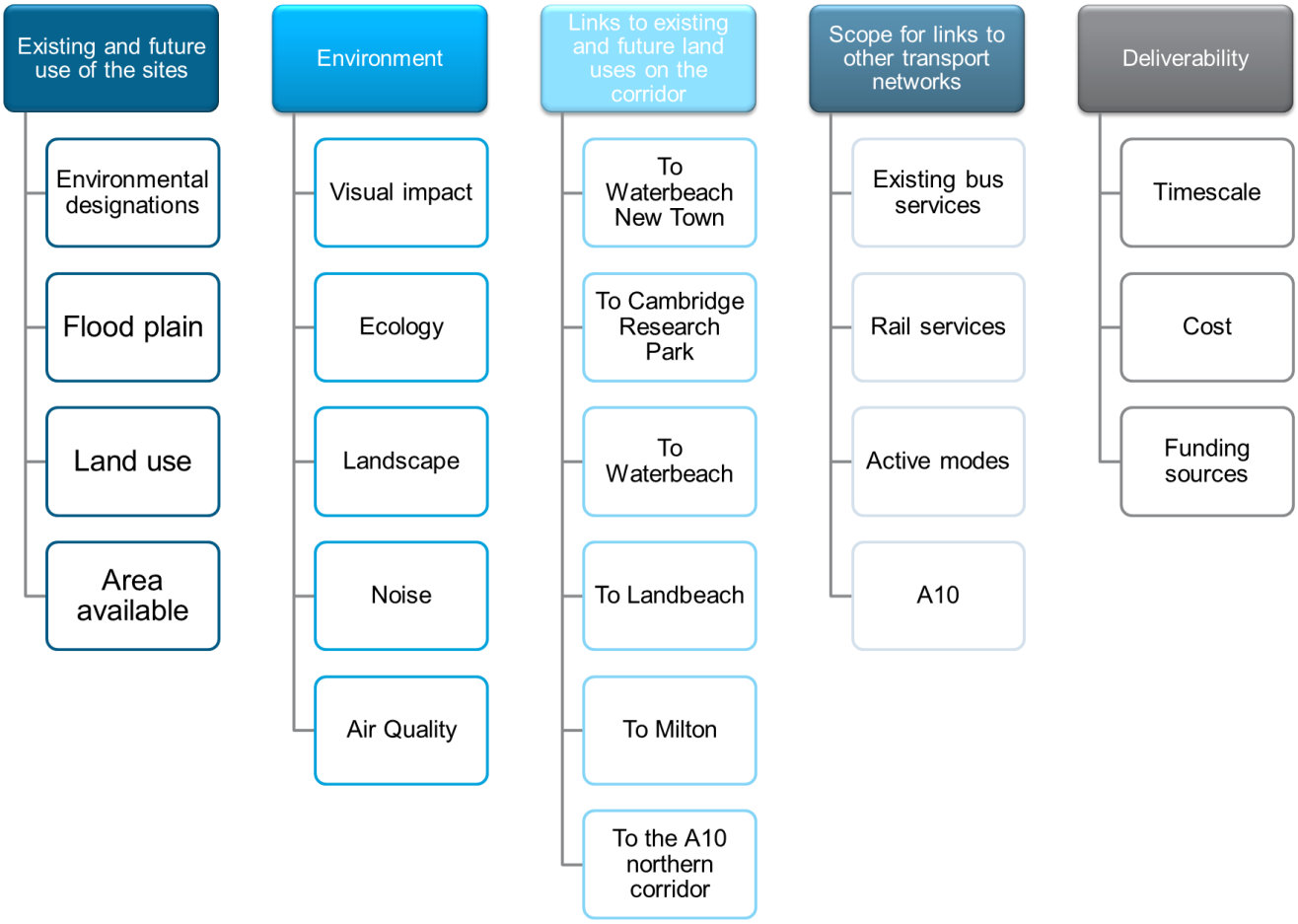


Table G-3 provides a summary of the MCAF category scores for Sites A, D and E/F. It is clear that Site E/F scores stronger across the categories, with a total score notably higher than the other sites. It has performed particularly strongly because of its location and connectivity, not just to the existing transport network but also to new development, and because of its lack of significant constraints. This means the site is considered deliverable.

Table G-3 - Summary of total MCAF scores for short-listed site locations

Site	Existing and Future use of the potential sites	Environment	Links to Existing and Future Land Use on the Corridor	Scope for Links to other Transport Networks	Deliverability	Total Weighted Score
Site A	84	132	108	132	48	504
Site D	76	91	172	202	36	577
Site E/F	108	124	244	240	72	788

It is recommended that Site E/F, within Zone W2, is taken forward to the assessment of the scheme options within the OBC. Stage 4 will determine site components and facilities for both Waterbeach and Milton Park and Ride sites, and how their engineering design will be integrated with the busway.

G.4. Stage 4: Development of the preferred option

The layout of the preferred Park and Ride location will be developed at the next stage of the project. To inform this, facilities that could be included at the Park and Ride have been considered, to form a scope for the design work.

Facilities that could be included at the site have been identified to improve user experience, link land sues and reduce the perception of interchange time. Some of these components could be provided by the scheme and others by third parties. As the scheme design process progresses it will be important to consider the components of other transport interchanges in the area, including Waterbeach Relocated Station and Waterbeach New Town Travel Hub, to ensure a coordinated approach. Core facilities that should be considered are:

- Parking, including accessible parking, drop-offs, taxi drop-off and electric vehicle charging;
- Cycle parking, including lockers and e-bike charging;
- Park and Ride building, including:
  - A waiting room;
  - Refreshments;
  - Toilets, both for the public and bus drivers;
  - Security/info desk; and
  - Information on onward journeys and destinations.
- Click and collect.

Operational components including bus layover and depot facilities will need to be discussed with bus operators and developed further as part of the design of the site.

Appendix H. Park and Ride assessment technical note

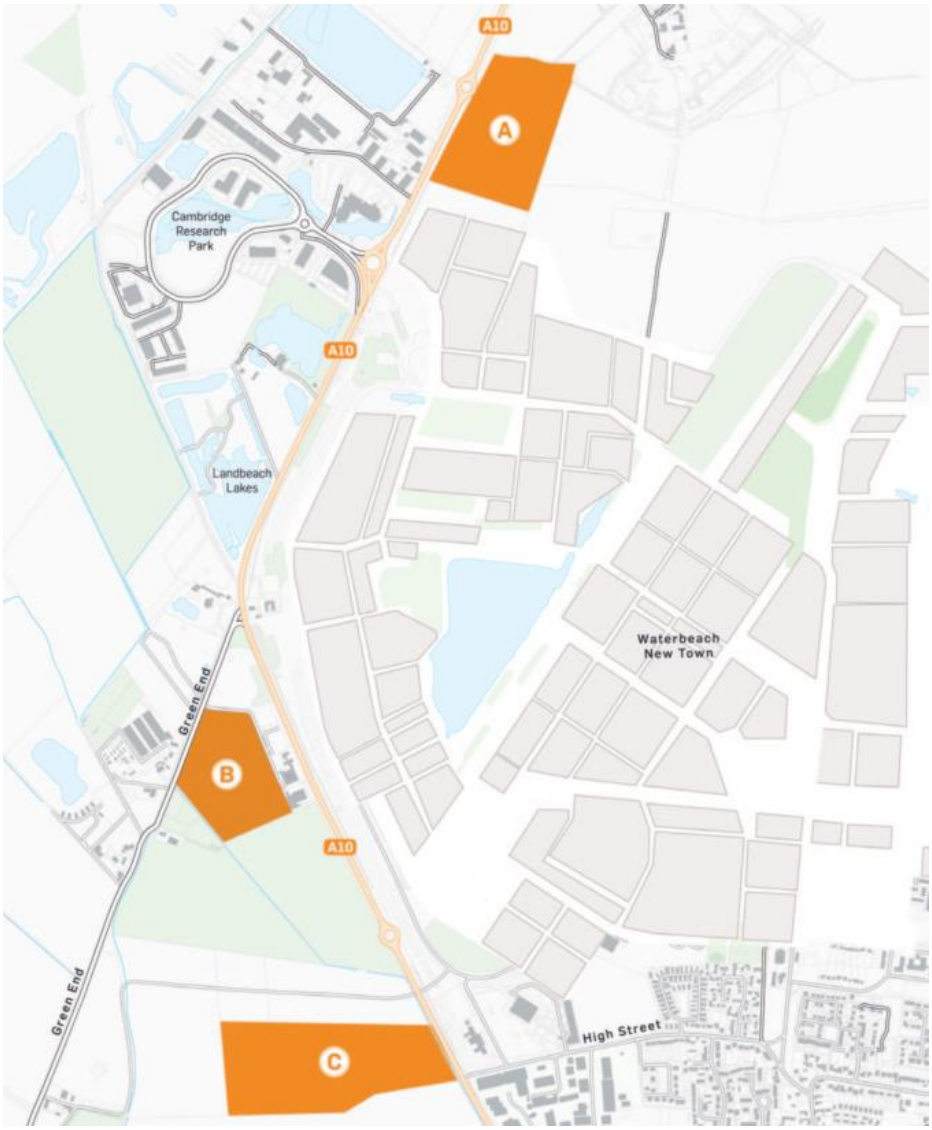
1. Introduction

This technical note provides a summary of the assessments undertaken to support the identification of a preferred option for a new Park and Ride at Waterbeach. Assessments have been undertaken for the three Park and Ride options, shown in Figure 1-1, by the following disciplines:

- Noise
- Heritage
- Landscape
- Water
- Flood risk
- Land ownership and designation
- Transport planning
- Transport modelling
- Stakeholder and public support
- Costing.

Each of the assessments is documented in separate technical outputs, summarised in the following sections. Each Park and Ride site option is assessed on a red, amber, green (RAG) scale for each assessment, to allow for a direct comparison of the strengths and weaknesses of each site.

Figure 1-1 - Park and Ride options



2. Noise

A high-level acoustic assessment has been undertaken for the three sites to assess potential noise impacts from construction and operation of the proposed Park and Ride. With regards to the operation of the P&R, only mechanical plant noise i.e. buses, building and infrastructure, associated with the operation of the P&R has been considered. A summary of the results for each site are set out below.

Site A

- The nearest noise sensitive receptor (NSR) is a residential receptor at approximately 135m. A less sensitive non-residential receptor (Denny Abbey & The Farmland Museum) is approximately 240m from the site.
- At the nearest NSR the acoustic environment is moderate to high ambient noise due to the proximity of the A10.
- The allowable total sound power level (i.e. the amount of noise that the Park and Ride can make before levels are too high at the NSR) at the Park and Ride: 105 dB LWA (Daytime), 95 dB LWA (Night).

Site B

- The nearest NSR is a residential receptor at approximately 40m.
- At the NSR the acoustic environment is low ambient due to significant offset distance to main roads.
- The allowable total sound power level at the Park and Ride: 83 dB LWA (Daytime), 83 dB LWA (Night).

Site C

- The nearest noise sensitive receptor (NSR) is a residential receptor at approximately 450m. A less sensitive non-residential receptor (Cambridgeshire ACF) is approximately 80m from the site.
- At the nearest NSR the acoustic environment is low ambient due to significant offset distance to main roads.
- The allowable total sound power level at the Park and Ride: 107 dB LWA (Daytime), 107 dB LWA (Night).

Based on the high-level assessment, the option with the least noise constraints is Option C closely followed by Option A.

Option B has the most noise constraints, where any mechanical plant and entry/exit points would likely need to be designed away from the residential receptors located close to the west of the site.

Table 2-1 - Acoustic assessment RAG rating

Site A	Site B	Site C
		 *

*Preferred option from an acoustic perspective

3. Heritage

A desktop heritage assessment has been undertaken for the three Park and Ride sites. A summary of the results for each site are set out below.

Site A

As the site is neighbouring a scheduled monument, this site could result in adverse effect on the historic monument and its related structures by introducing a new element into their setting. It is possible that this option would also cause impact to the significance of the listed buildings by introducing a new element into their setting. Any works in proximity to the scheduled monument are also likely to uncover previously unknown archaeology dating to the medieval and post-medieval periods.

The overall impact on the historic environment can be considered to be **adverse**.

Site B

This site is not expected to have any impact on any designated assets, as the only listed building in the study area is a milestone situated at a distance from the site. However, the potential for archaeology to be uncovered as a result of this option cannot be discounted. This is particularly so because the site is undeveloped and there is evidence of a wider medieval occupation of the immediate area in proximity to the scheme.

The overall effect on the historic environment resource is considered to be **neutral**, as there may have been archaeology present but it is likely to have been truncated or removed already.

Site C

It is not expected that this option will result in impact to the designated assets within the study area due to their distance from the site. However, it is possible that previously unknown archaeology would be uncovered as the site is undeveloped and in proximity to known scheduled remains.

The overall impact on the historic environment can be considered to be **negligible**, as archaeology may be present in previously undisturbed area but the actual impact will likely be minimal.

Table 3-1 - Heritage assessment RAG rating

Site A	Site B	Site C
		

4. Landscape

A desktop landscape assessment has been undertaken for the three Park and Ride sites. A summary of the results for each site are set out below.

Site A

Site A is reasonably typical of the landscape of the area (LCA 2B: Cottenham Fen Edge Claylands). Site A has the potential to:

- Complement the scale, landform and pattern of LCA 2B
- Maintain existing landscape character in an area that is not a designated landscape, is of neither national or local high quality, or vulnerable to change
- Avoid being intrusive visually, or have adverse effects on current levels of tranquillity
- Incorporate environmental design measures to ensure the scheme blends in smoothly with surrounding landscape elements and characteristics.
- Overall impact: **Neutral**

Site B

Site B is reasonably typical of LCA 2B: Cottenham Fen Edge Claylands. Site B has the potential to:

- Complement the scale, landform and pattern of LCA 2B
- Maintain existing landscape character in an area that is not a designated landscape, is of neither national or local high quality, or vulnerable to change
- Avoid being intrusive visually, or have adverse effects on current levels of tranquillity
- Incorporate environmental design measures to ensure the scheme blends in smoothly with surrounding landscape elements and characteristics.
- Overall impact: **Neutral**

Site C

Site C is reasonably typical of LCA 2B: Cottenham Fen Edge Claylands. Site C has the potential to:

- Complement the scale, landform and pattern of LCA 2B
- Maintain existing landscape character in an area that is not a designated landscape, is of neither national or local high quality, or vulnerable to change
- Avoid being intrusive visually, or have adverse effects on current levels of tranquillity
- Incorporate environmental design measures to ensure the scheme blends in smoothly with surrounding landscape elements and characteristics and
- Avoid conflict with government policy towards protection of the countryside. This is the main difference between the sites from a landscape perspective.
- Overall impact: **Neutral**

Although all sites are considered to have a neutral impact in terms of Landscape, it is considered that Site C holds the most potential at this stage because:

- Only a small segment borders the A10, allowing it to be quieter than Sites A and B
- It has the potential to be expanded to the west if necessary (surrounded by fields rather than infrastructure)
- Its positioning will not require a new junction on the A10
- It will not disturb Cambridge Research Park.

Table 4-1 - Landscape assessment RAG rating

Site A	Site B	Site C
		 *

*Preferred option from a landscape perspective

5. Water

A TAG Water Environment Impact Worksheet assessment has been undertaken to understand the impact of each site on the water environment, considering hydromorphology, flood risk, groundwater and water quality during construction and operation. Water quality impacts are similar for all three sites therefore water quality has been excluded from the assessment as it would not provide differentiation between the sites at this stage.

Site A

Regarding **access**:

- Site A could potentially result in additional watercourse realignments or crossings as on either side of the A10 there are watercourses. There is also potential that access could encroach into Flood Zone 2, on the western side of the A10.

Regarding **construction**:

- Site A could potentially result in the deterioration of the water quality of a number of drain systems through spillages of fuels or other contaminating liquids from construction activities.
- There is the potential for an increase in flood risk to the site itself and surrounding land uses through temporary site compounds.
- It has been assumed that the Park and Ride site will require below ground works. Therefore, impacts on groundwater levels and flows cannot be ruled out and will potentially require further investigation.
- The Park and Ride site is located immediately adjacent to the Upper Mill Drain. If the watercourse is realigned, it may result in temporary habitat loss. If a culvert is constructed to allow the watercourse to pass under the site, there are potential impacts to hydromorphology resulting from the in channel works. These in channel works could potentially cause localised damage to the bed, banks and riparian vegetation of the watercourse which may alter the morphological functioning of the channel. Even if the watercourse does not need to be realigned or culverted there are still potential impacts to hydromorphology resulting from construction works in close proximity to the watercourse.
- As there is a potential impact which is highly significant, the overall assessment score for the construction of Park and Ride site is **large adverse**. However, applying water quality, hydromorphology, groundwater and flood risk mitigation will reduce the magnitude of the potential impacts and give an overall assessment score of **neutral**.

Regarding **operation:**

- Site A could lead to the potential increase in impermeable surface area.
- Pollutants generated from the motorised traffic could potentially impact the water quality of the watercourses and/or the underlying aquifer's water quality.
- There is also potential for the increase in impermeable area to cause an increase in flood risk as a result of an increase in surface water runoff.
- If the Upper Mill Drain is realigned it may result in a reduction in hydromorphological diversity. If a culvert is constructed to allow the watercourse to pass under the site, there will be a loss of open watercourse.

- It has been assumed that the Park and Ride site will require below ground works. There is the potential for deep foundations to form a barrier to groundwater flow and a pathway for pollution to enter aquifers, resulting in a deterioration in water quality.
- As there is a potential impact which is highly significant, the overall assessment score for the operation of the site is **large adverse**. However, applying water quality, hydromorphology, groundwater and flood risk mitigation will reduce the magnitude of the potential impacts and give an overall assessment score of **neutral**.

Site B

Regarding **access**:

- Site B could potentially encroach into Flood Zones 2 and 3. As there are watercourses immediately adjacent to the A10 / Green End access could potentially result in additional watercourse crossings to provide access to the Park and Ride site.

Regarding **construction:**

- Site B could potentially result in the deterioration of the water quality of the Car Dyke Drain System through spillages of fuels or other contaminating liquids from construction activities.
- The Park and Ride site encroaches into Flood Zones 2 and 3 and there are also areas within the site at risk of surface water flooding. There is the potential that construction activities could cause an increase in flood risk. These activities include the storage of materials or temporary changes in topography and earthworks reducing floodplain capacity or impeding flood flow routes, an increase in temporary impermeable areas at site compounds increasing rainfall runoff and discharge of abstracted water (used in construction processes).
- It has been assumed that the Park and Ride site will require below ground works. Therefore, impacts on groundwater levels and flows cannot be ruled out and will potentially require further investigation.
- If the Car Dyke Drain System is realigned it may result in temporary habitat loss. If a culvert is constructed to allow the watercourse to pass under the Park and Ride site, there are potential impacts to hydromorphology resulting from the in channel works. These in channel works could potentially cause localised damage to the bed, banks and riparian vegetation of the watercourse which may alter the morphological functioning of the channel. Even if the watercourse does not need to be realigned or culverted, there is still potential impacts to hydromorphology resulting from construction works in close proximity to the watercourse.
- As there are potential impacts which are highly significant, the overall assessment score for the construction of the Park and Ride site is **large adverse**. However, applying water quality, hydromorphology, groundwater and flood risk mitigation will reduce the magnitude of the potential impacts and give an overall assessment score of **neutral**.

Regarding **operation:**

- Site B has the potential to increase the impermeable surface area from construction of the Park and Ride site.
- Pollutants generated from the motorised traffic could potentially impact the water quality of the watercourses and/or the underlying aquifer's water quality.
- There is also potential for the increase in impermeable area to cause an increase in flood risk as a result of an increase in surface water runoff.
- If the Car Dyke Drain System watercourse is realigned, it may result in a reduction in hydromorphological diversity. If a culvert is constructed to allow the watercourse to pass under the site, there will be a loss of open watercourse.
- It has been assumed that the Park and Ride site will require below ground works. There is the potential for deep foundations to form a barrier to groundwater flow and a pathway for pollution to enter aquifers, resulting in a deterioration in water quality.
- As there are potential impacts which are highly significant the overall assessment score for the operation of the Park and Ride site is **large adverse**. However, applying water quality, hydromorphology, groundwater and flood risk mitigation will reduce the magnitude of the potential impacts and give an overall assessment score of **neutral**.

Site C

Regarding access:

- Any access into the north of Site C will be within Flood Zones 2 and 3 and would potentially result in an additional watercourse crossing.

Regarding **construction**:

- The general activities associated with the Park and Ride site could potentially result in the deterioration of the water quality of the Car Dyke Drain System through spillages of fuels or other contaminating liquids from construction activities.
- The Park and Ride site encroaches into Flood Zones 2 and 3 and there are also areas within the site at risk of surface water flooding. There is the potential that construction activities could cause an increase in flood risk to the site itself and surrounding land uses through temporary site compounds.
- It has been assumed that the Park and Ride site will require below ground works. Therefore, impacts on groundwater levels and flows cannot be ruled out and will potentially require further investigation.
- The Park and Ride site crosses a drain and is immediately adjacent to a drain. Both of these drains are part of the Car Dyke Drain System. If the watercourses are realigned, it may result in temporary habitat loss. If culverts are constructed to allow the watercourses to pass under the Park and Ride site, there are potential impacts to hydromorphology resulting from the in channel works. These in channel works could potentially cause localised damage to the bed, banks and riparian vegetation of the watercourse which may alter the morphological functioning of the channel. Even if the watercourse located immediately adjacent to the site does not need to be realigned or culverted, there are still potential impacts to hydromorphology resulting from construction works in close proximity to the watercourse.
- As there are potential impacts which are significant, the overall assessment score for the construction of the Park and Ride site is **moderate adverse**. However, applying water quality, hydromorphology, groundwater and flood risk mitigation will reduce the magnitude of the potential impacts and give an overall assessment score of **neutral**.

