
The Cambridge South East Transport Order

Transport And Works Act 1992

Transport And Works (Applications And Objections Procedure) (England And Wales) Rules 2006

Outline Business Case

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Cambridge South East Transport Phase 2

Outline Business Case - Strategic Case

15 May 2020

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Glossary of Terms

Analysis of Monetised Cost and Benefits (AMCB) table: Summarises the monetised impacts of a scheme that are included in the scheme's Net Present Value and Benefit-Cost Ratio.

Appraisal Summary Table (AST): Provides a complete summary of the scheme impacts, including the scheme's monetised impacts and non-monetised impacts (both quantitative and qualitative).

Assumption: A statement which is not yet known to be true. It can be a bridge in the planning process to answer an uncertainty, and to allow scope and plans to be developed

Benefit Cost Ratio (BCR): Benefit Cost Ratio, is an indicator of the overall value for money of a project or proposal.

CaCC: Cambridge City Council

CCC: Cambridgeshire County Council

Cambridge Autonomous Metro (CAM): CAM is the proposed metro style system for Greater Cambridge.

Committed Schemes: Where a scheme has been deemed likely to proceed and is therefore included within the option appraisals.

Conservation Area: An area designated under Section 69 of the Planning (Listed Buildings and Conservation Areas) Act 1990 as being of special architectural or historic interest and with a character or appearance which is desirable to preserve or enhance.

Context: The setting of a site or area, including factors such as traffic, activities and land uses as well as landscape and built form.

Controls: Risk response activities that are undertaken as business as usual. These are identified as an aide-memoire, to draw attention to the purpose and aim of standard procedures and drive appropriate focus. Typically, controls will not incur any additional cost to delivery.

Countryside: The rural environment and its associated communities.

Cumulative Impact: The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.

Department of Transport (DfT): is a ministerial department, supported by 24 agencies and public bodies that plans and invests in transport infrastructure in the UK.

Dependency: An activity or activities which cannot be undertaken or completed until another scope of work has completed or reached a defined stage or point.

Early Assessment Sifting Tool (EAST): Early Assessment Sifting Tool is used by DfT, to quickly summarise and present evidence on options. INSET is an enhancement of EAST and follows the same broad principles and approach.

Effect: The consequence of the scale of any change to the baseline environment, i.e. impact, on the environmental receptor, taking account of its particular value or sensitivity.

Element: A component part of the landscape (for example, roads, hedges, woods).

Emerging Scheme: The best performing route alignment option for CSET phase 2 based on assessment to date.

Enhancement: Landscape improvement through restoration, reconstruction or creation.

Environment: Our physical surroundings including air, water and land.

Environmental Impact Assessment (EIA): A formal, structured process of evaluating the likely environmental impacts of a proposed scheme, considering inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Exclusion: An activity or product that has been specifically removed or omitted from the scope of work for the defined project.

Fall-backs: Contingency actions taken in response to a risk impact. Generally, risks that are tolerated should have fall-back actions identified, as should significant risks that are being treated, where the treatment has a significant likelihood of not fully mitigating the risk.

Full Business Case (FBC): The culmination of the three-stage business case process is the Full Business Case. This follows on from initial exploratory work to establish the strategic need for intervention in the Strategic Outline Business Case and the optioneering and appraisal work undertaken in the Outline Business Case. Generally, an investment committee will consider the Full Business Case then make a recommendation to ministers. Ministers will decide whether a proposal should proceed to implementation, however as funding and powers for transport investment have been devolved to the Greater Cambridge Partnership (GCP) as part of the Greater Cambridge City Deal, the decision to implement the scheme resides with GCP.

Form: The layout (structure and urban grain), density, scale (height and massing), appearance (materials and details) and landscape of development.

Gross Domestic Product (GDP): A measure of the total value of goods produced and services provided in an area.

Gross Value Added (GVA): A measure of the economic productivity of an area.

High Quality Public Transport (HQPT): High Quality Public Transport, is a transport system that includes a range of features such as high levels of segregation, junction priority, high quality infrastructure (shelters, CCTV, real time, lighting, seating, help points etc), and high quality vehicles to name but a few.

Heritage Asset: A building, monument, site, place, area or landscape of historic value.

Investment Sifting and Evaluation Tool (INSET): INSET is Mott MacDonald's evaluation tool used in the optioneering process. INSET is an enhancement and expansion of EAST.

Issue: A significant unanticipated event, or a risk which has impacted or has a >99% likelihood of occurrence, that affects the achievement of the project objectives.

Landform: Combination of slope and elevation that produce the shape and form of the land.

Landscape: The character and appearance of land, including its shape, form, ecology, natural features, colours and elements and the way these components combine. Landscape character can be expressed through landscape appraisal, and maps or plans. In towns 'townscape' describes the same concept.

Landscape Character: The distinct and recognisable pattern of elements that occur consistently in a particular type of landscape, and how this is perceived by people. It reflects

particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape.

Landscape Feature: A prominent eye-catching element, for example, wooded hilltop or church spire.

Landscape Quality: Based on judgements about the physical state of the landscape, and about its intactness, from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.

Landscape Sensitivity: The extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects on its character.

Land Use: The primary use of the land, including both rural and urban activities.

Local Liaison Forum (LLF): The LLF provide a link between a project team and the local community.

Multi Criteria Assessment Framework (MCAF): Multi-Criteria Assessment Frameworks are used in the optioneering assessment process and allow options to be assessed against a range of criteria linked to the scheme objectives as well as wider policy and strategy objectives.

Methodology: The specific approach and techniques used for a given study.

Mitigation: Measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development project.

Modal Shift: A shift from one transport type to another e.g. road travel to rail travel.

Movement: People and vehicles going to and passing through buildings, places and spaces. The movement network can be shown on plans, by space syntax analysis, by highway designations, by figure and ground diagrams, through data on origins and destinations or pedestrian flows, by desire lines, by details of public transport services, by walk bands or by details of cycle routes.

Nomis: A service provided by the Office for National Statistics, ONS, that provides free access to the most detailed and up-to-date UK labour market statistics from official sources.

Option Appraisal Report (OAR): The Options Appraisal Report sets out the process undertaken to identify and assess options, leading to the selection of the preferred option.

Outline Business Case (OBC): Is the second phase of the process which reconfirms the conclusions set out in the Strategic Outline Business Case (SOBC). The OBC focuses on the detailed assessment of the options to find the best solution.

Prince 2: PRojects IN Controlled Environments is a process-based method for effective project management, used extensively by the UK Government. It adopts a product-based planning approach to project management with emphasis on dividing projects into manageable and controllable stages.

Public Accounts (PA) table: Records the investment and operating costs incurred by a public sector in delivering the scheme.

Receptor: Something that makes up the environmental baseline e.g. humans or other biological species, elements of the physical environment including water, air and soil assets that make up the cultural heritage of an area.

Risk (Threat): An uncertain event or set of circumstances that, should it occur, will have an adverse effect on the achievement of the objectives of the project.

Risk (Opportunity): An uncertain event or set of circumstances that, should it be exploited, will have a positive effect on the achievement of the objectives of the project.

SATURN: Simulation and Assignment of Traffic in Urban Road Networks, is a computer program that calculates route choices between origin and destination.

Social and Distributional Impacts (SDI): considers the variance of transport intervention impacts across different social groups.

Strategic Outline Business Case (SOBC): This sets out the need for intervention (the case for change) and how this will meet strategic aims and objectives (the strategic fit). It provides suggested or preferred ways forward and presents the evidence for a decision.

Strategic View: The line of sight from a particular point to an important landmark or skyline.

Sustainability: The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs.

Topography: A description or representation of artificial or natural features on or off the ground.

Townscape: Physical and social characteristics of the built and unbuilt urban environment and the way in which those characteristics are perceived. The physical characteristics are expressed by the development form of buildings, structures and space, whilst the social characteristics are determined by how the physical characteristics are used and managed.

Transport Appraisal Guidance (TAG): The DfT's Transport Appraisal Guidance (often referred to as WebTAG)

Transparent Economic Assessment Model (TEAM): TEAM is a tool designed to calculate the economic impacts and benefits of proposed infrastructure interventions and policy measures.

Tranquillity: A state of calm or quiet.

Transport Economic Efficiency (TEE) table: Summarises the monetised impacts against different user groups.

Transport User Benefit Appraisal (TUBA): TUBA is an economic appraisal computer program developed for the Department for Transport (DfT) for appraising multi modal transport studies.

Uncertainty: A condition where the outcome can only be estimated.

Visual Impact: Change in the appearance of the landscape as a result of development. This can be positive (i.e. beneficial or an improvement) or negative (i.e. adverse or a detraction).

Wider Economic Benefits (WEBs): improvements in economic benefits that are acknowledged, but which are not typically captured in traditional transport cost-benefit analysis.

1 Introduction

The Strategic Case is one of the five cases that form the DfT's Transport Business Case process. The Strategic Case determines whether an investment is needed, either now or in the future. It demonstrates the case for change – that is, a clear rationale for making the investment' and strategic fit – that is how an investment will further the aims and objectives of the organisation.

The four other cases which make up the Transport Business Case Process are:

- The **Economic Case** which assesses options to identify all their impacts, and the resulting value for money, to fulfil the Treasury's requirements for appraisal and demonstrating value for the taxpayers' money. The Economic Case is presented in document 403394-MMD-BCA-00-RP-BC-0292.
- The **Financial Case** which outlines the affordability of the preferred option, its funding arrangements and technical accounting issues. The case also presents the financial profile of the preferred scheme option and an overview of how the scheme will be funded. The Financial Case is presented in document 403394-MMD-BCA-00-RP-BC-0293.
- The **Commercial Case** which provides evidence on the commercial viability of a proposal and the procurement strategy that is used to engage the market. It presents evidence on risk allocation and transfer, contract timescales and implementation timescale as well as details of the capability and skills of the team delivering the project. The Commercial Case is presented in document 403394-MMD-BCA-00-RP-BC-0231.
- The **Management Case** which assesses whether a proposal is deliverable. It tests the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance (e.g. a Gateway Review). The Management Case is presented in document 403394-MMD-BCA-00-RP-BC-0277.

The remainder of this document identifies and presents the evidence base of the need for intervention in the study area and sets out the CSET Phase 2 scheme aims and objectives. The Strategic Case also details the scheme options considered for Phase 2 and identifies the preferred scheme option. A full account of the options appraisal is however provided in Appendix A, Options Appraisal Report (OAR), document reference number 403394-MMD-BCA-00-RE-BC-0024-C.

1.1 Strategic Case Approach

The structure of the Strategic Case broadly aligns to the DfT's '*The Transport Business Case: Strategic Case*' which outlines key areas that should be covered as part of the business case documentation and the level to which they should be undertaken at OBC stage. Table 1.1 shows where the relevant information, in accordance with DfT requirements, can be found in the subsequent sections that make up the Strategic Case for CSET Phase 2.

Table 1.1: DfT Requirements for the Strategic Case

Content	DfT Requirements	Section Number and Title(s)
Introduction	Outline the approach taken to assess the Strategic Case and the study area	1.1. Strategic Case Approach
Project definition	Provide an update on previous work	2. CSET Definition and Context
Business strategy	Provide the context for the business case by describing the strategic aims and responsibilities of the organisation responsible for the proposal	2. CSET Definition and Context 2.3. Business Strategy 3. Policy Review
Problem identified	Describe the problems including the evidence base underpinning this? Justification for intervention?	4. Understanding the Problems and Opportunities 5. Socio Economic Overview 6. Economy and Business 7. Land Use and Development 8. How People Travel 9. Environment 10. Highways Network and Traffic 11. Road Safety 12. Wider Transport Provision 13. Summary of Issues and Opportunities
Impact of not changing	What is the impact of not changing?	14.3. Impact of Not Changing
Internal drivers for change	What is driving the need to change? e.g. improved technology, new business/service development as a result of policy? (Non-compulsory)	N/A, Non-Compulsory
External drivers for change	What is driving the need to change? e.g. legislation, pressure from public/ other departments? (Non-compulsory)	N/A, Non-Compulsory
Objectives	Establish specific, measurable, achievable, realistic and time-bound objectives that will solve the problem identified. Ensure that they align with the organisation's strategic aims	15. Scheme Aims and Objectives
Measures for success	Set out what constitutes successful delivery of the objectives	15.3. Measures of Success
Scope	Explain what the project will deliver and what is out of scope	16.1. Geographic Scope
Constraints	High level internal/external constraints e.g. technological environment, capability to deliver in-house, major contracts with provider, etc.	16.2. Constraints
Interdependencies	Internal/external factors upon which the successful delivery of the project is dependent	16.3. Interdependencies
Stakeholders	Outline the main stakeholder groups and their contribution to the project. Note any potential conflicts between different stakeholder groups and their demands	17. Stakeholders
Options	Set out all the options identified (including low cost alternative) and evaluate their impact on the proposal's objectives and wider public policy objectives. Risks associated with each option should be identified as should any risks common to all options	18. Option Generation 19. The Preferred Option

Source: DfT

2 CSET Definition and Context

This section of the Strategic Case provides background information on the Cambridge South East Transport (CSET) scheme and an overview of the strategic context that has influenced and shaped the development of the scheme to deliver a better choice of public transport, walking and cycling opportunities for those who travel along the A1307 corridor.

2.1 Overview of Strategic Need

Cambridge is one of the fastest growing cities in Europe. A booming economy and rapidly growing population have forced growth out of central Cambridge into the periphery, placing increasing pressure on the city's radial routes. The A1307 provides a key radial route through the south east of Cambridge between central Cambridge and Haverhill, serving a number of key employment locations and communities in the hinterland of Cambridge.

The Local Plan for Cambridge and South Cambridgeshire estimates that more than 44,000 additional jobs will have been created in the area by 2031, whilst 8,000 new homes are expected to be delivered across south east Cambridge over the next 15 years¹. An illustration of the growth anticipated within the study area can be seen in Figure 2.1. The rate at which residential and commercial development is anticipated to be delivered across south east Cambridge will place significant pressure on a transport system on which demand is already exceeding capacity during busy periods. If action is not taken to futureproof the transport network here, journey times are expected to increase by around 50%², primarily as a result of increased demand and a transport network which lacks the flexibility and capacity to respond appropriately.

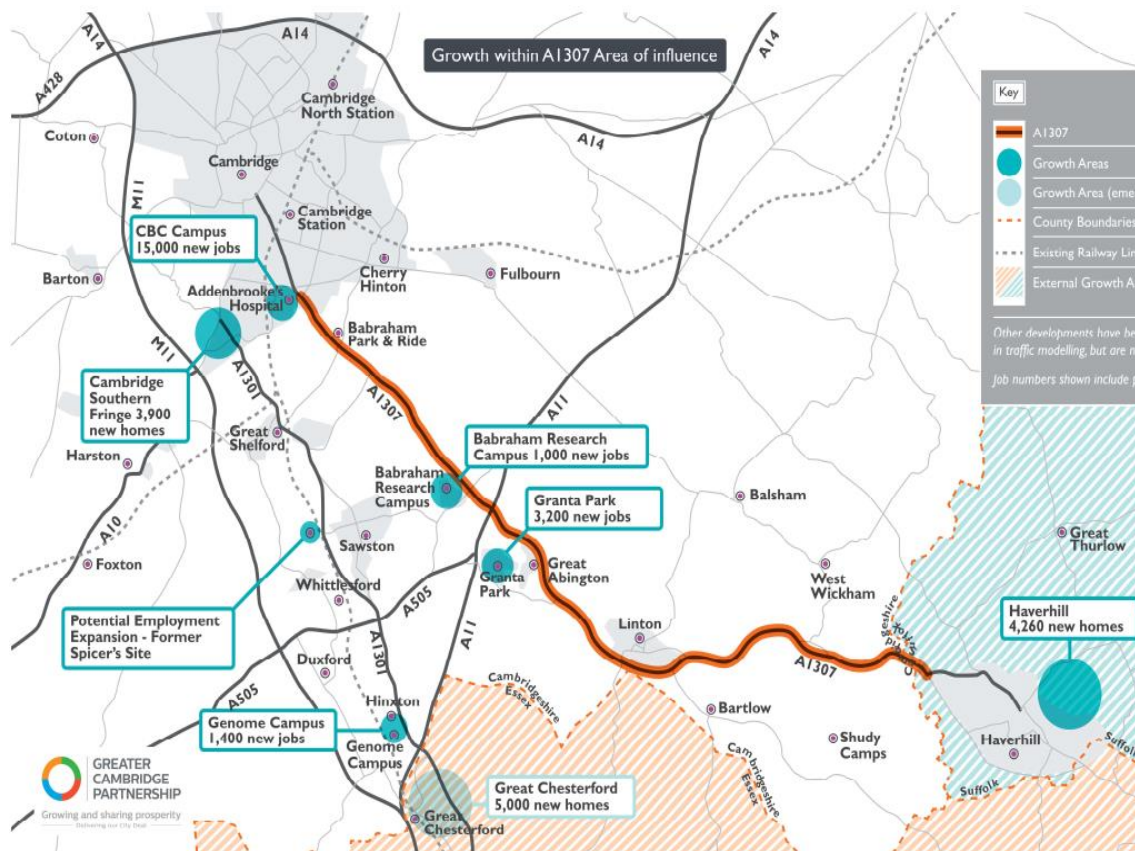
Cambridge and South Cambridgeshire import a larger proportion of labour than is exported. The significant number of job opportunities and sector-specific requirements of the dominant science and engineering industry necessitate that employers must attract labour from outside of the immediate area. Reliance on external labour results in high commuter demand on the transport network, particularly during peak hours.

A large proportion of commuters travelling into and within Cambridge opt for private car travel due to a lack of viable and attractive alternative modal options. Cycling can be restrictive over large stretches of the A1307, where cycle routes are often unsegregated from the carriageway. This has led to cycle mode share in rural areas being low in contrast with the very high mode share exhibited in central Cambridge. High volumes of traffic use the A1307 and high speeds are experienced over long stretches of the route, making cycling unsafe and unattractive to many prospective users, further details on this can be found under Section 11 of this OBC. Crossing points along the A1307 also present a safety hazard to cyclists and pedestrians. Individuals are frequently forced to cross high speed traffic with little to no protection, placing themselves at high risk and creating severance.

¹ South Cambridgeshire Local Plan; September 2018 & Cambridge Local Plan; October 2018

² South Cambridgeshire Local Plan; September 2018 & Cambridge Local Plan; October 2018

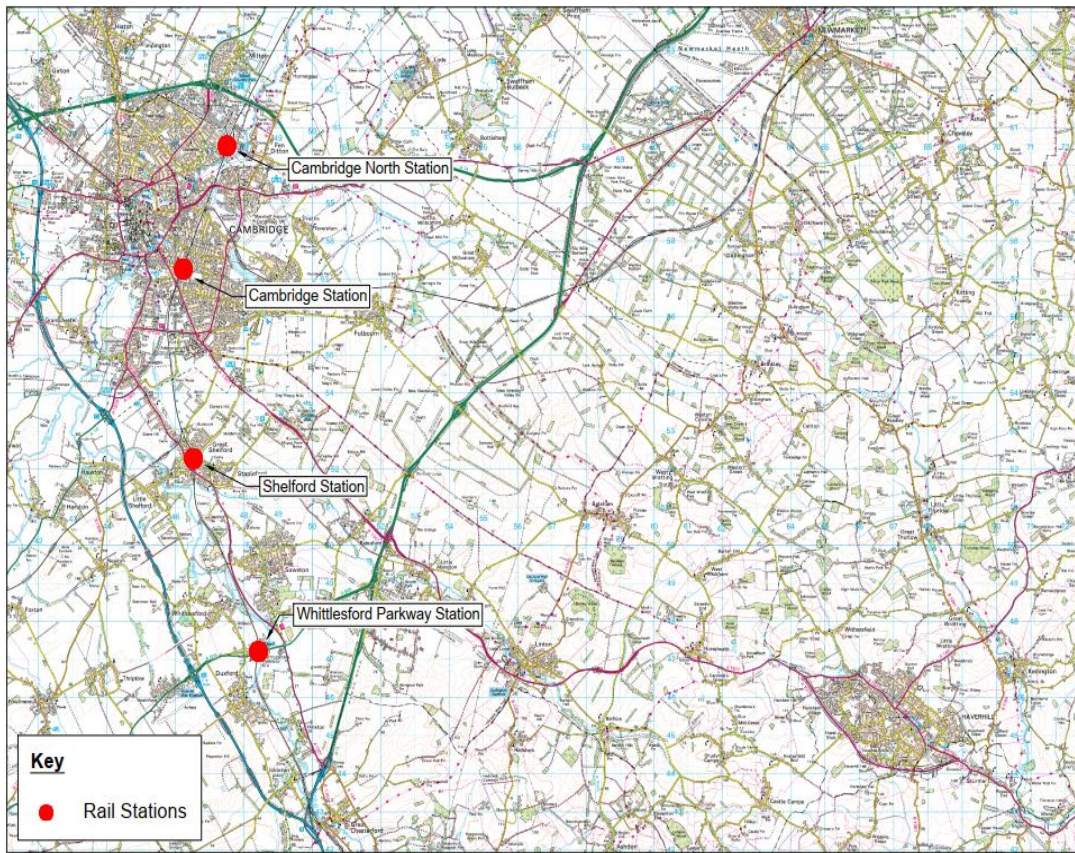
Figure 2.1: Planned Development along the A1307



Source: GCP

Much of the south east of Cambridge is detached from the rail network as illustrated in Figure 2.2. This means that rail users are required to undertake multi modal journeys which often involve inefficient and lengthy interchanges and are therefore, unattractive options.

Figure 2.2: Rail Station Locations



Source: OS Open Data Mapping

While up to five bus services per hour operate along the A1307, travel times by bus can be uncompetitive compared to car travel. Ultimately, the limitations of active travel and public transport mean that the preferred mode of travel to work for many is by car, leading to congestion and long delays along the A1307.

Delivery of new, sustainable transport infrastructure is fundamental to securing the rate of growth anticipated for south east Cambridge. A new public transport route, associated Travel Hub and cycling and walking infrastructure will provide existing, new and growing communities with improved access to jobs, services and other opportunities in and around the city.

Investing in sustainable travel and providing a viable and attractive alternative to car travel could encourage a modal shift, reducing reliance on private car travel and its damaging effects on the environment, economy and quality of life for users now and in the future.

The Strategic Case of this Outline Business Case (OBC) provides a robust evidence base which builds upon the overview presented here to provide a detailed account of the problems and opportunities relative to the scheme and articulate the need for intervention.

2.2 Cambridge South East Transport Scheme Detail

2.2.1 Phase 1 (2018-2020)

Phase 1 of the CSET scheme consists of 15 discrete small to medium works packages focusing on bus priority measures, junction improvements, walking and cycling measures and road safety enhancements along the A1307 between Cambridge and Haverhill. These initial works support and complement the CSET Phase 2 Scheme, which is the focus of this OBC.

Details on Phase 1 schemes can be found in the Phase 1 Business Case.

2.2.2 Phase 2 (2020+)

The wider CSET scheme extends from Cambridge Biomedical Campus at its north western edge to the junctions of the A11 with the A1307 and A505, providing improved connectivity for peripheral communities such as: Linton, the Abingtons, Babraham, Pampisford, Sawston, Stapleford and Great and Little Shelford.

It is proposed that Phase 2 will deliver a new dedicated public transport route between a new Travel Hub near the A11/A1307/A505 junction and the Cambridge Biomedical Campus via Sawston, Stapleford and Great Shelford.

In addition, it is proposed that connections will be provided from the Travel Hub to Babraham, Babraham Research Campus and Granta Park. At the Biomedical Campus, the new route is proposed to run on dedicated public transport lanes on Francis Crick Avenue, connecting to the existing Guided Busway, enabling services to continue to the station and Cambridge City Centre via the Busway.

Stops on the new route are proposed for the Biomedical Campus, Great Shelford, Stapleford, Sawston and the new Travel Hub site. The Biomedical Campus stop would be located near to the proposed Cambridge South Station to enable easy interchange with rail services in the future. All stops would have the following facilities:

- Platforms with shelter and real-time passenger information;
- Drop off facilities;
- Disabled parking; and
- Cycle parking and cycle lockers.

The route will connect to a new Travel Hub facility that will be delivered near the A11/A1307/A505 junction to supplement capacity and facilities at the Babraham Road Park & Ride site.

The name Travel Hub has been used as the site is intended to provide an interchange between different modes of transport such as walking, cycling and existing bus services. This is in addition to the site being a means to access the new public transport route by car.

The Travel Hub will be similar to a Park & Ride and offer the same facilities which can be found at a Park & Ride site such as indoor waiting areas. However, the Travel Hub proposed for this scheme is intended to be more sustainable than a typical Park & Ride design and flexible to allow it to be expanded or increased in size as future demand requires.

The Travel hub would have 200 cycle parking spaces and will provide:

- Covered waiting areas with toilets;
- Real time information;
- Covered, secure cycle storage;
- Electric vehicle charging points;
- Disabled parking spaces; and
- Lighting and CCTV.

A new multi-user path, generally 3-4 metres wide, would also be provided along the length of the public transport route. The multi-user path will serve a range of non-motorised uses, such as cycling, walking, horse riding and for use by mobility scooters and electric bikes. The path will be hard-surfaced to enable use during all weathers for both commuting and leisure.

2.3 Business Strategy

2.3.1 The City Deal Objectives

Since 2010, the government has pursued a policy of devolving increasing levels of powers and funding away from central Government and down to local/regional areas, with City Deals playing a key part of the devolution process. City Deals are a means for central government and local partners to agree key investment programmes and outcomes, especially around promotion of local economic growth and development.

The Greater Cambridge City Deal was signed between Government and local representatives in 2014. The Greater Cambridge Partnership (GCP) was formed following the deal made with Government and is the local delivery body, responsible for overseeing the delivery of the City Deal and the promotion of local economic growth and development. GCP aims to:

- Deliver up to £1 billion of investment, providing vital improvements to infrastructure, supporting and accelerating the creation of 44,000 new jobs and 33,500 new homes to Greater Cambridge by 2031; and
- Enable a new wave of innovation-led growth in the Greater Cambridge area by investing in infrastructure, housing and skills, thereby addressing housing shortages and transport congestion bottlenecks that will facilitate its continued growth and a continuation of the “*Cambridge Phenomenon*”³.

This investment fund offers funding towards proposed infrastructure in the region to help achieve these aims.

To ensure infrastructure investment aligns with these aims, the Greater Cambridge City Deal Assurance Framework has established key strategic objectives against which projects will be prioritised, these are:

- To nurture the conditions necessary to enable the potential of Greater Cambridge to create and retain the international high-tech businesses of the future which bring investment into the UK;
- 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
- To attract and retain more skilled people by investing in transport and housing whilst maintaining a good quality of life, in turn allowing a long-term increase in jobs emerging from the internationally competitive clusters and more University of Cambridge spin-outs.

In this context, the OBC for Phase 2 will be assessed by the GCP Executive Board to ascertain the extent to which any transport investment meets the strategic objectives of the City Deal, including:

- How well the scheme supports business investment and confidence?
- How well the scheme represents targeted investment where business needs it?
- How well the scheme links effectively into the key growth sites?
- How well the scheme supports transport infrastructure and quality of life?

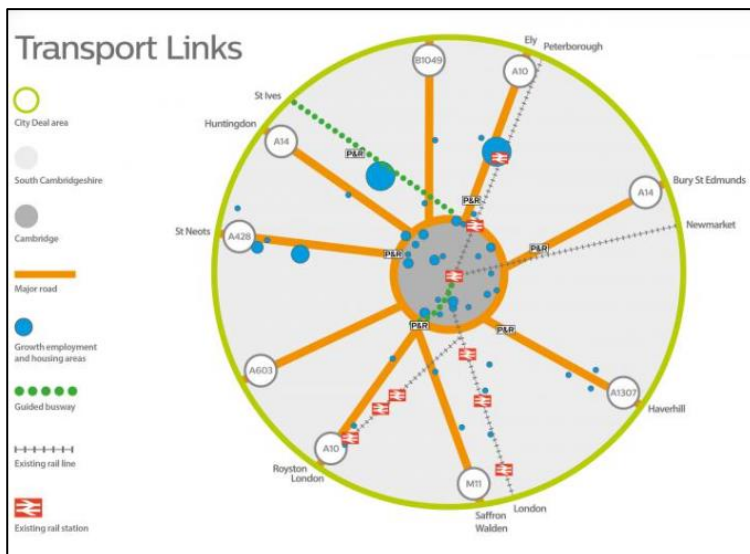
³ Section 5.1 provides further detail on the Cambridge Phenomenon.

2.3.2 The City Deal Investment Programme

The City Deal includes a programme to enhance transport capacity in Greater Cambridge, especially in areas where capacity is identified as an issue. This capacity is needed along key strategic routes to and from the city (particularly along those routes where significant new housing and/or employment growth is planned e.g. the A1307 corridor) as well as within the built-up area of the city.

The City Deal vision for a comprehensive sub-regional infrastructure network is represented in Figure 2.3, which draws on the key components of the development strategies within the Local Plans and the Transport Strategy for Cambridge and South Cambridgeshire.

Figure 2.3: The City Deal Vision for Greater Cambridgeshire

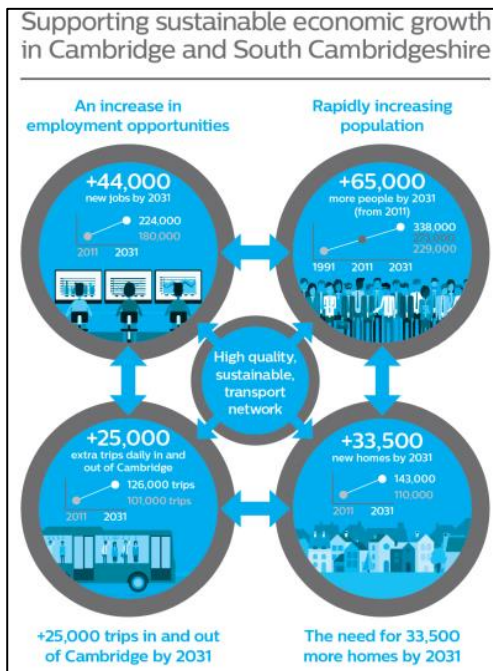


Source: Greater Cambridge City Deal

Development of a sustainable transport network aims to improve access to employment hubs and high-tech clusters in Greater Cambridge by making movement between them more straightforward, efficient and convenient.

The interrelationship between infrastructure and growth as envisaged by the City Deal is summarised in Figure 2.4 below:

Figure 2.4: City Deal Transport Investment Package



Source: Greater Cambridge City Deal

The backbone of the proposed strategy is a transport network to link areas of population and employment within the Greater Cambridge area, featuring:

- New orbital public transport routes around Cambridge that taken together provide a wider variety of direct High Quality Public Transport (HQPT) connections than would be typically possible under a traditional radial City Centre “*hub and spoke*” model;
- New HQPT links into Cambridge on key routes, connecting existing and new housing developments with major employment centres;
- A comprehensive network of pedestrian and cycle routes within Cambridge; and
- High quality bus priority measures on main radial routes.

This strategy will transform connectivity within and beyond the Greater Cambridge area, and consequently allow significant increases in public transport and cycle use that will maximise the capacity for movement, particularly within the historic core of Cambridge. This strategy also supports carbon reduction objectives and promotes a high quality of life for local communities by minimising the environmental impact of transport whilst facilitating growth of the area.

3 Policy Review

This section of the OBC provides a review of the national, regional and local policies and strategies that frame and influence transport investment in Cambridgeshire.

3.1 National Policy and Strategy

3.1.1 National Planning Policy Framework (NPPF)- March 2012 and National Planning Practice Guidance 2014

The National Planning Policy Framework (NPPF) sets out the UK Government planning policies for England. This document sets out requirements of the planning system and how policy should be adhered to and delivered in local plan development and planning decisions.

The NPPF promotes sustainable development and addresses the importance of developing sustainable transport solutions to support sustainable development. It advocates:

- A transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel;
- Transport solutions which support reductions in greenhouse gas emissions and reduce congestion; and
- Developing strategies for the provision of viable infrastructure necessary to support sustainable development, including transport investment necessary to support strategies for the growth of ports, airports or other major generators of travel demand in their areas.

The NPPF states that all developments that generate significant amounts of movement should take account of:

- Prioritising opportunities for encouraging the use of sustainable transport modes depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- Safe and sustainable access can be achieved for all users; and
- Improvements which can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

The NPPF also encourages local planning authorities to take account of:

- The availability of and opportunities for public transport;
- Local car ownership levels; and
- An overall need to reduce the use of high emission vehicles.

So, what does this mean for CSET Phase 2?

CSET Phase 2 will help to further sustainable development and align with the key principles of the NPPF by:

- Promoting the use of sustainable modes of transport by the provision of improved public transport infrastructure;
- Encouraging the use of non-car modes and low emission vehicles to minimise air quality effects of car travel; and
- Creating a safer environment for pedestrians and cyclists on the highway network.

3.1.2 Transport Investment Strategy

The Transport Investment Strategy (TIS) was developed in 2017 and supports the Government's *Building Our Industrial Strategy*. Maintaining and upgrading transport infrastructure is seen as a core component of achieving the objectives of the Industrial Strategy. The TIS sets out four objectives:

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

Several propositions have been agreed to enable the achievement of the TIS objectives:

- Ensure our investment consistently meets the needs of users and helps to create a balanced economy;
- Focus on getting the best value out of the network and our investment;
- Retain a resolute focus on delivery; and
- Remain adaptable in the face of change.

So, what does this mean for CSET Phase 2?

CSET Phase 2 will help to achieve the objectives of the TIS by:

- Providing alternative modal options to private vehicle travel, minimising the potential for increased congestion along the A1307 corridor which is associated with further development in south east Cambridge;
- Improving linkages between key employment centres and medical campuses along the corridor thus serving to enhance the international competitiveness of the area;
- Supporting the creation of new houses along the A1307 corridor by providing a safer transport network, with increased travel options for future residents; and
- Enabling people to access new employment opportunities in south east Cambridge identified by GCP and in turn increasing the size of the labour market for employers, further enhancing the international competitiveness of the area.

3.2 Regional Policy and Strategy

3.2.1 Greater Cambridge, Greater Peterborough Strategic Economic Plan (SEP)

The Greater Cambridge Greater Peterborough Enterprise Partnership (LEP) is a business-led organisation focused on sustainable economic growth. The Strategic Economic Plan (SEP) is effectively a bid document to Government, seeking to agree support for the local economy. The SEP prioritises six Intervention Packages:

- Digital connectivity and exploitation;
- Transport connectivity;
- Removing skills barriers to growth;
- Provision of incubation and innovation space;

- Accelerating business growth by targeted support through a growth hub; and
- Alconbury Weald enterprise campus.

The Transport connectivity package has four aims:

- An integrated and reliable transport network that enables efficient movement of goods and people;
- A highly connected and efficient rail network linking key destinations;
- Sustainable transport capacity to support and unlock growth along key corridors/hubs; and
- Good and reliable access to and between the key economic clusters.

A large number of transport proposals are included within the SEP that cover a full spectrum of improvements such as Major Transport Schemes, Trunk Road, Motorway and Major Rail Schemes, Local Transport Projects, and a Local Sustainable Transport Programme.

So, what does this mean for CSET Phase 2?

CSET Phase 2 aligns strongly with the aims of the SEP Transport Connectivity package, and whilst it is not specifically identified, the fact that it addresses commuting needs on a key radial route and potentially serves major employment centres is significant and relevant to the SEP.

CSET Phase 2 also aligns strongly with many of the other key packages, through:

- Improving links between key employment centres and housing development along the corridor, thus in turn increasing the size of the labour market for employers and reducing skills barriers to growth; and
- Improving links between medical and enterprise campuses, thus supporting the growth of a space for innovation as well as supporting the objective of accelerating business growth by supporting an internationally competitive growth hub.

3.2.2 Cambridgeshire Third Local Transport Plan (2011-2031)

The Cambridgeshire Third Local Transport Plan (LTP3) sets out CCC's plans and policies for the future of transport in Cambridgeshire. The current plan was adopted in 2011 and further updated in 2014 and covers the 20-year period up to 2031. The overarching vision of the plan is to create communities where people want to live and work, now and in the future. The LTP3 document addresses the County Council's priorities. These are:

- Supporting and protecting people when they need it most;
- Helping people to live independent and healthy lives in their communities; and
- Developing the local economy for the benefit of all.

The LTP3 also outlines the following strategic objectives:

- Enable people to thrive, achieve their potential and improve quality of life;
- Supporting and protecting vulnerable people;
- Managing and delivering the growth and development of sustainable communities;
- Promoting improved skills levels and economic prosperity across the county, helping people into jobs and encouraging enterprise; and
- Meeting the challenges of climate change and enhancing the natural environment.

The issues and problems related to each of the objectives listed above have been translated into a series of challenges for transport. The transport challenges which are outlined in the plan include:

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

So, what does this mean for CSET Phase 2?

CSET Phase 2 directly supports the Cambridgeshire LTP3. The interventions which will be implemented as part of the scheme will seek to address a number of the challenges outlined in the LTP3. Aligned with the challenges listed, the CSET scheme will aim to:

- Make sustainable modes of transport a viable and attractive alternative to the private car;
- Reduce the length of the commute and the need to travel by private car;
- Future proof the maintenance strategy and new transport infrastructure to cope with the effects of climate change; and
- Protect and enhance the natural environment by minimising the environmental impact of transport.

3.2.3 Mayoral Interim Transport Strategy Statement 2018 - Cambridgeshire and Peterborough Combined Authority (CPCA)

The Cambridgeshire and Peterborough Combined Authority (CPCA) was formed in 2017 and now fulfils the role of the Local Transport Authority which holds strategic transport powers for the area which were previously held by Cambridgeshire County Council and Peterborough City Council. One of the duties placed upon the authority is the development of a new Local Transport Plan. The Greater Cambridge and Greater Peterborough Local Transport Plan (GCGPLTP), underwent a comprehensive consultation process during 2019 and has now been published as a draft. Once adopted, the plan will set out the overall transport strategy for Cambridgeshire and Peterborough as a whole.

The CPCA Board has produced an interim Local Transport Plan as a temporary measure until a new Local Transport Plan for Cambridgeshire and Peterborough is produced. The interim Local Transport Plan is a combination of a Mayoral Interim Transport Strategy Statement and the previous Local Transport Plans of Cambridgeshire County Council and Peterborough City Council.

The Mayoral Interim Transport Strategy Statement sets out principles which will guide the development of the new LTP. These are:

- Economic growth and opportunity by connecting our dynamic workforce with a growing number of jobs;
- Equity to ensure that all areas of the Combined Authority can prosper; and
- Environmental responsiveness by encouraging active and sustainable travel choices.

The transport policies set out in the current Cambridgeshire Local Transport Plan and the emerging Cambridgeshire and Peterborough Local Transport Plan discuss the role of high-quality public transport corridors in providing the required sustainable transport capacity and connectivity to support growth. The policy has underpinned the development of existing (Cambridgeshire Guided Busway) and planned (Cambridge to Cambourne, Granta Park and Waterbeach New Town) segregated corridors. Despite the significant transport investment planned across Greater Cambridge, constraints remain part of the transport network.

Fundamentally, the historic and highly constrained nature of the city centre streetscape limits the public transport connectivity and capacity that can be achieved for trips to, across and within the city. It is felt that city centre constraints cannot be overcome with an at-grade transit solution therefore the Cambridgeshire Autonomous Metro (CAM), is proposed by the Combined Authority as a solution to increase capacity across the transport network.

CAM has been designed to support the shared CPCA and GCP priorities and outcomes around economic growth, accelerating housing delivery, promoting equity and encouraging sustainable growth and development. The Cambridgeshire Guided Busway and planned Cambridge to Cambourne, Granta Park and Waterbeach New Town segregated corridors will form integral elements of the full CAM network. It is envisaged that the introduction of CSET Phase 2 will support the operations of CAM, providing the early infrastructure to encourage its timely delivery, whilst also addressing transport issues in advance of its delivery.

So, what does this mean for CSET Phase 2?

CSET Phase 2 will strongly support the objectives which are likely to be included within the forthcoming Cambridgeshire and Peterborough Local Transport Plan (LTP). It is clear that the new LTP will have an explicit focus on improving public transport and encouraging active travel uptake. CSET Phase 2 will deliver a number of improvements to sustainable transport infrastructure along the A1307 corridor, encouraging cycling and walking in the study area and further supporting the transport objectives of the Combined Authority.

The delivery of CSET Phase 2 will provide the early infrastructure for CAM, encouraging its timely delivery, which will have a transformational impact on the transport network across central Cambridge and peripheral areas.

3.2.4 Cambridgeshire and Peterborough Local Transport Plan

The Cambridgeshire and Peterborough Local Transport Plan (CPLTP) has recently replaced the former LTP3. The CPLTP is the first transport strategy for the combined Cambridgeshire and Peterborough Combined Authority. The Combined Authority's vision is to '*Deliver a world-class transport network for Cambridgeshire and Peterborough that supports sustainable growth and*

opportunity for all. The CPLTP has a goal for each of the three wellbeing categories of: economy, society and environment. These are supported by a number of objectives:

- Economy:
 - Support new housing and development to accommodate a growing population and workforce, and address housing affordability issues;
 - Connect all new and existing communities sustainably so residents can easily access a good job within 30 minutes, spreading the region's prosperity;
 - Ensure all of our region's businesses and tourist attractions are connected sustainably to our main transport hubs, ports and airports; and
 - Build a transport network that is resilient and adaptive to human and environmental disruption, improving journey time reliability.
- Society:
 - Embed a safe systems approach into all planning and transport operations to achieve "Vision Zero" – zero fatalities or serious injuries;
 - Promote social inclusion through the provision of a sustainable transport network that is affordable and accessible for all;
 - Ensure transport initiatives improve air quality across the region to exceed good practice standards; and
 - Provide 'healthy streets' and high-quality public realm that puts people first and promotes active lifestyles.
- Environment:
 - Deliver a transport network that protects and enhances our natural, historic and built environments; and
 - Reduce emissions to as close to zero as possible to minimise the impact of transport and travel on climate change.

There are a series of policies and policy themes that sit below each of the objectives, which will ensure that the transport schemes identified support the vision of the CPLTP.

The CSET Phase 2 improvements on the A1307 corridor are specifically identified as a Strategic Project within the CPLTP.

So, what does this mean for CSET Phase 2?

CSET Phase 2 is strongly aligned with the objectives of the CPLTP and the proposed scheme is specifically identified as a Strategic Project in the CPLTP.

The proposed improvements will support new housing areas in south east Cambridge and provide high quality connections to major employment hubs within Cambridge. These connections will be made by sustainable transport, including new public transport infrastructure and walking and cycling provision. Overall, this will increase the uptake and mode share of sustainable modes for travel within south east Cambridge. The increase in sustainable modes could also result in a reduction in transport network emissions.

3.2.5 Cambridgeshire Long Term Transport Strategy (LTTS) 2011-2031

Cambridgeshire's Long-Term Transport Strategy (LTTS) forms part of the LTP3. Developed by CCC, the strategy was officially adopted in July 2015. The purpose of the LTTS is to provide additional detail on key strategic transport infrastructure and services needed to support the growth and local economy. The LTTS details how the transport network will be developed to:

- Support sustainable growth across Cambridgeshire to 2031 in accordance with the Local Plans of Cambridgeshire's City and District Councils;
- Consider longer term aspirations in support of sustainable growth to 2050; and
- Support the Greater Cambridge and Greater Peterborough Growth prospectus.

The objectives of the strategy are listed below:

- Ensure that the transport network supports sustainable growth and continued economic prosperity;
- Improve accessibility to employment and key services;
- Encourage sustainable alternatives to the private car, including rail, bus, walking and cycling, car sharing and low emission vehicles;
- Encourage healthy and active travel, supporting improved wellbeing;
- To make the most efficient use of the transport network;
- Reduce the need to travel;
- Minimise the impact of transport on the environment; and
- Prioritise investment where it can have the greatest impact.

The aspects of the strategy most relevant to the South East of Cambridge are outlined below:

- Expanding rail capacity and creating new stations (e.g. Cambridge South station); and
- Wider pedestrian/cycle network improvements to provide a comprehensive network of high-quality pedestrian/cycle routes linking the town with key destinations in Cambridge and the surrounding villages.

So, what does this mean for CSET Phase 2?

CSET Phase 2 is strongly aligned with the objectives of the LTTS. Phase 2 will improve transport infrastructure along a section of the A1307 corridor, encouraging healthy and sustainable travel across the study area and providing viable and attractive alternatives to private car travel.

The scheme will also improve access to some of Cambridge's largest employment sites, including Granta Park, Babraham Research Campus and Cambridge Biomedical Campus. All components of Phase 2 will support sustainable growth and continued economic prosperity across the study area and the wider region.

The CSET Phase 2 and Cambridge South railway station works are likely to be delivered sequentially but are being planned and developed in parallel. Consequently, the design concepts for the Cambridge South station and those of CSET will be influenced by each other but both schemes will significantly improve the public transport offer across south east Cambridge.

3.2.6 Cambridgeshire County Council Climate Change and Environment Strategy 2020-2025

The Cambridgeshire County Council (CCC) Climate Change and Environment Strategy was developed in response to the declaration of a climate emergency in May 2019.

As part of the strategy it is the Council's intention that:

“by 2025 all buildings that are both owned and occupied by the Council will be heated without fossil fuels, and all the Council's car and van fleet will be electric”.

The Council's vision is to deliver net zero carbon emissions in partnership with all stakeholders and the purpose of the strategy is to provide a clear statement of the council's climate change and environmental objectives.

The Strategy has been developed around three key themes:

- Quantifying carbon footprints to inform and deliver Climate Change mitigation through efforts to reduce or prevent carbon emissions;
- Adaptation to cope with the existing and future impacts of Climate Change; and
- Enhancing and conserving natural capital such as wildlife, plants, air, water and soils.

Priority areas for the Climate Change mitigation theme (reducing the carbon footprint) are:

- Energy efficient, low carbon buildings – improving energy efficiency and installing low carbon heating.
- Low carbon transport – prioritising walking, cycling and public transport, and supporting the uptake of electric vehicles.
- Waste management strategies to reduce carbon;
- Afforestation – planting trees; and
- Peatland - developing understanding and management best practice

Priority areas for the Climate Change adaptation theme are:

- Resilience of our services and buildings, effective Climate Change risk management strategies across all services, and supporting vulnerable people in severe weather or temperatures.
- Resilient infrastructure and highways;
- Flood risk;
- Water availability; and
- Green and Blue Infrastructure.

Priority areas for the natural capital theme are:

- Reducing waste and tackling plastic pollution;
- Air pollution;
- Green spaces, restoring and/or creating natural habitats, and land management, including more tree planting and continued environmental stewardship as part of rural estate management.
- Peatland; and
- Water management.

An action plan developed as part of the strategy identifies seven targets. Targets 1 to 5 will be delivered by the County Council, which are reflected in the pledge above, and targets 6 and 7 will be in collaboration with partners and communities.

So, what does this mean for CSET Phase 2?

CSET Phase 2 will deliver improved connectivity to outlying communities and new public transport routes from a new travel hub to employment areas at Babraham Research Campus and Granta Park and Cambridge City Centre, helping to **mitigate** against climate change by providing new and improved public transport routes, cycle parking facilities at the hub and at bus stops, electric vehicle charging points and a new multi user route along the extent of the new public transport route.

CSET Phase 2 will ensure that the county has resilient transport and highway infrastructure to **adapt** through the promotion and encouragement of the use of public transport, reducing vehicle use and ensuring sufficient future capacity.

CSET Phase 2 will also contribute to reduction in air pollution through the provision of new and improved public transport routes and infrastructure by facilitating a shift to public transport and active travel modes providing improved networks for electric vehicles, which will reduce vehicle emissions and help to protect or improve the **natural capital** within the county.

3.3 Local Policy and Strategy

3.3.1 Transport Strategy for Cambridge City and South Cambridgeshire (TSCSC)

The Transport Strategy for Cambridge and South Cambridgeshire was adopted by Cambridgeshire County Council in March 2014.

The overall vision outlined in the strategy is to create a sustainable, efficient and accessible transport system to support Cambridge City, major employment hubs, villages and key centres. The strategy covers all modes of transport and takes account of forecast employment and housing growth up to 2031. This includes Local Plan growth at key campuses along the A1307 corridor.

The transport strategy contains specific policies which are relevant to Phase 2 of the CSET scheme, including:

- Policy TSCSC 2: Catering for travel demand in Cambridge
 - To enable more travel demand to be accommodated on the constrained Cambridge transport network, all growth in travel demand will be catered for by sustainable transport. There will be improved priority for people travelling by sustainable modes in and out of the city to increase the uptake of these options.
- Policy TSCSC 3: Catering for travel demand in South Cambridgeshire
 - This policy states that as existing transport networks from South Cambridgeshire into Cambridge are constrained, passenger transport services on main radial corridors will be used for part or all of trips to Cambridge and to other key destinations. The policy also states that more people will walk and cycle to access services and that more people will car share.

- Policy TSCSC 4: National networks: trunk roads, motorways and rail
 - National improvements to strategic transport infrastructure must take account of local circumstances, opportunities and impacts e.g. changes to nationally important road and rail routes.
- Policy TSCSC 7: Supporting sustainable growth
 - Changes to the transport network should support sustainable travel modes.
- Policy TSCSC 8: Improving bus services
 - Improvements to the bus network, to develop an integrated and high-quality passenger transport system.
- Policy TSCSC 9: Access to jobs and services
 - Maximising access to employment and key services, particularly by sustainable modes to provide an effective and efficient transport network.
- Policy TSCSC 12: Encouraging cycling and walking
 - This policy states that all new developments must provide safe and convenient pedestrian and cycle improvements.
- Policy TSCSC 17: Air quality
 - Placing an emphasis on reducing emissions from transport to achieve air quality targets. Working with passenger transport operators to move towards 'clean' fleets and monitoring air quality to ensure targets are met.
- Policy TSCSC 18: Protecting the environment
 - Working alongside key partners such as transport operators and businesses to reduce transport related emissions. This will protect and enhance the character and environment of the area and support sustainable growth.

So, what does this mean for CSET Phase 2?

CSET Phase 2 is strongly aligned with a number of policies outlined in the transport strategy. The scheme will seek to cater for the increased travel demand within Cambridge and South Cambridgeshire by:

- Supporting modal shift to more sustainable forms of transport. CSET Phase 2 includes a new dedicated public transport route to promote sustainable travel, encouraging a movement away from private car use. The scheme also provides improved walking and cycling routes; and
- Public transport improvements and a new Travel Hub facility will encourage modal shift to more sustainable transport modes.

The CSET Phase 2 scheme will also contribute to improved road safety as indicated in the Economic Case. Reducing the proportion of journeys undertaken by car could reduce the number of congestion related incidents along the A1307 corridor. The provision of new public transport routes will reduce the reliance on private vehicle trips to cater for new travel demand, resulting in benefits to the environment and air quality. There are further opportunities for the public transport routes to be serviced by a modern, 'clean' fleet.

3.3.2 Cambridge Air Quality Management Plan (2018 - 2023)

Air quality is monitored in Cambridge through the Local Air Quality Management (LAQM) process. An Air Quality Management Area (AQMA) was introduced in 2004 due to excessively high levels of Nitrogen Dioxide (NO₂), with the purpose of improving air quality and bringing levels of pollutants below the National Air Quality Objectives.

In addition, Cambridge has an Air Quality Action Plan (2018 - 2023) which sets out priorities for maintaining and improving air quality as Cambridge continues to grow. Cambridge City Council, the Greater Cambridge Partnership and Cambridgeshire County Council officers have worked together to identify a range of actions required. The Action Plan has been developed in recognition of the legal requirement to work towards Air Quality Strategy (AQS) objectives under Part IV of the Environment Act 1995 and relevant regulations made under that part and to meet the requirements of the Local Air Quality Management (LAQM) statutory process. The key objective of this plan is to encourage, enable and require, where appropriate, the shift from internal combustion engine vehicles, to low emission petrol hybrid and ultra-low emission electric vehicles. The plan priorities are to tackle emissions from transport through a range of hard and soft measures. The seven main areas for action (the measures) are:

- Reduce emissions from taxis by requiring low emission taxis;
- Reduce emissions from buses and coaches;
- Reduce emissions from HGVs;
- Reduce emissions from all traffic/other traffic by providing better public transport;
- Maintaining low emissions through the planning process and long-term planning;
- Improving public health; and
- Leading by example.

So, what does this mean for CSET Phase 2?

CSET Phase 2 strongly aligns with the principles of the Air Quality Action Plan for Cambridge. In particular the scheme will seek to:

- Provide public transport improvements and improved Travel Hub facilities that will encourage modal shift to more sustainable transport modes thereby reducing the number of single occupancy vehicle trips into central Cambridge.
- It is proposed that the HQPT services using the CSET Phase 2 infrastructure will be operated by electric public transport vehicles, reducing the emissions generated by the fleet when compared to standard buses.

3.3.3 South Cambridgeshire Local Plan

The South Cambridgeshire Local Plan (SCLP) was adopted in September 2018 and sets out the planning policies and land allocations to guide future development of the district up to 2031. The SCLP outlines the following vision for South Cambridgeshire:

‘South Cambridgeshire will continue to be the best place to live, work and study in the country. Our district will demonstrate impressive and sustainable economic growth. Our residents will have a superb quality of life in an exceptionally beautiful, rural and green environment.’

In order to achieve the overarching vision for the district, set out by the Local Council, the following objectives have been established:

- To support economic growth by supporting South Cambridgeshire's position as a world leader in research and technology-based industries, research, and education; and supporting the rural economy;
- To protect the character of South Cambridgeshire, including its built and natural heritage, as well as protecting the Cambridge Green Belt. New development should enhance the area and protect and enhance biodiversity;
- To provide land for housing in sustainable locations that meets local needs and aspirations, and gives choice about type, size, tenure and cost;
- To deliver new developments that are high quality and well designed with distinctive character that reflects their location, and which responds robustly to the challenges of climate change; and
- To maximise potential for journeys to be undertaken by sustainable modes of transport including walking, cycling, bus and train.

Transport policy TI/2: Planning for Sustainable Travel, further demonstrates the council's commitment to the delivery and promotion of sustainable modes of travel and a reduction in car usage. The SCLP states that the 'transport system needs to be balanced in favour of sustainable modes; walking, cycling and public transport, in order to provide people with real choice about how they travel'⁴.

So, what does this mean for CSET Phase 2?

CSET Phase 2 will deliver greater modal choice for people travelling along the A1307 corridor. Improvements to active travel infrastructure will encourage uptake of cycling and walking along the corridor, directly aligning the scheme with the objectives of the SCLP. A new dedicated public transport route will also maximise the potential for journeys to be undertaken by sustainable modes within south east Cambridge and provide users of the corridor with real choice about how they travel, with viable alternatives to car travel.

Whilst the construction of new transport infrastructure will have impacts on the natural environment, there is a commitment from GCP to mitigate these and to achieve Biodiversity Net Gain.

3.3.4 Cambridge City Local Plan

The Cambridge Local Plan was formally adopted by the Council on 18 October 2018. The plan replaces the Cambridge Local Plan 2006 and sets out policies and proposals for future development and spatial planning requirements to 2031. 15 strategic objectives have been outlined in the plan and those with relevance to transport schemes are set out below:

- Contribute to the vision of Cambridge as an environmentally sustainable city, where it is easy for people to make a transition to a low carbon lifestyle;
- Meet the housing needs of the city within its sub region, delivering an approximate mix of housing types, sizes and tenures to meet existing and future needs, including affordable housing;

⁴ https://www.scambs.gov.uk/media/12740/south-cambridgeshire-adopted-local-plan-270918_sml.pdf

- Assist in the creation and maintenance of inclusive, environmentally sustainable communities;
- Promote and support economic growth in environmentally sustainable and accessible locations, facilitating innovation and supporting Cambridge's role as a world leader in higher education, research and knowledge-based industries, while maintaining the quality of life and place that contribute to economic success; and
- New development in Cambridge should be located to help minimise the distance people need to travel and be designed to make it easy for everyone to move around the city and access jobs and services by sustainable modes of transport.

It should also be noted that for the first time, Cambridge City Council and South Cambridgeshire District Council are currently working together to create a joint Local Plan for the two areas which will be referred to as the Greater Cambridge Local Plan. This will ensure that there is a consistent approach to planning, and the same planning policies, where appropriate across both areas. The Greater Cambridge Local Plan will guide how Greater Cambridge will change over the next two decades and beyond. Upon adoption the Greater Cambridge Local Plan will replace the South Cambridgeshire Local Plan 2018 and Cambridge City Local Plan 2018 as set out above.

So, what does this mean for CSET Phase 2?

CSET Phase 2 is well aligned with the objectives of the Cambridge City Local Plan. The project will seek to deliver sustainable travel improvements to one of Cambridge's key radial routes, encouraging users travelling from the south east of Cambridge to undertake journeys into the city via sustainable modes of travel. The Phase 2 measures also seek to improve quality of life across the study area by reducing carbon emissions generated as a result of private car journeys to key employment sites and the city centre. Phase 2 will also improve access to key employment sites including the Cambridge Biomedical Campus, to the south east of the city centre, supporting sustainable economic growth at the site.

Whilst the construction of new transport infrastructure will have impacts on the natural environment, there is a commitment from GCP to mitigate these and to achieve Biodiversity Net Gain.

3.3.5 Cambridge City Access Strategy

The Cambridge City Access Strategy (CAS), which is not currently adopted and is still subject to refinement, aims to address the issues that will arise from a 30% population increase by 2031. The impacts of this growth on the transport system are even greater, with more than 30% increase in morning peak traffic in Cambridge, a 40% increase in morning peak traffic in South Cambridgeshire and a doubling of time spent in congestion. The initial CAS outlined a package of eight measures to respond to the growth and associated issues, as illustrated below in Figure 3.1.

Figure 3.1: Cambridge City Access Strategy Measures



Source: Greater Cambridge Partnership

In response to this initial outline package, the Greater Cambridge Citizens' Assembly on congestion, air quality and public transport brought together 53 randomly selected residents from Greater Cambridge and the wider travel to work area for two weekends during September and October 2019 to assess if these measures were in fact the right measures in response to the issue of how to reduce congestion, improve air quality and provide better public transport in Greater Cambridge. Responses are still being taken into consideration and as such the package is not finalised.

So, what does this mean for CSET Phase 2?

The CSET Phase 2 scheme supports the package of measures identified within the CAS to manage the increase in travel demand in Cambridge. Phase 2 will include improvements to both the public transport and active modes networks in south Cambridge which will help minimise any increases in private vehicle trips. These measures are specifically recommended through the CAS, and will result in a wide range of benefits, including easing congestion, safer and easier journeys, and improved air quality and environmental outcomes.

The Cambridgeshire and Peterborough Local Industrial Strategy⁵ sets out how Cambridgeshire and Peterborough will maximise the economy's strengths and remove barriers that remain to ensure the economy is fit for the future. The Local Industrial Strategy sets out three priorities for Cambridgeshire and Peterborough's economy:

⁵ Cambridgeshire and Peterborough Local Industrial Strategy- July 2019

1. Improve the long-term capacity for growth in Greater Cambridge by supporting the foundations of productivity;
2. Increase sustainability and broaden the base of local economic growth; and
3. Expand and build upon the clusters and networks that have enabled Cambridge to become a global leader in innovative growth.

The strategy recognises the importance of transforming transport infrastructure capacity in order to maximise economic growth of the area. Research undertaken to inform the evidence base presented in the Local Industrial Strategy suggested that insufficient infrastructure is hampering productivity growth. The existing transport network in Cambridge was designed for a small town and is now struggling to cope with the weight of commuters looking to work in the city and on the periphery.

Transport was cited by businesses as a limitation for growth. Businesses stressed that 'a better road network and finding a solution to reduce traffic congestion in Cambridge' was considered a top priority. Whilst recognising the need for urgent investment in transport infrastructure to avoid stalling economic growth, the strategy also supports the move towards more sustainable modes of transport.

The strategy specifically cites the need for the delivery of CAM, which could support sustainable growth in and beyond Cambridge City. The delivery of CAM would transform connectivity across central Cambridge and the periphery and would serve several key economic hubs. CSET Phase 2 seeks to deliver the early infrastructure for CAM, enabling proposals to come forward quicker whilst also significantly improving connectivity in advance of CAM delivery.

So, what does this mean for CSET Phase 2?

Delivery of CSET Phase 2 is well aligned with the three priorities of the Cambridgeshire and Peterborough Local Industrial Strategy. Phase 2 will deliver additional capacity to the transport network and provide improved connectivity to key economic hubs, including Cambridge Biomedical Campus.

CSET Phase 2 will support the ongoing growth of the Cambridge Biomedical Campus, Granta Park and Babraham Research Campus and holds the potential to unlock further undeveloped land across south east Cambridge, encouraging investment and sustained economic growth.

CSET Phase 2 will deliver the early infrastructure to enable the timely delivery of CAM. CAM is specifically identified in the strategy as a key transport investment to support sustainable growth across Cambridgeshire. Delivery of CSET Phase 2 should be seen as essential to supporting the ongoing growth of Cambridge, addressing existing issues across south east Cambridge, futureproofing the transport network and enabling the delivery of CAM.

3.4 Other Relevant Plans and Studies

In addition to prevailing and anticipated forthcoming policy and strategy, there have also been several additional important studies undertaken which help to form an evidence base to support the need for intervention and the need for this particular scheme. These are summarised below.

3.4.1 Cambridge Biomedical Campus Transport Needs Review Parts 1, 2 and 3

The Cambridge Biomedical Campus (CBC) is a significant economic hub in the south of Cambridge and will continue to grow over the next 10-15 years. The site currently has 17,250 staff and 14,500 visitors every day.

Transport congestion has the potential to deteriorate access to the site, restricting the potential for economic growth. The Transport Needs Review has three parts:

Part 1: Assessment of existing and future transport supply (including availability, quality and reliability) and demand. Identification of challenges which include, highway congestion, gaps in bus services, high demand for car parking, low walking mode share and poor cycle parking provision. Part 1 also outlines short-term measures (through to 2022) to respond to these challenges.

Part 2: Assessment of changes in supply and demand from 2022-2031, and the potential impacts of the Cambridge South rail station. Part 2 sets two targets for private vehicle use:

- To maintain 2017 traffic levels through to 2031; and
- To achieve a 10-15% decrease in peak highway trips from 2011 levels (stretch target).

A number of demand management measures are identified to help achieve these targets, including parking restrictions, improved walking and cycling paths, uptake of car sharing and wider sustainable transport infrastructure improvements such as park and ride facilities, walking and cycling paths, and bus routes.

Part 3 develops a phasing and implementation plan for transport improvements through to 2031 and makes a case for investment in the Cambridge South Station and the Cambridgeshire Autonomous Metro (CAM). The CAM is anticipated to have the biggest impact on achieving the targets established in the Part 2 report. The recommendations include ensuring that the transport investment programme remains on track, looking at the quick wins to manage demand and congestion, and ongoing collaboration between the key stakeholder organisations.

So, what does this mean for CSET Phase 2?

Phase 2 is well aligned with the recommendations and findings of the CBC Transport Needs Review. CSET was assessed in the context of the increasing CBC travel demand, and the potential for it to reduce the number of trips on the highway network. By 2031, CSET works are anticipated to remove approximately 1,300 highway trips to the CBC per day. The CAM is expected to make the biggest contribution to achieving the vehicle trip targets set out within the CBC reports.

3.4.2 Cambridgeshire and Peterborough Independent Economic Review (CPIER)

The Cambridgeshire and Peterborough Independent Economic Review⁶ (CPIER) was commissioned and funded by Cambridgeshire and Peterborough Combined Authority, the Combined Authority's Business Board and Cambridge Ahead in June 2017. Following an intense and thorough review period, the CPIER was officially finalised and published in September 2018.

The report sets out an authoritative evidence base on the economic performance and potential of Cambridgeshire and Peterborough. The report suggests that if properly stewarded in the years ahead, Cambridgeshire and Peterborough can sustain its own economy, and support the UK economy. The CPIER makes fourteen key recommendations about how this should be done, and another thirteen subsidiary recommendations.

Of particular relevance to CSET Phase 2 is Key Recommendation 7:

'A package of transport and other infrastructure projects to alleviate the growing pains of Greater Cambridge should be considered the single most important infrastructure priority facing the Combined Authority in the short to medium term. These should include the use of better digital technology to enable more efficient use of current transport resources.'

The findings of the report suggest that the level of investment in the transport infrastructure of Cambridgeshire and Peterborough has been inadequate for too long. Research undertaken for the CPIER also found that the most acute constraints lie in the southern part of the Combined Authority area. The report suggests that unless urgently addressed, inadequate transport could become a hindrance to growth. Intelligently planned transport links are required to avoid worsening of congestion. It is suggested that investment here could be economically beneficial for the Combined Authority.

So, what does this mean for CSET Phase 2?

Research undertaken in the development of the CPIER identified transport as a key constraint to economic growth. It is suggested that investment could be economically beneficial for the Combined Authority. Of particular urgency is connectivity improvements to economic hubs, which could unlock land for development and encourage further growth.

CSET Phase 2 will significantly improve connectivity to some of Cambridgeshire's key economic hubs; Cambridge Biomedical Campus, Babraham Research Campus and Granta Park. The scheme will deliver a direct public transport link between the A11/A1307/A505 junction and the Cambridge Biomedical Campus. The transport infrastructure will also provide improved links to Granta Park to the east and Babraham Research Campus. The delivery of a new Non-Motorised User route will also improve connectivity for cyclists and pedestrians to economic hubs, providing a number of viable transport options to support growth and potentially unlock undeveloped land across south east Cambridge to further encourage investment in the area.

⁶ Cambridgeshire and Peterborough Independent Economic Review- September 2018

3.5 Policy Review Conclusion

This review has examined a comprehensive range of policy and strategies developed by the UK Government, Greater Cambridgeshire organisations, and local Cambridge bodies. There are consistent policy themes across all organisations, with a strong focus on sustainable transport, relieving congestion, improving active travel infrastructure, improving air quality, and delivering improvements to the provision and reliability of public transport.

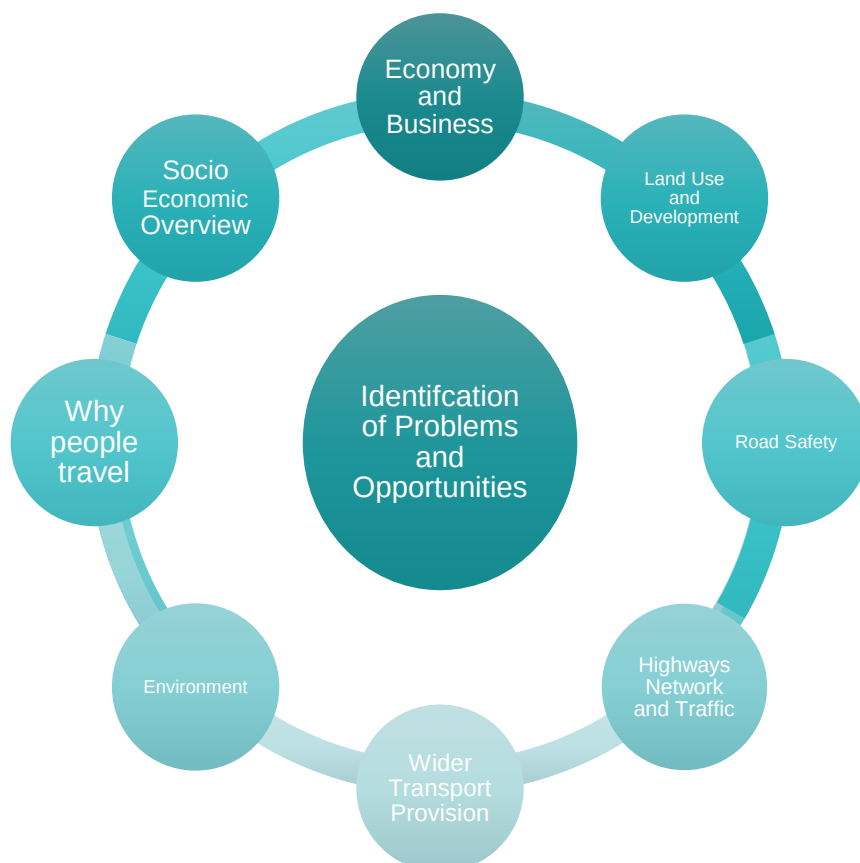
The CSET Phase 2 scheme will enable the local authorities and organisations to meet both transport and economic goals, without exacerbating existing congestion and environmental issues. The CSET Phase 2 scheme is specifically referred to within a number of local and regional documents as an important component of transport plans in Greater Cambridge. The CSET Phase 2 scheme will provide significant improvements to the public transport network in the south east of Cambridge alongside high-quality walking and cycling infrastructure. In turn this will increase accessibility to employment hubs and support residential growth in this part of Greater Cambridge.

4 Understanding the Problems and Opportunities

This section of the Strategic Case provides an overview of the problems and issues identified in the study area and the opportunities to resolve them. Problems and issues were first identified during the earlier stages of the Business Case process; these have since been reviewed at Outline Business Case (OBC) stage. Problem identification forms a crucial part of each stage of the Business Case process; hence a refreshed review of baseline conditions is required to reconfirm problems and opportunities identified.

Eight assessment themes have been identified as a basis for undertaking a review of evidence to capture the key problems and opportunities in the study area that transport investment may alleviate and/or support. The eight equally important themes are illustrated in Figure 4.1.

Figure 4.1: Assessment Themes



Source: Mott MacDonald

Sections 5 to 12 present baseline conditions for each of the above themes. From this, evidence-based issues and opportunities have been summarised together with their relevance and impact in terms of the CSET Phase 2 scheme.

The thematic approach has been adopted to identify where problems and opportunities:

- Exist in isolation in one thematic area;
- Where they intercept multiple themes; or
- Where one thematic problem or opportunity intensifies or compounds another thematic problem.

Each sub section is set out according to the following structure:

- A detailed review of the main issues and opportunities according to the theme;
- A summary of the key issues and opportunities in tabular format at the end of each section; and
- Relevance of the key issues to the CSET Phase 2 scheme.

Section 13 collates all of the emerging objectives from Sections 5 to 12. This has helped to re-inform and update evidence-based objectives for the overall scheme that were established at SOBC stage to support the scheme aims set out by GCP.

5 Socio-Economic Overview

This section provides an overview of socio-economic trends in Cambridge, Greater Cambridge and Cambridgeshire. Primarily it identifies challenges and opportunities regarding population growth and employment levels. In assessing pertinent socio-economic trends, this section of the report relies on data sources from the Office of National Statistics and Nomis as well as independent reports commissioned by the Cambridgeshire and Peterborough Combined Authority (CPCA).

5.1 Population

Cambridgeshire's ⁷ population has grown steadily over previous decades. However, more recently the population has experienced a significantly faster rate of growth with people coming from elsewhere in the UK as well as overseas, attracted by the high skilled employment opportunities, with a total population growth of 4.2% over just 5 years. The latest count in 2017 found Cambridgeshire's population to stand at 648,237, a figure expected to continue to grow rapidly over coming years.

The population of Cambridge itself is estimated to stand at 145,624 and is forecast to reach 150,000 within the next decade⁸. A contributing factor to Cambridge's population is that the city hosts a large academic population from the University of Cambridge and the Anglia Ruskin University. Cambridge's two universities serve around 30,000 students, by some estimates⁹. Since students represent a significant proportion of the population in Cambridge, the population can fluctuate according to term time. The impact of such fluctuations will become more severe as the student population continues to grow alongside the growth of the University and associated research and academia facilities. As a result, it is possible that Cambridgeshire will annually exceed the previous years' peak population as each academic year commences.

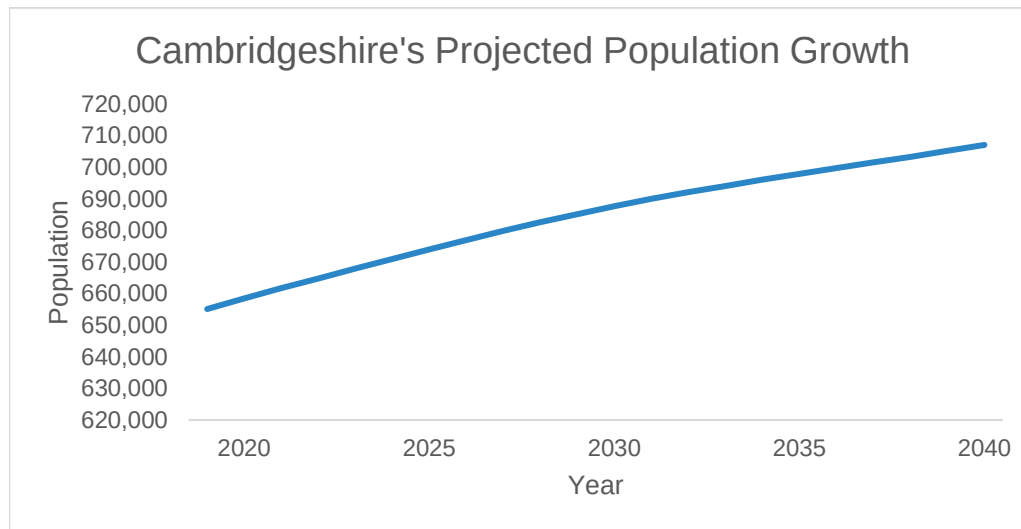
Figure 5.1 provides the population projections for Cambridgeshire up to 2040. Statistics indicate significant growth over the next 20 years. By 2040 the population can be expected to reach 707,068, an increase of nearly 10% when compared to the present.

⁷ Data extracted from Nomis is at a county level and covers the local authority areas of Cambridge, South Cambridgeshire, East Cambridgeshire, Huntingdonshire and Fenland. It does not include data for Peterborough.

⁸ <https://ukpopulation2019.com/population-of-cambridge-2019.html> [Accessed 12 December 2019]

⁹ The Complete University Guide. Archived from the original on 14 January 2013.

Figure 5.1: Cambridgeshire Population Projections

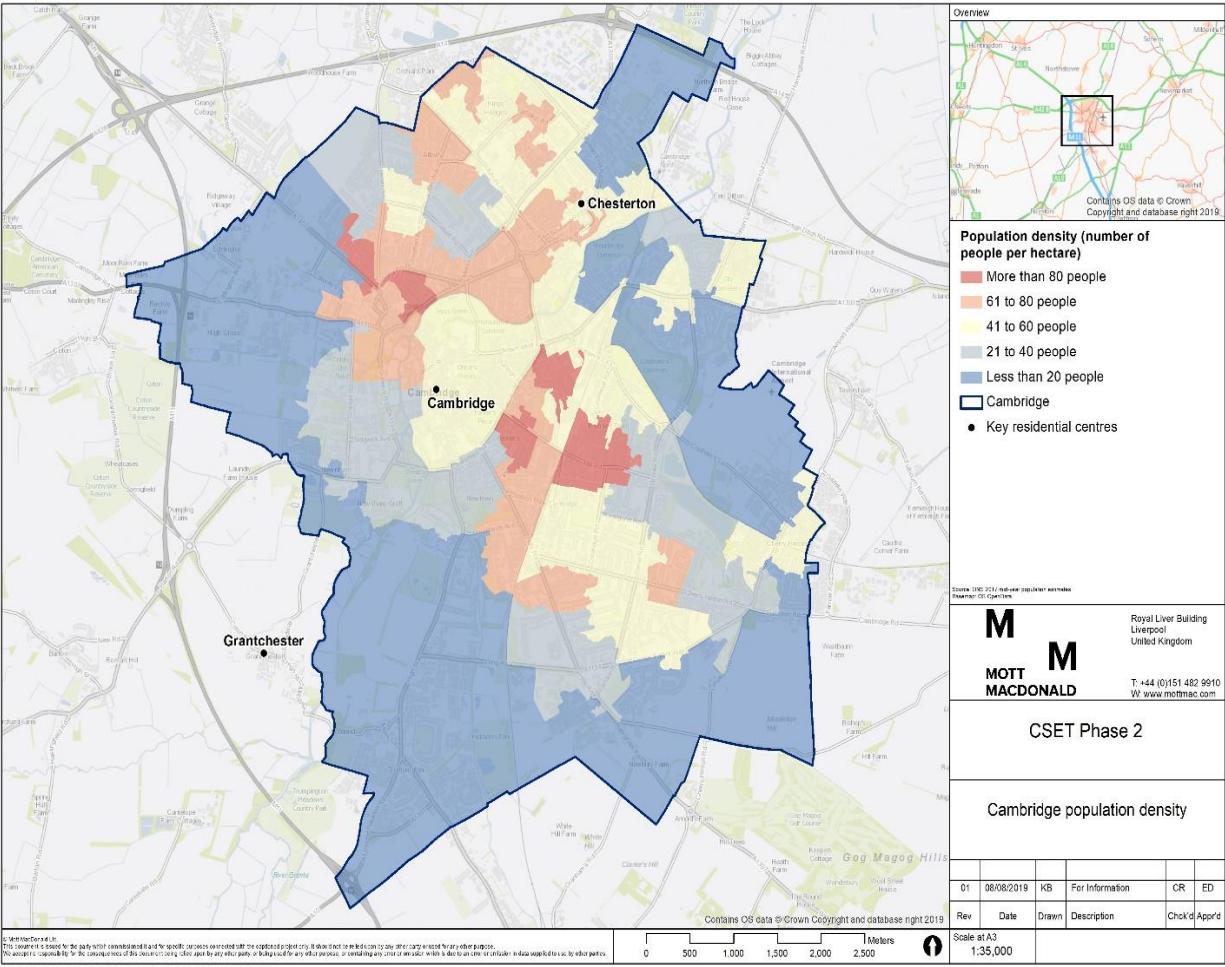


Source: ONS 2018

The rate of population growth anticipated for Cambridgeshire necessitates improvements to the existing transport infrastructure and to the number of travel options to ensure that congestion and capacity issues do not constrain growth and force individuals to consider relocation.