Regarding **operation:**

- The impacts relate to the potential increase in impermeable surface area from construction of the Park and Ride site.
- Pollutants generated from the motorised traffic could potentially impact the water quality of the watercourses and/or the underlying aquifer's water quality.
- There is also potential for the increase in impermeable area to cause an increase in flood risk as a result of an increase in surface water runoff.
- The Park and Ride site will encroach into Flood Zones 2 and 3 and as a result, floodplain storage compensation would be required.
- The Park and Ride site crosses a drain and is immediately adjacent to a drain. Both of these drains are part of the Car Dyke Drain System. If the watercourses are realigned, it may result in a reduction in hydromorphological diversity. If culverts are constructed to allow the watercourses to pass under the site, there will be a loss of open watercourse.
- It has been assumed that the Park and Ride site will require below ground works. There is the potential for deep foundations to form a barrier to groundwater flow and a pathway for pollution to enter aquifer resulting in a deterioration in water quality.
- As there is a potential impact which is significant, the overall assessment score for the operation of the Park and Ride site is **moderate adverse**. However, applying water quality, hydromorphology, groundwater and flood risk mitigation will reduce the magnitude of the potential impacts and give an overall assessment score of **neutral.**

The TAG assessment has shown that Site C will have the least impact on the water environment (without mitigation). It should be noted that the potential impacts identified at all sites can be mitigated.

Table 5-1 - Water assessment RAG rating

Topic	Site A	Site B	Site C
Construction	Large Adverse	Large Adverse	Moderate Adverse
Operation	Large Adverse	Large Adverse	Moderate Adverse
Overall RAG rating			

6. Flood risk

An initial Flood Risk Assessment (FRA) has been undertaken for the three sites. Flood risk to, and arising from, the potential use of Sites B and C for the Park and Ride facility is higher from fluvial sources than it is at Site A. The surface water, groundwater and other sources of flood risk are similar across the three sites. Therefore, from a flood risk perspective Site A is preferred for the Park and Ride facility, closely followed by Site C. Site B is significantly more constrained from a flood risk perspective, hence should be discounted going forward.

Table 6-1 – Flood Risk assessment RAG rating

Site A	Site B	Site C
*		

*Preferred option from a flood risk perspective

7. Land ownership and designation

All three Park and Ride sites are located within land already owned by Cambridgeshire County Council and sit outside of designated Greenbelt. Site C borders the Greenbelt to the south.

Table 7-1 – Greenbelt assessment RAG rating

Site A	Site B	Site C

8. Transport Planning

A high-level transport planning assessment has been undertaken for the three Park and Ride options. This is supported by transport model evidence presented in section 9.

Site A

Advantages

- Site A intercepts car trips travelling south on the A10 to Cambridge earlier in their journey, to the north of Waterbeach New Town, a significant future trip generator. This has the potential to reduce single occupancy vehicle km travelled and reduce the volume of traffic on the A10 to the south of Cambridge Research Park, potentially relieving congestion.
- Access would be taken directly from the A10 for cars and buses. Cars travelling from the north would turn left off the A10, therefore not crossing any opposing flow in the AM peak. Buses travelling from Ely could access the Park and Ride site directly from the A10 and either, continue their journey down the A10 or access Waterbeach New Town via a bus only road (dependant on agreement with Waterbeach New Town developers). In the PM peak vehicles travelling north would be required to give way to those travelling

south at the site access roundabout. However, this is not the dominant tidal flow and therefore not considered a significant constraint.

- The site would be in close proximity to Cambridge Research Park and could provide parking options with sustainable onward connections for employees of the site.

Disadvantages

- Located furthest north of the three Park and Ride sites being considered, Site A offers the longest journey times for Park and Ride users. Depending on service patterns, these journey times could be exacerbated by services accessing Cambridge Research Park and Waterbeach New Town before continuing journeys towards Cambridge. Ultimately this could lead to longer end to end journey times for users, encouraging them to remain in their vehicles for longer, to access Milton Park and Ride, or car parks within the City.
- A new junction on the A10 would provide access to the site for buses and cars. For remaining highway users, i.e. those not using the Park and Ride, this could lead to increased delay. The junction would also be in close proximity to the Cambridge Research Park/Waterbeach New Town northern junction, increasing the complexity of the delivery of the junction and potentially impacting the local road network operation.
- Located further from Cambridge, Park and Ride Site A is likely to generate less Park and Cycle and Park and Walk trips than the other sites. It also has less opportunity to connect with the wider active travel network to the south, however it would be connected to Waterbeach New Town to the south and Cambridge Research Park to the west, by connecting in with infrastructure being provided by the Waterbeach New Town developers.
- Site A is unlikely to be used by residents of Waterbeach New Town, who would be required to travel north before continuing their journey south towards Cambridge.
- Bus services using the Site A are still likely to service Waterbeach New Town. However, the frequency of services would likely be less, as some Park and Ride services are likely to run direct to Cambridge along the A10. This reduces the quality and therefore attractiveness of services through Waterbeach New Town to residents, therefore potentially reducing patronage on non-Park and Ride services (see section 9)

Site B

Advantages

- There are no additional advantages for Site B, that have been identified from a Transport Planning perspective, over and above the other two sites.

Disadvantages

- Access to the site would be from a new junction on Green End, which is currently a B road, rural in nature, providing access to residential properties along it as well as to the villages of Landbeach and Cottenham from the A10. Locating a Park and Ride site off Green End would change the nature of the road, increasing traffic flow and likely require an upgrade/reconfiguration of the Green End/A10 junction to provide effective and safe access for vehicles.
- Access to the site for active travel users is more challenging than for the other sites being considered, as users would be required to divert from existing routes to potentially travel away from their destination.
- The existing Green End in the vicinity of the site is not suitable for significant active travel flows.
- Buses accessing Site C from Waterbeach New Town and the guided busway would be required to travel further north to the site and then return south to access Waterbeach New Town, therefore increasing journey times.

Site C

Advantages

- Access taken directly from the A10, via the Waterbeach New Town southern roundabout, therefore not requiring an additional junction on the A10.
- Located on the desire line for trips from the north and Waterbeach New Town to Cambridge. Therefore, of the three sites, Site C offers the fastest journey times for Park and Ride buses.

- Likely to lead to the most Park and Cycle and Park and Walk trips due to being closer to trip destinations in Cambridge. It also has direct connectivity to the Mere Way route and busway active travel route connecting the site to Cambridge.
- Being south west of Waterbeach New Town, Site C is likely to attract more residents of the town by foot and cycle, perhaps those who are located close to the A10 and further away from the district centre bus interchanges.

Disadvantages

- Deliverability complexity in relation to other schemes in the same area, including Mere Way, the active travel bridge over the A10 and Waterbeach New Town southern access roundabout. However, these schemes also offer opportunity in terms of connectivity by sustainable modes and construction coordination and potential savings.
- Site C is located west of the A10 and therefore traffic travelling south in the AM peak, i.e. the dominant flow, is required to cross the northbound flow to access the site. However, the impact of this is not likely to be significant as the northbound flow is the less dominant flow in the AM peak. In the PM peak there is opportunity to provide an outbound slip onto the A10 to provide a degree of priority for traffic travelling north.
- Located further south than the other two sites being considered, traffic is intercepted later in its journey towards Cambridge, meaning that the vehicles remain on the road network further south past Waterbeach New Town.

Table 8-1 – Transport Planning assessment RAG rating

Site A	Site B	Site C
		

9. Transport modelling

Cambridge Sub Regional Transport Model 2 (CSRM2) runs were undertaken for all three Park and Ride sites to understand the predicted levels of demand for the site and the impact of the sites on the surrounding transport network, assuming then use of the Revised Central busway alignment. Headline results are shown in Table 9-1.

Overall, Site A and Site C lead to very similar numbers of Park and Ride trips in 2041, with Site A abstracting more trips from Milton Park and Ride due to its location further north. Site C generates more Park and Cycle trips and guided busway trips that the other two sites.

Site A experiences a significant increase in Park and Ride trips between 2026 and 2041, likely due to the dualling of the A10, which is represented in the 2041 model, but not the 2026 model. This makes access to Site A easier in 2041, due to decongestion of the network north of Waterbeach. The increase is less pronounced at Site B and C, likely due to traffic from Waterbeach New Town increasing between the two forecast years, dampening the impact of the A10 dualling south of Waterbeach New Town.

It is worth noting that there is uncertainty over the nature of the A10 upgrades at this stage as a study looking at options is ongoing.

Table 9-1 - Transport model results (Daily)

	Site A		Site B		Site C	
	2026	2041	2026	2041	2026	2041
Waterbeach Park and Ride Trips	600	1,900	1,000	950	1,200	1,200
Milton Park and Ride Trips	3,800	3,950	3,900	4,400	4,150	4,650
Total Park and Ride Trips	4,400	5,850	4,900	5,350	5,350	5,850
Guided Busway Trips (whole model)	27,000	34,500	27,000	34,800	27,900	35,200
Waterbeach Park and Cycle Trips	700	2,000	800	1,300	1,350	2,400
Overall results						

10. Public support

A public consultation was undertaken from January to March 2023. It consulted on the three options for the Park and Ride sites, alongside two options for the busway element of the scheme. Specific questions were asked regarding support for each of the Park and Ride sites, as well as different access arrangements for Site A and Site C. Only one access option was presented for Site C.

It is worth nothing that the majority of consultation respondents reside in Waterbeach, Landbeach, Histon and Impington and Milton, and are therefore not necessarily the target audience for a Park and Ride at Waterbeach. A smaller number of responses were received from residents of areas further north such as Ely and surrounding villages, who could benefit from a Park and Ride on the A10 at Waterbeach.

Site A

- Supported or strongly supported by 39% of consultation respondents, the highest proportion of support for each of the sites.
- Opposed or strongly opposed by 26% of consultation respondents, the lowest proportion of opposition for each of the sites.
- Supported by 2 of 11 stakeholders who responded to the consultation survey.
- The access option which includes only a new roundabout on the A10 for buses and cars was supported by 19% of respondents.
- The access option which includes a new roundabout on the A10 for buses and cars, and a bus only link to Waterbeach New Town was supported by 26% of respondents.

Site B

- Supported or strongly supported by 18% of consultation respondents, the lowest proportion of support for each of the sites.
- Opposed or strongly opposed by 43% of consultation respondents, the highest proportion of opposition for each of the sites.
- Supported by 3 of 11 stakeholders who responded to the consultation survey.
- 58% of respondents didn't support the access option, off Green End.

Site C

- Supported or strongly supported by 25% of consultation respondents, the middle-supported option of the three sites.
- Opposed or strongly opposed by 38% of consultation respondents, the middle site of the three in terms of opposition.
- Highest support amongst stakeholders who responded to the consultation survey (4 responses).
- The access option which includes access for buses and cars from the Waterbeach New Town southern roundabout was supported by 21% of respondents.
- The access option which includes access for buses from the Waterbeach New Town southern roundabout and access for cars via an extra arm on the Denny End Road junction was supported by 19% of respondents.

Overall public feedback for the Park and Ride sites was inconclusive with a high proportion of the public having 'no opinion'. Support was highest for Site A, followed by Site C, and was lowest for Site B. Site C was supported by the highest number of stakeholders. Access options will be explored further at the next stage of the option development.

Table 10-1 – Public support assessment RAG rating

Site A	Site B	Site C
		

11. Costs

A high-level costing exercise has been undertaken for all three Park and Ride sites. General assumptions are consistent between the sites and any infrastructure or elements that differ in the estimates are included in the table below.

For Site B, there are significant unknowns at this stage, given the level of upgrade required to the A10/Green End junction and the extension of the busway north to connect with the site. Therefore, these have not been reflected in the cost estimates but are likely to lead to a significant increase on the estimate show.

Alternatively, for Site C, there are a number of elements costed that could be value engineered to reduce the cost shown here, namely the connection to Denny End Road and the provision for ancillary services within the site.

Table 11-1 – Costs assessment RAG rating

	Site A	Site B	Site C
High-level cost (construction only)	£16m	£15.2m + cost of A10 junction changes and busway extension.	£21.7m
Caveats / Assumptions	Includes junction on the A10 and connection to Waterbeach New Town for buses	Includes junction on Green End but not any changes required to the A10 junction or the additional busway infrastructure required to reach the P&R site further north.	Larger site than A and B. Includes access road from Denny End junction, which is likely to be removed as a result of consultation feedback. Also includes additional space for ancillary facilities not provided in the other sites.
RAG			

12. Identification of preferred option

Table 12-1 provides a summary of the assessments for each discipline to enable an identification of the preferred Park and Ride site.

Overall, when considering the outcomes from all the assessments undertaken, Site C is identified as the preferred option with no red ratings from the disciplines. Site B is clearly the weakest option, scoring lower than Sites A and C in the majority of the assessments and having six red ratings. Site A has a number of significant drawbacks, particularly the red ratings related to heritage and water. Therefore, Site C will be taken forward for further development.

Table 12-1 - Summary of Park and Ride Assessments

Discipline	Site A	Site B	Site C
Acoustics			 *
Heritage			
Landscape			 *
Water			
Flood Risk	 *		
Land ownership			
Public support			
Transport Planning			
Transport Modelling			
Costs			

*Preferred option indicated by discipline teams

Appendix I. Appraisal Summary Table

Appraisal Summary Table

Date produced:	14/08/2023

Contact:	
Name	Amy Barnett
Organisation	Atkins
Role	Project Manager

Name of scheme:	Waterbeach to Cambridge Public Transport Scheme - Revised Central Option
Description of scheme:	Segregated busway route running between the existing Cambridgeshire Guided Busway and Butt Lane; with services running online along Butt Lane. The segregated route re-starts from Butt Lane at the Park and Ride, running north-south between Milton Park and Ride and the proposed A10 Park and Ride via Landbeach

Impacts		Summary of key impacts	Assessment					
			Quantitative			Qualitative	Monetary £m (NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	There is an expected £3.6m benefit to business users through improved economic efficiency, and £23.8m to private sector providers through increased revenues and savings in operating costs. There are net disbenefits for the two lower journey time saving bands due to slight increases in highway journey times as a result of the scheme. Developer contributions of £5.1m are also recorded as a disbenefit to the private sector (non-provider).	Value of journey time changes(£m): 4.2 Net journey time changes (£m) 0 to 2min: -0.7; 2 to 5min: -0.5; > 5min: 5.5			Improved transport efficiency through increased sustainable transport capacity and segregated public transport connections.	22.3	
	Reliability impact on Business users	The impact of the scheme on reliability for business users is expected to be positive, with the segregated busway enabling services to run largely unaffected by congestion on the highway network. There may be small disbenefits to highway users due to the delay caused by additional junctions. This will be reviewed at the next stage of development and could lead to an improvement in highway network performance.				Increased reliability by providing public transport segregated from the highway network.		
	Regeneration	Not assessed - no significant regeneration areas within scope of the scheme.						
	Wider Impacts	The scheme is expected to generate a total of £13.0m in wider economic impacts. This is through increased connectivity leading to static clustering (agglomeration) benefits of £13.8m. There is a small disbenefit of £1.1m to labour supply impacts due to a slight increase in highway journey times which, due to trip weighting of the impacts, outweighs the improvements to other modes. Benefits from output change in imperfectly competitive markets is expected to be positive, £0.4m.				Improvements in the connectivity of businesses and industries.	13.0	
Environmental	Noise	The monetised impact of the scheme on noise is expected to be a minor disbenefit of £0.02m, based on a small increase in vehicle kilometres. This is due to HGV re-routing in the model as a result of the scheme, which may be explained as model noise. The noise impact calculation follows a simplified, conservative approach, which groups buses with HGVs in terms of noise production parameters. It is considered that any noise impacts arising from the scheme will be able to be mitigated.				A change in vehicle kilometres driven leading to changes in noise levels.	-0.02	Neutral
	Air Quality	The monetised impact of the scheme on air quality is expected to be a minor benefit of £0.05m. This follows a simplified, conservative approach, which groups buses with HGVs in terms of emissions production parameters. Preliminary environmental assessments indicate that the scheme will not have an adverse impact on air quality.				A change in vehicle kilometres driven leading to changes in local air quality.	0.1	Slight Beneficial
	Greenhouse gases	The scheme is expected to reduce greenhouse gas emissions by reducing private vehicle usage. The monetised impact on greenhouse gas emissions is a benefit of £2.8m.	Change in non-traded carbon over 60y (CO2e): -36,984 Change in traded carbon over 60y (CO2e): -451			A reduction in vehicle kilometres driven leading to benefits in user greenhouse gas emissions.	2.8	
	Landscape	The scheme is expected to cover predominantly land of agricultural grades 2 and 3. It is not expected that the scheme will have a siginificant impact on landscape, with mitigation of any impacts likely to be available.				No qualitative appraisal undertaken		
	Townscape	Not assessed - not anticipated to be significant.						
	Historic Environment	There are two conservation areas and several scheduled monuments and listed buildings within the vicinity of the scheme. However, it is considered that mitigation of any impacts is likely to be possible.				No qualitative appraisal undertaken		
	Biodiversity	The scheme boundaries fall within the SSSI risk zones for Histon Road SSSI. Key constraints identified in initial surveys for were areas of priority habitat, including grazing marsh, deciduous woodland and traditional orchards; priority plant species, and priority species such as badgers and commuting bats. It is considered that the scheme can be delivered given appropriate mitigation.				No qualitative appraisal undertaken		
	Water Environment	The scheme covers areas of flood risk zones 2 and 3. Floodplain compensation and other mitigation may be required.				No qualitative appraisal undertaken		
Social	Commuting and Other users	Commuting and other users are expected to experience benefits of £53.5m. This is largely driven by improvements to journey times for public transport and active travel users, at £35.9m and £17.5m, respectively.	Value of journey time changes(£m): 51.0 Net journey time changes (£m) 0 to 2min: -4.3; 2 to 5min: 0.5; > 5min: 54.8			Improved transport efficiency through increased sustainable transport capacity and segregated public transport connections	53.5	
	Reliability impact on Commuting and Other users	The impact of the scheme on reliability for commuting and other users is expected to be positive, with the segregated busway enabling services to run largely unaffected by congestion on the highway network. There may also be small reliability benefits to highway users through reduced congestion. There may be small disbenefits to highway users due to the delay caused by additional junctions. This will be reviewed at the next stage of development and could lead to an improvement in highway network performance.				Increased reliability by providing public transport segregated from the highway network.		
	Physical activity	The scheme is expected to generate a total of £13.9m in health benefits through increased physical activity. This is due to a net increase in the uptake in active travel trips as a result of the scheme.				Increased uptake of active travel leading to physical activity benefits.	13.9	
	Journey quality	The scheme is expected to generate £2.5m in journey quality benefits, assessed for active travel users only. This is as a result of the improved infrastructure provided by the scheme.				Uptake of active travel on improved infrastructure leading to journey quality benefits.	2.5	
	Accidents	The scheme is expected to lead to a disbenefit of £0.6m in accidents. This is a result of additional junctions provided for the scheme, for the Park and Ride access and for the crossing of minor roads. The design of the Park and Ride access will be revisited and revised if necessary at the next stage of scheme development.				Additional junctions on the highway network, creating more potential conflict points, leading to an increase in the number of accidents.	0.6	Slight Adverse
	Security	It is expected that the scheme will provide both formal and informal surveillance, as well as landscaping that improves security for users.				Surveillance and landscaping from the scheme leading to increased security for all users.		Slight Beneficial
	Access to services	It is expected that the scheme will provide accessibility benefits, enabling users to reach destinations and undertake activities that they would otherwise not be able to do.				Increased service flexibility and travel markets served as a result of the scheme leading to improved access to services		Slight Beneficial
	Affordability	The distirbutional impacts suggest that the scheme is expected to provide negative benefits to affordability. This is because it will attract more users to use public transport, which means that there is a higher monetary cost involved with travel. However, it is expected that the lowest income quintile will experience affordability benefits. This is likely due to reduced private vehicle operating costs.				Net change in vehicle operating costs, public transport fares and area charges paid by users from different income groups.		Slight Adverse
	Severance	The scheme is expected to have small benefits to severance by providing increased active travel connectivity in the corridor.				Improved transport connectivity in the corridor leading to reduced severance.		Slight Beneficial
	Option and non-use values	Not assessed - not anticipated to be significant.						
Public Accounts	Cost to Broad Transport Budget	The scheme has a present value cost of £65.7m.					65.7	
	Indirect Tax Revenues	The scheme is expected to lead to a loss of £5.1m in indirect tax revenues.					-5.1	

Appraisal Summary Table

Date produced:	14/08/2023

Contact:	
Name	Amy Barnett
Organisation	Atkins
Role	Project Manager

Name of scheme:	Waterbeach to Cambridge Public Transport Scheme - Western Option
Description of scheme:	Segregated busway route running between the existing Cambridgeshire Guided Busway and Butt Lane; with an option to serve Milton Park and Ride. The segregated route continues from Butt Lane close to Mere Way, running north-south between Milton Park and Ride and the proposed A10 Park and Ride to the west of Landbeach.

Impacts		Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £m (NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	There is an expected £2.2m benefit to business users through improved economic efficiency, and £21.6m to private sector providers through increased revenues and savings in operating costs. There are net disbenefits for the lowest journey time saving bands due to slight increases in highway journey times as a result of the scheme. Developer contributions of £5.1m are also recorded as a disbenefit to the private sector (non-provider).	**Value of journey time changes(£m)** 0.8 **Net journey time changes (£m)** 0 to 2min: -1.8; 2 to 5min: 0.3; > 5min: 2.3	Improved transport efficiency through increased sustainable transport capacity and segregated public transport connections.	18.6	
	Reliability impact on Business users	The impact of the scheme on reliability for business users is expected to be positive, with the segregated busway enabling services to run largely unaffected by congestion on the highway network. There may be small disbenefits to highway users due to the delay caused by additional junctions. This will be reviewed at the next stage of development and could lead to an improvement in highway network performance.		Increased reliability by providing public transport segregated from the highway network.		
	Regeneration	Not assessed - no significant regeneration areas within scope of the scheme.				
	Wider Impacts	The scheme is expected to generate a total of £7.5m in wider economic impacts. This is through increased connectivity leading to static clustering (agglomeration) benefits of £8.4m. There is a small disbenefit of £1.2m to labour supply impacts due to a slight increase in highway journey times which, due to trip weighting of the impacts, outweighs the improvements to other modes. Benefits from output change in imperfectly competitive markets is expected to be positive, £0.2m.		Improvements in the connectivity of businesses and industries.	7.5	
Environmental	Noise	The monetised impact of the scheme on noise is expected to be a minor benefit of £0.2m, based on an small decrease in vehicle kilometres. The noise impact calculation follows a simplified, conservative approach, which groups buses with HGVs in terms of noise production parameters. It is considered that any specific noise impacts arising from the scheme will be able to be mitigated.		A change in vehicle kilometres driven leading to changes in noise levels.	0.17	Neutral
	Air Quality	The monetised impact of the scheme on air quality is expected to be a minor benefit of £0.04m. This follows a simplified, conservative approach, which groups buses with HGVs in terms of emissions production parameters. Preliminary environmental assessments indicate that the scheme will not have an adverse impact on air quality.		A change in vehicle kilometres driven leading to changes in local air quality.	0.04	Slight Beneficial
	Greenhouse gases	The scheme is expected to reduce greenhouse gas emissions by reducing private vehicle usage. The monetised impact on greenhouse gas emissions is a benefit of £2.2m.	Change in non-traded carbon over 60y (CO_2e): -29,089 Change in traded carbon over 60y (CO_2e): -383	A reduction in vehicle kilometres driven leading to benefits in user greenhouse gas emissions.	2.2	
	Landscape	The scheme is expected to cover predominantly land of agricultural grades 2 and 3. It is not expected that the scheme will have a siginificant impact on landscape, with mitigation of any impacts likely to be available.		No qualitative appraisal undertaken		
	Townscape	Not assessed - not anticipated to be significant.				
	Historic Environment	There are two conservation areas and several scheduled monuments and listed buildings within the vicinity of the scheme. However, it is considered that mitigation of any impacts is likely to be possible.		No qualitative appraisal undertaken		
	Biodiversity	The scheme boundaries fall within the SSSI risk zones for Histon Road SSSI. There is a local nature reserve close to the Western Option boundary. Key constraints identified in initial surveys for were areas of priority habitat, including grazing marsh, deciduous woodland and traditional orchards; priority plant species, and priority species such as badgers and commuting bats. It is considered that the scheme can be delivered given appropriate mitigation.		No qualitative appraisal undertaken		
	Water Environment	The scheme covers areas of flood risk zones 2 and 3. Floodplain compensation and other mitigation may be required.		No qualitative appraisal undertaken		
Social	Commuting and Other users	Commuting and other users are expected to experience benefits of £43.0m. This is largely driven by improvements to journey times for public transport and active travel users, at £26.6m and £17.1m, respectively.	**Value of journey time changes(£m)** 16.0 **Net journey time changes (£m)** 0 to 2min: -7.6; 2 to 5min: 3.5; > 5min: 20.1	Improved transport efficiency through increased sustainable transport capacity and segregated public transport connections	43.0	
	Reliability impact on Commuting and Other users	The impact of the scheme on reliability for commuting and other users is expected to be positive, with the segregated busway enabling services to run largely unaffected by congestion on the highway network. There may also be small reliability benefits to highway users through reduced congestion. There may be small disbenefits to highway users due to the delay caused by additional junctions. This will be reviewed at the next stage of development and could lead to an improvement in highway network performance.		Increased reliability by providing public transport segregated from the highway network.		
	Physical activity	The scheme is expected to generate a total of £14.3m in health benefits through increased physical activity. This is due to a net increase in the uptake in active travel trips as a result of the scheme.		Increased uptake of active travel leading to physical activity benefits.	14.4	
	Journey quality	The scheme is expected to generate £4.8m in journey quality benefits, assessed for active travel users only. This is as a result of the improved infrastructure provided by the scheme.		Uptake of active travel on improved infrastructure leading to journey quality benefits.	4.8	
	Accidents	The scheme is expected to lead to a disbenefit of £0.7m in accidents. This is a result of additional junctions provided for the scheme, for the Park and Ride access and for the crossing of minor roads. The design of the Park and Ride access will be revisited and revised if necessary at the next stage of scheme development.		Additional junctions on the highway network, creating more potential conflict points, leading to an increase in the number of accidents.	0.6	Slight Adverse
	Security	It is expected that the scheme will provide both formal and informal surveillance, as well as landscaping that improves security for users.		Surveillance and landscaping from the scheme leading to increased security for all users.		Slight Beneficial
	Access to services	It is expected that the scheme will provide accessibility benefits, enabling users to reach destinations and undertake activities that they would otherwise not be able to do.		Increased service flexibility and travel markets served as a result of the scheme leading to improved access to services		Slight Beneficial
	Affordability	The distirbutional impacts suggest that the scheme is expected to provide negative benefits to affordability. This is because it will attract more users to use public transport, which means that there is a higher monetary cost involved with travel. However, it is expected that the lowest income quintile will experience affordability benefits. This is likely due to reduced private vehicle operating costs.		Net change in vehicle operating costs, public transport fares and area charges paid by users from different income groups.		Slight Adverse
	Severance	The scheme is expected to have small benefits to severance by providing increased active travel connectivity in the corridor.		Improved transport connectivity in the corridor leading to reduced severance.		Slight Beneficial
	Option and non-use values	Not assessed - not anticipated to be significant.				
Public Accounts	Cost to Broad Transport Budget	The scheme has a present value cost of £64.7m.			64.6	
	Indirect Tax Revenues	The scheme is expected to lead to a loss of £4.2m in indirect tax revenues.			-4.2	

Appendix J. Transport Economic Efficiency Table

Economic Efficiency of the Transport System (TEE) - Revised Central Option

Non-business: Commuting	**ALL MODES**		**ROAD**	**Public Transport**	**P&R**	**NMU/P&A**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	16,836		-3,489	11,051	1,881	7,393
Vehicle operating costs	2,225		2,225	0	0	0
User charges	664		11	548	106	0
During Construction & Maintenance	0		0	0	0	0
COMMUTING	19,725	*(1a)*	-1,253	11,599	1,987	7,393

Non-business: Other	**ALL MODES**		**ROAD**	**Public Transport**	**P&R**	**NMU/P&A**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	34,099		-316	23,615	686	10,114
Vehicle operating costs	1,635		1,635	0	0	0
User charges	-1,966		-29	-1,843	-94	0
During Construction & Maintenance	0		0	0	0	0
NET NON-BUSINESS BENEFITS: OTHER	33,768	*(1b)*	1,290	21,771	592	10,114

Business					**Public Transport**		**P&R**	**NMU/P&A**
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	4,194		-180	-405	3,094		199	1,485
Vehicle operating costs	-575		-474	-101	0		0	0
User charges	40		-13	-8	161		-100	0
During Construction & Maintenance	0		0	0	0		0	0
Subtotal	3,659	*(2)*	-667	-514	3,256	0	100	1,485

Private sector provider impacts			**ROAD**	**Public Transport**	**P&R**		**NMU/P&A**
Revenue	14,855		0	10,231	4,624		0
Operating costs	6,485		0	6,485	0		0
Investment costs	2,470		0	2,470	0		0
Grant/subsidy	0		0	0	0		0
Subtotal	23,810	*(3)*	0	19,186	4,624	0	0
Other business impacts							
Developer contributions	-5,149	*(4)*		-5,149			
NET BUSINESS IMPACT	22,320	*(5) = (2) + (3) + (4)*					

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	75,812	*(6) = (1a) + (1b) + (5)*

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

Economic Efficiency of the Transport System (TEE) - Western Option

Non-business: Commuting	**ALL MODES**		**ROAD**	**Public Transport**	**P&R**	**NMU/P&A**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	14,571		-2,929	8,599	1,636	7,265
Vehicle operating costs	1,999		1,999	0	0	0
User charges	-582		1	-677	94	0
During Construction & Maintenance	0		0	0	0	0
COMMUTING	15,988	*(1a)*	-929	7,922	1,730	7,265

Non-business: Other	**ALL MODES**		**ROAD**	**Public Transport**	**P&R**	**NMU/P&A**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	27,709		-852	17,693	1,034	9,835
Vehicle operating costs	1,084		1,084	0	0	0
User charges	-1,817		-21	-1,859	62	0
During Construction & Maintenance	0		0	0	0	0
NET NON-BUSINESS BENEFITS: OTHER	26,976	*(1b)*	211	15,834	1,096	9,835

Business					**Public Transport**		**P&R**	**NMU/P&A**
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	3,161		-627	-424	2,386		335	1,491
Vehicle operating costs	-848		-743	-105	0		0	0
User charges	-144		-22	-3	-64		-54	0
During Construction & Maintenance	0		0	0	0		0	0
Subtotal	2,169	*(2)*	-1,392	-532	2,322	0	280	1,491

Private sector provider impacts			**ROAD**	**Public Transport**	**P&R**		**NMU/P&A**
Revenue	12,975		0	9,443	3,532		0
Operating costs	6,609		0	6,609	0		0
Investment costs	1,976		0	1,976	0		0
Grant/subsidy	0		0	0	0		0
Subtotal	21,560	*(3)*	0	18,029	3,532	0	0
Other business impacts							
Developer contributions	-5,149	*(4)*		-5,149			
NET BUSINESS IMPACT	18,580	*(5) = (2) + (3) + (4)*					

TOTAL		
Present Value of Transport Economic Efficiency Benefits (TEE)	61,544	*(6) = (1a) + (1b) + (5)*

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

Appendix K. Public Accounts Table

Public Accounts (PA) Table - Revised Central Option

	ALL MODES		ROAD	Public Transport	P&R	NMU/P&A
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue	4365		4373	-8	0	0
Operating Costs	6687		6687	0	0	0
Investment Costs	59806		59806	0	0	0
Developer and Other Contributions	-5149		-5149	0	0	0
Grant/Subsidy Payments	0		0	0	0	0
NET IMPACT	65710	*(7)*	0	0	0	0
Central Government Funding: Transport						
Revenue	0		0	0	0	0
Operating costs	0		0	0	0	0
Investment Costs	0		0	0	0	0
Developer and Other Contributions	0		0	0	0	0
Grant/Subsidy Payments	0		0	0	0	0
NET IMPACT	0	*(8)*	0	0	0	0
Central Government Funding: Non-Transport						
Indirect Tax Revenues	5055	*(9)*	2829	1586	640	0
TOTALS						
Broad Transport Budget	65710	*(10) = (7) + (8)*				
Wider Public Finances	5055	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Public Accounts (PA) Table - Western Option

	ALL MODES		ROAD	Public Transport	P&R	NMU/P&A
Local Government Funding	**TOTAL**		**INFRASTRUCTURE**			
Revenue	2755		2696	59	0	0
Operating Costs	5462		5462	0	0	0
Investment Costs	61487		61487	0	0	0
Developer and Other Contributions	-5149		-5149	0	0	0
Grant/Subsidy Payments	0		0	0	0	0
NET IMPACT	64555	*(7)*	64496	59	0	0
Central Government Funding: Transport						
Revenue	0		0	0	0	0
Operating costs	0		0	0	0	0
Investment Costs	0		0	0	0	0
Developer and Other Contributions	0		0	0	0	0
Grant/Subsidy Payments	0		0	0	0	0
NET IMPACT	0	*(8)*	0	0	0	0
Central Government Funding: Non-Transport						
Indirect Tax Revenues	4207	*(9)*	2253	1449	505	0
TOTALS						
Broad Transport Budget	64555	*(10) = (7) + (8)*				
Wider Public Finances	4207	*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.
All entries are discounted present values in 2010 prices and values.

Appendix L. Analysis of Monetised Costs and Benefits Table

Analysis of Monetised Costs and Benefits - Revised Central Option Initial BCR

Noise	-18	*(12)*
Local Air Quality	52	*(13)*
Greenhouse Gases	2756	*(14)*
Journey Quality	2487	*(15)*
Physical Activity	13886	*(16)*
Accidents	-565	*(17)*
Economic Efficiency: Consumer Users (Commuting)	19725	*(1a)*
Economic Efficiency: Consumer Users (Other)	33768	*(1b)*
Economic Efficiency: Business Users and Providers	22320	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-5055	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	89356	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	65710	*(10)*
Present Value of Costs (see notes) (PVC)	65710	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	23646	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	1.36	BCR=PVB/PVC

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

Analysis of Monetised Costs and Benefits - Western Option Initial BCR

Noise	175	*(12)*
Local Air Quality	40	*(13)*
Greenhouse Gases	2187	*(14)*
Journey Quality	4813	*(15)*
Physical Activity	14366	*(16)*
Accidents	-691	*(17)*
Economic Efficiency: Consumer Users (Commuting)	15988	*(1a)*
Economic Efficiency: Consumer Users (Other)	26976	*(1b)*
Economic Efficiency: Business Users and Providers	18580	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-4207	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	78226	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	64555	*(10)*
Present Value of Costs (see notes) (PVC)	64555	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	13671	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	1.21	BCR=PVB/PVC

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

Analysis of Monetised Costs and Benefits - Revised Central Option Adjusted BCR

Noise	-18	*(12)*
Local Air Quality	52	*(13)*
Greenhouse Gases	2756	*(14)*
Journey Quality	2487	*(15)*
Physical Activity	13886	*(16)*
Accidents	-565	*(17)*
Economic Efficiency: Consumer Users (Commuting)	19725	*(1a)*
Economic Efficiency: Consumer Users (Other)	33768	*(1b)*
Economic Efficiency: Business Users and Providers	22320	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-5055	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Productvitiy, Employment and Induced Investment effects (agglomeration, labour supply and output change)	13031	
Present Value of Benefits (see notes) (PVB)	102387	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	65710	*(10)*
Present Value of Costs (see notes) (PVC)	65710	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	36677	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	1.56	BCR=PVB/PVC

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

Analysis of Monetised Costs and Benefits - Western Option Adjusted BCR

Noise	175	*(12)*
Local Air Quality	40	*(13)*
Greenhouse Gases	2187	*(14)*
Journey Quality	4813	*(15)*
Physical Activity	14366	*(16)*
Accidents	-691	*(17)*
Economic Efficiency: Consumer Users (Commuting)	15988	*(1a)*
Economic Efficiency: Consumer Users (Other)	26976	*(1b)*
Economic Efficiency: Business Users and Providers	18580	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	-4207	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Productvitiy, Employment and Induced Investment effects (agglomeration, labour supply and output change)	7457	
Present Value of Benefits (see notes) (PVB)	85684	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	64555	*(10)*
Present Value of Costs (see notes) (PVC)	64555	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	21129	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	1.33	BCR=PVB/PVC

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

Appendix M. Model specification summary

A detailed modelling specification was produced to allow the OBC options to be represented in CSRM2. This note provides a summary of the specification.

The specification defines:

- The overall option description, including locations, widths and distances;
- Highway network connections, and the nature of the connections (Figure 6-5 and Figure 6-6);
- Bus stop locations (Figure 6-7);
- Service pattern assumptions, including routing and frequencies;
- Journey times between stop locations, including dwell time (to create end to end journey times)
- Active travel facilities, including width and connections with other infrastructure (Figure 6-8 and Figure 6-9);
- Park and Ride location, highway access, bus access and active travel access
- The outputs required from the model to feed into further analysis and appraisal.

Figure 6-5 - Revised Central route alignment and connections with the highway network