Population density across Cambridge is illustrated in Figure 5.2. It can be seen that clusters of densely populated areas exist. An overspill from the city centre can be seen to both the north west and south east, placing increased pressure on the city's radial routes as people move in and out of central Cambridge for employment, education, amenities and training opportunities.

Figure 5.2: Population Density in Cambridge



Source: Mott MacDonald

Key Issues and Opportunities

Table 5.1 below highlights the key issues and opportunities in relation to population in Cambridgeshire.

Table 5.1: Summary of Key Issues & Opportunities – Socio-Economic (Population)

Issues	Opportunities
<ul style="list-style-type: none"> The population of Cambridge and Cambridgeshire is growing rapidly and there is an increasing academic population. However, the current transport infrastructure is not evolving at a pace which matches population increase. Transport infrastructure which is inadequately equipped to accommodate a rapidly growing population may force people to relocate away from the area, slowing the rate of economic growth which has recently been experienced. Cambridge's dense population is overspilling into the periphery. A large proportion of the overspill are choosing to live to the south east of Cambridge and commute into Cambridge, placing increased pressure on radial routes in and out of central Cambridge. 	<ul style="list-style-type: none"> A greater number of people living in the area will create indirect and induced economic impacts, spending their incomes locally and using local services, resulting in growth in the local economy. A sustainable transport network will allow Cambridgeshire to continue its success in academia, technology and research through close ties between campuses enabling knowledge sharing and innovation. A transport system that supports growth of the area and economic growth will benefit the wider UK economy. Futureproofing existing transport infrastructure will support the requirements of future generations and will ensure a successful and sustainable future for Cambridgeshire. Cambridge has a large student population who are more likely to use public transport and cycle modes of transportation. Enhancing the sustainable transport options will benefit the future growth of the Universities in Cambridge enabling Cambridge and in turn the UK to maintain its international competitiveness while also relieving pressure on the transport network. Providing a safe cycle and walking route will provide residents and students with travel options and will contribute to health and wellbeing.

So, what does this mean for CSET Phase 2?

The A1307 currently experiences periods of acute congestion, resulting in delays for users. With Cambridgeshire's population set to grow, overspill from central Cambridge will result in increasing populations in towns on the hinterland of Cambridge, placing increased pressure on the city's radial routes.

The A1307 provides one of the city's key radial routes between Cambridge and Haverhill, serving a number of key communities and employment locations including Linton and Sawston. If transport infrastructure along the A1307 corridor does not evolve to accommodate population growth, conditions along the corridor will likely worsen, resulting in an adverse impact on air quality.

CSET Phase 2 will improve cycling, walking and public transport provision along a section of the A1307 corridor, providing users with an attractive and viable alternative to private car travel. Measures proposed as part of the scheme will ultimately ensure that people can travel through south east Cambridge in a reliable, timely and safe manner, whilst also futureproofing the corridor to accommodate the growth in trips associated with Cambridgeshire's increasing population.

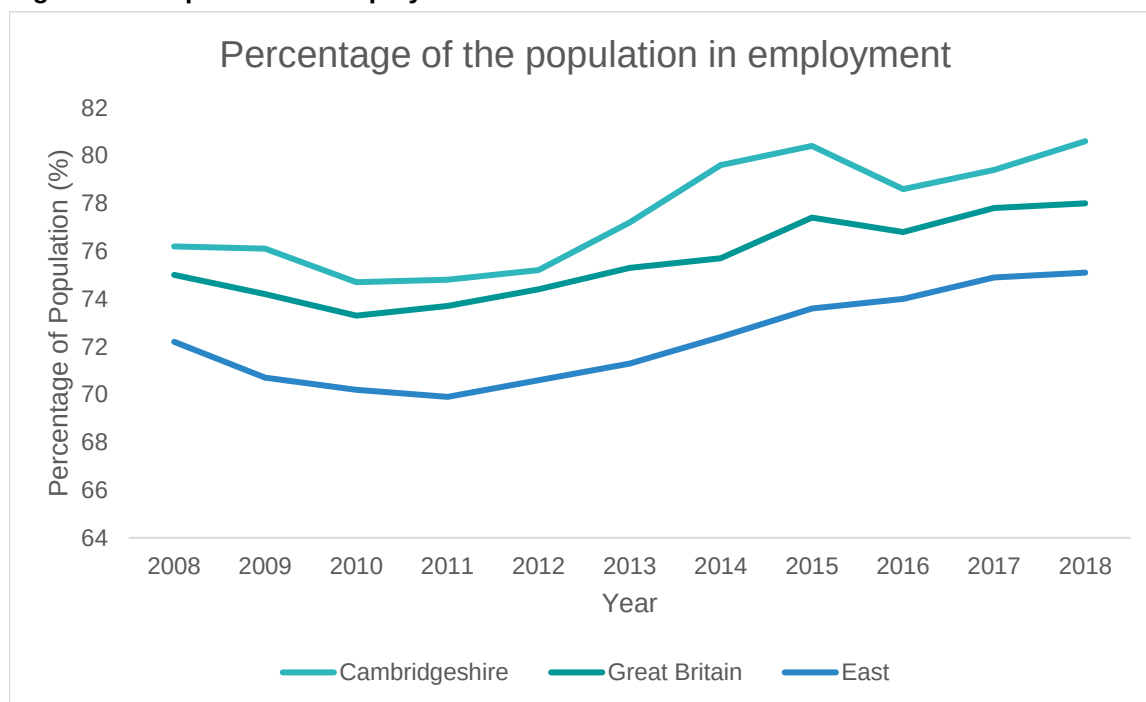
5.2 Employment and Skills

In order to continue to support economic growth, the population within the employment catchment area needs to possess the required skills and the transport network must be flexible and efficient enough to expand the catchment area to ensure that jobs created as a result of growth can be filled.

Cambridge and South Cambridgeshire import a larger proportion of labour than is exported, both from other Cambridgeshire local authorities and further afield. The significant number of job opportunities and sector specific requirements of the dominant science and engineering industry necessitate that employers must attract labour from outside of the immediate area. Reliance on external labour results in high commuter demand on the transport network, particularly during peak hours.

Figure 5.3 provides an overview of employment rates in Cambridgeshire. It can be seen that, employment rates in Cambridgeshire have remained consistently higher than the rest of the East of England and Great Britain throughout the analysis period. The number of people in employment increased rapidly in the 24-month period between 2016 and 2018. A percentage increase of 2.0% was observed during this period. The rapid growth experienced over the 24-month period could be an indication of the growth in employment which can be expected over forthcoming years.

Figure 5.3: Population in Employment

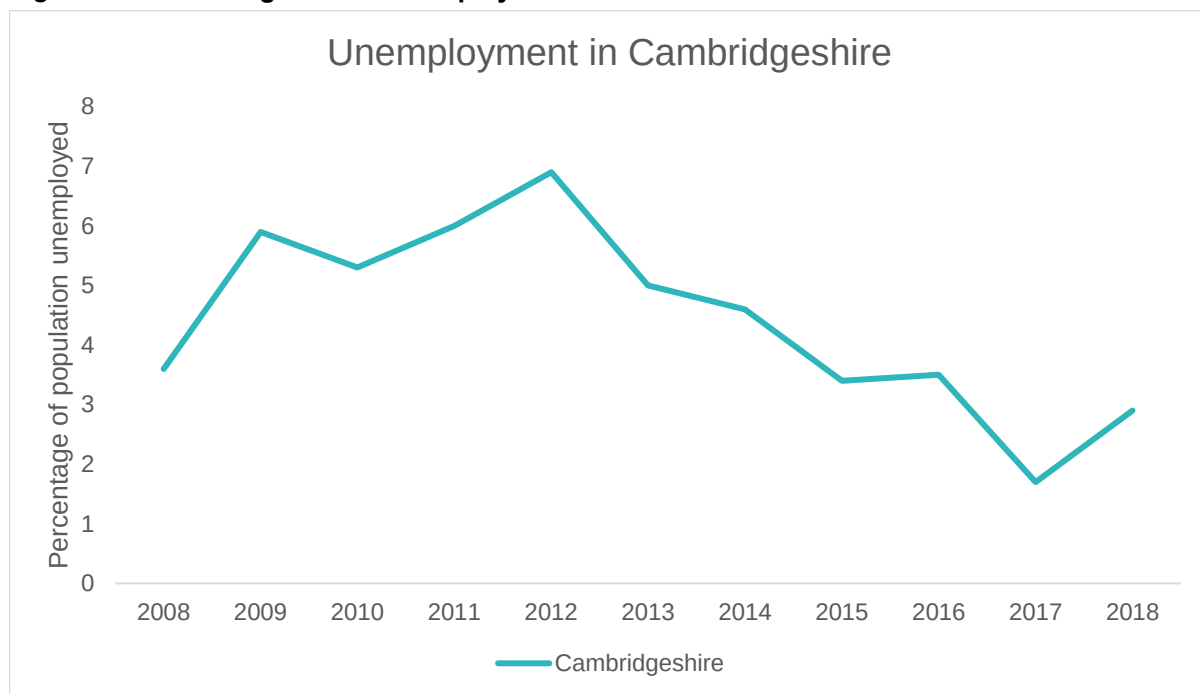


Source: ONS 2018

Figure 5.4 presents the unemployment rate in Cambridgeshire during the 10-year period between 2008 and 2018.

Since the height of the recession in 2012 when unemployment rates were at their highest, Cambridgeshire has recovered well. A 4% decrease in unemployment can be observed between 2012 and 2018. The unemployment rate in Cambridgeshire was at an all-time low in 2017, with only 1.7% of the population not in employment. The impressive recovery demonstrated in Cambridgeshire is testament to the growing economy of the area and sustained investment despite national instability.

Figure 5.4: Cambridgeshire's Unemployment Rate



Source: ONS 2018

Analysis of employment and unemployment levels for Cambridgeshire demonstrates that there is a strong and active economy. The economy is well positioned to initiate further growth as emerging opportunities are presented.

Table 5.2 below shows the number of people who are employed in Cambridgeshire, East England and Great Britain, providing an indication of the extent of Cambridgeshire's role as a source of employment for the surrounding region.

Table 5.2: Total Employee Jobs

Year	Cambridgeshire	East	Great Britain
2015	311,000	2,608,000	28,565,000
2016	319,000	2,680,000	29,045,000
2017	327,000	2,735,000	29,375,000
% Increase	5.1	4.9	3

Source: ONS Business Register and Employment Survey

In 2017, 327,000 people were employed in Cambridgeshire. The number of jobs available in Cambridgeshire represent a significant proportion of those available in the East of England, particularly when considering that the area represents less than 1% of the UK's land mass and population.

The economic performance of Cambridgeshire is very positive, particularly when compared with Great Britain. A recent review of businesses undertaken as part of the Cambridgeshire and Peterborough Independent Economic Review (CPIER) suggests that employment and turnover growth have been picking up right across the area¹⁰.

Cambridgeshire provides a key source of employment in the East of England and continues to grow its employment base, ensuring that the area continues to attract outside investment is crucial to sustaining the recent rate of economic growth experienced.

The provision of adequate transport infrastructure to accommodate the expansion of existing businesses whilst attracting further public and private sector investors is vital to the further growth of the area. Employment growth drives increased demand for housing and higher levels of commuting, therefore both factors must be addressed in order to support the growing economy of the area¹¹.

¹⁰ Cambridgeshire and Peterborough Independent Economic Review (CPIER). September 2018.

¹¹ Cambridgeshire and Peterborough Independent Economic Review, 2018

5.2.1 Anticipated Employment Growth

The East of England Forecasting Model (EEFM)¹² suggests that the East of England economy will employ a further 980,000 people over a twenty-year period by 2036, representing growth per annum of 0.7% and above the national average of 0.6%. Growth nationally is anticipated to continue to focus on the Greater South East (London, South East and East) given the high levels of innovation (compared to the other government office regions). The number of jobs in Cambridge compared to the wider area are shown in Table 5.3 below.

Table 5.3: Growth in Total Employee Jobs

	Cambridge	South Cambs	Greater Cambridge ¹³	CPCA ¹⁴	East	UK
Population, 000s						
2016	131	157	288	847	6,114	65,572
2036	160	195	355	1,010	7,096	73,361
2045	172	210	382	1,071	7,456	76,055
Absolute change, 000s						
2016-2036	29	38	67	163	982	7789
2016-2045	40	53	94	224	1,342	10,483
Annual growth rate (CAGR), %						
2016-2036	1.0%	1.1%	1.0%	0.9%	0.7%	0.6%
2016-2045	0.9%	1.0%	1.0%	0.8%	0.7%	0.5%
Employment, 000s						
2016	107	82	189	464	3,040	34,008
2036	123	90	213	519	3,359	36,582
2045	130	94	224	543	3,498	37,815
Absolute change, 000s						
2016-2036	16	8	24	54	319	2,574
2016-2045	24	12	35	79	458	3,806
Annual growth rate (CAGR), %						
2016-2036	0.7%	0.5%	0.6%	0.6%	0.5%	0.4%
2016-2045	0.7%	0.5%	0.6%	0.5%	0.5%	0.4%

Source: EEFM, Cambridge Econometrics, 2016

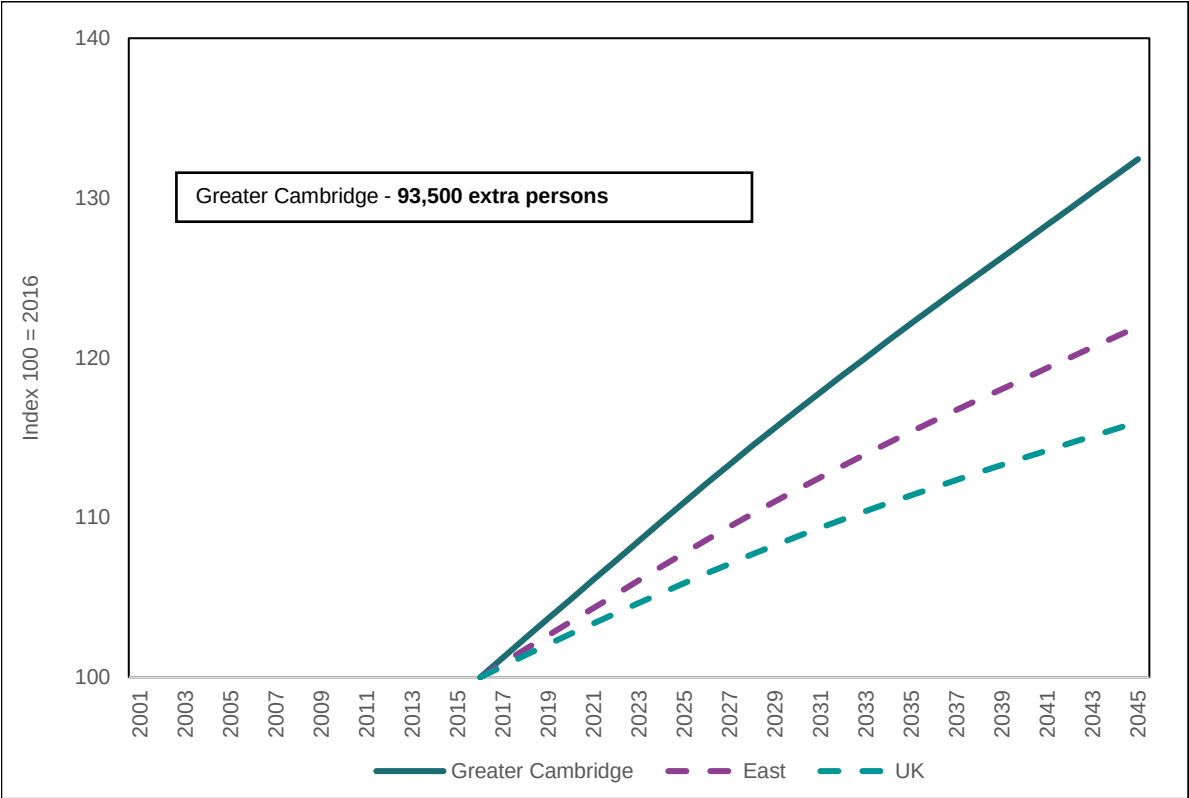
¹² The East of England Forecasting Model (EEFM) has been designed to facilitate the setting of consistent housing and jobs targets by provides a set of baseline forecasts prepared by Cambridge Econometrics for the East of England region and sub-regions (counties, unitaries and district authorities). The overall model structure captures the interdependence of the economy, demographic change and housing at a local level, as well as reflecting the impact of broader economic trends on the East of England. EEFM forecasts are based on historical past trends and are unconstrained, i.e. they do not take into account any policy or other constraints that might prevent their actual realisation on the ground. For more information refer to: <https://cambridgeshireinsight.org.uk/EEFM/>

¹³ Greater Cambridge is Cambridge and South Cambs combined.

¹⁴ CPCA data covers the local authority areas of Cambridge, South Cambridgeshire, East Cambridgeshire, Huntingdonshire, Fenland and Peterborough

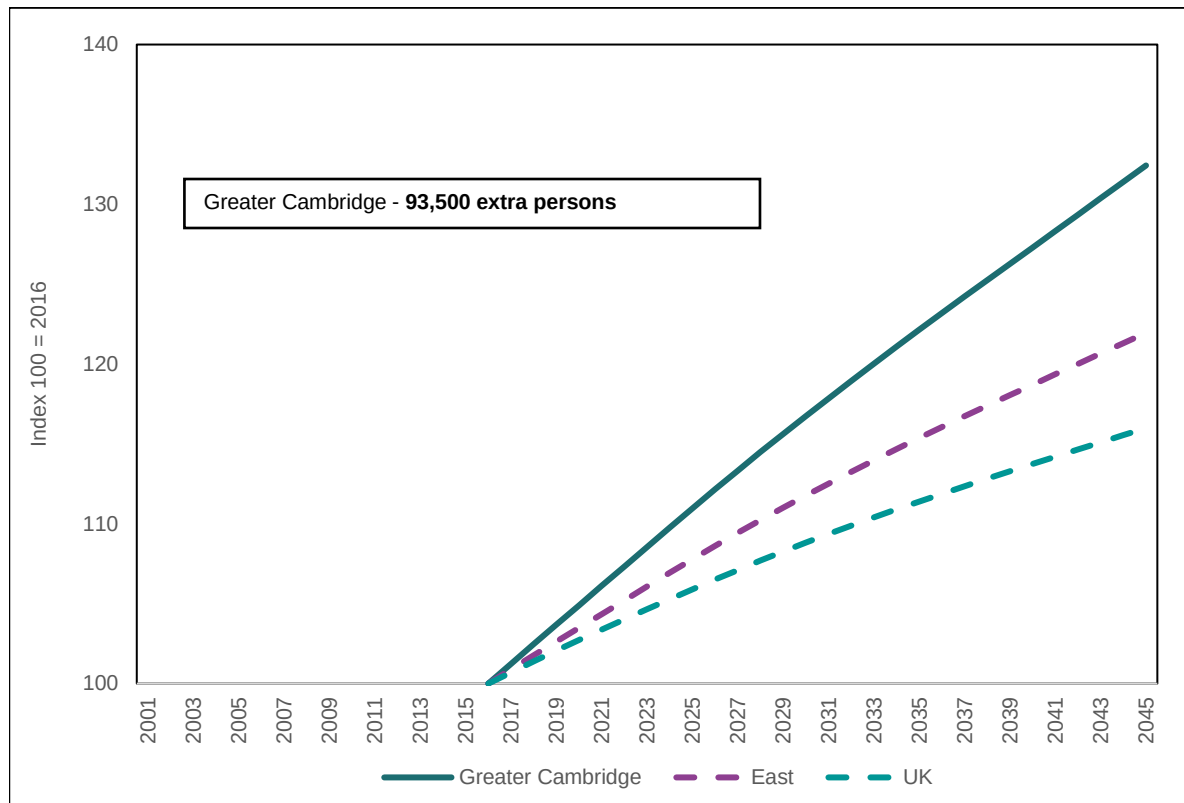
Between 2016 and 2045, as shown in Figure 5.5 and Figure 5.6 below, the rate of population and employment growth in Greater Cambridge is set to significantly outstrip the East and UK rates of growth. This is due to the strong historical performance of the city and its unique competitive strengths.

Figure 5.5: Indexed Population Growth Estimates, 2016-2045



Source: EEFM, Cambridge Econometrics, 2016

Figure 5.6: Indexed Employment Growth Estimates, 2016-2045



Source: EEFM, Cambridge Econometrics, 2016

Table 5.4 below compares the growth forecasts from the EEFM model to the growth targets within the Local Plans and actual employee growth over the 2011-16 period. Overall the total job growth in Greater Cambridgeshire over the planning period, 2011-31, was established as 44,100 jobs which informed the growth identified within the City Deal.

Although this growth is ambitious when compared to the latest EEFM 2016 figures (36,000 jobs over 2011-2031) it is in line with recent actual employee growth recorded in the national data. As shown in Figure 5.6 above, job growth exceeds the national rate significantly and is driven by the high-tech sectors, namely professional, scientific and technical, human health, and information and communication activities.

Table 5.4: Comparison of Growth Forecasts

	Local plans - jobs target 2011- 31	EEFM jobs growth 2011-31	Actual No. Employees growth BRES 2011-16
Cambridge	22,100	25,300	13,000
South Cambridgeshire	22,000	10,700	11,600
Greater Cambridge ¹⁵	44,100	36,000	24,600

Source: EEFM, Cambridge Econometrics, 2016

¹⁵ Greater Cambridge refers to the city of Cambridge and South Cambridgeshire but excludes Peterborough

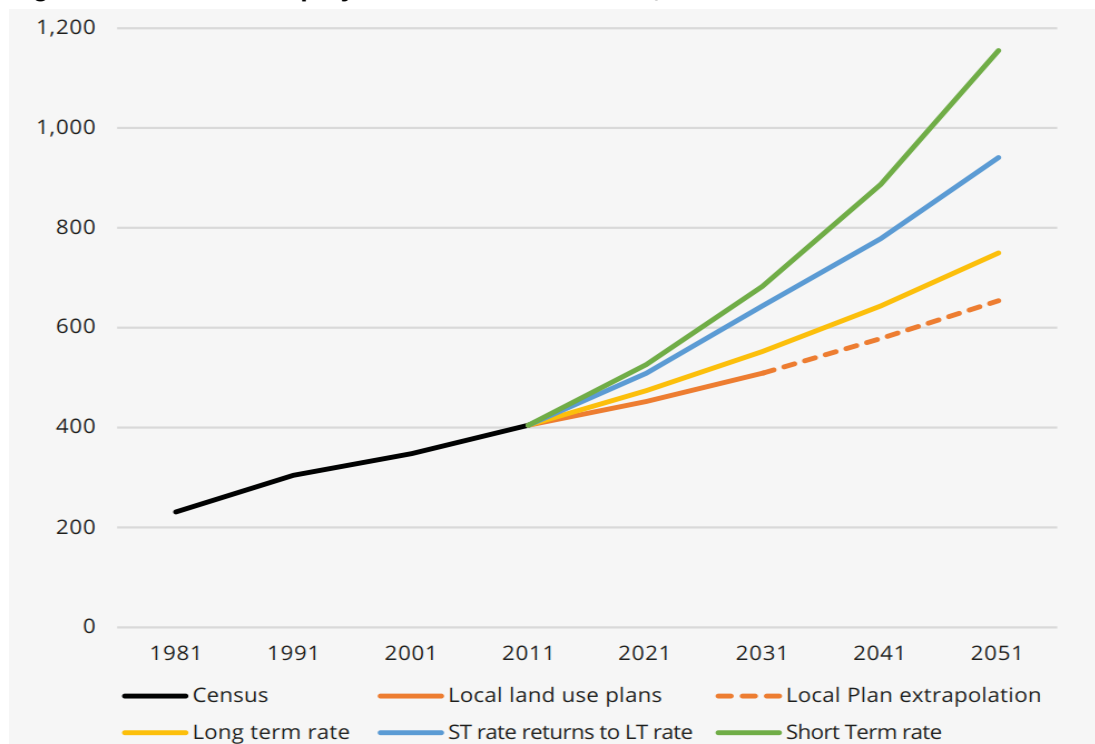
The CPIER articulates that not only has historical employment growth been underplayed but future employment growth could be much higher than these levels. The report has set out four scenarios for the future, which inform recommendations about how development will be carried out and what infrastructure is likely to be needed to position the area well, to maximise the benefits presented by opportunities associated with growth in the future. This includes examining the options for densification, fringe growth, dispersal, transport corridors and deeper digital transformations.

The modelling carried out was driven by employment growth and as this grows so does the demand for housing and the pressure on the transport system. The model has been run by the CPIER for four scenarios:

1. **Local land use plans** – capturing the assumptions around the employment targets underpinning the Local Plans;
2. **Employment Growth** – Longer term rate. Based on a continuation of the 1981-2016 trend of employment growth (no weight given to recent high levels of employment growth);
3. **Employment Growth** – Shorter term rate. Based on a continuation of the 2010-2015 employment growth trends according to the recent Centre for Business Research (CBR) data; and
4. **Employment Growth** – shorter term (ST) rate returning to longer term (LT) rate. This is the central projection of the four. It assumes first a continuation of growth rates closer to higher recent Office of National Statistics (ONS) employment growth rates, before gradually returning to longer term ONS growth rates.

The findings in relation to these scenarios are shown in Figure 5.7 and include Peterborough as well as the Cambridgeshire local authority areas. Clearly, forecast growth according to the employment projections from historical performance demonstrate that the growth le assumed within the Local Plans are very low and at the lower bound of the projections. Figures for Greater Cambridge on its own are not yet available, but this analysis, when looking at the central projection indicates that the 44,100 jobs target within the Local Plans is perhaps inherently pessimistic and planning and transport policy needs to be actively planning for further growth.

Figure 5.7: Indexed Employment Growth Estimates, 2016-2045



Source: Dr Ying Jin, Department of Architecture, University of Cambridge (CPIER)

If employment grows as anticipated at local land use plan levels, there will be an increased number of commuter trips and resultant issues across the transport network. If employment grows at higher rates (under the Shorter-Term rate scenario) there could be 82% more commuters travelling into Cambridge by 2031 when compared with 2011 levels¹⁶, with a number of significant transport issues arising as a result if the transport network does not evolve to accommodate such growth.

5.2.2 Cambridgeshire's Employment Sectors

A summary of employment by sector is provided in Table 5.5 and Figure 5.8. Employment is mostly concentrated in the professional, scientific and technical services and the education sectors. The dominance of these two sectors can largely be attributed to the growing biomedical campuses and the expansion of the University of Cambridge and associated facilities which has attracted both UK and international businesses.

The proportion of jobs in Human Health and Social Work activities is shown to be significant, representing 12.8% of all jobs in Cambridgeshire. This proportion can also largely be attributed to the significance of the Biomedical sector within Cambridgeshire and the ongoing investment from large pharmaceutical companies such as AstraZeneca which moved its global research headquarters to Cambridge in 2016. It should be noted that both Cambridge Biomedical Campus and the headquarters of AstraZeneca are located in close proximity to the A1307 corridor, indicating the significance of the study area as a strategically important employment hub for the UK.

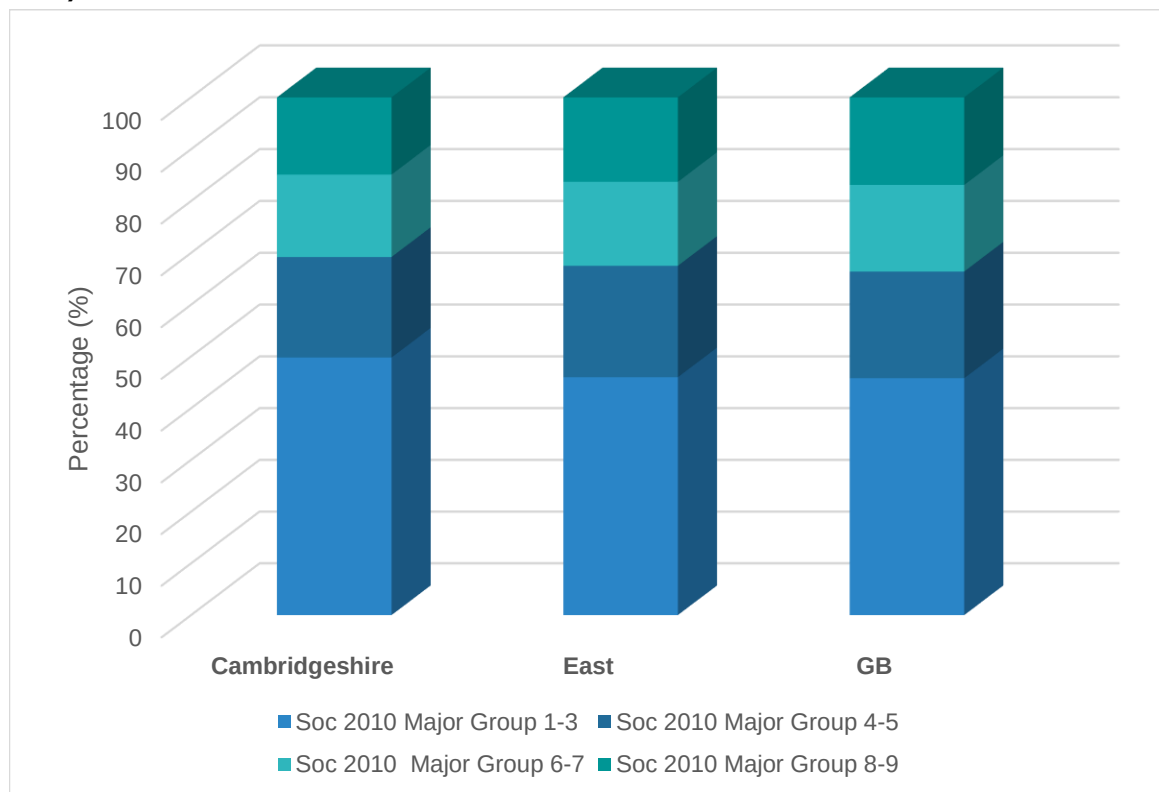
¹⁶ Cambridge & Peterborough Independent Economic Review (CPIER), Final Report, September 2018

Table 5.5: Employment Sectors in Cambridgeshire

Employment Sector	Cambridgeshire (Employee Jobs)	Cambridgeshire (%)	East (%)	Great Britain (%)
Manufacturing	32,000	9.8	8.0	8.2
Electricity, Gas, Steam and Air Conditioning	600	0.2	0.3	0.5
Water Supply	3,000	0.9	0.6	0.7
Construction	14,000	4.3	5.5	4.8
Wholesale and Retail Trade	42,000	12.8	17.1	15.2
Transportation and Storage	10,000	3.1	4.9	4.7
Accommodation and Food Service Activities	21,000	6.4	6.8	7.5
Information and Communication	18,000	5.5	3.6	4.4
Financial and Insurance Activities	4,000	1.2	2.4	3.5
Real Estate Activities	4,500	1.4	1.5	1.7
Professional, Scientific and Technical Activities	46,000	14.10	9.3	8.4
Administrative and Support Service Activities	24,000	7.3	10.5	9.1
Public Administration and Defence	9,000	2.8	3.0	4.3
Education	41,000	12.5	8.8	8.9
Human Health and Social Work Activities	42,000	12.8	12.6	13.3
Arts, Entertainment and Recreation	7,000	2.1	2.7	2.6
Other Services	7,000	2.1	1.9	2.0

Source: ONS Business Register and Employment Survey (2017)

Figure 5.8: Employment by Standard Occupation Classification (Soc) (October 2015-September 2016)



Source: ONS Annual Population Survey

The standard occupation classification groups referred to in Figure 5.8 are based on the classifications set out in Table 5.6.

Table 5.6: Employment by Occupation

Standard Occupation Classification (Soc) 2010 Major Group	Occupation
Soc 2010 Major Group 1-3	1. Managers, Directors and Senior Officials
	2. Professional Occupations
	3. Associate Professional and Technical
Soc 2010 Major Group 4-5	4. Administrative & Secretarial
	5. Skilled Trades Occupations
Soc 2010 Major Group 6-7	6. Caring, Leisure and Other Service Occupations
	7. Sales and Customer Service Occupations
Soc 2010 major group 8-9	8. Process Plant and Machines Operatives
	9. Elementary Occupations

Source: ONS Annual Population Survey

The distribution of employees across the Soc Major Groups provides an indication of the type of jobs that are available in Cambridgeshire and the level of skills required to obtain employment in the study area. In Cambridgeshire, almost half of the people in employment work in Soc 2010 major group 1-3 positions.

Cambridgeshire displays a higher proportion of people in managerial positions, professional occupations and associated professional technical positions in comparison to the East of England and Great Britain. Conversely, Cambridgeshire has a significantly lower proportion of people employed in Soc Major Group 6-7 and SOC Major Group 8-9.

The proportion of jobs in Cambridgeshire which are classified within Soc major group 1-3 means that employers need to attract labour from outside of the immediate area to recruit individuals with the necessary skills to fill these positions. Cambridgeshire needs to ensure therefore that links into and out of the area are improved to provide ease of access and present an attractive offer to individuals with the specified skills set.

Key Issues and Opportunities

Table 5.7 below highlights the key issues and opportunities for the CSET Phase 2 scheme in relation to employment and skills in Cambridgeshire.

Table 5.7: Summary of Key Issues & Opportunities – Socio-Economic (Employment)

Issues	Opportunities
<ul style="list-style-type: none"> Highly skilled professionals are required to fill a relatively large proportion of the jobs on offer in Cambridgeshire. Employers in Cambridgeshire therefore recruit from outside of the immediate area in order to find individuals who meet the specific requirements of job roles on offer. As a result, a large number of individuals work in Cambridgeshire but live outside of the area, leading to a high number of peak time commuters. High numbers of commuters are causing congestion problems during peak times, particularly in south east Cambridgeshire as individuals travel to employment opportunities in central Cambridge and further sites along the A1307 corridor. 	<ul style="list-style-type: none"> Cambridgeshire has a large proportion of people working in professional, scientific and technical activities compared to the national average. Increased employment within these sectors presents the opportunity to further excel Cambridgeshire, and in particular South Cambridgeshire as a destination of excellence in science and industry. Thereby attracting more jobs, employment opportunities and investment and boosting the local economy. CSET Phase 2 will provide attractive sustainable travel options that will help to accommodate existing and future commuter demand, providing a more efficient and sustainable transport network overall. Enhanced public transport and provision of an additional Travel Hub will alleviate pressure on the A1307.

So, what does this mean for CSET Phase 2?

The A1307 is a key route into the centre of Cambridge and provides direct links to Cambridge Biomedical Campus and a number of other employment centres to the south east of Cambridge including Granta Park and Babraham Research Campus. In recent years business growth across the south east of Cambridgeshire has placed increased pressure on the corridor, leading to long delays during peak times and unreliable journey times for commuters.

Delivery of CSET Phase 2 will support existing demand along the corridor whilst futureproofing the corridor to accommodate further growth. The provision of attractive sustainable transport modes along the corridor will provide commuters with a viable alternative to car travel. Improved travel choice and reduced pressure on the road network will ensure employers can continue to attract the necessary workforce to fill employment opportunities and that skilled individuals are not discouraged from seeking opportunities in Cambridgeshire as a result of unreliable journey times and a lack of other alternative modal options.

6 Economy and Business

This section of the report provides a breakdown of the business performance and economy of Cambridge and Cambridgeshire focusing primarily on the performance of businesses within the study area, along and around the A1307 corridor. Economic growth here has outpaced both the East of England and UK over the last decade and significantly increased the contribution that the county makes to the country. This has been driven primarily by rapid business creation and growth in South Cambridgeshire, particularly around the A1307 corridor.

6.1 The Cambridge Phenomenon

Greater Cambridge is renowned for being a world-leading centre for research, innovation and technology. Over the past 50 years there has been an explosion of globally significant companies and innovations across bioscience, medicine and technology. The 'Cambridge Phenomenon', is a term that describes the thriving hi-tech and biotech industry, which has developed since the 1960's. The GCP's current vision is to:

"Unleash a second wave of the 'Cambridge Phenomenon', with the aim of 'securing sustainable economic growth and quality of life for the people of Cambridge and South Cambridgeshire'".

Rapid business creation and growth in South Cambridgeshire, particularly around the A1307 corridor, as part of the 'Cambridge Phenomenon' has created jobs and prosperity in Greater Cambridge. The success of Greater Cambridge brings jobs and opportunities, not only for the City Region, but for the whole region and helps the UK economy to compete and attract high calibre knowledge-based individuals to fill gaps and increase economic growth. The city embodies the key foundations of the National Industrial Strategy¹⁷ for the UK to become the world's most innovative economy.

The success experienced over recent years is largely due to:¹⁸

- A world class university that draws talent from across the globe, fostering innovation and encouraging new businesses;
- The area's scale and connectedness allow overlapping networks to develop and facilitate a culture of co-operation and cross-fertilisation between entrepreneurs and academics, and;
- Retaining a strong heritage and sense of place, thereby competing with other world cities as a good place for business leaders and their families to live, not just a good place to do business.

The sub-region is home to world-leading research centres such as the MRC Laboratory for Molecular Biology, the Babraham Institute for immunology research, and the Wellcome Trust Sanger Institute for genomic research. This year the new Papworth Hospital will open at the Biomedical Campus, uniting this internationally recognised heart and lung treatment institution with other world-leading healthcare organisations.

¹⁷ Industrial Strategy: Building a Britain fit for the future, HM Government, November 2017

¹⁸ City Deal, Greater Cambridge City Deal Document, 2014

The University of Cambridge (UoC), which is amongst the world's top universities, attracts global talent, fosters innovation and encourages business spin-outs.

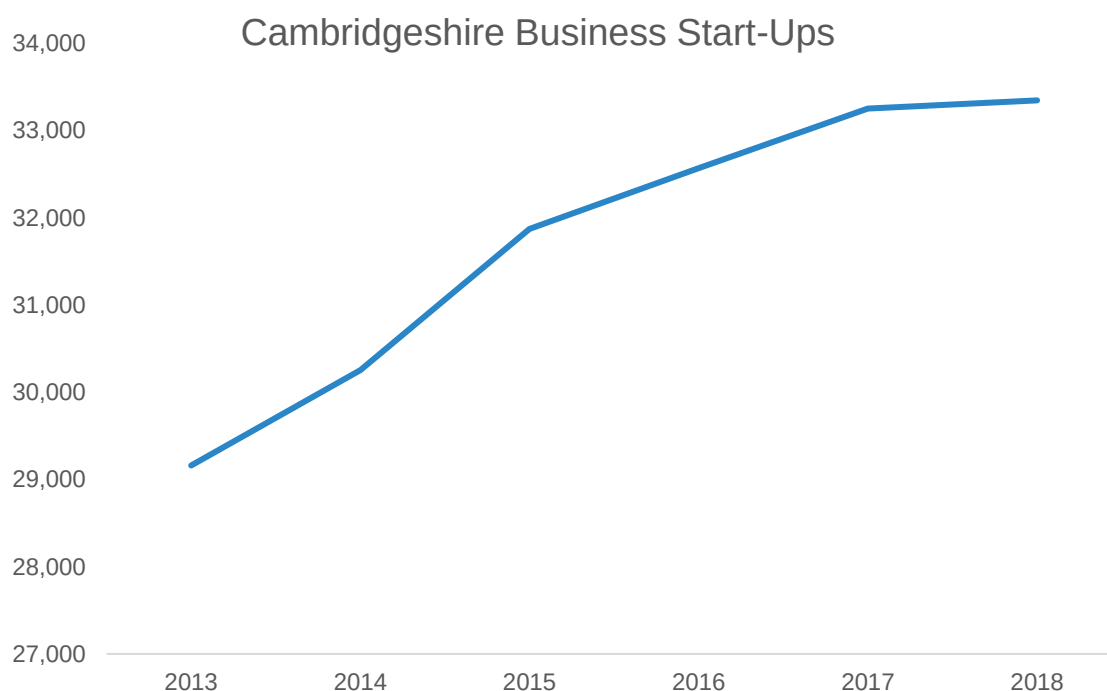
Cambridge has been at the forefront of the development of disruptive technologies, ranging from drug modelling, DNA sequencing and alternative fuels to network computing, inkjet printing, low power semiconductors, speech recognition software and telecommunications.

This entrepreneurial environment and concentration of people focused on science and engineering is attracting international businesses to invest in the area. More than 25 of the world's largest corporations have established operations in Cambridge, including Amazon, Apple, HP, Illumina, Microsoft, Sanofi, Siemens and Qualcomm. AstraZeneca has chosen Cambridge for its global research headquarters for 2,000 staff. Cambridge has transformed from a city characterised by a high rate of start-ups to a city which major companies class worthy of housing headquarters.

6.2 Business Growth

Building on the success of the 'Cambridge Phenomenon', Cambridgeshire has successfully built a reputation as an attractive location to invest and expand businesses, bringing businesses to Cambridge which might otherwise not have invested in the UK. Economic growth experienced has been driven primarily, but not entirely, by rapid business creation. The rate of business start-ups over the past five years is indicated below in Figure 6.1.

Figure 6.1: Cambridgeshire's Business Start Ups



Source: ONS 2018

Rapid growth in business start-ups can be seen between 2013 and 2017, with an impressive increase of nearly 10% during this four-year period. The slowest rate of growth can be seen between 2017 and 2018, and although the data presented was published before the end of 2018, it suggests growth is possibly slowing down.

If this is indeed the first indication of growth slowing, Cambridgeshire must identify and address the factors which may have recently deterred businesses from investing in the area at the same rate as previously experienced.

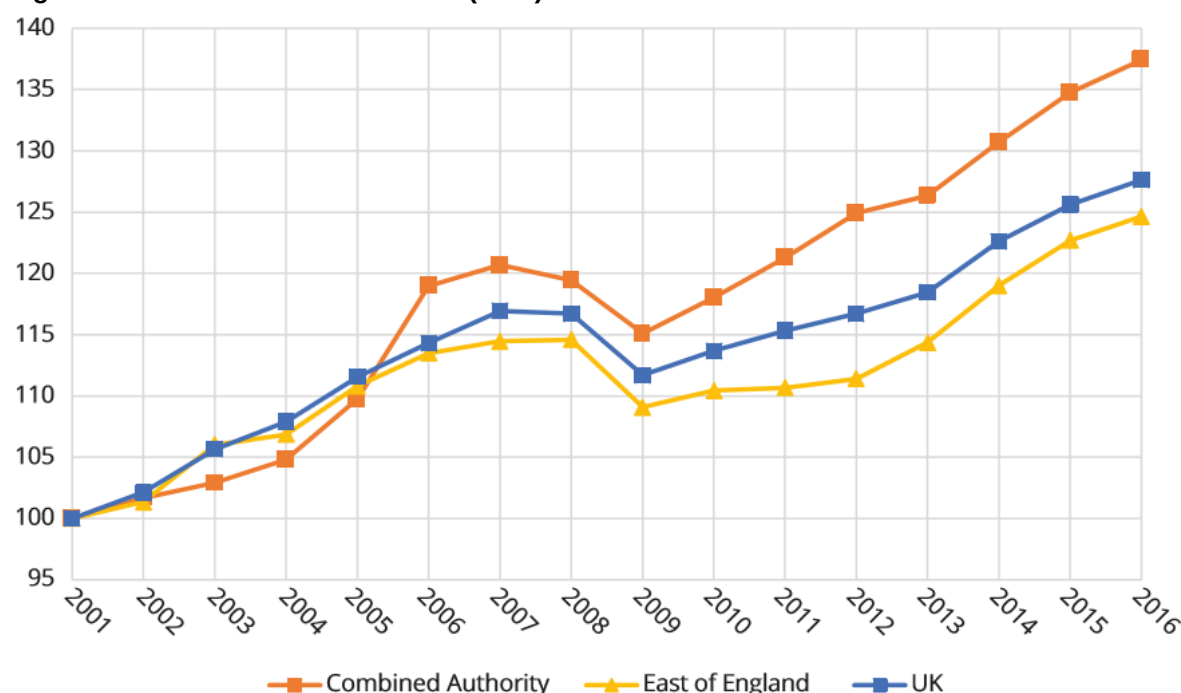
Cambridge and South Cambridgeshire's recent economic success is also attributable to the connectivity across the City, and its surrounding area. Likewise, this slowdown in business start-up rates could be linked to supply side constraints, such as labour market accessibility.

Transport infrastructure in the area needs to be able to support not only the current pace of growth, but also be future proofed to prepare for further emerging opportunities. A lack of investment in infrastructure could limit future growth in Cambridgeshire and may lead to slower economic growth and a loss of international competitiveness for the UK. The growth seen in Cambridgeshire and South Cambridgeshire in particular, is unlikely to be sustained in the future without further and significant investment in the infrastructure. Businesses are already beginning to note this as a major concern, suggesting action must be taken imminently¹⁹.

6.3 Gross Value Added (GVA)

Recent work undertaken as part of the CPIER has provided the most up to date analysis of GVA for the Cambridgeshire and Peterborough Combined Authority (CPCA) area. Figure 6.2 displays GVA growth between 2001 and 2016.

Figure 6.2: Real Gross Value Added (GVA)- Index 2001=100



Source: CPIER, 2018

GVA growth across the CPCA area has increasingly outpaced both the East of England and the rest of the UK, with record high GVA levels recorded in 2016. Research suggests that GVA growth across the CPCA area has been primarily driven by Cambridgeshire and more specifically, South Cambridgeshire. GVA generated in South Cambridgeshire is primarily a

¹⁹ Cambridgeshire and Peterborough Independent Economic Review, 2018.

result of the ongoing growth of the technology and science clusters centred around the A1307 corridor.

Ongoing growth in South Cambridgeshire, centred around the A1307 corridor brings huge opportunities for the area. However, in tandem this also brings burgeoning issues associated with the transport infrastructure and limited sustainable transport options along the corridor. The current demand alone has led to capacity issues along the corridor, poor accessibility and issues associated with delays and air quality. Failure to respond to these issues may compromise the rate of growth along the A1307 corridor.

Key Issues and Opportunities

Table 6.1 below highlights the key issues and opportunities for the CSET Phase 2 scheme in relation to economy and business in Cambridgeshire.

Table 6.1: Summary of Key Issues & Opportunities - Economy & Business

Issues	Opportunities
<ul style="list-style-type: none">Cambridge is strategically important for attracting international investors into the UK and maintaining the UK's international competitiveness. However, this relies on Cambridgeshire continuing to offer strong links between businesses, training campuses and housing developments.Rapid business creation and the number of businesses choosing to locate in Cambridgeshire has increased pressure on the existing transport network.The existing transport network is inadequately equipped to accommodate current demand. If the network does not evolve at the same rate as economic growth, this problem will inevitably worsen.Businesses may be deterred from investing if accessing the employment site is difficult for their workforce.Existing businesses may struggle to attract labour from outside of the local area as journey times are long and unreliable. This may also deter investors and businesses locating to the area.The rate of business start-ups has slightly declined recently. Cambridgeshire must establish the reason for this and seek to address concerns.	<ul style="list-style-type: none">Cambridgeshire has a worldwide reputation and strong existing economic base, and one which continues to grow. Infrastructure to support and facilitate continued access to employment and homes will equip the area to deal with expansion and thus support sustainable economic growth.The proposed Travel Hub will improve accessibility to key employment sites, including Babraham Research Campus, Granta Park and Cambridge Biomedical Campus, encouraging investment and supporting existing businesses. This will also alleviate pressure on the A1307.Cambridgeshire must ensure that sustainable modes of travel are attractive to an ever-increasing number of commuters. The proposed scheme will provide a viable alternative to private car travel, reducing congestion along key routes and providing benefits for the environment and quality of life.

So, what does this mean for CSET Phase 2?

The A1307 is a key commuter route, serving central Cambridge, Cambridge Biomedical Campus and a number of other employment centres and medical campuses to the south east of Cambridge including Granta Park and Babraham Research Campus. Growth of employment opportunities at a number of locations, has placed increased pressure on the transport corridor, leading to delays during peak times and unreliable journey times for commuters.

Delivery of a dedicated public transport route and a new Travel Hub facility as part of Phase 2 of the CSET scheme will alleviate existing demand for private car travel on the corridor and futureproof it to accommodate anticipated growth in demand. The scheme will improve the provision of sustainable transport modes along the corridor, providing commuters with an attractive and viable alternative to car travel.

Improvements to the transport corridor could support access to a wider workforce and strengthen the links between key training and employment centres, bringing benefits of agglomeration and knowledge sharing. In this way, attractive and sustainable travel options could support sustainable economic growth across Cambridgeshire and help to maintain Cambridge's world-leading offer, and in turn the UK's international competitiveness.

7 Land Use and Development

A significant level of development is planned across Cambridgeshire over the Local Plan period (2011-2031), which will provide employment space to underpin the growth targets. The local authorities' aim is to ensure sufficient land is available to accommodate the 22,100 forecast new jobs in Cambridge by 2031, including some 8,800 in B-use class (offices and industry). Therefore, provision has been made for the development of at least 12 hectares of employment land (net) from April 2011 to March 2031.

Furthermore, there is a strong pipeline of employment space beyond 2031. Investments in transport infrastructure will be critical to unlock the growth potential of Cambridge and South Cambridgeshire, and to achieve this transport network capacity, high congestion levels, and poor reliability issues will need to be addressed.

It is worth noting, as set out in the CPIER, that the economic success of Greater Cambridge, has in large part been a result of the historical approach to planning at the turn of the 21st century²⁰ which led to areas of the Cambridge Green Belt being freed for important developments and various market towns being expanded. A key element of this was the release of Green Belt land to enable the development of the Cambridge Biomedical Campus. This proactive approach to development continues in the current Local Plans but, as highlighted above, recognising the growth potential will require not only investment in transport but addressing housing shortages and ensuring sufficient employment floorspace is available post 2031 (the end point of the 2018 adopted Local Plans).

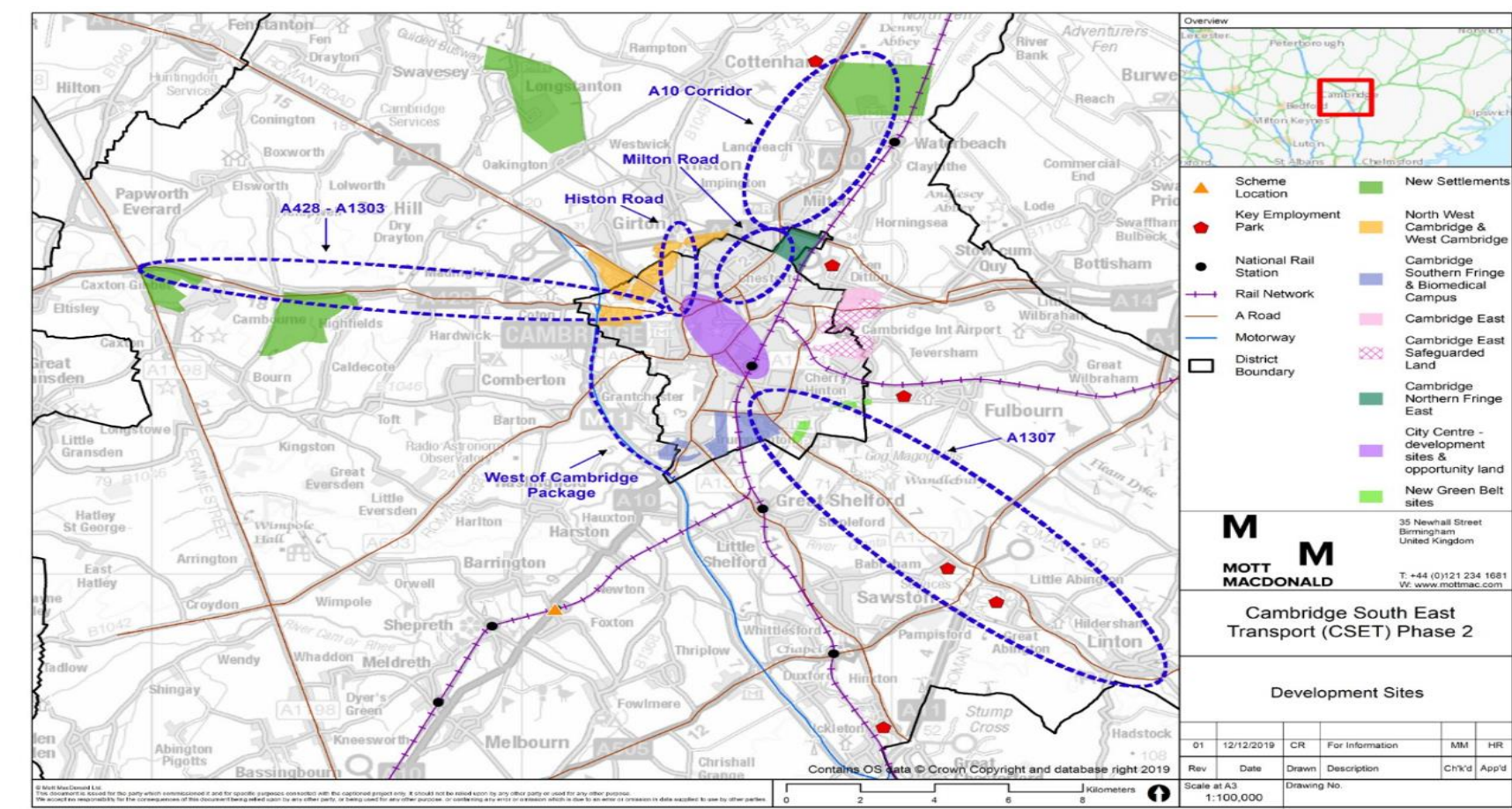
Figure 7.1 illustrates the major planned development sites, categorised into six key areas including:

- New Settlements;
- North West Cambridge and West Cambridge;
- Cambridge Southern Fringe and Biomedical Campus;
- Cambridge East;
- City Centre developments; and
- Existing employment locations.

Overlaid on the map are the City Deal transport schemes for reference. The A1307 corridor can be seen to the South East of the map.

²⁰ Discussed further below but set out fully in the Cambridge & Peterborough Independent Economic Review (CPIER), Final Report, September 2018.

Figure 7.1: Map of Key Development and City Deal Schemes



Source: Mott MacDonald, August 2016

7.1.1 Development in South East Cambridge

Of significance to Phase 2 of the CSET scheme is the level of proposed development in Cambridge's Southern Fringe and Biomedical Campus. A more detailed illustration of the major development sites in this area is provided in Figure 7.2.

Figure 7.2: Cambridge's Southern Fringe Major Development Sites



Source: Cambridge City Council, Cambridge Local Plan 2014: Proposed Submission. July 2013

Together, the developments across Cambridge's Southern Fringe and Biomedical Campus are set to provide high-quality new neighbourhoods, high-skilled employment growth and expansion of the City's existing hospital provision. In summary the following growth is anticipated:

- Today, 17,250 people currently work on the Biomedical Campus, however this is expected to rise by more than 50% to 26,000 by 2031²¹.
- The number of patients and visitors is also anticipated to increase significantly, from approximately 798,600 patients in 2017 to a projected 1,382,800 patients in 2031²².
- Residential developments at Clay Farm, Glebe Farm, Trumpington Meadows and Bell School could bring forward over 4,000 new homes and new student accommodation²³.

AstraZeneca and R&D arm MedImmune have aspirations to build a new Global Research and Development Centre and Corporate Headquarters on the Biomedical Campus. The progression of the AstraZeneca expansion is currently on hold whilst there is currently uncertainty in relation to the outcome of Brexit²⁴. However, if completed, there will be more 2,000 AstraZeneca and MedImmune research and development science jobs alone across the Campus²⁵.

²¹ Greater Cambridge Partnership Website, <https://www.greatercambridge.org.uk/transport/transport-projects/city-access/cambridge-biomedical-study/>, Accessed 17th October 2018

²² Atkins on behalf of Cambridgeshire County Council, Cambridge Biomedical Campus Transport Needs Review – Part 2 Report, April 2018

²³ Cambridge City Council, Growth Site Guide (March 2018): Cambridge Southern Fringe, March 2018

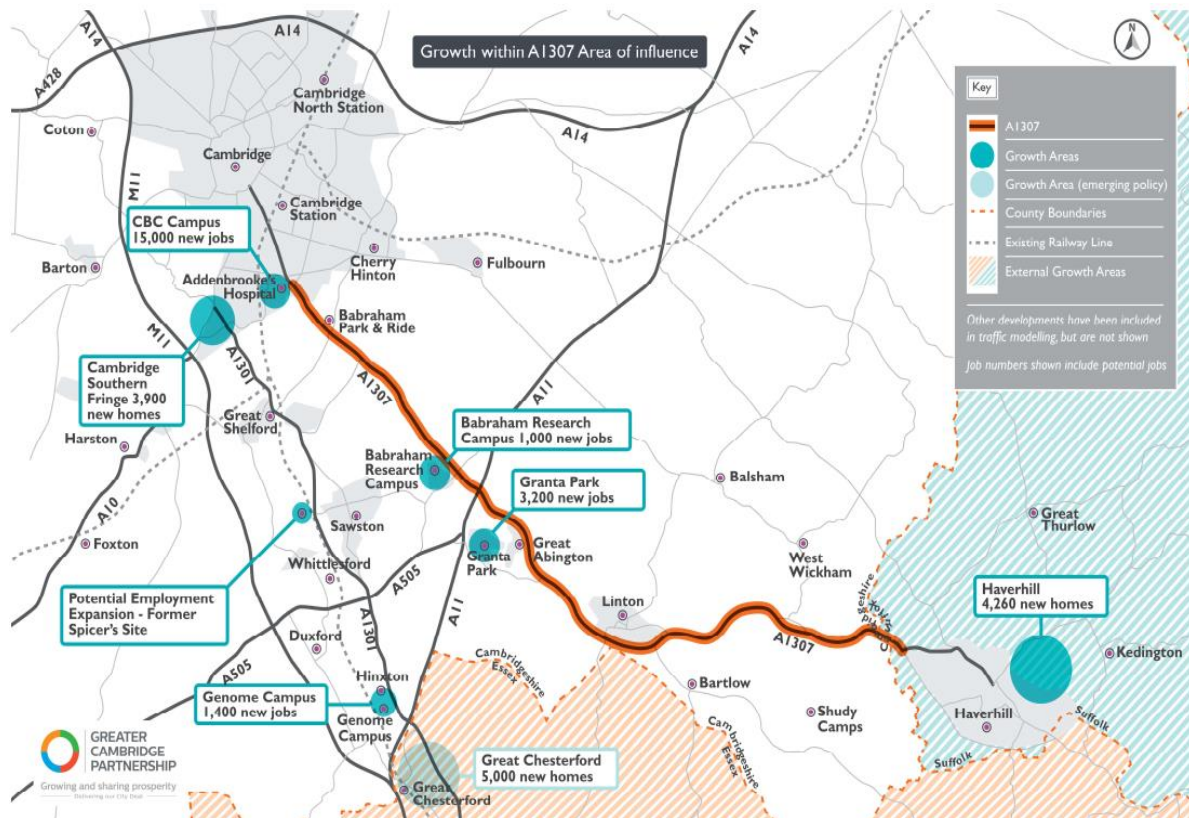
²⁴ The Guardian Website, <https://www.theguardian.com/business/2017/aug/27/astrazeneca-shrugs-off-brexit-fears-with-factory-expansion>, Accessed September 12th 2019

²⁵ AstraZeneca Website, <https://www.astrazeneca.com/our-science/cambridge.html>, Accessed 17th October 2018

7.1.2 Development Along the A1307 Corridor

Figure 7.3 shows the key growth areas in proximity to the A1307 corridor. A significant level of both commercial and housing led development is planned over coming years. Independently these growth areas would place a significant amount of pressure on the transport network in the area. However, collectively, the delivery of these planned developments will force the transport network beyond breaking point if action to accommodate increasing demand is not taken.

Figure 7.3: Cambridge's Southern Fringe Major Development Sites



Source: Cambridge City Council, Cambridge Local Plan 2014: Proposed Submission. July 2013

Works as part of the CSET Phase 2 scheme will reduce public transport journey times to key employment sites in proximity to the A1307 corridor and encourage journeys to be undertaken by active travel reducing the pressure which private car travel will place on the corridor.

Key Issues and Opportunities

Table 7.1 below highlights the key issues and opportunities in relation to land use and development in Cambridgeshire.

Table 7.1: Summary of Key Issues & Opportunities – Land Use & Development

Issues	Opportunities
<ul style="list-style-type: none"> • The level of planned development in Greater Cambridge will increase pressure on the existing transport network, resulting in deteriorating journey times and journey time reliability. • Increased demand on the road network across south east and central Cambridge will result in congestion and associated air quality issues. • Planned employment space may be left vacant if accessing the sites is deemed unattractive and inaccessible by the potential workforce. • Planned development may not come to fruition at the rate anticipated in the Local Plan if transport infrastructure is not in place to support development and expansion. 	<ul style="list-style-type: none"> • Addressing issues associated with Cambridgeshire's transport network will encourage planned development to come to fruition. Development will bring forward an unprecedented number of opportunities for economic growth. • CSET Phase 2 will improve active travel infrastructure along a section of the A1307 corridor, improving connectivity for pedestrians and cyclists. Improved active travel links will encourage commuters to adopt more sustainable modes of travel. • Preparing the transport network for future growth will secure a prosperous future for Cambridgeshire and encourage growth, post the Local Plan period, and provide economic benefits to the rest of the UK.

So, what does this mean for CSET Phase 2?

Existing transport infrastructure is not equipped to cope with the travel demand associated with the scale of development which is planned across south east Cambridge and central Cambridge. Failure to improve infrastructure adequately may stall the rate at which developments are delivered, slowing economic growth. Failure to invest in transport may ultimately result in a transport network which exceeds breaking point, resulting in increased delay, unreliable journey times, greater road safety concerns and increased greenhouse gas emissions.

CSET Phase 2 will deliver measures which will futureproof the network in preparation for planned growth. Attractive and reliable sustainable transport options will encourage uptake, alleviating pressure on the A1307 corridor and will help to accommodate greater demand.

8 How People Travel

This section explores the travel behaviour of those living/and or working within Cambridge and South Cambridgeshire. Data in this section has been primarily sourced from the 2011 census data produced by the Office of National Statistics.

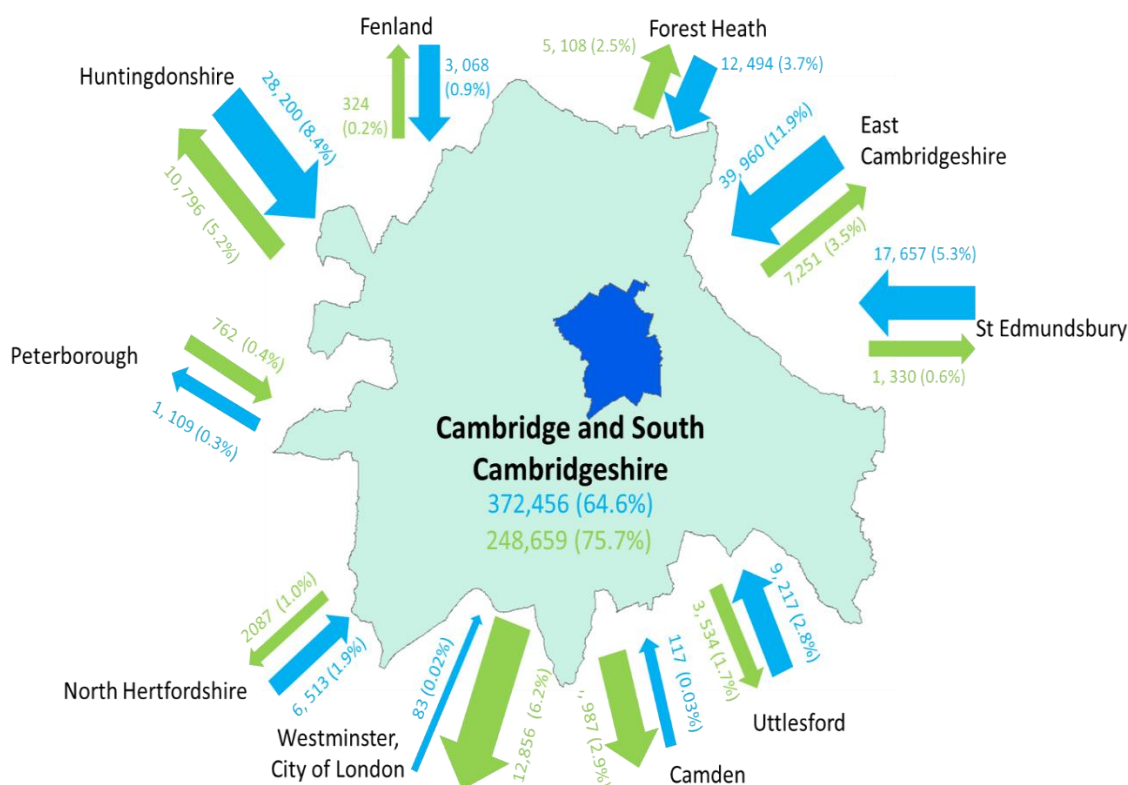
8.1 Commuter Trips

Figure 8.1 provides an overview of journey to work trips between Cambridge and South Cambridgeshire and key employment locations. The blue arrows show inbound travel to work trips, while the green arrows show outbound travel to work trips. Total numbers of people travelling are shown as well as the percentage share of the total incoming and outgoing trips.

Commuter flows indicate that inbound flows (372,456) are larger than outbound flows (248,659), highlighting the significance of the area as an employment hub for the surrounding region. The largest proportion of Cambridge and South Cambridgeshire's workforce travel from East Cambridgeshire and Huntingdonshire.

The largest proportions of outbound flows are to Westminster and the City of London, both to the south of the study area, and Huntingdonshire to the north west.

Figure 8.1: Incoming and Outgoing Commuter Flows

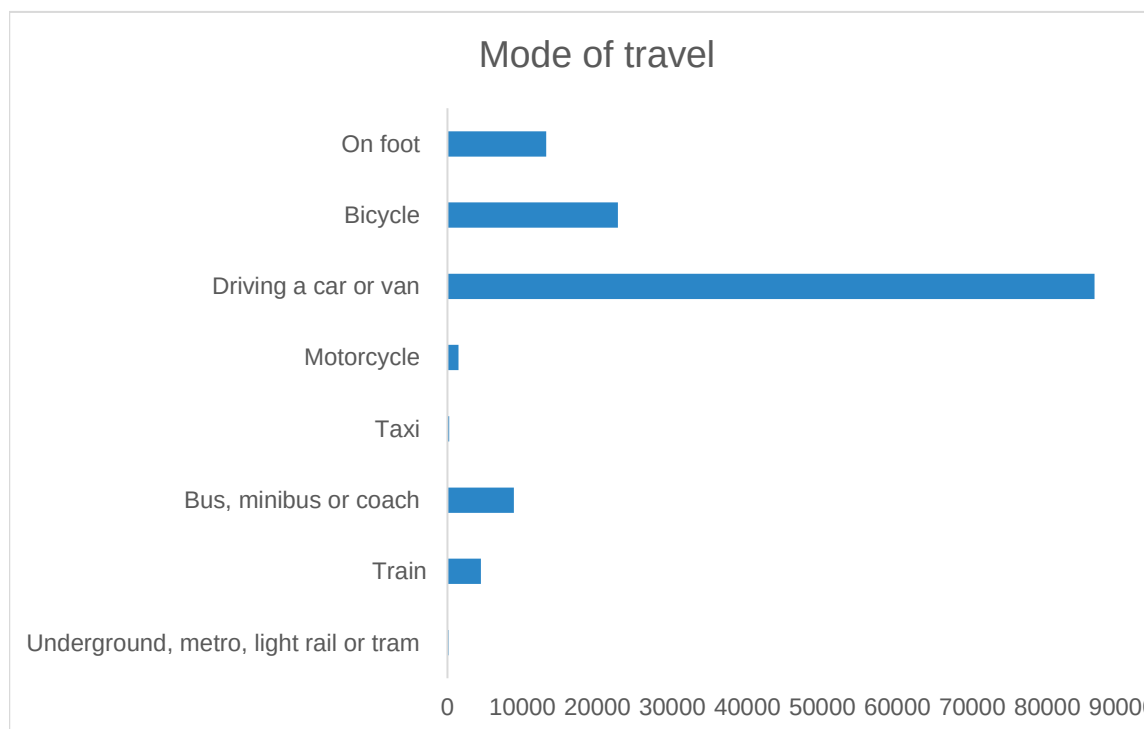


Source: Nomis WU03- Location of usual residence and place of work by method of travel to work (2011)

A large proportion of Cambridge and South Cambridgeshire's workforce live outside of the area and commute inbound making the accessibility of employment sites crucial to sustaining the necessary workforce to support continued economic growth across Cambridge and South Cambridgeshire and in turn maintain its international competitiveness. The transport network must flexibly adapt to the needs of those commuting into the area from different origin points.

Figure 8.2 below displays the modal split of Cambridge and South Cambridgeshire's workforce.

Figure 8.2: Modal Split in Cambridge & South Cambridgeshire



Source: Nomis WU03- Location of usual residence and place of work by method of travel to work 2011

63% of Cambridge and South Cambridgeshire's workforce as a whole commute by car or van, contributing significantly to the congestion experienced across the road network. As shown in Figure 8.1, a large proportion of those who work in Cambridge and South Cambridgeshire commute from east Cambridgeshire. The most popular routes to key employment sites in the south of Cambridge are via the A10 and the A1307.

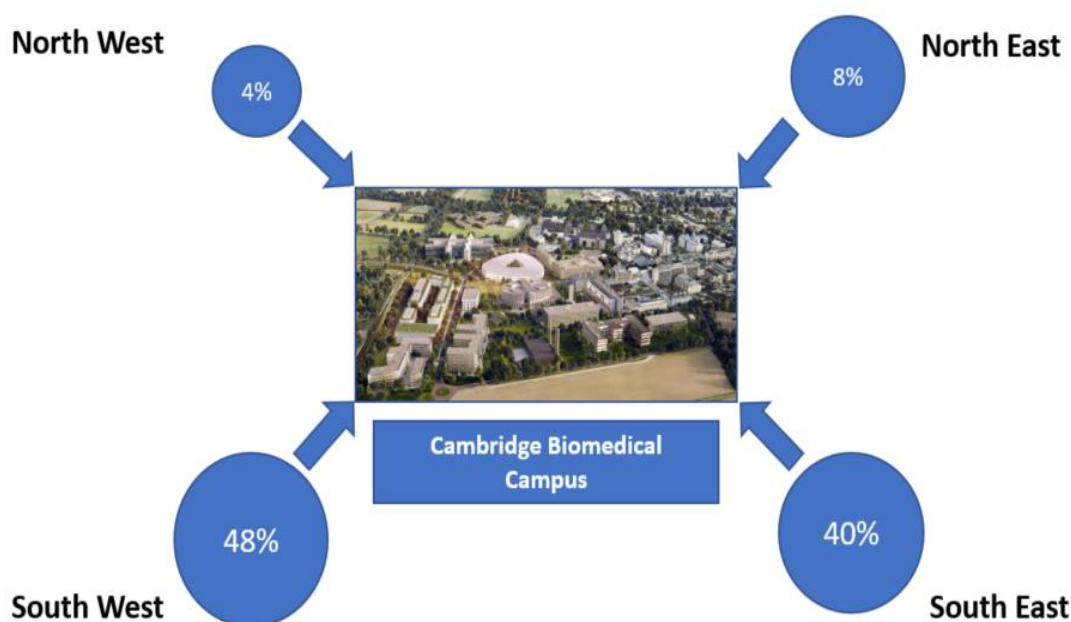
Data indicates that the second most popular mode of transport for commuters in Cambridge and South Cambridgeshire is bicycle. It is likely that the popularity of cycling to work is due to the number of people who live and also work in the immediate area. The short distance between origin and work destination makes cycling a viable, sustainable and attractive mode of travel.

Public transport appears to be a less favourable mode of travel for commuters. Census data analysed by Mott MacDonald during the development of this OBC indicates that only a small number of commuters opt for bus or train travel. However, it should be noted that this data was collected and published before the complete delivery of the Cambridgeshire Guided Busway which has experienced high levels of patronage, indicating a potential modal shift towards public transport which is not represented in data set provided here.

8.1.1 Roadside Interviews

The Cambridge Biomedical Campus is a major generator of travel demand. Roadside Interviews (RSI) conducted by CCC and Highways England in 2013 provide a detailed breakdown of travel patterns to the Campus for those journeys undertaken by car. RSI data provides information on where an individual is going to, coming from and for what purpose they are travelling by private vehicle. Interviews suggest that over 40% of staff who travel to the Campus by car, access the site from a south easterly direction as illustrated in Figure 8.3. Access from the south east is primarily facilitated by the A1307.

Figure 8.3: Direction of Staff Access to CBC by Vehicle



Source: RSI Data- CCC and Highways England

The proportion of staff accessing the site from the south west slightly exceeds the proportion accessing from the south east. However, the Local Plan anticipates the delivery of a significant number of houses to the south east of the CBC. It is likely that new housing developments will accommodate a proportion of the future workforce at the CBC. It can therefore be expected that an increased number of people will access the site from the south east in the future.

As an increased number of commuters will use the A1307 to access the Cambridge Biomedical Campus, the travel demand generated by the Campus, coupled with the demand associated with other developments along the A1307, will place an unprecedented amount of pressure on the corridor. The proposed location of the new Travel Hub is strategically located near to the junction between the A11/A1307/A505. The facility has the potential to intercept a significant proportion of car journeys that would otherwise travel along the A1307, towards central Cambridge and the Cambridge Biomedical Campus, resulting in congestion and excessive journey times along this stretch of the route, particularly during peak travel times. These car journeys could be replaced by more sustainable modes of travel via the new public transport route and associated NMU route as part of the Phase 2 scheme.

8.1.2 Forecast Increase in Private Car Trips

The Southern Fringe, including the CBC, is experiencing a high level of employment growth. Based on previous background work undertaken by Atkins in 2016, the Biomedical Campus alone (excluding Addenbrooke's Hospital) is expected to generate an additional 8,000 daily employee trips by the time it is fully operational. The current assumption is that at least 30% (2,400) of these additional trips are expected to be made by private car.

Congestion is already a major problem across Cambridge and South Cambridgeshire and threatens the liveability and attractiveness of Cambridge to residents, employees and visitors alike. Much of the congestion in Cambridge can be attributed to the heavy reliance on private vehicles²⁶. If trip forecasts outlined above prove to be accurate, an already congested road network will become worse with longer delays and increased unreliability.

It is expected that around 20,000 new jobs will be delivered across the CBC, Babraham Research Campus and Granta Park²⁷. The A1307 will be expected to accommodate a large proportion of all additional journeys generated by new job opportunities. Increased demand on this corridor will place an immense amount of pressure on infrastructure here. Infrastructure improvements must look to respond to forecast demand and accommodate it accordingly.

Key Issues and Opportunities

Table 8.1 below highlights the key issues and opportunities in relation to how people travel in Cambridgeshire.