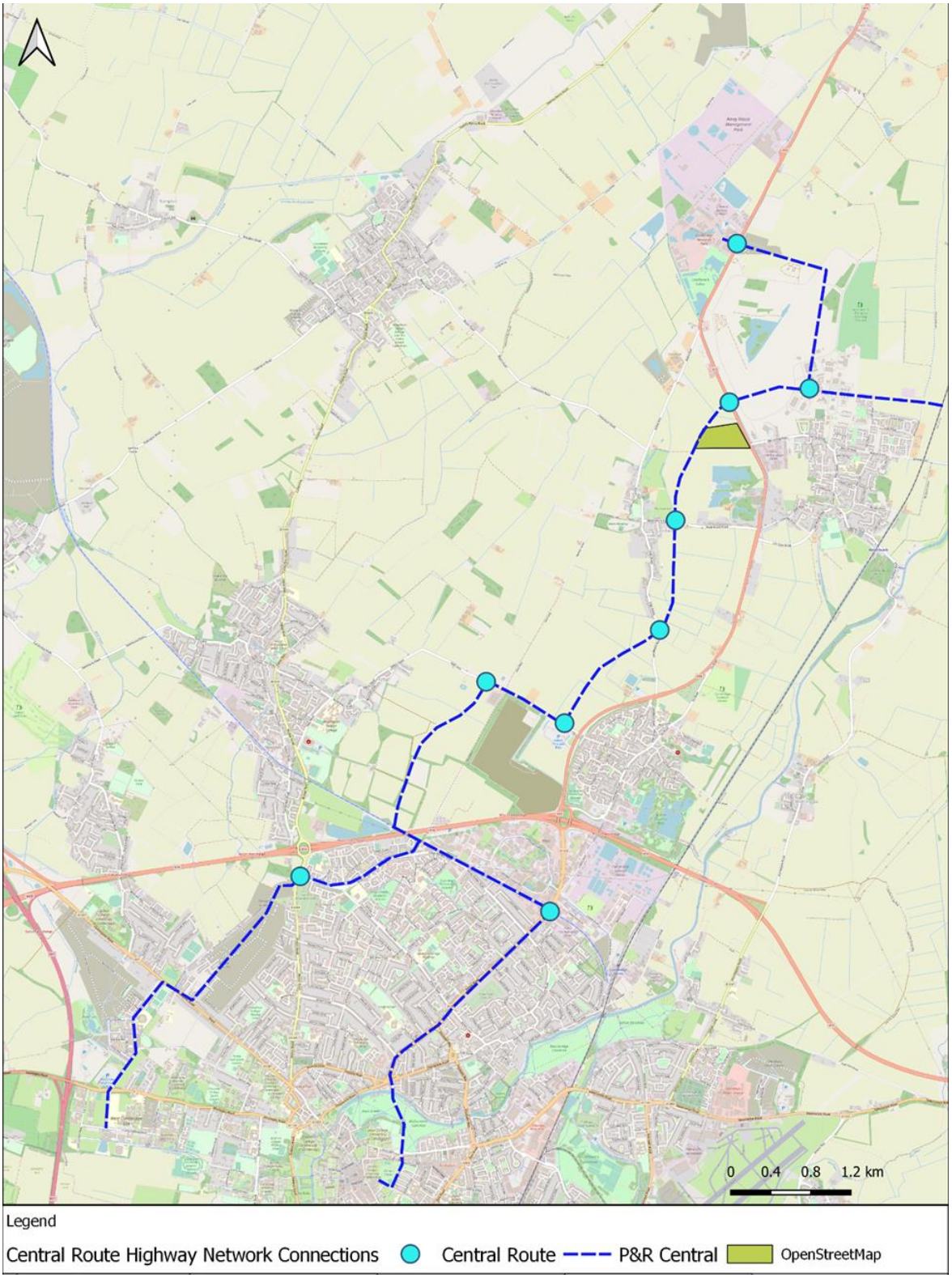


Figure 6-6 - Western route alignment and connections with the highway network

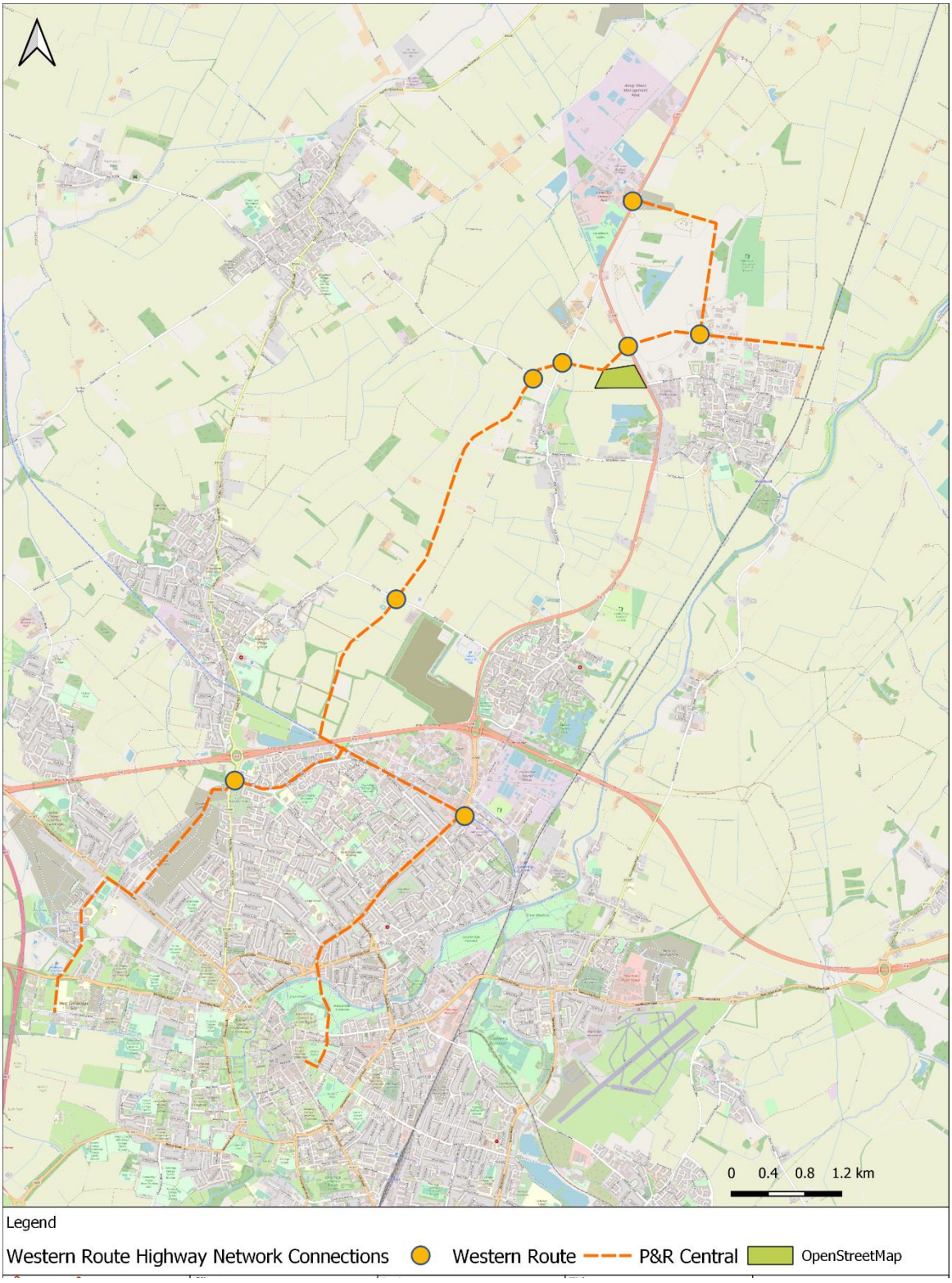


Figure 6-7 - Bus stop locations

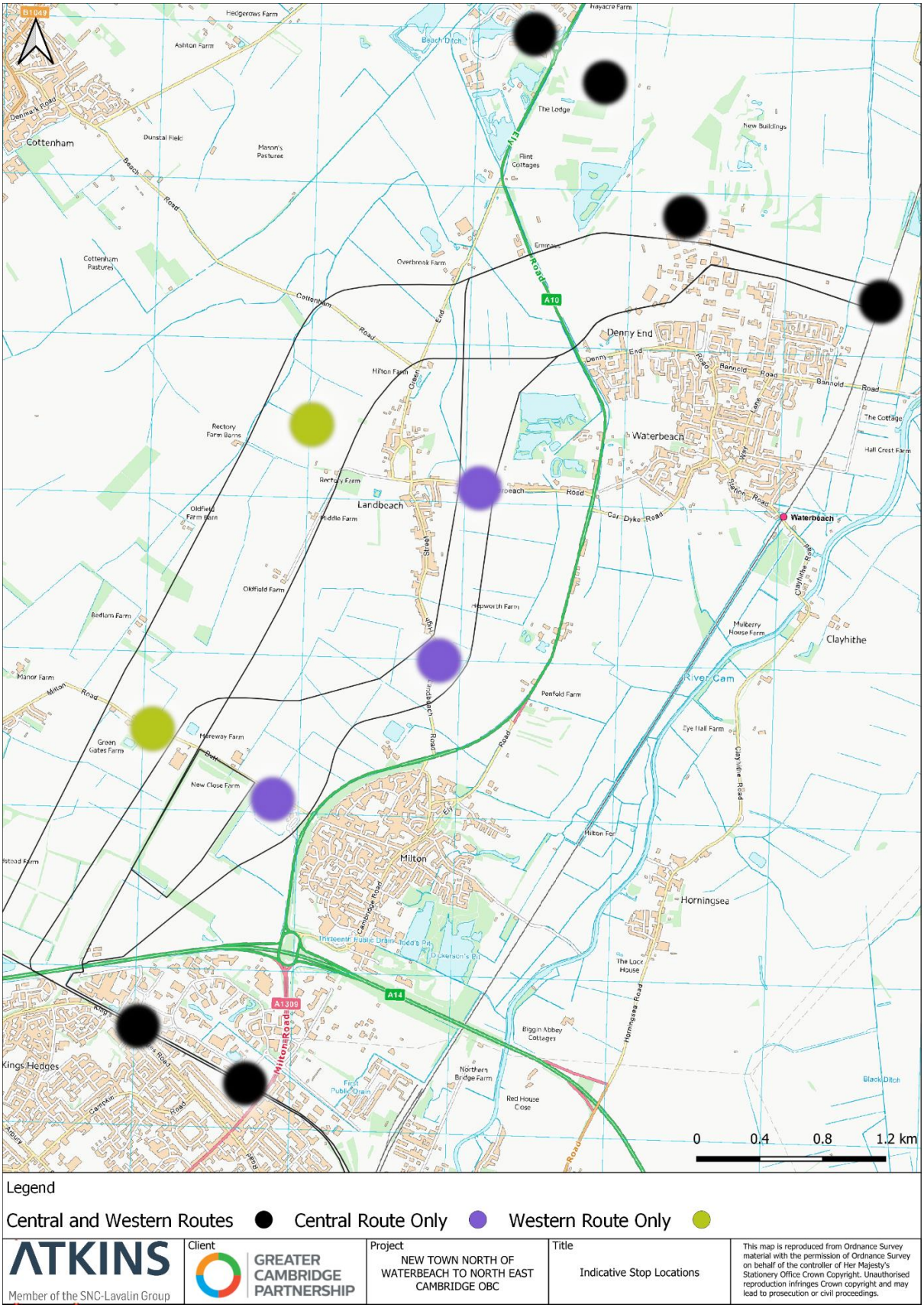


Figure 6-8 - Revised Central active travel infrastructure

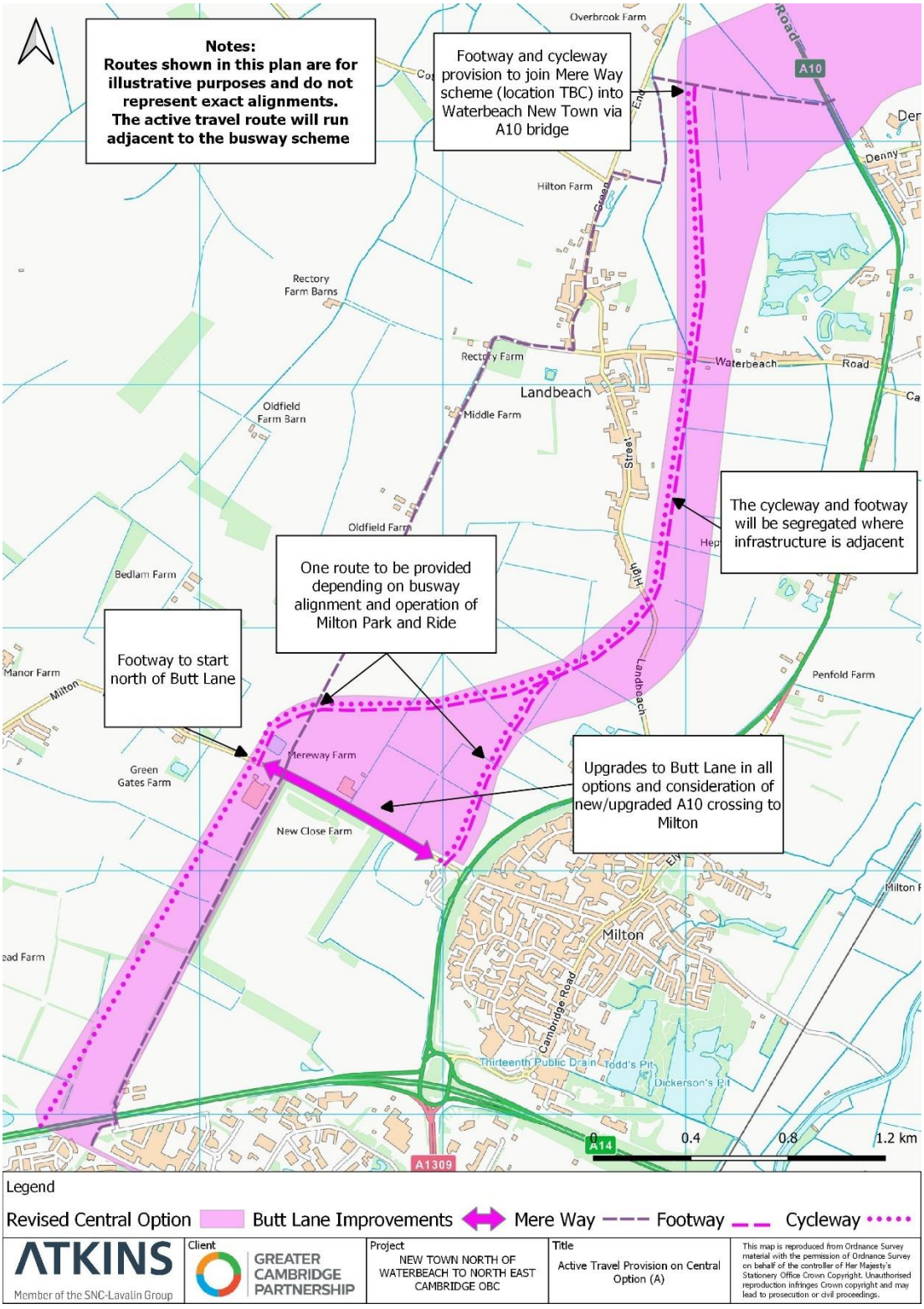
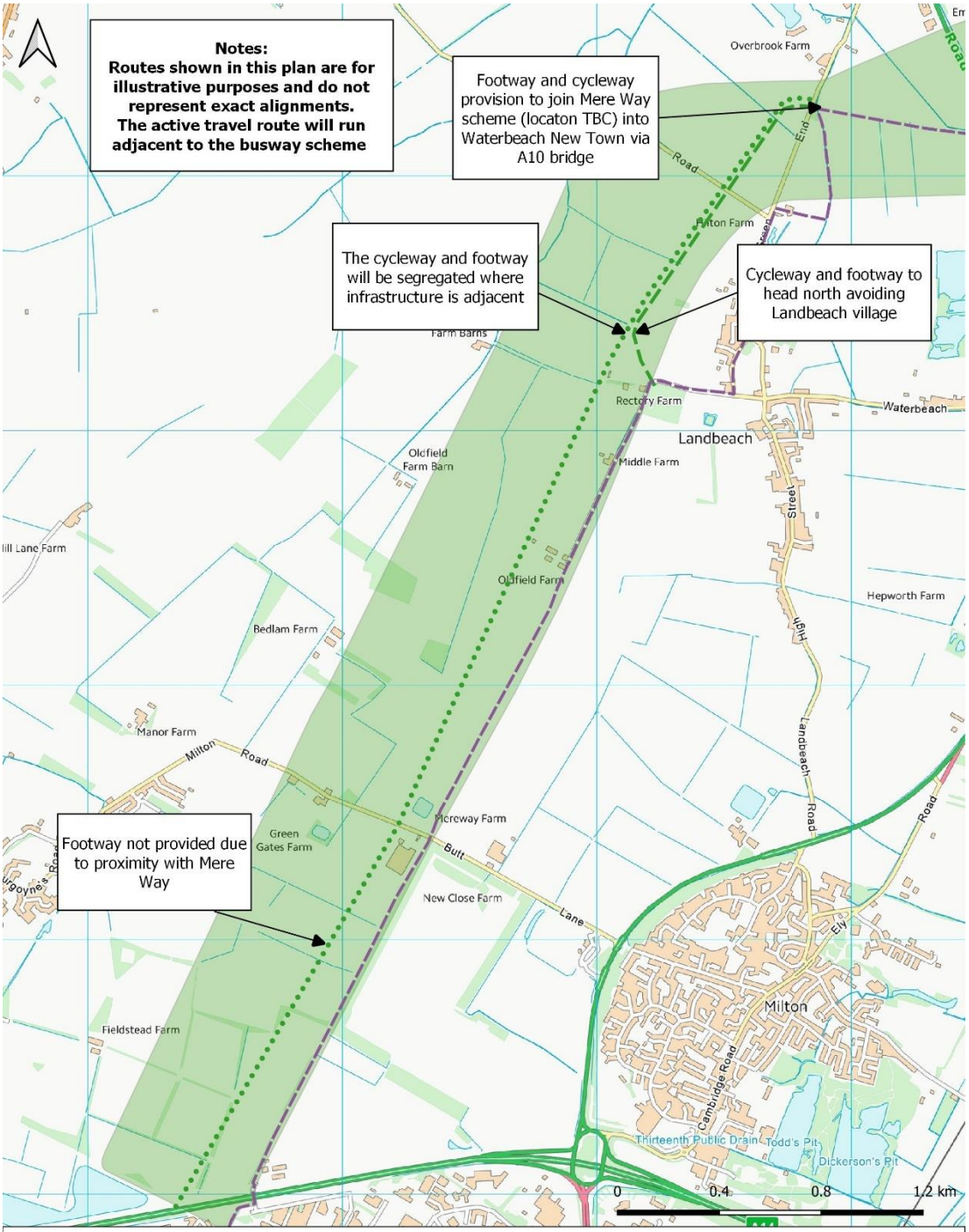


Figure 6-9 - Western active travel infrastructure



Appendix N. Capital cost assumptions and exclusions

The costs produced are based on the following assumptions:

- The prices are in a Q2-2023 price base;
- Cost estimates are based on Atkins scheme concept drawings provided. Where further detail was required, Google Maps was referred to derive quantities. Client consultations were held to define the scope for each drawing/option prior to commencement of the estimating exercise;
- Park and Ride specifications have been agreed;
- It is assumed that all items are to be removed from site and no items are to be reused except for traffic sign faces and service covers which have been reinstalled;
- No other construction work will impact on the project;
- It is assumed that the surfacing works on the carriageway will be undertaken at night;
- The preliminary and overhead and profit percentages are assumed based on estimator experience; and
- There is no information provided on the levels during the estimating exercise. Google imagery is taken as a reference and suitable assumption has been made based on estimator experience.

There are a number of exclusions from the costs as follows:

- Any consideration of stats/services or stats/service diversions;
- Builders work in connection with stats diversions;
- Early Contractor Involvement (ECI);
- Survey cost;
- Compound land costs;
- Statutory fees;
- Professional and legal fees;
- Finance costs;
- Planning and approval charges;
- Taxes and levies, including VAT;
- 3rd party compensation bias;
- Optimism bias;
- Supervision;
- Changes in government, policy, taxation or HSC legislation;
- Public consultation on scheme & legal agreements;
- Asbestos surveys and removal;
- Temporary and abnormal work;
- Fixed rate allowance;
- Public consultation on scheme and legal agreements allowance;
- Background inflation;
- Historic cost;
- Any consideration of commuted sums;
- Allowance for phasing of works;
- There is no information provided on the traffic signal loops during the estimating exercise and they are not included within the estimate;
- Ground improvement/soil stabilisation;
- Road Restraint System (RRS) – safety barrier;
- Bus Lane Enforcement (BLE) camera;

- Lighting columns in busway route; and
- LED road studs for road/cycleway/footway marking.

Appendix O. Financial project risks

Table O-1 - Financial project risks

Project risk description	Potential financial impact
Pre-opening	
The short-listed options will not be supported by the public as a result of: 1. Failure to bring public on the journey; 2. Benefits of the project not seen by the public; and 3. Public worries about detrimental effects on their properties.	Additional costs for extra mitigation.
Unable to deliver our programme: 1. Interface issues with other GCP/Cambridge & Peterborough Combined Authority (SOC) schemes; 2. Political relationship and interface between GCP and CPCA; and 3. Lack of strategic oversight.	Programme delay and/or increased costs.
Significant topographical constraints are identified.	Suitable mitigations will need to be found that may add additional cost to the project or require alternative routing.
Land not available to build required infrastructure as a result of failure to secure third party land for the project.	
Short-listed and preferred options found to be unaffordable resulting in: 1. Failure to work within the scope of the original budget; 2. Failure to engage with the Programme Manager; 3. Strategic decision to reduce resources; 4. Increase in construction prices above what has been allowed for; 5. The scheme fails to secure sufficient funding or that the funding available is insufficient; and 6. Costs of utilities alterations or diversions exceeds the budget allocation.	Outturn costs are greater than expected
The short-listed options will not be considered politically acceptable which could be a result of: 1. Local politician receiving overwhelming negative feedback for the project; and 2. Change in political priorities following elections.	Possible 'showstopper', come up with different options, delays and increased costs.
The design teams produce a product that is not buildable or creates difficulties in construction or does not function well in terms of operations.	Construction costs increase.

Project risk description	Potential financial impact
Unable to obtain planning consents when/where required due to: 1. Late planning applications; 2. Poor quality of planning applications; 3. Planning authorities refuse application; 4. Unclear planning requirements; and 5. Statutory process stalls due to legal and issues with use of TWA/DCO.	Cost increase associated with rework of planning application or TWAO application.
Environmental issues not identified at the initial assessment stage resulting in a failure to achieve the anticipated efficiencies associated with the use of Atkins bespoke tools for aspects of the initial environmental assessment and/or failure of the tool to identify all environmental receptors that need assessment.	Increased project costs.
Relocation of gas/water monitoring boreholes which are used by the landfill operator adjacent to Butt Lane. If the preferred busway route is to affect any of the exiting boreholes, their relocations have to be taken into account within the cost and programme.	Increased project costs.
The busway route surface water drainage strategy could change at later stages due to ground conditions and/or amended requirements of the local Flood Authority.	Increased project costs.
Existing unknown irrigation pipe network system within farm fields could be affected by the construction works.	Increased project costs.
Change in guidance approach necessary from optical guidance to kerb guidance.	Uncertainty over materials, costs and constructions.
Unfavourable ground conditions along the route.	Increased construction costs.
Developer contributions not coming forward in terms of the amount and/or timing expected.	GCP not able to recoup any costs for scheme outlay.
Project schedule delay.	Increased cost.
Waterbeach to Cambridge junction options with the A10 negatively impact the highway network.	Redesign work to mitigate against impacts causing a cost increase.
Unfavourable ground conditions along the route.	Increased construction costs and likely delay to the programme.
Post opening	
Low levels of active mode participation – either a) park a car and cycle or b) walk/cycle and ride bus.	Failure to achieve modal uptake causing a revenue decrease.
Additional traffic on Butt Lane causes congestion and slows down buses as a result of Science Park Extension, rerouting due to Make Connections.	Slower journey time for buses causing cost increase.
Realignment of bus stops in Milton Park and Ride required.	Enhanced bus journey times and reliability causing increase in cost.

Appendix P. GCP Delivery model options report

1. Introduction

1.1. Purpose of the report

As part of the Greater Cambridge City Deal, the Greater Cambridge Partnership (GCP) are delivering a range of sustainable and active travel projects. These include multiple schemes to be delivered between 2023- 2027 that are valued from approximately £40million- £200million. These major projects are:

1) Cambridge South East Transport Phase 2 (CSET Phase 2)
2) Cambourne to Cambridge (C2C)
3) Cambridge Eastern Access (CEA)
4) Waterbeach to Cambridge
5) Cambridge South West Transport (CSWTH)
6) Foxton Travel Hub

These schemes are at different stages of development with CSET Phase 2 the closest to construction.

This report details the Delivery Models available to develop a procurement strategy for each of the projects that assures delivery, secures innovation, and balances risk, cost control and time.

1.2. Current Status of Schemes

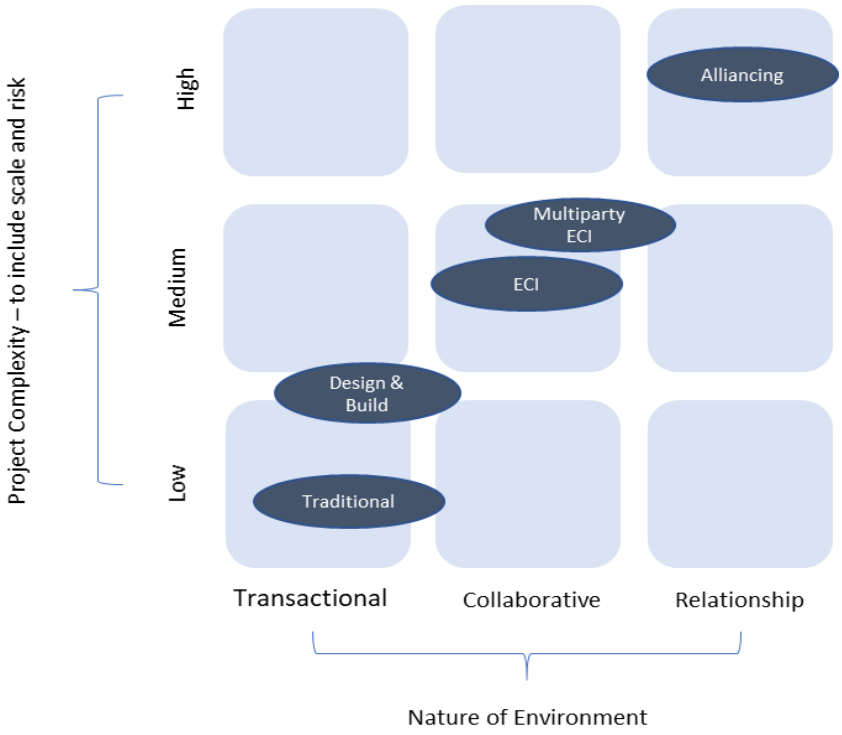
Table 1-1 - Overview of current status of projects

Scheme	Budget	Stage
Cambridge South East Transport Phase 2 (CSET Phase 2)	£132million	The Outline Business Case was approved in May 2020. This scheme was due to submit its TWAO in January 2022, but this has now been delayed until early 2023 whilst some design is revisited. A full prelim design was completed but a number of key elements, including structures will need to be reviewed.
Cambourne to Cambridge (C2C)	£157million	C2C is currently in the process of preparing its Environmental Statement, the aim is to consult on this over the Summer 2022 before formal submission of the TWAO late in 2022. The first full draft of the preliminary design has just been completed.
Cambridge Eastern Access (CEA)	£50.5million	Eastern Access has just completed its first initial options consultation. The project is broken up into two stages. Work is just beginning on the preliminary design.
Waterbeach to Cambridge	£52.6million	Waterbeach has an agreed SOBC and is now developing its OBC and preliminary design. A consultation on the preferred route is expected in late 2022/early 23.
Cambridge South West Transport (CSWTH)	£42million	CSWTH is at detailed design stage. Planning application submitted has been deferred for two years.
Foxton Travel Hub		Foxton Travel Hub is due to submit planning by the summer of 2022. Detailed Design is due to commence by the end of 2022.

2. Delivery Models

The nature of the environment to be established is a key strategic decision - a more collaborative/ relationship-based environment, as opposed to a transactional based relationship may be preferred; similarly, GCP may want to retain large elements of risk and opt for a more transactional, traditional approach.

Figure 2-1 - Delivery model topology



2.1. Summary of Preferred Delivery Models within the Business Cases

2.1.1. Cambridge South East Transport Phase 2 (CSET Phase 2)

An initial assessment of the delivery models for the Scheme was carried out for the purposes of the Outline Business Case. Based on the assessment, design and build has been selected as the preferred delivery model, noting that the model would be subject to further review as the Scheme developed.

Considerations for the assessments were the level of certainty for cost, time and quality and the rationale for the selection:

- The scheme can progress without significant delays during the procurement process. Some of the key activities can be progressed by the design team and will enable certainty of design in a reduced timescale
- Allows contractor input into the design before contract award to address issues such as buildability and construction phasing before final contract award

2.1.2. Cambourne to Cambridge (C2C)

An initial assessment of the delivery models for the Scheme was carried out for the purposes of the Outline Business Case. Based on the assessment, design and build has been selected as the preferred delivery model, noting that the model would be subject to further review as the Scheme developed.

Considerations for the assessments were the level of certainty for cost, time and quality and the rationale for the selection:

- The scheme can progress without significant delays during the procurement process. Some of the key activities can be progressed by the design team and will enable certainty of design in a reduced timescale
- Allows contractor input into the design before contract award to address issues such as buildability and construction phasing before final contract award
- The model would provide GCP with further opportunity to drive value for money

2.1.3. Cambridge Eastern Access (CEA)

On 1st July 2021 the GCP Executive Board approved the Strategic Outline Business Case (SOBC) for the project. The project team have stated to develop preferred options.

2.1.4. Waterbeach to Cambridge

The Strategic Outline Business Case (SOBC) was approved in July 2021, GCP are currently working through options for the Outline Business Case (OBC) however, initial discussions with GCP indicate that the preferred delivery model should incorporate Early Contractor Involvement (ECI).

2.1.5. Cambridge South West Transport (CSWTH)

An initial assessment of the delivery models for the Scheme was carried out for the purposes of the Outline Business Case. Based on the assessment, design and build has been selected as the preferred delivery model.

Considerations for the assessments were level of cost certainty, minimise preparation and delivery costs, efficient programme delivery, quality of design, continuity of project knowledge, risk mitigation measures and deliverability

- GCP would enter into a single contract relationship
- Potential legal challenge to design novation option
- Early collaboration between contractor and designer
- Cost effective procurement for GCP

2.1.6. Foxton Travel Hub

An initial assessment of the delivery models for the Scheme was carried out for the purposes of the Outline Business Case. The preferred delivery model was a traditional model:

- Maintains competitive tension in both stages ensuring value for money
- The design is considered non-complex and any benefits of early contractor, designer collaboration would be limited
- Lower tender cost for contractors
- Considered the most cost-effective procurement method for GCP

2.2. Traditional Model

The traditional delivery model requires the design to be fully developed prior to award of the construction contract.

2.2.1. Traditional 1

GCP would engage consultants directly to prepare preliminary and detailed design and typically the consultants will also provide support with development of the tender documents for the construction stage. When the tender documents have been developed the opportunity is then published and contractors invited to tender for the work based on the tender documents.

Risks around the design, Statutory Undertakings and engagement with complex stakeholders etc. would usually sit with GCP in this model. The main contractor would take on most or all of the key risks for the construction works but would also be dependent on the risk appetite of GCP and whether they wanted to retain some of the risks.

The traditional model is considered appropriate for routine, uncomplicated works of small to medium size and where there is sufficient time within the programme to fully complete the detailed design and then tender for the construction stage.

Typically, the pricing mechanism will be based on a lump sum type contract based on drawings, specifications and activity schedules or bills of quantities. However, careful consideration will need to be given to current market conditions and attractiveness of the preferred pricing mechanism and delivery model to contractors. Premarket engagement should be carried out prior to tendering to identify if there are any issues with the preferred pricing and delivery model, if contractors are unwilling to tender it could have a significant impact on the number of bids received and influence the value for money outcome.

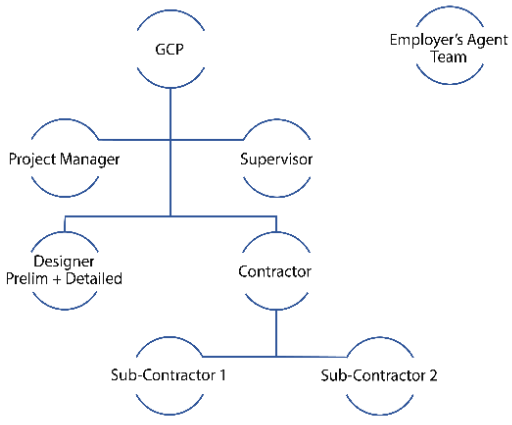
Lump sum contracts are appropriate for projects where the requirements are well defined at tender stage and bidders are able to accurately price the requirements. They transfer financial risk to the contractor and offer cost certainty however, any changes after contract award would result in a variation to contract which would incur additional costs, which should be considered in risk contingency.

Usually an Employer's Agent ("EA") would be appointed to help assist and likely administer the contract on the client side. The EA has no contractual link with the contractor.

2.2.2. Traditional 2

As with traditional 1 the preliminary and detailed design would need to be completed prior to award of the construction contract. The completed preliminary and detailed design would be handed to the contractor for construction only. This model differs from Traditional 1, in that all or most key risks (including construction risks) sit with the client in this 'Traditional' model. Typically, the pricing mechanism would be a lump sum/ target contract.

Figure 2-2 - Typical contractual relationships in a traditional delivery model.



2.2.3. Benefits of the traditional models

- GCP would have full control of the design at all stages of the project and would retain direct contractual relationships with the design team, main contractor and EA (if appointed)
- The pricing model is usually a lump sum which brings a level of cost certainty to a project
- Risks associated with the construction stage are transferred to the main contractor at contract award
- GCP can reduce design related risk by ensuring that all design issues are resolved prior to tendering for the construction works

- Straightforward tender process resulting in lower costs and a reduction in in-house resources to manage the tender process
- Tender evaluation is less complex and easier to assess than other delivery models
- High degree of cost certainty, providing the design is complete and reflects the project brief
- Design can be varied after the construction contract has been awarded without excessive cost or time implications, any variations would be evaluated using the tender prices

2.2.4. Disbenefits of the traditional model

- Price certainty relies on the completeness of GCP's design, any errors or omissions in the design at construction stage could result in variations and ultimately additional costs to GCP
- Any delays in the design stage will ultimately have an impact on tendering for the construction contract and could impact project delivery timescales
- No single point of responsibility. Design sits with the client and construction sits with the contractor which could lead to difficulties later in the project determining who is responsible for defects i.e., is it a design error or poor workmanship
- Separation of design and construction reduces the opportunity for innovation, collaboration and buildability input at design stage, minimising waste, reducing health and safety risks and identifying design constraints
- The client needs to ensure there are sufficient resources and experience in-house to administer and manage the design consultants and main contractor.

2.3. Design and build

In the design and build model the main contractor has responsibility for both design and construction. Preliminary design is a separate activity to the main contractor and will either be carried out in house by GCP, or by engaging consultants directly.

However, it is also typical for the contractor to also take on responsibility for the preliminary design work on appointment, the contractor would then develop and complete the detailed design.

2.3.1. Design and Build 1

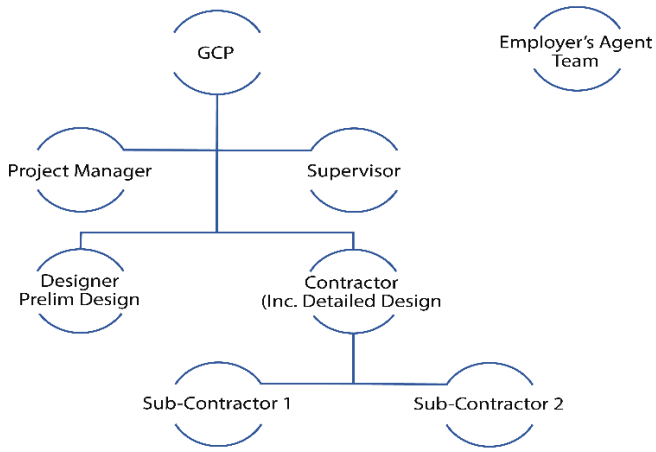
GCP would develop the functional and technical performance requirements and publish the opportunity for contractors to bid for the services and works either via a tendering process. It should be noted that the level of design information provided to the contractor at the time of tender will influence the contractor's ability to realise the benefits of a design and build model for the project. It is still imperative that the Scope of the procurement and project is clearly defined so that the tenderer's know precisely what is required of them.

The design and build model is typically used when there is a need for cost certainty and the functional and technical performance standards can be clearly defined within the tender documents. It is an appropriate model if GCP do not want to take on the design risk and/or a single point of responsibility for design and construction is required, or there is a need to improve constructability outcomes through incentivisation of the contractor.

This model can be used with differing pricing mechanisms however – lump sum, target, cost reimbursable are all often used in combination with this model.

Again, typically an Employer's Agent ("EA") would be appointed to help assist and likely administer the contract on the client side. The EA has no contractual link with the contractor

Figure 2-3 - typical contractual relationships in a design and build delivery model



Variations of the Design and Build Model

2.3.2. Design and Build 2 (Including ECI)

The principles above would be followed, in that GCP would develop the Preliminary design inhouse or with an appointed consultant. In this variant a Contractor would also be appointed to provide ECI advice, typically including constructability and programme advice to assist in the design development.

The Design and Build model would then follow as previously described.

2.3.3. Design, Novate and Construct

GCP would appoint a design consultant to develop the design to a stage it feels comfortable to tender, with the intention of novating (transferring) the consultants' appointments to the successful contractor, who will complete the design and carry out construction.

The design team's continued involvement in the project provides continuity in the design process, but after novation they take instruction from the contractor on all design matters.

The client needs to consider appointing an independent design consultant to monitor contractor outputs, to ensure the design meets contractual requirements.

Novation can be useful in an overheated market, where design development costs would result in contractors being reluctant to tender.

The level of design information at tender stage will influence contractor's ability to realise the benefits of the model. Tendering near completed designs limits opportunities for innovation and could result in risk pricing, the contractor would be taking on a design that some else has developed. This variation in the design and build model would transfer the risk to the contractor and limit the contractor's scope to manage the risk.

2.3.4. Benefits of design and build

- Provides cost certainty and benefits, value for money decisions can be optimised and unlike the traditional approach constructability will be a key factor in design decisions
- There is a single point of responsibility, so fewer disputes and minimised design/construction interface risks such as design errors and omissions
- Statutory approvals are the responsibility of the contractor, unless GCP choose to retain the risk

- Innovative design solutions and standardisation to maximise project benefits, the contractor and supply chain are engaged directly after contract award
- The contractor generally warrants the design is fit for purpose; however, this will need to be clearly defined in the contract
- Speed of delivery – the design and construction stages can be overlapped to enable an earlier on-site start date and earlier completion date which would not be feasible in the traditional model

2.3.5. Disbenefits of design and build

- Increase in tendering timescales, tenderers will need to prepare proposals for design and following receipt of tender responses the evaluation panel will need longer to evaluate proposals and if required seek clarification from tenderers
- Client requirements need to be set out clearly in the Scope / Works information provided at tender or inconsistencies may lead to change.
- It can be difficult to evaluate tender returns on a level playing field if Scope development is immature.
- GCP would need to be clear about any elements of the design that may need to be confirmed post-contract (e.g., finishes or structural elements). The contractor can be requested at tender stage to provide some flexibility in providing a range of options that can be decided upon later on
- It may be difficult for GCP to exert any significant level of control over the design process, and any significant design changes required post-contract are likely to prove costly.

2.4. Early Contractor Involvement (ECI)

Early Contractor Involvement (“ECI”) approach is ultimately a variant of the D&B route. It sees a more integrated team of contractor and designer being appointed to help develop a scheme from concept, through preliminary and on to detailed design and construction.

This would typically see a management type contractor being appointed, who would ultimately be responsible for all design and construction, as well as stakeholder engagement with the likes of the Environment Agency, Statutory Authorities etc. Owing to their early involvement there can be a reasonable appetite to take on risk.

The delivery model is suited to large, complex or high-risk projects as the integrated team has an understanding of requirements early in the project, risks can be managed effectively and buildability, value engineering and innovation given due consideration.

The ECI approach can complement either a traditional or design and build delivery model and should be considered where:

- Project risks are difficult to quantify
- Project delivery timescales are constrained
- A collaborative model is preferred
- There is a need for cost certainty and transparency

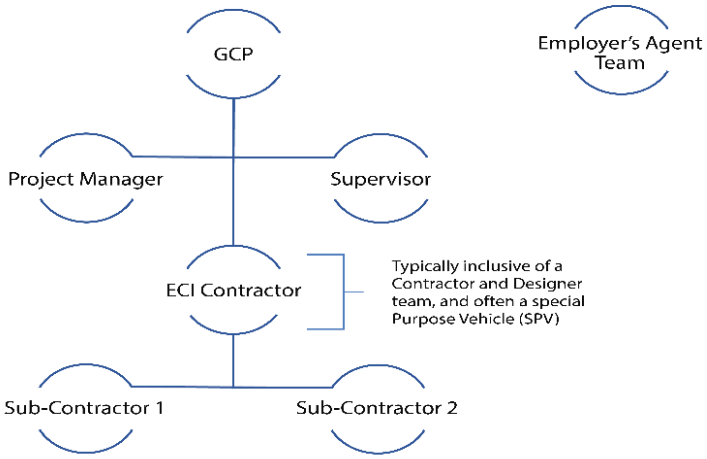
Again, usually an Employer’s Agent (“EA”) would be appointed to help assist and likely administer the contract on the client side. The EA has no contractual link with the contractor.

ECI is typically a two-stage tendering approach:

Stage 1 - Tender documents should contain sufficient project information to enable tenderers to submit a bid such as programme, identification of initial risks and opportunities for design and construction.

Stage 2 - The contractor will work with the design team to input into the design and develop its tender price for the construction phase. Provided the costs have been agreed with the client the contract is awarded

Figure 2-4 - Typical contractual relationships in an ECI model



2.4.1. Multiparty ECI Environment

A series of providers – designer, contractor, consultants, ECI/ constructability consultant etc. would be brought together to help deliver the Scheme. Key within the environment will be the early contractor/ constructability involvement element which would likely be achieved through consultancy from a contractor or specialist individual.

A Multiparty ECI Environment would take advantage of a partnering or bespoke relationship clause (e.g., X12 in the NEC4) setting out that everyone involved in a project is to work together towards a common goal or outcome.

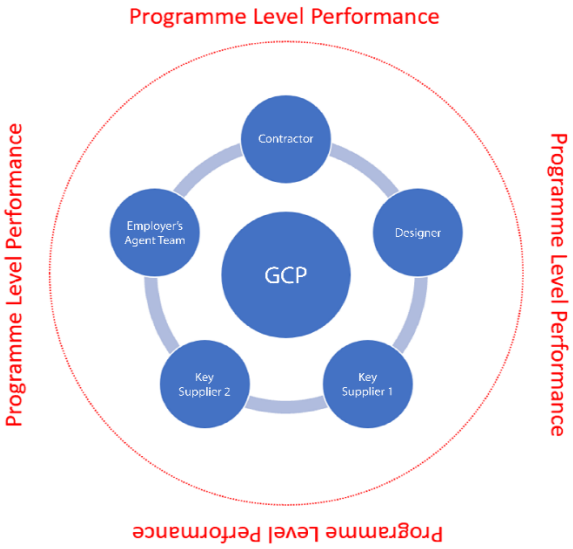
The client would have a number of contractual relationships to bring about delivery – everyone would have their own contractual relationship with GCP. In turn all those appointed would have an arrangement between them – potentially a memorandum of understanding round a series of programme objectives or a more complex performance arrangement where they would look to share any pain or gain when it comes to delivery.

Dispute resolution and escalation plans will feature, but organisations will retain independence and there will be contractual remedies between the client (GCP in this context) and its providers (note the difference in this context with Alliancing below)

Programme level performance will need to be driven via appropriate pain gain mechanisms.

An EA may well form part of the multiparty arrangement

Figure 2-5 - Typical contractual relationships in a Multiparty ECI model



2.4.2. X22 Variant of the Early Contractor Involvement (ECI) Model

NEC Engineering Construction Contracts (ECC) include provision of ECI through the secondary option X22 clause. If this optional clause is selected, GCP included would enter into a single contract to develop and agree the scope and prices before progressing to the construction stage. This option can only be used with ECC Option C (target price with activity schedule) and ECC Option E (cost reimbursable contract).

This model is a two-stage approach:

Stage 1 – development of the scope, detailed design and agreement on costs

Stage 2 – construction phase including completion of remaining detailed design

At the end of Stage 1 GCP would notify their intention to either proceed (or not) to Stage 2.

2.4.3. Benefits of ECI

- Improved cost and time savings can be achieved, the contractor is onboard from an early stage
- Enhanced opportunities for innovation
- Less transactional culture (with fewer variations and disputes), due to the inclusion of relationship principles and collaborative practices
- Improved integration of design and construction processes provides greater opportunity for optimising the design from a construction perspective, e.g., methods of construction, minimising waste and reducing health and safety risks.
- Earlier commitment of construction resources to the project.
- Earlier procurement of items with long lead times, such as steel and pre-cast concrete products.
- Good understanding of risk by all parties

2.4.4. Disbenefits of ECI

- Strong leadership and support from the client are required throughout to develop a no blame culture in the team, to achieve transparency and effective collaboration.

- Expertise and capability of the project manager and cost consultants are critical to helping the client adapt to working in an ECI environment.
- Where the client decides not to accept the open book negotiation offer, disruption to the project timelines can occur from re-tendering.
- High turnover of staff or major relationship breakdowns during the tender process can significantly impact performance.
- Public value is achieved using an open-book approach to accounting under the contract, and the ability to have the contractor's rates and margins independently verified.
- Competitive tension is maintained by setting clear conditions by which a contractor will be awarded a contract, e.g., achievement of a pre-determined cost ceiling.
- It is important that the contractor is paid for the services it provides during open-book negotiation, to secure commitment and ensure there are no intellectual property issues if the contractor isn't ultimately awarded a contract

2.5. Alliance Model

The alliance delivery model is a relationship style arrangement that brings together a series of providers – designer, contractor, consultants, ECI/ constructability consultant etc. to help deliver the project sharing risks and rewards.

It should be noted that there is no agreed definition of 'alliancing'. Broadly however they amount to an agreement that parties will act in a certain way to achieve a common goal or outcome. "All Alliance Participants" work together to bring about delivery

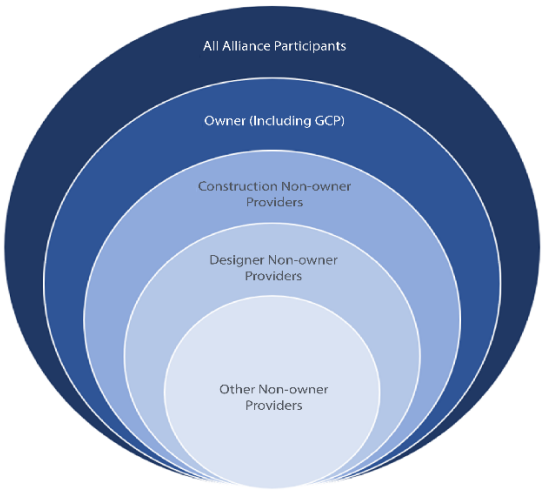
The model is considered suitable for major projects when risks on a project are particularly complex or uncertain, for example, when new/ never before seen risks are in play or there are complex external factors that need to be consider.

No / very limited claims possible between the parties, i.e., they can sue each other only in very limited circumstances, which is the key difference to the multiparty arrangement mentioned in 2.4.1 above.

Alliancing does not rest solely on the content of a contract – trust, good faith, collaborative mentality and organisation maturity all have a key role to play.