Table 8.1: Summary of Key Issues & Opportunities – How People Travel

Issues	Opportunities
<ul style="list-style-type: none"> Cambridge is one of the fastest growing cities in the UK and as such, it is not surprising that Cambridge and South Cambridgeshire are net importers of people for work purposes. However, the transport network is not equipped to accommodate the scale of inbound commuter flows. 63% of Cambridge and South Cambridgeshire's workforce commute by car or van resulting in congestion and associated air quality issues across many of central Cambridge's key radial routes. Ongoing growth at key employment sites across south east Cambridge and central Cambridge will result in increased commuter demand on the A1307 corridor where there is a lack of alternate travel modes to car. The CBC employs a large number of people and is a significant generator of travel demand. 40% of staff at the campus access the site from the south east, using the A1307, resulting in congestion and delays at peak times. 	<ul style="list-style-type: none"> An increased number of sustainable travel options across south east Cambridge may encourage a modal shift away from car travel resulting in a more sustainable travel environment. Improved public transport and walking and cycling provision across south east Cambridge could attract potential employees to opportunities in the area which will be essential to securing future growth of businesses in the area. The proposed Travel Hub facility is strategically located to intercept a large number of journeys heading into central Cambridge and towards the CBC and Babraham Research Campus. The onward public transport route and NMU route would provide a more sustainable link to key destinations whilst also providing journey time savings and journey time reliability for users.

²⁶ City Access and Bus Service Improvements Update- Greater Cambridge Partnership, 2018

²⁷ City Access and Bus Service Improvements Update- Greater Cambridge Partnership, 2018

So, what does this mean for CSET Phase 2?

63% of Cambridge and South Cambridgeshire's workforce commute by car or van, contributing to a growing congestion problem across central Cambridge's radial routes. A large proportion of commuters rely on the A1307 to access job opportunities in central Cambridge and south east Cambridge due to a lack of alternate routes and modal options.

There is significant potential for a growth in job opportunities across three of south east Cambridge's key employment sites; Cambridge Biomedical Campus, Babraham Research Campus and Granta Park, as well as potential for ongoing growth across central Cambridge. This is likely to put increased pressure on the A1307 corridor; thus, corridor improvements could support this continued growth in employment opportunities.

A new Travel Hub facility close to the A11 junction could intercept a proportion of car trips from areas to the south and east of central Cambridge, reducing the number of car trips into central Cambridge and towards the CBC and Babraham Research Campus. The Travel Hub facility will present existing and potential users of the A1307 with a sustainable alternative to car travel, offering the opportunity to travel by HQPT or via cycling and walking. Sustainable travel options in south east Cambridge may encourage a modal shift away from car travel.

9 Environment

The environmental constraints identified during the development of the SOBC have been reviewed and considered in this section of the report and built upon.

9.1 Air Quality

The centre of Cambridge has had an Air Quality Management Area (AQMA) since 2004 due to poor air quality (mainly due to high Nitrogen Dioxide from traffic) that does not meet National Air Quality Objectives. The AQMA extends along Hills Road (A1307) to the main London-Kings Lynn railway line. To implement improvement in air quality a series of Air Quality Management Plans have been implemented and integrate into the local transport plans. The latest air quality management plan is the Cambridge Air Quality Management Plan (2018 – 2023).

Air quality outside of the city is deemed to be good as indicated by DEFRA's modelling of air quality across the UK.

Public transport schemes are considered to have lower environmental impact because they are able to move a greater number of people per unit of pollutant emitted. The proposed scheme would encourage fewer private vehicles to enter Cambridge by providing high-quality public transport alternatives, including new non-motorised user routes into the city centre.

There is also the opportunity to move to electric or other non-fossil fuel powered public transport vehicles on the proposed route in the medium-term. This will help to reduce Nitrogen Dioxide (NO₂) emissions in particular and offers a sustainable journey into Cambridge.

9.2 Noise

Noise is increasingly understood to have an impact on human physical and mental health (e.g. by disrupting sleep patterns (physical health) and leading to stress, inability to concentrate, and frustration (mental health)). Traffic noise can be a significant contribution to ambient noise levels, with adverse consequences for human health. Hence, any scheme that seeks to reduce noise levels can bring benefit to human health. It is worth noting that changes in traffic levels need to be significant before noticeable improvements in ambient noise levels are noticed.

9.3 Historic Environment

Cambridge city centre has a world-famous historic built and natural environment that generates a very significant tourist industry in addition to providing the setting for its outstanding academic institutions. It is vital to preserve the setting of the historic buildings and open spaces, which the City Council has a duty to do, in the exercise of its development management functions, particularly within designated Conservation Areas. There are 17 such Conservation Areas in and around the centre of Cambridge, including in the villages of Great Shelford, Little Shelford, Babraham, Sawston and Great Abington. Whilst the emphasis in the conservation areas is to preserve and enhance the built environment (townscape) there is also a need to manage traffic levels to avoid noise, congestion and pollution which can have a significant impact on the character and appearance of the city.

There are known archaeological remains of regional and potentially national significance within the footprint of the proposed public transport route corridor.

The scheme will be assessed using aerial photographic interpretation, geophysical surveys and trial trenching to better understand the buried archaeology along the route. This will increase knowledge and understanding of the setting around Wandlebury and the Magog Scheduled Monuments.

9.4 Landscape

The landscape of the route corridor is mainly open, with an undulating landform which slopes gently down the River Granta valley in the south and Cambridge in the west. Little Tree Hill, Wandlebury and Fox Hill are highpoints. Large arable fields are separated by ditches and occasional low hedgerows. Views tend to be long, except where woodland belts frame or screen views. The landscape is more intimate around the villages of Babraham, Stapleford, Sawston and Great Shelford, where streets and garden boundaries tend to be tree lined. The designed landscapes of Babraham Hall, Wandlebury Country Park, Granta Park and The Gog Magog Golf Club gives part of the proposed route a more intimate wooded quality.

There are opportunities to enhance the landscape character of the area by changing the vertical profile of the proposed route and landscape mitigation in the form of sensitive planting along the route. The District Design Guide Supplementary Planning Document (SPD) and the Landscape in New Developments SPD have a number of landscape enhancement measures identified for the East Anglian Chalk landscape which would be taken into account when delivering the CSET Phase 2 scheme.

9.5 Green Belt

Large sections of the proposed route are located within the Green Belt. The Green Belt has a strong protection at both National and Local Level. Policy 4 of the adopted Cambridge City Local Plan (2018) sets out a presumption against inappropriate development in the Green Belt. Policy NH/8 of the South Cambridgeshire Local Plan 2018 also sets out the presumption against inappropriate development in the Green Belt.

When considering the acceptability of the principle of scheme development within the Green Belt, the key policy criteria is set out within paragraph 146 of the NPPF. Paragraph 146 of the NPPF states the following:

"Certain other forms of development are also not inappropriate in Green Belt provided they preserve the openness and do not conflict with the purposes of including land within it. These are: ...

- Local transport infrastructure which can demonstrate a requirement for a Green Belt location."

9.6 Biodiversity

There are several Sites of Special Scientific Interest (SSSI) in the area including:

- The Gog Magog Golf Course SSSI, the largest SSSI in the area, which is north of the proposed scheme adjacent to the A1307
- Sawston Hall Meadows SSSI and Demford Fen SSSI, both west of the London/Cambridge railway.

There are also the following Local Nature Reserves (LNR) within close proximity to the proposed route:

- Nine Wells LNR; and
- The Beechwoods LNR.

It is important to avoid any direct land take that could affect a SSSI area, but it is equally important to reduce traffic and thus nutrient loading from exhaust emissions – which could impact the important flora in SSSIs.

There are two County Wildlife Sites (CWS) in the immediate vicinity of the project as follows:

- Shelford - Haverhill Disused Railway (Pampisford)
- River Granta

The CSET Phase 2 project has the potential to deliver positive gain for biodiversity. There are significant opportunities to achieve this strategic objective as part of the design, providing both wildlife corridors by prioritising linking current areas of habitat together and creating new habitat in other areas. GCP are committed to ensuring a minimum of 10% biodiversity net gain for the scheme, with the aim to reach a 20% net gain.

9.7 Water and Flood Risk

There are numerous policies at national and local level relating to the protection of water resources. The general theme of all the policies is that the development and day to day activities must avoid any negative impacts on the quality of water bodies (surface or groundwater) from any anthropological activities, including from transport schemes where the greatest risks are from road drainage and accidents.

National and local policies on flooding all have a common basis to prevent development in flood zones that are not flood resilient. In particular the Environmental Permitting Regulations (EPR) 2010 aim to protect groundwater and surface waters from pollution by controlling the inputs of potentially harmful and polluting substances.

The project crosses the flood plain of the River Granta and some of the minor tributaries of the River Cam around the Cambridge Biomedical Campus. The scheme design will have to take into account the potential effects on flood risk on these flood plains and on all land adjacent to the scheme. To achieve this the CSET Phase 2 scheme will have SuDS drainage installed along the route and in the Travel Hub which will ensure runoff does not contribute to flood risk and should also ensure the quality of runoff discharged to infiltrate into the ground does not affect groundwater quality that is used for public water supplies.

There is potential for the CSET Phase 2 scheme to enhance biodiversity by creating water related habitats to compensate for lost flood storage in the River Granta flood plain. This is in line with policy 31 of the Cambridge Local Plan 2018 which states: *“development adjacent to a water body actively seeks to enhance the water body in terms of its hydromorphology, biodiversity potential and setting”*.

9.8 Greenhouse Gases

The Climate Change Act commits the UK government to reduce greenhouse gas emissions to net zero by 2050. Transport schemes present both a risk to reducing greenhouse gas emissions and an opportunity if modal shift to lower emitting transport can be achieved.

Public transport schemes such as the CSET Phase 2 project have the potential to reduce greenhouse gas emissions by introducing a carbon efficient public transport fleet, removing traffic off the road and reducing congestion. There is also potential for the public transport vehicles to be electric or other zero-emission vehicles in the medium term, thus the scheme should support GCP's move to meet the government policy.

The SCDC South Cambridgeshire Local Plan 2018 Policy CC/2 and the Cambridge City Local Plan 2018 policy 29 promote the generation of renewable energy from projects where possible. The CSET Phase 2 scheme provides the opportunity to introduce infrastructure that helps generate renewable energy, for example solar panels at the Travel Hub site. Opportunities to do so would be assessed at a later stage of the scheme's development.

Key Issues and Opportunities

Table 9.1 below highlights the key issues and opportunities in relation to environment along the A1307 CSET Phase 2 proposed route corridor.

Table 9.1: Summary of Key Issues & Opportunities – Environmental

Issues	Opportunities
<ul style="list-style-type: none"> Vehicle exhaust and other emissions can have an impact on air quality, increasing NO₂ and PM₁₀ and PM_{2.5} concentrations that can be harmful to human health if they exceed certain levels in the atmosphere. 	<ul style="list-style-type: none"> Public transport schemes are considered to have lower environmental impacts because they are able to move a greater number of people per unit of pollutant emitted. This scheme would encourage fewer private vehicles to enter Cambridge, where there is an air quality management problem, by providing high quality public transport. A medium term move to electric or other non-fossil fuel powered public transport vehicles will reduce NO₂ emissions in particular.
<ul style="list-style-type: none"> The scheme is located in a largely rural environment which will experience some increases in noise along the route and adjacent to the Travel Hub. 	<ul style="list-style-type: none"> Appropriate noise mitigation in the form of earth bunds or acoustic barriers will be included in the design to minimise noise intrusion on sensitive receptors close to the route or Travel Hub. The use of electric vehicles will mitigate some of the noise impacts once these become operational along the public transport route.
<ul style="list-style-type: none"> Government policy requires all development to deliver net zero carbon at the national level, which requires changes at every level in society. 	<ul style="list-style-type: none"> The scheme will lead to greater use of public transport in vehicles that are likely to be electric or other zero-emission vehicles in the medium term. Thus, the scheme should support GCPs move to meet government policy. Landscape planting will provide a small amount of offsetting potential by carbon sequestration where belts of trees are planted as part of the scheme.
<ul style="list-style-type: none"> There are Habitats of Principal Importance (HPIs) along the proposed route corridor which have the potential to be fragmented or isolated. This could cause an adverse impact on a range of protected species. 	<ul style="list-style-type: none"> There are opportunities for Biodiversity Net Gain along the proposed route corridor by planting ecologically valuable habitats. There are opportunities to develop wildlife corridors by prioritising linking current areas of habitat together. The immediate fields around the Nine Wells Nature Reserve are likely to be acquired by the scheme and would be planted up to increase biodiversity value around the reserve.
<ul style="list-style-type: none"> The landscape of the route corridor is mainly open, with an undulating landform which slopes gently down to the River Granta valley in the south and Cambridge in the west. Little Tree Hill, Wandlebury and Fox Hill are highpoints. Large arable fields are separated by ditches and occasional low 	<ul style="list-style-type: none"> There are opportunities for landscape mitigation to be planted to screen the selected Travel Hub, so it has less impact on the landscape.

<p>hedgerows. Views tend to be long, except where woodland belts frame or screen views.</p> <p>The landscape is more intimate around the villages of Babraham, Stapleford, Sawston and Great Shelford, where streets and garden boundaries tend to be tree-lined. The designed landscapes of Babraham Hall, Wandlebury Country Park, Granta Park and The Gog Magog Golf Club give parts of the route a more intimate wooded quality. The introduction of access roads and hard engineering into the landscape is likely to have an adverse impact.</p>	<ul style="list-style-type: none"> • The design of the route would be carried out in a manner that minimised visual intrusion and impacts on landscape character, this would be achieved by changing the vertical profile of the route and sensitive planting along the route.
<ul style="list-style-type: none"> • There are known archaeological remains of regional and potentially national significance within the footprint of the proposed route corridor. 	<ul style="list-style-type: none"> • The scheme will be assessed using aerial photographic interpretation, geophysical surveys and trial trenching to better understand the buried archaeology along the route. This will increase knowledge and understanding of the setting around Wandlebury and the Magog Scheduled Monuments. • There is potential to incorporate some of the scheme drainage discharge into Hobson Brook – which is a heritage feature running towards the city and which is frequently dry. Increasing flows in the drainage feature could have heritage benefits which need to be assessed.
<ul style="list-style-type: none"> • The scheme crosses the flood plain of the River Granta and is within the footprint of the Source Protection Zone 2 of groundwater fed public water supplies 	<ul style="list-style-type: none"> • The scheme design that crosses the River Granta will ensure that there is no increase in flood risk arising from the construction of the bridge(s) over the river. • There is opportunity to create water related habitat to compensate for lost flood storage in the River Granta flood plain. • The scheme will have SuDS drainage installed along the route and in the Travel Hub. This will ensure runoff does not contribute to flood risk and should also ensure the quality of runoff discharged to infiltrate into the ground does not affect groundwater quality that is used for public water supplies. • Opportunities to help with any wider flood management plans being developed by the Environment Agency will be explored during the EIA phase of the project.
<ul style="list-style-type: none"> • The proposed route corridor sits largely within the Cambridge Green Belt which has strong protection at both local and national level. 	<ul style="list-style-type: none"> • Appropriate landscaping and sensitive routing of the scheme. Or siting of the Travel Hub will minimise impacts on Green Belt function.

So, what does this mean for CSET Phase 2?

The proposed route for the scheme is in an environmentally sensitive area, as the majority of the route is within the Cambridgeshire Green Belt which is protected at both local and national level. There are also known archaeological remains of regional and potentially national significance within the footprint of the proposed route corridor.

Despite environmental challenges, the scheme offers the opportunity to enhance biodiversity within the area, by prioritising linking areas of existing habitats to create wildlife corridors and creating new habitats in other areas, both contributing to a positive biodiversity net gain. Landscape mitigation to effectively screen the Travel Hub and proposed route will also add to biodiversity net gain and could enhance the landscape character of the area with sensitive, community friendly planting schemes.

The major environmental benefit the scheme offers is to sustainable transport options into Cambridge city centre, reducing the number of private vehicles on the road and reducing congestion. This will help to reduce emissions, be beneficial to local air quality within the Cambridge city AQMA and contribute to reducing carbon emissions from vehicular transport.

10 Highways Network and Traffic

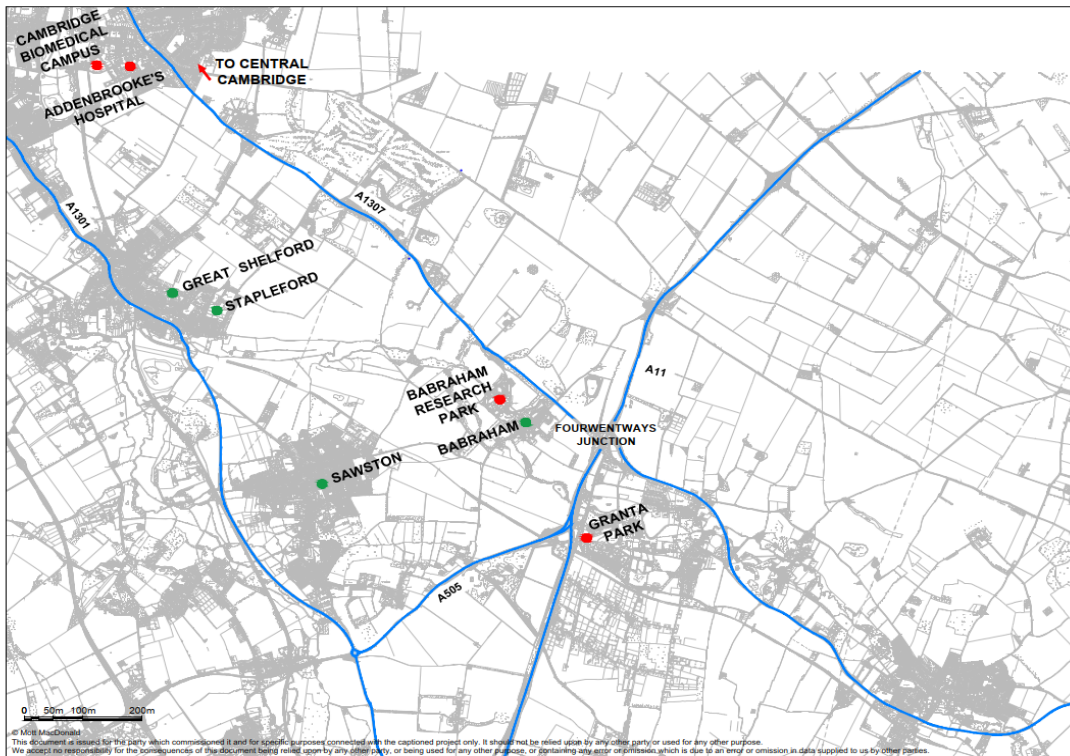
A large majority of commuters into and within Cambridge opt for private car travel due to a lack of viable and attractive travel alternatives. As a result, high volumes of traffic use the A1307.

High volumes of traffic, particularly during peak periods, have an impact on road safety for all road users. There is evidence to suggest that congestion associated with the number of vehicles using the A1307 may be a contributing factor to the number of recorded collisions along the route. High volumes of vehicles using the route may contribute to the perception that the route is not safe for pedestrians and cyclists, discouraging the use of sustainable modes of travel into Cambridge. This section of the Strategic Case evidences the key highway network, traffic and road safety issues and opportunities associated with the A1307 and the surrounding road network.

10.1 A1307 Corridor

The A1307 is a secondary class A road between the A14 at Junction 31 in Cambridge and Haverhill, Suffolk. The corridor is a key radial route to the centre of Cambridge and serves several rural villages. Outside of the centre of Cambridge, the route is predominately rural and consists of a mixture of single lane and dual lane carriageways with varying speed limits throughout. The geographical scope of the A1307 corridor in its entirety is illustrated below in Figure 10.1. The extent of the Phase 2 works stretches from the A11/A1307/A505 junction, north west to the CBC at Francis Crick Avenue.

Figure 10.1: A1307 Geographical Scope



Source: Mott MacDonald

Challenges identified include:

- Existing congestion and delays;
- Unreliable public transport journey times, as a result of congestion and delay;
- Development pressure; and
- Highway safety.

The following sub-sections assess the highway and transport challenges identified in more detail.

10.2 Congestion, Delay and Journey Times

The A1307 corridor is heavily used and at capacity during peak times, resulting in significant congestion and delay. Such congestion and delay along the route results in traffic re-routing onto less suitable local roads. Demand to travel by car on the key network also has an impact on bus journey times and reliability and consequently reduces the attractiveness of public transport. In addition, high volumes of vehicles using the route may contribute to the perception that the route is not safe for pedestrians and cyclists.

Population growth means trips on the transport network will increase by 25,000 by 2031 (from 101,000 in 2011 to 126,000)²⁸, further exacerbating the existing problems. GCP predicts that without action, by 2031:

- Traffic in Cambridge will increase by over 30% in the morning peak;
- Traffic in South Cambridgeshire will increase by almost 40% in the morning peak; and
- The time spent in congestion will more than double.

Figure 10.2 illustrates the impact on journey times for those travelling along A1307 between central Cambridge and the junction between the A11/A1307 as a result of planned development under current conditions.

Figure 10.2: Anticipated Impact on Journey Times



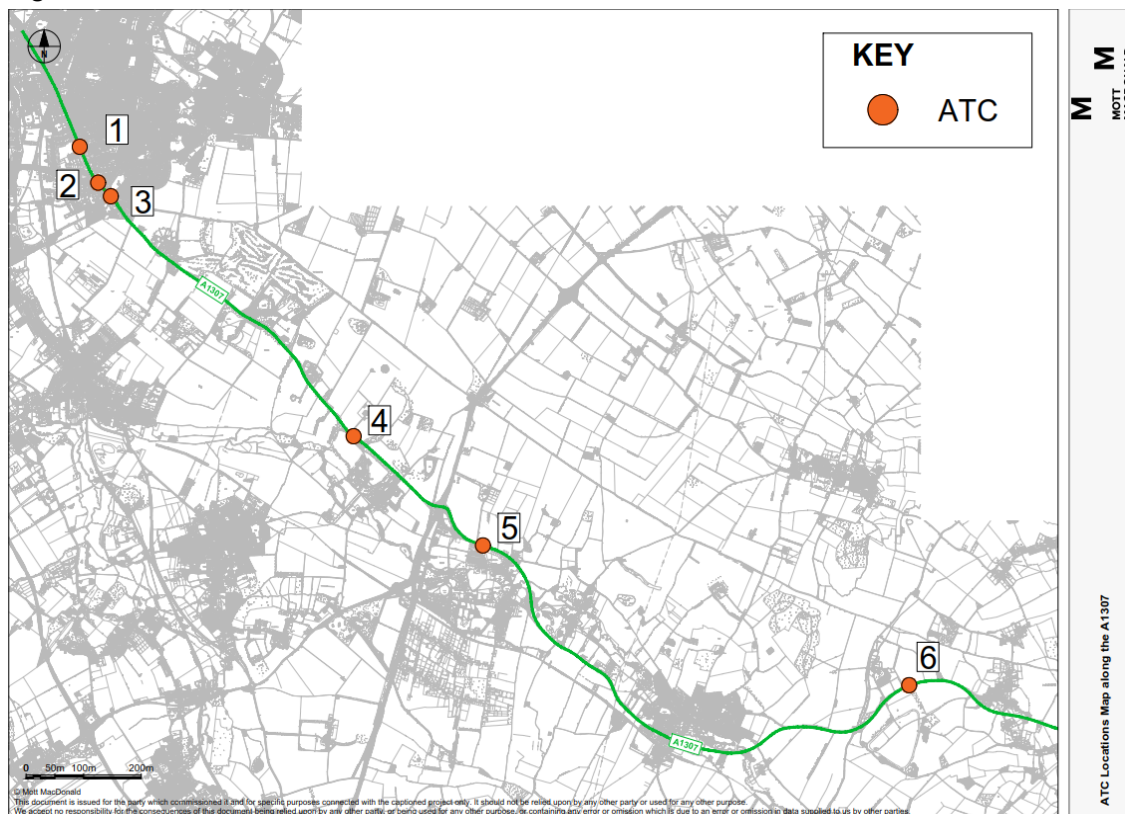
Source: Cambridge and South Cambridgeshire Local Plan

10.3 A1307 Traffic Flows

Automatic Traffic Count (ATC) data sourced from the Department for Transport (DfT) has been analysed for the A1307 corridor. Six traffic counters are positioned along the A1307 from Cambridge to Haverhill, the locations of the six ATC's are illustrated in Figure 10.3 and are numbered 1 to 6.

²⁸ <https://www.greatercambridge.org.uk>

Figure 10.3: ATC Locations



Source: Mott MacDonald/DfT

Annual Average Daily Flow's (AADF) recorded at these locations for the period 2013-2016 are summarised in Table 10.1 and displayed in Figure 10.4. Data recorded at all of the ATC sites, except for ATC 1, indicate that traffic counts have steadily grown over the 4-year period. The decline in traffic counts at ATC 1 may be attributable to the introduction of traffic management measures within the city centre.

Table 10.1: Two-way AADF Counts from ATC's Located Along the A1307

Year	ATC 1	ATC 2	ATC 3	ATC 4	ATC 5	ATC 6
2013	12717	10562	18746	16418	15466	14008
2014	11916	10865	19300	16884	15898	14378
2015	12212	11135	19427	17548	16580	14968
2016	12446	11370	19800	17908	16938	15280

Source: DfT

Figure 10.4: AADF Counts from ATC Sites Located Along the A1307



Source: Mott MacDonald/DfT

The highest traffic counts along the A1307 are recorded at ATC 3, just south of the Cambridge Biomedical Campus. The significantly lower traffic counts obtained at ATCs 1 and 2, just north of the Biomedical Campus, suggest that the Biomedical Campus is the main draw of trips on this part of the network. High traffic volumes along this section of the route demonstrate that the network is already under pressure and the traffic count total at ATC 3 is likely to increase as the Biomedical Campus continues to expand. It is clear from the ATC data that measures are required to ensure connectivity to the city centre is maintained whilst growth at the Biomedical centre continues. Increasing traffic counts for ATC's 2 to 6 over the 4-year period illustrate that, outside of the city centre, demand is increasing along the entire length of the A1307. Transport infrastructure is required to enable future growth and also ensure connectivity to the city centre is not impeded.

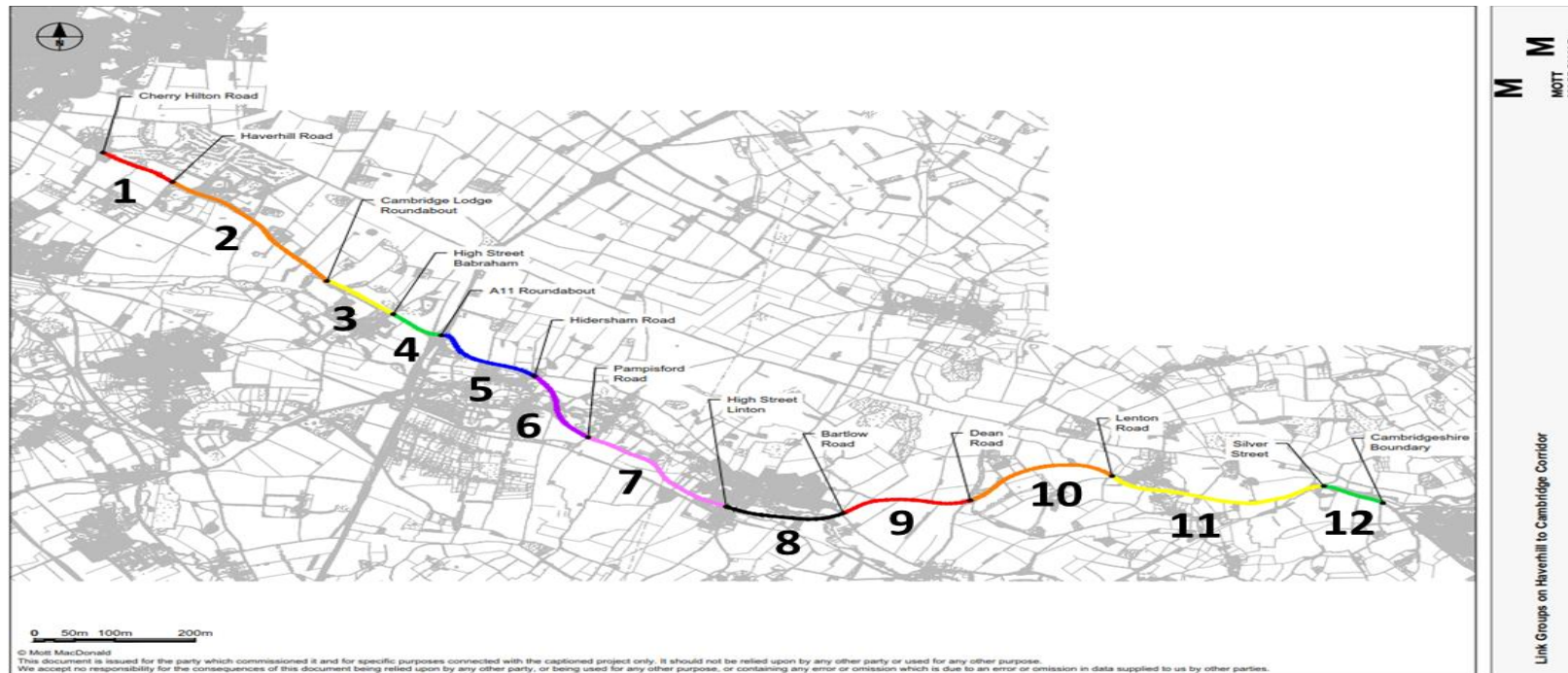
ATC's 3 and 4 demonstrate the highest volumes of traffic along the route. This is particularly pertinent to CSET Phase 2 since the introduction of a dedicated public transport route will provide much needed relief to this section of the route.

The ATC data presented provides evidence that the route is operating at capacity, particularly for the section of the A1307 within the Phase 2 scheme extents. The data therefore supports the introduction of viable sustainable travel options provided through CSET Phase 2 as a practical means to manage existing and anticipated traffic volumes.

10.4 Vehicle Speeds Along the A1307 Corridor

Trafficmaster Data has been obtained from CCC for the A1307 corridor throughout March 2018. The data presents vehicle speeds across 12 link groups along the A1307, from Cambridge to Haverhill. Figure 10.5 illustrates the location of the link groups referenced in Table 10.2 to Table 10.4.

Figure 10.5: Trafficmaster Link Groups



Source: Mott MacDonald

Table 10.2 displays average vehicle speeds Westbound (WB) towards central Cambridge and Eastbound (EB) towards the A1307/A11 in 2018 during the AM and PM peak on weekdays for link groups 1 to 5, which is the geographic scope of the scheme. Data indicates long delays on the immediate approach into Central Cambridge (link group 1). Congestion appears to be worse on the westbound approach into Central Cambridge, particularly during the morning peak. Significant delays are also noted on the eastbound approach to the A11 Roundabout (link group 4) during the PM peak.

Table 10.2: Trafficmaster Data Weekday Analysis

		Speed in Miles per Hour			
		08:00-09:00		17:00-18:00	
Link Group	Link Length (m)	WB	EB	WB	EB
1 Cherry Hinton Rd. – Haverhill Road	1,300	14	37	40	38
2 Haverhill Road – Cambridge Lodge Roundabout	2,888	49	47	49	42
3 Cambridge Lodge Roundabout – High St. Babraham	1,044	43	46	47	41
4 High St. Babraham – A11 Roundabout	706	38	41	45	15
5 A11 Roundabout – Hildersham Road	1,477	30	35	36	30

Source: DfT

Table 10.3 displays average vehicle speeds westbound (WB) towards central Cambridge and eastbound (EB) towards Haverhill in 2018 during the AM and PM peak at weekends. Higher vehicle speeds in both directions can be seen, compared to vehicle speeds for weekdays during the same time periods. Increased vehicle speeds suggest shorter delays and less congestion during weekends, demonstrating the adverse impact of commuter journeys on travel times along the A1307 corridor.

Table 10.3: Trafficmaster Data Weekend Analysis

		Speed in Miles per Hour			
		08:00-09:00		17:00-18:00	
Link Group	Link Length (m)	WB	EB	WB	EB
1 Cherry Hinton Road	1,300	47	44	47	39
2 Haverhill Road	2,888	55	53	56	51
3 Cambridge Lodge Roundabout	1,044	48	46	53	47
4 High Street, Babraham	706	44	38	52	47
5 A11 Roundabout	1,477	40	40	38	41

Source: DfT

Table 10.4 provides a comparison of weekday speeds versus weekend speeds to illustrate the impact of commuter demand on travel times indicated in Table 10.2 and Table 10.3.

Table 10.4: Difference Between Weekday and Weekend Speeds on A1307

		Speed in Miles per Hour			
		08:00-09:00		17:00-18:00	
Link Group	Link Length (m)	WB	EB	WB	EB
1	Cherry Hinton Road	33	7	6	2
2	Haverhill Road	6	6	7	9
3	Cambridge Lodge Roundabout	6	0	6	7
4	High Street, Babraham	6	3	7	32
5	A11 Roundabout	10	5	2	10

Source: DfT

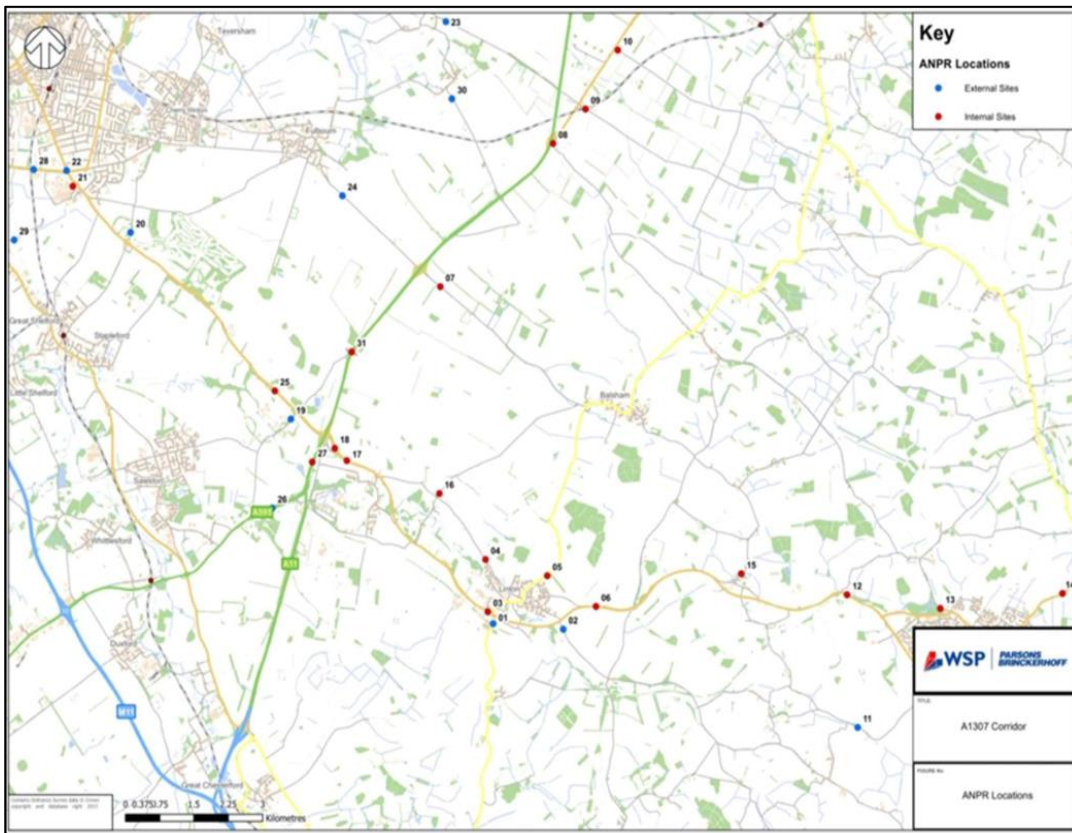
The biggest differences in weekday and weekend vehicle speeds can be seen during the AM peak on the westbound approaches into Cambridge and during the PM peak in the eastbound direction towards Haverhill. Most notably, a difference of 32mph between weekdays and the weekend can be seen on the eastbound approach to the junction between High Street and the A11 (link group 4). There is also a large variation in vehicle speed of circa 33mph westbound approach to the junction between Cherry Hinton Road and the A1307 (link group 1).

Differences in Trafficmaster data between weekdays and weekends suggest a high level of commuter flows in both an eastbound and westbound direction, however, the overall pattern of the data appears to be movement westbound towards central Cambridge. It is however expected that this trend may change slightly as a result of the growing number of employment opportunities to the south of Cambridge, resulting in an increased number of commuters travelling eastbound and a general increase in the number of users of the A1307.

10.5 Vehicle Routing and Journey Times

At SOBC stage Automatic Number Plate Recognition (ANPR) surveys were commissioned at various locations along the A1307 on Tuesday 18 and Wednesday 19 October 2016 to understand vehicle routing and journey times along the corridor. A total of 31 ANPR cameras were installed along the A1307 and A11 corridors from Addenbrooke's Hospital in the west to Haverhill in the east. Figure 10.6 details the locations of the ANPR survey cameras installed to gather origin and destination data and journey times.

Figure 10.6: ANPR Locations



Source: WSP A1307 Haverhill to Cambridge Monitoring Report, July 2017

Analysis of the origin and destination of car movements from Haverhill in the AM and PM Peak revealed that 11.1% of all vehicles travelling on the A1307 from Haverhill had a destination west of the A11, and in the PM Peak 35.4% of vehicle trips travelling on the A1307 towards Haverhill had an origin west of the A11. The data demonstrates that the CBC is a key attractor of vehicle trips along the route.

The SOBC stage analysis of journey times indicates that the median AM Peak journey time towards central Cambridge from Haverhill was calculated as 36 minutes and 32 seconds and the median PM Peak journey time from central Cambridge to Haverhill was calculated as 30 minutes and 2 seconds. Using Google mapping the journey time for this route is estimated to be around 20 minutes in both directions. This indicates that congestion along the route is possibly adding time onto journeys.

Key Issues and Opportunities

Table 10.5 below highlights the key issues and opportunities in relation to Highways, Network and Traffic across the study area.

Table 10.5: Summary of Key Issues & Opportunities – Highways, Network & Traffic

Issues	Opportunities
<ul style="list-style-type: none"> Heavy traffic flows are regularly experienced along the section of the A1307 approaching the CBC from the South. This is evidenced in ATC data analysed. Increasingly unattractive conditions are likely to deter further investment, restricting growth potential of the wider area. Increasing demand across the A1307 corridor has had an impact on capacity, journey time reliability and possibly road safety. Demand on the corridor is likely to increase, worsening congestion and journey times for users of the A1307. The CBC is key attractor of vehicle trips along the A1307. With growth at the campus projected, traffic flows are likely to increase which will have an adverse impact on journey times along the route. 	<ul style="list-style-type: none"> Proposed improvements to the transport infrastructure along the A1307 will facilitate more reliable and accessible multi-modal journeys. This will incentivise shifts away from private car usage and reduce congestion around the CBC, ensuring growth continues. Proposed infrastructure for public transport, walking and cycling along the A1307 will encourage the uptake of sustainable travel options along the corridor and reduce the demand on the road network. Alternative modal options will reduce the dominance of car travel along the A1307, reducing congestion along the corridor and providing more sustainable travel options for users. Congestion could be considered a key constraint for business investment and growth. Reducing congestion and improving transport provision could help improve network resilience. In tandem this could help encourage investment.

So, what does this mean for CSET Phase 2?

The A1307 currently experiences periods of congestion and delay which has an adverse impact on journey times. South east Cambridge has restricted modal choice, leaving users with little choice but to travel by car, increasing congestion and contributing to greenhouse gas emissions. Significant growth is anticipated across south east Cambridge which will generate a greater number of trips, leading to a deterioration in journey times and journey time reliability.

CSET Phase 2 presents the opportunity to provide additional capacity to the transport network by the introduction of viable alternatives to private car travel, thereby reducing the pressure on the existing A1307 corridor and improving journey times for users. The scheme will improve connectivity to key trip attractors via sustainable travel modes.

Increasing the proportion of people who travel to and through south east Cambridge using sustainable transport will reduce the proportion of users who opt to travel by car, reducing the pressure on the corridor. The proposed Travel Hub will provide an efficient transport interchange for users, presenting them with the opportunity to complete their onward journey via bus, cycling or walking, reducing congestion levels on the approach to central Cambridge and the CBC.

11 Road Safety

This section of the report provides a summary of the collision analysis undertaken for the CSET Phase 2 scheme extents. For the purposes of analysis, scheme extents have been prescribed as the stretch of carriageway between Cambridge Biomedical Campus and the A1307/A11 roundabout.

11.1 Collision Analysis

Analysis has considered STATS19 data recorded by the Police and cleansed and tabulated by the Department for Transport (DfT) and data featured on the CrashMap website. Data has been reviewed for the five-year period covering 2014-2018 inclusive.

STATS19 and CrashMap provides data on injury collisions only, therefore damage collisions have not been reviewed as part of the analysis. General assumptions regarding collision contributory factors have been made based on the traffic flows, traffic speeds and the highway layout associated with the A1307 route.

A total of 52 collisions were recorded for the A1307 between Addenbrooke's Hospital and the A1307/A11 junction for the five-year analysis period. Figure 11.1 illustrates the locations of the recorded collisions for the full extent of the study area.

Figure 11.1: Map of Personal Injury Collisions (PIC) for the Five-Year Period 2014-2018



Source: Mott MacDonald

Table 11.1 provides a breakdown of the collision locations along the route and details the severity of the collisions recorded.

Table 11.1: Collisions by Location & Severity

Location	Collision Severity			
	Slight	Serious	Fatal	Total
A1307/Fendon Road roundabout	7	1	0	8
A1307/Nightingale Avenue	2	0	0	2
A1307 near junction with Wort's Causeway	1	0	0	1
Babraham Road / Granham's Road	2	0	0	2
A1307 Newbury Farm	0	1	0	1
A1307 Babraham Road Park & Ride	1	0	0	1
A1307/Hinton Way roundabout	3	0	0	3
A1307 NW of Haverhill Road	1	1	0	2
A1307/Haverhill Road	4	1	0	5
A1307 Babraham Road dual carriageway	3	0	0	3
A1307 Babraham Road Magog Farm Barns	1	0	0	1
A1307 Babraham Road Mile Road	0	1	0	1
A1307 Cambridge Road Babraham Research Campus	1	0	0	1
A1307 Cambridge Road between Babraham Research Campus and High Street	5	0	0	5
A1307/High Street	4	1	0	5
A1307/A11	9	2	0	11
Total collisions in 5-year period	44	8	0	52
*Sites with 4 or more collisions within proximity, known as a Collision Cluster Site.				

Source: Cambridge County Council

The collision data demonstrates that of the 52 collisions recorded for the five-year period 2014-2018, a total of 8 collisions are recorded as serious in severity and 44 collisions are recorded as slight in severity.

The collision profile in Table 11.2 below illustrates collisions recorded by year.

Table 11.2: Personal Injury Collisions by Year, 2014-2018

Year	Number of Collisions	Proportion of Total (%)
2014	8	16%
2015	17	33%
2016	14	25%
2017	8	16%
2018	5	10%
Total:	52	100%

Source: Mott MacDonald

Figure 11.2 illustrates the breakdown of collisions by severity for each year for the data analysed.

Figure 11.2: Personal Injury Collisions by Year and Severity



Source: Mott MacDonald

A number of collision cluster sites have been identified along the route. For the purpose of this study, clusters have been identified as four or more collisions recorded within close proximity. Four cluster collision sites have been identified:

- A1307/Fendon Road roundabout;
- A1307/Haverhill Road T-junction;
- A1307/High Street junction; and
- A1307/A11 Fourwentways roundabout.

The four cluster sites have been identified at junction intersections along the A1307. Although the collision descriptions for each of the collisions have not been interrogated, the locations of the collision clusters suggest that collisions may have occurred due to conflicting vehicle movements, i.e. at a crossroads where vehicles are turning across the priority arm (A1307), or at junctions that suffer from significant congestion, i.e. at traffic signal junctions collisions may be higher where congestion leads to shunt type collisions.

Key Issues and Opportunities

Table 11.3 below highlights the key issues and opportunities in relation to road safety across the study area.

Table 11.3: Summary of Key Issues & Opportunities – Road Safety

Issues	Opportunities
<ul style="list-style-type: none"> • Collisions recorded along the A1307 between Addenbrooke's Hospital and the A1307/A11 Fourwentways roundabout may be associated with high volumes of traffic for some sections of the route and the consequential congestion and delay. • A number of recorded collisions may be associated with high vehicle speeds for some parts of the route. This may contribute to the perception that the route is not safe for pedestrians and cyclists and discourage uptake. 	<ul style="list-style-type: none"> • Provision for cyclists and pedestrians in a safe environment will encourage sustainable travel. • Further improvements to cycling and walking provision will build upon interventions delivered in CSET Phase 1 to improve road safety for a number of users.

So, what does this mean for CSET Phase 2?

Analysis of Personal Injury Collision (PIC) data for the A1307 suggests that a number of collisions which have occurred between 2014-2018 are attributable to the traffic volumes and speed conditions along the corridor.

CSET Phase 2 presents the opportunity to improve the safety of cyclists and pedestrians through provision of off-highway cycling and walking infrastructure, providing an alternative to the existing network. The scheme also builds upon the improvements delivered in CSET Phase 1 across the study area.

12 Wider Transport Provision

This section examines the wider transport network provision across Cambridgeshire, and in particular, south east Cambridge. Accessibility is examined on a mode by mode basis. Transport data has been obtained from the Office of National Statistics (ONS) and the Department of Transport (DfT).

12.1 Rail

Rail plays a crucial role in the transport of people and goods. South east Cambridge does not benefit from a dedicated rail station. The closest rail stations to locations in south east Cambridge and more specifically, to locations along the A1307 corridor, are Cambridge, Shelford and Whittlesford Parkway; these are illustrated in Figure 12.1.

Figure 12.1: Rail Station Locations



Source: OS Open Data Mapping

Cambridge rail station is served by the Greater Anglia and Great Northern Train Operating Companies (TOC), connecting Cambridge with the rest of East Anglia and London. London routes are typically into either King's Cross or Liverpool Street stations, whilst regional destinations include Ipswich, Ely and Norwich. The CrossCountry TOC also provides a service which travels south east to Stansted Airport and north west to Birmingham via Peterborough. Thameslink also provides a service to Brighton.

Shelford rail station, located approximately 1.4 miles west of the A1307 along Hinton Way, provides users with direct services northbound to Cambridge, with journey times of around 8 minutes and southbound to Bishops Stortford and London Liverpool Street in around 90 minutes. Services from Shelford to Cambridge are hourly in the off peak and half hourly during peak periods.

Whittlesford Parkway is the next station south of Shelford rail station, approximately 3 miles south-west of the A1307. Whittlesford Parkway serves the village of Whittlesford in Cambridgeshire with regular Abellio Greater Anglia services on the West Anglia Main Line. Trains from Whittlesford Parkway run thrice hourly in each direction, with additional trains calling at peak times to serve commuter demand. Two trains run southbound to London Liverpool Street; one semi-fast and one stopping. One southbound train runs semi-fast to Stansted Airport. Two non-stop trains run through to Cambridge, the third northbound train calls at Shelford. In peak periods, a select number of trains continue to Ely and King's Lynn.

It should be noted that a new station in the south of Cambridge has been identified as part of the Cambridgeshire Long Term Transport Strategy. Work is in the early stages and whilst it is progressing through Network Rail's Governance for Railway Investment Projects (GRIP) process, neither the station footprint nor location have currently been determined. If delivered, the new station, along with a four-track line, has the potential to improve rail accessibility in south east Cambridge, providing appropriate supporting transport infrastructure is also delivered.

Current Station Usage

Cambridge rail station is the busiest in the east of England²⁹ and provides local and regional transport connections for a significant number of people. Since 2011 there has been a 31% increase in the number of passenger entries and exits at Cambridge rail station.

Shelford and Whittlesford Parkway have also experienced major increases in passenger numbers over the same time period. Estimated passenger entries and exits can be seen in Table 12.1, along with the estimated percentage increase over the six-year period.

Table 12.1: Estimates Number of Passenger Entries and Exits

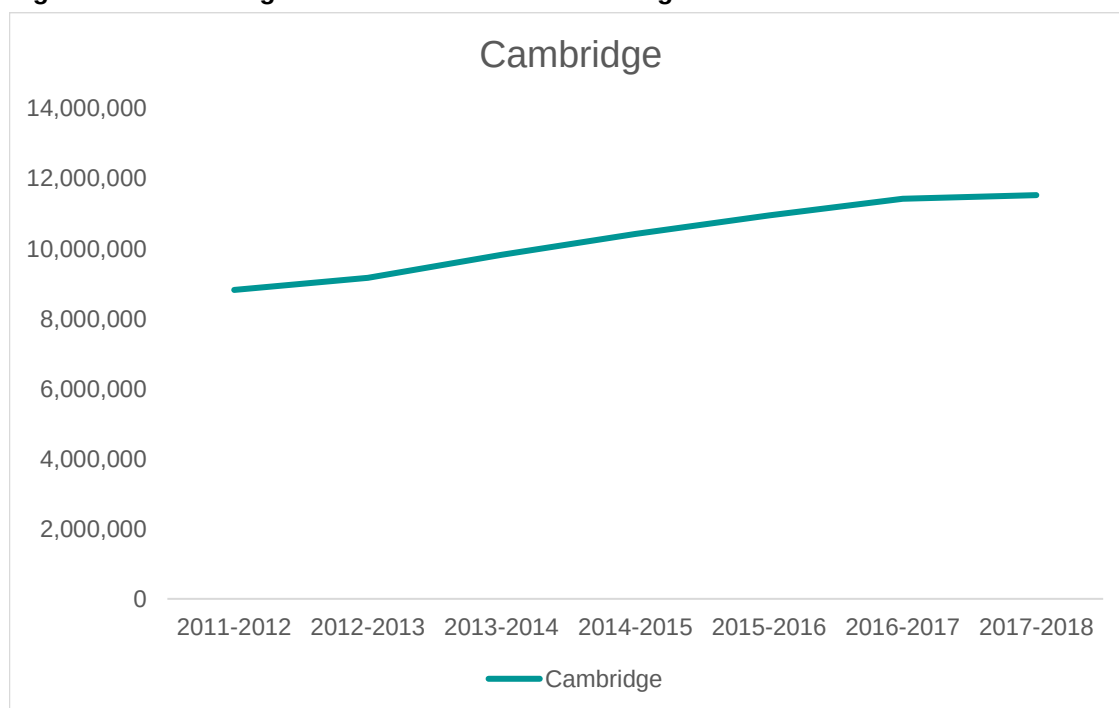
Station	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	% change
Cambridge	8,823,236	9,168,938	9,824,859	10,420,178	10,954,212	11,424,902	11,530,238	+31
Shelford	145,900	154,060	152,976	159,920	174,920	182,138	204,618	+40
Whittlesford Parkway	343,772	396,622	431,544	454,734	493,004	509,744	538,972	+56

Source: Office of Rail and Road

²⁹https://www.thetrainline.com/stations/cambridge?ds_kids=p34781589471&cm=0p4a&msclkid=85ab9a16dcca1301306fc1cdc28f6d2b&gclid=CIGnm9XD94CFQ6MhQod9-EELg&gclid=ds

Passenger numbers at Cambridge rail station are at an all-time high. The station experienced over 11.5 million entries and exits in the year 2017-2018. In order to accommodate increasing demand, £16 million has recently been spent at the station to deliver a new platform³⁰. The new platform has meant that trains which are 50% longer and contain extra seats are able to stop at Cambridge. The delivery of the new platform has boosted capacity and reduced overcrowding on a number of lines. Figure 12.2 provides a graph of passenger entries and exits between 2011 and 2018.

Figure 12.2: Passenger Entries and Exits - Cambridge Rail Station



Source: Office of Rail and Road

Shelford and Whittlesford Parkway, situated on the West Anglia Main Line, are much smaller stations than Cambridge. However, both stations have also experienced a significant increase in passenger numbers since 2011. Passenger numbers at Whittlesford Parkway have nearly doubled since 2011, placing increased pressure on the station and associated services.

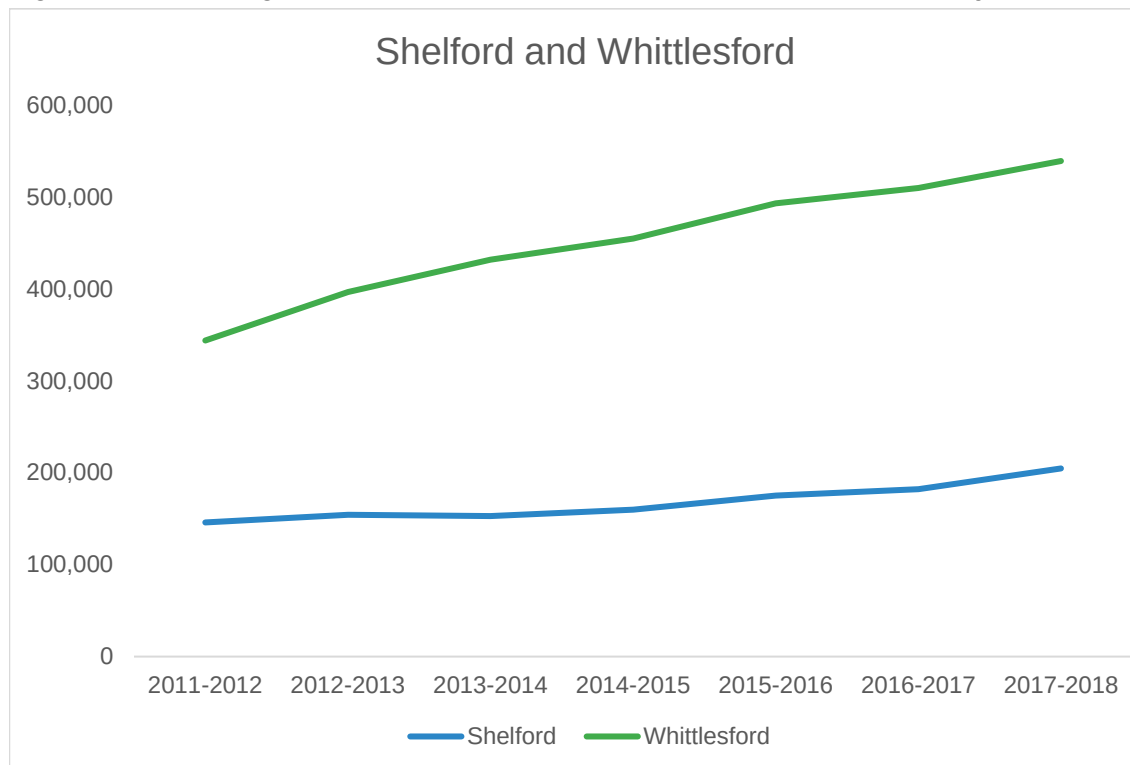
It is likely that the growth in passenger numbers at both stations is associated with the growth of central Cambridge and also the more recent increase in employment opportunities across peripheral areas, such as Babraham Research Campus and Granta Park.

The A505 provides a direct connection between Whittlesford Parkway and Granta Park making multi-modal journeys quick and attractive. Journey times by bike between Whittlesford Parkway and Granta Park of under 20 minutes can be achieved.

³⁰ <https://www.cambridge-news.co.uk/news/cambridge-news/cambridge-station-national-rail-awards-13496757> [Accessed 14/0519]

Figure 12.3 details the number of passenger entries and exits at Shelford and Whittlesford Parkway rail stations between 2011 and 2018.

Figure 12.3: Passenger Entries and Exits - Shelford and Whittlesford Parkway



Source: Office of Rail and Road

Analysis undertaken suggests a significant increase in the use of rail services across Cambridgeshire. However, Section 5 indicates that only a small proportion of commuters in Cambridge and South Cambridgeshire travel by train. Low uptake of rail journeys by commuters could indicate that travel to work journeys are not adequately catered for across Cambridgeshire by the rail network. This is particularly true of employment opportunities in south east Cambridge, including the growth areas highlighted along the A1307.

12.1.1 Rail Proposals

East West Rail

Whilst at present there are no direct rail links along the A1307 corridor, there are plans for rail improvements to the west of Cambridge along the Oxford to Cambridge Arc in the form of the East West Rail proposal. The East West Rail is a new rail link under development which would connect communities between Oxford, Milton Keynes, Bedford and Cambridge³¹.

The project proposes bringing back into use a section of railway that was closed to passengers in the 1960s, refurbishing existing railway lines between Bletchley and Bedford, and building brand new railway infrastructure between Bedford and Cambridge.

An overview of the entire East West Rail proposal can be seen in Figure 12.4.

³¹ East West Rail Preferred Route Option Executive Summary, January 2020

Figure 12.4: Proposed East West Rail Corridor



Source: East West Rail Preferred Route Option Document- January 2020

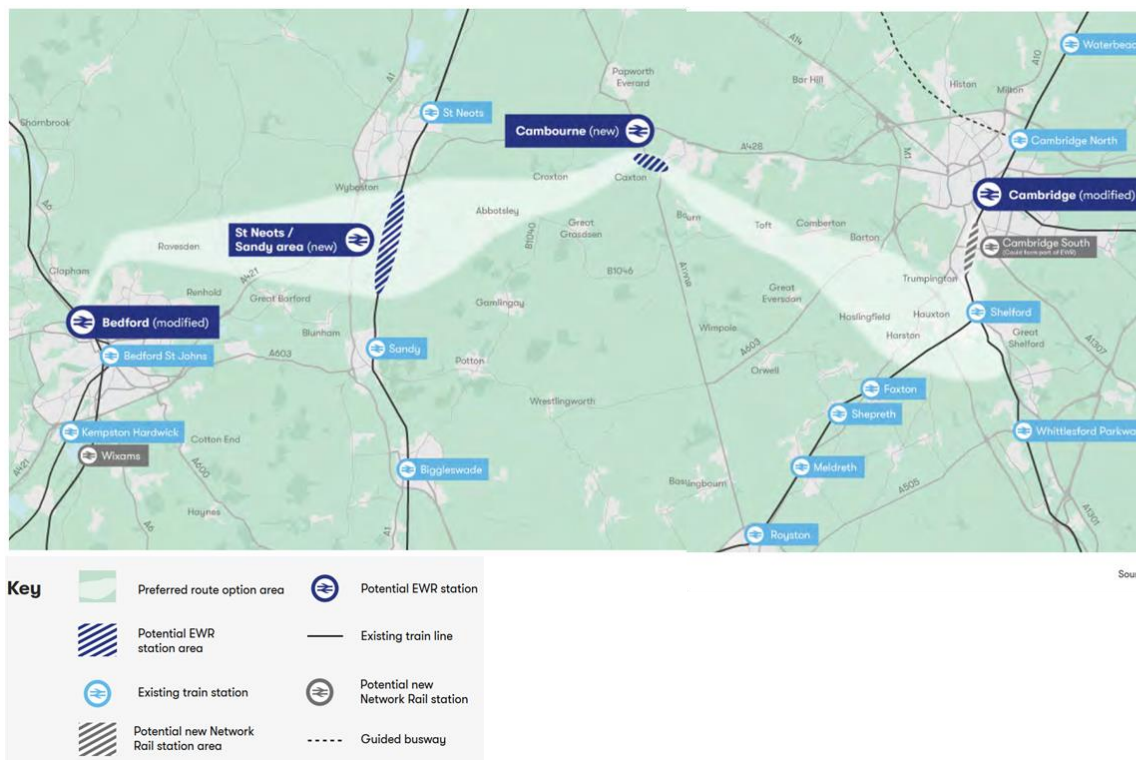
Completed in 2016, the section between Oxford and Bicester Village combined upgrading the track with major improvements to local stations and Chiltern Railways began running services from Oxford through to London via Bicester in 2017.

The section from Bicester to Milton Keynes and Bedford involves reinstating parts of the old track, upgrading stations and building a new station at Winslow. A Transport and Works Act Order (TWAO) was submitted in July 2018 and the Secretary of State for Transport is expected to make a decision on this submission early in 2020. If granted, construction is expected to start this year, following the final investment decision by government.

Options were developed for the Bedford to Cambridge section and consultation was held between January and March 2019 where the public were presented with a shortlist of five broad route alignments. The results of that consultation were published in January 2020, and based on responses, found that the preferred route alignment option between Bedford and Cambridge would link existing stations in Bedford and Cambridge with communities in Cambourne and the area north of Sandy, south of St. Neots. Figure 12.5 illustrates this preferred alignment.

Of relevance to CSET Phase 2, this section of the East West Rail alignment will connect the growing population of Cambourne with environmentally sustainable transport and could integrate with proposed improvements to the local transport network in south Cambridgeshire such as the busway extension and the Cambridgeshire Autonomous Metro (CAM). CSET, along with the developing Cambourne to Cambridge scheme is essentially Phase 1 of CAM delivery and as such will need to consider the impacts and synergies between the emerging preferred CSET option and this preferred alignment for East West Rail.

Figure 12.5: Preferred Route Alignment: Bedford to Cambridge



Source: East West Rail Preferred Consultation Option Executive Summary, January 2020

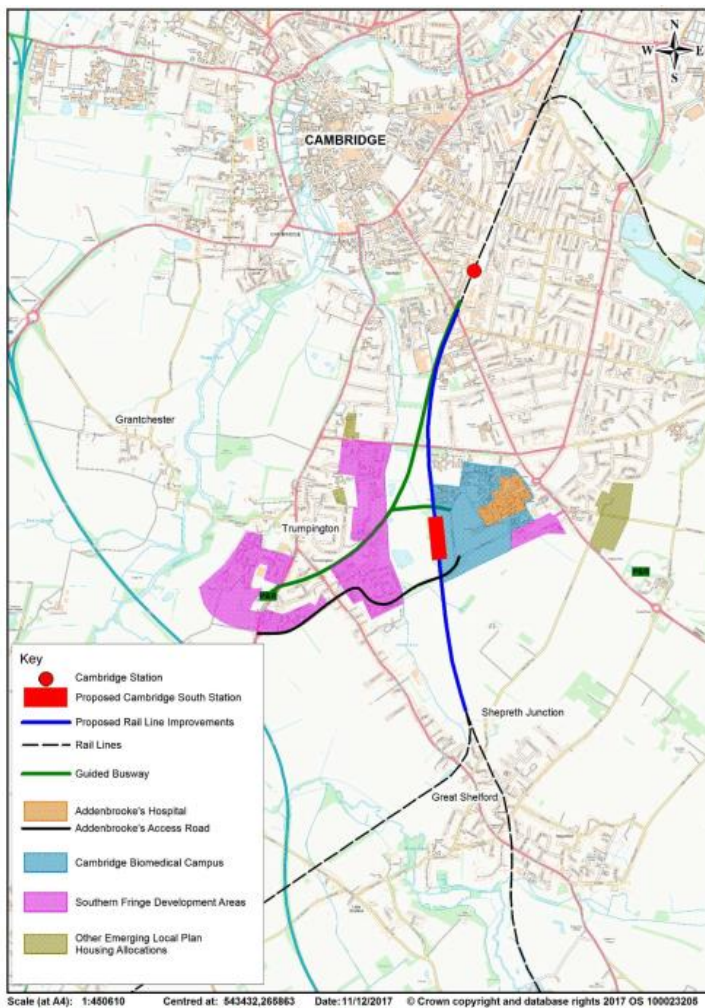
On the basis of consultation, the East West Railway Company are now beginning to develop options within the preferred route alignment. Consideration will be given to station sites, land and connections with local transport networks and the CSET development team will need to liaise with the East West Railway Company to ensure synergies between the schemes. In this manner the benefits of both schemes can be maximised in a holistic manner that addresses the wider strategic objectives of economic growth and improved transport connectivity in the area.

Cambridge South Station

The proposed new rail station at Cambridge South aims to improve connectivity between the growing Biomedical Campus and international gateways, to reduce reliance on Cambridge station for travel to the southern fringe, and to improve sustainable transport access into the Southern Fringe.

The proposed Cambridge South Station would be located to the west of the A1307. With appropriate provision for interchange, CSET Phase 2 would complement the delivery of the proposed Cambridge South Station in providing south Cambridge with a holistic sustainable transport network. Figure 12.6 displays the most recent proposal for the general location of Cambridge South Station.

Figure 12.6: Cambridge South Station



Source: Cambridge South Station Briefing Note, CCC, 2018

12.2 Bus

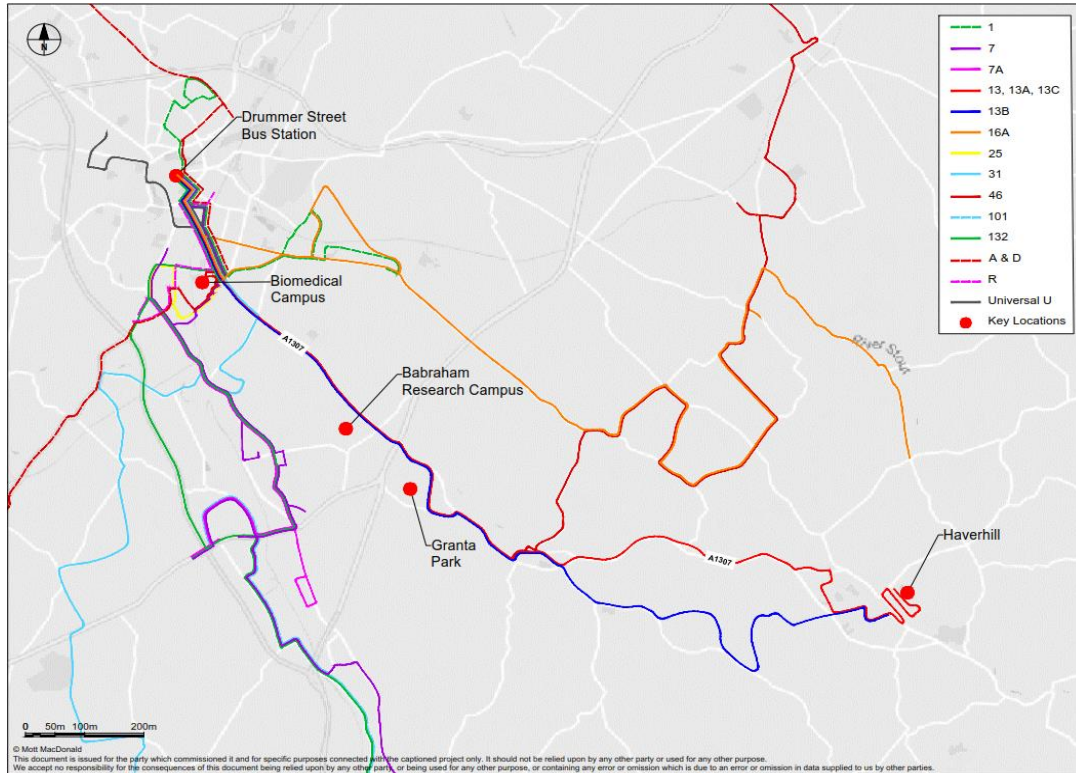
This sub-section explores the bus network and provision of services in south east Cambridgeshire. Bus travel presents an efficient way to transport people around urban areas and the periphery. Buses are categorised as a more sustainable and effective mode of transport which utilises highway space more efficiently. Bus travel also presents a relatively affordable means of transport and as such is a valued travel option.

Regular Bus Network

Cambridgeshire's bus network is primarily composed of a wide-reaching traditional bus network complimented by 'The Busway'-Cambridgeshire's Guided Busway. Collectively these two networks provide good coverage across Cambridge and South Cambridgeshire. Cambridge's bus station located on Drummer Street acts as a hub for bus activity with most buses to and from destinations outside the city starting and terminating at this interchange or adjacent on-street bus stops.

Figure 12.7 displays bus routes within the study area which either run along the A1307, run parallel to the A1307 or intercept with the A1307.

Figure 12.7: Bus Routes within the Study Area



Source: Cambridgeshire County Council/Sustrans

In total there are 16 bus stops (eight on each carriageway) on the A1307 between Addenbrooke's Hospital and Linton as detailed in Figure 12.8.

Figure 12.8: Bus Routes within the Study Area



Source: Cambridgeshire County Council/Sustrans

Details of those services which operate along the A1307 and A1301 are summarised in Table 12.2. The information provided has been taken from the CCC website.

Table 12.2: Bus Services on A1307 and A1301

Bus Service	Stops	Weekday Services	Saturday Services	Sunday Services
13 Gold- Cambridge, Linton, Haverhill	18	18 Services 06:55 to 00:59	16 Services 08:00 to 00:59	14 Services 09:20 to 00:26
13 Gold- Haverhill, Linton, Cambridge	16	17 Services 05:44 to 23:03	17 Services 06:52 to 23:03	14 Services 07:33 to 22:35
13A Gold- Cambridge, Haverhill	15	12 Services 07:25 to 20:07	12 Services 08:47 to 20:07	No Services
13A Gold- Haverhill, Cambridge	15	16 Services 05:14 to 18:03	11 Services 06:07 to 18:53	No Services
13B Gold- Haverhill, Linton, Cambridge	9	1 Service 07:28 to 09:06	No Services	No Services
13C Gold- Haverhill, Linton, Cambridge	11	1 Service 07:28 to 09:06	No Services	No Services
31- Cambridge, Stapleford. Cambridge	15	6 Services 06:58 to 14:55	6 Services 10:25 to 19:42	No Services
31- Fowlmere, Stapleford, Cambridge	15	6 Services 06:58 to 14:55	5 Services 06:58 to 14:55	No Services
Babraham Park and Ride- Cambridge City Centre, Babraham Road Park & Ride	4	80 Services 06:46 to 20:49	60 Services 07:41 to 20:49	30 Services 09:19 to 18:24
Babraham Park and Ride - Babraham Park and Ride, Cambridge City Centre	4	77 Services 06:46 to 20:49	70 Services 08:06 to 20:49	36 Services 08:56 to 18:32
X13 Gold- Cambridge, Linton, Haverhill	11	8 Services 16:10 to 19:48	1 Service 16:15 to 17:03	No Services
X13 Gold- Haverhill, Linton, Cambridge	13	5 Services 06:45 to 08:46	No Services	No Services
Citi 7- Cambridge, Great Shelford, Stapleford, Sawston, Pampisford, Saffron Waldon	7 Cambridge-Sawston	40-42 services between Cambridge and Sawston 06.55 to 23.25	40-42 services between Cambridge and Sawston 06.55 to 23.25	18- 19 services between Cambridge and Sawston
	18 Cambridge – Saffron Waldon	12-14 services between Cambridge and Saffron Waldon 06.55-18.15	12-14 services between Cambridge and Saffron Waldon 6.55-18.15	No services between Cambridge and Saffron Waldon

Source: <https://www.cambridgeshire.gov.uk/residents/travel-roads-and-parking/buses/bus-timetables/>

It can be seen that a good number of services travel along the A1307 as part of their route, providing an efficient and frequent service for users.

The Stagecoach Gold 13 group of services provide particularly good connectivity between Cambridge and Haverhill, offering up to four services per hour arriving in Cambridge in the AM Peak period and departing from Cambridge during the PM Peak period; they also offer one service per hour on Sundays. These services also serve key villages along the route including Linton and Babraham.

Average bus journey times from Cambridge Drummer Street to Haverhill Bus Station are around 1 hour 10 minutes during interpeak hours, this is approximately 30 minutes longer than undertaking the same journey by car. However, journeys undertaken by both bus and car can become significantly longer during peak travel hours due to congestion along the corridor. As an example, the same service between Cambridge Drummer Street and Haverhill Bus Station takes anywhere between approximately 1 hour 20 and 1 hour 30 minutes. Additional delays to an already excessive journey time can discourage users from adopting bus as a mode of travel, reducing patronage on key services.

Cambridgeshire's Guided Busway provides coverage from Royston to the south of Cambridge, up to Peterborough to the north of Cambridge. The six routes provided by the Busway can be seen in Figure 12.9.

Cambridgeshire's Guided Busway

Many of the employment opportunities located in the Southern Fringe including those located at the Cambridge Biomedical Campus are served by the Busway, however it does not extend any further south east beyond the campus, thus there is no busway connectivity between settlements and other employment hubs along the A1307 corridor such as Great Shelford, Stapleford, Sawston, Babraham and its research campus, Granta Park, Linton and Haverhill.

Privately Operated Bus Services by Cambridgeshire Employers

403394-MMD-BCA-00-RP-BC-0247 | C | 15 May 2020

Key Issues and Opportunities

Table 12.3 below highlights the key issues and opportunities in relation to rail and bus provision across the study area.

Table 12.3: Summary of Key Issues & Opportunities – Rail & Bus

Issues	Opportunities
<ul style="list-style-type: none"> • South east Cambridge is detached from the rail network forcing rail users to undertake lengthy multi-modal journeys, enduring inefficient interchanges and inadequate coverage. • Congestion along the A1307, coupled with multiple stops make bus journey times excessively lengthy and uncompetitive when compared with car travel, discouraging uptake of bus travel. • The A1307 is not directly served by the Cambridgeshire Guided Busway. As such for commutes that start in locations where the busway is a convenient travel option, passengers will need to change to regular bus services to continue to employment locations along the A1307 corridor, beyond the CBC. Although tickets are transferable, the perception of a break in journey and the possibility of missing connections due to delay may lead to potential users still opting to travel by car. 	<ul style="list-style-type: none"> • Improvements to public transport provision across south east Cambridge could encourage uptake, reducing the proportion of journeys undertaken by private car. • A reduction in the proportion of private car journeys across south east Cambridge could benefit the environment, creating a sustainable travel environment across the area. • Better public transport connectivity, with services for key employment hubs could encourage commuters to adopt public transport as their primary mode of transport. • Possibility to integrate staff bus services to key employment hubs into the public transport network. • Improved active transport routes delivered in tandem with new public transport infrastructure could encourage a greater number of multi-modal journeys.

So, what does this mean for CSET Phase 2?

South east Cambridge is currently detached from the rail network, making journeys to south east Cambridge by public transport largely inconvenient and lengthy. Whilst there are a number of bus routes which operate frequently along the corridor and connections to the guided busway exist, journey times via bus are excessively long and unreliable as buses are delayed by worsening congestion in and out of central Cambridge and further slowed by the number of stops.

A fast, efficient, reliable and frequent public transport route which serves demand and provides good coverage across south east Cambridge could transform the perception of public transport across south east Cambridge, encouraging uptake. Increased uptake of public transport for journeys along the A1307 corridor could reduce the proportion of people who travel by car, reducing existing pressure on the route. Furthermore, the possibility to integrate staff bus services to key employment hubs into the public transport network will further enhance connectivity and provide greater modal choice for those living and working in south east Cambridge.

Onward connections from the proposed public transport route to Cambridge train station could further encourage use of rail services, as multimodal journeys to employment sites across south east Cambridge are made easier. The proposed Cambridge South station will also be well connected to the public transport route, further improving the public transport offer of south east Cambridge.

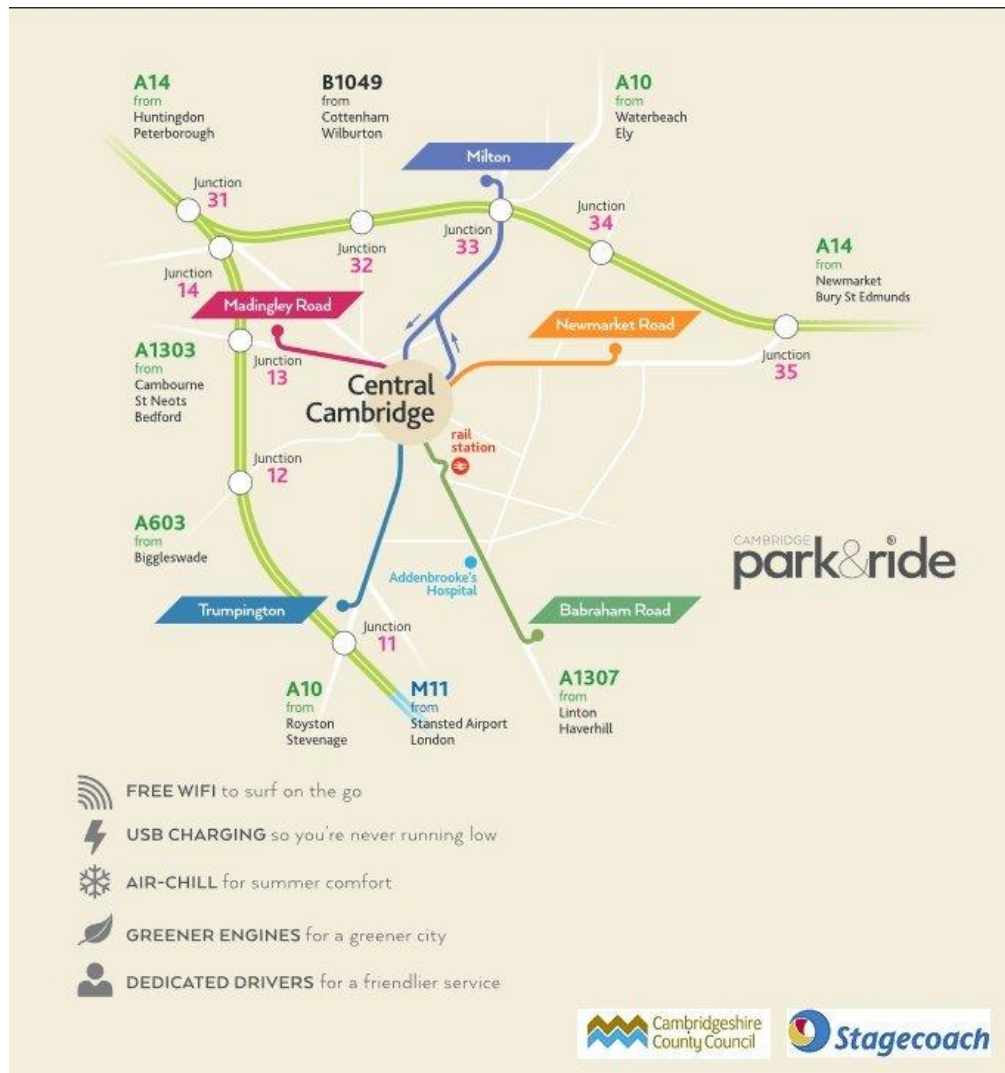
12.3 Park & Ride

Cambridge has a total of five well used Park & Ride sites, located on the outskirts of the City. The existing Park & Ride sites are strategically located to intercept trips on the key radial routes into the City Centre, they are;

- Madingley Road (M11/A1303 to Central Cambridge);
- Milton (A10 to Central Cambridge);
- Newmarket Road (A1303 to Central Cambridge);
- Babraham Road (A1307 to Central Cambridge); and
- Trumpington (M11/A10 to Central Cambridge).