Everyone, including the client/ ultimate owner shares in success and failure. Typically, everyone would be under one contract (but not always) with a variety of pain gain mechanisms linked to performance being in play

Figure 2-6 - Typical contractual relationships in an Alliance model



2.5.1. Benefits of Alliancing

- The project can be tendered before the scope and details of the project are finalised
- Improved efficiency and innovation can be achieved all parties are working together at an early stage of the project
- There is maximum flexibility across all aspects of delivery, enabling fast-tracking where necessary to meet time constraints.
- Participants can develop a detailed understanding of pricing and cost due to the transparent, collective contract-pricing process.
- A fully integrated project team deals with planning, design and construction, encouraging participants to look for best-for-project solutions.
- Supports a high level of knowledge transfer between all participants.
- Alignment of commercial interests, plus the relationship approach and no-blame culture, can result in fewer disputes. Where these do occur, quicker resolution is possible.
- Parties are incentivised to work together to achieve time and cost targets

2.5.2. Disbenefits of Alliancing

- Alliancing requires strong leadership and a very mature client with sector specific experience. Most Client organisations would not align to this model.
- The “no blame, no disputes” philosophy means legal claims between participants are generally limited to matters of wilful default or insolvency. Other contract and negligence related matters are commonly excluded.
- Quality outcomes can be compromised in order to meet cost targets and time demands. Good planning is required to avoid any re-work, which must be paid for, which compounds the ‘pain’ for all participants.
- This method requires significant resourcing from the client in terms of governance and management arrangements.
- Clients need to carefully consider the personal attributes needed for personnel to work successfully in an alliance structure, as embedding the right culture from day one is critical to success.
- Strong leadership is needed from the client's senior leaders to ensure that the required no blame culture is established and implemented throughout the project.
- Relationships are critical to the success of this model. Issues that could impact include high turnover of staff (client or contractor), or major relationship breakdowns.
- Value for money is achieved through an open-book accounting-based approach, which allows the contractor's rates and margins to be independently verified.
- The accounting-based approach, and the requirement for detailed cost scrutiny, requires a higher degree of cost management input compared to other delivery models

Appendix Q. Risk register

Risk/Opportunity	Current Status	Ref No.	Classification	Risk Category	Project Stage	Project Risk Description (If)	Potential Impact (then)	Inherent Risk/Opp Rating				GCP Lead Officer	Risk Mitigation / Realisation Measures	Residual Risk Rating			Risk/Opp Action Owner	Actions Identified/Taken
								Primary impact (time/cost):	Likelihood	Impact	Score			Likelihood	Impact	Score		
Risk	LIVE	R 0017	Communications	External Stakeholders	DS3 - Preliminary Design	Lack of coordination and synergies between project and other major developments in the area as a result of: 1) Failure to identify key stakeholders affected by our works 2) Lack of support and engagement with landowners, developers, business 3) Poor communication between project and key interface 4) It proves not possible to reach an agreement with Cambridge Science Park / Urban + Civic / RLW over bus access	Delays to our programme, access issues, coordination issues, lack of public buy in	Start of works date	4	4	16	Paul van de Bulk	The communications strategy includes third parties with appropriate engagement strategies developed. A land consultant has been appointed for specific landowner engagement Regular engagement ongoing with developers and key stakeholders Stakeholder list maintained and updated regularly	2	4	8	CCC PM	Ongoing engagement with RLW, U&C and Science Park Developers. Initial Landowner engagement to be undertaken upon determination of a preferred option
Risk	LIVE	R 0002	Communications	External Stakeholders	DS3 - Preliminary Design	The shortlisted options will not be supported by the public as a result of: 1) Fail to bring public on the journey 2) Benefits of the project not seen by the public 3) Public worries about detrimental effects on their properties	Objections raised at the political level and barriers created to the project. Hostile stakeholder engagement. Reworks. Significant Local media adopt a negative stance towards the scheme and runs stories that challenge its credibility lays. Additional costs for extra mitigation.	Cost increase	2	4	8	Paul van de Bulk	Regular engagement will take place with local residents through both formal and informal consultation. Ensure that local residents receive detailed information about the scheme which covers the benefits and mitigation measures. Ensuring that early public engagement takes place to get buy-in from the public for the principle of enhanced public transport route. Public engagement planned in early 2022 will provide an update on the project and allow for input from the public before the commencement of the OBC phase. Consultation will take place in late 2022 to allow the public to submit their views on the preferred scheme option and public comments will be accommodated as much as possible.	2	4	8	CCC PM	Stakeholder engagement throughout OBC phase. Public consultations regularly
Risk	LIVE	R 0018	Political	External Stakeholders	DS3 - Preliminary Design	Unable to deliver our programme: 1) Interface issues with other Greater Cambridge Partnership / CPCA schemes 2) Political relationship and interface between GCP and CPCA 3) Lack of strategic oversight	Conflicts between the various schemes. Programme delay and/or increased costs	Start of works date	2	4	8	Paul van de Bulk	High level programme management will manage out conflicts. Regular engagement with CPCA will identify any programme issues between the two schemes	1	4	4	Programme Board	Regular engagement with A10 project team
Risk	LIVE	R 0019	Political	Statutory Process	DS3 - Preliminary Design	The options presented contradict the requirements of the Local Plans as there are uncertainties in emerging Local Plan and emerging local transport plan.	Strategic case no longer in line with policies, project impact new developments in the area.	Start of works date	3	3	9	Paul van de Bulk	Ensure that the schemes are consistent with the latest Local Plans as well as ensuring that appropriate development links are considered. Engagement with GCSP already undertaken regarding the emerging local plan and will be ongoing throughout the project. At present there is no certainty over the emerging local plan proposals so these cannot (and should not) be reflected at this stage	1	2	2	CCC PM	Engagement with GCSP and developers bringing schemes forward that are not included within the latest local plan (Rectory Farm and Science Park North)
Risk	LIVE	R 0011	Technical	Scheme Development	DS4 - Detailed Design	As a result of changes in assumptions or appraisal guidance the business case fails to justify the scheme on cost/ strategic justification meaning that: 1) 'do nothing' proves to be the optimum scenario - 2) Strategic case fails to justify the scheme	Showstopper' Bus operators could lose their support for the scheme	Start of works date	1	3	3	Paul van de Bulk	Follow best practice and observe all statutory procedures in preparing the business case and devote sufficient resources to preparing the case. If do nothing proves to be the optimum case based on value for money then so be it	1	3	3	CCC PM	Following GCP Assurance Framework and DfT Business Case Guidance
Risk	LIVE	R 0004	Governance	Statutory Process	DS3 - Preliminary Design	There is a judicial review of the scheme is undertaken meaning that: 1) Opponents to the scheme challenge it on procedural grounds 2) Failure to follow procedures on the EIA and TWA	Additional works and delays, possibly another iteration of the stage	Start of works date	2	5	10	Paul van de Bulk	Ensure that all statutory processes and legal requirements are followed to ensure that there is no scope for judicial review	1	5	5	CCC PM	Ensure that EIA and TWAO process are followed in line with guidance
Risk	LIVE	R 0015	Technical	Scheme Development	DS4 - Detailed Design	Significant topographical constraints are identified	Suitable mitigations will need to be found that may add additional cost to the project or require alternative routing	Start of works date	3	4	12	Paul van de Bulk	Conduct preliminary or desktop surveys to ensure that no major unforeseen issues emerge when the full survey is undertaken. Topographical surveys will be undertaken initially with other surveys as appropriate as the scheme progresses.	2	3	6	CCC PM	Conduct preliminary / desktop surveys
Risk	LIVE	R 0016	Procurement	Statutory Process	DS4 - Detailed Design	Land not available to build required infrastructure as a result of failure to secure third party land for the project	Possible 'showstopper', come up with different options, delays and increased costs Option of compulsory purchase may be required	Start of works date	2	5	10	Paul van de Bulk	If possible, align schemes within County land. Identify and begin negotiations with third party landowners at the earliest possible opportunity in order to agree a purchase. If necessary, and as a last resort, the promotors will remind third party land owners of their intention the use CPO powers to secure the land required. Land specialists appointed to undertake negotiations	1	5	5	CCC PM	Align scheme with CCC land and engage with landowners early
Risk	LIVE	R 0008	Financial	Project Funding	DS3 - Preliminary Design	Shortlisted and preferred options found to be unaffordable resulting in: 1) Failure to work within the scope of the original budget 2) Failure to engage with Programme Manager 3) Strategic decision to reduce resources 4) Increase in construction prices above what has been allowed for 5) The scheme fails to secure sufficient funding or that the funding available is insufficient 6) Costs of utilities alterations or diversions exceeds the budget allocation	Outturn costs are greater than expected	Cost increase	3	3	9	Paul van de Bulk	The preferred and shortlisted options will be rigorously assessed and costed along with a robust business case.	2	2	4	CCC PM	Accommodate contingency in cost estimates to allow for inflation. Undertake regular costing exercises
Risk	LIVE	R 0001	Political	External Stakeholders	DS3 - Preliminary Design	The shortlisted options will not be considered politically acceptable which could be a result of: 1) Local politician receiving overwhelming negative feedback for the project 2) Change in political priorities following elections	Possible 'showstopper', come up with different options, delays and increased costs	Start of works date	2	4	8	Paul van de Bulk	Regular engagement will take place with Members and GCP Executive Board / Assembly	2	4	8	CCC PM	Stakeholder engagement, including with Councillors, throughout OBC phase. Public consultations regularly
Risk	LIVE	R 0012	Environmental	Scheme Development	DS3 - Preliminary Design	Significant environmental issues are not adequately identified at the right time resulting in a failure to conduct adequate environmental surveys at the right stages and in the right seasonal window	Additional mitigation works, potential requirement to change route options Stakeholder conflicts Delay to programme to ensure surveys are undertaken at the right time	Start of works date	3	4	12	Paul van de Bulk	An environmental assessment will be undertaken to identify any environmental issues. Environmental mitigation measures will be programmed to limit or avoid environmental harm. Once basic preferred option has been established, further detailed assessments are conducted.	2	3	6	CCC PM	Early environmental constraints assessment already undertaken and ecology walkover planned for Sept 2022
Risk	LIVE	R 0020	Technical	Scheme Development	DS3 - Preliminary Design	Scheme is not properly assessed against a reliable transport model meaning that modelling practices do not meet TAG requirements and are not representative of the site conditions	Scheme design is not appropriate due to inaccurate modelling. Also benefits not properly realised. Business case is not approved	Start of works date	2	4	8	Paul van de Bulk	Develop modelling strategy for the project that sets out a specification required and methodology to be used. Regularly engage with CCC Modelling lead on CSRM and ensure that the consultants are maintaining agreed standards and controls on any modelling work.	1	4	4	CCC PM	Modelling approach agreed with CCC lead for OBC. Operational modelling to be undertaken at next phase
Risk	LIVE	R 0021	Technical	Governance	DS4 - Detailed Design	The design teams produce a product that is not buildable or creates difficulties in construction or does not function well in terms of operations	Construction cost increases Modifications to design that don't comply with the fundamental aims of the project Programme delay	Start of works date	3	5	15	Paul van de Bulk	Develop an appropriate delivery programme aligning with a procurement strategy for the work. This will be consistent with other emerging GCP schemes whilst considering existing delivery frameworks.	2	4	8	Contractor	Develop a procurement strategy with Early Contractor Engagement
Risk	LIVE	R 0024	Project	Project Funding	DS5 - Delivery	Failure to secure agreement with bus operators to service new routes and / or park and ride meaning a viable commercial case for the scheme is not developed.	Infrastructure not utilised to its full potential Reputational damage	Start of works date	2	5	10	Paul van de Bulk	Early engagement with bus companies	1	5	5	CCC PM	Engagement with stagecoach ongoing. Creation of a service agreement with Stagecoach
Risk	LIVE	R 0025	Governance	Supply Chain	DS3 - Preliminary Design	Programme cannot be delivered to its planned timescales due to: 1) Insufficient time allowed for activities 2) Insufficient resources 3) Programme is overly ambitious for its timeframes	Unable to deliver the project on time for when is needed,	Start of works date	3	4	12	Paul van de Bulk	Ensure adequate time is allocated in the programme for preparation of the business case, and data requirements are flagged up early to ensure that all data required is available.	2	4	8	CCC PM	Regular programme reviews, incorporating lessons learnt from other projects to allow realistic timescales for tasks
Risk	LIVE	R 0026	Technical	Statutory Process	DS4 - Detailed Design	Unable to obtain planning consents when/where required due to: 1) Late planning applications 2) Poor quality of planning applications 3) Planning authorities refuse our application 4) Unclear planning requirements 5) Statutory process stalls due to legal and issues with use of TWA/DCO	Programme delays, unable to access and/or build on land, cost increases associated with rework of planning application or TWAO application	Start of works date	3	4	12	Paul van de Bulk	Early discussions with Planning Authority to understand key issues and evidence base required.	2	4	8	CCC PM	Early discussions with planning authority
Risk	CLOSED	R 0027		Statutory Process	DS4 - Detailed Design	Statutory process stalls due to legal and issues with use of TWA/DCO		Start of works date	3	3	9	Paul van de Bulk	Continuous dialogue with DfT. Discussion with programme leads in relation with the earlier projects taking place.					

Risk/Opportunity	Current Status	Classification	Risk Category	Project Stage	Project Risk Description (If)	Potential Impact (then)	Potential Impact (then)		Inherent Risk/Opp Rating			GCP Lead Officer	Risk Mitigation / Realisation Measures	Residual Risk Rating			Risk/Opp Action Owner	Actions Identified/Taken
								Primary impact (time/cost):	Likelihood	Impact	Score			Likelihood	Impact	Score		
Risk	LIVE	R 0028	Technical	Design	DS4 - Detailed Design	Project is predicated on immature technology. Design is not adequate to accommodate the emerging transport solutions.	Further design work required Project uses old/outdated technology	Start of works date	5	3	15	Paul van de Bulk	Review state of the art technology areas, and establish maturity at early stage. Avoid relying on emerging technologies unless risk can be managed. Design transitway to accommodate 'traditional vehicles' as well as being adaptable to future technologies.	3	3	9	CCC PM	Design transitway for traditional vehicles at concept design phase and keep abreast of emerging technologies to understand likelihood of adoption and risks associated with them
Risk	CLOSED	R 0031	Political	Governance	DS3 - Preliminary Design	The design of each GCP scheme does not compliment each other, link up, work together with potential land conflicts resulting in strategic conflicts between the CPCA proposal to upgrade A10 and the GCP proposals to develop a new stand alone public transport route. We know that CPCA are going to review their previous work at SOBC stage which has the chance of changing their outcomes	Uncertainty around the business cases for each scheme Rework designs Reputational damage	Start of works date	4	4	16	Paul van de Bulk	The Business Case needs to set out how Public Transport still needs to be improved even with the A10 dualling, therefore our proposed interventions are required. Ongoing engagement with the A10 will keep up to date on the progress of their scheme and technical work will identify specific areas of intersection to consider. We will consider producing an interface agreement between the two projects at an appropriate time			0		
Risk	LIVE	R 0032	Technical	Scheme Development	DS3 - Preliminary Design	The do-minimum scenario is poorly represented if the scenario is not defined properly.	Scope for challenge as the scheme progresses Inaccurate representation of benefits and the need for the scheme	Start of works date	2	3	6	Paul van de Bulk	To be defined and agreed at ASR stage. This will include discussions with the developers and CCC over S106 contributions and identify dependent development if required.	1	3	3	CCC PM	DM agreed at ASR. Consistent approach provided across all GCP schemes
Risk	LIVE	R 0033	Project	Scheme Development	DS3 - Preliminary Design	Patronage levels on the route and/or P&R are lower than expected as a result of: 1) Coronavirus changes the publics view on the usage of Public Transport and political aspirations. 2) scheme proves less popular among the public	Scheme is not commercially viable	Start of works date	4	2	8	Paul van de Bulk	To monitor the progress of the recovery post Covid-19 linking to work with GCP that will undertake on a programme wide basis. Undertake sensitivity tests around the impact of Covid-19 in line with TAG guidance to factor impact into the business case	2	2	4	CCC PM	Undertake sensitivity tests around impact of Covid-19. Continued engagement with bus operators on Covid-19 recovery
Risk	LIVE	R 0034	Environmental	Scheme Development	DS3 - Preliminary Design	Environmental issues not identified at the initial assessment stage resulting in a failure to achieve the anticipated efficiencies associated with the use of Atkins bespoke tools for aspects of the initial environmental assessment and/or failure of the tool to identify all environmental receptors that need assessment.	Increased project costs and delay to programme as a result needing to do more surveys	Cost increase	3	3	9	Paul van de Bulk	Commence with the application of the tool as soon as possible. The budget for this work allowed for some time for the PANGEA team to support	1	3	3	CCC PM	Early environmental constraints assessment already undertaken and ecology walkover planned for Sept 2022
Risk	LIVE	R 0035	Environmental	Statutory Process	DS3 - Preliminary Design	Longer programme of environmental engagement. Significantly longer than usual response times from Statutory Consultees including the Environment Agency and LLFAs	Delay to programme	Start of works date	3	3	9	Paul van de Bulk	Engage with statutory environmental consultees as early as possible and identify likely response time	2	2	4	CCC PM	Early engagement with LLFA and Environment Agency
Risk	LIVE	R 0036	Governance	Governance	DS4 - Detailed Design	Issues arise that mean we are unable to follow a TWAO consenting strategy or there is a more appropriate consenting strategy that we are not currently aware of as a result of assumptions around the consenting strategy as the CSETS project	Abortive work assuming TWAO approach. Delay to programme should an alternative approach be required.	Start of works date	2	3	6	Paul van de Bulk	Ensuring that a planning and consents strategy is programmed early and started as part of the OBC.	1	3	3	CCC PM	Consenting Strategy being undertaken as part of the OBC phase
Risk	LIVE	R 0037	Governance	Design	DS3 - Preliminary Design	Any changes that take place during the early PCF phases are not covered by the EIA. Detailed design required to meet TWAO requirements means that corridor for EIA is narrow	Risk of redesign and further environmental assessment	Start of works date	2	3	6	Paul van de Bulk	Ensure that flexibility is built into the EIA and other assessments to accommodate any design changes further down the line. Early engagement with PANGEA team to ensure environment led design to ensure that early mitigation is also built in rather than retrofitted into any PCF stage.	1	3	3	CCC PM	Flexibility in EIA corridor
Risk	LIVE	R 0038	Governance	Scheme Development	DS4 - Detailed Design	TWAO route is not an option for our scheme or we are required to design our scheme to meet TWAO regulations (i.e. physically guided) as a result of TWAO requirements not covering an optical guided system by the time that this project gets to TWAO application stage.	Rework to design scheme to meet requirements or change method of securing the infrastructure to DCO.	Start of works date	3	2	6	Paul van de Bulk	Flexible approach to design and close engagement with CSETS team to keep up to date on any changes to TWAO requirements and challenges they face.	1	3	3	CCC PM	Consenting Strategy being undertaken as part of the OBC phase and reviewed regularly.
Risk	LIVE	R 0039	Technical	Scheme Development	DS3 - Preliminary Design	Significant scheme interface between Urban&Civic's Mere Way scheme, NMU bridge and access junction, and the Waterbeach to Cambridge Scheme, preferred Park and Ride Location and A10 crossing point	Technical complexity with scheme interfaces lead to engineering and flood risk feasibility issues and Masterplanning conflicts with Urban&Civic's scheme. Potential to lead to re-work should flood risk information from U&C/LLFA come late in the day, which would result in a design change	Start of works date	3	1	3	Paul van de Bulk	Do not fully discount alternative Park and Ride sites at this stage (Site A) Work closely with Urban&Civic throughout design stages to optimise design and find solution that works for both parties	2	1	2	CCC PM	Other P&R site options are still in consideration. Ongoing engagement with U&C
Risk	LIVE	R 0040	Governance	Statutory Process	DS3 - Preliminary Design	TWAO requirements - Active Travel Infrastructure not permissible under TWAO application.	Alternative consenting strategy may be necessary	Start of works date	4	1	4	Paul van de Bulk	Early engagement with Planning Leads to develop consenting strategy. Capturing lessons learnt from other projects including CSETS and Cambourne to Cambridge	4	1	4	CCC PM	Consenting strategy being produced. Lessons learnt from other projects being taken on board
Risk	LIVE	R 0041	Environmental	Scheme Development	DS3 - Preliminary Design	The scheme causes encroachment into the floodplain, planning approval will not be granted without acceptable flood compensation provision then fluvial flood risk implications associated with the Busway and the P&R at the Waterbeach end. Potential conflict with flood compensation required for the U&C Mere way scheme. Suitable flood compensation provision not achievable owing to other schemes at this locality.	Change in design / location of the busway and P&R at the Waterbeach end	Start of works date	2	3	6	Paul van de Bulk	Obtain plans for the U&C scheme in this locality including the proposed compensation design / requirements. If it is not possible to obtain plans from U&C or the LLFA we would need to gather flood level information, accepting that it may be over conservative. If the conservative levels impose impossible design constraints then we may need to consider hydraulic modelling which may reduce flood extent and/or level	1	3	3	CCC PM	Obtain plans for U&C flood mitigation
Risk	LIVE	R 0042	Project	Supply Chain	DS5 - Delivery	Extended manufacture lead in times - up to 4 months in some instances.	Delay to programme	Start of works date	3	4	12	Paul van de Bulk	Client to consider whether they are able to contract for materials in advance of scheme approval to help mitigate against any slippage against programme. Reflect risk in OBC regarding the implication it may have on the project. How we will deal with it will be covered more in the FBC	2	4	8	CCC PM	Client to consider early contracts for materials. Lead in times to be regularly reviewed
Risk	LIVE	R 0043	Technical	Scheme Development	DS2 - Feasibility	Relocation of gas/water monitoring boreholes which are used by the landfill operator adjacent to Butt Lane. If the preferred busway route is to affect any of the exiting boreholes, their relocations have to be taken into account within the cost and programme.	Delay to programme and cost increase. Even if the landfill operator was to agree to the changes to the location of the borehole, the Environmental Agency may not.	Start of works date	4	3	12	Paul van de Bulk	The landfill operator has confirmed that the boreholes could remain in close proximity to the potential bus route verges or footway/cycleway, as long as access is maintained to them. To avoid any potential delay in the programme and cost associated with the relocation of the boreholes it is recommended that the proposed Busway Route or potential widening of Butt Lane is such that would not affect the location of boreholes.	1	3	3	CCC PM	Design where possible to avoid moving boreholes. If movement is necessary, engage with EA, CCC and Landfill operator
Risk	LIVE	R 0044	Communications	Consultation/Comms	DS5 - Delivery	Any potential works along Butt Lane will cause disruption and delays to road and active travel users (including access/egress of Milton P&R)	Additional mitigation works, potential requirement for diversion route and alternative access allowance of the Milton P&R through A10. Stakeholder conflicts.	Start of works date	4	3	12	Paul van de Bulk	Buildability and traffic management requirements to be discussed at the beginning of the Detail Design Stage.	4	3	12	CCC PM	Pick up at detailed design phase
Risk	LIVE	R 0045	Political	Design	DS3 - Preliminary Design	Currently, the proposed busway route links to a new roundabout proposed by U&C at A10. If the U&C junction is constructed before the busway route it might require subsequent alteration.	Reputational damage if a newly constructed junction would require alteration within a couple of years of construction.	Completion of works date	2	3	6	Paul van de Bulk	Close liaison with U&C so the busway arm is accounted for and considered within the new roundabout layout.	1	3	3	CCC PM	Continued liaison with U&C and participation in their Phase 2 design meetings