Figure 12.10 illustrates the location of Cambridge's current Park & Ride facilities.

Figure 12.10: Cambridge's Current Park & Ride Facilities



Source: www.cambridgeparkandrideinfo.com

Babraham Road Park & Ride is located along the A1307, on the outskirts of Cambridge. The facility provides 1,458 car parking spaces and 250 cycle parking spaces. Additional cycle parking and cycle lockers have recently been delivered at the site as part of CSET Phase 1. Babraham Road Park & Ride provides onward services to central Cambridge every ten minutes Mondays to Saturday and every 15 minutes on Sundays as illustrated below in Figure 12.11.

Figure 12.11: Babraham Road Park & Ride Bus Timetable - Outbound and return services

departures from Babraham Road park&ride to Central Cambridge travel time 21 mins			returning from Central Cambridge Emmanuel Street E5		
Mon - Fri	Saturdays	Sun & public holidays	Mon - Fri	Saturdays	Sun & public holidays
0646	0806	0856	0641	0741	0919
0706	then every	then every	0651	0801	then every
0716	10 mins	15 mins	0701	until	15 mins
0726	until	until	0711		until
0736			0721		1804
0746			0731		
0756			0741		
0806			0751		
then every			0758		
10 mins			then every		
until			10 mins		
			until		
1826	1826	1811		1851	
1846	1846			1911	
1856	1856			1931	
1910	1910			1951	
1930	1930			2011	
1950	1950			2031	
2010	2010		1008		
2030	2030		1021		
			then every		
			10 mins		
			until		
			1851		
			1911		
			1931		
			1951		
			2011		
			2031		

Source: www.cambridgeparkandrideinfo.com

Babraham Road Park & Ride is well used and intercepts a proportion of journeys travelling along the A1307, on the immediate south easterly approach to central Cambridge and provides a frequent and convenient service to Addenbrooke's Hospital in addition to the city centre. The route covered by Babraham Road Park & Ride bus services can be seen in Figure 12.12.

Figure 12.12: Babraham Road Park & Ride Bus Route



Whilst Babraham Road Park & Ride provides good connections to central Cambridge and Addenbrooke's Hospital, the growing economic hubs of Babraham Research Campus, Granta Park and Cambridge Biomedical Campus are not well served by the facility and associated onward bus services.

Travel Hubs are transport interchanges of varying sizes, allowing people from surrounding areas to access sustainable transport networks, such as public transport, walking and cycling routes.

CSET Phase 2 proposes the delivery of a new Travel Hub facility near to the junction between the A11 and A1307.

The proposed location of the facility presents the opportunity to intercept a higher number of journeys due to its strategic location near to the A11 Fourwentways junction. The facility will also provide improved connectivity to Granta Park, Babraham Research Campus and Cambridge Biomedical Campus by the provision of a new public transport link and active travel routes, linking the Travel Hub site to key trip attractors.

Key Issues and Opportunities

Table 12.4 below highlights the key issues and opportunities in relation to Park & Ride provision across Cambridgeshire.

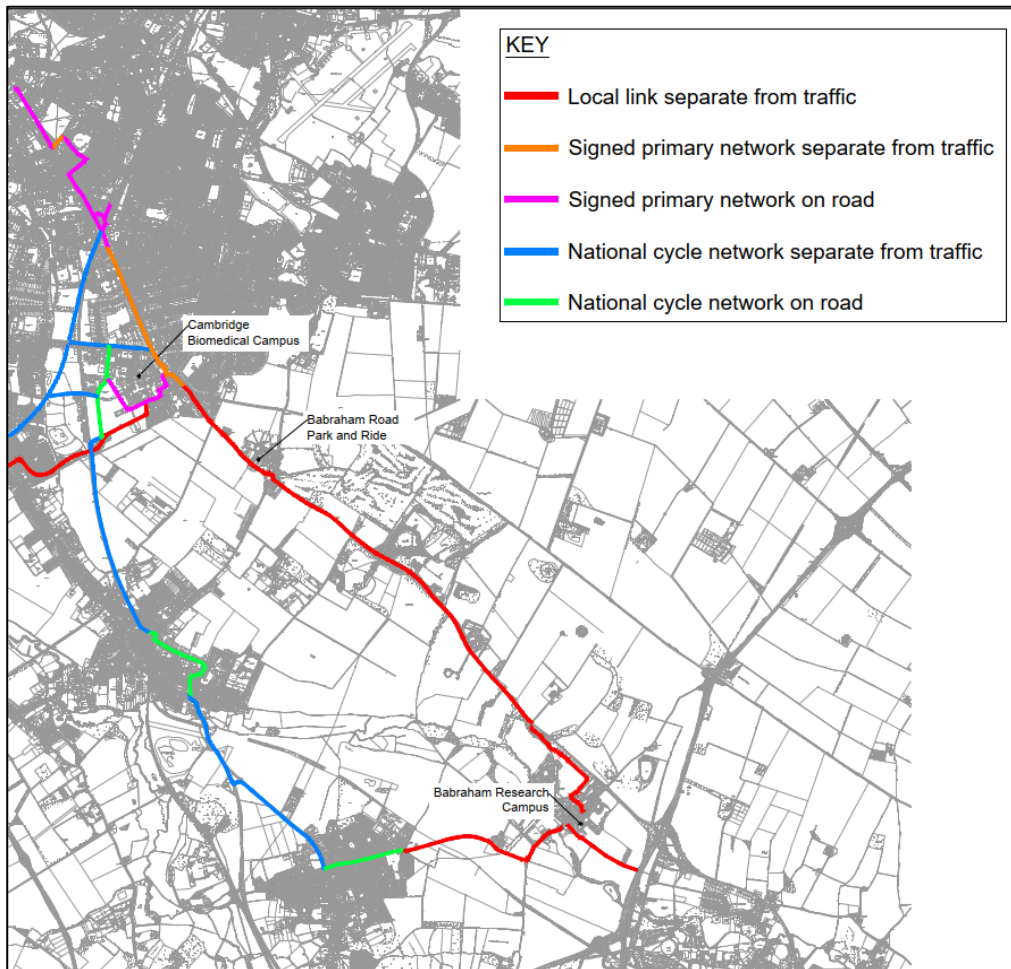
Table 12.4: Summary of Key Issues & Opportunities – Park & Ride Provision

Issues	Opportunities
<ul style="list-style-type: none"> Despite Cambridgeshire's existing Park & Ride network, facilities are not well positioned to serve demand associated with growing economic hubs across south east Cambridge. Ongoing development across south east Cambridge will place increased pressure on the Babraham Road Park & Ride site. Capacity here will not be able to accommodate demand. 	<ul style="list-style-type: none"> A strategically located Travel Hub facility could encourage a larger proportion of users to opt for more sustainable modes of travel, parking at the Travel Hub and using public transport, cycling or walking for their onward journey. A new Travel Hub facility in south east Cambridge will accommodate increasing demand for parking capacity across the area.

12.4 Cycling

Cycling presents an active, affordable and sustainable mode of transport. Figure 12.13 provides a cycle map of the study area.

Figure 12.13: A1307 Cycling Connectivity



Source: Mott MacDonald

Some sections of the A1307 benefit from segregated cycle paths, providing safe and sustainable journeys by bike. This is true of the eastern section of the A1307, which stretches from the central Cambridge to Babraham Research Campus. Shelford, Stapleford and Sawston are also integrated into the cycle network of the study area. However, there are large stretches of the A1307, where cycle routes are often unsegregated from the carriageway. This has led to cycle mode share in rural areas being low in contrast with the very high mode share exhibited in central Cambridge.

Crossings along the A1307 also present a safety hazard to cyclists. Both signalised and unsignalised junctions along the corridor are ill equipped for cyclists. Inadequate cycle provision discourages potential cyclists from taking up this mode of travel for commuter journeys to employment sites along the A1307 corridor. Instead commuters are more frequently resorting to private car travel, resulting in long delays and issues with congestion.

The CSET Phase 2 scheme will facilitate cycling along the A1307 corridor making cycling a safer and more attractive mode of travel. The route will also link to a multi-user path for pedestrians, cyclists and horse riders from Cambridge to Linton as part of the Linton Greenway.

12.5 Walking

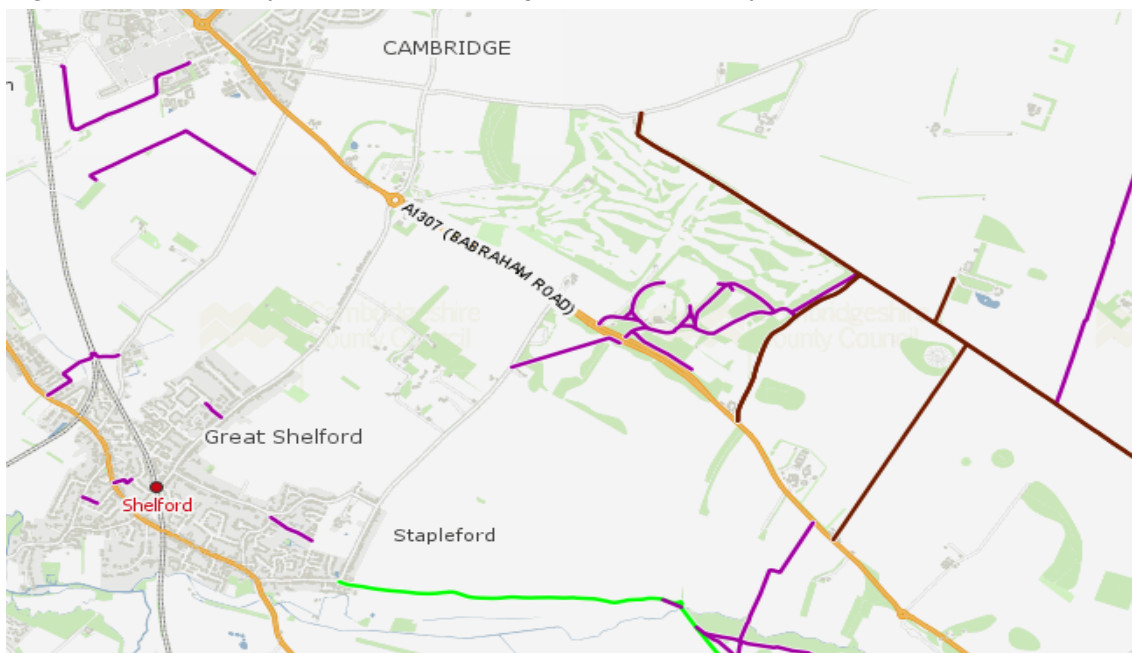
For distances under 2km, walking is a quick and effective way to travel. For this reason, walking trips often form at least one leg of a multi-modal journey. Walking is also a form of active transport and presents limited impacts to the environment, thereby a preferred transport mode as it offers benefits to the user and the transport network.

Similar to public perceptions of cycling in south east Cambridgeshire, the popularity of walking here is limited by the lack of continuous, safe and segregated footpaths and infrequent and inadequate crossing provision.

Public Rights of Way

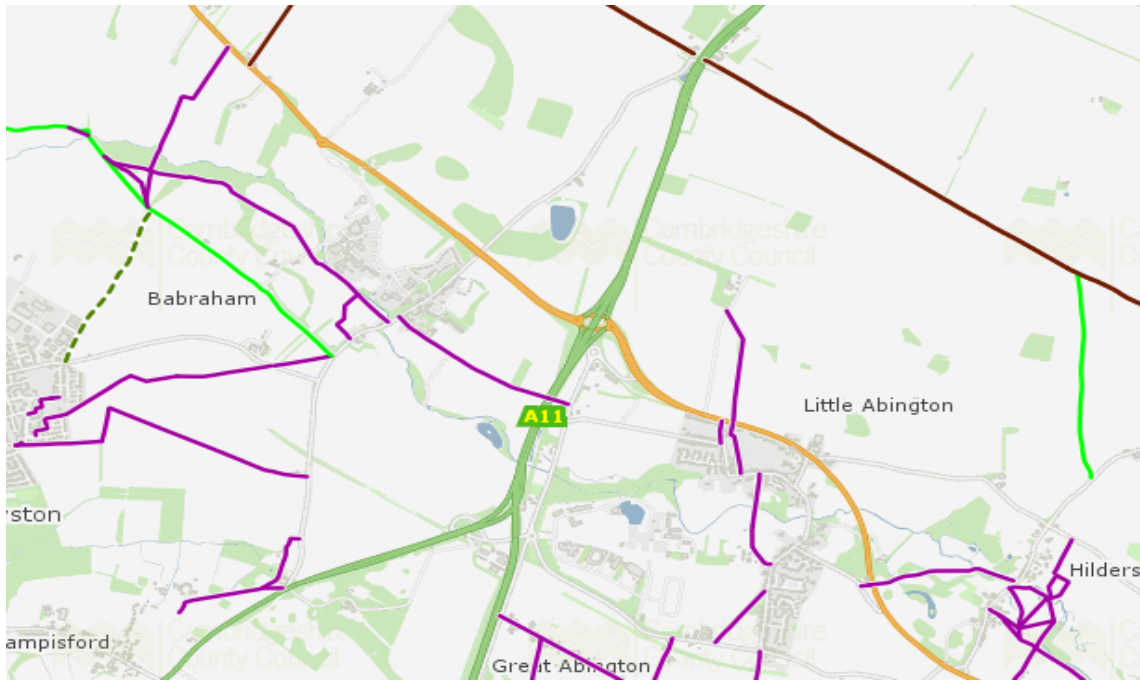
There are a number of fragmented Public Rights of Way (PRoW) within the study area, routes either run alongside the A1307, intersect the A1307 or run parallel to the A1307. The greatest number of PRoW exist towards the south east of the A1307 corridor, serving villages such as Linton. Figure 12.14 and Figure 12.15 illustrate the locations of the PRoW in the study area.

Figure 12.14: PRoW (Addenbrooke's Hospital to Babraham)



Source: Cambridgeshire County Council

Figure 12.15: PRow (Babraham to Hildersham)



Source: Cambridgeshire County Council

Major employment sites such as Granta Park are not easily accessible by foot or bicycle. A footbridge allows for safe crossing of the A11 but is not accessible to all due to stairs, as illustrated in Figure 12.16. The A1307 is considered to be devoid of safe crossing facilities, discouraging cycling and walking.

Figure 12.16: A11 Pedestrian Footbridge



Source: Mott MacDonald

Key Issues and Opportunities

Table 12.5 below highlights the key issues and opportunities in relation to cycling and walking provision across the study area.

Table 12.5: Summary of Key Issues & Opportunities – Walking & Cycling

Issues	Opportunities
<ul style="list-style-type: none"> There is a lack of continuous active travel routes along the A1307 and within the wider study area. The area particularly lacks connections to/from more rural settlements to the south east of Cambridge. Alternate routes which are intended to serve the purpose of connecting south east Cambridge to central Cambridge do not adequately serve route demand. Crossing points along the A1307 are few and far between and inadequately designed for NMU's, forcing users to cross high speed traffic unsafely. It is likely that inadequate active travel provision along the A1307 for cyclists and pedestrians is a factor in low uptake of active travel modes along this route. 	<ul style="list-style-type: none"> Improved active travel infrastructure along the corridor could encourage increased uptake of cycling and walking, contributing to improved wellbeing and quality of life. Higher uptake of active travel modes could reduce greenhouse gas emissions associated with car travel. Adoption of active travel modes as a commuter transport mode could reduce congestion along the A1307 corridor as the modal share of active travel is maximised, improving journey reliability for public transport, further supporting modal shift away from car use. The delivery of a Travel Hub could provide an efficient interchange between multiple transport modes, making sustainable travel easy and attractive for users, encouraging uptake of sustainable modes.

So, what does this mean for CSET Phase 2?

Existing active travel infrastructure along the A1307 corridor is inadequate, routes are fragmented and inappropriately designed. There are limited crossing facilities along the corridor, leaving users with little choice but to cross the road with no protection, putting themselves at risk. As a result of limited and poor infrastructure, cycling and walking along the corridor may be perceived as unsafe and unattractive, discouraging uptake.

CSET Phase 2 will deliver a new multi-user path, generally 3-4 metres wide, along the length of the public transport route. The multi-user path will serve a range of non-motorised uses, such as cycling, walking, horse riding and for use by mobility scooters and electric bikes. The path will be hard-surfaced to enable use during all weathers for both commuting and leisure. New active travel infrastructure along the corridor will encourage uptake of cycling and walking. The proposed Travel Hub would also provide an efficient interchange for cyclists, facilities such as cycle lockers and stands will be provided at the Travel Hub, making multi modal journeys viable.

Good connections between the route and employment sites such as Granta Park could make active travel a more attractive modal option for commuters, reducing the pressure on the A1307 during peak travel times for commuters.

13 Summary of Issues and Opportunities

Population	Issues	Opportunities
	<ul style="list-style-type: none"> The population of Cambridge and Cambridgeshire is growing rapidly and there is an increasing academic population. However, the current transport infrastructure is not evolving at a pace which matches population increase. Transport infrastructure which is inadequately equipped to accommodate a rapidly growing population may force people to relocate away from the area, slowing the rate of economic growth which has recently been experienced. Cambridge's dense population is overspilling into the periphery. A large proportion of the overspill are choosing to live to the south east of Cambridge and commute into Cambridge, placing increased pressure on radial routes in and out of central Cambridge. 	<ul style="list-style-type: none"> A greater number of people living in the area will create indirect and induced economic impacts, spending their incomes locally and using local services, resulting in growth in the local economy. A sustainable transport network will allow Cambridgeshire to continue its success in academia, technology and research through close ties between campuses enabling knowledge sharing and innovation. A transport system that supports growth of the area and economic growth will benefit the wider UK economy. Futureproofing existing transport infrastructure will support the requirements of future generations and will ensure a successful and sustainable future for Cambridgeshire. Cambridge has a large student population who are more likely to use public transport and cycle modes of transportation. Enhancing the sustainable transport options will benefit the future growth of the Universities in Cambridge enabling Cambridge and in turn the UK to maintain its international competitiveness while also relieving pressure on the transport network. Providing a safe cycle and walking route will provide residents and students with travel options and will contribute to health and wellbeing.

Employment and Skills	Issues	Opportunities
	<ul style="list-style-type: none"> Highly skilled professionals are required to fill a large proportion of the jobs on offer in Cambridgeshire. Employers in Cambridgeshire therefore recruit from outside of the immediate area in order to find individuals who meet the specific requirements of job roles on offer. As a result, a large number of individuals work in Cambridgeshire but live outside of the area, leading to a high number of peak time commuters. High numbers of commuters are causing congestion problems during peak times, particularly in south east Cambridgeshire as individuals travel to employment opportunities in central Cambridge and further sites along the A1307. 	<ul style="list-style-type: none"> Cambridgeshire has a large proportion of people working in professional, scientific and technical activities compared to the national average. Increased employment within these sectors presents the opportunity to further excel Cambridgeshire, and in particular south Cambridgeshire as a destination of excellence in science and industry. Thereby attracting more jobs, employment opportunities and investment and boosting the local economy. CSET Phase 2 will provide attractive sustainable travel options that will help to accommodate existing and future commuter demand, providing a more efficient and sustainable transport network overall. Enhanced public transport and provision of an additional Travel Hub will alleviate pressure on the A1307.

Economy and Business	Issues	Opportunities
	<ul style="list-style-type: none"> Cambridge is strategically important for attracting international investors into the UK and maintaining the UK's international competitiveness. However, this relies on Cambridgeshire continuing to offer strong links between businesses, training campuses and housing developments. Rapid business creation and the number of businesses choosing to locate in Cambridgeshire has increased pressure on the existing transport network. The existing transport network is inadequately equipped to accommodate current demand. If the network does not evolve at the same rate as economic growth, this problem will inevitably worsen. Businesses may be deterred from investing if accessing the employment site is difficult for their workforce. Existing businesses may struggle to attract labour from outside of the local area as journey times are long and unreliable. This may also deter investors and businesses locating to the area. The rate of business start-ups has slightly declined recently. Cambridgeshire must establish the reason for this and seek to address concerns. 	<ul style="list-style-type: none"> Cambridgeshire has a worldwide reputation and strong existing economic base, and one which continues to grow. Infrastructure to support and facilitate continued access to employment and homes will equip the area to deal with expansion and thus support sustainable economic growth. The proposed Travel Hub will improve accessibility to key employment sites, including Babraham Research Campus, Granta Park and Cambridge Biomedical Campus, encouraging investment and supporting existing businesses. This will also alleviate pressure on the A1307. Cambridgeshire must ensure that sustainable modes of travel are attractive to an ever-increasing number of commuters. The proposed scheme will provide a viable alternative to private car travel, reducing congestion along key routes and providing benefits for the environment and quality of life.

Land Use and Development	Issues	Opportunities
	<ul style="list-style-type: none"> The level of planned development in Greater Cambridge will increase pressure on the existing transport network, resulting in deteriorating journey times and journey time reliability. Increased demand on the road network across south east and central Cambridge will result in congestion and associated air quality issues. Planned employment space may be left vacant if accessing the sites is deemed unattractive and inaccessible by the potential workforce. Planned development may not come to fruition at the rate anticipated in the Local Plan if transport infrastructure is not in place to support development and expansion. 	<ul style="list-style-type: none"> Addressing issues associated with Cambridgeshire's transport network will encourage planned development to come to fruition. Development will bring forward an unprecedented number of opportunities for economic growth. CSET Phase 2 will improve active travel infrastructure along a section of the A1307, improving connectivity for pedestrians and cyclists. Improved active travel links will encourage commuters to adopt more sustainable modes of travel. Preparing the transport network for future growth will secure a prosperous future for Cambridgeshire and encourage growth, post Local Plan period, and provide economic benefits to the rest of the UK.

How People Travel	Issues	Opportunities
	<ul style="list-style-type: none"> Cambridge is one of the fastest growing cities in the UK and as such, it is not surprising that Cambridge and South Cambridgeshire are net importers of people for work purposes. However, the transport network is not equipped to accommodate the number of inbound commuter's flow. 63% of Cambridge and South Cambridgeshire's workforce commute by car or van resulting in congestion and associated air quality issues across many of central Cambridge's key radial routes. Ongoing growth at key employment sites across south east Cambridge and central Cambridge will result in increased commuter demand on the A1307 corridor where there is a lack of alternate travel modes to car. The CBC employs a large number of people and is a significant generator of travel demand. 40% of staff at the campus access the site from the south east, using the A1307, resulting in congestion and delays at peak times. 	<ul style="list-style-type: none"> An increased number of sustainable travel options across south east Cambridge may encourage a modal shift away from car travel resulting in a more sustainable travel environment. Improved public transport and walking and cycling provision across south east Cambridge could attract potential employees to opportunities in the area which will be essential to securing future growth of businesses in the area. The proposed Travel Hub facility is strategically located to intercept a large number of journeys heading into central Cambridge and towards the CBC and Babraham Research Campus. The onward public transport route and NMU route would provide a more sustainable link to key destinations whilst also providing journey time savings and journey time reliability for users.

Environment	Issues	Opportunities
Air Quality	<ul style="list-style-type: none"> Vehicle exhaust and other emissions can have an impact on air quality, increasing NO2 and PM10 and PM2.5 concentrations that can be harmful to human health if they exceed certain levels in the atmosphere. 	<ul style="list-style-type: none"> Public Transport (PT) schemes are considered to have lower environmental impacts because they are able to move a greater number of people per unit of pollutant emitted. This scheme would encourage fewer private vehicles entering Cambridge where there is an air quality management problem, by providing high quality public transport. A medium term move to electric or other non-fossil fuel powered public transport vehicles will reduce NO2 emissions in particular.
Noise	<ul style="list-style-type: none"> The scheme is located in a largely rural environment which will experience some increases in noise along the route and adjacent to the Travel Hub. 	<ul style="list-style-type: none"> Noise mitigation in the form of earth bunds or acoustic barriers will be included in the design to minimise noise intrusion on sensitive receptors close to the route or Travel Hub.
Greenhouse Gases	<ul style="list-style-type: none"> The government policy requires all development to deliver net zero carbon at the national level, which requires changes at every level in society. 	<ul style="list-style-type: none"> The scheme will lead to greater use of public transport in vehicles that are likely to be electric or other zero carbon powered vehicles in the medium term. Thus, the scheme should support GCPs move to meet government policy. Landscape planting will provide a small amount of offsetting potential by carbon sequestration where belts of trees are planted as part of the scheme
Biodiversity	<ul style="list-style-type: none"> There are Habitats of Principle Importance (HPis) along the proposed route corridor which have the potential to be fragmented or isolated. This could cause an adverse impact on a range of protected species. 	<ul style="list-style-type: none"> There are opportunities for Biodiversity Net Gain along the proposed route corridor by planting ecologically valuable habitats. There are opportunities to develop wildlife corridors by prioritising linking current areas of habitat together.

Landscape	<ul style="list-style-type: none"> The current landscape in the area is open fields in a slightly elevated position. The introduction of access roads and hard engineering into the landscape is likely to have an adverse impact.
Heritage and Archaeology	<ul style="list-style-type: none"> There are known archaeological remains of regional and potentially national significance within the footprint of the proposed route corridor.
Water Resources	<ul style="list-style-type: none"> The scheme crosses the flood plain of the River Granta and is within the footprint of the Source Protection Zone 2 of groundwater fed public water supplies
Green Belt	<ul style="list-style-type: none"> The proposed route corridor sits largely within the Cambridge Green Belt which has strong protection at both local and national level.

- The immediate fields around the Nine Wells Nature Reserve are likely to be acquired by the scheme and would be planted up to increase biodiversity value around the reserve.
- There are opportunities for landscape mitigation to be planted to screen the Travel Hubs, so they have less impact on the landscape.
- The design of the route would be carried out in a manner that minimised visual intrusion and impacts on landscape character, this would be achieved by changing the vertical profile of the route and sensitive planting along the route.
- The scheme will be assessed using aerial photographic interpretation, geophysical surveys and trial trenching to better understand the buried archaeology along the route. This will increase knowledge and understanding of the setting around Wandlebury and the Magog Scheduled Monuments.
- There is potential to incorporate some of the scheme drainage discharge into Hobson Brook – which is a heritage feature running towards the city and which is frequently dry. Increasing flows in the drainage feature could have heritage benefits which need to be assessed.
- The scheme design that crosses the River Granta will ensure that there is no increase in flood risk arising from the construction of the bridge(s) over the river.
- There is opportunity to create water related habitat to compensate for lost flood storage in the River Granta flood plain.
- The scheme will have SuDS drainage installed along the route and in the Travel Hub – this will ensure runoff does not contribute to flood risk whilst also ensuring runoff discharged to infiltrate into the ground does not affect the quality of groundwater that is used for public water supplies.
- Opportunities to help with any wider flood management plans being developed by the Environment Agency will be explored during the EIA phase of the project.
- Appropriate landscaping and sensitive routing of the scheme. Or siting of the Travel Hub will minimise impacts on Green Belt function.

Rail and Bus Provision	Issues	Opportunities
	<ul style="list-style-type: none"> South east Cambridge is detached from the rail network forcing rail users to undertake lengthy multi-modal journeys, enduring inefficient interchanges and inadequate coverage. Congestion along the A1307, coupled with multiple stops make bus journey times excessively lengthy and uncompetitive when compared with car travel. Discouraging uptake of bus travel. The A1307 is not directly served by the Cambridgeshire Guided Busway. As such for commutes that start in locations where the busway is a convenient travel option, passengers will need to change to regular bus services to continue to employment locations along the A1307 corridor, beyond the CBC. Although tickets are transferable, the perception of a break in journey and the possibility of missing connections due to delay may lead to potential users still opting to travel by car. 	<ul style="list-style-type: none"> Improvements to public transport provision across south east Cambridge could encourage uptake, reducing the proportion of journeys undertaken by private car. A reduction in the proportion of private car journeys across south east Cambridge could benefit the environment, creating a sustainable travel environment across south east Cambridge. Better public transport connectivity, with services for key employment hubs could encourage commuters to adopt public transport as their primary mode of transport. Possibility to integrate staff bus services to key employment hubs into the public transport network Improved active transport routes delivered in tandem with new public transport infrastructure could encourage a greater number of multi-modal journeys.

Highways Network and Traffic	Issues	Opportunities
	<ul style="list-style-type: none"> Heavy traffic flows are regularly experienced along the section of the A1307 approaching the CBC from the South. This is evidenced in ATC data analysed. Increasingly unattractive conditions are likely to deter further investment, restricting growth potential of the wider area. Increasing demand across the A1307 corridor has had an impact on capacity, journey time reliability and possibly road safety. Demand on the corridor is likely to increase, worsening congestion and journey times for users of the A1307. The CBC is key attractor of vehicle trips along the A1307. With growth at the campus projected, traffic flows are likely to increase which will have an adverse impact on journey times along the route. 	<ul style="list-style-type: none"> Proposed improvements to the transport infrastructure along the A1307 will facilitate more reliable and accessible multi-modal journeys. This will incentivise shifts away from private car usage and reduce congestion around the CBC, ensuring growth continues. Proposed infrastructure for public transport, walking and cycling along the A1307 will encourage the uptake of sustainable travel options along the corridor and reduce the demand on the road network. Alternative modal options will reduce the dominance of car travel along the A1307, reducing congestion along the corridor and providing more sustainable travel options for users. Congestion could be considered a key constraint for business investment and growth. Reducing congestion and improving transport provision could help improve network resilience. In tandem this could help encourage investment.

Road Safety	Issues	Opportunities
	<ul style="list-style-type: none"> A high number of collisions have been recorded along the A1307 between Addenbrookes Hospital and A1307/A11 may be associated with high volumes of traffic for some sections of the route and congestion and delay. A number of recorded collisions may be associated with high vehicle speeds for some parts of the route. This may contribute to the perception that the route is not safe for pedestrians and cyclists and discourage uptake. 	<ul style="list-style-type: none"> Alternative sustainable travel options will reduce the dominance of car travel along the A1307, thereby reducing congestion and delay along the corridor and will subsequently have a benefit to road safety. Further improvements to cycling and walking provision will build upon interventions delivered in CSET Phase 1 to improve road safety for a number of users.

Park & Ride Provision	Issues	Opportunities
	<ul style="list-style-type: none"> Despite Cambridgeshire's existing Park & Ride network, facilities are not well positioned to serve demand associated with growing economic hubs across south east Cambridge. Ongoing development across south east Cambridge will place increased pressure on the Babraham Road Park & Ride site. Capacity here will not be able to accommodate demand. 	<ul style="list-style-type: none"> A strategically located Travel Hub facility could encourage a larger proportion of users to opt for more sustainable modes of travel- Parking at the Travel Hub and using public transport or cycling or walking for their onward journey. A new Travel Hub facility in south east Cambridge will accommodate increasing demand for parking capacity across the area.

Walking and Cycling Provision	Issues	Opportunities
	<ul style="list-style-type: none"> There is a lack of continuous active travel routes within the study area. The area particularly lacks connections to/from more rural settlements to the south east of Cambridge. Alternate routes which are intended to serve the purpose of connecting south east Cambridge to central Cambridge do not adequately serve route demand. Crossing points along the A1307 are few and far between and inadequately designed for NMU's, forcing users to cross high speed traffic unsafely. It is likely that inadequate active travel provision along the A1307 for cyclists and pedestrians is a factor in low uptake of active travel modes along this route. 	<ul style="list-style-type: none"> Improved active travel infrastructure along the corridor could encourage increased uptake of cycling and walking, contributing to improved wellbeing and quality of life. Higher uptake of active travel modes could reduce greenhouse gas emissions associated with car travel. Adoption of active travel modes as a commuter transport mode could reduce congestion along the A1307 corridor as the modal share of active travel is maximised, improving journey reliability for public transport, further supporting modal shift away from car use. The delivery of a Travel Hub could provide an efficient interchange between multiple transport modes, making sustainable travel easy and attractive for users, encouraging uptake of sustainable modes.

14 Need for Intervention

Having established a firm evidence base on which to establish objectives to guide scheme development and appraisal in Sections 6 to 13, this section draws the problems and issues identified in the thematic evidence-based review together in a holistic manner to establish a rationale for investment.

14.1 Futureproofing the Transport Network to Support Growth

Cambridge is one of the fastest growing and most productive cities in the UK with notable population and economic growth forecasted to occur in the short to medium term. Cambridge's growth is driven by a thriving internationally recognised hi-tech and biotech industry, known as the "Cambridge Phenomenon" and is strategically important in boosting the UK's international competitiveness. It is expected to continue to be a key location for regional and national job creation should the supply side constraints, such as labour market accessibility and housing availability, be addressed. This scheme presents the opportunity to address this challenge and improve labour market access and maintain Cambridge's international reputation as an attractive place to live, work and invest.

Fuelled by the 'Cambridge Phenomenon' and the rise of a successful entrepreneurial environment, significant capital investment is needed to provide a greener, more reliable, less congested and better-connected transport network for the region. Whilst investment in transport infrastructure supports the Government's post-Brexit Industrial Strategy and aligns with the 2017 Transport Investment Strategy, it also creates a stronger economy, fuelling further investment into the UK. This growth however, especially in South Cambridgeshire, cannot be sustained in the long term unless significant investment and changes are made to future-proof existing transport infrastructure.

Greater Cambridge's economic success is putting pressure on its housing market. Very high average house prices are in turn pushing its workforce further out of the city to more affordable housing and increasing levels of commuting into the city.

As detailed throughout this Strategic Case the A1307 is a key radial route between central Cambridge and Haverhill which serves the Cambridge Biomedical Campus and other employment centres, such as Babraham Research Campus and Granta Park.

Many of the staff working at the Cambridge Biomedical Campus, and at other employment hubs along the A1307, do not live in the immediate area, resulting in a high number of commuter trips. The geographical distribution of the workforce, coupled with limited modal choice has resulted in a car dependent culture, resulting in congestion and capacity constraints.

With the already dense population of Cambridgeshire continuing to increase in response to economic growth, business creation and increased employment opportunities, there are increased numbers of people commuting into Cambridge from its peripheral areas. This is evident in the scale of proposed commercial and residential led development across south east Cambridge as well as in Haverhill. Development on the periphery of central Cambridge has placed increased pressure on radial routes, such as the A1307. At present, transport infrastructure in south east Cambridge is not adequate to accommodate demand associated with the level of proposed development. Failure to act appropriately may compromise the rate of economic growth which has been experienced over recent years and thus threaten Cambridge's international standing.

14.2 Introducing Modal Choice

Despite extensive congestion and road safety issues, less than 36,000 of the workforce in Cambridge and South Cambridgeshire opt to travel by bus or train. Although several bus services operate along the A1307 and A1301, congestion along the corridors increases an already excessive journey time, particularly during peak travel periods. Rail provision is also limited in south east Cambridge. The area is largely detached from the rail network as it does not have a dedicated train station. Poor public transport further exacerbates car dependency, as commuters opt for the convenience and flexibility of travelling by car.

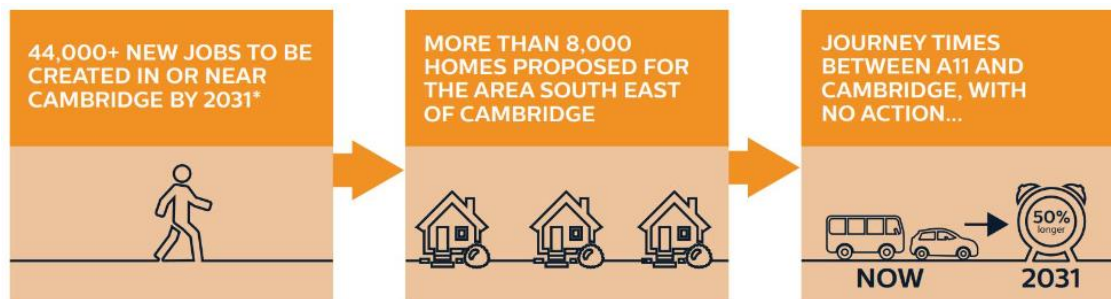
Dedicated provision is made for cyclists, pedestrians and equestrians in parts of the study area. However, active travel infrastructure is inadequate or non-existent in some areas, and does not cater for existing demand, nor does it encourage uptake for these journeys.

Ultimately those travelling through or to south east Cambridge are left with few attractive options to car use, further reinforcing the car dependent culture which exists here and exacerbating congestion and capacity issues.

14.3 Impact of Not Changing

In establishing the need for the proposed scheme, it is important to consider the counterfactual, that is, what would happen if the status quo was allowed to continue and GCP opted not to intervene. In not changing, south east Cambridge runs the risk of experiencing a situation in which journey times are worsened, a spread of peak hour is experienced, and network resilience is significantly eroded. The potential impact of growth without transport improvements is illustrated below in Figure 14.1. If no action is taken to deal with the anticipated growth sustainably, average journey times on key radial routes such as the A1307 are expected to increase by around 50%.

Figure 14.1: Impact of Growth Without Transport Improvements



Source: Cambridge and South Cambridgeshire Local Plan

Failure to deliver new public transport infrastructure and walking and cycling provision will further exacerbate congestion and delay along the corridor, as users are left with no alternative option other than to travel by car. Inadequate sustainable travel options will have a negative impact on the quality of life of users and worsen air quality in the study area as vehicle emissions increasingly pollute the environment.

Increases in journey times and worsening journey time reliability could mean the current agglomeration benefits that Cambridge benefits from through the close connections and knowledge sharing between employment sites and training campuses would be much reduced. This, alongside the impacts of poorer air quality, could result in businesses, that are currently attracted to the UK because of Cambridge's global offer, seeking locations elsewhere outside

the UK. The expected economic growth from the planned employment sites and housing developments could therefore potentially be constrained through the lack of supporting infrastructure. Insufficient transport opportunities along the A1307 could therefore impede the economic growth of the area, reversing the positive economic growth which has been experienced over more recent years.

15 Scheme Aims and Objectives

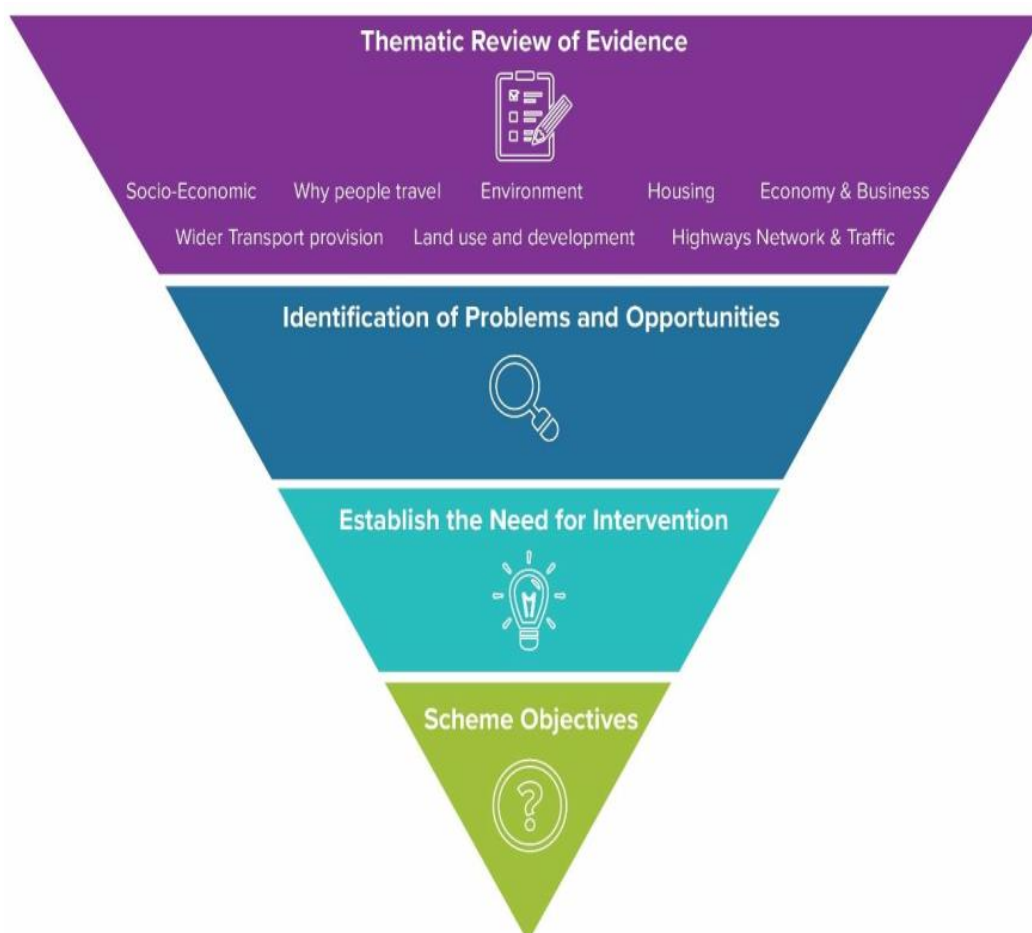
In addition to scheme aims identified by GCP during the development of the SOBC, scheme objectives have been established at OBC stage to reflect updates to the evidence base and to guide the development and appraisal of the scheme. This section provides a summary of how the scheme objectives were established and sets out the relationship between the existing aims and newly developed scheme objectives.

The thematic evidence review undertaken during the development of the Strategic Case identified a range of challenges and opportunities in the study area; this alongside the policy review mapped out the need for intervention.

Establishing an evidence-based need to take action to address clearly defined issues and opportunities enabled the development of scheme objectives.

This process of setting scheme objectives is illustrated below in Figure 15.1.

Figure 15.1: Objective Setting Process



Source: Mott MacDonald

15.1 Study Aims

Regarding transport, the GCP has identified the following challenge:

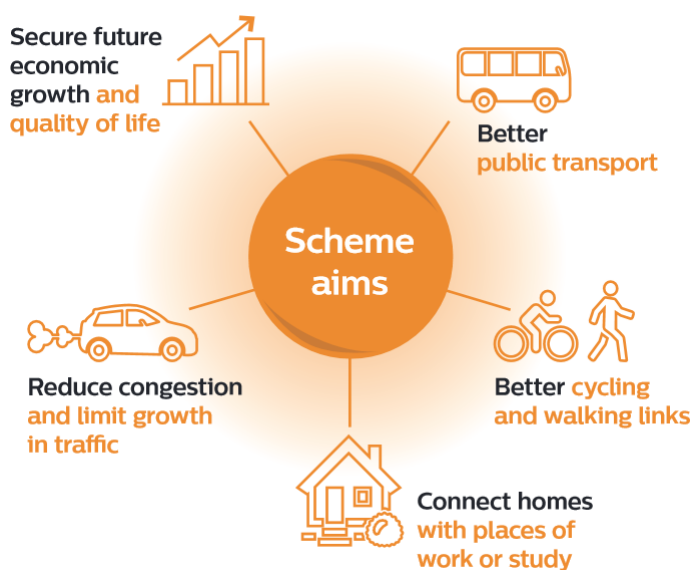
'The Greater Cambridge area of Cambridge and South Cambridgeshire is set to grow by up to 30% over the next 15 years- with the population rising by 65,000 to 338,000 by 2031. Population growth means trips on the transport network will increase by 25,000 by 2031. If we carry on as we are by 2031:

- *Traffic in Cambridge will increase by over 30% in the morning peak*
- *Traffic in South Cambridgeshire will increase by almost 40% in the morning peak*
- *The time spent in congestion will more than double.'*

In developing an appropriate action plan to tackle the challenge set out above the GCP has developed six transport aims. The GCP will aim to:



In addition to the GCP Transport Aims set out above, five study specific aims have been developed, which are illustrated in the infographic below³².

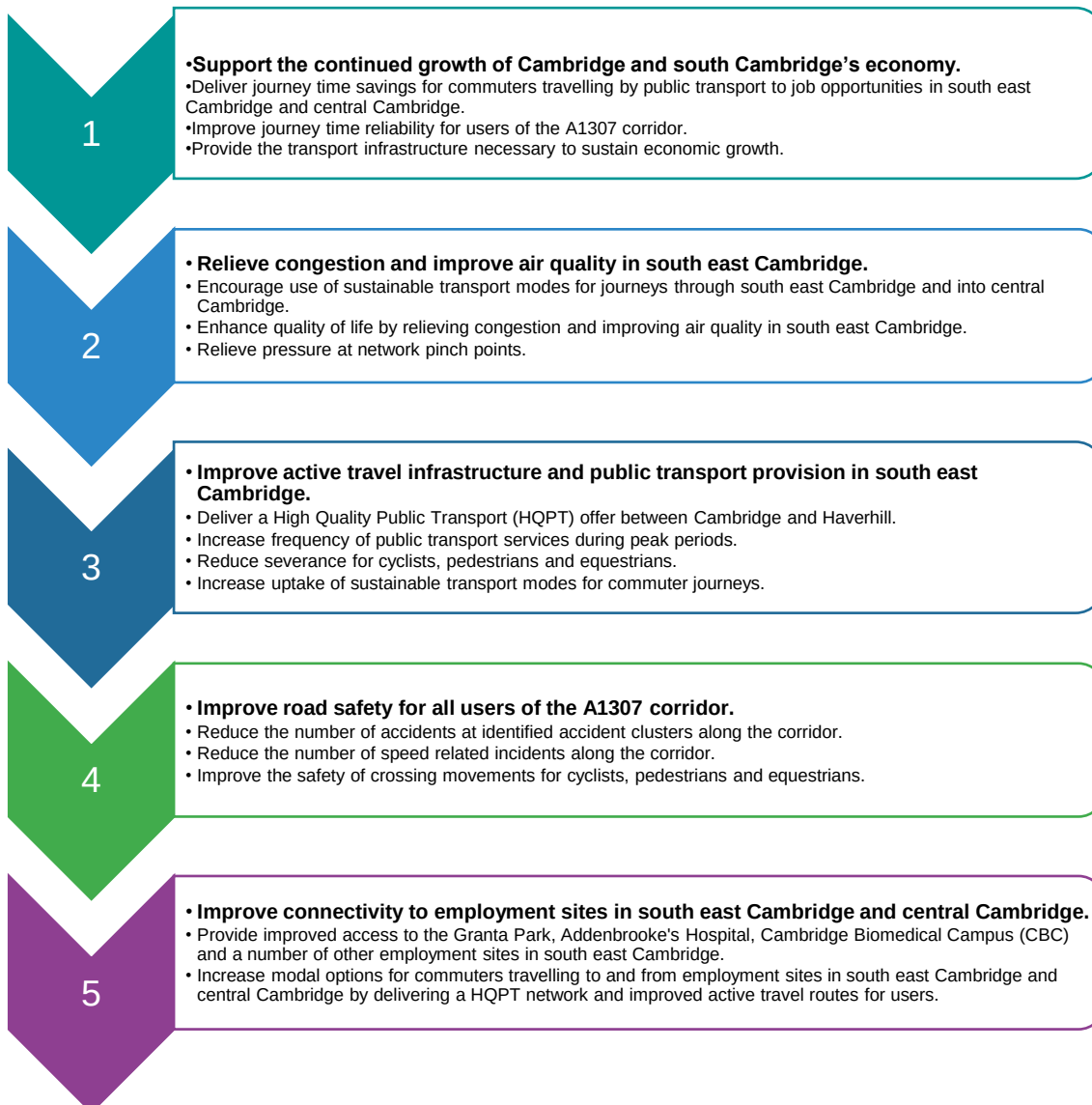


³² <https://www.greatercambridge.org.uk/transport/transport-projects/cambridge-south-east-study/> [Accessed 14 May 2019]

The study aims for the overarching CSET scheme, together with the GCP Transport Aims have aided the development of the scheme specific objectives developed for this OBC. The scheme objectives set out in the following sub-section will detail how the aims outlined above will be achieved.

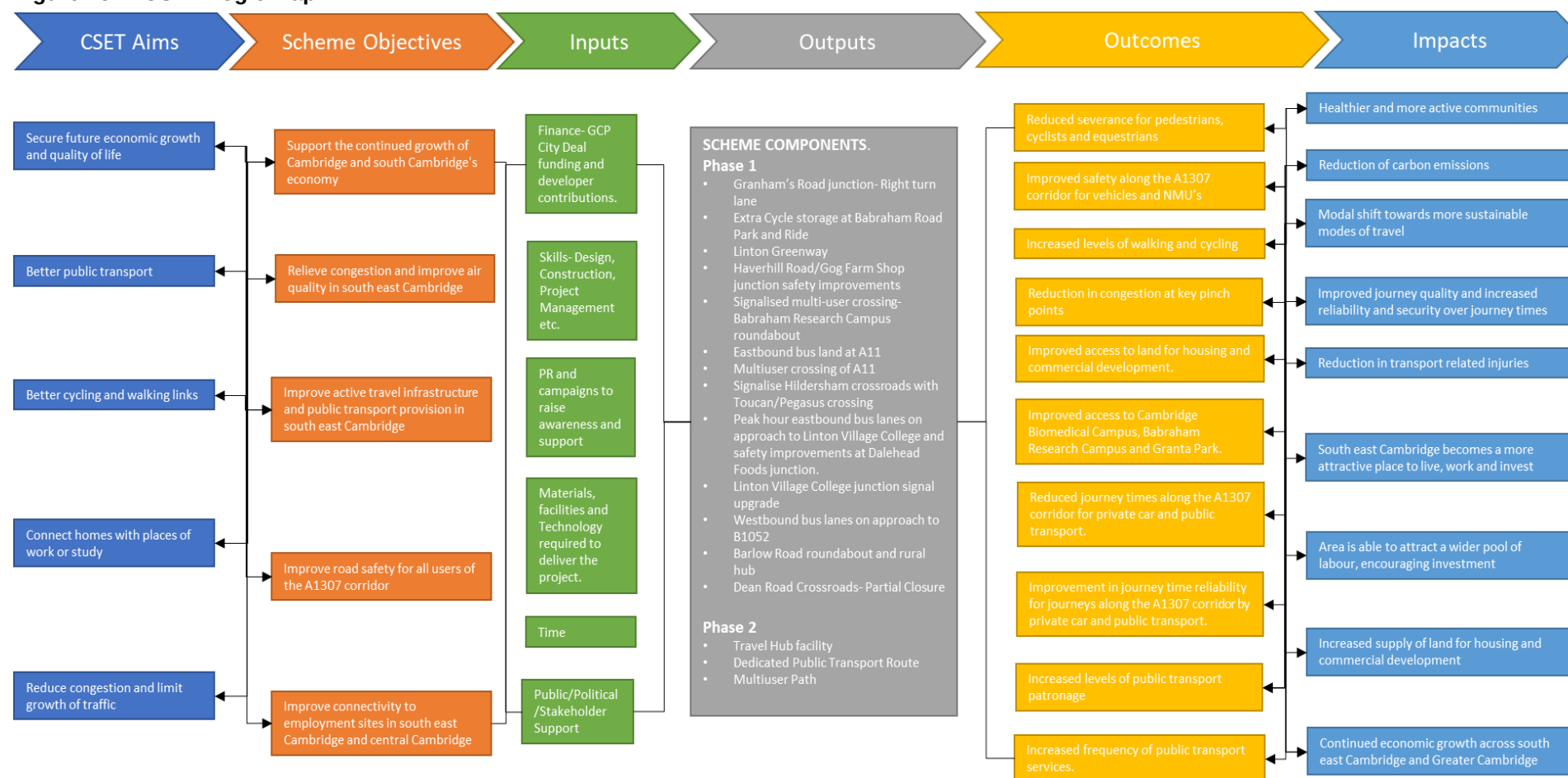
15.2 Scheme Objectives

Scheme objectives were developed by Mott MacDonald in consultation with GCP and apply to CSET as a whole, both Phase 2 and Phase 1. The scheme objectives set out below have been designed to be Specific, Measurable, Achievable, Realistic, and Time Bound (SMART).



The logic map in Figure 15.2 shows the causal pathway between the objectives of the scheme, the outputs and the expected outcomes and impacts. This sets the basis for the framework of the Monitoring and Evaluation Plan, which can be found in the Management Case.

Figure 15.2: CSET Logic Map



15.3 Measures of Success

In order to establish whether objectives have been achieved, a Monitoring and Evaluation Plan has been developed and is included in Section 23.6, as part of the Management Case. This sets out how outcomes associated with successful achievement of objectives will be measured. The key performance indicators by which success against each of the objectives will be measured are shown here. These are categorised by those which will be monitored at project level and those which will be monitored at programme level as part of the wider City Deal delivery of infrastructure schemes. The CSET measures of success are set out below in Table 15.1.

Table 15.1: Measures of Success

Scheme Sub-Objective	Performance Indicator	Level Benefits Measured at	
		Project	Programme
Deliver journey time savings for commuters travelling by public transport to job opportunities in south east Cambridge and central Cambridge.	Reduction in journey times for commuter journeys.	✓	
Improve journey time reliability for public transport users along the A1307 corridor.	Improved journey time reliability for journeys undertaken by public transport.	✓	
Provide the transport infrastructure necessary to sustain economic growth.	Economic growth across south east Cambridge.		✓
Encourage use of sustainable transport modes for journeys through south east Cambridge and into central Cambridge.	Increased uptake of sustainable transport modes; reduced private car usage.	✓	
Enhance quality of life by relieving congestion and improving air quality in south east Cambridge.	Reduction in cases of reported health problems associated with traffic congestion, including respiratory and heart related illnesses.		✓
Relieve pressure at network pinch points.	Reduced pressure at identified network pinch points.	✓	
Deliver a High-Quality Public Transport (HQPT) offer between Cambridge and Haverhill	Increase uptake in public transport, reduced private car usage.	✓	
Increase frequency of public transport services during peak periods.	Number of public transport services during peak periods.	✓	
Reduce severance for cyclists, pedestrians and equestrians.	Increased number of cyclists, pedestrians and equestrians across the study area.	✓	
Increase uptake of sustainable transport modes for commuter journeys.	Increased number of travel to work journeys undertaken by active travel modes.	✓	
Reduce the number of incidents at identified incidents cluster sites along the corridor.	Reduction in the numbers Killed or Seriously Injured (KSI) along the A1307 corridor.	✓	
Reduce the number of speed related incidents along the corridor.	Reduced number of speed related incidents recorded.	✓	
Improve the safety of crossing movements for cyclists, pedestrians and equestrians to encourage use of these modes.	Increased number of cyclists, pedestrians and equestrians across the study area.	✓	

Provide improved access to the Granta Park, Addenbrooke's Hospital, Cambridge Biomedical Campus (CBC) and a number of other employment sites in south east Cambridge.	Increase in uptake of employment opportunities at key employment sites across south east Cambridge.	✓
Increase modal options for commuters travelling to and from employment sites in south east Cambridge and central Cambridge by delivering HQPT network and improved active travel routes for users.	Increased uptake in public transport and active modes for commuter journeys; reduced private car usage.	✓

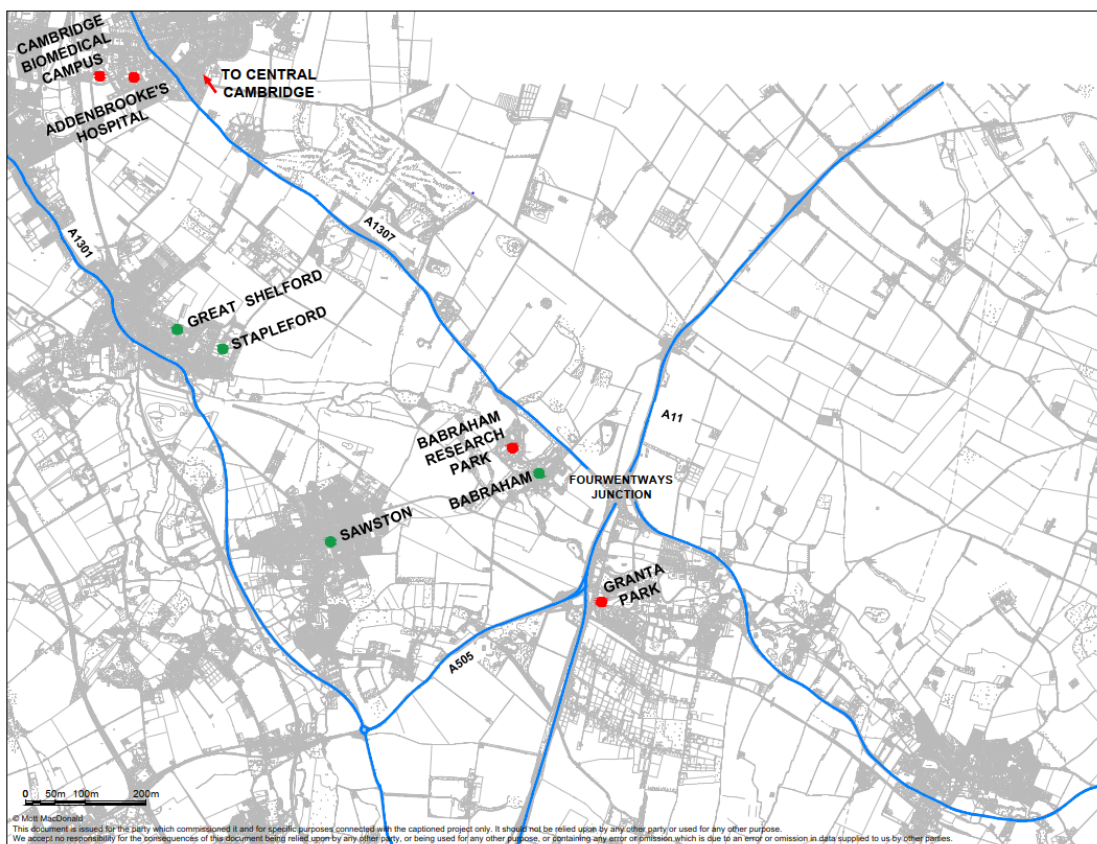
Source: <https://www.cambridgeshire.gov.uk/residents/travel-roads-and-parking/buses/bus-timetables/>

16 Potential Constraints and Interdependencies

16.1 Geographic Scope

The geographic scope of the CSET Phase 2 scheme focuses on a section of the A1307 corridor stretching from the A11/A1307 Fourwentways junction, north west to the Cambridge Biomedical Campus. This section of the A1307 travels past villages such as Babraham, Stapleford and Great Shelford and provides one of the key access routes into central Cambridge from the south east. An overview of the geographic extent of the CSET Phase 2 works can be seen below in Figure 16.1.

Figure 16.1: Phase 2 Geographic Scope



Source: Mott MacDonald

16.2 Constraints

In the design and delivery of the CSET Phase 2 works, the project team will need to consider how best to overcome, incorporate or mitigate impacts relating to the constraints set out below.

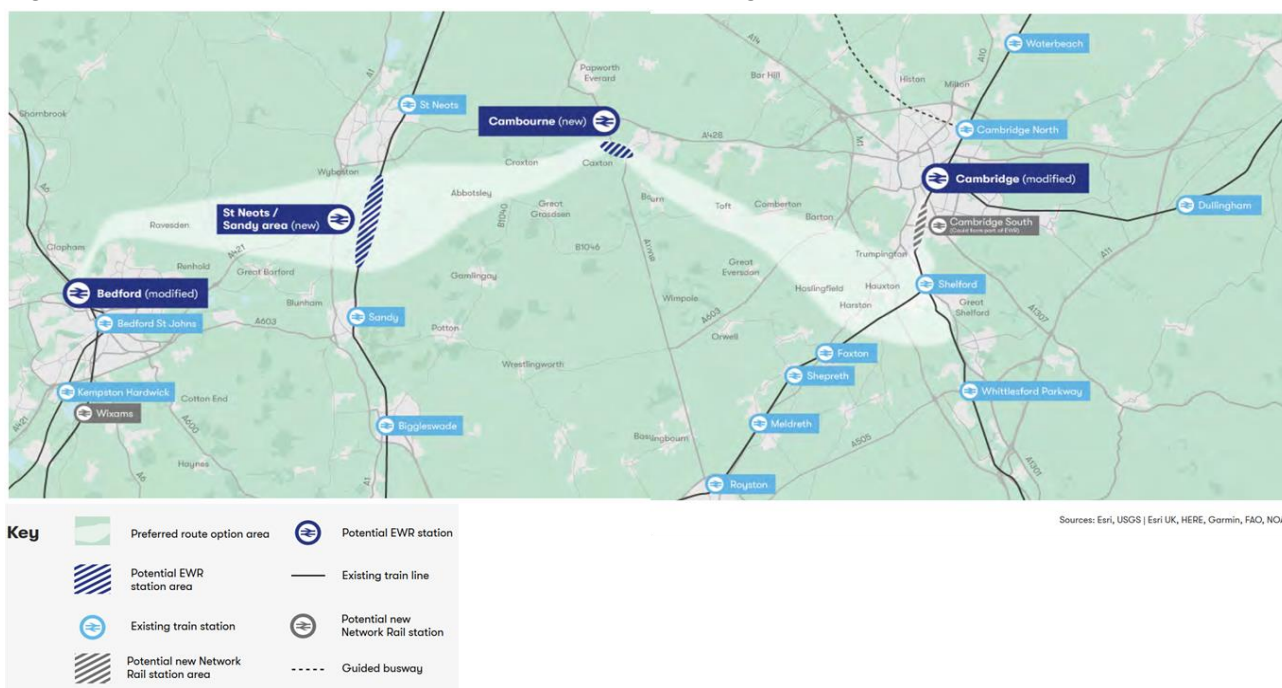
Route Alignment

16.2.1 East West Rail

The East West Rail scheme proposes bringing back into use a section of railway that was closed to passengers in the 1960s, refurbishing existing railway lines between Bletchley and Bedford, and building brand new railway infrastructure between Bedford and Cambridge.

In January 2020, based on the results of public consultation held the previous year, the preferred route corridor between Bedford and Cambridge was identified and will link existing stations in Bedford and Cambridge with communities in Cambourne and the area north of Sandy, south of St. Neots. Figure 16.2 illustrates this corridor. The preferred corridor envisages joining the London to Cambridge Main Line railway in the vicinity of Great Shelford; the actual point of joining being either south or north of Great Shelford, but yet to be determined.

Figure 16.2: Preferred Route Corridor: Bedford to Cambridge



Source: East West Rail Preferred Consultation Option Executive Summary, January 2020

The preferred East West Rail route alignment currently has the potential to connect to the existing Shelford station which sits firmly within the CSET Phase 2 corridor. This means until a new station at Cambridge South is approved and delivered that there could be potential for users of the new East West Rail route to alight at Shelford and make use of the CSET route onward to key employment hubs such as CBC, Granta Park and Babraham Research Park, thereby boosting patronage. This is in fact an opportunity and as such consideration will need to be given to the frequency of services and the capacity of vehicles operating along the CSET route. Consideration may also be given to station improvements at Great Shelford to accommodate a potential increase in passenger activity.

However, in terms of construction, the residents of Great Shelford may raise objections to the delivery of both a new major rail scheme and a new public transport route in their immediate environs within a relatively short space of time. This may have planning implications and cause delays to delivery. Furthermore, in terms of the delivery of CSET, there may be physical or environmental constraints surrounding the delivery of both schemes in what could be an overlapping time frame.

On the basis of consultation, the East West Railway Company are now beginning to develop alignment options within the preferred route corridor. Consideration will be given to station sites, land and connections with local transport networks and the Cambridge South East Transport development team is liaising with the East West Railway Company to ensure synergies between the schemes. In this manner the benefits of both schemes can be maximised in a holistic manner that addresses the wider strategic objectives of economic growth and improved transport connectivity in the area.

16.2.2 Potential Conflict with Non-Motorised Users

There has been one fatality and one serious incident on Cambridge's existing guided busway in the last 12 months. One of these involved a cyclist who, in order to avoid pedestrians swerved and collided with the kerb of the busway. This caused him to be thrown into the path of the oncoming vehicle, which had no ability to manoeuvre to avoid the cyclist. In June of 2019 a bus did leave the tracks in order to avoid a group of cyclists, this resulted in the outcome shown in Figure 16.3. Collisions with cyclists were also recorded in 2012, 2014 and 2017.

Figure 16.3: Guided Bus Incident as a Result of Avoiding Non-Motorised Users



Source: www.cambridge-news.co.uk³³

A pedestrian was hit in a collision once in 2015 and another in 2016, whilst in June 2018 a pedestrian was found unconscious on the busway tracks. Such incidents have raised concerns over safety with increasing arguments that cyclist and pedestrian provision should be segregated by barriers or a greater separation distance from the busway as vehicles on the busway reach up to speeds of 60mph, comparable with the speed of a train. These incidents have the potential to constrain the scheme

³³ <https://www.cambridge-news.co.uk/news/cambridge-news/cambridgeshire-guided-busway-crash-car-13626561>

unless solutions for ensuring the safety of non-motorised users can be included in any designs, which may impact land take and potentially cost.

HQPT Operations

16.2.3 Legislative Issues Regarding Optically Guided Vehicles

Both kerb-guided and optically-guided vehicles are being considered for HQPT operations on the CSET Phase 2 public transport route. When operating within a guideway, kerb-guided vehicles do not have the capability to move from the tracks on which they run, similar to light rail, whereas optically-guided vehicles do have the ability to manoeuvre within the route alignment. There is a current preference for optically-guided vehicles. Vehicles employing this technology are currently in use in Europe but would require type approval for use in the UK.

16.2.4 Lack of Alternative Providers of Optical Guidance Technology

At present there is only one established provider of optical guidance technology, Siemens - who supply the guidance systems for the current optically-guided bus operations in other countries. GCP could therefore be constrained by the lack of competition as this is currently a captive market. This may exert upward pressure on procurement prices and also may reduce any incentive for the single supplier to provide any service enhancements or speciality modifications. However, this constraint is likely to be mitigated by current developments in autonomous vehicle technology which include equipping vehicles with a range of sensors, including cameras, for positioning and guidance and are expected to lead to the availability of alternatives to the Siemens system.

Travel Hub Facility

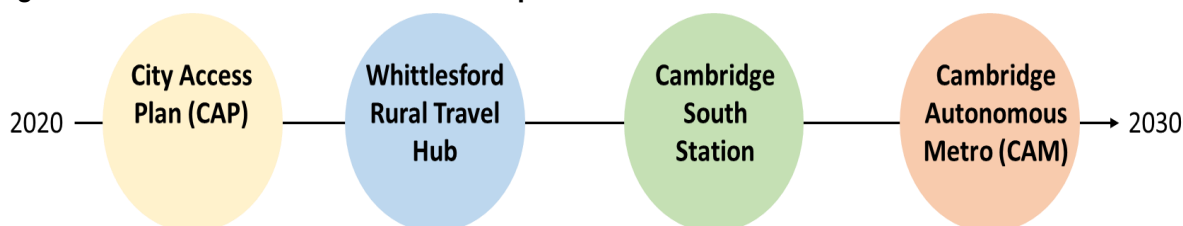
16.2.5 Location of Utilities infrastructure

There is a high-pressure gas main which runs to the west of the A11, in the general area within which the Travel Hub facility is proposed. The pipeline is classified by the Health and Safety Executive as a hazardous installation and is therefore subject to Planning Advice for Developments near Hazardous Installations. This may rule out consideration of some options and narrow the possibilities for the scheme.

16.3 Interdependencies

Whilst the CSET Phase 2 proposals do not have any specific dependencies in order to be delivered, the project is interdependent with a number of other proposals located within close proximity. Figure 16.4 provides an indicative timeline of the anticipated delivery timescales of the four schemes considered within this sub-section, followed by further details of the relevant schemes and their interdependent relationship with CSET Phase 2.

Figure 16.4: Indicative Timeline of Interdependent Schemes



Source: Mott MacDonald

In order to provide improved end to end connectivity between settlements and employment sites along the A1307 corridor and the city centre, CSET Phase 2 will depend on the City Access Strategy and associated Plan to tackle the issues of congestion within the city centre and enhance the ability for people to get into, out of and around the city.

Schemes within this strategy aim to reduce congestion on routes into the city centre which will be key to reducing public transport journey times on sections of route where HQPT services are sharing road space with general traffic, therefore making the CSET Travel Hub more attractive and successful. In addition, the removal of traffic from the city centre will help create additional demand for the facility.

A505 Royston to Granta Park Strategic Transport Study

A strategic transport study for the A505 corridor between Royston and the A11 at Granta Park has recently been commissioned by Cambridgeshire County Council on behalf of CPCA. This study will look at current traffic problems and potential future demand on the A505 between Royston and the A11; a corridor which skirts the southern edge of the scope of the CSET Phase 2 scheme, and will investigate options for better provision for cyclists, pedestrians and public transport users. Any proposals put forward will need to consider the CSET Phase 2 proposals, just as the development of CSET will need to take into account any emerging findings from this study to ensure a joined-up approach to infrastructure delivery.

Whittlesford Rural Travel Hub

Rural Travel Hubs are small, flexible transport interchanges at key locations in Cambridgeshire, allowing more people to access sustainable transport networks. The Whittlesford Rural Travel Hub would include a larger car park at Whittlesford Parkway station which is highlighted in red in Figure 16.5.

Figure 16.5: Location of Whittlesford Rural Travel Hub



Source: Skanska

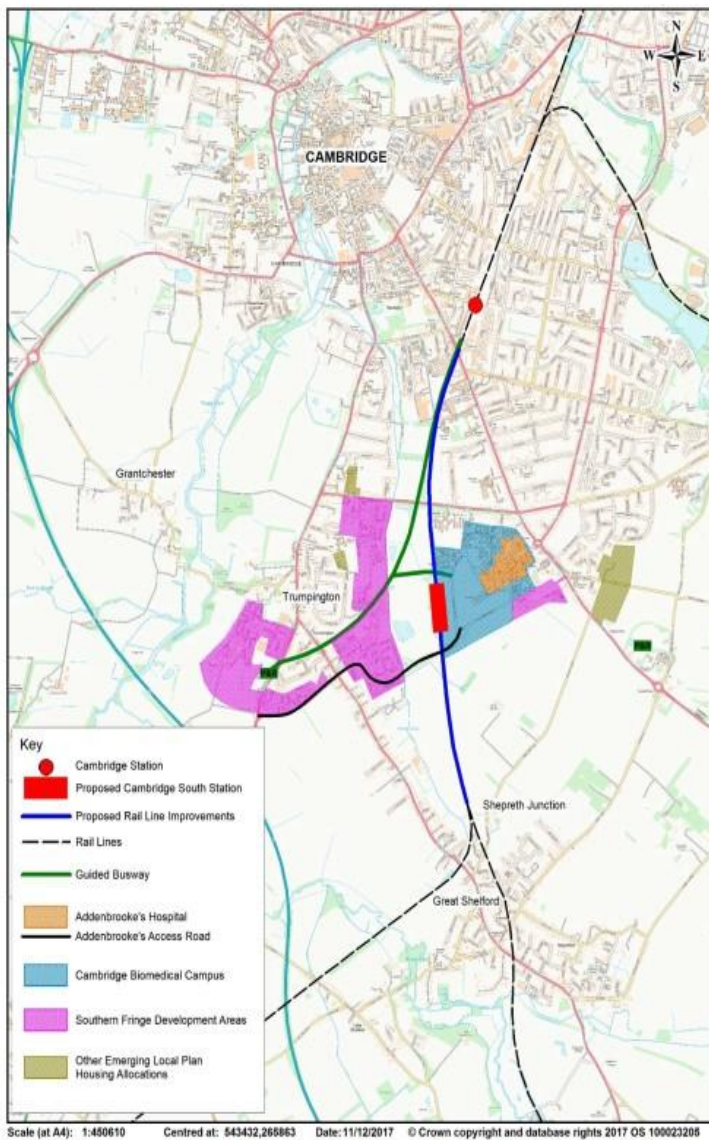
Improvements to connectivity along the A1307 corridor as a result of CSET Phase 2 could encourage demand at Whittlesford Rural Hub as well as at the new CSET Travel Hub as individuals travelling to Cambridge from the south east could utilise parking facilities at either location. It is possible that the Whittlesford site may attract some of the potential users of the CSET Travel Hub and route and negatively impact utilisation.

Cambridge South Station

The proposed new rail station at Cambridge South aims to improve connectivity between the growing Biomedical Campus and international gateways, to reduce reliance on Cambridge station for travel to the Southern Fringe, and to improve sustainable transport access into the Southern Fringe.

The proposed Cambridge South Station will further improve the public transport offer for south Cambridge but will likely be located to the west of the A1307 as shown in Figure 16.6.

Figure 16.6: Proposed Location of Cambridge South Station



Source: Cambridge South Station Briefing Note, CCC; 2018

Although passengers using Cambridge South station would not use the CSET Travel Hub facility itself, the segregated cycle and footway alongside the new route may be regarded as an attractive, sustainable alternative modal option for onward commutes.

Cambridge Autonomous Metro (CAM)

CSET Phase 2 is a priority for the GCP and will create a vital link to ease congestion, offer sustainable travel choices, connect communities and support growth. The project is regarded as one of a number of GCP projects that form Phase 1 of the longer-term Cambridgeshire Autonomous Metro (CAM) programme.

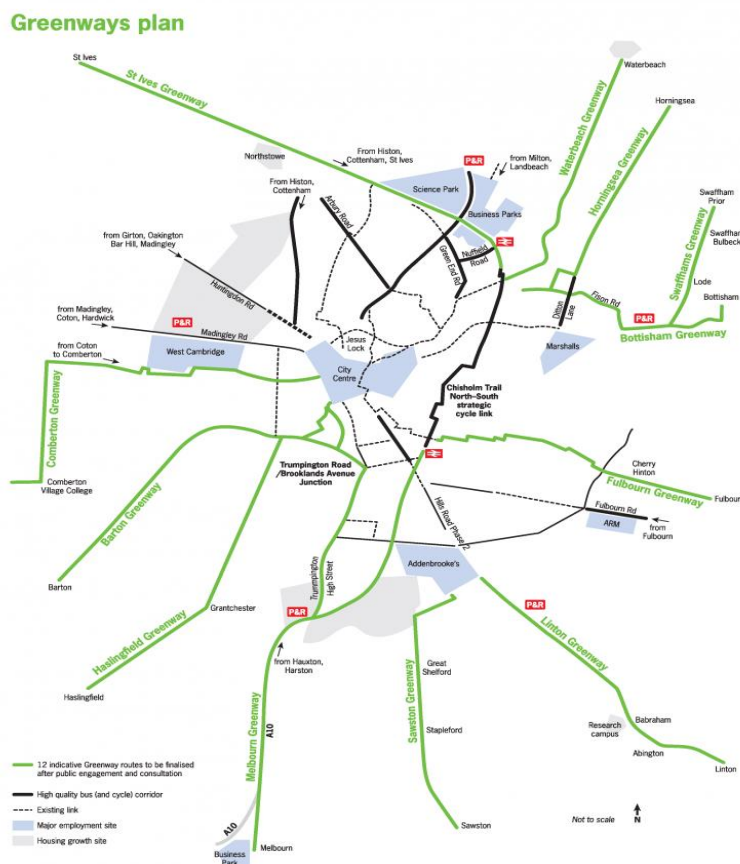
The CPCA's plans for a wider, regional CAM are at an early stage and action is needed now to tackle worsening congestion and accommodate housing and employment growth. A future CAM network proposes electric, rubber-tired tram-like vehicles using dedicated, off-road routes to bypass congestion and routes would extend underground through Cambridge to provide traffic-free, fast transport.