Risk/Opportunity	Current Status	Classification	Risk Category	Project Stage	Project Risk Description (If)	Potential Impact (then)	Potential Impact (then)		Inherent Risk/Opp Rating			GCP Lead Officer	Risk Mitigation / Realisation Measures	Residual Risk Rating			Risk/Opp Action Owner	Actions Identified/Taken
								Primary impact (time/cost):	Likelihood	Impact	Score			Likelihood	Impact	Score		
Risk	LIVE	R 0046	Governance	Scheme Development	DS3 - Preliminary Design	Chosen preferred busway route might clashes with other Approved Planning Applications.	Change in design. The preferred route might be subject to change.	Start of works date	3	4	12	Paul van de Bulk	Maintain communication with the Greater Cambridge Shared Planning team for timely notification of approved and pre-approved applications within the area of the busway route and mitigate the impact.	2	4	8	CCC PM	Ongoing engagement with GCSP
Risk	LIVE	R 0047	Environmental	Design	DS3 - Preliminary Design	The busway route surface water drainage strategy could change at later stages due to ground conditions and/or amended requirements of the local Flood Authority.	Change in design. Delay to programme and cost increase.	Start of works date	2	3	6	Paul van de Bulk	The Surface Water Drainage Strategy and potential Sustainable Drainage Strategy to be reviewed at Preliminary Design and early engagement to be done with the Local Flood Authority for provisional approval.	1	3	3	CCC PM	Ongoing engagement with Local Flood Authority. Conduct Surface Water Strategy
Risk	LIVE	R 0048	Communications	Consultation/Comms	DS3 - Preliminary Design	Existing unknown irrigation pipe network system within farm fields could be affected by the construction works.	Delay to programme and cost increase.	Start of works date	3	3	9	Paul van de Bulk	During Preliminary Design Stage the preferred route to be discussed with the affected land owners and information requested for any underground irrigation system.	1	3	3	CCC PM	Landowner engagement
Opportunity	LIVE	R 0049	Project	Consultation/Comms	DS5 - Delivery	The Landfill Operator advised that around 2026 they would need to close the current cell which is in operation and would need a vast amount of backfill material and potentially top soil too.	-	Start of works date	3	1	3	Paul van de Bulk	To be discussed at Detail Design stage with the Landfill Operator and Principal Contractor.			0	CCC PM	
Risk	LIVE	R 0050	Political	Design	DS5 - Delivery	Optical guidance is unproven and has yet to be safety tested at the operation speeds required for this scheme	Need for redesign work and consideration of alternative guidance/non-guidance infrastructure. Potential to need alternative consent routes depending on the type of infrastructure.	Start of works date	5	5	25	Paul van de Bulk	Raise concerns with client. Engagement with client about ongoing testing. Concept design work flexible to adapt to emerging technologies.	4	5	20	CCC PM	Client engagement and adaptable design
Risk	LIVE	R 0051	Communications	Scheme Development	DS3 - Preliminary Design	Failure to obtain consensus on P&R site location	Delay to programme and rework, further engagement. Risk that preferred busway option is not compatible with P&R site location	Start of works date	3	3	9	Paul van de Bulk	Early engagement on P&R options with the public and landowners. Ensure that P&R is vigorously assessed as part of business case	2	3	6	CCC PM	Engagement on P&R and assessment in the business case
Risk	LIVE	R 0052	Environmental	Scheme Development	DS4 - Detailed Design	Flood risk in the area is more significant than anticipated. Lack of accurate flood modelling at the concept design stage leads to uncertainty over the risk and levels of mitigation required	Rework and additional mitigation required to address flood risk issues	Start of works date	3	4	12	Paul van de Bulk	Comprehensive flood modelling at preliminary design stage.	2	4	8	CCC PM	Flood modelling to be undertaken after OBC phase
Risk	LIVE	R 0053	Technical	Design	DS5 - Delivery	Proposed solution cannot operate at adequate speeds	Reduced speed of guidance technology leads to impact on business case and leads to objections/questioning at public inquiry. Need to redesign scheme to physical guidance	Start of works date	4	3	12	Paul van de Bulk	Keep abreast of technology review to consider impact on design process	3	3	9	CCC PM	Keep abreast of technology review
Risk	LIVE	R 0054	Environmental	Project Scope	DS5 - Delivery	Inability to meet policy objectives in local plans related to biodiversity net gain	Challenge at planning application stage, stakeholder push back	Completion of works date	2	3	6	Paul van de Bulk	Early engagement with Atkins and the LPA Ecologists. Ecology walkover survey being undertaken in Autumn 2022 to ensure identification of key ecology areas early	1	3	3	CCC PM	Engagement with LPA Ecologists. Ecology walkover
Risk	LIVE	R 0055	Technical	Design	DS3 - Preliminary Design	W2C junction options with the A10 negatively impact the highway network	Redesign work to mitigate against impacts	Cost increase	3	2	6	Paul van de Bulk	Operational modelling at Preliminary design phase to identify issues and build mitigation into ongoing design work	1	2	2	CCC PM	Operational modelling
Risk	LIVE	R 0056	Technical	Statutory Process	DS4 - Detailed Design	Consideration of Greenbelt in option identification and development process is not sufficient	Challenge at planning application stage, stakeholder push back	Start of works date	3	4	12	Paul van de Bulk	Undertake Greenbelt Assessment at Preliminary Design Phase. Engage with Planners early to mitigate against impact	1	4	4	CCC PM	Greenbelt assessment at preliminary design phase
Risk	LIVE	R 0057	Governance	Scheme Development	DS3 - Preliminary Design	Change in guidance approach necessary from optical guidance to kerb guidance	Uncertainty over materials, costs and construction leading to design changes	Cost increase	4	5	20	Paul van de Bulk	Keep abreast of technology review to consider impact on design process	4	5	20	CCC PM	Keep abreast of technology review
Risk	LIVE	R 0058	Environmental	Scheme Development	DS5 - Delivery	Unfavourable ground conditions along the route	Increased construction costs and likely delay to programme	Cost increase	3	3	9	Paul van de Bulk	Ground investigations as part of preliminary design phase to accommodate mitigation early in the design process	2	3	6	CCC PM	Ground investigations as part of prelim design phase
Risk	LIVE	R 0059	Procurement	Supply Chain	DS4 - Detailed Design	Only one suitable supplier of optical guidance technology at the time of supply chain procurement	Uncertainty over market value, quality of delivery	Start of works date	4	4	16	Paul van de Bulk	Keep abreast of technology review and market testing to consider impact on design process			0		
Risk	LIVE	R 0060	Technical	Scheme Development	DS3 - Preliminary Design	Waterbeach Greenway route changes to become closer to the alignment of the busway The Waterbeach Greenway is assumed to link to the P&R via Denny End Lane	Design changes required to reduce the scope of the active travel infrastructure alongside the busway	Start of works date	3	2	6	Paul van de Bulk	Continued engagement with Waterbeach Greenway team and GCP officers	2	2	4	CCC PM	Continued engagement with Waterbeach Greenway team and GCP officers
Risk	LIVE	R 0065	Financial	Project Funding	DS5 - Delivery	Developer contributions not coming forward in terms of the amount and/or timing expected	GCP not able to recoup any costs for scheme outlay	Cost increase	3	5	15	Paul van de Bulk	Continued engagement with CCC Transport Team and GCSP	2	5	10	CCC PM	Continued engagement with CCC Transport Team and GCSP
Risk	LIVE	R 0068	Project	Scheme Development	DS5 - Delivery	Additional traffic on Butt Lane causes congestion and slows down buses as a result of Science park extension, rerouting due to Making Connections	Slower Journey Times for buses	Cost increase	3	2	6	Paul van de Bulk	Engagement with local planning authority to manage traffic on Butt Lane. This relates initially to the Recycling Centre and the new Police Building but other developments such as the New Science Park Extensions need to be monitored.	2	2	4	CCC PM	Engagement with local planning authority to manage traffic on Butt Lane. This relates initially to the Recycling Centre and the new Police Building but other developments such as the New Science Park Extensions need to be monitored.
Opportunity	LIVE	R 0069	Technical	Scheme Development	DS3 - Preliminary Design	Realignment of bus stops in Milton P&R required	Enhanced bus journey times and reliability	Cost increase	2	3	6	Paul van de Bulk	Effective Design to deliver bus performance	3	3	9	CCC PM	Continued design work
Risk	LIVE	R 0070	Political	Project Scope	DS5 - Delivery	Delay to the build out of Waterbeach New Town	Impacts on the levels of forecast patronage and therefore the overall performance of the scheme. Bus operators could lose their overall support for the scheme	Completion of works date	2	5	10	Paul van de Bulk	Continued engagement with U&C/RLW and GCSP to understand the risk	2	5	10	CCC PM	Continued engagement with U&C/RLW and GCSP to understand the risk
Risk	LIVE	R0072	Project	Scheme Development	DS5 - Delivery	Project Schedule Delay			3	4	12	Paul van de Bulk	Regularly review programme	3	4	12	CCC PM	Regularly review programme
Risk	LIVE	R0073	Project	Design	DS3 - Preliminary Design	Diversionary utility works as part of the Milton P&R improvements, also considering the recently installed Cambridge Water mains asset	Scheme costs and construction duration	Cost increase	4	3	12	Paul van de Bulk	Define utilities and exact impact in the next design phase. Undertake C3 and C4 enquiries	4	1	4	CCC PM	Provide C3 costs so the utilities engament can start during preliminary design

Risk/Opportunity	Current Status	Classification	Risk Category	Project Stage	Project Risk Description (If)	Potential Impact (then)	Potential Impact (then)	Inherent Risk/Opp Rating			GCP Lead Officer	Risk Mitigation / Realisation Measures	Residual Risk Rating			Risk/Opp Action Owner	Actions Identified/Taken
							Primary impact (time/cost):	Likelihood	Impact	Score			Likelihood	Impact	Score		
Risk	LIVE	R0074	Project	External Stakeholders	DS5 - Delivery	Milton Recycling Centre, Farms, Business Park and other local business present on Butt's Lane, which will be affected by traffic management	Disruption to business activities	Completion of works date	4	4	16	Paul van de Bulk	Early consultation, discussing traffic management options with Contractors to accommodate where possible.	4	2	8	CCC PM	Reduce the impact via design, early contractor involvement (ECI)
Risk	LIVE	R0075	Financial	External Stakeholders	DS5 - Delivery	Loss of Revenue for the Park and Ride During these improvements outweighing benefits.	Disruption to P&R operation and loss of revenue	Completion of works date	3	3	9	Paul van de Bulk	Assess the options of maximising the usage of Milton P&R while delivering the works	2	2	4	CCC PM	Reduce the impact via design
Risk	LIVE	R0076	Environmental	Scheme Development	DS5 - Delivery	Thirteenth Public Drain and several ditches surround the site will be affected by the works	These watercourses may be polluted during construction.	Cost increase	3	4	12	Paul van de Bulk	Confirm exact impact during detailed design phase so Contractors can factor adequate working arrangements	2	2	4	CCC PM	Reduce the impact via design. Early consultation with drainage boards and LLFA
Opportunity	LIVE	R0077	Technical	Design	DS3 - Preliminary Design	All options consider a combined use of the both Milton P&R accesses. There is a risk of bus and cars queuing to leave through the A10 P&R access	Disruption to the bus services		2	-3	-6	Paul van de Bulk	Investigating potential access segregation for the next stage. Buses using Butt Lane for access/egress whereas cars could use the A10. This is to be investigated for preliminary design. Considering this in the traffic modelling	2	-4	-8	CCC PM	Include the mitigation in the scope of the traffic modelling and design for preliminary design

Appendix R. Communications and engagement plan

Better Public Transport Waterbeach to Cambridge

Communications and Engagement Plan: Development of Outline Business Case

Version 5.0

08 08 2023

Key

1. Introduction

As the delivery body for the Greater Cambridge City Deal, the Greater Cambridge Partnership (GCP) is investing in solutions to tackle current and future transport problems by offering better and more sustainable ways to make journeys by public transport, cycling and walking.

As we emerge from COVID-19 restrictions and communities continue to recover and grow in line with the area's Local Plan, sustainable transport options will be vital to access work, study and other opportunities the city has to offer – whether using public transport, cycling or walking.

A central part of the GCP's City Deal, investment in infrastructure is well underway, creating new, segregated public transport routes along four corridors identified as essential to connect growing communities to employment hubs across the city. Waterbeach to Cambridge is one of these four high quality public transport corridors alongside a western route linking Cambourne to Cambridge (C2C), a southeast route (Cambridge Southeast Transport (CSET)) linking Cambridge with the Babraham Research Campus and Granta Park and access to Cambridge from the east (Cambridge Eastern Access or CEA (Cambridge Eastern Access)).

The GCP's corridor projects aim to reduce worsening congestion and improve access to better services for growing communities in areas surrounding the city, with additional travel hub facilities to increase parking capacity and walking, cycling and equestrian provision to complement a network of Greenways for walkers, cyclists and horse riders.

2. Objectives

GCP's corridor projects aim to support the economic growth of Greater Cambridge, deliver a sustainable transport network and enhance quality of life by relieving congestion and improving air quality.

The priorities for communications during the development of the route options for the Outline Business Case phase are to:

- Provide all relevant stakeholders with clear, well-structured details of the GCP vision, project objectives and possible options, as well as being clear about what this project will not cover.
- Create opportunities for stakeholders to freely and openly express their opinions and encourage the opportunity to share their views on the options.
- Share the feedback from the public engagement period.
- Use an appropriate methodology for collecting the stakeholder responses and analyse them.
- Ensure wide feedback from the public and stakeholders across the relevant areas to assist in decision making.
- Create a consistent message across all projects to ensure stakeholders are aware that the Waterbeach to Cambridge public transport corridor is part of a wider vision set forward by the GCP.
- Identify advocates for the project.
- Manage any reputational risks associated with the project.
- Raise the profile of the GCP and its work.

3. Key milestones

Following the Government's confirmation in May 2020, unlocking up to £400m of funding for the city deal the Waterbeach to Cambridge project entered a phase of pre-consultation which concluded on Monday 3 August 2020.

Outputs from this pre-consultation engagement along with early option sifting during July/August were included in an Option Appraisals Report (OAR) which was considered at the Executive Board in October 2020 where approval for the project to move to the next stage was agreed.

A public consultation on the options for inclusion in the Strategic Outline Business Case (SOBC) was undertaken between Monday 19 October 2020 and Monday 14 December 2020.

The Strategic Outline Business Case (SOBC) was agreed at the 1 July 2021 Executive Board. The project is now at the Outline Business Case stage which culminates in the identification of a preferred option. Shortlisted options were presented at the preferred options consultation from January to March 2023. Feedback from the consultation informed the identification of the preferred option to be presented to the GCP Executive Board in September 2023.

4. Considerations

4.1 Clear purpose/setting expectations

As with all consultations, it is important to set clear expectations about the purpose and scope of the consultation. i.e., this is an opportunity for people to share their views and preferences on a shortlisted group of options.

This consultation will present information on a range of options identified by the project team and informed by the pre-consultation engagement.

4.2 COVID-19

The GCP's communications approach and messaging needs to continue to be sensitive to and reflect a country and community recovering from the economic and societal impacts of the pandemic.

Government advice regarding COVID-19 restrictions will continue to influence the approach to public meetings and presentation of consultation materials.

The traditional channels used to reach stakeholders will need to be adapted to use more remote digital methods to ensure the public and stakeholders are given sufficient opportunity to engage with the proposed schemes.

The latest consultation adopted a hybrid approach so that those that wanted to feed back through online channels and events could continue to do so.

4.3 Local Plan

GCP's corridor schemes invest in infrastructure to facilitate committed growth set out in the existing City and South Cambridgeshire Local Plans 2018. Cambridge City Council and South Cambridgeshire District Council ("the Councils") have committed to work together to prepare a new Local Plan for Greater Cambridge with a draft plan expected within 2023.Consultation on the Local Plan First Proposals ran in November and December 2021. Engagement is ongoing between the Waterbeach to Cambridge project team and GCSP regarding the emerging proposals for the Local Plan.

4.4 City Access

In and around the city centre, building on the recommendations of the Greater Cambridge Citizens' Assembly, the GCP is developing measures to step-up sustainable transport connections running through Cambridge's historic heart and assist the continuation of services using corridor schemes as they progress on existing roads to city locations.

GCPs Executive Board considered short-term measures developed by GCP's City Access project to create space and ramp up cycling and walking provision to get the city centre moving and support recovery from Covid-19.

Consultation on the 'Making Connections' scheme which includes City Access proposals alongside an increase in bus and active travel offering ran from October to December 2022.

4.5. Waterbeach New Town

RAF Waterbeach was vacated by the military in 2013 and the site, to the north of Waterbeach village, has now been developed as a 'new town'. There are plans for up to 11,000 homes as well as new schools, as well as a healthcare centre, a library, a leisure centre, outdoor sports facilities, play parks, recreation areas and woodlands. The proposals for the east of the 'new town' include the relocation of Waterbeach Railway Station, further north from its current location. Although not part of the Waterbeach to Cambridge project, the relocation needs to be considered in light of the service routing at the northern end of the corridor.

Section 106 agreements that the Waterbeach to Cambridge project needs to be mindful of going forward:

- Milton: Advisory cycle lanes, signage and hatch markings on Cambridge Road in Milton.
- Mere Way Cycleway: A shared use path will be built along Mere Way and the Roman Road, passing through Landbeach and onto the A10, where a walking and cycling bridge will cross the A10 and connect with a shared use path into the New Town and to the Greenway through the existing village of Waterbeach.
- Bus services: extension of the Milton Park and Ride bus service or a new service to link Waterbeach New Town and Cambridge, and a new bus service between Cambridge Research Park, Waterbeach railway station and Waterbeach New Town.
- A10 signalisation works (Landbeach Road / Humphries Way Junction): Traffic signals will be installed at the junction of the A10 with Landbeach Road and Humphries Road to manage demand. The A10 at the junction will also be widened to accommodate turning lanes.
- A10 improvements at Butt Lane and Milton Park and Ride enhancements: widening the southbound lane on the A10 south of Butt Lane.

A series of workshops are ongoing between the Waterbeach to Cambridge project team and Urban&Civic to coordinate design and approach to public transport within the corridor.

4.6 North East Cambridge Area Action Plan

The Area Action Plan which covers an area in Cambridge between the Guided Busway and A14 in northeast Cambridge is the planning framework that Cambridge City Council and South Cambridgeshire District Council will use to guide all development in the area over the next 20 years. Engagement is ongoing between the Waterbeach to Cambridge project team and the NEC team to coordinate projects.

4.7 A10 Scheme

The Cambridgeshire and Peterborough Combined Authority (CPCA) and Cambridgeshire County Council are considering options for the A10 north of Cambridge to increase capacity and improve journey time reliability. A Strategic Outline Business Case was published in July 2020 and considered seven options ranging from junction improvements to a full A10 offline dual carriageway bypass.

None of the options considered within the Waterbeach to Cambridge project are dependent on any of the A10 dualling proposals, although there may be interfaces if both a public transport scheme and an A10 scheme come forward. There is potential to share part of the public transport corridor with the A10 dualling scheme. This could improve cost effectiveness and reduce any adverse impacts of the two schemes.

Engagement is ongoing between the Waterbeach to Cambridge project team and the A10 team to coordinate projects.

4.8 Greenways

The proposed route for the Waterbeach Greenway has been revised in light of a number of constraints identified during the scheme design development. The route will connect Waterbeach New Town and the relocated Waterbeach Station to Cambridge North Station via Milton.

None of the options considered within the Waterbeach to Cambridge project are dependent on the active mode provision that the Greenway will provide. However, the project will consider connections to/from W2C options from existing and planning active mode provision within the study area, of which the Greenway is one scheme.

A new alignment of the Waterbeach Greenway is scheduled to go to GCP's Joint Assembly and Executive Board in September, with the recommendation to consult on the scheme specifics of the new alignment.