The options for CSET Phase 2 are the first phase of the emerging CAM, and as such option development must take into consideration how they will link, connect and align with the wider CAM network.

Cambridge Greenways

The Cambridge Greenways project comprises of a network of 12 radial routes into Cambridge from surrounding towns and villages as shown in Figure 16.7. The Linton Greenway and Sawston Greenway are both located within the same geographic area where the CSET Phase 2 project is proposed. The Linton Greenway is being delivered as part of CSET Phase 1 and this includes providing access to the upgraded footbridge crossing over the A11. Although it has been determined that delivery of CSET Phase 2 should not be constrained by the Linton Greenway, rather the development of the Greenway and its route/features will be adapted to accommodate CSET Phase 2, it is clear that the two schemes will interface with each other and so provision needs to be made to ensure that the schemes are developed so that they complement each other and enhance overall connectivity within the area.

Figure 16.7: Proposed Cambridge Greenways Network



Source: GCP

The proposed Sawston Greenway would be built around the successful path that runs between Cambridge Biomedical Campus and Great Shelford, which is now so popular that it needs to be widened. The initial development of the Sawston Greenway proposals acknowledge that should CSET Phase 2 include an off-road cycle/pedestrian route, work undertaken to date could help the development of this element of the CSET scheme. Any off-road provision delivered through CSET will need to consider how it can address the need for intervention established by the Sawston Greenway whilst ensuring that there is no redundant duplication of infrastructure, gaps in provision or misaligned links between the two schemes. Table 16.1 summarises the scheme constraints and interdependencies.

Table 16.1: Summary of Scheme Constraints and Interdependencies

Constraint/Interdependency	Nature of Constraint/Interdependency with CSET Phase 2
Constraints	
East-West Rail	Rail options may constrain the alignment options north of Shelford and within CBC
Potential conflict with NMU's	Concerns from the public and associated costs in ensuring segregated NMU provision
Legislative issues	Optically guided public transport vehicles, being considered for CSET are currently not type approved for use in the UK
Lack of alternative guidance technology providers	Lack of competition may mean premium operational costs / supplier dependency as market is captive
Location of utilities	Planning advice regarding hazardous installations may limit the number of alignment and Travel Hub site layout options
Interdependencies	
City Access Plan (CAP)	CAP measures to improve congestion and reduce public transport journey times can bolster demand for the scheme
Whittlesford Rural Travel Hub	Potential users of the CSET facility may use Whittlesford instead, adversely affecting demand
Cambridge South Station	Potential users of the CSET facility may use Cambridge South station instead, adversely affecting demand
CAM	CSET scheme design must be able to accommodate future interface and linkage with CAM
A505 Strategic Transport Study	CSET development needs to consider emerging proposals and ensure a linked-up approach to infrastructure delivery
Cambridge Greenways	CSET proposals may deliver/should consider scheme elements that also meet the need for intervention established for the Sawston and Linton Greenways, to avoid provision of redundant infrastructure or creation of a disjointed network

Source: Mott MacDonald

17 Stakeholders

The stakeholders for the CSET Phase 2 project are a key interdependency for the project to ensure it meets stakeholder needs. Key stakeholders have identified issues and fed back to GCP throughout the development of the C2C project.

GCP has grouped stakeholders into four distinct groups in order to develop an appropriate communications approach to successfully engage necessary parties. The four groups and the overarching approaches to engagement with them are set out below.

Manage Closely

Stakeholders which are considered to have high influence and high interest need to be actively and closely managed through frequent communications to keep this group fully engaged with the project.

This should include regular face to face meetings and activities to allow for active discussion and consultation, supported by tailored communications that maintain an open dialogue between those solely involved with the project.

Keep Satisfied

Stakeholders which are considered to have high influence and low interest are regarded as 'Opinion Formers' and should be managed through regular, tailored communications that satisfy their needs. Pro-active consultation on specific areas can be used to increase their interest and support for the project. Communications to this group need to be timely and relevant, with opportunities for face-to-face and two-way communication to help build relationships.

Keep Informed

Stakeholders which are considered to have high interest and low influence need to be kept informed of developments through regular communications providing general updates and relevant information. Offering opportunities to share their views on specific areas that may affect them can help to increase support and goodwill for the project. Communication channels could include newsletters, emails, direct mail, forums and questionnaires and social media opportunities.

Monitor

Stakeholders who are considered to have low interest and low influence are unlikely to be actively seeking information about the project. This group can be kept informed through easily accessible, general communications, e.g. news articles, social media, website, brochures. Reactive communications may also be required, for example, to respond to specific queries.

A list of the stakeholders and the groups to which they belong is included in the Stakeholder Engagement and Communications Plan, and is included as Appendix F, document reference MMD-BCA-00-RP-BC-0371.

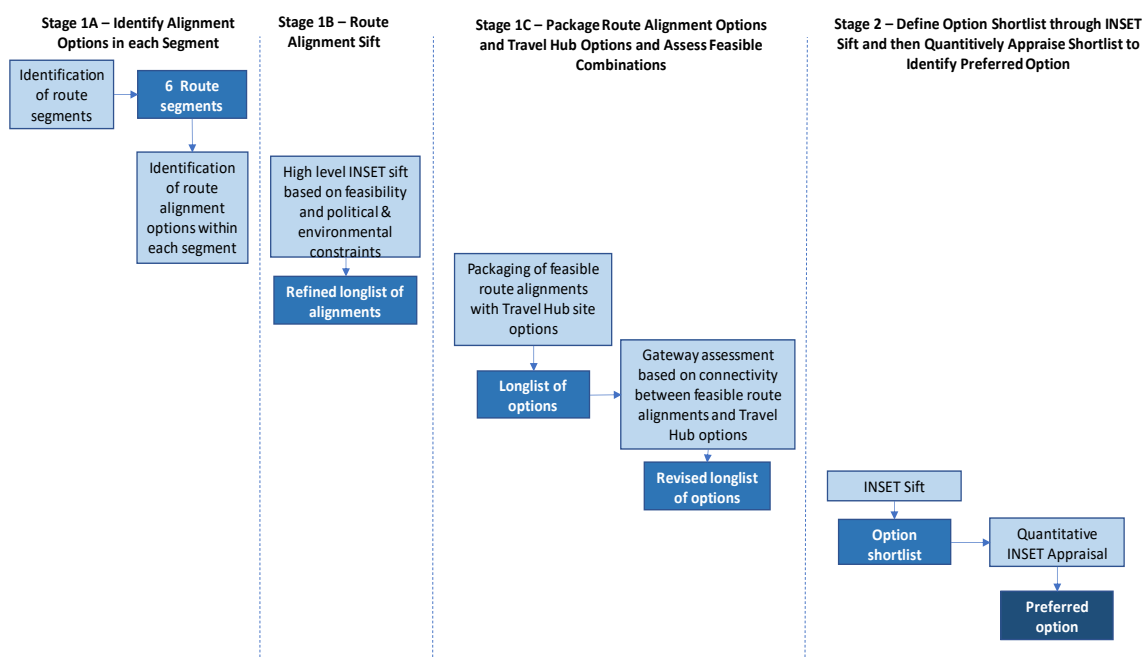
18 Option Generation

This section provides a summary of the options that were generated and taken through a multistage appraisal process to arrive at a shortlist of five options which were assessed in greater detail to arrive at the preferred option. A complete account of the process and appraisal results can be found in Appendix A: OAR, document reference MMD-BCA-00-RE-BC-0024.

18.1 Option Generation Process

Options were generated and appraised in accordance with the process map shown in Figure 18.1. The four stages of the bespoke CSET Phase 2 option generation and appraisal process are aligned with the first two stages of the Department for Transport's (DfT) guidance 'The Transport Appraisal Process'³⁴.

Figure 18.1: Options Assessment Framework



Source: Mott MacDonald

To establish a long list of option packages consisting of both a proposed route alignment and a Travel Hub facility, option generation was essentially performed in Stages 1A to 1C as shown in the above process map.

18.1.1 Travel Hub Site Development

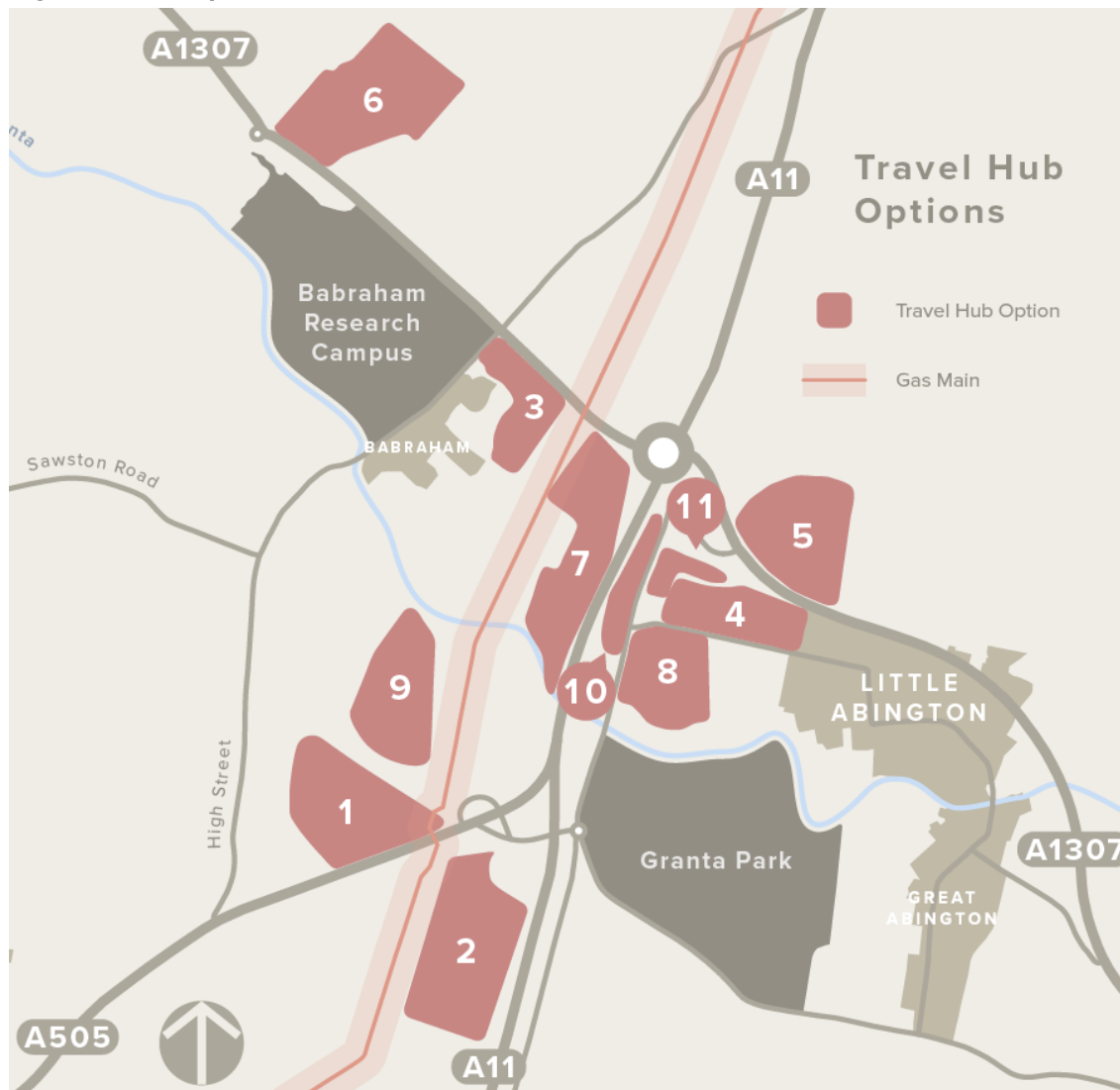
Eleven Travel Hub sites were identified, and these are shown in Figure 18.2. A brief description of each site follows on from this.

³⁴ Transport Analysis Guidance, The Transport Appraisal Process, May 2018, Department for Transport (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712965/webtag-transport-appraisal-process-may-2018.pdf)

Sites were developed based upon the following key criteria:

- Location – the new strategic Travel Hub facility should be located within close proximity to the intersection of the A11, A1307 and A505;
- Capacity – availability of sites of sufficient size to accommodate 2,000 to 3,000 spaces;³⁵
- Accessibility, proximity and synergy to corridor route alignments;
- Compatibility with other emerging strategic transport infrastructure schemes; and
- Constraints to development.

Figure 18.2: Proposed Phase 2 Travel Hub Sites



Source: Mott MacDonald. Contains OS data © Crown copyright and database rights 2018 OS 100023205

³⁵ WSP's Technical Note ref 70012014-TN-006 P&R cites the Cambridge Parking Strategy Review (SDG, May 2017) in seeking a minimum parking space provision for new Travel Hub facilities of 2,000 spaces, with further consideration for future expansion to a total of 3,000 spaces

Travel Hub Site 1

Site 1 is located to the west of the A11/A505 junction, with direct access from the A505. Public access to the site would require a new junction from the A505 or significant improvements to the existing A11/A505 junction which is not currently an all-movements junction.

The site would facilitate direct access to an offline route, with capacity of up to 3,000 spaces. The site is located on Green Belt land (current use arable farming) but could be seen as essential transport infrastructure and an exception could be permitted.

The location of the site would mean a diversion for many users away from their desire line into Cambridge. This could increase traffic using Pampisford Road and result in a change in traffic flow at the A11/A1307 Fourwentways) junction and junctions between the A1307 and Newmarket Road and Pampisford Road.

Travel Hub Site 2

Site 2 is located to the west of the A11, with direct access from the A505 or A11 an option. A bridge across the A505 or signalised junction would be required to provide access for the public transport route. This location would require significant improvements to the existing A11/A505 junction to provide public vehicle access. For those willing to access the site from the A1307, there would be a significant diversion (approximately 2.4km).

The site is located beyond the dedicated Green Belt but has the potential to impact the setting of the Grade 2 listed Pampisford Hall. The site is also adjacent to a high-pressure gas pipeline over which development is restricted. However, there is enough space to accommodate 3,000 parking spaces within this boundary.

Travel Hub Site 3

Site 3 is located to the west of the A11, with direct access to the A1307 and would be well located for public access and to intercept potential users travelling into Cambridge via the A1307.

However, the site would require a dedicated public transport link from the western alignment options and consideration would need to be given to future proofing to allow for potential extensions and use by CAM vehicles.

The site is dedicated as Green Belt land and would be located in close proximity to Babraham village. It is noted that GCP made an undertaking in November 2017 not to progress this site, owing to the potential impact on the setting of the village. However, it was retained within the longlist of options to allow a full and fair assessment against the other Travel Hub options that have subsequently been identified.

The site is also situated adjacent to the high-pressure gas pipeline and, although the required capacity could be provided, avoiding the gas pipeline would mean that the Travel Hub site would extend around the village, which was the reason for the previous GCP decision.

Travel Hub Site 4

Site 4 is located east of the A11. It is currently an organic farm, with a school neighbouring it to the west and residential dwellings in Little Abington to the east. The site has potential to accommodate up to 2,000 vehicles but there is less opportunity for expansion without impacting on the neighbouring school playing fields.

The site is not within the dedicated Green Belt, however, the current land use cannot be easily relocated or mitigated and developing this land would impact the operation of the farm and local

employment. Developing a Travel Hub facility on this site could also have detrimental impacts on the school and Little Abington. To access the site, a bridge would be required over the A11, the position of which would be dependent on the alignment option.

Travel Hub Site 5

Site 5 is located on the A1307 east of the A11. It has a parking capacity of 2,100 and could accommodate an expansion of up to 3,000 vehicles. The site is currently used as arable farmland but is outside of the designated Green Belt.

As with the other sites located east of the A11, a bridge would be required to connect with the route alignment options west of the A11. A new junction would be required on the A1307 to provide access to the site. The design of this would be dependent on whether public transport vehicles join Newmarket Road or run via a dedicated alignment to Site 5. The latter would require a signalised junction on the A1307 to provide a crossing point for public transport vehicles to enter the site. General traffic could enter the site by replacing the existing priority junction between Newmarket Road and the A1307 with a four-arm roundabout.

The site is relatively well located for vehicles travelling towards Cambridge from Haverhill, Linton and other points east of the A11; however, those travelling on the A11 would need to deviate from their desire line into Cambridge and the site location would not be as visible to them.

Travel Hub Site 6

Site 6 is located on the A1307, opposite the Babraham Research Campus roundabout with amendments to the existing junction providing access into the site. This site would be well located for potential users travelling into Cambridge and, as the site is located west of the A11/A1307 Fourwentways junction, the current trip distribution would be maintained.

The site is on Green Belt land and has parking capacity of 2,000 with the opportunity to expand to 2,500.

Travel Hub Site 7

Site 7 is located west of the A11 and in a location which would be passed by all traffic travelling west into Cambridge on the A1307, avoiding the need for many users to deviate from their existing route and being visible to drivers which would encourage future use. Access to this site would be from the A1307 via a new junction.

The site has a potential parking capacity of between 2,000 and 2,800 spaces but is subject to a number of constraints. It is located within the Green Belt; part of the site is situated in flood zones 2 and 3³⁶ and it is located adjacent to the high-pressure gas pipeline with the access from the A1307 crossing the pipeline. In addition, the site straddles an existing public footpath. All these would need careful consideration in planning the layout of the site and necessary mitigation measures.

Travel Hub Site 8

Site 8 is located on Newmarket Road (east of the A11) and has a provisional parking capacity of 2,000 spaces, with potential to expand to 2,200. Access to the site would be indirect for vehicles which would need to travel from the A1307 via Newmarket Road and the site would have limited visibility.

³⁶ Zone 2 is defined by the Environment Agency as land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) and Zone 3 as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%)

For public transport access to the site, a bridge over the A11 would be required, the position of which would be dependent on the associated alignment option.

The site is adjacent to a listed building whilst the current land use is school playing fields. This has low ecological value but would need to be replaced and there are potentially greater air quality and noise impacts from a site in this location.

Travel Hub Site 9

Site 9 is located opposite Site 1, to the west of the A11/A505 junction. The site is set back from the A505 so additional infrastructure would need to be implemented for access. The site has potential to provide between 2,000 and 3,000 spaces.

Public access to this site will require a new junction from the A505 or A11, the improvement of the existing A505/A11 junction or involve the construction of a new access road from the A1307.

The site is located on Green Belt land, which is currently being used for arable farming. The Travel Hub infrastructure could be an essential development, and an exception could be permitted. The site is located close to the high-pressure gas pipeline and the impact on this would be dependent on the access location.

The location creates a significant diversion for those using the A1307 from the A11 (Fourwentways) junction and the site would be less visible to the majority of potential users.

Travel Hub Site 10

Site 10 is located between the A11 and Newmarket Road. It is assumed access will be provided from Newmarket Road, rather than the A11, meaning access from the A1307, A505 and A11 would be indirect. As this site is located east of the A11, a bridge would be required for public transport access from the offline route alignment options.

The site would be insufficient in size to meet capacity requirements, with indicative layouts suggesting approximately 800-900 vehicles could be accommodated.

Travel Hub Site 11

Site 11 is a smaller site, located on Newmarket Road and was formerly used as a café and car park. It has a provisional parking capacity of approximately 500-600 vehicles.

The site could either be accessed from Newmarket Road or via a new or modified junction on the A1307.

Sites 10 and 11 though not meeting capacity requirements were considered as it was recognised there may be potential to merge the sites due to their close proximity.

18.1.2 Route Alignment Development

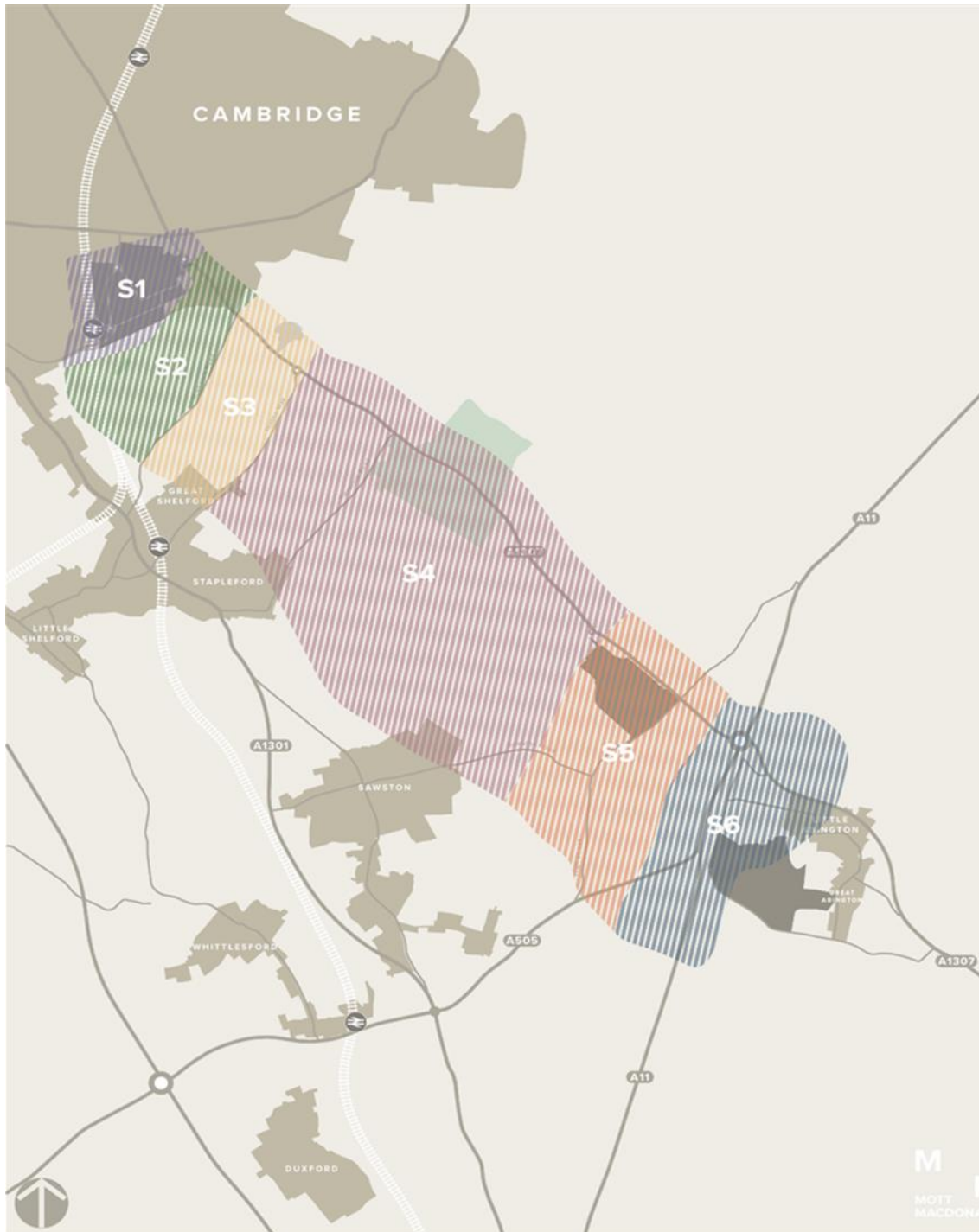
The length of the route along the study area between the Cambridge Biomedical Campus and the A11/A1307 Fourwentways junction was split into six segments and multiple route alignments were then developed in each of these segments.

The segments are shown in Figure 18.3 and are as follows:

- Segment 1: CBC;
- Segment 2: CBC to Granham's Road;
- Segment 3: Granham's Road to Hinton Way;
- Segment 4: Hinton way to Sawston Road;

- Segment 5: Sawston Road to High Street; and
- Segment 6: Connection to the Travel Hub site.

Figure 18.3: Route Segments



Source: Mott MacDonald

In total 38 route alignments were developed. These are shown on a segment by segment basis in Figure 18.4 to Figure 18.9.

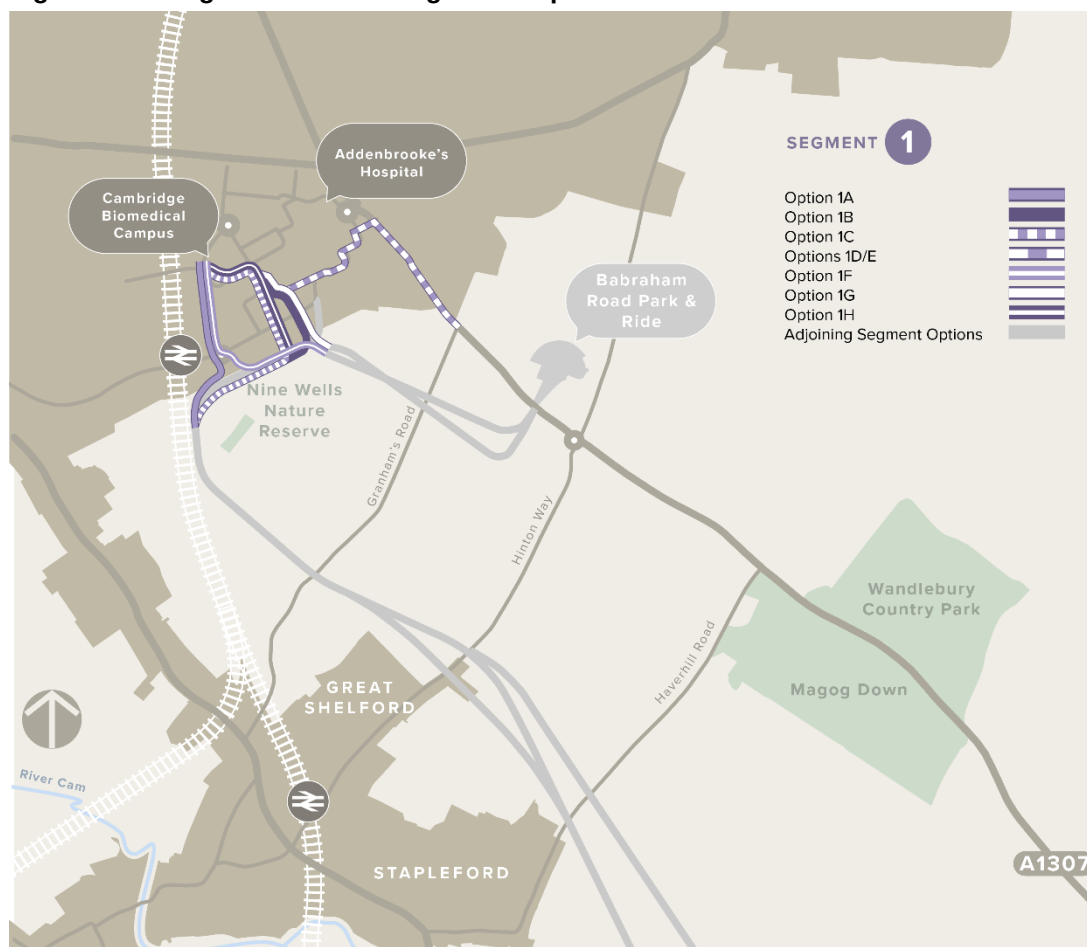
Segment 1: CBC

Eight options (1A-1H) were identified for the connection into the CBC and shown in Figure 18.4. Option 1A would run from a western alignment parallel with the railway and connect to the campus at the roundabout junction of Addenbrooke's Road, Dame Mary Archer Way and Francis Crick Avenue. It would then follow Francis Crick Avenue before joining the route of the existing guided busway. Option 1F is similar to Option 1A except it would connect to an alignment following the A1307 rather than a western alignment.

Options 1B, 1C, 1G and 1H would join the campus at Robinson Way and follow this to reach the route of the existing guided busway. The options differ in the route they take through land and the proposed development area to the south of the campus. Options 1B and 1C would connect to a western alignment, with Option 1C providing a more direct connection to Robinson Way. Options 1G and 1H would connect to an alignment alongside the A1307 with both being a similar distance.

Options 1D and 1E differ from the other options by entering the campus to the east, rather than the south, and connecting with a route running via Hills Road. Option 1D would provide a segregated route into the campus whereas Option 1E would require public transport vehicles to share with general traffic.

Figure 18.4: Segment 1 Route Alignment Options



Source: Mott MacDonald. Contains OS data © Crown copyright and database rights 2018 OS 100023205

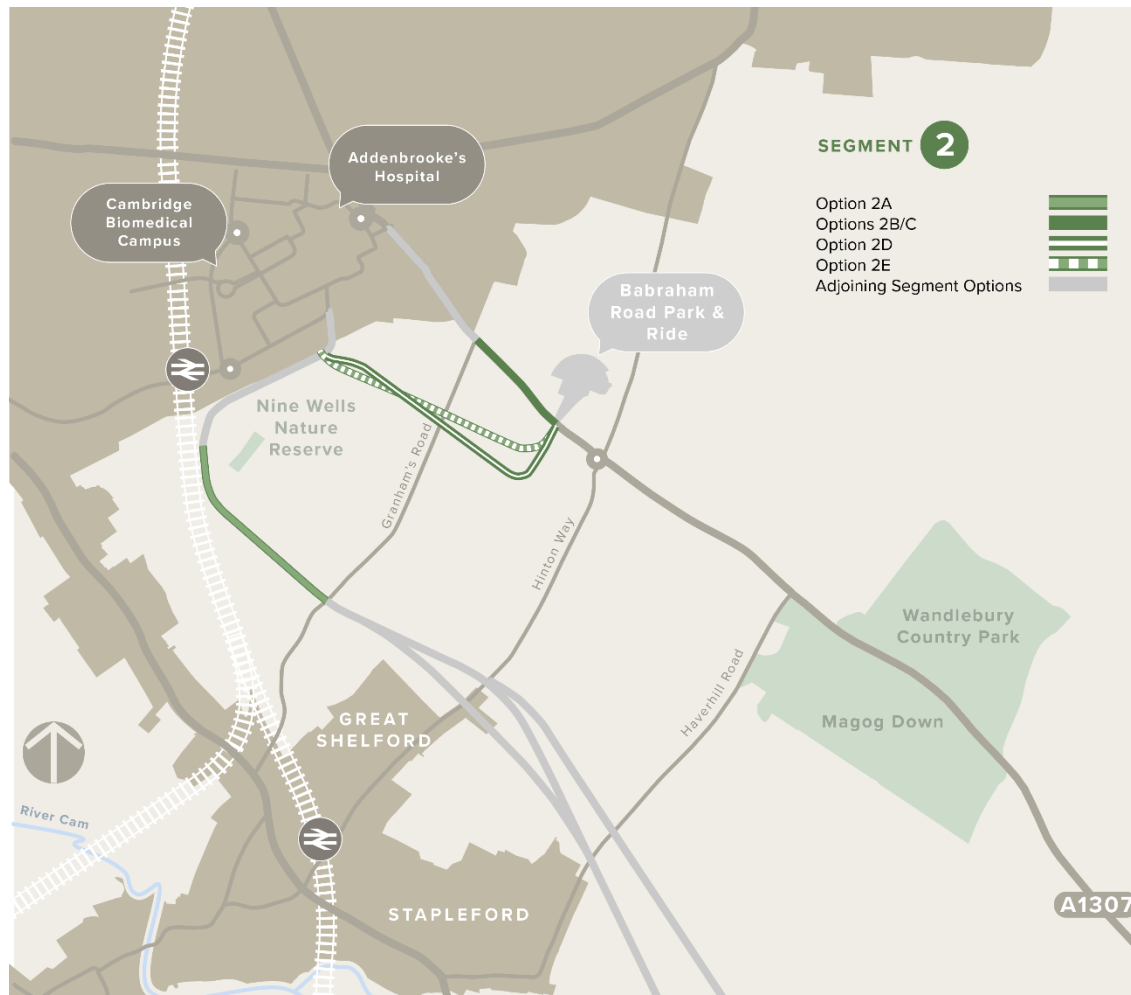
Segment 2: CBC to Granham's Road

Five route alignment options (2A-2E) were identified in Segment 2 and shown in Figure 18.5.

Option 2A would provide a dedicated route for public transport vehicles and run to the west of Nine Wells Nature Reserve, parallel with the railway. This has been designed to avoid dissecting the nature reserve.

Options 2B and 2C would continue along the A1307 (Hills Road) to reach the CBC at the Addenbrooke's Hospital roundabout. Option 2B would provide separate lanes alongside the existing carriageway whereas Option 2C would provide a new alignment parallel to the existing carriageway. Options 2D and 2E would provide a new connecting road between the A1307 at Babraham Road Park & Ride to the south of the CBC. The difference between these options is that Option 2E provides a direct alignment and Option 2D follows the field boundary.

Figure 18.5: Segment 2 Route Alignment Options



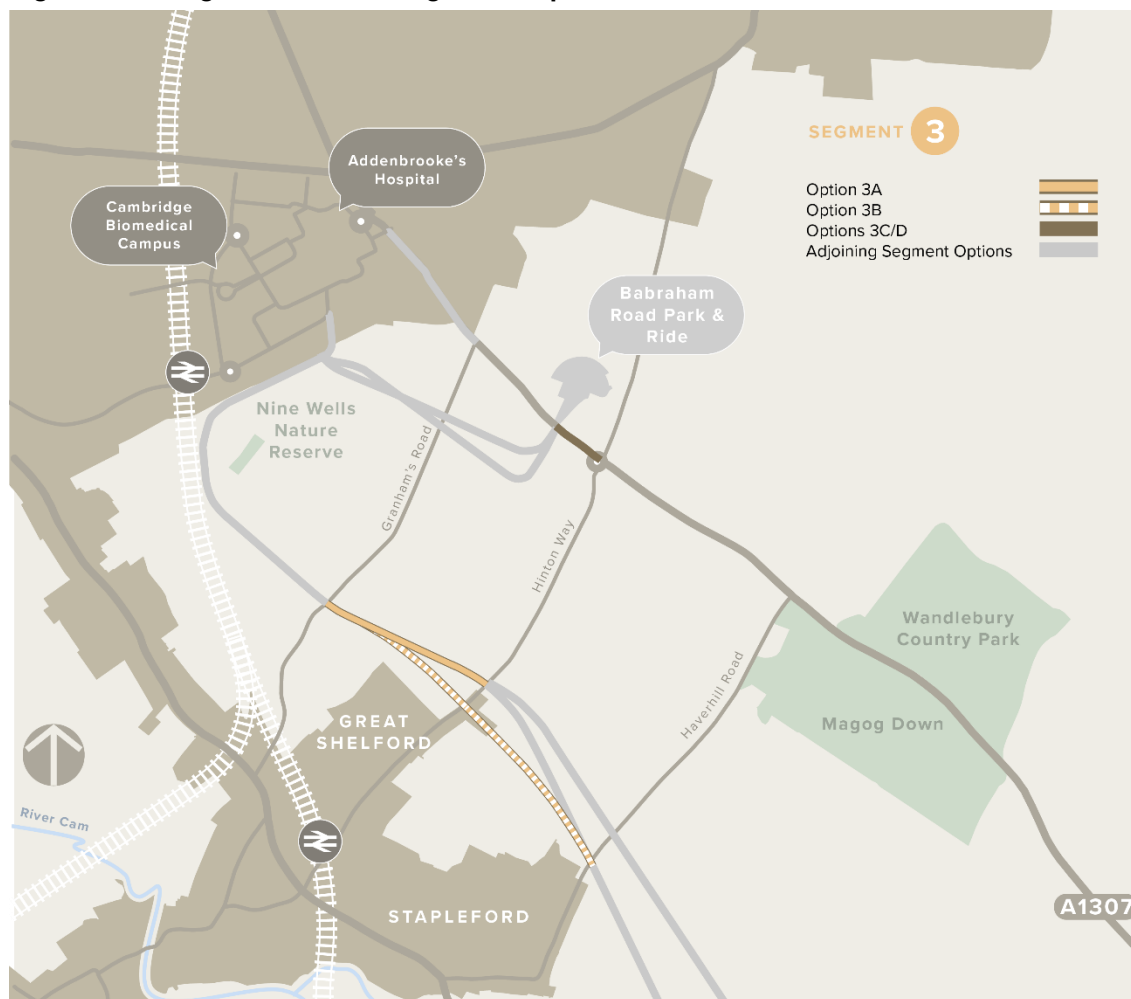
Source: Mott MacDonald. Contains OS data © Crown copyright and database rights 2018 OS 100023205

Segment 3: Granham's Road to Hinton Way

Four route alignment options (3A-3D), were identified in Segment 3 and shown in Figure 18.6. Both Options 3A and 3B would provide a new alignment. Option 3A would run between Granham's Road and Hinton Way to the east of Great Shelford whereas Option 3B would take a more direct route but consequently require the compulsory purchase of residential properties.

Options 3C and 3D would run alongside the A1307. Option 3C would comprise a widening of the existing carriageway whereas Option 3D would be the construction of a new road parallel with the A1307.

Figure 18.6: Segment 3 Route Alignment Options



Source: Mott MacDonald. Contains OS data © Crown copyright and database rights 2018 OS 100023205

Segment 4: Hinton Way to Sawston Road

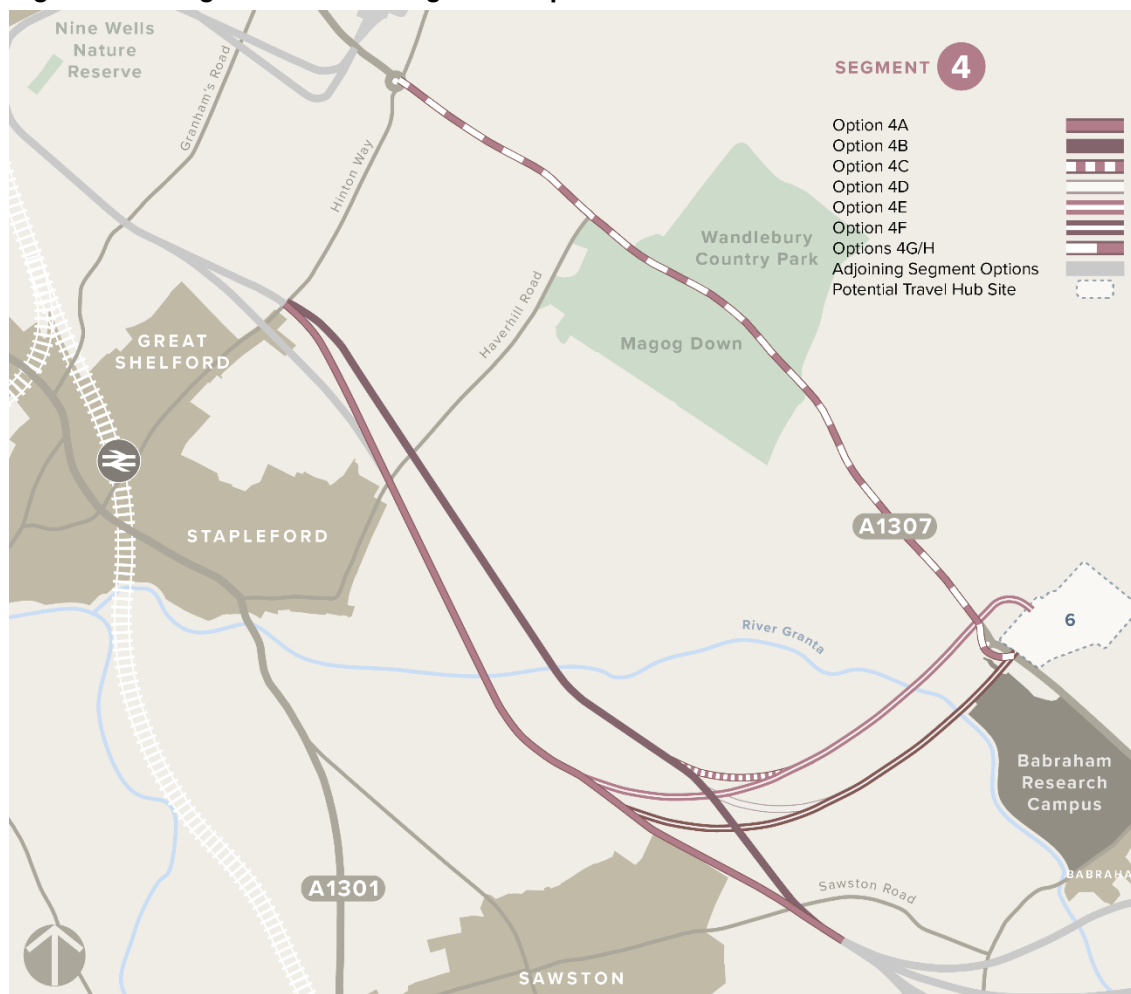
Eight route alignment options (4A-4H) were identified in Segment 4 and shown in Figure 18.7. Options 4A, 4B, 4C, 4D, 4E and 4F are variations of a new alignment running between Hinton Way and Sawston Road. In contrast, Options 4G and 4H would follow the A1307 with Option 4G being a widening of the existing carriageway and Option 4H being a new road parallel with the A1307.

Option 4A is a westerly alignment which runs alongside the former railway alignment and close to the villages of Stapleford and Sawston. Option 4B follows a marginally more direct route to the east of Option 4A but is slightly further from the residential areas.

Options 4C and 4D provide connections from the easterly alignment (Option 4B) to a new Travel Hub site on the A1307, north of Babraham Research Campus. Option 4C would connect into the north of the site and Option 4D would connect into the south.

Similarly, Options 4E and 4F provide connections from the westerly alignment (Option 4A) to the same Travel Hub site on the A1307. Option 4E would connect into the north of the site and Option 4D would connect into the south.

Figure 18.7: Segment 4 Route Alignment Options



Source: Mott MacDonald. Contains OS data © Crown copyright and database rights 2018 OS 100023205

Segment 5: Sawston Road to High Street

Seven route alignment options (5A-5G) were identified in Segment 5 and shown in Figure 18.8. Options 5A, 5B, 5C, 5D and 5G would provide a new alignment running south east of Sawston. Options 5E and 5F would instead follow the A1307 from Babraham Research Campus, with Option 5E being a widening of the existing carriageway and Option 5F a new road parallel with the A1307.

Option 5A would run adjacent to the former railway alignment from Sawston and therefore close to the County Wildlife Site. It would also require a bridge over High Street or significant regrading of land. This would be avoided by Options 5B and 5C which would bypass the former railway to the south and north respectively.

Option 5D would follow a different route from Sawston to connect directly with a Travel Hub site adjoining the A1307 to the south east of Babraham Research Campus. Option 5G would provide a direct link from Sawston to the A11/A1307 junction and a Travel Hub site located in this area.

Figure 18.8: Segment 5 Route Alignment Options

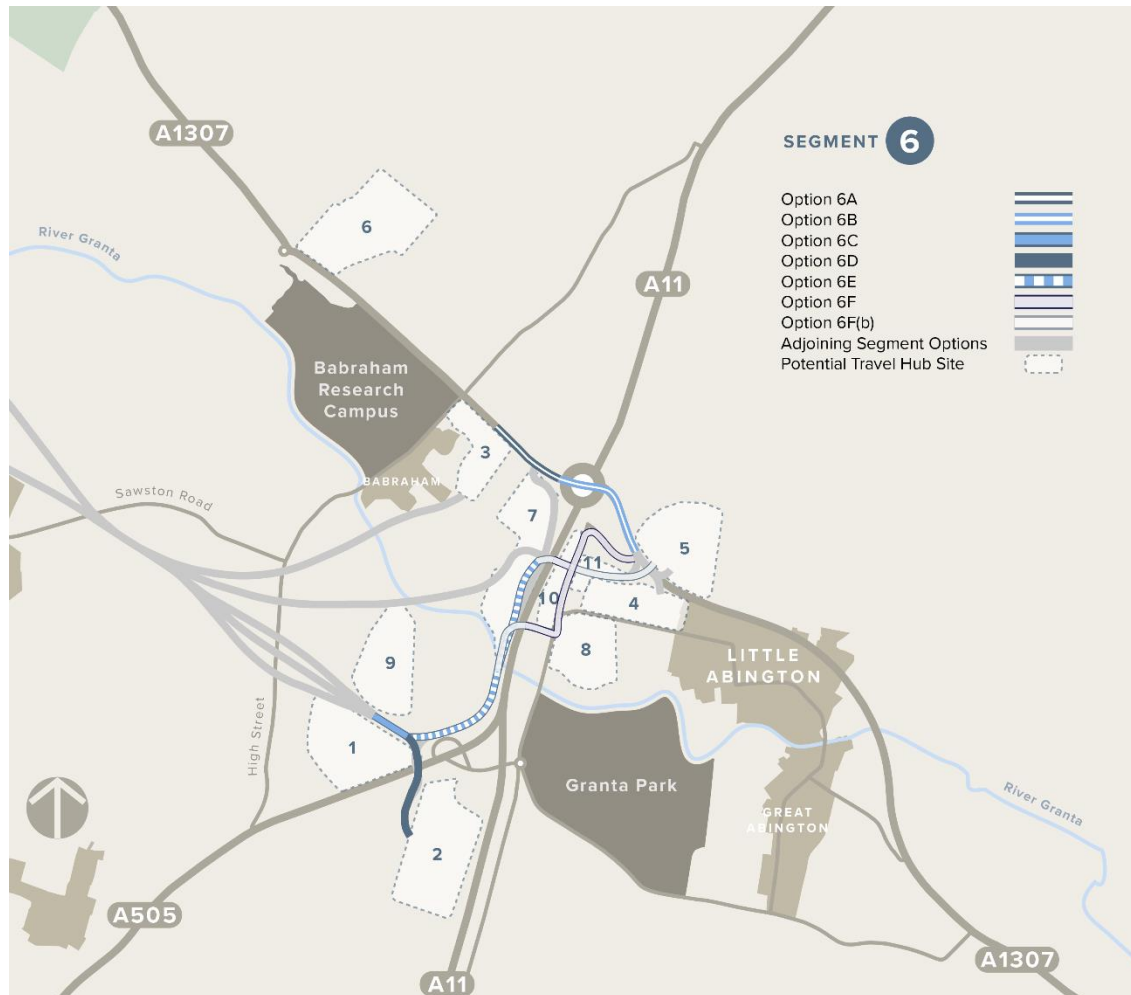


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Segment 6: Connection to Travel Hub Site

Segment 6 considered how potential locations for the 11 potential Travel Hub sites would be accessed from the main alignment options extending as far as the A11. Six route alignment options (6A-6F) were identified and detailed in Figure 18.9.

Figure 18.9: Segment 6 Route Alignment Options



Source: Mott MacDonald. Contains OS data © Crown copyright and database rights 2018 OS 100023205

Option 6A would run alongside the A1307 as far as the A11, therefore serving a Travel Hub site west of the A11. Option 6B would also follow the A1307 but cross the A11 and serve a Travel Hub site to the east of this.

Option 6C would provide a connection from a new western alignment, serving Travel Hub sites located north of the A505. It would not require a significant extension to the public transport route in order to serve a Travel Hub site in this location.

Option 6D would extend from a new western alignment and cross the A505 to serve a Travel Hub site on the south of this.

Option 6E would also require an extension to the public transport route, in this case running parallel with the A11.

Option 6F would extend Options 6E or 5G by creating a bridge across the A11. It would then join the existing highway network with public transport vehicles running on Newmarket Road/Bourn Bridge to connect with a Travel Hub site. Option 6F(b) would cross the A11 but extend to the A1307 via a dedicated new route instead of sharing with existing traffic on Newmarket Road.

18.2 Option Long List

Following a high level sift at Stage 1B, which sought to discount any route alignments that were not feasibly deliverable based on political and environmental constraints, 25 alignments remained. These are listed in Table 18.1. Due to the nature of the landscape and topography some of the segments had more alignment possibilities than others.

Table 18.1: Feasible Route Alignments within each Segment

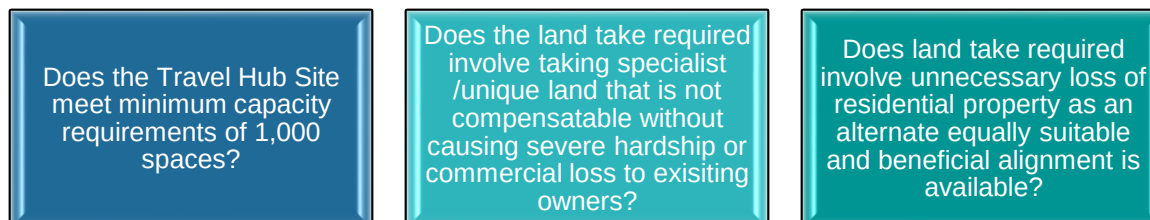
Segment	Overview of Segment
1: CBC	Option 1A: Western alignment with entry via Francis Crick Ave
	Option 1B: Western alignment with entry via Robinson Way (East)
	Option 1C: Western alignment with entry via Robinson Way (West)
	Option 1F: A1307 alignment with entry via Francis Crick Ave
2: CBC to Granham's Road	Option 2A: West of Nine Wells
	Option 2D: A1307 alignment with link road to CBC via field boundary
	Option 2E: A1307 alignment with link road to CBC direct alignment
3: Granham's Road to Hinton Way	Option 3A: East (avoiding urban area)
	Option 3B: Western Route
	Option 3C: A1307 (separate lanes)
4: Hinton Way to Sawston Road	Option 4A: West with no Travel Hub connection
	Option 4B: East with no Travel Hub connection
	Option 4C: East with northern connection to Travel Hub
	Option 4D: East with southern connection to Travel Hub
	Option 4E: West with northern connection to Travel Hub
	Option 4F: West with southern Babraham Research Campus connection to Travel Hub
	Option 4G: A1307 (separate lanes)
5: Sawston Road to High Street	Option 5C: North of former railway
	Option 5D: Connection to Babraham Research Campus Travel Hub
	Option 5E: A1307 (separate lanes)
	Option 5G: Direct route to A11 and A1307 Travel Hub sites
6: Connection to Travel Hub Site	Option 6A: Via A1307 (north)
	Option 6C: Direct from western alignment
	Option 6E: Parallel with A11 (without crossing)
	Option 6F: Parallel with A11 (with crossing)

Source: Mott MacDonald

These 25 route alignments were then combined with the 11 potential Travel Hub sites. In theory this should have led to 275 option packages (25 x 11), had all feasible alignments been able to connect to each of the 11 Travel Hub sites, however this was not the case and the maximum number of option packages generated was 231.

As 231 was a far too large a number of options to develop in detail, and differences between some of the options were marginal, a Gateway Assessment was undertaken to discount any of the option packages that either did not meet key policy objectives or would cause hardship and distress such that it would render the scheme unacceptable by the local communities.

The three Gateway Assessment Criteria are:



Through this Gateway Assessment, 141 of the 231 options were sifted out leaving 90 options remaining as a refined long list to go forward to Stage 2 for formal appraisal. Full detail on the refined long list can be found in Appendix A: OAR, document reference MMD-BCA-00-RE-BC-0024-C.

18.3 Option Sifting

The longlist of 90 option packages were subjected to a detailed qualitative sift and scored using a Multi-Criteria Assessment Framework according to how well they addressed criteria under the themes of:

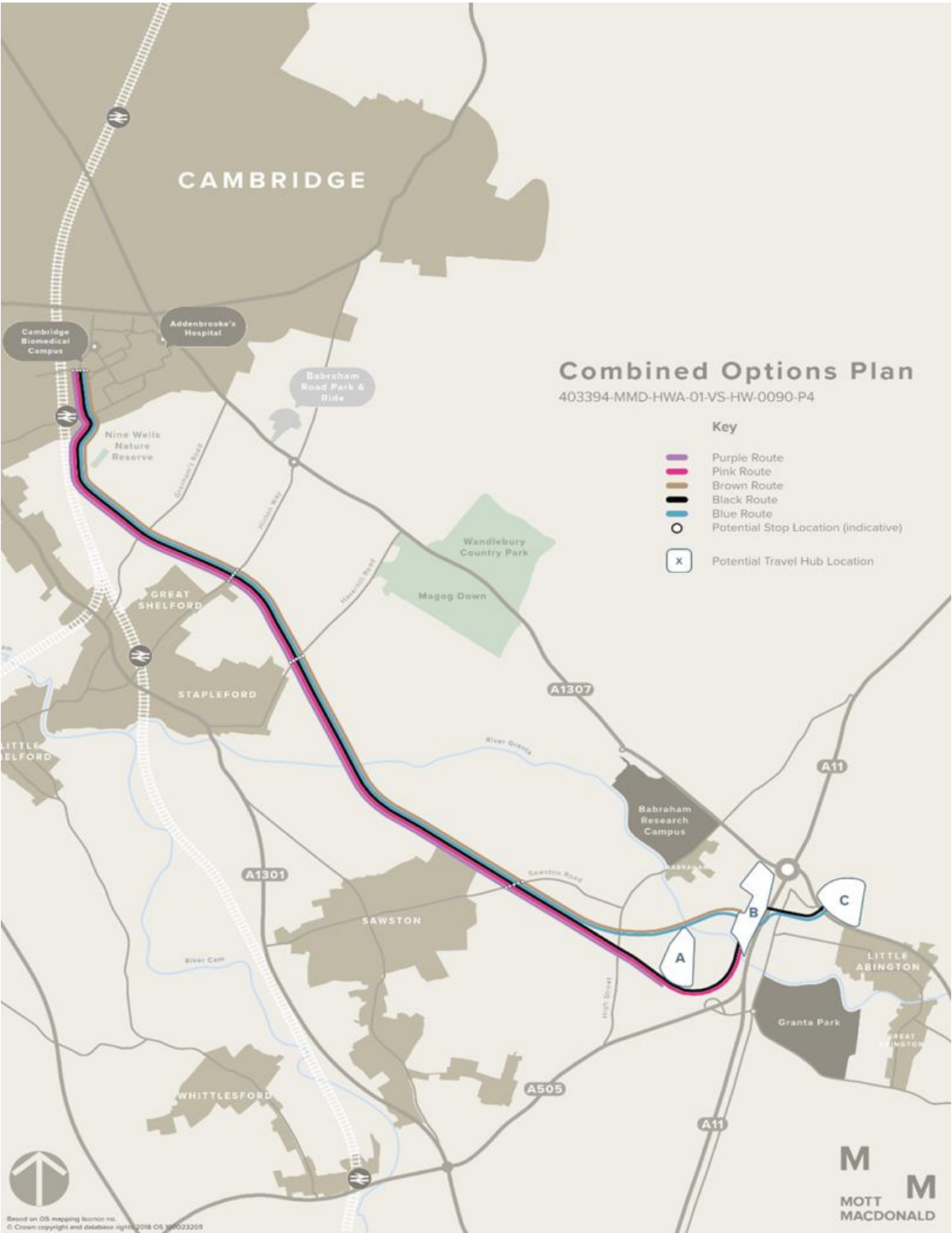


A seven-point scoring system was adopted to assess how well options met the established criteria, using a scale of -3 to +3, where -3 represented a very poor ability to address criteria and +3 a very good ability. On this basis and with some refinement to the designs following consultation with stakeholders five options were shortlisted and taken forward for a robust quantitative appraisal.

18.4 Option Shortlist

The five shortlisted options are shown in Figure 18.10. There are five route alignments, which are denoted by colour; Black, Blue, Brown, Pink and Purple and three Travel Hub sites denoted by letter; A, B and C.

Figure 18.10: Option Shortlist



Source: Mott MacDonald

18.4.1 Overview of Shortlisted Route Alignments

All five options follow the same route between CBC and Sawston, from which point they diverge into five alternative alignments, leading to one of three Travel Hub sites.

All options would have the same HQPT service frequencies and have similar levels of provision for pedestrians and cyclists. The main differences between each option and the Travel Hub sites are summarised below; this includes acknowledgement of constraints and risks to delivery.

CBC to Sawston

The section of the route common to all options runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with the railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. All four stops proposed at this stage are within this section and in the same locations for each option. These would be at the CBC, Hinton Way (Great Shelford), Haverhill Road (Stapleford) and Sawston Road (Sawston). The route would cross each of these roads and Granham's Road, via new at-grade junctions to be signalised with priority given to public transport vehicles. Before reaching High Street, the route options then diverge as outlined within the following sections.

Brown Option

The Brown (and Blue) route takes a direct alignment across fields towards the A11, which includes a second crossing of the River Granta. The Brown route ends at Travel Hub Site B, located to the south west of the junction between the A1307 and A11. General traffic would access it from the A1307 via a new junction whilst the site itself would have a linear arrangement in order to accommodate it between a high-pressure gas main, over which development is restricted, and the A11. The site could provide parking for up to 2,800 cars.

Blue Option

The Blue route extends beyond the Brown route to cross the A11 via a new bridge. The route would then cross Newmarket Road at a new junction, before running through the south of the former Comfort Café site and crossing the A1307 via a new junction to connect with Travel Hub Site C, located on the north side of the A1307. As with the junctions on the common section of route, all new junctions would be at-grade and signalised with priority for public transport vehicles. Site C would have a separate roundabout junction to provide general traffic with access into the site at the current junction between the A1307 and Newmarket Road. It could provide parking for up to 2,100 cars.

Black Option

The Black, Purple and Pink routes follow the route of a former railway; however, as this is now designated as a County Wildlife Site, the proposed alignment would be slightly to the north of this, also avoiding the need for a bridge or significant regrading works at the former High Street crossing. All three options follow the same route initially with the Black and Pink options continuing to the A505 junction before running parallel with the A11 and crossing the River Granta. The Black route would then cross the A11 before following the same alignment as the Blue option from Newmarket Road to Travel Hub Site C.

Pink Option

The Pink option is the same as the Black option but, instead of crossing the A11, it terminates at Travel Hub Site B to the north of the River Granta. This would be the same as the Travel Hub site for the Brown route but have a slightly different layout in order to accommodate public

transport vehicles entering the site from the south rather than west. This would result in a slightly lower capacity of up to 2,500 cars.

Purple Option

The Purple route is the shortest of all options and, unlike other options, crosses the River Granta once only. It follows the same route as the Pink and Black route but stops to the west of the A11/A505 junction and would serve Travel Hub Site A. This would be accessed via a new roundabout junction to the north of the A505 slip road and require an extended access road to the site itself. This would be necessary in order to avoid the high-pressure gas pipeline. The site would provide capacity for approximately 2,000 cars but has potential for expansion.

It was from these five shortlisted options; outcomes of the INSET process, that the preferred option was selected; this is detailed in Section 19.

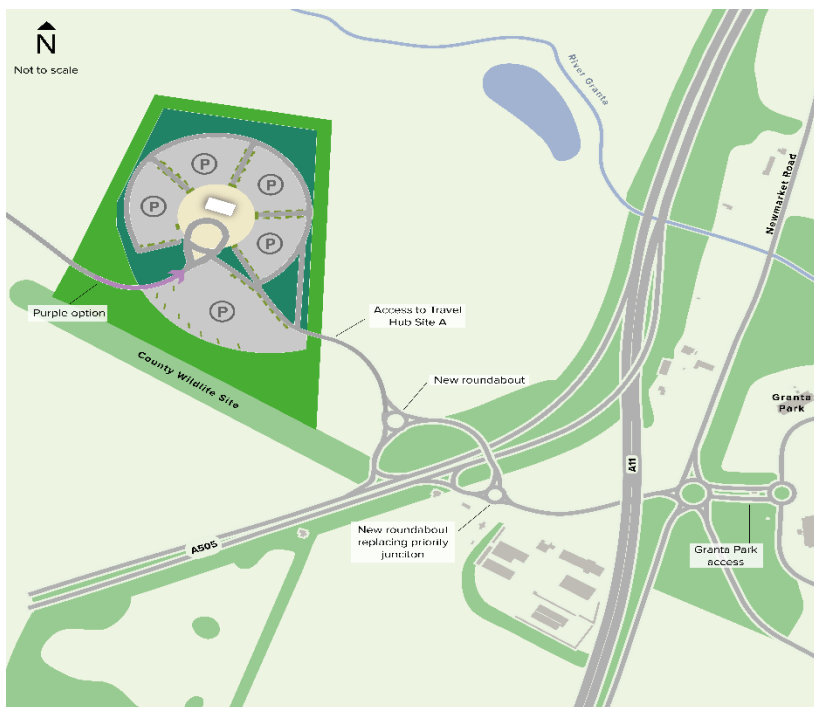
18.4.2 Overview of Shortlisted Travel Hub Sites

Travel Hub Site A

Site A is located to the west of the A11/A505 junction. The site is set back from the A505 so additional infrastructure would need to be implemented for access. The site has potential to provide between 2,000 and 3,000 spaces.

Figure 18.11 shows the site location and proposed access from the A505/Granta Park junction, with a roundabout at the access/exit and a second roundabout, where the northbound access road meets the access road from the A505 southbound to Granta Park.

Figure 18.11: Travel Hub Site A and Proposed Access



Source: Mott MacDonald

The site is located on Green Belt land, which is currently being used for arable farming. In planning terms this type of transport infrastructure may be considered essential development, and therefore a case could be made for 'not inappropriate development'. The site is located to

avoid a high-pressure gas pipeline and the associated exclusion zone, albeit the access to the site would need to cross the pipeline. An access road crossing the pipeline is permissible, but the site itself must be outside the exclusion zone.

The location requires a significant diversion for traffic currently using the A1307 from the A11 (Fourwentways) junction to the A505/Granta Park junction and the site would not be visible to potential users travelling on the A1307 or A11.

Travel Hub Site B

Site B is located west of the A11 and in a location which would be passed by all traffic travelling west into Cambridge on the A1307, avoiding the need for many users to deviate from their existing route and being visible to drivers which would encourage future use. Access to this site would be from the A1307 via a new junction in the form of a roundabout (Figure 18.12) or alternatively a signal-controlled junction.

Figure 18.12: Travel Hub Site B and Proposed Access



Source: Mott MacDonald

The site has a potential parking capacity of between 2,000 and 2,800 spaces but is subject to several constraints. It is located within the Green Belt; parts of the site are situated in flood zones 2 and 3³⁷ and it is located adjacent to a high-pressure gas pipeline with the access from the A1307 crossing the pipeline. An access road crossing the pipeline is permissible, but the site itself must be outside the exclusion zone. In addition, the site straddles an existing public footpath. All these constraints have been considered in planning the layout of the site.

³⁷ Zone 2 is defined by the Environment Agency as land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) and Zone 3 as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%)

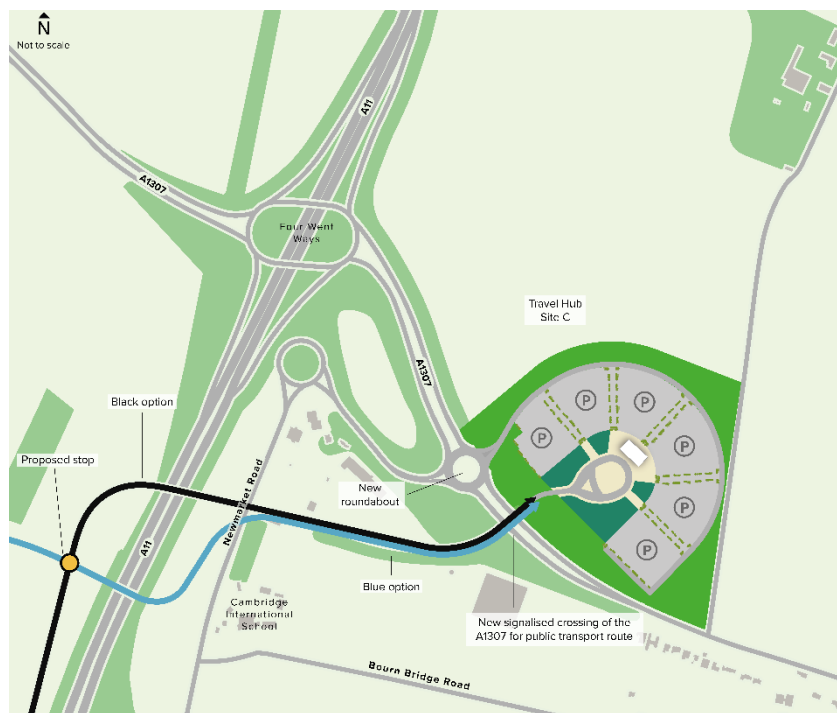
Travel Hub Site C

Site C is located on the A1307 east of the A11. It has a parking capacity of 2,100 and could accommodate an expansion towards the A11 to increase capacity up to 3,000 vehicles. The site is currently used as arable farmland but is outside of the designated Green Belt.

A new bridge over the A11 would be required to connect this site with the route alignment options west of the A11. **Figure 18.13** shows the site location and proposed access. A new signalised junction would be required on the A1307 to provide a crossing point for public transport vehicles to enter the site. General traffic could enter the site by replacing the existing priority junction between Newmarket Road and the A1307 with a four-arm roundabout.

The site is relatively well located for vehicles travelling towards Cambridge from Haverhill, Linton and other points east of the A11; however, those travelling on the A11 would need to deviate from their desire line into Cambridge and the site location would not be as visible to them.

Figure 18.13: Travel Hub Site C and Proposed Access



Source: Mott MacDonald

19 The Preferred Option

19.1 Preferred Option Selection Process

In order to identify a preferred option, the five shortlisted options were appraised from multiple perspectives utilising three mechanisms:

1. Mott MacDonald's in-house Multi-Criteria Assessment Framework INSET, (Investment, Sifting and Evaluation Tool): a quantitative and more detailed qualitative assessment of the shortlisted options was undertaken to aid in the identification of the preferred option. A detailed account of this process can be found in Appendix A: OAR, document reference MMD-BCA-00-RE-BC-0024.
2. Benefit Cost Ratio (BCR) calculation and Value for Money (VfM). A detailed account of this process can be found in the Economic Case of this OBC.
3. Consultation Feedback: based on public consultation held during the autumn of 2019. A summary of the consultation process and the subsequent feedback can be found in the Management Case of this OBC and the results are reported fully in the consultation summary report produced by the Cambridgeshire Research Group for GCP.³⁸

Under all three mechanisms the preferred option was either Brown (INSET and consultation feedback) or Purple (BCR). This narrowed the potential options down to either Travel Hub Site A (Purple) or B (Brown). The Black and Blue options which connected to Travel Hub Site C, and the Pink option connecting to Travel Hub Site B were at this point discounted from further consideration.

In order to assess the relative advantages and disadvantages between Site A and Site B, microsimulation modelling work was undertaken using VISSIM software to assess the traffic impact at both of these sites to investigate if there were any material differences between the two options that might influence the recommendation of a preferred option. However, it was found that there was no material difference in overall network performance between the two options. Based on the evidence from the microsimulation modelling a roundabout access junction to Site B was identified as the preferred form of access junction for the Brown option.

It was concluded that the Brown option was the best performing in terms of both route alignment and Travel Hub site, performing best both under the INSET appraisal process, which assessed options against a total 92 criteria under 7 themes, and at public consultation. This option will be taken forward for consideration by the GCP Executive Board as the recommended preferred option to be progressed for planning and further development to Full Business Case stage.

Section 19.2 summarises the appraisal process and outcome under each of the three mechanisms.

19.2 Appraisal Outcomes

The main appraisal tool at the option shortlist stage was INSET, which had previously been used to sift the longlist of options to arrive at the shortlist.

³⁸ Cambridge South East Transport – Better Public Transport Project: Summary Report of Consultation Findings, Cambridgeshire Research Group, January 2020

For consistency the same process was applied to assessment of the options shortlist, where options were again appraised against 92 criteria under seven themes, though at the shortlist stage a more quantitative approach was adopted, but still involving some qualitative elements.

Feedback from consultation and public opinion was not included as one of the assessment criteria under INSET because no public consultation was undertaken until after the options shortlist had been identified. The results of and feedback from consultation have therefore been considered as a separate mechanism in the selection of a preferred option.

Benefit Cost Ratios were also calculated for the shortlisted options. Again, this process was not undertaken in the assessment of the longlist as the options would have required more detailed development in order to apply this quantitative analysis. To apply such an analysis to options which could be discounted through qualitative measures alone was not deemed efficient or proportionate and this approach is consistent with DfT appraisal guidance.

19.2.1 INSET Appraisal

The five shortlisted options were quantitatively assessed against the same criteria under the same themes (noted below) as they were under qualitative assessment at the longlist stage of the appraisal process:



Where applicable, metrics (e.g. journey times, junction delay) were calculated. Where quantitative analysis was not possible or applicable, a more detailed and robust qualitative analysis was undertaken that built on the assessment undertaken at the longlist stage, using the same seven-point scoring system. Metrics were then calibrated into scores ranging from -3 to +3, where -3 represented a very poor ability to address criteria and +3 a very good ability. A full list of the criteria under each theme and the basis for assigning scores are detailed in Appendix A: OAR, document reference MMD-BCA-00-RE-BC-0024.

The final results of the INSET appraisal are set out in Table 19.1 and can be interpreted on a theme by theme basis as well as by overall score. The final ranking of the five shortlisted options is also indicated.

Table 19.1: Final Option Shortlist INSET Results

Rank	Scheme	Transport Benefits	Environment	Deliverability	Social Impacts (Quality of Life)	Wider Economic Benefits	Alignment with Objectives	Policy Alignment	Total Score
1	Brown Route from Travel Hub Site B	1.52	-1.25	-0.57	0.88	3.00	1.75	2.20	1.08
2	Pink Route from Travel Hub Site B	1.50	-1.25	-0.64	0.88	3.00	1.75	2.20	1.06
3	Blue Route from Travel Hub Site C	1.33	-1.25	-1.10	0.58	3.00	1.65	2.20	0.92
4	Purple Route from Travel Hub Site A	1.31	-1.25	-0.29	0.71	2.00	1.68	2.20	0.91
5	Black Route from Travel Hub Site C	1.33	-1.25	-1.38	0.58	3.00	1.65	2.20	0.88

Source: Mott MacDonald

As shown in Table 19.1 the INSET appraisal has identified the **Brown Route** from Travel Hub Site B as the **indicative preferred option** for CSET Phase 2 **under this appraisal mechanism with a score of 1.08**

19.2.2 Benefit Cost Ratio

The Benefit Cost Ratio (BCR) is the ratio of the Present Value of option Benefits (PVB) to the Present Value of option Costs (PVC).

The BCR calculation is provided below (values are in £m). The approach undertaken to calculate these ratios is documented in detail in the Economic Case of this OBC.

In accordance with DfT transport appraisal guidance a BCR of less than 1 indicates Poor Value for Money (VfM); a BCR between 1 and 1.5 indicates Low VfM, between 1.50 and 2 Medium VfM, between 2 and 4, High VfM and a BCR of more than 4 indicates Very High VfM. Table 19.2 presents a comparison of the BCR for the five shortlisted options.

Table 19.2: Benefit Cost Ratio Comparison

Economic Summary	Site A	Site B	Site B	Site C	Site C
Appraisal Period 60 Years	Purple	Brown	Pink	Blue	Black
Present Value Benefits (PVB) £m	£57.1	£57.2	£51.1	£58.8	£52.6
Present Value Costs (PVC) £m	£70.2	£80.9	£79.9	£101.7	£96.8
Benefit Cost Ratio (BCR)	0.81	0.71	0.64	0.58	0.54
BCR Rank	1	2	3	4	5
Difference PVB-PVC £m	(£13.17)	(£23.73)	(£28.84)	(£42.90)	(£44.25)

Source: Mott MacDonald

The **Purple option** generates the highest BCR at 0.81 making it the **indicative preferred option under this appraisal mechanism**, with the Brown option ranked second. The main factor influencing the better performance of the Purple option relative to the Brown option is the lower cost of the Purple option. This reflects the shorter route length required to connect to Travel Hub Site A and avoidance of the need for a second crossing of the River Granta.

However, this and indeed all options at present represent a Poor VfM case, based on the DfT appraisal criteria. Future work to develop and refine the preferred option will explore the potential to enhance the VfM of the scheme, including further consideration of measures to generate additional patronage and user benefits, and of the wider economic benefits of the scheme. This will be reported in the Full Business Case.

19.2.3 Consultation Feedback

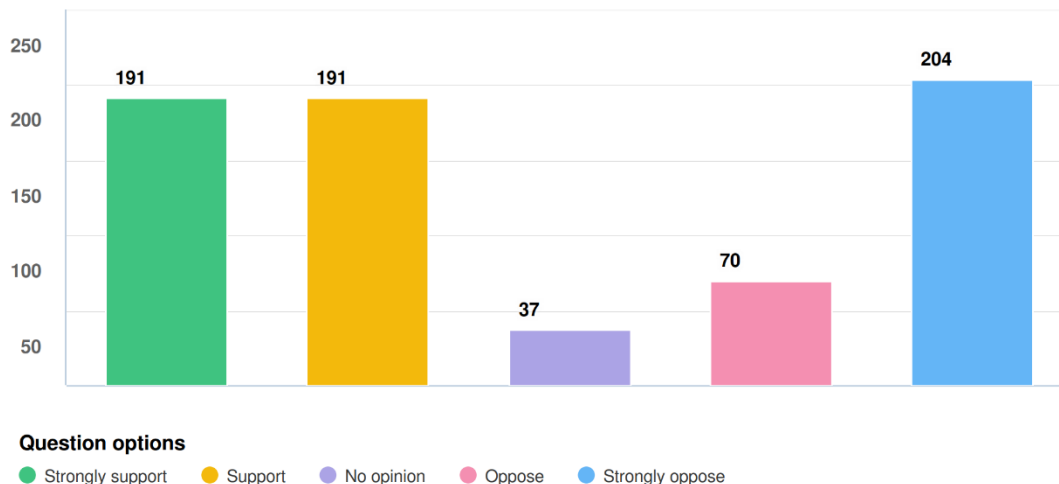
Public consultation on the five shortlisted options was held between September and November 2019.

Quantitative data was recorded through the consultation questionnaire (online and hard copy) with 702 responses in total recorded, though not all respondents answered all questions. A detailed account of the feedback can be found in the Statement of Community Involvement that accompanies this OBC as Appendix E, document reference MMD-BCA-00-RP-BC-0371, however the high-level responses to key questions that influenced the selection of the preferred option are noted here.

In terms of general support for the scheme proposals it was found that 382 (55%) out of 693 responses received to this question supported them to some extent as opposed to 274 (40%)

who opposed the proposals to some degree; 37 (5%) of the respondents expressed no opinion. The results of the survey are detailed in Figure 19.1.

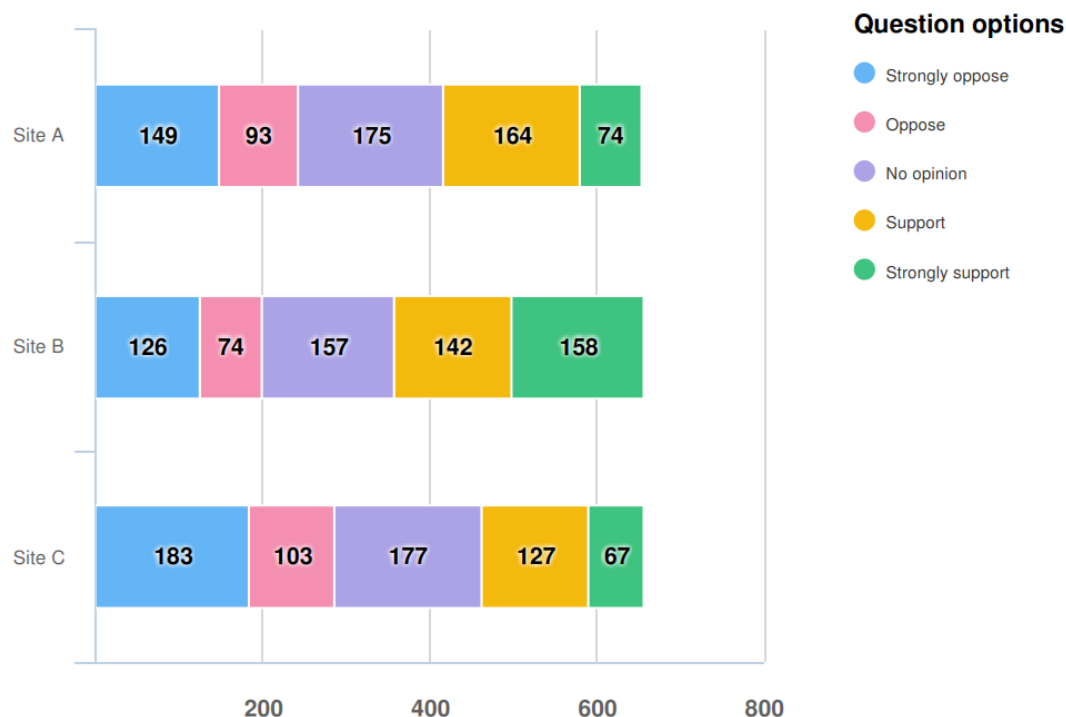
Figure 19.1: Level of Support for the Scheme Proposals in General



Source: Consult Cambridgeshire

Regarding the preferred location for the Travel Hub most support was expressed for Site B, with 300 (45%) of the 668 responses either supporting or strongly supporting the option and 200 (30%) opposing the site to some degree. Site C proved to be the least attractive site with only 194 (30%) supporting it to some extent and 286 (43%) opposing it. This is illustrated in Figure 19.2.

Figure 19.2: Level of Support for the Travel Hub Sites



Source: Consult Cambridgeshire

36 stakeholder responses were also received on behalf of groups and organisations. Although individual stakeholders had preferences for the location of the Travel Hub, no individual site had clear support or opposition. Stakeholders were concerned about:

- The ability to access the site from surrounding roads and the potential impact this could have on those roads;
- The impact on the environment and nearby villages;
- Access to Granta Park and Babraham Research Campus; and
- The possibility of future proofing through expanding the site and extending the public transport route towards Haverhill.

When asked about the route alignments the Brown option, which connects to the most strongly supported Travel Hub site (Site B) received the greatest level of approval with 228 out of the 651 responses received supporting the option to some extent, compared with 198 opposing the site to some degree. The Black and Blue options which connect to Site C, the least popular Travel Hub site, received the least support with only 158 and 173 respondents respectively showing some level of support. This is shown in Figure 19.3.

Figure 19.3: Level of Support for the Complete Option Packages



Source: Consult Cambridge

On this basis **consultation** concluded the **Brown Route** from Travel Hub Site B was, from a public acceptability standpoint, the **indicative preferred option** - aligning with the findings of the formal INSET appraisal process.

19.3 Options Discounted

Under all three mechanisms the preferred option was either Brown (INSET and consultation feedback) or Purple (BCR). This narrowed the potential options down to either Travel Hub Site

A (Purple) or B (Brown). The Black and Blue options connecting to Travel Hub Site C, and the Pink option connecting to Travel Hub Site B were at this point discounted from further consideration.

There are clear grounds for discounting the two options connecting to Travel Hub Site C at this point:

- These are the two highest cost options out of the five shortlisted, with significant additional Present Value Costs of £15.9m (Black) and £20.8m (Blue) relative to the next highest cost option (Brown);
- These are also the two options with the lowest BCRs, indicating that the additional costs of these options are not justified by additional benefits;
- Travel Hub Site C was the least supported of the three Travel Hub site options in the consultation responses;
- The Black and Blue options connecting to Site C were the least supported of the five complete option packages; and
- The Black and Blue options connecting to Site C involve the construction of a new bridge over the A11. Constructing a bridge over a live high-speed trunk road presents some challenges and the inherent construction risks are greater than the other options.

The main grounds for preferring the Brown option connecting to Travel Hub Site B over the Pink option are:

- The Brown route is more direct, offering shorter journey times, generating higher patronage and delivering additional benefits relative to the Pink option. This is reflected in a higher INSET score for the Transport User Benefits theme;
- The additional benefits of the Brown option are sufficient to justify the additional costs of this option relative to the Pink option as demonstrated by the higher BCR of the Brown option; and
- The Brown option received a slightly greater level of support and a slightly lower level of opposition relative to the Pink option in the consultation responses.

19.4 Consideration of Remaining Options

The remaining options from which to select a recommended preferred option were narrowed down to two, namely:

- The Brown option (Travel Hub Site B), identified as the indicative preferred option from both the INSET appraisal and consultation feedback; and
- The Purple option (Travel Hub Site A), identified as the best performing option in terms of VfM.

These options were analysed further, including undertaking microsimulation modelling using VISSIM software to assess the traffic impact at both of these sites to investigate if there were any material differences in performance between the two options.

19.4.1 VISSIM Modelling

Future year (2036) models for the AM and PM Peak were created and comparisons between the two options made regarding:

- Junction Performance (processed traffic volumes, average queue length; and average delay);

- Travel Time Performance, based on the time required to traverse existing routes using:
 - the A505 between the M11, Junction 10 and the A11/A1307 junction and
 - the A1307 between High Street Abington and a point east of the Babraham Campus roundabout;
- Overall Network Performance.

A detailed account of the modelling process can be found in the VISSIM Assessment Report, document reference 403394-MMD-TRA-00-RP-TA-0241 and is summarised in the Economic Case of this OBC.

In conclusion, the Purple option resulted in the best modelled operational performance, however, the differences relative to the Brown option are marginal and the benefit with the Purple option is likely to be due to the lower traffic flow using the access junction to Site A as forecast by the SATURN model of the highway network. This reflects the access to Site A not being provided directly from the principal road network.

19.4.2 Green Belt Considerations

The conclusions of a report³⁹ assessing Green Belt considerations in relation to the shortlisted route and Travel Hub site options included that:

- The Brown option would require a bridge over the River Granta and associated ramped approaches, which is not required for the Purple option, introducing a volume of additional built development into open countryside. This would impact openness and result in a Moderate-minor degree of harm to Green Belt. However, it may be possible to design a bridge structure that reduces the potential harm as part of the detailed design of the structure;
- Both of the proposed Travel Hub Sites located within the Green Belt (Sites A and B) would introduce a volume of new development with a permanent visual and spatial effect on the openness of the Green Belt;
- Whilst both Travel Hub Sites A and B would have similar conflict with Green Belt purposes, Travel Hub Site B fits slightly better with its landscape context, being closer to the A11 and at a lower elevation; and
- Overall, for both Travel Hub Sites A and B, there would be partial changes to relevant aspects of the landscape, resulting in a Moderate degree of harm to Green Belt arising from the impact on openness and a conflict with National Green Belt purpose 3, Cambridge Green Belt purpose 2 and National Green Belt purpose 4. Planting around the perimeter of Site A or along the northern boundary of Site B could reduce this conflict over time to a Moderate-minor degree of harm to Green Belt purposes.

Green Belt considerations do not provide compelling reasons to prefer either the Purple option (Travel Hub Site A) or the Brown option (Travel Hub Site B). While the Brown option requires a bridge over the River Granta which is not required for the Purple option, impacting on openness, Travel Hub Site B fits slightly better with its landscape context than Site A.

³⁹ Cambridge South East Transport, Consideration of Green Belt Issues, LDA Design, March 2020

19.5 The Preferred Option

Following consideration of all of the appraisal perspectives and mechanisms outlined above it was concluded that the Brown option was the best performing option in terms of both route alignment and Travel Hub site, performing best under the INSET appraisal process, which assessed options against a total 92 criteria covering a wide range of transport specific, strategic, economic, environmental and political factors, and being the preferred option in the public consultation, while ranking second for value for money.

Although the BCR calculation showed that the Purple option provided the best value for money, this is only one element or rationale for implementing the scheme and it considers only a narrow set of economic criteria in the appraisal process.

Travel Hub Site B ultimately has greater potential to fulfil the role of a multi-modal Travel Hub and to facilitate enhancements to sustainable transport connectivity to both employment campuses than Site A. Site B is better located to intercept traffic on both the A1307 and A11, and to act as a public transport hub than Site A, to which access is compromised by the lack of a northbound exit from the A11 at the A505 junction. Site A is also more remote from Babraham Research Campus.

The Brown Route from Travel Hub Site B will therefore be taken forward for consideration by the GCP Executive Board as the recommended preferred option to be progressed for planning and further development to Full Business Case stage.

Figure 19.4 illustrates the alignment of the Brown option.

Figure 19.4: Brown Option



Source: Mott MacDonald

The Brown option follows the same alignment as all other shortlisted options up to a point just north of High Street, in that it runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with the railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. Four passenger stops are proposed at the CBC, Hinton Way (Great Shelford), Haverhill Road (Stapleford) and Sawston Road (Sawston). The route then crosses each of these roads and Granham's Road, via a new at-grade junctions to be signalised with priority given to public transport vehicles.

Before reaching High Street the route then cuts across fields towards the A11 which includes a second crossing of the River Granta. The route ends at Travel Hub Site B, located to the south west of the junction between the A1307 and A11. General traffic would access the Travel Hub from the A1307 via a new roundabout junction whilst the site itself would have a linear arrangement in order to accommodate it between a high-pressure gas main, over which development is restricted, and the A11. The site could provide parking for up to 2,800 cars with the current known constraints.

19.6 Future Option Refinements

Having established the Brown option as the recommended preferred scheme, stakeholder feedback and consultation responses from landowners have resulted in the need to explore the following minor design amendments to the route alignment:

- Review alignment around Nine Wells to provide better protection for grey partridge which use the hedgerow along the currently proposed route;
- Change requested by landowner at Granham's Road/Hinton Way to reduce dissection of a field;
- Alternative alignment north of Haverhill Road to avoid dissection of a field;
- Review whether alignment can be brought any closer to the villages, particularly at Stapleford; and
- Amend route between Sawston and Babraham to run close to the south side of Sawston Road in response to comments on the impact of the proposals on the Green Belt and landscape impacts. This would also bring the shared-use path to be built alongside the public transport route closer to Babraham and link into the existing cycle path between Sawston and Babraham.

These are not alternative options, and in the event of any of these amendments being adopted they are considered to represent only minor modifications to the current recommended preferred route.

All but one of these potential minor amendments to the route alignment are within the section of the alignment that is identical for all five shortlisted options. Any minor design changes here would impact all options equally and would not affect the overall ranking or the selection of the Brown option as the preferred option.

This design development work will be undertaken at Full Business Case stage and the performance and impacts of the proposed alignment change compared with the initial Brown option so that a decision on the optimum alignment can be made and taken forward for detailed design and implementation.

19.7 Approach to Future Proofing

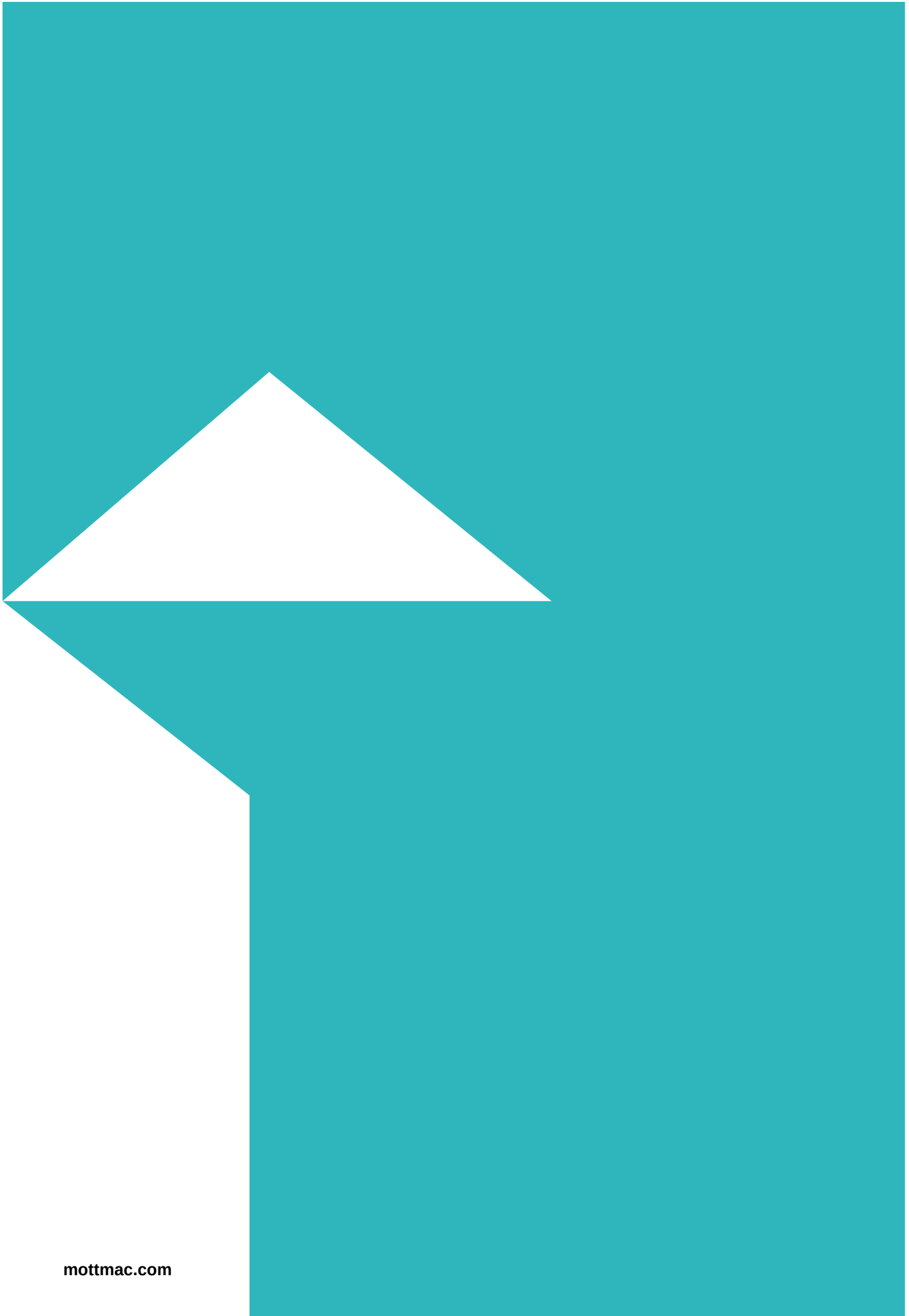
The CSET project aspires to utilise guidance technology that delivers the greatest level of benefits in relation to meeting its strategic objectives, and to ensure alignment with the future CAM network, for which CSET Phase 2 would partially comprise Phase 1, if CAM were consented. The benefits of such a system include:

- Requiring limited fixed infrastructure;
- Facilitating the alignment of vehicles with a raised platform at stops for level boarding;
- Ease of retrofitting to existing/new buses; and
- Providing a smooth transition between sections with continuous guidance and sections beyond the core CSET Phase 2 public transport route where vehicles would operate without guidance.

As these technologies are still developing, the assessment of the CSET project, including its economic appraisal and costings, have been based on utilising existing Euro VI standard buses, which use proven technology which typically meets the standards of Clean Air Zones. However, as the aspiration is to eventually use the most up to date guidance technology for the CSET Phase 2 project, Appendix C, document reference 403394-MMD-BCA-00-RP-BC-0369 sets out the GCP's consideration of guidance technology options, and in particular considers the available options in the context of their compliance with existing Transport Works Act 1992 (TWA) legislation and the project objectives.

20 Summary

- The CSET Phase 2 proposal will deliver a new dedicated public transport route between a new Travel Hub near the A11/A1307/A505 junction and the Cambridge Biomedical Campus via intermediate communities. The term Travel Hub has been used as the site is intended to provide an interchange between different modes of transport such as walking, cycling and existing bus services and be more sustainable than a typical Park & Ride facility.
- Eight assessment themes have been identified as a basis for undertaking a review of evidence to capture the key problems and opportunities in the study area that transport investment may alleviate and/or support.
- Many of the issues presented relate to the population and employment growth of Cambridge, with this growth resulting in increased congestion and associated impacts on air quality, journey time and the environment, with many of the areas experiencing growth currently poorly connected by public transport.
- The opportunities stated relate to the potential for Cambridge and the wider area to grow in a more sustainable manner, improving public transport travel and spurring more development through greater connections between the peripheral communities and central Cambridge.
- There is a need for intervention as the number of new jobs and homes expected to be created in the coming years would mean journey times between the A11 and Cambridge would increase by 50% by 2031 whilst an increase in car use will have a negative impact on quality of life and worsen air pollution.
- CSET Phase 2 options have been subjected to a multistage appraisal process, including a gateway assessment and detailed option sifting to shortlist five options, all travelling from CBC to Sawston before diverging into different route alignments.
- These five options were appraised from multiple perspectives utilising three mechanisms: Mott MacDonald's in-house Multi-Criteria Assessment Framework INSET; Benefit Cost Ratio (BCR) calculation and Value for Money (VfM); and consultation feedback. Under all three mechanisms the preferred option was either Brown (INSET and consultation feedback) or Purple (BCR).
- It was concluded that the Brown option was the best performing in terms of both route alignment and Travel Hub site and therefore it will be taken forward for GCP Executive Board approval as the preferred option to be progressed for planning and further development at Full Business Case stage.
- The Brown route takes a direct route across fields towards the A11 which includes a second crossing of the River Granta. The route ends at Travel Hub Site B, located to the south west of the junction between the A1307 and A11. General traffic would access the Travel Hub from the A1307 via a new roundabout junction whilst the site itself would have a linear arrangement in order to accommodate it between a high-pressure gas main, over which development is restricted, and the A11. The site could provide parking for up to 2,800 cars.





Cambridge South East Transport Phase 2

Outline Business Case - Economic Case

15 May 2020

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Cambridge South East Transport Phase 2

Outline Business Case - Economic Case

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Glossary of Terms

Analysis of Monetised Cost and Benefits (AMCB) table: Summarises the monetised impacts of a scheme that are included in the scheme's Net Present Value and Benefit-Cost Ratio.

Appraisal Summary Table (AST): Provides a complete summary of the scheme impacts, including the scheme's monetised impacts and non-monetised impacts (both quantitative and qualitative).

Assumption: A statement which is not yet known to be true. It can be a bridge in the planning process to answer an uncertainty, and to allow scope and plans to be developed

Benefit Cost Ratio (BCR): Benefit Cost Ratio, is an indicator of the overall value for money of a project or proposal.

CaCC: Cambridge City Council

CCC: Cambridgeshire County Council

Cambridge Autonomous Metro (CAM): CAM is the proposed metro style system for Greater Cambridge.

Committed Schemes: Where a scheme has been deemed likely to proceed and is therefore included within the option appraisals.

Conservation Area: An area designated under Section 69 of the Planning (Listed Buildings and Conservation Areas) Act 1990 as being of special architectural or historic interest and with a character or appearance which is desirable to preserve or enhance.

Context: The setting of a site or area, including factors such as traffic, activities and land uses as well as landscape and built form.

Controls: Risk response activities that are undertaken as business as usual. These are identified as an aide-memoire, to draw attention to the purpose and aim of standard procedures and drive appropriate focus. Typically, controls will not incur any additional cost to delivery.

Countryside: The rural environment and its associated communities.

Cumulative Impact: The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.

Department of Transport (DfT): is a ministerial department, supported by [24 agencies and public bodies](#) that plans and invests in transport infrastructure in the UK.

Dependency: An activity or activities which cannot be undertaken or completed until another scope of work has completed or reached a defined stage or point.

Early Assessment Sifting Tool (EAST): Early Assessment Sifting Tool is used by DfT, to quickly summarise and present evidence on options. INSET is an enhancement of EAST and follows the same broad principles and approach.

Effect: The consequence of the scale of any change to the baseline environment, i.e. impact, on the environmental receptor, taking account of its particular value or sensitivity.

Element: A component part of the landscape (for example, roads, hedges, woods).

Emerging Scheme: The best performing route alignment option for CSET phase 2 based on assessment to date.

Enhancement: Landscape improvement through restoration, reconstruction or creation.

Environment: Our physical surroundings including air, water and land.

Environmental Impact Assessment (EIA): A formal, structured process of evaluating the likely environmental impacts of a proposed scheme, considering inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Exclusion: An activity or product that has been specifically removed or omitted from the scope of work for the defined project.

Fall-backs: Contingency actions taken in response to a risk impact. Generally, risks that are tolerated should have fall-back actions identified, as should significant risks that are being treated, where the treatment has a significant likelihood of not fully mitigating the risk.

Full Business Case (FBC): The culmination of the three-stage business case process is the Full Business Case. This follows on from initial exploratory work to establish the strategic need for intervention in the Strategic Outline Business Case and the optioneering and appraisal work undertaken in the Outline Business Case. Generally, an investment committee will consider the Full Business Case then make a recommendation to ministers. Ministers will decide whether a proposal should proceed to implementation, however as funding and powers for transport investment have been devolved to the Greater Cambridge Partnership (GCP) as part of the Greater Cambridge City Deal, the decision to implement the scheme resides with GCP.

Form: The layout (structure and urban grain), density, scale (height and massing), appearance (materials and details) and landscape of development.

Gross Domestic Product (GDP): A measure of the total value of goods produced and services provided in an area.

Gross Value Added (GVA): A measure of the economic productivity of an area.

High Quality Public Transport (HQPT): High Quality Public Transport, is a transport system that includes a range of features such as high levels of segregation, junction priority, high quality infrastructure (shelters, CCTV, real time, lighting, seating, help points etc), and high quality vehicles to name but a few.

Heritage Asset: A building, monument, site, place, area or landscape of historic value.

Investment Sifting and Evaluation Tool (INSET): INSET is Mott MacDonald's evaluation tool used in the optioneering process. INSET is an enhancement and expansion of EAST.

Issue: A significant unanticipated event, or a risk which has impacted or has a >99% likelihood of occurrence, that affects the achievement of the project objectives.

Landform: Combination of slope and elevation that produce the shape and form of the land.

Landscape: The character and appearance of land, including its shape, form, ecology, natural features, colours and elements and the way these components combine. Landscape character can be expressed through landscape appraisal, and maps or plans. In towns 'townscape' describes the same concept.

Landscape Character: The distinct and recognisable pattern of elements that occur consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape.

Landscape Feature: A prominent eye-catching element, for example, wooded hilltop or church spire.

Landscape Quality: Based on judgements about the physical state of the landscape, and about its intactness, from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.

Landscape Sensitivity: The extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects on its character.

Land Use: The primary use of the land, including both rural and urban activities.

Local Liaison Forum (LLF): The LLF provide a link between a project team and the local community.

Multi Criteria Assessment Framework (MCAF): Multi-Criteria Assessment Frameworks are used in the optioneering assessment process and allow options to be assessed against a range of criteria linked to the scheme objectives as well as wider policy and strategy objectives.

Methodology: The specific approach and techniques used for a given study.

Mitigation: Measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development project.

Modal Shift: A shift from one transport type to another e.g. road travel to rail travel.

Movement: People and vehicles going to and passing through buildings, places and spaces. The movement network can be shown on plans, by space syntax analysis, by highway designations, by figure and ground diagrams, through data on origins and destinations or pedestrian flows, by desire lines, by details of public transport services, by walk bands or by details of cycle routes.

Nomis: A service provided by the Office for National Statistics, ONS, that provides free access to the most detailed and up-to-date UK labour market statistics from official sources.

Option Appraisal Report (OAR): The Options Appraisal Report sets out the process undertaken to identify and assess options, leading to the selection of the preferred option.

Outline Business Case (OBC): Is the second phase of the process which reconfirms the conclusions set out in the Strategic Outline Business Case (SOBC). The OBC focuses on the detailed assessment of the options to find the best solution.

Prince 2: Projects **I**n **C**ontrolled **E**nvironments is a process-based method for effective project management, used extensively by the UK Government. It adopts a product-based planning approach to project management with emphasis on dividing projects into manageable and controllable stages.

Public Accounts (PA) table: Records the investment and operating costs incurred by a public sector in delivering the scheme.

Receptor: Something that makes up the environmental baseline e.g. humans or other biological species, elements of the physical environment including water, air and soil assets that make up the cultural heritage of an area.

Risk (Threat): An uncertain event or set of circumstances that, should it occur, will have an adverse effect on the achievement of the objectives of the project.

Risk (Opportunity): An uncertain event or set of circumstances that, should it be exploited, will have a positive effect on the achievement of the objectives of the project.

SATURN: Simulation and Assignment of Traffic in Urban Road Networks, is a computer program that calculates route choices between origin and destination.

Social and Distributional Impacts (SDI): considers the variance of transport intervention impacts across different social groups.

Strategic Outline Business Case (SOBC): This sets out the need for intervention (the case for change) and how this will meet strategic aims and objectives (the strategic fit). It provides suggested or preferred ways forward and presents the evidence for a decision.

Strategic View: The line of sight from a particular point to an important landmark or skyline.

Sustainability: The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs.

Topography: A description or representation of artificial or natural features on or off the ground.

Townscape: Physical and social characteristics of the built and unbuilt urban environment and the way in which those characteristics are perceived. The physical characteristics are expressed by the development

form of buildings, structures and space, whilst the social characteristics are determined by how the physical characteristics are used and managed.

Transport Appraisal Guidance (TAG): The DfT's Transport Appraisal Guidance (often referred to as TAG)

Transparent Economic Assessment Model (TEAM): TEAM is a tool designed to calculate the economic impacts and benefits of proposed infrastructure interventions and policy measures.

Tranquillity: A state of calm or quiet.

Transport Economic Efficiency (TEE) table: Summarises the monetised impacts against different user groups.

Transport User Benefit Appraisal (TUBA): TUBA is an economic appraisal computer program developed for the Department for Transport (DfT) for appraising multi modal transport studies.

Uncertainty: A condition where the outcome can only be estimated.

Visual Impact: Change in the appearance of the landscape as a result of development. This can be positive (i.e. beneficial or an improvement) or negative (i.e. adverse or a detraction).

Wider Economic Benefits (WEBs): improvements in economic benefits that are acknowledged, but which are not typically captured in traditional transport cost-benefit analysis.

1 Introduction

The Economic Case is one of the five cases that form the DfT's Transport Business Case process. The Economic Case assesses options to identify all their impacts, and the resulting value for money, to fulfil Treasury's requirements for appraisal and demonstrating value for money in the use of taxpayer's money. The Economic Case identifies what economic, environmental, social and distribution impacts the scheme is expected to deliver.

The other four cases which make up the Transport Business Case Process are:

- The **Strategic Case** which determines whether an investment is needed, either now or in the future. It demonstrates the case for change – that is, a clear rationale for making the investment and its strategic fit – how an investment will further the aims and objectives of the organisation. The Strategic Case is presented in document 403394-MMD-BCA-00-RP-BC-0247.
- The **Financial Case** which outlines the affordability of the preferred option, its funding arrangements and technical accounting issues. The case also presents the financial profile of the preferred option and an overview of how the scheme will be funded. The Financial Case is presented in document 403394-MMD-BCA-00-RP-BC-0293.
- The **Commercial Case** which provides evidence on the commercial viability of a proposal and the procurement strategy that is used to engage the market. It presents evidence on risk allocation and transfer, contract timescales and implementation timescale as well as details of the capability and skills of the team delivering the project. The Commercial Case is presented in document 403394-MMD-BCA-00-RP-BC-0231.
- The **Management Case** which assesses whether a proposal is deliverable. It tests the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance (e.g. a Gateway Review). The Management Case is presented in document 403394-MMD-BCA-00-RP-BC-0277.

The remainder of this document comprises the Economic Case for Phase 2 of the Cambridge South East Transport (CSET) Phase 2 project.

1.1 Approach

The Economic Case for CSET Phase 2 has been developed to ensure that it proportionally follows the requirements of the DfT's 'The Transport Business Case: Economic Case' which are noted in Table 1.1.

Table 1.1: Compliance with DfT Requirements for the Economic Case at OBC

Content	DfT Requirements	Section Number and Title (s)
Introduction	Outline approach to assessing value for money	1 Introduction
Options appraised	A list of options (set out in the Strategic Case) that have been appraised	3 Options Appraised
Assumptions	TAG sets out assumptions that should be used in the conduct of transport studies. List any further assumptions supporting the analysis.	5.2 Assumptions
Sensitivity and risk profile	Set out how changes in different variables affect the Net Present Value/Net Present Cost. The risk profile should show how likely it is that these changes will happen.	13 Sensitivity Tests
Appraisal Summary Table	See TAG for detailed guidance on producing the Appraisal Summary table	12.4 Appraisal Summary Table
Value for Money Statement	See Value for Money guidance on producing the VfM statement.	12.2 Value for Money Statement

Source: DfT

1.2 Scheme Overview

The Greater Cambridge Partnership (GCP) is promoting a transport scheme to improve links between Cambridge Biomedical Campus and the junctions of the A11 with the A1307 and A505, providing improved connectivity for peripheral communities such as: Linton, the Abingtons, Babraham, Pampisford, Sawston, Stapleford and Great and Little Shelford. This scheme will create a vital link to ease congestion, offer sustainable travel choices, connect communities and support growth. The scheme is known as the Cambridge South East Transport (CSET). Phase 1 of CSET consists of 15 small-to-medium work packages, with a timeline for completion between 2018-2020.

It is proposed that Phase 2 of CSET will deliver a new dedicated public transport route between a new Travel Hub near the A11/A1307/A505 junction and the Cambridge Biomedical Campus via Sawston, Stapleford and Great Shelford. This report presents the economic case for the preferred route option known as the Brown option. Full details of the preferred scheme design are presented in Section 1.4.

The Economic Case assesses options to identify all their impacts, and the resulting value for money, to fulfil Treasury's requirements for appraisal and demonstrating value for money in the use of taxpayers' money the Economic Case identifies what economic, environmental, social and distributional impacts the scheme is expected to have.

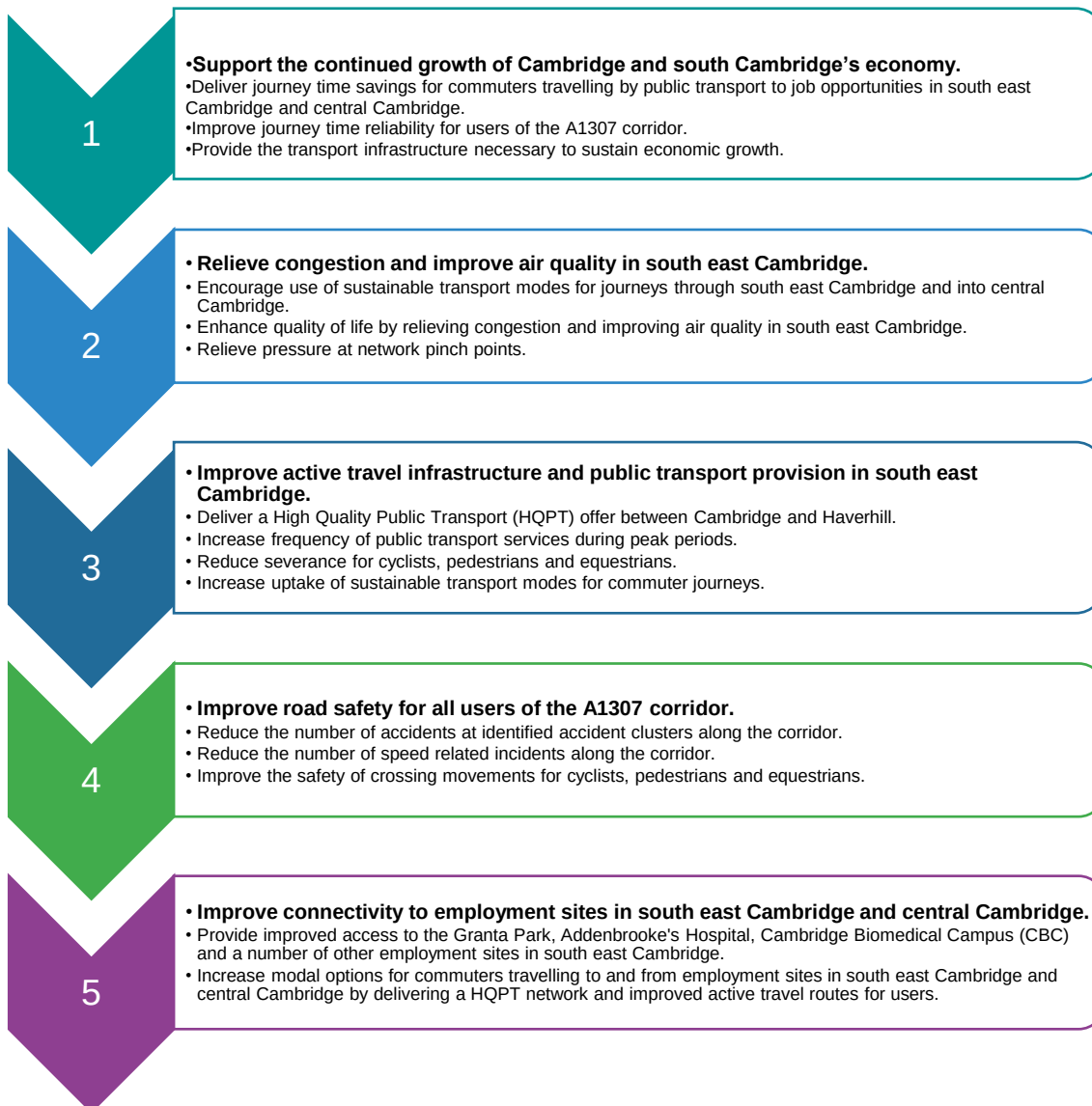
This report presents the economic case for the scheme and focuses on the monetised impacts of the scheme. The report sets out to provide:

- An assessment of the economic benefits of the CSET Phase 2 project capturing economic, environmental, social and distribution impacts of the scheme.
- An assessment of the scheme Value for Money (VfM) based on outputs from the Cambridge Sub-Regional Model 2 (CSRM2), as well as the monetisation of other scheme benefits where proportional to their impact, and the latest available scheme costs following current guidance on VfM.

The report describes the methodology used to produce the transport economic appraisal, the calculation of accidents benefits, journey time reliability benefits and wider economic impacts. Furthermore, this report describes the methodologies used to complete the appraisals of noise, air quality and greenhouse gases.

1.3 Scheme Objectives

The key objectives of the proposed scheme are to:



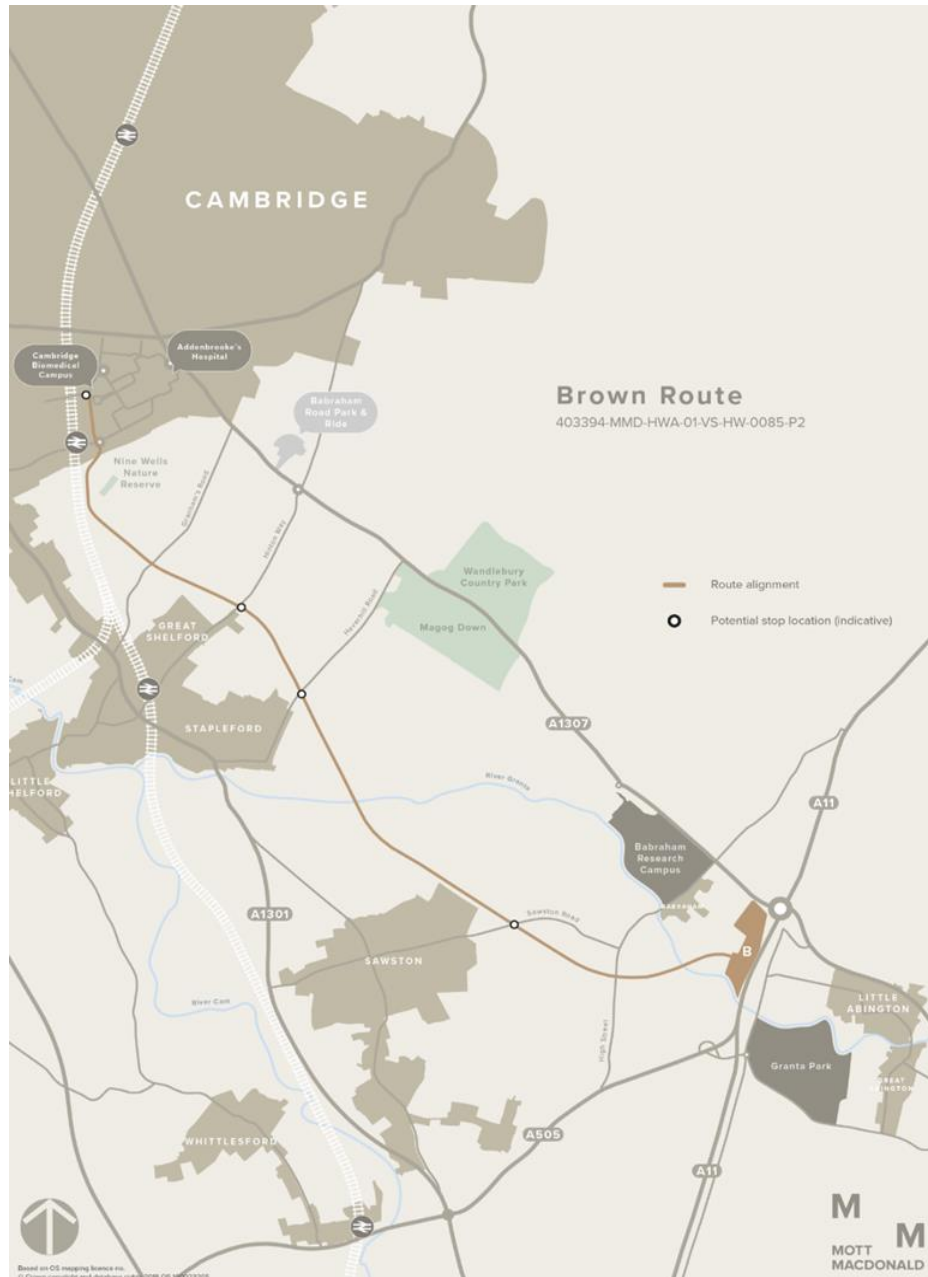
1.4 The Preferred Option

The preferred option for the CSET Phase 2 project is the Brown route, with a detailed description as follows:

- The preferred option starts on the Cambridge Biomedical Campus (CBC) at the junction of the existing guided busway with Francis Crick Avenue. It runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with the railway.
- It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston.
- Four passenger stops are proposed at the CBC, Hinton Way (Great Shelford), Haverhill Road (Stapleford) and Sawston Road (Sawston).
- The route then crosses each of these roads and Granham's Road, via a new at-grade junction to be signalised with priority given to public transport vehicles.
- Before reaching High Street the route then cuts across fields towards the A11 which includes a second crossing of the River Granta.

- The route ends at Travel Hub Site B, located to the south west of the junction between the A1307 and A11. General traffic would access it from the A1307 via a new roundabout junction whilst the site itself would have a linear arrangement in order to accommodate it between a high-pressure gas main, over which development is restricted, and the A11. The site could provide parking for up to 2,800 cars.

Figure 1.1: CSET Phase 2 Preferred Option



Source: Mott MacDonald

1.5 Scheme Key Features

The CSET Phase 2 project will offer the following features and benefits: (all benefits shown for forecast year 2026).

Table 1.2: CSET Phase 2 Preferred Option Key Features

Benefit	Preferred Option
Journey Times: Travel Hub Site B to Cambridge	AM Peak (08:00-09:00) <ul style="list-style-type: none"> 23 minutes PM Peak (17:00-18:00) <ul style="list-style-type: none"> 25 minutes
Demand (peak hour P&R vehicles)	AM Peak Hour (08:00-9:00) <ul style="list-style-type: none"> Inbound - 430 vehicles of which 170 are new P&R vehicle trips (40%) PM Peak Hour (17:00-18:00) <ul style="list-style-type: none"> Outbound - 380 vehicles of which 170 are new P&R vehicle trips (45%)
Demand (peak hour P&R passengers)	AM Peak Hour (08:00-09:00) <ul style="list-style-type: none"> Inbound - 580 P&R passengers of which 230 are new P&R passenger trips (40%) PM Peak Hour (17:00-18:00) <ul style="list-style-type: none"> Outbound - 530 P&R passengers of which 240 are new P&R passenger trips (45%)
HQPT Service Frequency (peak)	30 minute frequency (2 services per hour) between Haverhill and Cambridge City Centre 15 minute frequency (4 services per hour) between Granta Park and Cambridge City Centre 7/8-minute frequency (8 services per hour) between Travel Hub and Cambridge City Centre
Parking Capacity at Travel Hub	Up to 2,800 additional P&R car spaces
HQPT Service Capacity (peak)	Circa 600 passenger capacity (Example 46 seats + 30 standing per vehicle)
Journey Time Reliability	Provision of reliable service operating on segregated public transport route between Travel Hub and Cambridge
Mode Shift	Minimal transfer to P&R Key objective is to increase P&R choice, availability and capacity
Wider Economic Impacts	Supports continued investment in key employment locations including: <ul style="list-style-type: none"> Cambridge Biomedical Campus Babraham Research Centre Granta Park Supports the delivery of housing along the CSET corridor, including: <ul style="list-style-type: none"> Sawston
Environmental	Reduces distance travelled purely by private car Improves air quality in the Cambridge City Centre AQMA

Source: Mott MacDonald

2 Approach to Economic Appraisal

2.1 Introduction

As detailed in Appendix A: Options Appraisal Report (OAR), document reference 403394-MMD-BCA-00-RE-BC-0024, and in Section 18 of the Strategic Case, document reference 403394-MMD-BCA-00-RP-BC-0247, a total of 231 option packages consisting of combinations of 11 potential Travel Hub sites and 25 different route alignments were appraised in a 4-stage appraisal process to arrive at an indicative preferred option.

The initial 231 option packages were reduced to 90 following a gateway assessment. These 90 options were then subject to a rigorous qualitative appraisal process using INSET. INSET is a decision support toolkit developed in-house by Mott MacDonald and was used to carry out the initial high level sift of route alignment options. Based on HM Treasury Green Book compliant Multi-Criteria Decision Analysis (MCDA) and accepted by the DfT as a valid assessment framework, INSET is flexible, replicable and transparent and can be used for both high level qualitative option sifting and detailed quantitative appraisal. Detail on the operation of INSET can be found in Appendix A: OAR (document reference 403394-MMD-BCA-00-RE-BC-0024).

The results of the INSET appraisal led to an option shortlist of five options, which were then quantitatively assessed to identify an indicative preferred option as summarised in Section 19 of the Strategic Case (document reference: 403394-MMD-BCA-00-RP-BC-0247) and detailed in Appendix A: OAR (document reference 403394-MMD-BCA-00-RE-BC-0024).

The five shortlisted options were also taken to public consultation and feedback was also considered in the identification of the preferred option.

Both the INSET appraisal process and feedback from public consultation identified the Brown Option, detailed in Section 19 of the Strategic Case, as the indicative preferred option.

As a means of sense checking the INSET appraisal results and consultation feedback, this Economic Case documents an additional appraisal process and has compared the Benefit Cost Ratio (BCR) and VfM of the five shortlisted options in line with DfT TAG guidance. The BCR and VfM were not included in the appraisal criteria established for INSET and as such the appraisal documented here is independent of the INSET process.

Social and Distributional Appraisals were also undertaken on the five shortlisted options, again adopting DfT TAG guidance and established appraisal criteria that were not included in the INSET appraisal.

2.2 Transport Guidance and Wider Economic Impacts

The HM Treasury (HMT) Green Book¹ provides central government guidance on how to appraise and evaluate public policies, projects and programmes (the Five Case Model), which is based on the principles of welfare economics. The Department for Transport (DfT) Transport Appraisal Guidance (TAG) is the Department's internal guidance on business case making, which the Outline Business Case (OBC) for this scheme is consistent with.

The Economic Case for the scheme includes Cost-Benefit Analysis (CBA) of user and non-user impacts (from changes in travel costs and times, including 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 BCR. User benefits (in the form of monetised travel time 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.

¹ The Green Book: Central Government Guidance on Appraisal and Evaluation, HM Treasury, 2018

Through consumer surplus theory, user benefits are assumed to act as a proxy for conventional economic impacts, e.g. changes in Gross Domestic Product (GDP), or, at a local/regional level, Gross Value Added (GVA) and the associated jobs 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.

Since the mid-2000s, this analysis has been augmented within TAG² with recommendations for the assessment of Wider Economic Impacts (WEIs), as set out in TAG units A.2.1-A.2.4 (& TAG unit M5.3) and shown in Figure 2.1 below. 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 May 2018, updated May 2019) identifies three 'levels' of impact and these have been incorporated into the VfM assessment. These include:

- **Level 1 (User benefits):** These are direct effects and 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. These are also termed 'established' monetised economic impacts of transport investment (as they have long been the mainstay of economic appraisal).
- **Level 2 (Productivity effects):** these are productivity gains accruing to firms and workers, including those that are not themselves necessarily users of the transport improvement. These arise because of the economic benefits of scale and economic density, both of which are known to lead to higher productivity. These are also termed 'evolving' monetised economic impacts and are initially (for Level 2) considered in terms of **fixed land use** scenarios, i.e. no interaction between transport supply and land use patterns.
- **Level 3 (Investment and employment effects):** these 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 here. These effects are also 'indicative' monetised impacts and can involve **dynamic land use** scenarios (in response to changes in transport supply).

² <https://www.gov.uk/guidance/transport-analysis-guidance-TAG>

Figure 2.1: WEIs and Levels of Analysis

Table 2 - Relationships between Wider Economic Impacts, Levels of Analysis and Land Use assumptions			
	Level 1 (Initial BCR)	Level 2 (Adjusted BCR)	Level 3 (Indicative Monetised Impacts or Non-Monetised Impacts)
Fixed Land Use	User benefits		
		Static Clustering	
Implicit Land Use Change		Output Change in Imperfectly Competitive Markets	
		Labour Supply Impacts	
Explicit Land Use Change			Dependent Development
			Move to More/Less Productive Jobs
			Dynamic Clustering
			Supplementary Economic Modelling

*Note that the arrows signify the previous levels of analysis are required

Source: TAG Unit A2.1, Wider Economic Impacts Appraisal, May 2018³

The primary rationale of the CSET Phase 2 project is to support the continued growth of Greater Cambridge by providing new transport infrastructure that will provide effective links to development sites, supporting housing and employment growth. Fundamentally, given the overall aim of these proposals are to enable growth by ensuring sufficient transport capacity, it is critical that the business case, whilst adhering to DfT's TAG Unit A2.1 guidance, looks more widely from a local economic development perspective at how the scheme supports economic growth in Greater Cambridge and how these translate into net economic impacts at the UK level.

The remaining sections provide an overview of the adopted approach for the assessment of each identified benefit level in the context of CSET Phase 2.

2.2.1 Level 1: Transport Impacts

The Level 1 benefits for the CSET Phase 2 project have been calculated in line with DfT guidance to inform the initial VfM assessments and the initial BCR. The appraisal focused on the monetised transport user benefits to produce the initial BCR, as shown in Table 2.1 below.

Table 2.1: Level 1 Benefits Informing Core VfM Statement

Benefit	Description
Transport User Benefits (TAG A5-4)	<ul style="list-style-type: none"> Transport economic appraisal is undertaken in accordance with published DfT guidance This has followed the marginal external costs method from TAG unit A5-4. The use of road vehicles incurs both private costs borne by the individual traveller, such as fuel and personal travel time, and external costs borne by others. For car use, these external costs include congestion, air pollution, noise, infrastructure and accident costs.

³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712878/tag-unit-a2-1-wider-impacts-overview-document.pdf

Benefit	Description
	<ul style="list-style-type: none"> The MEC method is based on the change in these external costs arising from a change in vehicle kms as a result of the scheme.
Safety (TAG A5-4)	<ul style="list-style-type: none"> As with the transport user benefits, this has followed the marginal external costs method from TAG unit A5-4.
Air Quality (TAG A5-4)	<ul style="list-style-type: none"> As with the transport user benefits, this has followed the marginal external costs method from TAG unit A5-4.
Noise (TAG A5-4)	<ul style="list-style-type: none"> As with the transport user benefits, this has followed the marginal external costs method from TAG unit A5-4.
Greenhouse Gases (TAG A5-4)	<ul style="list-style-type: none"> As with the transport user benefits, this has followed the marginal external costs method from TAG unit A5-4.
Active Travel (TAG A5-4)	<ul style="list-style-type: none"> Appraisal of the active travel benefits associated with changes to walking and cycling trips using the DfT Active Mode Appraisal Toolkit (AMAT)

Source: Mott MacDonald

2.2.2 Level 2: Wider Economic Impacts (Fixed Land Use)

Level 2 benefits have been calculated in accordance with TAG Unit A2-1 and use the transport modelling outputs as a basis for all calculations. The results of the Level 2 benefit appraisal were used to inform an adjusted BCR that takes into account the WEIs of the CSET Phase 2 project, assuming fixed land use.

This appraisal, shown in Table 2.2 below, only captures impacts that are not already included in the conventional transport user benefit calculations, including:

- Agglomeration;
- Tax revenues arising from labour market impacts, and;
- Output change in imperfectly competitive markets.

Table 2.2: Level 2 - Project Benefits Informing Adjusted VfM Statement

Benefit	Description
Agglomeration (TAG Unit A2.1)	<ul style="list-style-type: none"> Agglomeration refers to the concentration of economic activity over an area. Transport can increase the accessibility of an area for businesses and workers, therefore impacting on the level of agglomeration, through the reduction of generalised costs for business and commuting trips. The level of agglomeration reflects the productivity benefits experienced by businesses as a result of improved connections to other businesses and to potential employees thus improving interaction, knowledge exchange and access to markets, including labour markets.
Tax revenues arising from labour market impacts (TAG Unit A2.1)	<ul style="list-style-type: none"> Transport can have an impact on labour supply by affecting the overall costs and benefits to individual workers. An individual will weigh the cost of travel against the wages of a job travelled to. Changes in transport costs is likely to have an impact on the incentives of individuals to work and hence have an impact on the overall level of labour supplied in the economy. This can have a positive impact on the economic at a national level with an increase in potential workers employed affecting the level of UK GDP through increases in tax revenues
Output change in imperfectly competitive markets (TAG Unit A2.1)	<ul style="list-style-type: none"> Markets are generally considered not to be perfectly competitive, thus leading to lower production and higher prices than would exist in a perfectly competitive market. This is seen as being detrimental to consumers and the economy as a whole. Reductions in transport costs allows for an increase in production in the goods and services that use transport, reducing costs so that businesses can make more profit or pass on the saving to customers so they can be more competitive.

Source: Mott MacDonald

2.2.3 Level 3: Wider Economic Impacts (Land Use Change)

The CSET Phase 2 project supports the spatial growth planned in Greater Cambridge and therefore has the potential to alter patterns of private sector investment and employment, and thereby land use.

The assessment of the Level 3 impacts has been based on a Land Value Uplift (LVU) approach which examines how the CSET Phase 2 project supports the planned development along the corridor. This includes the economic impacts at a:

- **Greater Cambridge level**, which focuses on how the CSET Phase 2 project helps to address transport and housing bottlenecks along the corridor and therefore support development. The economic impacts are measured in terms of gross jobs and the associated Gross Value Added (GVA) supported at development sites along the corridor. This primarily informs the Strategic Case.
- **UK level**, which focuses on the net benefits for the UK. A key consideration in order to set out the Level 3 WEIs is producing a best understanding of the difference between the net impacts at the sub-national level, i.e. Greater Cambridge, and national level. This depends on assessing the level of likely displacement of economic activity between Greater Cambridge and the rest of the UK which the scheme will support.

The UK impacts are primarily measured in terms of the LVU associated with dependent development (adjusted for displacement) while the sub-national impacts focus on the jobs and GVA generated as outlined in Table 2.3 below.

Within this Economic Case it is envisaged that the Level 3 impacts discussed in Appendix H: Wider Economic Impacts Report, document reference 403394-MMD-BCA-00-RP-BC-0289, are used to inform the Value for Money (VfM) assessment using a 'Switching Value' approach following DfT VfM guidance. This examines the additional level of benefits required to change the scheme's VfM category and how the additional benefits brought about through LVU contribute to this switch.

A detailed assessment has been carried out for the CSET Phase 2 corridor to review the current economic activity and the proposed investment (developments – residential and employment), based on the principles of the Level 3 Wider Economic Impacts assessment, as outlined above.

This assessment has essentially concluded that based on the current known proposed investments there are **no developments** which could be classified as scheme dependent or directly attributed to the influence of the CSET Phase 2 proposal, as presented within the Wider Economic Benefits assessment in Section 7.

The assessment acknowledges the potential continued expansion of existing key employment sites, Granta Park and Babraham Research Campus. However, based on the current course of investment, the CSET Phase 2 project would be a supporting feature rather than an instigator of this investment. It is considered that the Level 2 appraisal as previously outlined is sufficient to capture this influence.

Table 2.3: Level 3 Economic Impacts – Informing this Economic Case

Benefit	Description
Dependent development	
Land Value Uplift (LVU)	<ul style="list-style-type: none"> • Relates to the increase in land value as a result of a change in its use reflecting the economic benefits of conversion to a more productive use. The estimate is then adjusted for any change that would occur without the proposed intervention, displacement of demand from other potential developments and the wider effects of the resulting development. • Calculated for Greater Cambridge and the net UK impacts. • Forms 'non-traditional' Level 3 impacts using dynamic land use modelling. • LVU impact at the UK level is the core Level 3 impact.
Labour supply	
Changes in total employment and GDP welfare at a net UK level	<ul style="list-style-type: none"> • Level 3 SEM – 'non-traditional' using dynamic land use modelling and context specific additionality. • Used as a validation test for the LVU assessment.

Source: Mott MacDonald

3 Options Appraised

The five shortlisted options that are the focus of this Economic Case are shown in Figure 3.1. There are five route alignments, which are denoted by colour; Brown, Blue, Black, Pink and Purple and three travel Hub sites denoted by letter; A, B and C.

The optioneering process to arrive at the above route alignments and travel sites are summarised in Section 18 of the Strategic Case (document reference: 403394-MMD-BCA-00-RP-BC-0247) and detailed in full in Appendix A: OAR (document reference 403394-MMD-BCA-00-RP-BC-0024-C).

All five options follow the same route between CBC and Sawston, from which point they diverge into five alternative alignments, leading to one of three Travel Hub sites. All options would have the same service frequencies and have similar levels of provision for pedestrians and cyclists. The main differences between each option and the Travel Hub sites are summarised below.

CBC to Sawston

This section of the route common to all options runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with the railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. All four stops proposed at this stage are within this section and in the same locations for each option. These would be at the CBC, Hinton Way (Great Shelford), Haverhill Road (Stapleford) and Sawston Road (Sawston). The route would cross each of these roads and Granham's Road, via new at-grade junctions to be signalised with priority given to public transport vehicles. Before reaching High Street, the route options then diverge as outlined within the following sections.

Brown Option

The Brown (and Blue) route takes a direct alignment across fields towards the A11 which includes a second crossing of the River Granta. The Brown route ends at Travel Hub Site B, located to the south west of the junction between the A1307 and A11. General traffic would access it from the A1307 via a new junction whilst the site itself would have a linear arrangement in order to accommodate it between a high-pressure gas main, over which development is restricted, and the A11. The site could provide parking for up to 2,800 cars.

Blue Option

The Blue route extends beyond the Brown route to cross the A11 via a new bridge. The route would then cross Newmarket Road at a new junction, before running through the south of the former Comfort Café site and crossing the A1307 via a new junction to connect with Travel Hub Site C, located on the north side of the A1307. As with the junctions on the common section of route, all new junctions would be at-grade and signalised with priority for public transport vehicles. Site C would have a separate roundabout junction to provide general traffic with access into the site at the current junction between the A1307 and Newmarket Road. It could provide parking for up to 2,100 cars.

Black Option

The Black, Purple and Pink routes follow the route of a former railway; however, as this is now designated as a County Wildlife Site, the proposed alignment would be slightly to the north of this, also avoiding the need for a bridge or significant regrading works at the former High Street crossing. All three options follow the same route initially with the Black and Pink options continuing to the A505 junction before running parallel with the A11 and crossing the River Granta. The Black route would then cross the A11 before following the same alignment as the Blue option from Newmarket Road to Travel Hub Site C. It could provide parking for up to 2,100 cars.

Pink Option

The Pink option is the same as the Black option but, instead of crossing the A11, it terminates at Travel Hub Site B to the north of the River Granta. This would be the same as the Travel Hub site for the Brown route but have a slightly different layout in order to accommodate public transport vehicles entering the site from the south rather than west. This would result in a slightly lower capacity of up to 2,500 cars.

Purple Option

The Purple route is the shortest of all options and, unlike other options, crosses the River Granta once only. It follows the same route as the Pink and Black route but stops to the west of the A11/A505 junction and would serve Travel Hub Site A. This would be accessed via a new roundabout junction to the north of the A505 slip road and require an extended access road to the site itself. This would be necessary in order to avoid the high-pressure gas pipeline. The site would provide capacity for approximately 2,000 cars but has potential for expansion.

Combined Options Plan
403394-MMD-HWA-01-VS-HW-0090-P4

Key

- Purple Route
- Pink Route
- Brown Route
- Black Route
- Blue Route
- Potential Stop Location (indicative)
- Potential Travel Hub Location

Map Labels: CAMBRIDGE, Addenbrooke's Hospital, Cambridge Biomedical Campus, Nine Wells Nature Reserve, Great Shelford, STAPLEFORD, LITTLE SHELFORD, River Cam, WHITTLESFORD, SAWSTON, River Great Ouse, Wandlebury Country Park, Magog Down, Babraham Research Campus, A1301, A1307, A505, A11, Grants Park, LITTLE ABINGDON, GREAT WINDSOR.

Route Options: Purple Route, Pink Route, Brown Route, Black Route, Blue Route.

Legend: Potential Stop Location (indicative), Potential Travel Hub Location.

Scale: 0 1 2 3 4 5 6 7 8 9 10 km

North Arrow: Up arrow indicating North.

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Logo: MOTT MACDONALD

Source: Mott MacDonald

4 Transport Modelling Framework

The Cambridge Sub Regional Model D-Series (CSRM2) has been used as the basis of the assessment of the different options. This has been enhanced with additional local refinements to its highway model and the creation of a new public transport model to provide a more accurate assessment of the public transport impacts of the options being considered.

The following reports explain the CSRM2 base year model, demand model set-up and forecasting approach:

- CSRM2 D-Series Highway Local Model Validation Report (v3.0, October 2018)⁴;
- CSRM2 D-Series Transport Demand and Public Transport Model Development and Validation Report (v3.0, October 2018); and
- CSRM2 D-Series Model Forecasting Report.

These provide details of the survey data used to build the base year traffic model and the network and planning assumptions used to produce the forecast assignments.

4.1 Base Year Modelling

4.1.1 2015 Base Year Highway Model

The base year CSRM2 SATURN highway model structure was initially reviewed along the A1307, A428/A1303 and A10/A1309 corridors.

The modelled flows at various points along the A1307 corridor were compared to the observed data available to ensure the model was accurately reflecting current base year (2015) flows.

4.1.2 2015 Base Year Public Transport Model

Public transport supply data was sourced from CSRM2 and converted from MEPLAN software to build a standalone model in CUBE software. During this conversion process, the hierarchical network of connections between modes as coded in MEPLAN was simplified such that transfers within a transit node did not require additional walk connections. The physical transit network was developed based on links describing the stopping sequences of transit lines. Thus, intermediate nodes such as junctions are not represented.

Journey times for transit services are based on the congested times modelled in the CSRM2 highway module, which are added to the timetabled running times in the MEPLAN model. Where transit lines were coded with varying headways along the route in MEPLAN, this was converted into additional variant transit lines such that link vehicle frequencies matched those in CSRM.

The zoning system was retained as per CSRM2 and additional connectors added where zones were not directly connected to constituent transit nodes served by transit lines. Direct zone connectors were added where excessively long public transport routings were being made between adjacent zones.

Rail demand matrices were sourced directly from CSRM2. New bus matrices were developed using a combination of onboard bus origin-destination surveys and ticket sales data from November 2015. Ticket sales data controlled the magnitude of the demand matrices with the Origin Destination survey data providing trip end distributions. Separate matrices were developed for conventional bus, Guided Bus and Park & Ride bus based on observed usage of each sub mode in the survey data.

For Park & Ride demand, the highway element of these trips is not modelled explicitly in the public transport model. Trips in the rail and bus Park & Ride matrices were aggregated to the zones representing either the bus Park & Ride site or the relevant rail station, using a gravity function to distribute zonal trip ends to up to three competing Park & Ride locations. This was based on the principle that AM Peak trips predominantly

⁴ CSRM2 D-Series Highway Local Model Validation Report, Transport Demand and Public Transport Model Development and Validation Report and Model Forecasting Report produced by Atkins

drive to the Park & Ride site and thus trip origins are aggregated to the site, and likewise trip destinations in the PM Peak.

The aggregation process resulted in demand at most bus Park & Ride sites being up to 85% of car parking capacity, with only Madingley Road and Newmarket Road having over 100%. However, these proportions do not take account of the proportion of Park & Ride bus service usage by non-drivers (e.g. car passengers, kiss & ride, walk/PT access).

For rail, any excess in Park & Ride demand allocated to stations in excess of parking availability was not aggregated to the site but retained as full Origin Destinations and assumed to access the station by public transport. Most station car parks are effectively filled in the morning peak.

The modelled flows across the Cambridge Radial Cordon were compared to the observed data available to ensure the model was accurately reflecting current base year (2015) flows. The observed data used as part of the CSRM calibration and validation was used, with additional data cleaning to remove Monday and Friday data to be consistent with the data used to build the bus matrices and improve matching of fare stage data to model sectors.

In all cases, all modelled bus flows across the cordon were higher than observed; however, all flows were within TAG unit M3.2 acceptance criteria except for AM Peak outbound. Modelled guided bus flows alone were mostly lower than observed, though in most cases meeting TAG criteria. In many cases hourly flows were lower than the minimum threshold of 150 passengers per hour required to satisfy TAG criteria. Further analysis of average vehicle loadings across the cordon demonstrated no excessive loadings with average loadings in the main peak flow directions varying between 20 and 50 passengers per vehicle.

4.2 Forecast Years Modelling

Foundation Case CSRM2 demand model runs for the Do Minimum scenario and the five shortlisted scheme options were produced for the AM peak period (07:00-10:00), Interpeak period (10:00– 16:00) and PM peak period (16:00-19:00) for the forecast years of 2026 and 2036.

The Foundation Case represents a scenario which is consistent with the currently proposed Local Plans for the four Local Authority Districts represented in CSRM2 (Cambridge City, South Cambridgeshire, Huntingdonshire and East Cambridgeshire). This includes local assumptions on housing, employment and other developments, along with transport schemes which are either committed or expected to be required to support development.

The changes made to the base year highway networks were similarly applied to the forecast year highway networks. Separate networks were then created for the Do Minimum and the five Do Something options (set out in Section 3). In addition to the network changes, new High Quality Public Transport services between Haverhill, Granta Park, the new Travel Hub site and Cambridge city centre were included in line with the CSET Phase 2 Public Transport Network Strategy Report (Appendix D, document reference 403394-MMD-BCA-00-RP-BC-0370). CSRM uses reduced waiting and travel time weightings for high quality bus services compared to ordinary bus services. These reduced waiting and travel time weightings have been applied to the new services along the CSET scheme corridor.

The changes between the CSRM2 base year output highway and public transport matrices and those output for the two forecast years were applied to the enhanced highway model and the new public transport model to provide the final highway and public transport assignments with and without the scheme options.

For forecast year scenarios, separate Park & Ride matrices for each site were provided from CSRM2. These splits were used in forecasting and aggregating the bus and rail Park & Ride demand, removing the need to estimate Park & Ride site choice as undertaken for the base year.

The CSRM2 demand model had more highway trips entering than leaving both the existing Babraham Road Park & Ride site and the proposed new Travel Hub sites over a 12-hour period. This was due to non-home-based, other trips being generated by direction and therefore able to choose a different mode of travel for each direction of their journey.

A process to adjust the model outputs to balance highway trips entering and leaving the Park & Ride / Travel Hub sites over a 12-hour day was derived. This retained the CSRM2 AM peak period results and then applied the observed profiles of arrivals and departures across the day from the existing Babraham Road Park & Ride site to provide Interpeak and PM peak period highway trips to and from the Park & Ride / Travel Hub sites.

It was also noted that the CSRM2 outputs did not include any trips in the pre-peak hour highway matrices to or from the new Travel Hub sites proposed. These were additionally added in based on the peak hour trips to and from the new Travel Hub sites to ensure the operation of the junctions close to the sites proposed was modelled as accurately as possible.

4.3 Key Modelling Results

4.3.1 Public Transport Journey Times

The public transport journey time benefit of the CSET Phase 2 proposal is presented in two comparison analysis (Inbound and Outbound), as follows for the Preferred option (Brown):

- Haverhill to Cambridge via Travel Hub Site B; and
- Travel Hub Site B to Cambridge Biomedical Campus (CBC).

Travel Hub B is a new location for public transport movements, therefore direct comparisons with competing services are slightly misleading, as existing services are not tailored to serve this demand, travel time varies by service and within the peak period. In addition, travel by private car remains a viable option. Nevertheless, the following tables present a journey time comparison with a comparable existing service.

Table 4.1 and Table 4.2 indicate that in the case of the maximum extent of the service from Haverhill to Cambridge, the CSET Phase 2 public transport route provides a modest travel time saving on average eight minutes (15%), with higher levels of benefit in the PM.

Table 4.1: 2026 Inbound Journey Times – Haverhill to Cambridge via Travel Hub Site B

Option	AM (07-10)		IP (10-16)		PM (16-19)	
Do Minimum (X13 AM, 13 IP, 13 PM)	48 mins		50 mins		54 mins	
Scheme Preferred Option (Brown)	42 mins	%	42 mins	%	42 mins	%
Saving & Percentage	6 mins	-13%	8 mins	-16%	12 mins	-22%

Table 4.2: 2026 Outbound Journey Times – Cambridge to Haverhill via Travel Hub Site B

Option	AM (07-10)		IP (10-16)		PM (16-19)	
Do Minimum (13 AM & IP, X13 PM)	51 mins		51 mins		54 mins	
Scheme Preferred Option (Brown)	43 mins	%	43 mins	%	46 mins	%
Saving & Percentage	8 mins	-16%	8 mins	-16%	8 mins	-15%

Table 4.3 and Table 4.4 provide the direct comparison with the CSET Phase 2 segregated route between Travel Hub Site B and the CBC and the existing service from/to A1307 Cambridge Lodge bus stops.

At this localised level, the travel time saving for the segregated route represents a significant saving at over 40% of the Do Minimum travel time.

Table 4.3: 2026 Inbound Journey Times – Travel Hub B to CBC

Option	AM (07-10)		PM (16-19)	
Do Minimum (X13 AM, 13 PM)	16 mins		15 mins	
Scheme Preferred Option (Brown)	9 mins	%	9 mins	%
Saving & Percentage	7 mins	-44%	6 mins	40%

Table 4.4: 2026 Outbound Journey Times – CBC to Travel Hub B

Option	AM (07-10)		PM (16-19)	
Do Minimum (13 AM, X13 PM)	17 mins		17 mins	
Scheme Preferred Option (Brown)	9 mins	%	9 mins	%
Saving & Percentage	8 mins	-47%	8 mins	-47%

Source: Mott MacDonald

4.3.2 Bus Passenger Demand

Passenger demand for the proposed CSET Phase 2 High Quality Public Transport (HQPT) service has been divided into three distinct classifications:

1. Travel Hub Site B passengers;
2. Extended service passengers – Granta Park, Linton and Haverhill; and
3. On-route passengers – Sawston, Stapleford and Great Shelford.

In addition to connecting the Travel Hub site with the Cambridge Biomedical Campus and Cambridge City Centre, the CSET Phase 2 scheme has been designed to provide an enhanced public transport service to wider locations e.g. Haverhill and Linton, whilst providing improved public transport connectivity for intermediate locations on the CSET public transport route, with dedicated stops at Sawston, Stapleford and Great Shelford.

The following detailed passenger volumes are presented for the Travel Hub site and the on-route locations to provide context to the CSET Phase 2 service patronage. The extended services generate a relatively low level of patronage, as indicated in the economic appraisal, therefore the information is presented for those locations that influence the assessment.

4.3.2.1 Travel Hub Site B

Table 4.5 and Table 4.6 provide the total Travel Hub vehicles and passenger demand for 2026 and 2036. Overall the assessment indicates that on average 40% of the total P&R users are new users attracted by the provision of the Travel Hub and the CSET Phase 2 HQPT service.

Table 4.5: AM Peak Hourly 2-way P&R Passengers (08:00-09:00)

Forecast Year		P&R Total	New	% New
2026	Vehicles	447	180	40%
	Passengers	593	239	
2036	Vehicles	408	156	38%
	Passengers	563	215	

Source: Mott MacDonald

Table 4.6: PM Peak hourly 2-way P&R Passengers (17:00-18:00)

Forecast Year		P&R Total	New	% New
2026	Vehicles	447	192	43%
	Passengers	593	255	
2036	Vehicles	394	174	44%
	Passengers	544	240	

Source: Mott MacDonald

4.3.2.2 On-route Demand

The On-route locations of Sawston, Stapleford and Great Shelford represent key locations for the attraction of patronage to the CSET Phase 2 HQPT service. The service has been designed to accommodate and encourage patronage through dedicated stops. Table 4.7 presents the modelled patronage per stop location for the modelled periods and daily. Overall the service is popular with over 1,200 daily journeys.

Table 4.7: Period 2-way Passengers – On-route Demand

Forecast Year	Location	AM (07:00-10:00)	IP (10:00-16:00)	PM (16:00-19:00)	Weekday 12hr	%
2026	Sawston	121	241	127	489	40%
	Stapleford	19	30	15	64	5%
	Great Shelford	192	318	173	683	55%
	Total	332	589	315	1,236	100%

Source: Mott MacDonald

5 Transport Economic Appraisal

5.1 Benefit Cost Ratio and Value for Money Appraisal

In the calculation of the Benefit Cost Ratio (BCR) and subsequent Value for Money calculation (VfM) several assumptions have been made and these are outlined below.

5.2 Assumptions

5.2.1 General Costs

In line with the guidance on cost the following assumptions have been applied to generate a Present Value of Costs (PVC) in 2010 prices, discounted:

- Spend Profile – It has been assumed that all costs are expended over the period 2020 to 2025 inclusive;
- Risk contingency of 25% (P80) has been applied to costs;
- Costs have been uplifted by a Market Price Factor of 1.19;
- Costs have then been modified by GDP deflator from 2020 to 2010; and
- Finally, costs have been discounted to 2010 prices to arrive at a figure for the PVC.

5.2.2 Environmental Costs

Costs for Noise, Air Quality and Greenhouse Gases, are based on the standardised reduction in Car based distance travelled. These are based on the Marginal External Cost (MEC) prices, as defined in TAG Table 5.4.2 which shows the pence per km saved for different road classifications. We have classified the A1307, which is the main impacted corridor, as a Rural 'A' Road. Under this assumption:

- A saving of 0.2p per km is applied for Local Air Quality;
- A saving of 0.8p per km is applied for Greenhouse Gases;
- Noise impacts are excluded based on the Rural 'A' Road classification within the MEC.

5.2.3 Opening Year

The opening year for the scheme was assumed to be 2024. Modelling was undertaken for 2026 and has been discounted to 2024.

5.2.4 Appraisal Period

A 60-year appraisal period has been used, with a horizon year of 2083.

5.2.5 Revenue and OPEX (currently excluded)

At present the assessment excludes the contribution of additional revenue and operational costs (OPEX). It is likely that due to the volume of new users, the potential revenue generation would be a significant contributing factor, however, careful consideration is required as to who will benefit from this revenue.

5.3 Establishing Demand

Demand for the CSET Phase 2 HQPT service was established for the appraised options based on a consistent method, as outlined previously. The demand for the service is divided into three classifications:

1. Travel Hub demand – consisting of:
 - Existing users (transferred from existing services) and;
 - New users
2. Extended services demand – for Granta Park, Linton and Haverhill
 - Existing users (transferred from existing services) and;
 - New users
3. On-route demand – for Sawston, Stapleford and Great Shelford
 - Existing users (transferred from existing services)

A detailed breakdown of the demand by location over the 60-year appraisal period is shown in Table 5.1.

The table includes the proportion of total users by location and the proportion of new users attracted by the provision of the CSET Phase 2 HQPT service. Overall the assessment indicates that the service would generate between 80-90 million users over the 60-year period with 40% being new users, principally associated with the Travel Hub itself.

The Travel Hub accounts for the highest proportion of total patronage at approaching 70%, followed by the On-route demand at nearly 30%. The route alignment for these On-route locations is consistent across options therefore the demand is consistent. The variances in the total demand between the options is accounted for by the Extended services equating to 4-5% at 3-4 million users.

In terms of total patronage, the Travel Hub Site A Purple option generates the highest demand. However, the overall patronage is reasonably consistent across all option with the exception of the slightly longer alignment routes Pink and Black, which indicated that the extended route journey time is likely to reduce the overall attractiveness of the service.

Table 5.1: Detailed CSET Phase 2 User Breakdown

User Trips (2-way) 60 Years Rank	Site A	Site B	Site B	Site C	Site C
	PUR	BRN	PNK	BLU	BLK
	1	3	2	4	5
Total users (2-way)	88.15	83.93	78.01	87.11	80.61
Existing user trips (m)	52.57	50.36	47.83	51.13	47.90
New user trips (m)	35.58	33.57	30.18	35.98	32.71
% New users	40%	40%	39%	41%	41%
1 - Travel Hub users (m)	59.90	55.63	49.70	58.83	52.38
% Total	68%	66%	64%	68%	65%
% New users	56%	57%	57%	58%	59%
2 - Extended service users (m)	3.70	3.75	3.75	3.72	3.67
% Total	4%	4%	5%	4%	5%
% New users	51%	51%	51%	51%	51%
3 - On-route users (m)	24.55	24.55	24.55	24.55	24.55
% Total	28%	29%	31%	28%	30%
% New users	0%	0%	0%	0%	0%

Source: Mott MacDonald Notes: (m = millions)

In line with the Consumer Surplus theory, new users will experience half of the benefit of existing users, under the Rule of Half (RoH). RoH suggests that when consumers change their travel in response to a financial incentive, the net consumer surplus averages half of their price change (called the “rule of half”). This considers total changes in financial costs, travel time, convenience and mobility as perceived by consumers.

The proportion of existing and new users for the Travel Hub site and the extended bus routes was determined through highway and public transport modelling.

Annualised patronage represents 305 days per annum (excluding holidays etc. in accordance with TAG Guidance, this includes:

- 253 weekdays – based on AM (x3 hours), Inter-peak (IP) (x6 hours) and PM (x3 hours) modelling, representing 12 hours of daily operation; and
- 52 weekends (18hrs per weekend) – based on IP modelling.

Annualisation factors vary between the Highway and Public Transport (PT) models:

- Highway expands hourly volumes to period volumes, based on the Travel Hub profile
- Public transport is modelled in periods.

5.4 Transport Benefits

The benefits within the options appraisal were divided into two classifications:

1. Journey time savings, accounting for 80% of benefits and consisting of travel time savings for all users, including:
 - Travel Hub users (passengers);
 - Extended service users (passengers); and
 - On-route service users (passengers).

Travel time savings were monetised based on specified values of time (commute, work and other).

2. Non-user benefits classified as Marginal External Costs (MEC), amounting to the remaining 20% of benefits. These comprised additional non-user benefits based on distance saved by Travel Hub vehicles only, including:
 - Congestion;
 - Infrastructure;
 - Accident;
 - Local Air Quality;
 - Noise;
 - Greenhouse Gases; and
 - Indirect Tax (cost).

DfT TAG Databook A.5.4.2 provides pence-per kilometre factors to convert the distance saved into a monetised value and the RoH is applied to new users. Journey time saving benefits are shown in Table 5.2 and monetised values of both journey time savings and non-user benefits in Table 5.3.

5.4.1 Journey Time Benefits

The journey time benefits represent the travel time savings experienced by users of the CSET Phase 2 HQPT service in comparison to the existing bus services and forecasted travel times.

In the case of this assessment, the journey time savings are based on standardised assumptions regarding the proposed infrastructure and services and the most direct existing service during the relevant period, including the existing peak hours X13 service where applicable. The option to travel by car is also considered.

Table 5.2 below presents an example set of journey time savings by direction and time period for the Brown option for the CSET Phase 2 infrastructure itself which is applied to the Travel Hub and Extended service users. This demonstrates a modest travel time saving of up to 12 minutes in the PM period. The relatively modest travel time saving is due to the comparison with the express service (X13) and travel time by car. There is a marginal increase in journey time savings during the Inter-peak period when the X13 service does not operate.

In terms of the options assessed, there are marginal differences between the options. These are related to the changes in the route alignment and Travel Hub locations relative to the Brown option, as follows:

- Travel Hub A – Purple – On average 1-minute additional saving (+10%), due to shorter route;
- Travel Hub B – Pink – On average 1-minute additional travel time (+10%), due to longer route than Brown; and
- Travel Hub C – Blue – On average 30 seconds additional travel time (+5%), due to route crossing A11, with the Black option incurring an additional 1-minute (+10%), due to the longer route.

Table 5.2: Example Journey Time Saving per Route Brown Option (2026)

Time Saving (mm:ss)	AM (07-10)		IP (10-16)		PM (16-19)	
	In	Out	In	Out	In	Out
CSET Phase 2	06:01	07:28	08:09	08:09	12:06	08:10
On-route (PT)	29:08	26:52	15:00	15:00	25:16	24:11

In contrast, users from the On-route locations of Sawston, Stapleford and Great Shelford experience significant travel time savings, as the analysis only considers the currently modelled Public Transport demand and therefore the journey time savings are substantial at 25-30 minutes in the peak periods and a standardised 15 minutes in the Inter-peak. A key factor contributing to this is the reduction in wait time due to the enhanced service frequency relative to the existing Citi 7 route.