4.9 Relocation of Anglian Water Waste Treatment Works

Anglian Water have received funding from Central Government via the Housing Infrastructure Fund to relocate their waste treatment works to release the site for housing development as part of the Northeast Cambridge Area Action Plan.

A Development Consent Order (DCO) application was submitted in April 2023 and has been accepted for examination. The new site is north of the A14, between Fen Ditton and Horningsea.

5. Project Summary

The Waterbeach to Cambridge corridor is one of the key radial routes into Cambridge. The major transport links are the A10 trunk road, which suffers from significant congestion during peak times, particularly at the Cambridge end, and the King's Lynn–London King's Cross rail line. There are also sites of planned or potential large development along the corridor, such as Waterbeach New Town and Science Park/Northeast Cambridge expansion which will place considerable additional pressure on the corridor.

The Ely to Cambridge A10 Transport Study identified that existing congestion problems experienced on the A10 will be exacerbated by trips from planned developments in the northern corridor, particularly the area between Waterbeach New Town and Cambridge. Therefore, there is a need to provide high-quality sustainable transport solutions in the corridor to

- accommodate the additional housing and employment growth.

- reduce dependency on private motor vehicles by providing alternative high-quality means of transport between key locations.
- support local policy and strategies which identify a clear need to reduce congestion to enable the additional sustainable growth to be accommodated within the study area; and
- provide physical integration with other local transport interventions such as the Waterbeach Greenway, Chisholm Trail and Milton and Histon Road schemes.

6. Project Objectives

The objectives (outputs) for this project are to provide:

- In relation to public transport – a fall in journey times, and reliability and capacity improvements;
- In relation to active travel – quality and capacity improvements and safety improvements; and Reduced car dependency in the study area.

The outcome objectives of this project are for the project to lead to:

- Provide additional sustainable transport capacity to provide for the transport demands of economic and housing growth;
- More reliable journey times by public transport;
- More journeys along the corridor being undertaken by public transport; and
- More short journeys along the corridor being undertaken by walking and cycling (because people feel safer and have direct routes between origins and destinations).

The objectives for this project are to:

- Support local plans for Cambridge and North Cambridge, providing better, sustainable transport links between Cambridge and Waterbeach including the Waterbeach New Town development.
- Ease congestion and pressure on the A10 corridor and Ely to Cambridge railway line that is likely to increase over coming years given the planned developments.
- Work in parallel with a number of other transport projects which are also under development for this corridor. These have been identified in the A10 Ely to Cambridge Transport Study to address transport concerns from the Waterbeach New Town development.

  These other transport projects include:

- The GCP Milton Road project which would allow faster and more reliable public transport journeys.
- The GCP Waterbeach Greenway.
- Relocation of the Waterbeach Railway Station as part of the Waterbeach New Town Development (In the South Cambridgeshire Local Plan, funding stream and lead body for the new station is currently unconfirmed).
- The dualling of the A10 between Ely and Cambridge (Combined Authority led project).
- Rail capacity improvements between King's Lynn and Cambridge (Network Rail led projects).

7. Project Key Messages

The key messages for this project are:

- The Greater Cambridge Partnership (GCP) is working to create better and greener transport networks, connecting people to homes, jobs, study and opportunity.
- The A10 between Ely and Cambridge is heavily congested during peak times and drivers face long delays. Without action, car trips into the city are set to increase by up to 70%, by 2031 with already lengthy journey times expected to double. Similarly, the Waterbeach to Cambridge Railway line has undergone significant sustained growth, with trains arriving at Cambridge Station in the morning peak suffering from overcrowding.
- We must act now to tackle gridlock and reduce escalating pollution levels that harm air quality for thousands of people. Greater Cambridge is an economic success story with up to 11,000 new homes planned for development in the Waterbeach New Town. More than 44,000 new jobs will be created in or around the city, but our current public transport facilities are limited, unreliable and caught up in delays.
- This project will be vital to Cambridge's recovery from the impacts of Covid-19 and to grow in line with the area's Local Plan. Sustainable transport options will be vital to access work, study and other opportunities the city has to offer – whether using public transport, cycling, walking, or other active travel methods.
- A dedicated public transport route between Waterbeach and Cambridge is essential to connect existing and expanding communities to jobs, services and other opportunities in the Greater Cambridge area. Regular, reliable public transport can make travel in and out of the city a viable and convenient option for all.
- Developing a dedicated public transport route between Waterbeach and Cambridge presents a future-proof, sustainable infrastructure investment. Bypassing other road traffic and served by modern, low-emission vehicles, the route will offer an attractive alternative to car travel and complement the rail service with additional provision for walking and cycling.

8. Stakeholder Engagement Overview

8.1 Overview

GCP has engaged with the public throughout the development of the Waterbeach to Cambridge public transport corridor project and will continue to do so as the project progresses. Appendix 1 set out the overview of the stakeholders for this project.

Table 1 (below) sets out an overview for the completed and planned public and stakeholder engagement. This communications plan covers phase 5 and 6.

Table 1: Stakeholder Engagement Overview

Phase	***Time***	***Activity***	***Events***
Pre- Consultation Engagement			
Phase 1:	November 2019 – December 2019	Re-engagement with stakeholders critical to the delivery of the Project.	Pre-consultation Workshop 1: - **27 November 2020**

Phase 2:	January 2020 – September 2020	Light engagement during emerging options stages with politicians/Members, specialist audiences and national bodies (including those critical to the delivery of the A10 Study);	
	06 July - 31 July 2020	Pre-consultation engagement ConsultCambs	No events planned due to Covid-19 restrictions – consultation to be online only
Consultation (8 Weeks)			
Phase 3:	19 October 2020 – 14 December 2020	Public consultation with all audiences.	'Digital by default' based engagement
Post - Consultation Engagement - SOBC Engagement			
Phase 4:	Jan 2021 to June 2021	Publish consultation results Stakeholder engagement activity to socialise SOBC	Results to be taken to Joint Assembly and Executive Board along with recommendations for next steps
Development of OBC			
Phase 5:	Summer 2021 – *Summer* 2022	Targeted stakeholder engagement to support development of OBC.	Stakeholder Engagement Event – Wednesday 9th February 2022 via Microsoft Teams
Phase 6:	January – March 2023	Public consultation on preferred options for busway route and initial consultation on Park and Ride location	Five face-to-face events and three virtual events
Development of full business case			
Phase 7:	Autumn 2023 – Mid 2025	Stakeholder engagement to support development of full business case	TBC
Phase 8:	2024	EIA (Environmental Impact Assessment) consultation	TBC
Construction			
Phase 9:	Late2025 – Mid2026	Stakeholder Engagement to support pre-construction work	TBC
	Mid 2026 – Late 2028 2027	Stakeholder Engagement to support construction work	TBC
Phase 10	Late 2028	Stakeholder Engagement around opening event	Opening Event

Table 2 (below) sets out how the complete and planned phases of the public and stakeholder engagement activity will support the projects development and meets the project milestone.

Table 2: Project Timeline Milestone and Decisions Gateway

Project Milestone		*Stakeholder and Comms activity*	
Key milestones	*Date*	*Activity*	*Date*
Option Appraisal Report	Oct 2020	Phase 1 and 2 Pre-consultation Engagement	Nov 2019 – September 2020
October 2020 Key Decision 2 – Approval to consult on initial route options			
Consultation on initial options	Nov 2020	Phase 3 Consultation Engagement	Oct- Dec 2020

Strategic Outline Business case	April 2021	Phase 4 Post Consultation Engagement	Jan 2021- June 2021
June 2021 Key Decision 3 – Agree the options from SOBC for further appraisal			
Development of OBC	Summer 2021 – Autumn 2023	Phase 5 Development of OBC	Summer 2021 – October 2023
Consultation on preferred options	*Early 2023*	Phase 6 Public Consultation on preferred options for busway route and initial consultation on Park and Ride location	Early 2023
September 2023 Key Decision 4 - Approval of Preferred Option			
Development of Full Business Case	*Autumn* 2023 – Mid 2025	Phase 7: Full Business Case	Autumn 2023 – June 2025
Consultation on EIA	2024	Phase 8: EIA Consultation	TBC
June 2025 Key Decision 5 - Approval for Construction			
Pre-Construction	Mid 2025 – Mid2026	Phase 9: Construction	Mid 2025 – Mid2026
Construction	Mid 2026 – Late 2028		Mid 2026 – Late 2028
Opening	Late 2028	Phase 10: Opening	Late 2028

9. Pre-Consultation Stakeholder Engagement

8.1 SOBC Pre-consultation stakeholder engagement activity

The pre-consultation period started in November 2019 and ran to the launching of the formal eight-week consultation period, due to start on 19 October 2020. The first stakeholder objective for this part of the programme was to engage with stakeholders critical to the delivery of the project. This was done by some light engagement during emerging options stages with politicians/members, specialist audiences and national bodies including those critical to the delivery of the A10 Study. Wider stakeholder engagement, including with the public, was planned to be via a number of 'pre-consultation stakeholder drop-ins'. However due to CV19 restrictions on public events these were replaced by online engagement via the ConsultCambs consultation and engagement platform. Table 3 summarises the key stakeholder events during this period.

Table 3: Pre- consultation Stakeholder Events

Date	*Activity*
27 November 2019	Pre-consultation Stakeholder Workshop 1 – 'first contact' meeting
6 July to 3 August 2020	Pre-consultation engagement online via ConsultCambs

9.2 SOBC Pre-consultation stakeholder feedback

The first pre-consultation stakeholder workshop was held on 27 November 2019 at Waterbeach Barracks. The purpose was to understand stakeholders' views on the existing issues, constraints, and opportunities within the corridor. The key outputs from the stakeholder engagement are summarised in Table 4 below:

Table 4: Key Stakeholder feedback from November 2019 Workshop

Existing Challenges	Congestion affecting not only car travel but also the reliability of buses
	The limited frequency of local buses can be a barrier to travel
	Some Non-Motorised User paths within the corridor have not been maintained well
	The railway service between Waterbeach and Cambridge is considered to be underused
	Current issues around Waterbeach with informal parking
Public Transport Opportunities	There is currently no signage/real time passenger information at or around stops
	There is a lack of bus priority within the corridor
	There is a need for reliable and fast public transport through the corridor, requiring both an increase in overall service levels and segregation from traffic congestion
	There are two distinct public transport needs: a 'core' transit service to/from Cambridge, on a rapid and segregated route and a more localised service within the Waterbeach area to serve individual neighbourhoods
	Public transport could be subsidised to promote mode shift from private vehicles
	Access to the existing busway could be improved from Cambridge Science Park
	Additional parking close to the busway could reduce car mode share within Cambridge city centre
	Additional trains could alleviate congestion on inbound trains to Cambridge in the AM peak
Opportunities for Non-Motorised User (NMUs)	Segregated NMU links are preferred if in close proximity to other infrastructure (to improve perceived levels of safety)
	Additional A10 crossing points to improve east-west links
	Opportunities for improved NMU routes between Horningsea and Waterbeach (outside the current study area)
	An overall need to improve NMU access to/from Waterbeach in all directions
	Improve perceived safety levels between Cambridge North railway station and Cambridge Guided Buses

Due to Covid-19 restrictions we were unable to hold the planned public and stakeholder drop-ins. Instead, the engagement took place over four weeks via ConsultCambs only. The online engagement had the same objectives as the original drop-in sessions and the focus was to capture feedback on the best route/areas to avoid for a public transport, walking and cycling route to the east of Cambridge.

ConsultCambs offered the public two options for sharing their feedback. They were:

1. An interactive map which allowed stakeholders and the general public to drop pins on the map and leave comments.

2. A survey which allowed us to receive some structured feedback from stakeholders and the general public. This will give some baseline date on stakeholder views and provide some stakeholder metrics for the October board paper alongside the Option Appraisal Report from Atkins.

The drop-in sessions were originally planned from March 2020. These were cancelled due to the Covid-19 lockdown.

In total we received 108 completed surveys and 173 pins on the map.

Appendix 2 is the report produced by Atkins which summarises the stakeholder feedback we have received as part of the engagement activity.

10. SOBC Stakeholder Engagement

10.1 SOBC Stakeholder Engagement

Following Executive Board approval in October 2020, a public consultation was undertaken for eight weeks from Monday 19 October to Monday 14 December 2020.

Due to Covid-19 restrictions all stakeholder engagement activity was 'digital by default'. The consultation adopted a multi-channel approach to promote and seek feedback including through traditional and online paid-for, owned and earned media, and through the wide-spread distribution of around 6,000 consultation Booklets.

In light of coronavirus restrictions, 8 online briefings were held, 1 one to one session, 4 parish council meetings, 3 resident meetings and a pre-launch briefing with local district and county councillors. In addition, a social media campaign was undertaken, including a Facebook live session with over 50 questions submitted. There were over 3,000 visitors to the dedicated website and over 1,000 documents (maps, information, and copies of the booklet) downloaded.

All parish councils and school in the study area were contacted. Adverts were placed in local newspapers including the Cambridge News, Cambridge Independent and Ely Standard. Adverts were also placed at the Milton Park and Ride site and on Ely, Cambridge North and Cambridge railway stations.

Quantitative data was recorded through a formal consultation questionnaire (online and hard copy) with 570 complete responses recorded in total. In addition, a large amount of qualitative feedback was also gathered via the questionnaire, via email and social media. all of which have also been analysed.

10.2 SOBC Stakeholder Feedback

The outputs of this consultation were analysed by the Business Intelligence unit of Cambridgeshire County Council. (Full report Appendix x) there key findings were: -

- Just over half of respondents supported the proposal to build a new dedicated transport route and associated active travel route between the new town at Waterbeach and Cambridge.
- Three of the four proposed routing options were opposed by over two thirds of respondents.
- Just under half of respondents supported the western route.
- Around half of respondents indicated that Waterbeach village, Waterbeach new town and the relocated Waterbeach rail station should be given 'somewhat high' or 'very high' priority on the route.
- Respondents gave a low priority indication to the proposal of creating faster journeys by missing out locations between the Waterbeach new town and Cambridge.
- The majority of people thought that the scheme would have a negative environmental impact.
- A great deal of detailed comments was received, from which the most common areas of discussion were:
    - Concerns about the loss of housing/personal property
    - Concerns about negatively impacting the environment
    - Further improvements to active travel in the area

    - Use of existing infrastructure, and the linkages with the potential dualling of the A10 route
    - Concerns about connections to and for Waterbeach, and loss of existing bus services
- Responses were also received on behalf of 32 different groups or organisations. All of the responses from these groups will be made available to Board Members in full and will be published alongside the results of the public consultation survey.

In addition, a petition was received from the Cambridge Independent newspaper, that called on GCP not to demolish homes in Glebe Road/Cambridge Road in Waterbeach when establishing a new public transport route from Waterbeach to Cambridge. 1,661 signatures were received to this petition.

10.3 SOBC Key Messages from the SOBC Stakeholder Engagement

Having review the feedback from the consultation the following key messages were identified: -

- The Strategic Outline Business Case (SOBC) has established that there is a strategic case for a new high-quality public transport route between Waterbeach and Cambridge.
- Such a new public transport route would improve access to Cambridge from the north via the A10 corridor for journeys by public transport, cycling and walking.
- There is stakeholder and wider public support for the development of a new high-quality public transport route between Waterbeach and Cambridge.
- The SOBC recommends that: -
    - two of the four areas of interest identified in the Options Appraisal Report should be taken forward for development of a preferred route for the new high-quality public transport route between Waterbeach and Cambridge.
    - Both the A10 and Eastern areas of Interest are not taken forward because they scored less favourable in the economic assessment.
    - The corridor between via the allotments in Waterbeach is not included in the areas of interest taken forward for development of a preferred route because it does not deliver the journey times and reliability required of the project. Additionally, there was a lack of local support for the use such a route.
    - Two areas of interest taken forward for development of a preferred route are: -
        - The Western area of interest
        - A revised central area of interest, which excludes the route via the allotments in Waterbeach area.

11. OBC Stakeholder Engagement

11.1 OBC stakeholder engagement activity

We plan to undertake a public consultation as part of the development of the OBC in early 2023 on the preferred option for the busway route and the options for the Waterbeach Park and Ride.

Prior to the launch of the public consultation the following stakeholder activities have been undertaken. These are set out in table 5 below.

Table 5: Stakeholder Engagement Activity

	Activity	Timescale
i.	Project Update via Gov- Delivery	August
ii.	Cllr Briefing/ Project Update - online	September- October

iii.	Attend Waterbeach Parish Council Meeting	September
iv.	Attend Landbeach Parish Council Meeting	September
v.	Attend Milton Parish Council Meeting	September
vi.	Online Workshop	February 2022
vii.	Face to Face Workshop (now online only due to Covid-19)	February 2022
viii.	Attend Waterbeach Parish Council Meeting	November
ix.	Attend Landbeach Parish Council Meeting	November
x.	Attend Milton Parish Council Meeting	November
xi.	Media and Social Media Plan	Rolling
xii.	Landowner and Developer Engagement	Rolling

A stakeholder engagement workshop was held in February 2022. The purpose of this engagement event was to inform stakeholders of key assumptions that will inform the design, modelling and appraisal work for the OBC and to collect stakeholders' views on these.

During the engagement, stakeholders were informed of the background to the scheme, work undertaken to date and the conclusions drawn from analysis of areas that required further consideration since the conclusion of the SOC. The focus areas were:

- Waterbeach New Town;
- Park and Ride;
- Active Travel, including Mere Way; and
- Busway Stops and Facilities.

Feedback from the stakeholder event was analysed qualitatively via thematic analysis, which involves assigning a theme to comments raised from stakeholders for each focus area. Feedback received from stakeholders that has design or planning implications for the scheme is set out, by focus area, below.

Waterbeach New Town

- Stakeholders were generally in favour of having a segregated busway network within the New Town, or bus priority. This will be explored via continuing liaison with Urban&Civic; and
- Several stakeholders stated that, if a bridge were built to cross the A10, it should be similar in design to the Mere Way bridge crossing.

Park and Ride

- Several stakeholders suggested that the Park and Ride should provide electric vehicle (EV) charging ports and cycle/scooter hire docking stations to encourage sustainable travel. These will be considered further at a more detailed design stage.

Active travel and Mere Way

- There was divided opinion over the need for an active travel route alongside the busway due to route duplication with Mere Way. Following the event, Atkins re-confirmed the active travel requirements in the corridor and concluded that, in line with previous conclusions, there is a need for active travel infrastructure adjacent to the busway route as it serves different markets and users to that of other GCP schemes (Waterbeach Greenway), and upgrades associated with Waterbeach New Town (Mere Way and A10). Where the active travel route

runs alongside Mere Way, segregated active travel infrastructure will not be provided to reduce scheme costs without compromising the quality of the provision; and

- Stakeholders felt that an active travel route alongside the busway should be lit for safety reasons but should be balanced with the issue of potential light pollution.

Busway stops and infrastructure

- Stakeholders generally considered that one busway stop serving Landbeach would be sufficient.

Stakeholder engagement with a number of parties will be ongoing throughout the OBC phase as follows:

- Urban & Civic
- RLW
- Science Park (Vectos)
- Research Park
- North East Cambridge
- A10 dualling team

12. OBC Consultation

12.1 OBC consultation activity

A preferred options consultation was undertaken between January and March 2023 on the Revised Central and Western options, and three options for a Waterbeach Park and Ride.

The consultation was 8 weeks in duration and consisted of both online events and face-to-face events. There were five face-to-face events (Waterbeach, Landbeach, Milton, Histon & Impington and Cambridge Science Park) and three online events. A drop in event was also run at Cambridge Regional College.

The consultation material presented the two options being assessed as part of the OBC and how the options were been assessed. It allowed the public and stakeholder to input their views and comments on the options to feed into the outcomes of the OBC. The material also presented three options for a Waterbeach Park and Ride location and associated facilities.

12.2 OBC consultation feedback

The outputs of the consultation were analysed by the Business Intelligence unit of Cambridgeshire County Council. Their key findings were:

- Just under half of respondents opposed the Western route option for the Waterbeach to Cambridge busway.
- Just over half of respondents supported the Revised Central route option for the Waterbeach to Cambridge busway.
- The majority of respondents supported the proposals for active travel infrastructure proposed alongside the busway.
- The majority of respondents felt busway bus stops should have ‘shelter’, ‘real-time passenger information’, ‘seating’, ‘cycle parking’, ‘lighting’, ‘wayfinding’, and ‘CCTV’.
- Over a third of respondents had ‘no opinion’ on the three locations for a new Waterbeach Park and Ride.
    - Just over two fifths supported Site B.
    - Just under two fifths supported Site A and C.
- The majority of respondents had ‘no opinion’ on the two access proposals for Site A.
    - Just over a quarter of respondents supported access proposal 2.

    - Just over a quarter of respondents opposed access proposal 1.
- Over half of respondents indicated they did not support the access proposal for Site B.
- Less than half of respondents had 'no opinion' on the two access proposals for Site C.
    - Under a third of respondents opposed access proposal 1.
    - Over a third of respondents opposed access proposal 2.
- The majority of respondents felt the Park and Ride should have 'shelter', 'toilets', 'cycle parking', 'seating', and 'Electric Vehicle charging'.
- A significant number of detailed comments were received. From these it was clear that there were concerns about;
    - The impact of the proposals on Landbeach, both the residents and agricultural land surrounding the village, with particular concerns about the Revised Central route and Site B, although not being isolated to these two elements of the proposals.
    - Whether there was a need for a new busway and Park and Ride site given the availability of existing public transport infrastructure, including rail, and the Milton Park and Ride.
    - The impact of the proposals on the environment, use of greenbelt and agricultural land, and the risk of increased development in the area.
- Responses were also received on behalf of a number of different groups or organisations. All of the responses from these groups have been made available to board members in full and will be published alongside the results of the public consultation survey.

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