The total travel time savings for the scheme over the 60-year appraisal are calculated by the multiplication of the travel time savings for the forecast years (2026 and 2036), based on the following approach:

- Opening Year (2024 to 2026) – based on back casting from interpolated trend from 2036 to 2026;
- 30 Year Projection (2024 to 2053) – TAG guidance specifies that benefits are projected for 30 years from the Opening Year. The patronage and journey time savings for this period are based on the extrapolation of the 2026 to 2036 trend up to 2053; and
- Horizon Period (2053 to 2083) – TAG guidance specifies that benefits beyond the initial 30 years are held constant. The demand and time savings determined in 2053 are therefore sustained until the appraisal horizon year of 2083.

Table 5.3 below presents the calculated total journey time savings for the 60-year appraisal period, based on the multiplication of the travel time savings and the calculated demand, which show marginal variance by option.

The analysis includes the presentation of the journey time savings by component, summarised as:

1. Travel Hub users – represent up to 40% of the total benefits due to the proportion of new users.
2. Extended service users – represent a small proportion of benefits at less than £1 million.

3. On-route users – represent up to 60% of the total benefits due to the scale of travel time savings achieved for these users. However, the option alignments are consistent therefore the option assessment identifies no additional benefit.

Table 5.3: Transport Benefits – Journey Time Savings

Journey Time Savings (m/hrs) 60 Years Rank	Site A	Site B	Site B	Site C	Site C
	PUR	BRN	PNK	BLU	BLK
	3	2	5	1	4
Total Journey Time Savings (m/hrs)	13.83	14.14	12.81	14.39	13.03
Existing user trips - JT savings (m/hrs)	11.22	11.34	10.58	11.43	10.60
New user trips - JT savings (m/hrs)	2.61	2.81	2.23	2.96	2.43
% New users	19%	20%	17%	21%	19%

1 - Travel Hub users (m/hrs)	5.17	5.58	4.34	5.82	4.56
% Total	37%	39%	34%	40%	35%
% New users	45%	46%	46%	46%	48%
2 - Extended service users (m/hrs)	0.86	0.77	0.67	0.77	0.67
% Total	6%	5%	5%	5%	5%
% New users	35%	35%	35%	35%	35%
3 - On-route users (m/hrs)	7.80	7.80	7.80	7.80	7.80
% Total	56%	55%	61%	54%	60%
% New users	0%	0%	0%	0%	0%

Source: Mott MacDonald Notes: (m = millions, hrs = hours)

A monetised value for the journey time savings was calculated by the multiplication of the time savings based on a defined Value of Time (VoT) per user purpose split as shown in Table 5.4 below.

Table 5.4: Public Transport User Value of Time (VoT)

Purpose	2010 VoT	% Bus Travel			
		AM	IP	PM	Weekend
Business	£12.94	26%	7%	33%	11%
Commute	£12.85	2%	2%	3%	1%
Other	£5.86	72%	91%	64%	88%

Source: DfT TAG data book Table A1.3.4, May 2019 - Percentage of Person Trips

Table 5.5 below presents the monetised journey time benefits for the shortlisted CSET Phase 2 options, based on the above monetisation methodology and the application of the Rule of Half (RoH) for new users, based on the identified components.

Overall the monetised journey time benefits across the options are reasonably consistent, with the scheme generating benefits in the region of £40-£46m over the 60-year appraisal period. The influence of the RoH is present in the economics, as the new users represent approximately 20% of the overall journey time benefit.

Based on the scale of travel time saving, the On-route patronage accounts for 50% of the total benefit.

Table 5.5: Monetised Transport Benefits – Journey Time Savings

Journey Time Savings (£m) 60 Years, (2010 prices, discounted) Rank	Site A	Site B	Site B	Site C	Site C
	PUR	BRN	PNK	BLU	BLK
	3	2	5	1	4
Total Journey Time Savings (£m)	£45.03	£46.05	£41.18	£47.03	£42.03
Existing user trips - JT savings (£m)	£34.84	£35.42	£32.69	£35.82	£32.80
New user trips - JT savings (£m)	£10.19	£10.63	£8.49	£11.20	£9.23
% New users	23%	23%	21%	24%	22%

1 - Travel Hub users	£18.43	£19.88	£15.46	£20.84	£16.31
% Total	41%	43%	38%	44%	39%
% New users	42%	43%	43%	43%	45%
2 - Extended service users	£4.03	£3.59	£3.15	£3.61	£3.14
% Total	29%	25%	25%	25%	24%
% New users	60%	60%	60%	61%	60%
3 - On-route users	£22.57	£22.57	£22.57	£22.57	£22.57
% Total	50%	49%	55%	48%	54%
% New Users	0%	0%	0%	0%	0%

Source: Mott MacDonald Notes: (£m = millions)

5.4.2 Marginal External Cost (MEC) Benefits – Travel Hub Users

The Marginal External Cost (MEC) approach is designed to capture the secondary benefits of the proposed intervention in terms of the change in the distance travelled. This method has been adopted as a proportionate approach to establishing a monetised benefit for the reduction in distance travelled by car.

The method is based on the application of DfT defined costs (pence per kilometre) for a range of predefined factors, as presented for 2010, 2025 & 2035 in Table 5.6 below. DfT has defined assumptions regarding the increase in these costs over time as indicated by the noticeable increase in congestion. For the assessment of the change on travel along principally the A1307 corridor the Rural 'A' Road costs have been applied. Values are calculated for the 60-year appraisal period by interpolation of the provided DfT costs up to 2035, after which they are held constant for the remainder of the appraisal period.

Table 5.6: MEC External Cost Assumptions – Rural 'A' Road

ID	Factor (pence-per-km)	2010	2025	%	2035	%
1	Congestion Average	2.0	3.4	76%	5.3	170%
2	Infrastructure	0.1	0.1	32%	0.2	66%
3	Accident	0.7	1.1	56%	1.6	135%
4	Local Air Quality	0.2	0.0	-72%	0.0	-76%
5	Noise	0.0	0.0	0%	0.0	0%
6	Greenhouse Gases	0.8	0.6	-23%	0.7	-17%
7	Indirect Taxation	-4.4	-2.7	-39%	-1.6	-63%

Source: Table A 5.4.2a: Marginal External Costs and Indirect Tax

For the MEC assessment, a standardised distance saving for Travel Hub users has been applied based on distance that would otherwise be travelled along the A1307 to the Babraham Park & Ride site (6km), with the following assumptions applied:

- Existing P&R users – 12km daily distance saving per two-way trip; and
- New users – 6km daily distance saving per two-way trip, after applying the RoH (50%).

MEC benefits have only been calculated for the Travel Hub users, with the results summarised in Table 5.7.

Overall the analysis indicates that the options generate a similar level of distance saving over the 60-year appraisal period of between 300-350 million kilometres, with the Travel Hub A Purple option attracting the highest level of demand and therefore kilometres saved.

At a monetised level, this distance saving equates to an economic benefit of between £10-12m, with most of this benefit associated with congestion relief, as indicated by the MEC assumptions presented in Table 5.6. A reduction in distance travelled will lead to a reduction in fuel consumed, resulting in a reduction in revenue received by government from indirect taxation. This is treated as an economic cost.

Table 5.7: Monetised MEC Benefits

Vehicle Distance Saving 60 Years, (2010 prices, discounted)	Site A	Site B	Site B	Site C	Site C
	PUR	BRN	PNK	BLU	BLK
	Rank	1	3	5	2
Total Vehicle Distance Saving (m/km)	353	326	292	345	310
Existing user vehicle distance saving (m/km)	200	182	163	189	165
New user vehicle distance saving (m/km)	153	144	129	156	145
% New users	43%	44%	44%	45%	47%

MEC Non-User Benefits (£m)	£12.03	£11.06	£9.92	£11.73	£10.54	% Ave
All User - 1. Congestion (£m)	£10.59	£9.76	£8.75	£10.34	£9.29	88%
All User - 2. Infrastructure (£m)	£0.34	£0.31	£0.28	£0.33	£0.30	3%
All User - 3. Accident (£m)	£3.31	£3.05	£2.73	£3.23	£2.90	28%
All User - 4. Local Air Quality (£m)	£0.09	£0.08	£0.07	£0.09	£0.08	1%
All User - 5. Noise (£m)	£0.00	£0.00	£0.00	£0.00	£0.00	0%
All User - 6. Greenhouse Gases (£m)	£1.39	£1.29	£1.15	£1.36	£1.22	12%
All User - 7. Indirect Taxation (£m)	-£3.69	-£3.43	-£3.08	-£3.61	-£3.24	-31%

5.4.3 Options Assessment Benefits Summary

Table 5.8 below presents a summary of the monetised benefits calculated for the shortlisted options based on the identified approach.

- The Brown (Site B), Purple (Site A) and Blue (Site C) options generate reasonably consistent results in terms of journey time savings and MEC benefits, based on a different balance in benefits;
- The Purple option (Site A) generates the highest level of users at nearly 90 million over 60 years; and
- The Pink (Site B) and Black (Site C) options generate noticeably lower levels of benefits, due to the extended route length relative to the Brown and Blue options and associated increased travel time.

Table 5.8: Summary of Option Assessment Monetised Benefits

Assessment Summary 60 Years	Site A	Site B	Site B	Site C	Site C
	PUR	BRN	PNK	BLU	BLK
Total Users (2-way)	88.15	83.93	78.01	87.11	80.61
Rank	1	3	2	4	5
Total Journey Time Savings (£m)	£45.03	£46.05	£41.18	£47.03	£42.03
Rank	3	2	5	1	4
MEC Non-User Benefits (£m)	£12.03	£11.06	£9.92	£11.73	£10.54
Rank	1	3	5	2	4
Total Benefits (£m)	£57.05	£57.11	£51.10	£58.76	£52.57
Rank	3	2	5	1	4

Source: Mott MacDonald Notes: (£m = millions)

5.5 Capital Costs (CAPEX)

Table 5.9 presents for each of the shortlisted options:

- The raw capital cost (2019 prices); and
- The Present Value Cost (PVC), at 2010 prices with market prices adjustments and discounted.

The Purple option (Site A) has the lowest capital cost due to the avoidance of the cost of the infrastructure required on other routes to cross key obstacles i.e. the River Granta (Sites B and C) and crossing the A11 (Site C).

A cost comparison with the Purple option (Site A) indicates that approximately an additional £10m PVC is required to extend the route across the River Granta to reach Site B and a further £15m to cross the A11 to reach Site C.

This cost assessment identifies that the Site C options are unviable based on an additional cost of 38% to 45% relative to lowest cost option with limited additional benefit, as previously indicated.

Table 5.9: Capital Expenditure (CAPEX) Costs in £ millions

Costs CAPEX (£m)	Site A	Site B	Site B	Site C	Site C
	PUR	BRN	PNK	BLU	BLK
Rank	1	3	2	5	4
Cost CAPEX (£m)	£94.86	£109.24	£107.90	£137.29	£130.75
Present Value Cost (PVC) (2010 Prices, Discounted) (£m)	£70.24	£80.90	£79.91	£101.67	£96.82
% Difference Purple	0%	15%	14%	45%	38%
Difference Purple (£m)	£0.00	£10.66	£9.67	£31.43	£26.58

Source: Mott MacDonald Notes: (£m = millions)

5.6 Options Assessment – Value for Money (VfM)

The Value for Money (VfM) for the options assessment is based on the calculated Benefit to Cost Ratio (BCR), which is based on comparison of the Present Value of Benefits (PVB) and the Present Value of Costs (PVC). A positive number in excess of 1.0 is considered to represent an economic return on the initial investment.

The DfT has defined standard categories for the VfM based on the BCR, as follows:

- 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; and
- Very Poor - BCR less than or equal to 0.

Table 5.10 below presents the BCR and VfM calculation for each of the shortlisted options. The assessment indicates that all options presently represent a Poor VfM, based on the applied consistent methodology with the level of PVB remaining reasonably consistent and PVC noticeably varying.

Table 5.10: Option Assessment Value for Money Comparison

Economic Summary 60 Years (2010, discounted)	Site A	Site B	Site B	Site C	Site C
	PUR	BRN	PNK	BLU	BLK
(Present Value Benefits) PVB	£57.1	£57.2	£51.1	£58.8	£52.6
(Present Value Costs) PVC	£70.2	£80.9	£79.9	£101.7	£96.8
(Benefit Cost Ratio) BCR	0.81	0.71	0.64	0.58	0.54
BCR Rank	1	2	3	4	5
Difference PVB-PVC (Value for Money) VfM	(£13.17) Poor	(£23.73) Poor	(£28.84) Poor	(£42.90) Poor	(£44.25) Poor

Source: Mott MacDonald Notes: (£m = millions)

Based on the lowest cost in CAPEX, the **Purple Option** generates the highest BCR at **0.81** making it the **indicative preferred option under this appraisal mechanism**. However, this and indeed all options at present represent a Poor VfM case, based on the DfT appraisal criteria. For the option appraisal all options have performed similarly with the CAPEX being a key factor in the BCR.

The Brown Option is also considered as a viable option based on the Travel Hub B direct connection with the A1307 itself, consistent performance in terms of PVB with the Purple option and a comparable BCR of **0.71**.

Based on this the two highest performing deliverable options from the appraisal have been identified as the Purple (Site A) and Brown (Site B) Options. These were then taken forward to operational assessment (microsimulation) modelling to assess the detailed operation of the access arrangements to each of the proposed Travel Hub sites.

5.7 Microsimulation Modelling

Further operational modelling (microsimulation) has been undertaken to assess the traffic impact of the access arrangements at each of these Travel Hub sites, Site A (accessed from the A505 Granta Park junction) and Site B (accessed from the A1307).

5.7.1 Overview of VISSIM

VISSIM is a microscopic real time traffic flow simulation model based on individual vehicles and driver behaviour. VISSIM can analyse vehicular traffic including bus/ tram, pedestrian and bicycle operations under constraints such as lane change configuration, traffic composition, traffic signals and bus/tram stops.

5.7.2 VISSIM Modelling Scope and Development

A base model and a future year (2036) model were developed. The model extents are shown in Figure 5.1 and include the surrounding local and strategic highway network. The blue line represents the model extents and the red circles represent the modelled junctions. Note that the M11 motorway junction and the junction with the A11/A1307 include the slip road approaches and exits but exclude the mainline carriageway.

Figure 5.1: Model Extents



Source: Mott MacDonald

5.7.3 Base Model Development

The base model has been developed using CAD drawings and online mapping sources and the traffic counts have been used to develop balanced flows as inputs into the VISSIM model, for static assignment within the model for peak hour periods with a 30-minute seed period to populate the model initially. The assessment periods cover the weekday peak hours of 07:30-08:30 and 16:45-17:45, in 15-minute intervals.

The model has been validated against Trafficmaster journey times for routes between the M11 junction 10 through to the A11 / A1307 roundabout, travelling both eastbound and westbound. Both journey time routes validate to within 15% in both peak hours. The base models are therefore considered suitable for the purpose of assessing the forecast scenario including the impact of the proposed Travel Hub.

5.7.4 Future Year Model Development

The 2036 flows for each future year model combine outputs from the SATURN highway model and the base VISSIM model inputs to derive the future year VISSIM model demand. Differences in turning flows between the SATURN Base and SATURN Forecast year were calculated and added to the VISSIM base flows.

As the SATURN model period is a single hour, the difference applied to the VISSIM model has been proportionally profiled into 15-minute intervals, based on the VISSIM Base flows.

It has been assumed that the vehicle composition would not change from the VISSIM Base model, therefore differences have been applied on an all-vehicle basis, with the vehicle type split being determined by surveys undertaken in March 2019.

5.7.5 VISSIM Outcomes

When modelled in VISSIM, the Purple option results in the best modelled operational performance, however, the differences to the Brown option are marginal and the benefit with the Purple scheme is likely to be due to the lower traffic flow using the site access as predicted by the SATURN model.

Further detail on the VISSIM modelling exercise can be found in the VISSIM Assessment Report, Document reference 403394-MMD-TRA-00-RP-TA-0241.

5.7.6 Preferred Option

As noted in Section 2.1, the five shortlisted options were appraised from multiple perspectives utilising three mechanisms. Aside from Benefit Cost Ratio calculation and Value for Money assessment, which is the subject of this Economic Case the following two processes contributed to the identification of a preferred option:

1. Mott MacDonald's in-house Multi-Criteria Assessment Framework INSET, (Investment, Sifting and Evaluation Tool): a quantitative and more detailed qualitative assessment of the shortlisted options was undertaken to aid in the identification of the preferred option. A detailed account of this process can be found in the OAR, document reference MMD-BCA-00-RE-BC-0024-B.
2. Consultation Feedback: based on public consultation held during the autumn of 2019. A summary of the consultation process and the subsequent feedback can be found in the Management Case of the OBC and the results are reported fully in the consultation summary report produced by the Cambridgeshire Research Group for GCP.⁵

Following consideration of all of the appraisal perspectives and mechanisms outlined above it was concluded that the Brown option was the best performing in terms of both route alignment and Travel Hub site, performing best both under the INSET appraisal process, which assessed options against a total 92 criteria under seven themes, and at public consultation, while ranking second for value for money. Although the BCR calculation showed that the Purple option provided the best value for money, this is only one element or rationale for implementing the scheme and it considers only a narrow set of economic criteria in the appraisal process.

⁵ Cambridge South East Transport – Better Public Transport Project: Summary Report of Consultation Findings, Cambridgeshire Research Group, January 2020

6 Reliability Benefits

6.1 Approach to Calculation of Reliability Ratios and Benefits

This assessment of reliability benefits was undertaken for CSET Phase 2 to look at bus service reliability by deriving reliability ratios for existing services operating on the Cambridgeshire Guided Busway and non-busway services.

DfT TAG Unit A1.3⁶ states that for most public transport journeys, the existence of timetabled arrival times means that it is usual to consider reliability in terms of lateness, defined as the difference between travellers' actual and timetabled arrival times. Adopting this definition means that arrival before the timetabled arrival time is usually ignored. Two measures of lateness must be considered: average lateness; and the variability of lateness, measured by the standard deviation of lateness.

The reliability ratio for public transport is defined as the ratio of the value of the standard deviation of lateness to the value of average lateness, where the value of average lateness is a factor of the value of travel time savings:

$$\text{Reliability Ratio} = \text{Value of SD of lateness} / \text{Value of average lateness}$$

where

$$\text{Value of average lateness} = \text{factor} * \text{value of travel time}$$

DfT TAG Unit A1.3 suggests that the value of average lateness for public transport is 2.5 times the value of in-vehicle time. Taking the value of commuting time as 8.36⁷ gives a Value of Average Lateness = 20.9.

Real Time Passenger Information (RTPI) data for Monday to Friday journeys in November 2018 was obtained for services 1, 7, 12, 13/13A/X13 and Busway B and has been analysed by looking at certain sections where:

- Services operate on segregated Busway infrastructure;
- On-road bus lanes are in place; and
- Services operate on-road with no bus priority.

The data showed the “actual run time” and the “scheduled run time”.

For each section, the maximum journey times, the average lateness (taking the lateness of on time and early journeys as zero) and the standard deviation of lateness have been derived for each hour from 0700 to 1800. The Reliability Ratio has also been calculated.

The results for the 0700 to 1800 period for each section, ranked by the reliability ratio are summarised in Figure 6.1 and Table 6.1.

6.2 Reliability Ratios

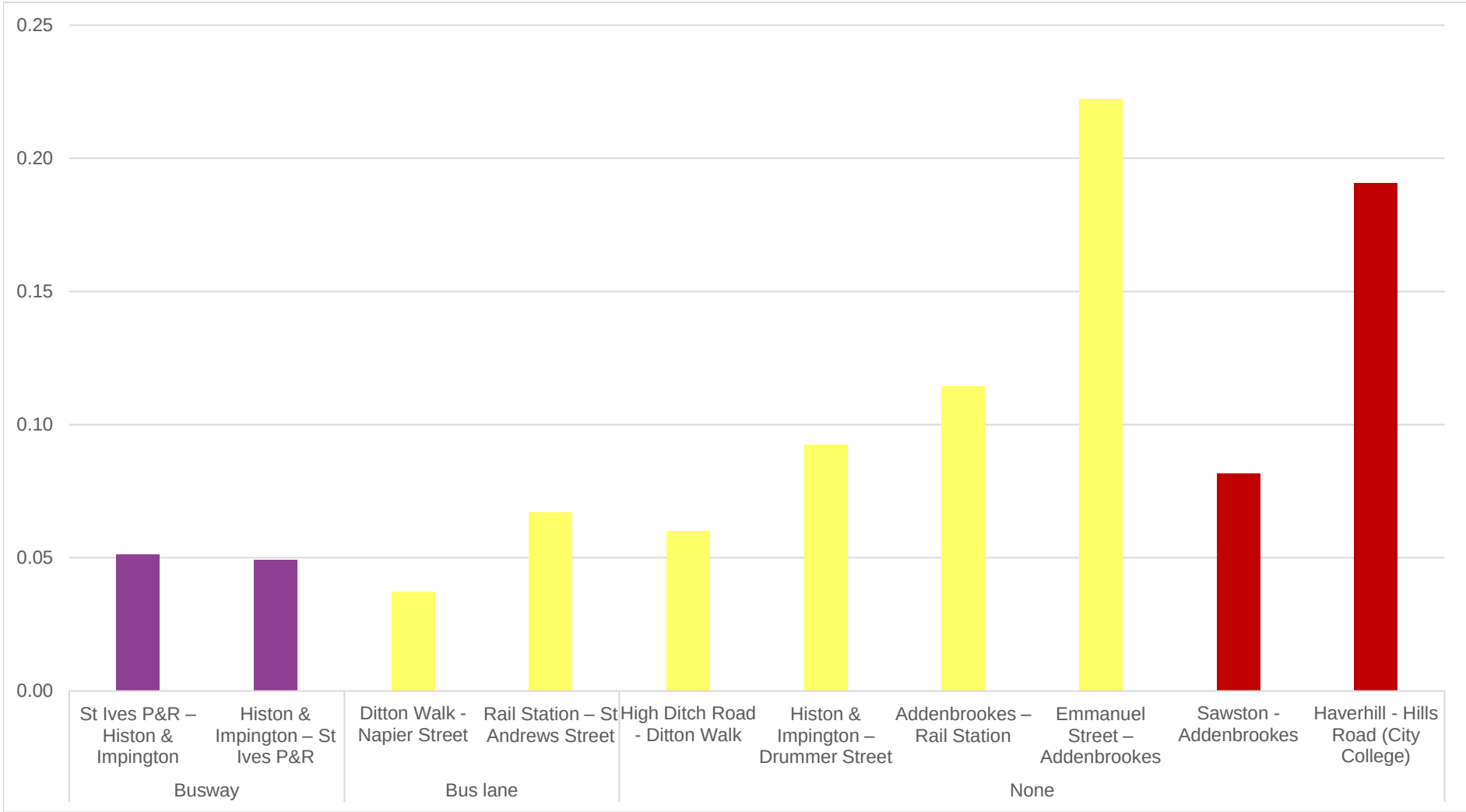
The Reliability Ratios show that the Busway sections perform better than the non-busway sections which is the expected result, meaning that the segregated infrastructure is delivering journey times that are more consistent.

While the Busway sections are not affected by traffic congestion, there are other factors that affect journey time variability, especially boarding times, which might be extended on certain journeys due to volume of passengers or the driver having to deal with queries.

⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/603254/TAG-tag-unit-a1-3-user-and-provider-impacts-march-2017.pdf

⁷ TAG Data Book – July 2019 table A1.3.1 see <https://www.gov.uk/government/publications/tag-data-book>

Figure 6.1: Reliability Ratios



Source: Mott MacDonald

Table 6.1: Route Reliability Data

Route	Section	Bus Lanes/Busway	0700-1800 sample size (no of journeys)	0700-1800 maximum journey time (mins)	0700-1800 average lateness (mins)	0700-1800 standard deviation of lateness	Reliability ration	Rank (low to high reliability ratio)
Citi 1	Addenbrooke's – Rail Station	None	271	26.42	1.10	2.40	0.11	8
	Rail Station – St Andrews Street	Hills Road bus lane	270	26.47	0.66	1.40	0.07	5
	Emmanuel Street – Addenbrooke's	None	260	58.90	2.77	4.66	0.22	10
Citi 7	Sawston – Addenbrooke's	None	671	44.50	1.21	1.71	0.08	6
12	High Ditch Road – Ditton Walk	None	238	17.50	0.46	1.25	0.06	4
	Ditton Walk – Napier Street	Newmarket Road bus lane	238	10.62	0.46	0.78	0.04	1
13/13A/X13	Haverhill – Hills Road (City College)	None	446	98.90	2.25	3.99	0.19	9
Busway B	St Ives P&R – Histon and Impington	Busway	758	27.48	0.47	1.07	0.05	=2
	Histon and Impington – Drummer Street	None	427	32.50	1.53	1.93	0.09	7
	Histon and Impington – St Ives P&R	Busway	910	27.88	0.53	1.03	0.05	=2

Source: Mott MacDonald

Note: the end points of the sections are partly determined by the number of journeys recorded at each point: For service 12, the end point of Napier Street is used instead of the more logical Drummer Street because a greater number of journeys are recorded at Napier Street, similarly for the 13/13A/X13 Hills Road (City College) has a greater number of journeys recorded there than at Addenbrooke's.

6.3 Reliability Economic Benefits

The reliability assessment has identified noticeable variability in the travel time reliability for key competing services with CSET Phase 2, for example services 13/13A/X13, which operate along the A1307 corridor. This variability equates to over 2 minutes of average lateness, as shown in Table 6.2.

Based on the comparison between the CSET Phase 2 service and the existing 13 service variants, the segregated service offers the potential to generate substantial benefit, if the cause of this lateness is mitigated by the provision of a segregated route.

The economic benefit for improvements in reliability has been calculated as follows:

- Extraction of service patronage from the modelled Do-Minimum (DM) and Do-Something (DS) Brown option for 2026 by time period;
- Calculation of user purpose split, as per TAG proportions as presented in Table 5.4;
- Calculation of the cost of reliability based on the time incurred and the relevant VoT;
- Comparison of the DM and DS cost of reliability across the defined services; and
- Calculation of benefits over 60-year appraisal period (2024-2083) based on consistent reliability savings and discounted to 2010 prices.

It is acknowledged that the scale of reliability savings is likely to increase over time based on increases in highway congestion. However, the assessment is based on the application of observed reliability information, as reliability is not included within the modelling approach.

Table 6.2: CSET Phase 2 Reliability Service Assumptions

ID	Service	Average Lateness (mm:ss)	Reliability Ratio
1	Clt7	01:12	0.08
2	13/13A/X13	02:15	0.19
3	CSET Phase 2	00:28	0.05
Savings CSET-13 Services		01:46	-0.14
% Saving CSET/13 Services		-79%	-74%

Source: Mott MacDonald

Table 6.3 below presents the calculated monetised reliability benefit for the proposed CSET Phase 2 service, based on the applied methodology. The assessment identifies the potential for an economic benefit approaching £7million over the 60-year appraisal period if all users experience the full improvement in reliability identified above.

However, some users making journeys to or from central Cambridge, where the CSET services will operate on-road after reaching the end of the existing Busway, or shorter journeys, are not expected to experience the full level of improved reliability attributed to the provision of the segregated route. A conservative assumption of 50% has therefore been applied to generate an additional PVB of £3.4m, representing an average reliability saving per journey of approximately 1 minute.

Table 6.3: CSET Phase 2 Monetised Reliability Benefit Preferred Option (Brown)

Reliability Benefit	Percentage	(Present Value Benefit) PVB*	Average Lateness Saving (mm:ss)
Maximum Benefit	100%	£6,884	01:46
Applied Benefit	50%	£3,442	00:53

Source: Mott MacDonald Notes *PVB – 60-year, 2010 prices, discounted

7 Wider Economic Benefits

During the INSET appraisal process the five shortlisted options were qualitatively appraised against the following Wider Economic Benefits criteria:

- Supporting development and employment sites;
- Number of new homes supported;
- Number of new jobs created;
- GVA uplift;
- Land value uplift; and
- Increase in job catchments area.

Due to the relatively constrained geographic scope of the options there was no significant difference between the options, in fact, with the exception of the “Increase in Job Catchment Area” criteria, none of the routes could reasonably be distinguished from one another in terms of Wider Economic Benefits (WEBs) and as such all the options scored equally positively (+3) against all criteria. Positive scores were noted on the basis that the scheme could have the ability to support the long-term success of the Cambridge Biomedical Campus which is anticipated by a Mott MacDonald 2018 study to deliver 10,000 net additional jobs over the next 15-20 years.

For the “Increase in Job Catchment Area” criteria results ranged between 91,352 and 98,470 people, a bandwidth of 7,118 people. This bandwidth was then split into equal ranges of 1017 over the 7 possible INSET scores (-3 to +3). This meant all options, except for Purple, scored +3. Purple scored -3 as the Travel Hub site is more remotely located from both Granta Park and the Babraham Research Campus. This evaluation process is documented in Appendix A: OAR, document reference 403394-MMD-BCA-00-RE-BC-0024.

The result was that under the WEBs appraisal no one preferred option could be identified as Brown, Pink, Blue and Black options all scored equally favourably; the Purple option was however clearly identified as the least favourable option under this area of appraisal and this is reflected in the INSET scores shown in the Final Option Shortlist INSET Results table within Section 19 of the Strategic Case, document reference 403394-MMD-BCA-00-RP-BC-0247. This is covered in further detail in Appendix A: OAR, document reference 403394-MMD-BCA-00-RE-BC-0024.

Although no preferred option could be identified through the application of a WEBs appraisal alone, the Brown option has been taken forward as the preferred option based on INSET appraisal and consultation feedback. As such a more detail WEBs appraisal of the Brown option and the potential benefits it can generate is presented here. Full details can be found in Appendix H: Wider Economic Impacts Report, document reference 403394-MMD-BCA-00-RP-BC-0289.

7.1 Assessment Process (TEAM)

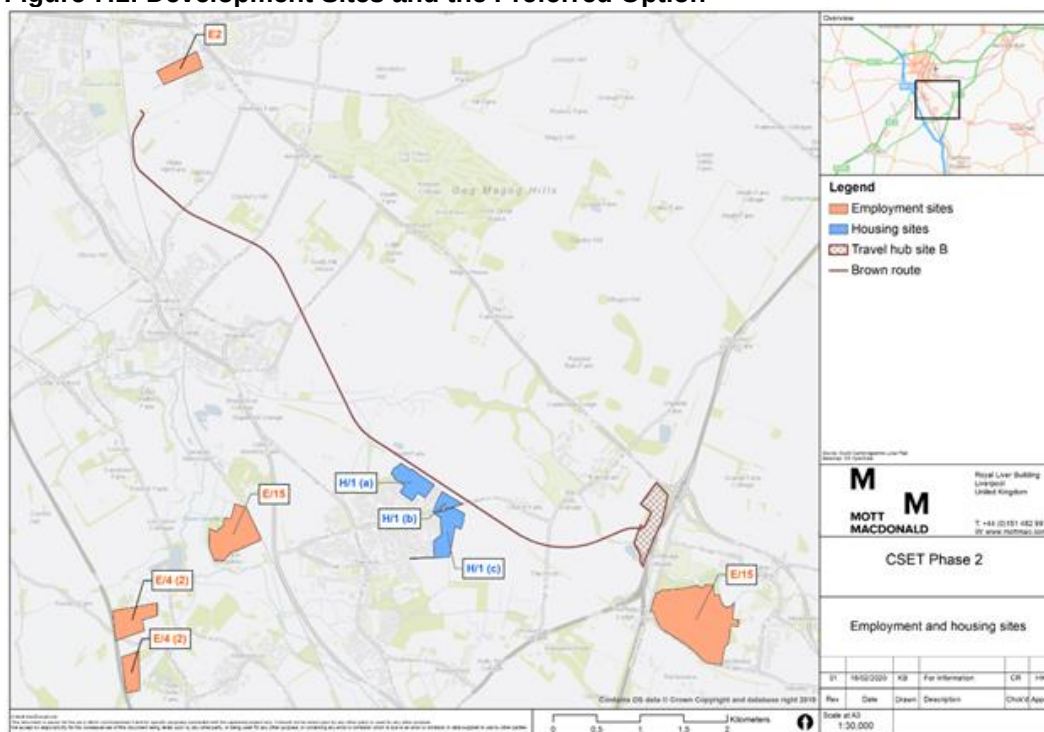
The potential for the preferred option to support the development of commercial and residential land in close proximity to the route has been assessed in line with TAG Unit A2.3. The assessment found that no sites were directly dependent on the scheme. This is partially as a result of the development context within Cambridge, where demand for commercial and residential sites in areas close to Cambridge city centre and key sites such as Granta Park is high, leading to many sites coming forward without public sector intervention.

As no sites are deemed to be dependent, it is not possible to attribute the development of any site, whether commercial or residential, to the project. On this basis, there are no quantifiable wider economic benefits from land-use change that can be directly attributed to the delivery of the project. Notwithstanding the above, in terms of establishing the strategic context to the scheme, it is worthwhile to demonstrate the scale of future development sites in the South East Cambridgeshire area in terms of jobs, Gross Value Added (GVA) and land value uplift.

The economic benefits of the commercial developments in terms of gross jobs and GVA have been assessed using Mott MacDonald's Transparent Economic Assessment Model (TEAM). TEAM assesses the core economic benefits of the associated land-use changes relating to jobs and GVA. The model uses Office of National Statistics (ONS) datasets alongside bespoke local area analysis, in this case for the South Cambridgeshire District Council to inform specific assumptions.

TEAM has been applied to only quantify the gross economic impact of the development of site E/4 (2) in Pampisford because, as discussed above, no sites are considered to be dependent to this scheme. This site is shown together with other employment and housing sites in Figure 7.1.

Figure 7.1: Development Sites and the Preferred Option



Source: South Cambridgeshire District Council

The potential economic benefits of the development site are calculated through the following steps:

- Inputting of key site details into TEAM including the development footprints and land uses; and
- Calculation of economic impacts through feeding the proposed uses by size through TEAM to calculate the gross direct effects of the development site in terms of employment and economic output (measured by GVA) once fully developed. These are calculated using land use assumptions relating to development footprints, land uses, occupancy rates and employment densities to convert land use to jobs. The GVA is then calculated using GVA per worker aligned to the jobs created.

7.2 Assumptions Used

The assumptions used in this appraisal are set out in Table 7.1.

Table 7.1: Assumptions Used

Assumption	Justification
GVA per worker (2017 prices adjusted to 2010 prices) – £45,537.	GVA figures have been calculated based on applying GVA per worker data across the whole economy at a regional level, which is East of England, the latest data is from 2017, which puts GVA per worker at £51,303. This has been adjusted to 2010 prices using the HMT GDP deflators. This produces a value of £45,537 of GVA per FTE.
Plot ratio – 40%	As the site information was provided in hectares, a standard assumption of 40% was applied to estimate the proportion of the site on which usable employment floorspace will be built.
Occupancy rate – 75%	An occupancy rate of 75% accounts for the possibility that the site will not be occupied to full capacity. This provides a conservative estimate of the likely wider economic benefits of the scheme as the actual sites could be more fully occupied if the scheme is well received by investors, developers and potential occupiers.
Employment density – B1 average – 12m ² /FTE	The site was identified for use as B1 office. As the HCA (now Homes England) Employment Density Guide (2015) provides a range of B1 employment densities, an average employment density of 12m ² of Net Internal Area (NIA)/Full Time Equivalent (FTE) job was taken. - This is the assumption that one full-time equivalent (FTE) job is generated for every 12m ² of B1 employment space in NIA. This conservative assumption has been used to demonstrate the economic impact of a range of potential B1 office uses, rather than focussing on only one B1 use, which could significantly impact the reliability of the assessment if incorrect. These assumptions are based on the HCA Employment Density Guide 2015.

Source: Mott MacDonald

7.3 Results

This analysis found that Site E/4 (2) could accommodate approximately 404 gross jobs, producing around £18m of gross GVA per annum, in 2010 prices, as shown in Table 7.2 below.

Table 7.2: TEAM results

Site	Gross Jobs	Gross GVA Per Annum, £m (2010 prices)
E/4 (2) Pampisford	404	£18m

Source: Mott MacDonald

As stated above, this impact is not attributable to the scheme, but serves to demonstrate the value of supporting sites in this area.

7.4 Land Value Impact of Residential Land

The value of residential allocations H/1 (A and B) in Sawston shown in Figure 7.1 have been assessed at a gross level using a Land Value Uplift (LVU) methodology, in line with guidance from the Ministry of Housing, Communities and Local Government (MHCLG)⁸. The assessment of land value uplift of the residential land allocation has been based on VOA benchmark data, demonstrating the impact of the land changing use from its current use (agricultural and industrial land) to its proposed use (residential). The land use values are provided by MHCLG and have been adjusted from their 2017 price base to the 2010 price required by TAG, so as to be consistent with the wider appraisal. The conversion of land values is shown in Table 7.3.

Table 7.3: Adjusted Land Values

Metric Category	Metric	Value	Price Year	Source
Land values	Industrial (brownfield) Cambridge per ha	£875,000	2017	MHCLG, Land value estimates for policy appraisal 2017, https://www.gov.uk/government/publications/land-value-estimates-for-policy-appraisal-2017
	Agricultural (greenfield) land value Greater Cambridge and Peterborough LEP per ha	£21,000	2017	MHCLG, Land value estimates for policy appraisal 2017, https://www.gov.uk/government/publications/land-value-estimates-for-policy-appraisal-2017
	Residential South Cambridgeshire per ha	£5,300,000	2017	MHCLG, Land value estimates for policy appraisal 2017, https://www.gov.uk/government/publications/land-value-estimates-for-policy-appraisal-2017
Deflator to 2010	GDP deflator - to adjust 2017 values to 2010	88.76	Indexed to 2017/18	ONS, GDP Deflators, Spring statement, 2018
Deflated land values (2010)	Industrial (brownfield land) LCR 2010 prices per ha	£776,644	Adjusted to 2010	Mott MacDonald calculation
	Agricultural (greenfield) land value GCP LEP 2010	£18,639	Adjusted to 2010	Mott MacDonald calculation
	Residential South Cambridgeshire /per ha 2010 prices	£4,704,244	Adjusted to 2010	Mott MacDonald calculation

Source: Mott MacDonald/MHCLG

Applying these values at a gross level to the sites produces the following output in Table 7.4.

Table 7.4: Gross Land Value Uplift of Residential Sites

Site	H/1(a)	H/1(b)	H/1(c)	Combined
Current use	Industrial	Agricultural	Agricultural	-
Size (ha)	10.7	3.64	11.64	25.98
current value per ha (2010 prices)	£776,644	£18,639	£18,639	
Current land value (2010 Prices)	£8,310,091	£67,848	£216,963	£8,594,902
Future use	Residential	Residential	Residential	
Residential land value (2010 prices) Per ha	£4,704,244	£4,704,244	£4,704,244	
Future value of site (residential) (2010 prices)	£50,335,406	£17,123,447	£54,757,395	£122,216,248
Uplift in land value (gross)	£42,025,315	£17,055,599	£54,540,432	£113,621,346

Source: Mott MacDonald

⁸ See MHCLG (formerly DCLG) Appraisal Guide, 2014

The analysis found that the total gross land value uplift associated with the change of use of the three residential sites in this area is approximately £113m.

7.4.1 Conclusion of Wider Economic Benefits Analysis

In summary it was found that the development of the three residential sites and single employment site identified in the South Cambridgeshire Local Plan (2018)⁹ could produce:

- Approximately 404 gross jobs and £18m of gross GVA per annum; and
- A single uplift in land values of approximately £113m.

Although the sites identified in the area around the CSET scheme were assessed as **not being dependent on the scheme**, the scheme can still support the wider development of South Cambridgeshire. CSET will provide additional transport capacity that will enable people to access key sites at either end of the CSET route.

The development of sites across this area are likely to further increase demand on the road network along the A1307 and nearby roads. The greater use of the road network in this area is likely to increase congestion and journey times, resulting in greater transport costs for users and greater levels pollution in the local area. This could lead to further developing being inhibited by the need to address capacity issues on the road network which is unlikely to be funded by private sector developers.

Accordingly, CSET provides public transport access to key sites across the area of South Cambridgeshire, enabling the growth of sites in this area to be supported by this access and helping to prevent this growth overburdening the local road network. Although these sites are not dependent on CSET to come forward, the future growth of these sites can be directly supported by this scheme in the future through the sustainable public transport access provided to a number of key sites by this scheme.

⁹ <https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/the-adopted-development-plan/south-cambridgeshire-local-plan-2018/>

7.5 Level 2 Wider Economic Benefits

The WEBs assessment has not identified directly attributable developments and associated Level 3 benefits. Nevertheless, the assessment methodology establishes a clear approach to the monetisation of Level 2 benefits which are calculated in accordance with TAG Unit A2-1 as set out within Section 2 based on a fixed land use. This approach captures benefits for agglomeration, tax revenues arising from labour market impacts, and output change in imperfectly competitive markets.

The approach is based on the duplication of the proportion of the total Level 1 benefits (Journey Time, MEC and Reliability) as specified within Table 7.5.

The WEBs Level 2 assessment identifies a potential additional PVB of **£9.2m** for the Preferred option.

Table 7.5: CSET Phase 2 Level 2 Benefits Preferred Option (Brown)

ID	Impact	PVB	%	Method
1	Agglomeration and labour supply	£8,478m	92%	14% of All Level 1 Benefits (£60.5m)
2	Output change in imperfectly competitive markets	£728m	8%	10% of Business only Level 1 Benefits (£7.2m)
Total Level 2 PVB		£9,206m	100%	

Source: Mott MacDonald Notes *PVB – 60-year, 2010 prices, discounted

8 Environmental Impacts

8.1 Introduction

A series of environmental issues have been assessed as part of the INSET options assessment. A full description of the environmental assessment works and the detailed worksheets completed are included in Appendix G: Environmental Appraisal Report (document reference: 403394-MMD-ENV-00-RP-EN-0353).

The appraisal of options was undertaken in accordance with the DfT's TAG Unit 3A guidance by specialists in the following topics:

- Air Quality;
- Biodiversity;
- Greenhouse Gases;
- Historic Environment;
- Landscape;
- Noise; and
- Water.

Those environmental impacts that are able to be monetised as part of the economic appraisal for the preferred option include air quality, greenhouse gases and noise. The results of these assessments are included in Section 5 of this Economic Case. The other environmental impacts feed into the VfM statement and have been assessed in a qualitative and non-monetised manner using TAG appraisal worksheets.

8.2 Air Quality

A quantitative assessment of the effect on air quality has been carried out to inform the overall Benefit Cost Ratio of each option. This assessment followed the TAG Unit A5-4 Marginal External Costs (MEC) to derive Net Present Values (NPVs) related to air quality as reported in Section 5.

The proposed project and associated air quality study area lies within the boundaries of Cambridge City Council (CCC) and South Cambridgeshire District Council (SCDC) areas. Baseline air quality information was obtained from a variety of sources including local authorities, national networks monitoring sites and other published sources. The closest Air Quality Management Area (AQMA) to the air quality study area is approximately 2.3km north of the Cambridge Biomedical Campus.

The assessment was undertaken considering the following key aspects:

- Existing baseline conditions – risk of exceedances of air quality objectives & EU limit values;
- Number of properties affected, and;
- Potential changes in traffic data.

The Cambridge City AQMA was designated by CCC in 2004 as a result of air quality in the city exceeding the annual mean NO₂ objective. SCDC has also designated an AQMA along the A14 which is located 6.6km north west of the five options, this AQMA was designated in 2008 for

exceeding both the annual mean NO₂ objective and the daily mean PM₁₀ objective. Monitoring data was obtained from surveys undertaken by CCC and SCDC in 2016 to 2018.

SCDC Orchard monitoring station, at Orchard Park Primary School, located approximately 7.1km north of the scheme, is considered representative of the conditions likely to occur in the study area. The results show that NO₂ and PM₁₀ concentrations were well below the annual and 1-hour means objectives in July 2019. SCDC's 27 diffusion tube monitoring sites within the district show that NO₂ concentrations were well within the national objectives between 2015 to 2018.

Defra provides estimates of background pollution concentrations for NO_x, NO₂, PM₁₀ and PM_{2.5} across the UK for each one-kilometre grid square for every year from 2017 to 2030. The data shows background concentrations are within the relevant objectives in 2019 i.e. air quality is good in the study area.

There is no scheme specific monitoring available, although air quality monitoring will be carried out to inform the EIA baseline of the Brown Option and Travel Hub Site B.

The existing pollutant concentrations along the Brown Option and Travel Hub Site B are likely to be below the relevant air quality objectives and EU limit values.

The receptors included within the qualitative assessment were those where the annual mean air quality objectives are applicable for the protection of human health and are within 200m of the scheme option. The receptors include residential properties, educational facilities, hospitals and prisons.

A qualitative assessment of the options was carried out to determine how the options could differ in their impact on air quality. The Brown Option is not expected to have a significant impact on changes in traffic flows on the surrounding road network that would cause significant changes to air quality. Changes in traffic on the local road network have the potential to decrease along the A1307 due to the increased provision of public transport. It would be expected that there would be an increase in traffic on the local road network approaching Travel Hub Site B. These changes in traffic have the potential to cause marginal improvements and deterioration in air quality but not large enough to be significant.

It was concluded that the Brown Option and Travel Hub Site B would have a **neutral effect** on air quality.

8.3 Biodiversity

Biodiversity was assessed following the TAG Unit A3 Environmental Impact Appraisal guidance using the information collected from field surveys in 2018 and additional information from the Cambridge and Peterborough Environmental Records Centre.

The ecological features that occur within a 'Zone of Influence' (Zol) for a proposed development were investigated.

For the Brown Option there is one international site designated for bats within 30km of the options, this is the Eversden and Wimpole Woods Special Area of Conservation (SAC) approximately 10.5km to the west. The Alder Carr Site of Special Scientific Interest (SSSI), located approximately 1.5km to the south east of the Brown Option.

The Brown route avoids sites protected for ecological purposes. The following habitats have been identified within the options footprint:

- Semi-improved neutral grassland (Priority habitat on the Cambridgeshire and Peterborough HAP);
- Improved grassland;
- Broadleaved semi-natural woodland (Habitat of Principle Importance (HPI) and Priority habitat on the Cambridgeshire and Peterborough HAP);
- Scattered trees;
- Arable (Priority habitat on the Cambridgeshire and Peterborough HAP);
- Species rich and species poor hedgerows; (HPI and Priority habitat on the Cambridgeshire and Peterborough HAP) and;
- Standing and running water (HPI and Priority habitat on the Cambridgeshire and Peterborough HAP).

There are known protected species potentially supported by the habitats within the Brown Option footprint.

The assessment of the Brown Option between CBC and Sawston identified a potential **slight adverse** impact to barbastelle bats from the SAC as there could be an impact to loss of habitat connectivity, commuting routes and foraging grounds.

More locally, a low number of vehicles along the route (i.e. it is not a major road) and the hours of operation are unlikely to significantly overlap with activity times for bats which will reduce the risk of collision with bats species and reduce light spill for sensitive species such as barbastelle. The Brown Option therefore has been assessed as **slight adverse** for bats species.

Nine Wells Local Nature Reserve (LNR) is located 80m from the Brown option, and over 7km from Travel Hub Site B (which would not have an impact on the LNR). Due to the proximity of the route to the LNR, potential impacts from airborne pollution (whilst non-electric vehicles used the route) may cause a **slight adverse** impact upon the LNR.

The Shelford – Haverhill Disused Railway (Pampisford) County Wildlife Site (CWS) is located 500m from Travel Hub Site B and 185m south of the Brown option, due to the distance from the travel hub and it being unlikely for significant changes in airborne pollutants to arise from the route, a **neutral impact** is anticipated. The River Granta is within 200m of Travel Hub Site B and also crosses all but one of the options in two locations. The route alignment is not expected to impact the CWS as the design will avoid any direct impact.

There will be a **slight adverse** impact on the semi-improved neutral and improved grassland, arable, scattered trees, running and standing water and broadleaved semi-natural woodland due to the loss and fragmentation of habitats, with a **moderate adverse** impact upon hedgerows due to loss and severance. Through loss and severance of habitats, the scheme has to potential of a **slight adverse** impact on Species of Principal Importance (SPI).

The overall summary assessment score is **moderate adverse** due to the slight adverse impact anticipated on foraging and commuting bats and the loss and severance of hedgerows.

8.4 Greenhouse Gases

Government has commitments to see reductions in carbon (and other greenhouse gases) which require a step change in transport using vehicles. The scheme is a key part of the strategy to achieve such modal shift by providing high quality public transport. The TAG appraisal does not consider construction impacts but assesses operational impacts.

Greenhouse Gases (GHG) have been assessed following the semi-quantitative TAG Unit A3 Environmental Impact Appraisal with regards to GHG emissions associated specifically with the operational phase of the scheme. A quantitative assessment of the GHG effect of the scheme options to inform the overall Benefit Cost Ratio of each option has followed the TAG Unit A5-4 Marginal External Costs (MEC) to derive Net Present Values (NPVs) related to greenhouse gas. This is reported in Section 5.

Using the route information and maps, a qualitative assessment was also undertaken using professional judgement on the impact the options would have on traffic flows and GHG emissions.

During operation the carbon footprint of the scheme will be minimised with the intention to use low carbon or electric vehicles on the route. This would reduce GHG emissions throughout the operating lifetime of the Brown route and Travel Hub Site B.

The qualitative assessment concluded that none of the options has a significantly different impact on GHG. There are opportunities to reduce carbon for the Brown route. The embedded carbon and slight delay in some local roads accommodate passing public transport vehicles could increase carbon slightly but the modal shift to low carbon public transport is likely to balance (and potentially outweigh) any minor increase in greenhouse gases on local roads.

It was concluded that for the Brown option the greenhouse gases impact would effectively be **neutral**.

8.5 Historic Environment

The appraisal follows the TAG Unit 3A Environmental Impact Appraisal guidance. This appraisal has used the following sources:

- The National Heritage List for England (NHLE) maintained by Historic England for details of nationally designated heritage assets;
- Cambridgeshire Historic Environment Record (CHER) for information on locally listed parks and gardens and conservation areas;
- The CHER for records pertaining to all non-designated heritage assets (both below and above ground), previous archaeological events, secondary sources;
- The Archaeology Data Service has been searched for relevant archaeological fieldwork grey literature reports and publications; and
- A search was undertaken on relevant planning applications (which contained historic environment information) held by the CCC and SCDC.

The route section between Addenbrookes and West of High Street, Babraham crosses the channel that connects Nine Wells springs to Hobson Conduit which is a protected heritage asset. There are no other direct impacts on any listed buildings or other protected sites from the route section of the Brown Option. However, there are a number of listed buildings which could have their setting affected by the route section of which the most significant are:

- Nine Wells Monument (NHLE 1127825);
- Dovecote at Granhams Farm (NHLE 133068);
- Stapleford Hall (NHLE 1331071); and
- Church Farmhouse (NHLE 1331134).

The Brown route would have no direct physical impact on the scheduled Cropmarks site west of White Hill Farm. However, associated archaeological remains are known to extend beyond the scheduled area and into the area of the proposed route, to the south of Nine Wells. This would cause a **slight impact** to the asset from alteration to the context of the asset.

There would be **slight impact** through alteration to the setting/context of the Babraham Conservation Area, as the movement of vehicles along the route during its operation may be visible along the Babraham Avenue from Babraham Hall.

There would be a **slight impact** on Middlefield House, which is a Grade II* Listed Building, through alteration to its setting and context of the asset. The route and crossing of the Granta would be visible from the asset along the garden avenue. This would slightly urbanise the rural view from the house impacting on how the asset is appreciated. The impact is only lessened by the distance from the asset. The movement along the scheme would also be visible.

The construction of the Brown route would have a **large impact** on prehistoric and Roman remains. These remains would predominantly be of low, local or medium, regional value, however, the remains associated with Granhams Farm moated site (an asset of potential schedulable quality), may be of national significance. In addition, Hobson's Conduit, which is fed by a stream that crosses the proposed route near Nine Wells is of national significance.

The Brown route and Travel Hub Site B would impact on the former post medieval cut channel at Bourn Brook. This would result in a **large impact** on assets likely to be of low value.

The construction of the Brown route would cause an impact on a cropmarks complex to the south of Babraham. This would result in a **large impact** on assets likely to be of low to moderate value.

There is a high potential for previously unrecorded archaeological remains to be present within the footprint of the route. This would result in a **large impact** on assets likely to be of low to moderate value from the Brown route and Travel Hub Site B.

In summary, **a major adverse impact is predicted to unknown archaeological remains** due to the construction of the option. Where remains are present, they will be removed by necessary excavations. There are known archaeological remains of regional (and potentially national) significance with the footprint of the proposed option.

8.6 Landscape

Landscape impacts were assessed following the TAG Unit 3A Environmental Impact Appraisal guidance taking into account the landscape character of the area, registered parks and gardens, conservation areas and visual effects of the proposed options. Site visits were undertaken in 2019 during summer and winter to identify the landscape character and the potential visibility of scheme from the surrounding area.

The Brown route alignment and Travel Hub Site B lies within the River Granta Valley Landscape Character Assessment (LCA). The Granta Valley, south and south east of Cambridge, has the low lying, gentle topography typical of river valleys. Key to its character are the tree-lined river and the arable fields, pastures and water meadows on the fertile soils of the valley. The River Granta is a County Wildlife Site for much of its length.

The River Granta Valley LCA is partly in the Green Belt. The Brown route and Travel Hub Site B lies within the South Cambridgeshire Green Belt, apart from the 200m of the route within the Cambridge Biomedical Campus.

The Brown route between Cambridge and Sawston would impact the landscape of farmland and vegetation along the route. Vehicles moving across the rural landscape and through the River Granta valley would introduce uncharacteristic movements into views from residential properties, roads and PRoW that cross the landscape (particularly across the low lying valley associated with the river) and, to varying degrees, from Magog Down and the Gog Magog Hills, north of the scheme.

The Brown route in this area would be at the same level as current ground surface. The route would be unobtrusive in all but close views from roads and Public Rights of Way (PRoW). However, there would be filtered views of the operating vehicles from residential properties on the southern edge of Cambridge, the north-eastern edge of Great Shelford, the northern-eastern edge of Stapleford; the eastern edge of Sawston and on the south-eastern edge of Babraham.

The Brown Option would result in **adverse impacts** due to the introduction and operation of the scheme and associated travel hub into the farmed landscape between Cambridge and Sawston.

The route option from Sawston to the Travel Hub would have similar impacts on landscape and views.

The Brown Option and Travel Hub Site B would replace arable fields with pavement for the public transport route and non-motorised user path, lighting in places, signage, bus halts and infrastructure including a one-story building on the travel hub. This would introduce urbanising elements into a rural setting. The travel hub would also occupy parts of three separate fields, adversely affecting the pattern of the landscape. The travel hub would be clearly visible from PRoW 12/4 and in filtered views from dwellings on the south-eastern boundary of Babraham. The travel hub would be lit at night, affecting the night-time landscape character of the rural area between Babraham and the A11 (although there is lighting on the A11/A1307 junction roundabout). The movement and noise generated by the travel hub and the vehicles operating along the route would reduce tranquillity.

The overall impact on landscape is **moderate adverse impact**.

8.7 Noise

A quantitative assessment of the effect on noise has been carried out to inform the overall Benefit Cost Ratio of each option. This assessment followed the TAG Unit A5-4 Marginal External Costs (MEC) to derive Net Present Values (NPVs) related to noise as reported in Section 5.

The assessment of noise has also been carried out using a qualitative appraisal for OAR purposes. At the time of the appraisal detailed forecast traffic data was not available to complete a full quantitative TAG assessment for all scheme options. The appraisal considers noise impacts due to health effects for each proposed scheme option during the operational phase of the scheme only. The impacts of noise from construction are not considered within the scope of this appraisal as this is not required under the TAG guidance.

The Brown Option is in a horizontal alignment for the majority of the route which is in a rural setting. There are a limited number of sensitive receptors along the route as a result, but the route will pass near to some residential properties in places. The Brown Option is not expected to result in substantial changes to traffic flows on the surrounding road network in relation to noise, and therefore impacts would be localised to areas around the scheme route which are in general sparsely populated. Where the new route passes noise sensitive receptors, such as those near Stapleford and Sawston, noise from public transport is likely to be audible at the nearest properties.

Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the rural road network, the A1307, A11, A505 and the railway line are likely to predominate for receptors near these locations and significant impacts arising from the scheme are unlikely to result.

New sources associated with Travel Hub Site B, including traffic movements within hub boundaries, is unlikely to be significant at the nearest noise sensitive properties due to the distance these are from the hub location. Noise associated with the hub operations can be reduced through design and inclusion of mitigation (bunds or acoustic barriers for example) where necessary.

The Brown Option and Travel Hub Site B would result in **minor adverse** impacts.

8.8 Water

Water was assessed following the qualitative TAG Unit A3 Environmental Impact Appraisal with regards to the value of water resource features that occur in the study area, based on their quality, scale, rarity and substitutability.

The Brown Option would not affect the conveyance of groundwater that provides drinking water in the area, or baseflow to the River Granta. The low permeability car park surface of the selected travel hub will not change recharge or conveyance of groundwater as the total area of any the development is very small in relation to the overall groundwater catchment in the area. In addition, any rainfall running off the site would be collected through the drainage system and discharged locally, thereby causing negligible loss to the catchment overall.

The Brown route cross the River Granta twice. There are no underground structures intended for any travel hub sites, and footings from any river crossing would only have minor impacts on groundwater flow at a very localised level. The design of any river crossing would have to ensure there was no loss of flood storage and no increase in flood risk to adjoining land or downstream of any river crossings.

The Brown route would have a neutral impact on the agricultural surface water abstraction on the River Granta east of Babraham as it should not prevent this abstraction continuing. The route crosses two Source Protection Zones (SPZ); SPZ2 and SPZ3 associated with the two public abstractions near Babraham and one abstraction in Sawston. The nature of the infrastructure and traffic levels on the route would not create a risk to groundwater within the SPZ2 and SPZ3.

Travel Hub Site B has a total footprint that extends into the River Granta flood zones 2 and 3 south east of Babraham. However, the layout would not require car parking infrastructure in the flood zones (the footprint in the flood zone is likely to be used for landscape planting). A drainage strategy and design for the travel hub site would be designed to best SuDS practice.

The level of traffic along the public transport route would not be high enough to generate any significant contamination risks from the public transport vehicles. The design of travel hub drainage and drainage along the approved route will take into account the need to prevent runoff and spillages (likely to be very minor) from having any significant impact on groundwater quality. The travel hub's drainage design will specifically include features to intercept potentially contaminating substances arising from the parking areas (e.g. from fuel and hydraulic leaks, tire and brakes wear and tear) such as the use of vegetated drainage basins.

The overall impact on water resources arising from The Brown route and Travel Hub Site B are therefore considered to be **negligible**.

8.9 Summary of Environmental Appraisal

Table 8.1 below presents a summary of the TAG worksheet of the Brown option and Travel Hub Site B. This includes a short description of the overall impact, an assessment of the magnitude of the potential impact and a rating.

Table 8.1: Summary of Overall Environmental Impact

Disciplines	Overall potential impact	Overall potential effect
Air quality	This option is unlikely to result in significant changes to the baseline conditions. The changes in air quality from this option are judged to be de minimis.	Neutral
Biodiversity	In summary, there would be an overall moderate adverse effect on biodiversity as a result of the Brown Option and Travel Hub Site B. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Bats using Eversdean and Wimpole Woods SAC will have a slight adverse effect though potential barriers to dispersal and severance of commuting routes. The scheme would not present any significant adverse effects on the integrity of SSSIs.	Moderate adverse
Impact on Green Belt	The Brown route passes through the South Cambridgeshire Green Belt along a similar route as the other options. The Brown route goes to Option B Travel Hub which also sits within the Green Belt. This is likely to have a moderate adverse effect as arable fields will be changed into car parks.	Moderate adverse

Greenhouse Gases	During the scheme's operation, as with those junction's further north, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. As the site could provide parking for up to 2,800 cars this combination of Travel Hub will enable the greatest possible modal shift due to having the largest capacity. However, there is a potential for increased emissions by traffic on local roads waiting for vehicles on the route to pass crossings, but this will be offset by gains achieved through modal shift in transport.	Neutral
Historic Environment	In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present, they will be removed by necessary excavations. There are known archaeological remains of regional (and potentially national) significance within the footprint of the proposed option.	Major adverse
Landscape	In conclusion, the Brown Option would result in moderate adverse impacts due to the introduction and operation of a Travel Hub and access roads into arable fields albeit adjacent to the large A1307/A11 grade separated junction. There would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however vehicles using the access would remain noticeable in the landscape.	Moderate adverse
Noise	This Option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Noise from traffic within the Option B Travel hub is unlikely to be significant at the nearest noise sensitive properties and can be reduced through design and inclusion of mitigation where necessary. With this Option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Option B Travel Hub.	Minor adverse
Water	Insignificant impact on water resources as no direct impacts on any water features other than crossing of River Granta which will require design to be compliant with statutory requirements to have zero increase in flood risk. An SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.	Neutral

9 Social Impacts Appraisal

9.1 Introduction

Although not a part of the formal assessment criteria described in Appendix A: OAR, document reference 403394-MMD-BCA-00-RE-BC-0024, a Social Impact (SI) Appraisal was conducted for the five shortlisted options. A SI appraisal covers the human experience of a transport system and its impact on social factors not considered as part of economic or environmental appraisals. The eight social impacts that should be considered as part of a SI appraisal are:

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

Not all eight impacts are always assessed for every scheme, as some may not always be relevant, however in this instance all eight were deemed relevant and scoped in, in accordance with methods prescribed in TAG Unit A4.1.

Each relevant SI was then assessed on a seven-point scale of beneficial, adverse or neutral impacts, with a score then input into the Appraisal Summary Table (AST). The seven-point scale for SI is set out in Table 9.1.

Table 9.1: SI Assessment Scoring Basis

Assessment	
Large beneficial	✓✓✓
Moderate beneficial	✓✓
Slight beneficial	✓
Neutral	-
Slight adverse	×
Moderate adverse	×
Large adverse	×

Source: Mott MacDonald based on TAG Unit A4.1 and A4.2

9.2 Results

The results of the SI Appraisal for the five shortlisted options are shown in Table 9.2. It can be seen across all options that there will be largely beneficial social impacts, with 'option and non-use values' bringing about the largest benefits due to the large potential catchment area. Personal affordability impacts bring about the only neutral impacts.

Table 9.2: Social Impact Appraisal Summary Scores for Scheme Options

	Travel Hub Site A	Travel Hub Site B		Travel Hub Site C	
	Purple	Brown	Pink	Black	Blue
Accidents	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Physical activity	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Security	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Severance	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Journey quality	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Option and non-use values	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
Accessibility	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Personal affordability	Neutral	Neutral	Neutral	Neutral	Neutral

Source: Mott MacDonald

Overall, all five shortlisted scheme options are very similar and as such all options score the same in respect of all impacts. Further information on the SI appraisal can be found in Appendix I: Social Impact Appraisal Report, document reference 403394-MMD-BCA-00-RP-BC-373.

10 Distributional Impacts Appraisal

10.1 Introduction

While the SI appraisal looks at the social impacts of the schemes on the whole population, a number of those impacts are further assessed as part of the Distributional Impacts (DI) Appraisal which looks at the impact of the schemes on vulnerable population groups, and whether any impacts are proportionate. The eight distributional impacts are as follows:

- User benefits;
- Noise;
- Air Quality;
- Accidents;
- Security;
- Severance;
- Accessibility; and
- Affordability.

A screening process was then undertaken to determine the relevance of the impacts to the scheme in question to see if they should be scoped in or out. The screening process considered whether there were expected positive or negative impacts on specific social groups, (shown in Table 10.1), as to whether any potential negative impacts can be designed out and whether any positive or negative impacts are sufficiently minor and socially and/or spatially dispersed, such that a full DI appraisal is disproportionate to the potential impacts.

As the five shortlisted schemes are broadly similar in that the route deviates slightly in a relatively small area and the three potential travel hubs are located relatively close to each other, they were either scoped in or out together. In this case Noise and Air Quality were scoped out as initial assessments due to the lack of detailed modelling data required to be able to assess distributional impacts.

The social groups that were assessed for each distribution impact are displayed in Table 10.1.

Table 10.1: Scope of Socio-demographic Analysis

Social Group (tick indicated analysis required for each impact)	Distributional Impacts							
	User benefits	Noise	Air quality	Accidents	Security	Severance	Accessibility	Affordability
Income distribution	✓	✓	✓				✓	✓
Children: proportion of population aged under 16		✓	✓	✓	✓	✓	✓	
Young people: proportion of population aged between 16 and 25				✓			✓	
Older people: proportion of population aged 70 and over		✓		✓	✓	✓	✓	
Proportion of population with a disability					✓	✓	✓	
Proportion of population of Black, Asian and Minority Ethnic (BAME) origin					✓		✓	
Proportion of households without access to a car						✓	✓	
Carers: proportion of households with dependent children							✓	

Source: Department for Transport (Dec 2015) TAG Unit A4.2 Distributional Impact Appraisal

Each DI that was scoped in was then assessed on a seven-point scale of beneficial, adverse or neutral impacts, with a score then input into the Appraisal Summary Table (AST). The seven-point scale for DI appraisal is set out in Table 10.2.

Table 10.2: Distributional Impact Scale

Impact	Assessment
Beneficial and the population impacted is significantly greater than the proportion of the group in the total population (>5%)	Large beneficial
Beneficial and the population impacted is broadly in line with the proportion of the group in the total population (-5% - 5%)	Moderate beneficial
Beneficial and the population impacted is smaller than the proportion of the group in the total population (<-5%)	Slight beneficial
There are no significant benefits or disbenefits experienced by the group for the specified impact	Neutral
Adverse and the population impacted is smaller than the proportion of the population of the group in the total population (<-5%)	Slight adverse
Adverse and the population impacted is broadly in line with the proportion of the population of the group in the total population (-5% - 5%)	Moderate adverse
Adverse and the population impacted is significantly greater than the proportion of the group in the total population (>5%)	Large adverse

Source: Mott MacDonald based on TAG Unit A4.1 and A4.2

The summary assessment scores for the DI appraisals can be seen in Table 10.3 below. Across all options, the DIs are broadly beneficial though adverse severance impacts are brought about as a result of permanent severance impacts in the areas surrounding the proposed travel hub. It is expected that the location of the travel hub will sever movements in surrounding residential locations and to key employment sites such as Babraham Research Campus and Granta Park.

The population within the study areas for the majority of the social groups is broadly in line with the national comparator figure. As the five scheme locations are almost identical, there is very little variance in the population within each indicative 1km study area. At Full Business Case (FBC) stage, should more detailed modelling become available, the study areas will become more refined. In this case the proportion of impacted population could change and subsequently scorings could change.

Table 10.3: Distributional Impact Appraisal Summary Scores for Scheme Options

	Travel Hub Site A	Travel Hub Site B		Travel Hub Site C	
	Purple	Brown	Pink	Black	Blue
User benefits	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Noise	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out
Air Quality	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out
Accidents	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Severance	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Security	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Accessibility	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Personal affordability	Neutral	Neutral	Neutral	Neutral	Neutral

Source: Mott MacDonald

Further information on the DI appraisal can be found in Appendix J: Distributional Impact Appraisal Report, document reference 403394-MMD-BCA-00-RP-BC-374. In conclusion, no preferred option can be identified from either the SI or DI appraisal alone.

11 Impact on Public Accounts

This chapter sets out the costs of the options that are captured in the appraisal and explains the costs included and how they are manipulated following TAG guidance to provide Present Value of Costs (PVC). First the capital cost is presented for all options and then the whole life costs (maintenance and renewals) associated with the proposed projects. The risk allowance for each option is presented and then the inflation and optimism bias assumptions are explained. The costs are brought together, adjusted and discounted for inclusion in the cost benefit analysis.

11.1 Baseline Capital Costs

Cost estimates have been prepared by quantity surveyors from Mott MacDonald. The detailed breakdown of construction cost estimation is presented in in Appendix K: Project Costs Breakdown, document reference 403394-MMD-BCA-00-RP-BC-0372. Key assumptions are outlined below:

- **Construction costs:** Costs have been calculated based on the current level of design for all the construction works and activities;
- **Preparation costs:** This consists of all project management, consultant support and agent authority fees to cover the elements of survey requirements, preliminary design, public consultation, public inquiry, and the costs of obtaining statutory orders;
- **Statutory Undertakings:** Costs to divert or protect existing Statutory Undertakers' equipment affected by the works; and
- **Land Costs:** Costs have been calculated for the purchase of areas of permanent land take. Costs have also been considered for temporary land required for construction as working areas or compounds. Allowance has been made for General Disturbance, Injurious Affection, Severance and Loss Payments.

The risk adjusted cost estimates are presented in Table 11.1, which mirrors Table 2.2 in the Financial Case. This details the capital costs for the preferred option, divided into construction, design, project management, statutory undertakers, land, and inflation costs. Costs are inclusive of the P80 risk allowance and it is these costs that the economic appraisal has been based on.

Table 11.1: Preferred Option Risk Adjusted Capital Costs

Cost Item	Cost (£) Q2 2020 prices	Cost (£) Outturn Prices ¹⁰
Construction	68,676,000	68,676,000
Design	9,546,000	9,546,000
Project Management	12,547,000	12,547,000
Environmental Mitigation	2,936,000	2,936,000
Statutory undertakings	12,543,000	12,543,000
Land Costs	11,450,000	11,450,000
Inflation	£93,000	12,207,000
TOTAL	£117,790,000	129,905,000

Source: Mott MacDonald

¹⁰ As reported in Financial Case, document reference 403394-MMD-BCA-00-RP-BC-0293

11.2 Risk and Optimism Bias

In accordance with defined cost assumption guidelines, the capital costs contain defined risk contingency based on P80 (25%) or P90 (29%) and additional risk identified as Optimism Bias.

Table 11.2 presents a range of cost scenarios based on variants of these defined assumptions, with the core cost equates to **£85.65m** in 2010 prices inclusive of 15% Optimism Bias.

Table 11.2: CSET Phase 2 Preferred Option Cost Scenarios

ID	Cost Scenario	Optimism Bias	Price	Cost (£m)	% Base
Base	Original Capital Cost		Q2 2020	£117.79	
Core	P80 Risk (25%) + OB (15%)	15%	2010 Prices	£85.65	-27%
Test 1	P80 Risk (25%) + OB (44%)	44%	2010 Prices	£107.25	-9%
Test 2	P90 Risk (29%) + OB (15%)	15%	2010 Prices	£88.39	-25%

11.3 Whole Life Cost Estimates

For this assessment operational and maintenance costs have been excluded from the Economic Case. This is based on the assumption that the revenue will offset the ongoing operating and maintenance costs of the service and infrastructure.

11.4 Preferred Option Present Value Costs (PVC)

Based on the inclusion of the risk contingency and optimism bias, as previously outlined the defined Present Value Cost (PVC) for the CSET Phase 2 preferred option is £85.65m.

11.5 Public Accounts

The total impact on public accounts is estimated to be **£89.08m** (2010 prices), as shown in Table 11.3, all of which is a cost to local government. Note for the economic appraisal all funding costs and maintenance costs for the scheme were allocated to local government. No funding costs have been allocated to central government.

Table 11.3: Public Accounts – Preferred Option

Origin	Cost Type	(£,000 2010 Prices)
Local Government Funding	Revenue	£0
	Operating Costs	£0
	Investment Costs	£85,650
	Developer and Other Contributions	£0
	Grant/Subsidy Payments	£0
	NET IMPACT	£85,650 (7)
Central Government Funding: Transport	Revenue	£0
	Operating costs	£0
	Investment Costs	£0
	Developer and Other Contributions	£0
	Grant/Subsidy Payments	£0
	NET IMPACT	£0 (8)
Central Government Funding: Non-Transport	Indirect Tax Revenues	£3,433 (9)
Totals	Broad transport Budget	£85,650 (10) = (7) +
	Wider Public Finances	£3,433 (11) = (9)
	NET TOTAL	£89,083

Source: Mott MacDonald

The scheme generates a reduction in fuel consumption which leads to a decrease in indirect tax revenues leading to an increase overall costs within the public accounts.

It should be noted that the costs in the Total Impact on Public Accounts in Table 11.3 is lower than the risk adjusted Capital Costs in Table 11.1 as the figures in the Public Accounts table are expressed as Present Values of Costs (PVC) in 2010 prices, discounted. The difference between the two figures is accounted for by the following adjustments, which are also listed in the Assumptions section (5.2) of the Economic Case:

- Costs have been uplifted by a Market Price Factor of 1.19;
- Costs have then been modified by GDP deflator from 2020 to 2010; and
- Costs have been discounted to 2010 prices to arrive at a figure for the PVC.

The Market Price Factor adjustment, deflation and discounting to 2010 prices are in accordance with DfT TAG guidance for Cost Benefit Analysis and HM Treasury Green Book principles. The driver for this is to enable the economic performance of schemes to be compared on a consistent basis at national level.

In comparison, the Financial Case, from which Table 11.1 has been extracted, presents the forecast outturn capital cost of the scheme including risk contingency and an allowance for future inflation up to the years in which the costs are forecast to be incurred.

11.6 Transport Economic Efficiency Table (TEE)

Table 11.4 presents the Transport Economic Efficiency (TEE) table for the CSET Phase 2 preferred options based on the defined Level 1 benefits including; journey time, marginal external costs (MEC) and reliability benefits, as previously outlined.

The table identifies that the primary source of benefits is “Other” users (57%), which is a key characteristic of a public transport service which operates throughout the day and weekend.

Business users represent a small proportion of the overall benefits at 12%.

In summary, the TEE table user benefits profile is considered representative of a public transport intervention.

Table 11.4: CSET Phase 2 TEE Table – Preferred Option

TEE – (2010 prices, discounted £m)	PVB	%
1. Total Users - Commute (£m)	£18.60	31%
2. Total Users - Business (£m)	£7.28	12%
3. Total Users - Other (£m)	£34.68	57%
Total User Trips - Period (£m)	£60.56	100%

Source: Mott MacDonald

12 Value for Money

The Value for Money (VfM) statement for the CSET Phase 2 project takes into consideration all appraisal and assessment work undertaken to date to arrive at the emerging scheme that is shown to present the best VfM. This takes into account the monetised impacts versus the project costs presented as a Benefit to Cost Ratio (BCR), as well as the findings from any qualitative and non-monetised assessments.

The approach to the assessment of VfM of City Deal schemes, as set out in the City Deal Assurance Framework, reflects this by stating that projects with a BCR less than 2:1 may still be considered for funding if they can demonstrate a compelling case for investment based on meeting the objectives of the City Deal. These include, for example, unlocking barriers to growth, delivering wider economic benefits, environmental and social benefits. As long as the project provides a robust evidence base with a proportionate level of quantitative and qualitative analysis to demonstrate that the project represents good VfM and can meet the policy objectives of the City Deal, these do not need to be included in the central benefit-cost analysis.

12.1 Analysis of Monetised Costs and Benefits

The Benefit to Cost Ratio (BCR) is an indication of the return on public sector investment in a project. The BCR is the ratio of the Present Value of Benefits (PVB) over the Present Value of Costs (PVC) and indicates how much benefit is obtained for each unit of cost. Based on an assessment of the benefits and costs of each option an initial assessment of the CSET Phase 2 project's VfM has been calculated and is presented in Table 12.1, that includes an initial BCR (established monetised impacts) and an adjusted BCR (evolving monetised impacts) as appraised.

Table 12.1: Analysis of Monetised Costs & Benefits (AMCB)¹¹ – Level 1 Preferred Option

(2010 Prices, discounted)	Total Value	Journey	MEC	Reli
Noise	£0	-	£0	-
Local Air Quality	£81	-	£81	-
Greenhouse Gases	£1,287	-	£1,287	-
Journey Quality	£0	-	£0	-
Physical Activity	£0	-	£0	-
Accidents	£3,051	-	£3,051	-
Economic Efficiency: Consumer Users	£18,316	£14,846	£2,188	£1,35
Economic Efficiency: Consumer Users (Other)	£33,800	£25,205	£6,840	£1,96
Economic Efficiency: Business Users and Providers	£7,141	£6,000	£1,050	£124
Wider Public Finances (Indirect Taxation)	-£3,433	-	-£3,433	-
Present Value of Benefits (PVB)	£60,557	£46,050	£11,064	£3,44
Broad Transport Budget	£0	76%	18%	6%
Present Value of Costs (PVC)	£85,652			
OVERALL IMPACTS				
Net Present Value (NPV)	-£25,095	NPV=PVB-PVC		
Benefit to Cost Ratio (BCR) – Level 1	0.71	BCR=PVB/PVC		

Source: Mott MacDonald

¹¹ 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.

12.2 Value for Money Statement

The VfM categories defined by the DfT and used by GCP are set out in Table 12.2.

Table 12.2: DfT VfM Categories

VfM Category	Implied by...
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

Source: Department for Transport Value for Money Framework

The monetised Level 1 economic benefits (based on transport modelling outcomes, including journey time savings, marginal external costs (MEC) & reliability benefits) show that the scheme produces an **initial Benefit to Cost Ratio (BCR)** of **0.71** from a PVB of **£60.5m** and a cost to public accounts of **£85.6m**

According to DfT guidance and criteria the BCR of **0.71** yields poor VfM, based on Level 1 benefits

12.3 Level 2 Adjusted BCR

Following the completion of the Level 1 benefits assessment as previously outlined, a further consideration is the impact of the defined Level 2 benefits on the VfM.

The WEB Level 2 assessment has identified an additional £9.2m PVB as outlined within Table 7.5. Table 12.3 below presents the impact of including these Level 2 benefits within the VfM case, which equates to an increase of the BCR by 15% to **0.81**. The scheme VfM status remains Poor, however Level 2 benefits are a noticeable contribution.

Table 12.3: CSET Phase 2 – Adjusted BCR including Level 1 & Level 2 Benefits

Benefit (2010 Prices, discounted)	Value	%
Level 1 PVB	£60,557	87%
Level 2 PVB	£9,206	13%
Total PVB	£69,762	100%
Total PVC	£85,652	
BCR Level 1 & 2	0.81	VfM Poor
% Level 2	15%	

12.4 Appraisal Summary Table

The Appraisal Summary Table (AST) presented below provides details of the overall impacts of the scheme. These include both qualitative and quantitative benefits.

Appraisal Summary Table		CSETs A1307 Phase 2	Site B	BRN			
Impacts		Summary of key impacts	Assessment				
			Quantitative		Qualitative	Monetary £(NPV)	
Economy	Business users & transport providers	The CSET Phase 2 provides alternative travel option for business users to utilise to travel into Cambridge and key employments centres all the corridor. Overall business travellers are a smaller proportion of overall travel, particularly bus based, therefore the monetised benefit is slight, due the the low level of business traveller on Public Transport	Value of journey time changes(£) £6,000		Slight Benefit	£6,000	
		Net journey time changes (£)					
		0 to 2min	2 to 5min	> 5min			
		-	-	£6,000			
	Reliability impact on Business users	P&R service provides reliable travel times of commuter and other trips to/from Cambridge. Economic impact of these reliability savings have not been assessed.	Not assessed in detail		Slight Benefit	-	
	Regeneration	The P&R service provides a alternative high quality travel option w hich supports regeneration along the corridor. Specific regeneration sites are not identified in the assessment.	Not assessed in detail		Slight Benefit	-	
	Wider Impacts	The P&R service provides a alternative high quality travel option which provides improved accessibility to key employment centres Cambridge, Biomedical Campus, Babraham Research Centre and Granta Park. The scheme is designed to support wider economic benefits but it is difficult to attribute these directly to the scheme.	Not assessed in detail		Slight Benefit	-	
Environmental	Noise	The A1307 service operates as a segregated service within a rural environment. Based on the MEC approach, the distance saving for the scheme on a Rural A road equates to no impact on Noise. Minor localised benefits are likely for key receptors along the service corridor and parallel routes.	Assessed through the MEC approach		Neutral	£0	
	Air Quality	The P&R service generates a reduction in distance travelled by private car w hich is converted to a very minor benefit through the MEC process. This is due to the key impact being a Rural A road.	Assessed through the MEC approach		Neutral	£81	
	Greenhouse gases	The P&R service generates a reduction in distance travelled by private car w hich is converted to a slight benefit through the MEC process.	Change in non-traded carbon over 60y (CO2e)	-	Slight Benefit	£1,287	
			Change in traded carbon over 60y (CO2e)	-			
	Landscape	The scheme w ould result in moderate adverse impacts due to the introduction and operation of a Travel Hub and access roads into arable fields albeit adjacent to the large A1307/A11 grade separated junction. There w ould be a loss of farmland and some vegetation	N/A		Moderate Adverse	-	
	Tow nscape	N/A	N/A		N/A	-	
	Historic Environment	A major adverse impact is predicted to unknow n archaeological remains w ithin the proposed option area through the construction of the option. Where remains are present, they will be removed by necessary excavations	N/A		Major Adverse	-	
	Biodiversity	The proposed w orks, w ithout appropriate mitigation, have the potential to adversely affect bats, otters, w ater voles, reptiles, badgers, barn ow ls, w hite-claw ed crayfish, great crested new ts, invertebrates nesting birds and other species and habitats of principle importance,	N/A		Moderate Adverse	-	
	Water Environment	Insignificant impact on w ater resources as no direct impacts on any w ater features other than crossing of River Granta w hich w ill require design to be compliant w ith statutory requirements to have zero increase in flood risk.	N/A		Neutral	-	

Appraisal Summary Table		CSETs A1307 Phase 2	Site B	BRN			
Impacts		Summary of key impacts		Assessment			
				Quantitative		Qualitative	Monetary £(NPV)
Social	Commuting and Other users	The CSET Phase 2 proposal is principally the provision of a high quality & frequent P&R service between Cambridge and key employment centres. The P&R service is primarily designed to provide a reliable service operating throughout the day, resulting in benefits for commuters and other users. In addition the service operators at weekends. The service provides significantly improved public transport connectivity and serve to On-Route locations, Swaston, Stapelford and Great Shelford generating substainal benefits.	Value of journey time changes (£)		£40,051	Medium Benefit	£40,051
			Net journey time changes (£)				
			0 to 2min	2 to 5min	> 5min		
			-	-	£40,051		
	Reliability impact on Commuting and Other users	P&R service provides reliable travel times of commuter and other trips to/from Cambridge. Economic impact of these reliability savings has been addressed based on observed current performance, with a segregated busway provide noticeable improvement in public transport reliability.	Not assessed in detail		Slight Benefit	£3,442	
	Physical activity	P&R service encourages the adoption of sustainable travel to access/egress the service. This impact has not been assessed in detail as part of this assessment.	Not assessed in detail		Slight Benefit	-	
	Journey quality	The bus segregated service is a high quality & frequent service with noticeable improvements in journey quality. This has not monetised as part of this assessment. However, by design the proposed vehicle will be a notieable improvement in additional to the segregated travel experience.	Not assessed in detail		Medium Benefit	-	
	Accidents	P&R service reduces the net distance travelled by private car and specifically the number of vehicles along the A1307 corridor. The accident benefit has been calculated based on the distance saving through the MEC approach.	Assessed through the MEC approach		Slight Benefit	£3,051	
	Security	Increased surface expansion could result in more users being able to park in a secure location. The proposed travel hubs and PT route will benefit from good levels of both formal and informal security, including CCTV systems and passive surveillance from workers and other users	N/A		Moderate Beneficial	-	
	Access to services	The scheme aims to improve accessibility and connectivity in South East Cambridge, though for those residents who are currently limited by no access to a car, these limitations will still exist. Cambridge is the major centre of employment and services and this scheme aims to better link residents to these services and activities	N/A		Slight Beneficial	-	
Affordability	There are no expected personal affordability impacts as a result of any of the five scheme options. Parking at the travel hubs will be free of charge and the cost of bus services into the centre is expected to be in line with costs on the rest of the network across Cambridge	N/A		Neutral	-		
Severance	There will be severance impacts as a result of the location of the travel hub and along the route at various points. Pedestrian journeys in the area between Babraham and New market Road will likely become longer and less attractive while journeys at points along the proposed route will still be able to be made, with some hindrance resulting in slightly longer journey times.	N/A		Moderate Adverse	-		
Option and non-use values	The addition of the public transport route from Haverhill, via the travel hub and onwards into Cambridge would give option values to approximately 40,000 households. Services running at eight per hour between the travel hub and Cambridge and a further two between Granta Park and Cambridge and two between Haverhill and Cambridge would give local residents a number of options for accessing the service and therefore better connect local towns and villages to services	N/A		Large beneficial	-		
Public Accounts	Cost to Broad Transport Budget	Transport budget based on capital cost (CAPEX Only). Service is identified as revenue generating. Revenue is excluded from the assessment.	Cost based on CAPEX only		-	£85,652	
	Indirect Tax Revenues	Project generates a mode transfer to a P&R service and an overall reduction in distance travelled. This results in a reduction in fuel consumption and fuel tax generation.	Assessed through the MEC approach		-	-£3,433	

13 Sensitivity Tests

A number of sensitivity tests have been carried out around the preferred option. The purpose of the sensitivity tests is to understand if the intervention being proposed is still value for money given alternative cost assumptions and demand levels driven by higher growth scenarios. The sensitivity tests can be grouped into the following categories:

- Sensitivity around scheme costs for the preferred scheme - investigating the impact of different levels of optimism bias and risk contingency allowance; and
- Sensitivity around alternative growth scenarios - looking at the impact of higher demand growth, in line with that reported in the Cambridgeshire & Peterborough Independent Economic Review (CPIER).

13.1 Sensitivity to Scheme Costs

Two sensitivity tests have been carried out to assess the sensitivity of the scheme to different assumptions surrounding scheme costs. These relate to:

- The level of optimism bias; and
- The treatment of risk.

Both these tests have been carried out under the core scenario and the high growth scenario.

13.1.1 Optimism Bias

TAG A1-2 presents guidance on determine the appropriate level of optimism bias to apply to scheme costs. This is dependent on the nature of the scheme and its status in the scheme development process. The preferred scheme has been assessed based on the guidance included in TAG A1-2, which results in optimism bias of 15% being applied, commensurate with a local authority scheme at OBC stage.

It is important to examine the impact of a range of other possible levels of optimism bias on the cost estimates reported in the TEE and PA tables. To address this a sensitivity has been carried out assuming an optimism bias level of 44%, which is the appropriate level for a local authority scheme at SOBC stage. The scheme costs with an optimism bias of 44% are shown in Table 13.1, as test 1, with corresponding impact on the BCR.

13.1.2 Treatment of Risk

Risk in this context refers to identifiable factors that may impact on scheme costs, leading to over- or under-spends. Risk adjusted costs were used in the economic appraisal for the preferred option. For the core base costs, a risk value based on P80 was applied, meaning there is an 80% likelihood that the project will be delivered within budget. For the purpose of this sensitivity test the P90 costs have been used representing a 90% likelihood that the project will be delivered within budget. The scheme costs based on a P90 estimate are shown in Table 13.1, as test 2, with corresponding impact on the BCR.

13.2 Alternative Growth Sensitivity Test

One sensitivity test has been carried out to assess the sensitivity of the scheme to different assumptions surrounding future growth. This is based on the CPIER findings that Cambridge is expected to achieve growth greater than that set out in the adopted Local Plans.

CSRM2 (D-series) was developed with three future year scenarios, known as the Foundation Case (2026 FC, 2031 FC and 2036 FC), of which 2026 and 2036 have been used in testing the various options for CSET Phase 2. The Foundation Case represents a scenario which is consistent with the Local Plans for the four Local Authority Districts covered by CSRM2 (Cambridge City, South Cambridgeshire, Huntingdonshire and East Cambridgeshire). As such it is constrained to the levels of growth and locations contained in published and proposed plans.

However, since the Local Plans were published, actual growth has differed in terms of the rate and locations in which it is occurring. In addition, there is the potential for overall employment growth to be greater in the period to 2031 than projected in the Local Plans, particularly in the Cambridge area, as noted in the CPIER interim report.

An alternative future growth scenario was therefore developed, nominally called 'High Growth' (HG), to represent a revised pattern and rate of growth across the modelled area. In addition to revised employment and dwelling forecasts, the HG forecasts also included academies and other private schools.

The impact of this HG alternative scenario on the scheme's VfM has been tested, with a greater level of demand and therefore associated benefit evaluated. The results are shown as Tests 3A, 3B and 3C in Table 13.1.

13.3 Sensitivity Test Results

The sensitivity test economic results are presented for the 5 scenarios in Table 13.1 below.

It can be seen from the above that the application of the sensitivity tests under both Core and High Growth scenarios have relatively little impact on VfM status, which remains "Poor" under all scenarios. However, in terms of the BCR there is a 17% uplift in the comparable High Growth scenario (Test 3A) relative to the Core scenario, showing that the BCR is sensitive to increases in demand. In this scenario the BCR is approaching a neutral **1.00** with further benefits or cost reductions moving the VfM towards the "Low" classification under these conditions.

Table 13.1: Preferred Option – Economic Appraisal Sensitivity Tests (£m, 2010 prices)

Scenario	Core	Test 1	Test 2	Test 3A	Test 3B	Test 3C
		Core			High Growth	
Cost Assumptions	P80 Risk (25%) + OB (15%)	P80 Risk (25%) + OB (44%)	P90 Risk (29%) + OB (15%)	Core	Test 1	Test 2
Level 1 PVB	£60.6	£60.6	£60.6	£70.8	£70.8	£70.8
Level 2 PVB	£9.2	£9.2	£9.2	£10.8	£10.8	£10.8
Total PVB	£69.8	£69.8	£69.8	£81.7	£81.7	£81.7
PVC	£85.7	£107.3	£88.4	£85.7	£107.3	£88.4
NPV	-£15.9	-£46.7	-£27.8	-£14.8	-£36.4	-£17.6
Level 1 BCR	0.71	0.56	0.69	0.83	0.66	0.80
Adjusted BCR (Lv1&2)	0.81	0.65	0.79	0.95	0.76	0.92
VfM Category	Poor	Poor	Poor	Poor	Poor	Poor
% Difference from Adjusted Core		-20%	-3%	17%	-7%	13%

Source: Mott MacDonald

OB = Optimism Bias





Cambridge South East Transport Phase 2

Outline Business Case - Financial Case

15 May 2020

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1 Introduction

The Financial Case is one of the five cases that form the DfT's Transport Business Case process. The Financial Case outlines the affordability of the preferred option, its funding arrangements and technical accounting issues. The case also presents the financial profile of the preferred scheme option and an overview of how the scheme will be funded.

The other four cases which make up the Transport Business Case Process are:

- The **Strategic Case** which determines whether an investment is needed, either now or in the future. It demonstrates the case for change – that is, a clear rationale for making the investment and its strategic fit – how an investment will further the aims and objectives of the organisation. The Strategic Case is presented in document 403394-MMD-BCA-00-RP-BC-0247.
- The **Economic Case** which assesses options to identify all their impacts, and the resulting value for money, to fulfil Treasury's requirements for appraisal and demonstrating value for the taxpayers' money. The Economic Case is presented in document 403394-MMD-BCA-00-RP-BC-0292.
- The **Commercial Case** which provides evidence on the commercial viability of a proposal and the procurement strategy that is used to engage the market. It presents evidence on risk allocation and transfer, contract timescales and implementation timescale as well as details of the capability and skills of the team delivering the project. The Commercial Case is presented in document 403394-MMD-BCA-00-RP-BC-0231.
- The **Management Case** which assesses whether a proposal is deliverable. It tests the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance (e.g. a Gateway Review). The Management Case is presented in document 403394-MMD-BCA-00-RP-BC-0277.

The remainder of this document comprises the Financial Case for Phase 2 of the Cambridge South East Transport (CSET) project.

1.1 Approach to the Development of the Financial Case

The DfT's guidance document, 'The Transport Business Case: Financial Case', outlines the areas that should be covered as part of the Financial Case at the OBC stage. This has been used as a broad guide in developing the structure and content of this Financial Case. Table 1.1 shows where the relevant information on required content can be found in this document.

Table 1.1: Compliance with DfT requirements for the Financial Case at OBC Stage

Content	DfT Requirements	Section Number and Title(s)
Introduction	Outline the approach taken to assess affordability.	1.1 Approach to the Development of the Financial Case
Costs	Provide details of: <ul style="list-style-type: none"> • Expected whole life costs • When they will occur • Breakdown and profile of costs by those parties on whom they fall • Any risk allowance that maybe needed (in the event of things going wrong) 	2.1 Base Costs 2.2 Risk Adjusted Costs 2.3 Spend Profile 2.4 Vehicle Capital Costs 2.5 Maintenance and Renewals Costs 2.6 Operating Costs
Budget/Funding Cover	Provide analysis of the budget/funding cover for the project. Set out, if relevant,	3. Funding Arrangements

	details of other funding sources (e.g. third-party contributions, fees).	
Accounting Implications	Describe expected impact on organisation's balance sheet.	4. Accounting Implications

Source: DfT

2 Scheme Costs

Scheme costs for the preferred option have been developed based upon the designs set out in Appendix N of the OBC: Preferred Option Drawings, document reference 403394-MMD-BCA-XX-RP-BC-0360. The detailed breakdown of costs for the preferred option is included in Appendix K of the OBC: Project Costs Breakdown, document reference 403394-MMD-BCA-00-RP-BC-0372. Land cost estimates have been prepared separately and are included within overall scheme costs. The estimated scheme cost is considered proportionate and affordable to the scale of the issues identified in the Strategic Case and the predicted benefits of the scheme as assessed in the Economic Case. The comprehensive costs include preparation and design, project management and planning, construction, land acquisition, inflation and other costs.

The total base capital costs for the infrastructure needed to deliver the preferred option, exclusive of any risk allowance, amount to **£103,924,000**. A high-level breakdown of the costs is presented in Table 2.1. An additional amount of £25,981,000 has been estimated to cover risks.

The estimated total capital infrastructure cost of the scheme, inclusive of risk, is **£129,905,000** as shown in Table 2.2. An additional sum of £2,400,000 has been spent between 2015 and 2019 on developing the scheme. These historic costs together with future risk-adjusted capital costs total **£132,305,000** and constitute the funding ask.

2.1 Base Costs

Base capital costs for the infrastructure needed to deliver the preferred option have been produced by Mott MacDonald cost estimators. The base costs exclude any allowance for risk.

The base cost estimates include the following:

- **Construction costs:** These consist of:
 - Main works contract (including structures, such as bridges, the Travel Hub facility, road works, general works, site clearance and earthworks and contractors' preliminaries); and
 - Ancillary work contracts (including maintenance compounds, lighting, landscaping and environmental mitigation).
- **Design costs:** This accounts for design fees, on-site supervision and testing of scheme elements prior to scheme opening.
- **Project Management costs:** This consists of all project management, public consultation, public inquiry, and the costs of obtaining statutory orders.
- **Environmental Mitigation:** Allowance for costs and fees to provide mitigation and commuted payments for future maintenance of environmental mitigation measures.
- **Statutory Undertakings:** Costs to divert or protect existing Statutory Undertakers' equipment affected by the works.
- **Land costs:** This includes the acquisition and legal transaction costs for all the required private and commercial land, and additionally accounts for property management costs and compensation.
- **Inflation costs:** This accounts for inflation above the base cost estimates in accordance with RPI.

Key assumptions made to derive robust estimated scheme costs included:

- The project began in 2015 and is expected to be completed by 2025;
- An opening year of 2025;

- The scheme will use guided system technology;
- Scheme costs are prepared in Q2 2020 prices; and
- An inflation rate of 3% per annum has been applied to Q2 2020 costs, based on forecast RPI.

Table 2.1 shows the breakdown of base capital infrastructure costs for the preferred scheme option, exclusive of any risk allowance.

Table 2.1: Base Capital Costs – Infrastructure (exclusive of risk allowance)

Cost Item	Cost (£)
Construction	54,941,000
Design	7,637,000
Project management	10,037,000
Environmental mitigation	2,349,000
Statutory undertakings	10,034,000
Land costs	9,160,000
Inflation	9,766,000
TOTAL	103,924,000

Source: Mott MacDonald

2.2 Risk Adjusted Costs

As the scheme design for the preferred option is at an early stage of progression, there is still significant development work required to be undertaken to progress the design to the point where the scheme can be constructed. It is therefore important to recognise that there is uncertainty in the design and assumptions upon which the costs are based and to reflect this an uplift has been applied to the base costs.

At this current stage of development, the Outline Business Case (OBC), a confidence level of P80¹ risk has been applied to calculate the overall project cost estimate (this is the base costs plus the risk value). The value that has been applied is 25%. A cost range has also been calculated based on P50 (19%) and P90 (29%) contingency allowances. Table 2.2 provides a breakdown of the risk-adjusted capital infrastructure costs for the preferred scheme option.

Table 2.2: Capital Costs – Infrastructure Adjusted for Risk

Cost Item	Cost (£)
Construction	68,676,000
Design	9,546,000
Project management	12,547,000
Environmental mitigation	2,936,000
Statutory undertakings	12,543,000
Land costs	11,450,000
Inflation	12,207,000
TOTAL	129,905,000
Range	123,670,000 to 134,062,000

Source: Mott MacDonald

¹ A confidence level of 80% (P80) means that in 80% of instances, the result can be considered reliable

The capital infrastructure cost of the preferred option after adjustment for risk is therefore £129,905,000 (P80), with a range of £123,670,000 (P50) to £134,062,000 (P90).

At the next stage of development, the Full Business Case (FBC), the designs and details of the preferred scheme option will be at a higher level of maturity, with unspecified uncertainties reduced to a minimum. All known areas of uncertainty are documented on the project Risk Register. As the CSET Phase 2 scheme is developed the Risk Register will continue to be used to identify, quantify and value the known uncertainties of the project and maintained as a live document. It will identify who owns each item, provide an assessment of the likelihood of occurrence and an estimate of the impact of occurrence on project outcomes (cost and duration).

Based on the Risk Register, a Quantitative Cost Risk Assessment (QCRA) process will be followed. This will use the latest project cost estimates, the Risk Register data and Monte Carlo simulation software to determine the contingency allowance to be included in the risk-adjusted project cost estimate at FBC stage.

2.3 Spend Profile

The total risk adjusted capital infrastructure cost of the preferred scheme option from 2020 is £129,905,000. However, an additional sum of £2,400,000 has been spent between 2015 and 2019 on developing the scheme. These historic costs together with future risk-adjusted capital costs total £132,305,000 and constitute the funding ask. Table 2.3 below shows the actual (2015-2019) and expected (2020-2025) annual spend profile for the project.

Table 2.3: Annual Spend Profile – Preferred Option

Costs (£)	2015 to 2019 ²	2020	2021	2022	2023	2024	2025
Annual costs	2,400,000	1,885,000	1,941,000	14,871,000	54,574,000	46,666,000	9,968,000
Cumulative TOTAL	2,400,000	4,285,000	6,226,000	21,097,000	75,671,000	122,337,000	132,305,000

Source: Mott MacDonald

2.4 Vehicle Capital Costs

While there is a potential capital cost to be considered for the supply of new vehicles for the High Quality Public Transport (HQPT) services planned to operate on the CSET Phase 2 corridor, a final preferred operating model for the scheme is yet to be confirmed. The options available for the supply of vehicles are set out in the Commercial Case, with a final decision on a preferred option to be confirmed in the FBC (in line with DfT guidance).

At present it is not expected that the preferred option would involve the procurement of vehicles by GCP or its partner organisations. Accordingly, vehicle capital costs do not form part of the current funding ask.

2.5 Maintenance and Renewals Costs

TAG Unit A1.2 (Scheme Costs) states that traffic-related maintenance and renewal costs should also be considered in addition to capital investment costs. The potential financial costs of ongoing maintenance include:

- General inspection of infrastructure and regular maintenance / replacement;

² These costs account for developing the scheme from its inception up to OBC submission

- Replacement of asphalt to footways, maintenance tracks and new highway works;
- General street cleaning;
- Landscaping maintenance;
- Gully cleaning;
- Replacement of street lighting fittings;
- Maintenance of public transport stop infrastructure and fittings;
- Maintenance of traffic signals; and
- Maintenance of facilities building at the Travel Hub.

The assessment of maintenance costs assumes a period of 60 years from the opening year of 2025 to 2084 inclusive, with a total budget of £33,440,000 at 2025 (opening year) prices, undiscounted. This equates to annual maintenance costs of £557,333. There are peaks and troughs within the maintenance cost profile as some of the works will be carried out as part of annual highway maintenance, while others such as planing and resurfacing the carriageway are carried out periodically as and when the top surface reaches the end of its design life.

For annual maintenance works it is assumed that payments will be in equal instalments across a 25-year period and will commence one year after the scheme opens, which is assumed to be 2025. However, at this time specific maintenance costs are subject to negotiation with potential providers and are therefore commercially sensitive, so are not published in this OBC. They will be known with more clarity at FBC stage and published at that time.

2.6 Operating Costs

Operating costs to be considered include:

- Vehicle operating costs; and
- The operating costs of the Travel Hub facility and the public transport route itself.

2.6.1 Vehicle Operating Costs

The potential operating models for the HQPT services planned to operate on the CSET Phase 2 corridor are set out in the Commercial Case, with a final decision on a preferred option to be confirmed in the FBC (in line with DfT guidance).

At present it is assumed that a commercial level of HQPT service will be provided that will enable vehicle operating costs to be fully covered from fares paid by service users. This assumption is supported by the well-established commercial operation of public transport services on the existing Cambridgeshire Guided Busway since 2011. Accordingly, vehicle operating costs do not form part of the current funding ask.

2.6.2 Travel Hub Facility and Public Transport Route

As with maintenance costs, operating costs for both the Travel Hub facility and the public transport route are subject to negotiation with potential providers and are therefore commercially sensitive, so are not published in this OBC. They will be known with more clarity at FBC stage and published at that time, although again they do not form part of the funding ask.

A summary of the likely key operating cost items, based on Mott MacDonald cost estimators' past experience, are noted along with assumptions and estimated quantities in Table 2.4.

Table 2.4: Operating Costs – Travel Hub Facility and Public Transport Route

Operating Cost Item	Assumptions	Quantity	Unit
Travel Hub Facility			
General cleaning for the facilities building	Daily and 2 people for 2 hours	1,460	hr
Utilities cost for the facilities building	Yearly	224	m ²
Monitor CCTV cameras	Allow 1-person hour per day to monitor the cameras (overtime paid to cover additional requirement)	365	hr
Power consumption - Lighting at Travel Hub	129nr Luma 3 lights x 254w = 32,766w per hour = 32.77kW x 4,380 hours per year = 143,533kW (as advised by DW Windsor)	143,533	kW
Power Consumption - CCTV cameras	Allow 25% of the above lighting quantity	35,883	kW
Public Transport Route			
Power Consumption - Lighting at Stops	12nr Luma 1 lights x 254w = 3,048w per hour = 3.05kW x 4,380 hours year = 13,359kW (as advised by DW Windsor)	13,359	kW
Power Consumption - CCTV cameras	Allow 25% of the above lighting quantity	3,340	kW

Source: Mott MacDonald

3 Funding Arrangements

Funding for the CSET Phase 2 project is intended to be sourced primarily through the Greater Cambridge City Deal.

The City Deal Grant is a funding framework for central government and local partners to agree investment programmes, centred on the promotion of local economic growth and development. City Deal funding is being released by central government in tranches. The first tranche of funding for the Greater Cambridge City Deal awarded to GCP is worth £100 million (£20 million per year). A further £200m will be approved subject to gateway review and released from April 2020 onwards, and a final £200m will be released from April 2025 onwards.

To help meet the funding requirements and to address the impacts and transport requirements of future development within the CSET Phase 2 corridor, GCP will seek future opportunities to recover an appropriate proportion of the scheme cost from local developer contributions, secured through the planning process. However, no immediate opportunities to secure developer contributions to the scheme have been identified and so it is currently assumed that all funding will be drawn down from the City Deal funding.

3.1 Funding Profile - Capital Costs

At this stage no developer contributions have been secured so the City Deal is the sole funding source. Table 3.1 shows the funding profile by funding source from scheme inception in 2015 through to completion in 2025 and includes historic costs expended prior to the publication of this document, as well as the risk adjusted costs for future capital infrastructure spend.

Table 3.1: Funding Profile – Preferred Option (£)

Funding source	2015 to 2019	2020	2021	2022	2023	2024	2025	Total
City Deal	2,400,000	1,885,000	1,941,000	14,871,000	54,574,000	46,666,000	9,968,000	132,305,000
TOTAL	2,400,000	1,885,000	1,941,000	14,871,000	54,574,000	46,666,000	9,968,000	132,305,000

Source: GCP

4 Accounting Implications

The total risk adjusted capital infrastructure cost for the CSET Phase 2 project from 2020 through to completion in 2025 amounts to **£129,905,000**. This amount together with £2,400,000 spent on scheme development prior to 2020 totals a funding ask of **£132,305,000** and is deemed affordable based on successfully securing funding from the Greater Cambridge City Deal and potentially through the GCP Future Investment Strategy³, which is currently being developed.

If costs increase or funding from the identified sources is not secured, then the GCP as scheme promoters will explore other options through the GCP Future Investment Strategy to underwrite these costs. This may involve funding directly or by sourcing additional third-party funding. In any event, as the scheme proceeds, value engineering exercises will be undertaken to review the costs and reduce these where possible. Should a financial shortfall be identified then a more robust value engineering process may need to revisit the scheme in order to reduce costs, whilst minimising any reduction in the ability of the scheme to achieve its objectives and realise intended benefits.

The proposed scheme will also incur an increase in revenue costs in order to maintain the new assets. Arrangements for meeting these costs are being explored as part of the scheme's Commercial Case, including consideration of the alternative operating and maintenance options. The preferred option will be finalised at the next phase of scheme development and reported in the FBC, with any financial implications reflected within the Financial Case.

Options to fund any revenue cost shortfalls required to operate the new system will be explored and reported in the FBC by the GCP as scheme promoters, although it is anticipated that the operating model for the scheme will not result in a need for any revenue costs to be funded directly by the GCP.

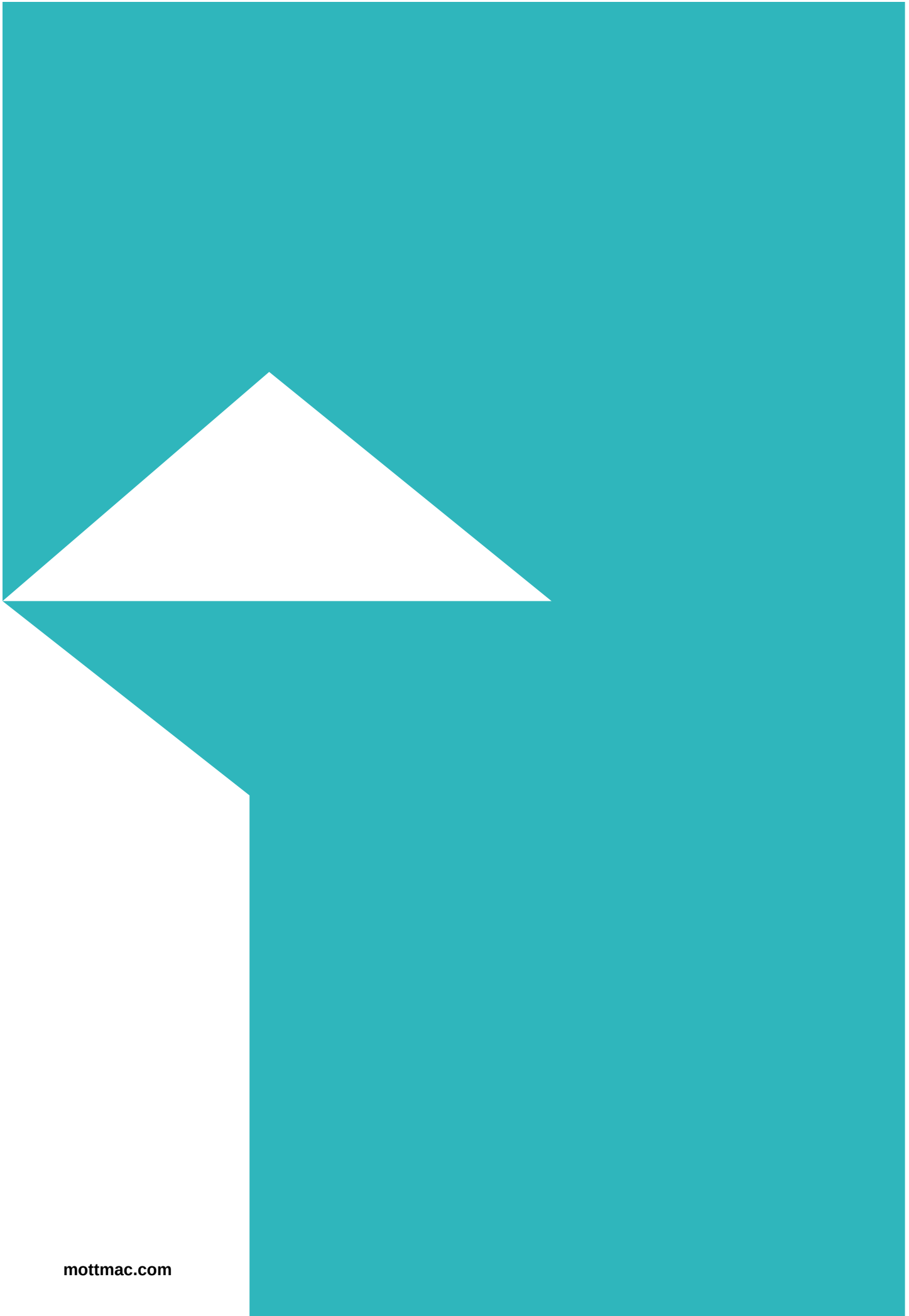
4.1 State Aid

The GCP as scheme promoters will be using any funding it receives in furtherance of its statutory functions to provide public infrastructure which will not be commercially exploited. In addition, the CSET Phase 2 infrastructure is unlikely to specifically benefit any single organisation other than that it is likely to serve multiple existing and future employment and housing sites. Therefore, it is not anticipated that the CSET Phase 2 project has any State Aid implications. However, a full State Aid check will be carried out as part of the FBC.

³ <https://www.greatercambridge.org.uk/futureinvestmentstrategy>

5 Summary

- The Financial Case outlines the affordability of the CSET Phase 2 preferred option, its funding arrangements and technical accounting issues. The case has presented the financial profile of the preferred scheme option and an overview of how the scheme will be funded.
- Scheme costs for the preferred option have been developed based upon the designs set out in the Options Appraisal Report (OAR) and Strategic Case. The estimated scheme cost is considered proportionate and affordable to the scale of the issues identified in the Strategic Case and the predicted benefits of the scheme as assessed in the Economic Case.
- The estimated base cost of the scheme is £103,924,000 plus an additional £25,981,000 to cover risks, giving a total risk adjusted capital infrastructure cost of £129,905,000 from 2020 through to completion in 2025.
- Historic costs incurred between 2015 and 2019 in scheme development amount to £2,400,000. These costs together with future risk-adjusted capital costs total £132,305,000, which is the funding ask.
- Funding for the CSET Phase 2 project is intended to be sourced primarily through the Greater Cambridge City Deal, with GCP then seeking future opportunities to recover an appropriate proportion of the scheme cost from local developer contributions, secured through the planning process. As it stands, no immediate opportunities to secure developer contributions to the scheme have been identified.





Cambridge South East Transport Phase 2

Outline Business Case - Commercial Case

15 May 2020

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Glossary of Terms

Analysis of Monetised Cost and Benefits (AMCB) table: Summarises the monetised impacts of a scheme that are included in the scheme's Net Present Value and Benefit-Cost Ratio.

Appraisal Summary Table (AST): Provides a complete summary of the scheme impacts, including the scheme's monetised impacts and non-monetised impacts (both quantitative and qualitative).

Assumption: A statement which is not yet known to be true. It can be a bridge in the planning process to answer an uncertainty, and to allow scope and plans to be developed

Benefit Cost Ratio (BCR): Benefit Cost Ratio, is an indicator of the overall value for money of a project or proposal.

CaCC: Cambridge City Council

CCC: Cambridgeshire County Council

Cambridge Autonomous Metro (CAM): CAM is the proposed metro style system for Greater Cambridge.

Committed Schemes: Where a scheme has been deemed likely to proceed and is therefore included within the option appraisals.

Conservation Area: An area designated under Section 69 of the Planning (Listed Buildings and Conservation Areas) Act 1990 as being of special architectural or historic interest and with a character or appearance which is desirable to preserve or enhance.

Context: The setting of a site or area, including factors such as traffic, activities and land uses as well as landscape and built form.

Controls: Risk response activities that are undertaken as business as usual. These are identified as an aide-memoire, to draw attention to the purpose and aim of standard procedures and drive appropriate focus. Typically, controls will not incur any additional cost to delivery.

Countryside: The rural environment and its associated communities.

Cumulative Impact: The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.

Department of Transport (DfT): is a ministerial department, supported by 24 agencies and public bodies that plans and invests in transport infrastructure in the UK.

Dependency: An activity or activities which cannot be undertaken or completed until another scope of work has completed or reached a defined stage or point.

Early Assessment Sifting Tool (EAST): Early Assessment Sifting Tool is used by DfT, to quickly summarise and present evidence on options. INSET is an enhancement of EAST and follows the same broad principles and approach.

Effect: The consequence of the scale of any change to the baseline environment, i.e. impact, on the environmental receptor, taking account of its particular value or sensitivity.

Element: A component part of the landscape (for example, roads, hedges, woods).

Emerging Scheme: The best performing route alignment option for CSET phase 2 based on assessment to date.

Enhancement: Landscape improvement through restoration, reconstruction or creation.

Environment: Our physical surroundings including air, water and land.

Environmental Impact Assessment (EIA): A formal, structured process of evaluating the likely environmental impacts of a proposed scheme, considering inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Exclusion: An activity or product that has been specifically removed or omitted from the scope of work for the defined project.

Fall-backs: Contingency actions taken in response to a risk impact. Generally, risks that are tolerated should have fall-back actions identified, as should significant risks that are being treated, where the treatment has a significant likelihood of not fully mitigating the risk.

Full Business Case (FBC): The culmination of the three-stage business case process is the Full Business Case. This follows on from initial exploratory work to establish the strategic need for intervention in the Strategic Outline Business Case and the optioneering and appraisal work undertaken in the Outline Business Case. Generally, an investment committee will consider the Full Business Case then make a recommendation to ministers. Ministers will decide whether a proposal should proceed to implementation, however as funding and powers for transport investment have been devolved to the Greater Cambridge Partnership (GCP) as part of the Greater Cambridge City Deal, the decision to implement the scheme resides with GCP.

Form: The layout (structure and urban grain), density, scale (height and massing), appearance (materials and details) and landscape of development.

Gross Domestic Product (GDP): A measure of the total value of goods produced and services provided in an area.

Gross Value Added (GVA): A measure of the economic productivity of an area.

High Quality Public Transport (HQPT): High Quality Public Transport, is a transport system that includes a range of features such as high levels of segregation, junction priority, high quality infrastructure (shelters, CCTV, real time, lighting, seating, help points etc), and high quality vehicles to name but a few.

Heritage Asset: A building, monument, site, place, area or landscape of historic value.

Investment Sifting and Evaluation Tool (INSET): INSET is Mott MacDonald's evaluation tool used in the optioneering process. INSET is an enhancement and expansion of EAST.

Issue: A significant unanticipated event, or a risk which has impacted or has a >99% likelihood of occurrence, that affects the achievement of the project objectives.

Landform: Combination of slope and elevation that produce the shape and form of the land.

Landscape: The character and appearance of land, including its shape, form, ecology, natural features, colours and elements and the way these components combine. Landscape character can be expressed through landscape appraisal, and maps or plans. In towns 'townscape' describes the same concept.

Landscape Character: The distinct and recognisable pattern of elements that occur consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape.

Landscape Feature: A prominent eye-catching element, for example, wooded hilltop or church spire.

Landscape Quality: Based on judgements about the physical state of the landscape, and about its intactness, from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.

Landscape Sensitivity: The extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects on its character.

Land Use: The primary use of the land, including both rural and urban activities.

Local Liaison Forum (LLF): The LLF provide a link between a project team and the local community.

Multi Criteria Assessment Framework (MCAF): Multi-Criteria Assessment Frameworks are used in the optioneering assessment process and allow options to be assessed against a range of criteria linked to the scheme objectives as well as wider policy and strategy objectives.

Methodology: The specific approach and techniques used for a given study.

Mitigation: Measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development project.

Modal Shift: A shift from one transport type to another e.g. road travel to rail travel.

Movement: People and vehicles going to and passing through buildings, places and spaces. The movement network can be shown on plans, by space syntax analysis, by highway designations, by figure and ground diagrams, through data on origins and destinations or pedestrian flows, by desire lines, by details of public transport services, by walk bands or by details of cycle routes.

Nomis: A service provided by the Office for National Statistics, ONS, that provides free access to the most detailed and up-to-date UK labour market statistics from official sources.

Option Appraisal Report (OAR): The Options Appraisal Report sets out the process undertaken to identify and assess options, leading to the selection of the preferred option.

Outline Business Case (OBC): Is the second phase of the process which reconfirms the conclusions set out in the Strategic Outline Business Case (SOBC). The OBC focuses on the detailed assessment of the options to find the best solution.

Prince 2: PRojects IN Controlled Environments is a process-based method for effective project management, used extensively by the UK Government. It adopts a product-based planning approach to project management with emphasis on dividing projects into manageable and controllable stages.

Public Accounts (PA) table: Records the investment and operating costs incurred by a public sector in delivering the scheme.

Receptor: Something that makes up the environmental baseline e.g. humans or other biological species, elements of the physical environment including water, air and soil assets that make up the cultural heritage of an area.

Risk (Threat): An uncertain event or set of circumstances that, should it occur, will have an adverse effect on the achievement of the objectives of the project.

Risk (Opportunity): An uncertain event or set of circumstances that, should it be exploited, will have a positive effect on the achievement of the objectives of the project.

SATURN: Simulation and Assignment of Traffic in Urban Road Networks, is a computer program that calculates route choices between origin and destination.

Social and Distributional Impacts (SDI): considers the variance of transport intervention impacts across different social groups.

Strategic Outline Business Case (SOBC): This sets out the need for intervention (the case for change) and how this will meet strategic aims and objectives (the strategic fit). It provides suggested or preferred ways forward and presents the evidence for a decision.

Strategic View: The line of sight from a particular point to an important landmark or skyline.

Sustainability: The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs.

Topography: A description or representation of artificial or natural features on or off the ground.

Townscape: Physical and social characteristics of the built and unbuilt urban environment and the way in which those characteristics are perceived. The physical characteristics are expressed by the development form of buildings, structures and space, whilst the social characteristics are determined by how the physical characteristics are used and managed.

Transport Appraisal Guidance (TAG): The DfT's Transport Appraisal Guidance (often referred to as WebTAG)

Transparent Economic Assessment Model (TEAM): TEAM is a tool designed to calculate the economic impacts and benefits of proposed infrastructure interventions and policy measures.

Tranquillity: A state of calm or quiet.

Transport Economic Efficiency (TEE) table: Summarises the monetised impacts against different user groups.

Transport User Benefit Appraisal (TUBA): TUBA is an economic appraisal computer program developed for the Department for Transport (DfT) for appraising multi modal transport studies.

Uncertainty: A condition where the outcome can only be estimated.

Visual Impact: Change in the appearance of the landscape as a result of development. This can be positive (i.e. beneficial or an improvement) or negative (i.e. adverse or a detraction).

Wider Economic Benefits (WEBs): improvements in economic benefits that are acknowledged, but which are not typically captured in traditional transport cost-benefit analysis.

1 Introduction

The Commercial Case is one of the five cases that form the DfT's Transport Business Case process. The Commercial Case provides evidence on the commercial viability of a proposal and the procurement strategy that is used to engage the market. It presents evidence on risk allocation and transfer, contract timescales and implementation timescale as well as details of the capability and skills of the team delivering the project.

The other four cases which make up the Transport Business Case Process are:

- The **Strategic Case** which determines whether an investment is needed, either now or in the future. It demonstrates the case for change – that is, a clear rationale for making the investment and its strategic fit – how an investment will further the aims and objectives of the organisation. The Strategic Case is presented in document 403394-MMD-BCA-00-RP-BC-0247.
- The **Economic Case** which assesses options to identify all their impacts, and the resulting value for money, to fulfil Treasury's requirements for appraisal and demonstrating value for the taxpayers' money. The Economic Case is presented in document 403394-MMD-BCA-00-RP-BC-0292.
- The **Financial Case** which outlines the affordability of the preferred option, its funding arrangements and technical accounting issues. The case also presents the financial profile of the preferred option and an overview of how the scheme will be funded. The Financial Case is presented in document 403394-MMD-BCA-00-RP-BC-0293.
- The **Management Case** which assesses whether a proposal is deliverable. It tests the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance (e.g. a Gateway Review). The Management Case is presented in document 403394-MMD-BCA-00-RP-BC-0277.

The remainder of this document comprises the Commercial Case for Phase 2 of the A1307 Cambridge South East Transport (CSET) Phase 2 project.

1.1 Approach to the Development of the Commercial Case

The DfT's guidance document, '*The Transport Business Case: Commercial Case*', outlines the areas that should be covered as part of the Commercial Case. Table 1.1 shows where the relevant information, in accordance with DfT requirements, can be found in the subsequent sections that make up the Commercial Case.

As with all construction projects, there is a need for time, cost and quality issues to be managed and their inevitable tensions balanced. The process of contract selection and formulation will help to ensure the scope and project specific risks are controlled through procurement.

Table 1.1: DfT Requirements for the Commercial Case at OBC Stage

Content	DfT Requirements	Section Number and Title
Introduction	Outline the approach taken to assess commercial viability.	1.1 Approach to the Development of the Commercial Case
Output based specification	Summarise the requirement in terms of outcomes and outputs, supplemented by full specification as appendix.	2. Output Based Specification
Procurement strategy	Detail procurement/purchasing options including how they will secure the economic, social and environmental factors outlined in the economic case	3. Procurement Strategy
Sourcing options	Explain the options for sources of provision of services to meet the business need e.g. partnerships, framework, existing supplier arrangements, with rationale for selecting preferred sourcing option.	3.2 Procurement Options – infrastructure 3.3 Procurement Options – Services 3.5 Procurement Options – Maintenance of Infrastructure
Payment mechanisms	Set out the proposed payment mechanisms that will be negotiated with the providers e.g. linked to performance and availability, providing incentives for alternative revenue streams. (See the Office for Government Commerce's Achieving Excellence briefing for advice on payment mechanisms for construction projects.)	4. Contract and Payment Mechanisms 4.1. Form of Contract
Pricing framework and charging mechanisms	To include incentives, deductions and performance targets.	5. Pricing Framework and Charging Mechanisms
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.	6. Risk Allocation and Transfer
Contract length	Set out scenarios for contract length (with rationale) and proposed key contractual clauses.	7. Contract length
Human resource issues	Personnel/people management/trade union implications, where applicable, including TUPE regulations.	8.5 Human Resources
Contract management	Provide a high-level view of implementation timescales. Detail additional support for in service management during roll-out / closure. Set out arrangements for managing contract through project / service delivery.	8. Contract Management

Source: DfT

2 Output Based Specification

The purpose of this section is to summarise the requirements of the CSET Phase 2 scheme in terms of its outcomes and the required outputs to achieve those outcomes, therefore meeting the scheme's objectives.

The transport, economic, social and environmental outcomes that the CSET scheme must achieve are:

- Reduced severance for pedestrians, cyclists and equestrians;
- Improved safety along the A1307 corridor for vehicles and NMU's;
- Increased levels of walking and cycling;
- Reduction in congestion at key pinch points;
- Improved access to land for housing and commercial development;
- Improved access to Cambridge Biomedical Campus, Babraham Research Campus and Granta Park;
- Reduced journey time reliability for journeys along the A1307 corridor by private car and public transport;
- Increased levels of public transport patronage; and
- Increased frequency of public transport services.

These outcomes will be achieved by provision of the following high-level scheme outputs:

- A new travel hub near the A11/A1307/A505, to give more opportunity for sustainable travel in addition to the existing Babraham Road Park & Ride;
- A new public transport route between the A11 and the Cambridge Biomedical Campus via Sawston, Stapleford and Great Shelford; and
- New walking, cycling and horse-riding links.

The outputs required for the Commercial Case are therefore:

- A procurement strategy that supports the Commercial Case objectives; and
- Procurement routes and sourcing options that deliver the required outcomes.

The subsequent sub sections of this Commercial Case discuss the approach to developing these outputs in line with the required objectives of the Commercial Case and outcomes of the scheme.

2.1 Commercial Case Objectives

CSET Phase 2 is one of a number of projects that form part of CAM Phase 1 and as such the commercial objectives for CSET need to support and align with the objectives of CAM Phase 1, which are noted below.

2.1.1 CAM Phase 1 Objectives and Outcomes

- Achieve cost certainty, or certainty that the Cambridge Autonomous Metro (CAM) Phase 1 can be delivered within the funding constraints;
- Minimise preparation costs in relation to scheme design;
- The scheme will be delivered within construction design standards that are defined within the contract;
- Obtain contractor input to risk management and appraisals, including mitigation measures, to capitalise at an early stage on opportunities to reduce construction risk and improve outturn certainty thereby reducing risks to a level that is as low as reasonably practicable; and
- Engagement with contractors and stakeholders throughout planning to scheme delivery.

2.1.2 CSET Phase 2

In order to demonstrate alignment with the objectives of CAM Phase 1 and support delivery of the scheme outcomes, the Commercial Case must achieve specific objectives. The primary objectives of the Phase 2 Commercial Case are to:

- **Achieve cost certainty** - and certainty that Phase 2 can be delivered within the funding constraints;
- **Minimise preparation costs** in relation to scheme design and construction delivery costs;
- **Deliver programme efficiency** - achieve an efficient delivery programme that enables start on site in 2022 and completion in 2025;
- **Ensure continuity of Project Knowledge** - Maintain project knowledge to support scheme design and successful rebuttal of any project challenge. The knowledge of the scheme and associated issues and constraints, generated through the development of the OBC, is seen as an asset and will help enhance quality of delivery and achievement of programme;
- **Minimise Risk** - Obtain contractor input to risk management and appraisals, including mitigation measures, to capitalise at an early stage on opportunities to reduce construction risk and improve outturn certainty, thereby reducing risks to a level that is as low as reasonably practicable;
- **Deliverability** - Engagement with contractors and stakeholders, throughout planning to scheme delivery, to support development of robust, buildable and deliverable proposals; and
- **Ensure quality** - Ensure the Greater Cambridge Partnership (GCP) receives a quality finished product for such a significant intervention in the city. Quality encompasses a range of factors, including:
 - System performance and reliability, which underpin the economic case;
 - Construction quality; and
 - Safety and compliance with statutory obligations, including environmental obligations.

These are the criteria by which procurement strategies and methods have been assessed and the subsequent sections detail the results of this assessment.

3 Procurement Strategy

This section provides insight into the procurement options for the CSET Phase 2 scheme and is an integral part of the project management process. The procurement strategy has been designed to ensure:

- Value for money: GCP is under a duty to secure value for money in all of its transactions;
- Compliance with legislation: a wide variety of UK and European Union legislation and regulations apply;
- Avoidance of fraud and corruption: procurement must be visible and tightly controlled to limit potential fraud and avoid any suggestion of corruption;
- The promoting / procuring authorities' vision and ambitions: procurement contributes directly to the delivery of GCP's vision and long-term ambitions;
- The Commercial Case objectives are fulfilled; and
- Flexibility: Allow for future schemes, development, innovation and new technology, ensuring GCP is not locked into long-term agreements.

3.1 Tendering Procedure

The Public Contracts Directive 2014 issued by the European Union was implemented in the UK through the Public Contracts Regulations 2015. Cambridgeshire County Council as the public authority responsible for procuring the CSET Phase 2 scheme on behalf of the GCP, are required to comply with these Regulations. The Regulations describe a number of options for procurement processes for contracts and the criteria that determine which of these options can be applied. The options given are:

- **Open Procedure** - bids for the contract are received from any applicant who fulfils certain minimum criteria. This procedure requires a fully developed scheme design and proposal and may result in the receipt of a large number of bids. This procedure allows an unlimited number of interested parties to tender against defined parameters. There are no restrictions (e.g. pre-qualification) on the parties who are permitted to tender, meaning that some parties may not be suitable to carry out the work. This procedure is straightforward and transparent but can attract a large number of potential bidders (which will require a greater degree of assessment and resource requirements). It also takes considerable time and resource, as well as limiting time for Early Contractor Involvement (ECI), and buildability input by the contractor.
- **Restricted Procedure** - applicants are required to submit a pre-qualification application from which a short list of the most suitable applicants is drawn up. Bids are invited only from those applicants on the short list. This is a two-stage procedure. The first stage allows the contracting authority to set the minimum criteria relating to technical, economic and financial capabilities that the potential bidders must satisfy and suppliers are alerted to express an interest to a contract opportunity by obtaining and submitting a Selection Questionnaire which is utilised used to establish such aspects as their capability, experience and suitability. The second stage involves shortlisted suppliers which meet the selection criteria being invited to tender. All tenders are evaluated in line with the methodology and award criteria set out in the tender documentation.
- **Competitive Dialogue Procedure** - this may be used where the needs of the contract cannot be met with readily available solutions and the Open or Restricted procedures are not considered suitable. In this case applicants are short listed but the solution for the scheme is developed with the applicants, at which point a reduced number of applicants are asked to submit a final tender. This procedure is appropriate for complex contracts where contracting authorities are not

objectively able to define the technical means capable of satisfying their needs or objectives; and / or are not objectively able to specify the legal and/or financial make-up of a project. This is a multi-stage procedure. The first stage is a pre-qualification to select the potential bidders to participate in the dialogue. In the second stage the contracting authority enters a dialogue with the potential bidders to identify and define the means best suited to satisfying their needs. Any aspect of the contract may be discussed, including technical requirements for the works to be delivered and the commercial / contractual arrangements to be used. The dialogue may be conducted in successive phases with the remaining bidders being invited to tender. By the end of the dialogue phase the contracting authority's requirements will have been determined such that the scheme can be tendered. In the final stage, the remaining bidders from the dialogue phase are invited to tender for the scheme.

- **Competitive Procedure with Negotiation** - this relatively new procedure is intended to be used where minimum requirements can be specified but negotiations with bidders may be needed to improve the initial tenders. The grounds for using this procedure are as follows:
 - Where needs cannot be met without adaptation of readily available solutions;
 - Where the contract includes design or innovative solutions;
 - Where the requirement is complex in nature, in its legal and financial makeup or because of its risks;
 - Where the technical specifications cannot be established with sufficient precision; or
 - In the case of unacceptable/irregular tenders.

Within this procedure, bidders initially submit tenders based on the information issued by the contracting authority. The contracting authority is then able to review the tenders it has received and negotiate with the bidders, following which the tenders will be resubmitted. This procedure may therefore be useful where the requirements are well developed initially and full tender documents can be produced, but it is felt that there may be advantage in retaining the ability to hold negotiations if there are certain aspects which bidders raise.

3.1.1 Preferred Tendering Procedure

This scheme is likely to be procured using the Restricted Procedure because it will be possible to publish a well-defined tender package for bidders to price against. The Restricted Procedure also has defined timescales for each stage which will allow GCP to ensure that the tenders can be received by the dates required by the overall project programme. A Direct Award is unlikely to be justified and an Open Tender Procedure has potential to attract multiple submissions with a protracted length of time required to evaluate tenders.

Whilst the Restricted Procedure is the likely procurement procedure, this will not be confirmed until Full Business Case (FBC) stage following further consideration of the procurement procedures available.

The implications of Brexit are not currently known but it is likely that after Brexit there will be no immediate change to public procurement rules in the UK.

3.2 Procurement Options - Infrastructure

The desired balance of risk is a key influence in the choice of procurement. The key criteria for risk are interdependent and often in tension:

- Time (speed or certainty of completion date);
- Cost (price level or cost certainty); and
- Quality (functionality and performance).

Time and cost will directly influence the procurement option and quality will be partly addressed through the tendering procedure. A pre-qualification process, based on the assessment of references and evidence of competence, will ensure the selection of appropriate companies that have demonstrated the necessary skills and experience to undertake the work. The following procurement routes have been considered:

3.2.1 Option 1: Traditional Contract

For this option, a designer would be appointed to complete a full detailed design. A tender would then be undertaken based on the detailed design. The appointed contractor would be responsible for construction only. A successful traditional contract requires certainty of buildable design information and that adequate time is made available to prepare the detailed design and provide the contractor with sufficient construction information. Consequently, for this method to be truly effective, full documentation needs to be in place before the contractor can be invited to tender.

The traditional arrangement allows close control of the design process by the GCP. However, as the construction contract is awarded based on the completed design, there is limited opportunity for the successful contractor to influence the design to reduce risks and cost. Although contractor input can be brought in during the design stage, it may not be relevant as the same contractor may not undertake construction. This form of contract can also limit the contractor's ability to use innovative construction methods which could result in savings and increased performance of the finished scheme. Separate contracts between the GCP and the parties providing the design and construction results in risks from any issues arising from the design resting, at least initially, with the client. Table 3.1 summarises the key points assessed for this option:

Table 3.1: Traditional Option Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Scope, anticipated costs and risk profile are well established prior to tender leading to more consistent tender returns. • No delay to scheme progression. • Allows for competitive tender. • Comparable in programme terms with design and build. • High client control over specification and quality. • GCP has more control over the contractor's work sequences and traffic management. • GCP have complete control over all design decisions. • Familiarity among contractors and consultants - the roles and responsibilities are well understood. 	<ul style="list-style-type: none"> • Design risk remains with GCP. • Design progressed without input from contractor that will deliver construction stage, buildability and phasing issued may not be assessed appropriately leading to redesign, cost increase and delay. • Requires strong technical expertise not available within GCP to deliver value for money. • There is limited resource within GCP to manage a detailed design. • There are significant design interfaces between the various work elements to be managed. • GCP exposed to delay risks associated with design interfaces. • To be effective, it requires the scheme to be more or less fully designed before tenders are sought - this may result in an extended pre-tender period. • The fragmented design and construction process and responsibility can lead to disputes, for example in respect of whether construction defects are really design defects or whether they are construction defects.

<ul style="list-style-type: none"> • GCP retains responsibility for and control of the design team. • There is direct reporting by the design team to GCP to ensure that quality control is maintained; and • There is certainty of price (if the work is fully designed in advance). 	<ul style="list-style-type: none"> • There is the potential for over-design and/or over-engineering; • The contractor is not involved in the design process and therefore is not required to 'buy in' to the design. • GCP retains responsibility for the design team performance. • A contractor may price the work to win the job rather than providing a price that properly reflects the work to be carried out. This can encourage a claims culture if the submitted price was too low because of market forces.
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Source: Mott MacDonald

3.2.2 Option 2: Design and Build

Under this option GCP would submit for tender the design developed during the statutory processes and pass it to the contractor to tender the detailed design and construction. A single stage design and build contract places the design and construction in one package. The contract is awarded based on a cost for the design and construction of the works, based on a design. This arrangement offers an incentive for the contractor to ensure that the design is buildable and can facilitate a quicker start on construction as work can commence before the design is complete, so long as it is sufficiently advanced. However, as the contractor must estimate the cost at tender stage based on preliminary design information, there is a risk that the actual cost for construction is different with the potential for contractual claims and disputes.

This method of procurement involves the contractor being responsible for the design as well as construction. It can be suitable for cost certainty and fast track construction. This approach is not suitable where the client brief is developing or for very complex projects. The main contractor takes responsibility for both design and construction and will use either in-house designers or employ consultants to carry out the design. The main contractor has a direct influence over the design process and as such takes on the associated risks. To ensure that the client obtains what they are seeking in respect of a finished project it is essential that the client specifies exactly what is required and checks that this is matched by what the contractor offers to provide.

Therefore, although it is not necessary for full documentation (including the design) to be in place before the contractor can be invited to tender, for carrying out the work it is important that the client's brief and requirements are clearly set out. The design and build procurement approach is popular as the liability for both the design and the build is with the contractor and there is less chance of liability for a defect falling in the gap between design and construction. Table 3.2 highlights the key advantages and disadvantages of the Design and Build Option.

Table 3.2: Design and Build Option Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Risks can be transferred to the contractor. • Less scope for variations in design compared with traditional tender. • Detailed design will be progressed with input to buildability and construction phasing. • No delay to scheme progression and option to retain OBC team to provide continuity of delivery. • Tender would be undertaken with more developed design information leading to more consistent tender returns. • Speed of delivery from concept to completed project. In its simplest form, design and build allows work on site to begin earlier (that is before the design is fully complete) than under traditional forms of contract. • Single point responsibility. The contractor is responsible for the design and the construction; Therefore, the GCP should have a single point of responsibility. • Acceptance of design. As the contractor is responsible for the design and the construction, the contractor and the supply chain are involved in the production of the design to be used, and hence 'buy in' to that design. • Cost certainty, as the contractor can use their experience and expertise in providing a design that allows them to buy goods and services at the best buying margins. • Unless a contract states otherwise, the law implies a duty of fitness for purposes on a design and build contractor. This is more onerous than the normal duty of 'reasonable skill and care' imposed on a design consultant. • Complex design interface risks lie with the contractor, who is best able to manage them. • Greater scope for private sector innovation. 	<ul style="list-style-type: none"> • Contractor risks are higher and may raise the price of the contract. This particularly relevant at early stages as the risk profile of the scheme is more uncertain. • Potential variation and challenge to existing design by appointed contractor. • GCP has less control and influence over design matters. • Inflexibility. There is only limited scope for the client to make changes to their requirements once the client's requirements and contractor's proposals have been agreed. • Design quality. As it is often perceived that the contractor is driven by price rather than by design standards, the design and build procurement route is not always the appropriate route to use where a high-quality design is required, unless a robust specification is included within GCP's requirements. • The question of the quality achieved can be an issue because of the lack of control that the client has over the designer. The designer acts for the contractor not for GCP.

Source: Mott MacDonald

3.2.3 Option 3: Early Contractor Involvement Two Stage Design and Build

Early Contractor Involvement (ECI) is a derivative of design and build but is used when engaging the contractor at an earlier time is seen to be advantageous to GCP. ECI is suited to projects that are not fully defined and where the contractor's knowledge and specialism is required to develop the design. This form of contract allows supplier engagement at an early stage of a project in order to draw in industry experience at the design and preparation stages. ECI contracts remain an option for major transport infrastructure schemes where there is significant scope for input from the supply chain.

Their knowledge and abilities to influence project decisions will have maximum impact in terms of project timing, quality and cost. In adopting this approach careful consideration of the choice of contractual conditions is required to ensure that appropriate clauses are in place at key milestones in the development of the design. The timing of the appointment of the contractor in the project development is important; the design should be sufficiently developed to enable estimates and assumptions to be prepared and the client brief sufficiently developed. ECI is not suitable where the brief and scope of the works is fully defined or for repetitive or maintenance related work.

It is a collaborative form of contract, which brings the contractor into the project team early, with the team working together through the design and construction phases. This provides benefits of ensuring that the contractor can use his experience in the design phase to reduce overall project risk and

ensure buildability. However, there are some significant differences compared with the single stage approach that provides a greater level of cost control and certainty.

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

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

The advantages are similar to those of design and build but can also provide the following as shown in Table 3.3.

Table 3.3: Early Contractor Involvement Two Stage Design and Build Option Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Benefits in assisting clients where there are complex design and buildability issues to be overcome at the preparatory stage of the scheme. • Bringing the contractor's experience to the project at key stages to influence the design. There is an increase in the scope for innovation as contractors can contribute to the development of the project. • High quality when all parties are able to contribute to the design at an early stage and health and safety risks are effectively managed. • Creation of an early design and development team, adopting a partnering approach, with increased transparency and therefore reduced risks and increased shared responsibility limiting the reasons for litigation. • Allows for early supplier engagement on a partnering basis. • Contractor is better placed to manage risk, having been involved from an early stage in the design process. • Allows for the incorporation of supplier skills and knowledge within the early stages of design. 	<ul style="list-style-type: none"> • Less cost certainty at tender stage and variations and changes to the scope of work made by the client at a late stage can be expensive. • Increased cost in contract management resources to administer the contract process. • Each party has different interests at the design stage which can lead to conflict or delay. • Although rates would be market tested, the target cost for the main construction works would be negotiated rather than competitively tendered.

Source: Mott MacDonald

3.2.4 Option 4: Design, Build, Operate and Maintain

In a Design, Build, Operate and Maintain (DBOM) arrangement, the private sector party is responsible for designing, building, operating and maintaining the project. Where major capital works are to be included in a contract with operational requirements, the suggested approach involves the authority procuring a consortium (building contractor and operator) that will take the lead and take on the risk in the design, construction and the operation of the new facility. Consortia bid for the contract, which is normally a long-term contract of 15 plus years and between them, deliver an optimum solution (in

terms of design, construction and operation) balancing capital costs and revenue costs. Table 3.4 highlights the key advantages and disadvantages of the DBOM Option.

Table 3.4: Design, Build, Operate and Maintain Option Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> • Suitable where private sector is better placed to manage maintenance (or O&M) risks. • Improved incentive to introduce innovation and encourages reduction in long term life cycle costs as some of the asset lifecycle risk is transferred to the contractor. • Contractor warrants design including 'fitness for purpose'; • There is a single point of accountability. • Offers a lower risk of cost overruns as the price is determined upfront for the period of the contract, including capital and O&M costs. • As a result of a greater emphasis on achieving an efficient whole of life costing, the DBOM model provides an improved scope for design and construction innovation. • The risk allocation regime and contractual structure associated with this model provides incentives to achieve on time completion. 	<ul style="list-style-type: none"> • Limited transfer of risk during construction as funding provided progressively. • Long-term nature of contracts prevents the flexibility required by GCP to allow for future innovation and new technology. • Risk of cost overruns and time delays is difficult to mitigate for GCP as liquidated damages associated with design and build may not provide as much incentive for the private sector to complete the works on time and on budget. • Limited meaningful transfer of risk with no capital at risk. • Tends to have longer tender periods than the other models as it is necessary to evaluate operation and maintenance risks. • GCP has a residual exposure to support the project should budget overruns occur.

Source: Mott MacDonald

3.2.5 Option 5: Management Contracting

This method of procurement is suitable for fast track and/or complex projects that have a developing brief. It is less suitable where cost certainty before starting construction is required and where the client wishes to transfer risk to the contractor. It is not considered that this method is suitable for further consideration for CSET Phase 2.

Further, procurement options involving private finance have not been considered as:

- Public funding is already identified and available thus there is no need; and
- The size of the scheme does not warrant the need for or expense of establishing a private finance model.

3.2.6 Procurement Option Assessment (Infrastructure)

To compare the five procurement options, levels of cost, time and quality certainty have been considered and rated as high, medium or low certainty levels for the project as shown in Table 3.5. Based in an initial assessment design and build has been selected, which will be subject to further review.

Table 3.5: Procurement Option Comparison (Infrastructure)

Procurement Option	Level of Certainty		
	Cost	Time	Quality
Traditional Contract	Medium / High	Medium / High	High
Design and Build	High	High	Medium / High
Early Contractor Involvement	Medium	Medium	High
Design, Build, Operate and Maintain	High	High	Low / Medium
Management Contracting	Low	High	Medium / High

Source: Mott MacDonald

3.2.7 Selection of Procurement Option (Infrastructure)

As part of the current stage of scheme development and for the OBC, design and build has been selected as the preferred procurement strategy. However, this is subject to further review as part of the next stage of work in developing the scheme and informing the FBC. The reasoning for selection of a design and build procurement method at this stage is discussed further below.

- This option allows the scheme programme to progress without significant delay during an involved procurement exercise. This allows some key programme activities to be progressed by the design team and will enable certainty of design in a shorter space of time.
- It also achieves an appropriate balance between design progression and contractor input. The design needs to progress sufficiently to allow a consistent basis for tendering between contractors but also allow contractor input to design before final contract award so that issues such as buildability and construction phasing can be appropriately addressed.

Adopting a design and build approach puts the responsibility for design, including integration, with the contractor and it would be the responsibility of GCP to define its requirements. In relation to the primary procurement objectives, the design and build model will provide GCP with more opportunity to drive value for money and more opportunity to transfer delay risk and interface risks to the contractor. Table 3.6 shows how that selected procurement option meets the required Commercial Case objectives.

Table 3.6: Preferred Procurement Option Alignment with Commercial Case Objectives

Commercial Case Objectives	Design and Build Procurement
Cost Certainty	Facilitates consistent tendering basis for procurement as design information is sufficiently progressed to compare between submissions.
Minimise Costs	Allows competition between interested parties and adoption of appropriate form of contract.
Programme	Allows progression of programme and contributes to achieving certainty on route alignment quickly.
Quality	Competition enabled will bring added value proposals and allows choice of delivery team based on experience and suitability.
Continuity of Knowledge	Allows option to maintain project team and knowledge accumulated.
Risk	Appropriate risk analysis and sharing enabled.
Deliverability	Allows contractor input to design leading to buildable designs.
Quality	Requires a detailed specification.

Source: Mott MacDonald

3.3 Procurement Options - Services

The operation of the current bus services along the CSET Phase 2 corridor is largely on a commercial basis. With regard to the new High Quality Public Transport (HQPT) services which are expected to operate on the CSET infrastructure, it is not the intention of GCP to be directly involved in their procurement and control as that is not within GCP's powers. The Local Transport Authority (LTA) that has the relevant powers is the Cambridgeshire & Peterborough Combined Authority (CPCA). The CPCA Mayor's recently commissioned Strategic Bus Review concluded that further work was required including procurement and completion of a Business Case to assess different delivery model options. Following completion of this latter piece of work, the CPCA Mayor is expected to make a decision on the future preferred option for delivering bus services in early 2021.

In advance of the Mayor's decision, the potential public transport operating models currently available for the CSET Phase 2 project have been identified and the following issues and key questions considered:

- Available operating models for providing services;
- Appetite in the market to engage with those models;
- Impact and influence on fares and patronage;
- Risks; and
- Commercial implications of objectives for clean high-quality transport such as high frequency services operated by high quality electric vehicles.

3.4 Potential Operating Models

An overview of potential operating models from the emerging Public Transport Operating Strategy are summarised in Table 3.7.

Table 3.7: Potential Operating Models

Models and Key Features	Options
Partnership <ul style="list-style-type: none"> • Infrastructure delivered by promoter • Vehicles provided by operator • Services delivered by operator wholly or mainly on a commercial basis • Obligations of promoter and operator set out in partnership agreement / scheme 	Voluntary Partnership Agreement (VPA) Advanced Quality Partnership Scheme (AQPS) Enhanced Partnership Plan and Scheme (EPP/EPS)
Procurement of Vehicles <ul style="list-style-type: none"> • Vehicles specified and procured by promoter • Owned or leased from finance provided by promoter • Leased to operator 	Finance or Operating Lease
Procurement of Operations <ul style="list-style-type: none"> • Vehicles provided by operator • Services delivered by operator under contract to the promoter 	Route-based Contracts Franchising Use of Transport and Works Act Powers
Integrated Procurement of Vehicles and Operations	See 'Table 9: Potential public transport operating models for CSET'
Integrated Procurement of Infrastructure, Vehicles and Operations	Design, Build, Operate and Maintain (DBOM)

Source: Mott MacDonald

In this Section the models and the options under each model are assessed in terms of their practicality and relevance to CSET Phase 2.

Voluntary Partnership Agreement (VPA) – not worthy of further consideration. This form of partnership is less prescriptive than the existing Cambridgeshire Guided Busway (CGB) Quality Bus Partnership (QBP) and does not enable the Local Transport Authority (LTA) to set standards for vehicles or service levels aligned with the objectives of the CSET Phase 2 scheme. It is limited to what operators can offer within the negotiation of an agreement and subsequently deliver, which may fall short of the standards sought to meet the scheme objectives.

Advanced Quality Partnership Scheme (AQPS) – worthy of further consideration. This form of partnership is more prescriptive than the existing CGB QBP and has the potential to go further in supporting the delivery of the CSET Phase 2 scheme objectives as set out in detail in the Strategic Case as standards for vehicles or service levels aligned with these objectives can be specified. The ability to specify requirements for vehicle emissions and the types of fuel or power used by vehicles is of relevance to the aspirations for the operation of electric or other zero-emission vehicles on the services using the CSET Phase 2 infrastructure.

Enhanced Partnership Plan and Scheme (EPP/EPS) – this approach is both more prescriptive than the existing CGB QBP and the AQPS option. However, the requirements for the EPP/EPS route in terms of the steps towards formal agreement suggest that there would be more advantage in the AQPS approach which requires less by way of plans and is more obviously applied to the CSET corridor. The EPP/EPS approach could be considered further if market engagement indicates an appetite for this.

Route-based Contracts and Franchising – further consideration of both is relevant, if the commercial market is unwilling or unable to deliver on the aspirations for the operation of electric or other zero-emission vehicles on the HQPT services using the CSET Phase 2 infrastructure.

The **EPP/EPS and Franchising** options also require further consideration in the light of the outcome of the CPCA Mayor's Strategic Bus Review and the potential operating models for the wider Cambridge Autonomous Metro (CAM) system.

Use of Transport and Works Act (TWA) Powers – relevant if a TWA is used to obtain powers to both construct the CSET Phase 2 infrastructure and operate services on this infrastructure. Offers control of the specification and provision of services, and some of the benefits of the franchising approach, while not being dependent on the outcome of the CPCA Strategic Bus Review.

Types of contract available under these models, are, in summary:

- Gross cost (maximises LTA control, but also its financial exposure - LTA retains revenue, operator receives payment for full cost of operation);
- Net cost (maximises operator's incentive to invest and grow patronage, limits LTA's financial commitment, as long as contract is stable - operator retains revenue);
- Diminishing subsidy (operator retains revenue, but has bid on basis of predicted growth in revenue being sufficient to cover reducing the subsidy over time); and
- Revenue share (operator retains revenue but has bid on basis of sharing any revenue above an agreed threshold).

Table 3.8: Potential Operating Models

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
Partnership <ul style="list-style-type: none"> Infrastructure delivered by promoter Vehicles provided by operator Services delivered by operator wholly or mainly on a commercial basis Obligations of promoter and operator set out in partnership agreement / scheme 	Voluntary Partnership Agreement (VPA)	Key Features <ul style="list-style-type: none"> Replaces Quality Bus Partnerships delivered under the basic powers within Transport Act 1985¹ A VPA is a joint agreement between the Local Transport Authority (LTA) and some/all local operators. Under a VPA, operator commitments/actions are linked to local authority commitments/actions which might include joint reviews to identify bus priority measures, LTA capital investment (typically in infrastructure, passenger information systems) and operator capital investment (typically in vehicles) or revenue expenditure on items such as service enhancements, driver training or marketing. LTA has no control over routes, timetables, frequencies or fares (other than for subsidised services). Normally there are no legal obligations on either party. The success of the arrangements depends on good working relationships between the local authority and bus operators. There needs to be consensus on what needs to be done and a degree of trust that everyone will deliver "their part of the bargain". Asset Ownership <ul style="list-style-type: none"> LTA controls on road and any off-road infrastructure, and back office for concessionary fares, Real Time Passenger Information (RTPI) systems etc. Operator owns/leases vehicles, depots etc., and back office for commercial ticketing schemes, on board systems. For a guided system, the LTA would own and maintain the guidance system infrastructure while the operator would own and 	Practicality <p>A VPA could be applied to the CSET Phase 2 project but this assumes that the core services are operated on a commercial basis (i.e. without subsidy – subsidy would imply some form of contractual relationship between the operator and the LTA) ².</p> Relevance <p>This form of partnership is less prescriptive than the existing Cambridgeshire Guided Busway Quality Bus Partnership (a statutory Quality Partnership Scheme within the meaning of Part II of the Transport Act 2000). It does not enable the LTA to set standards for vehicles or service levels and is limited to what operators are prepared to offer within the negotiation of an agreement and subsequently deliver.</p> <p>Given the limitations of a VPA as a model to support the delivery of the CSET Phase 2 scheme objectives, and the intention of CPCA to explore other options for bus service provision using the powers and opportunities provided by the Bus Services Act 2017, this option is unlikely to be appropriate for further consideration for the CSET Phase 2 project.</p>

¹ e.g. Milton Keynes where the council reconstituted the QBP signed in 2007 as a Voluntary Partnership Agreement (VPA) under the Transport Act 2000, as amended by Section 46 of the Local Transport Act 2008.

² A VPA would not preclude some services within the scope of the agreement, for example evening and Sunday services, being subsidised by and operated under contract to the LTA.

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<p>maintain any equipment required on the vehicles (e.g. guidewheels or sensors).</p> <p>Risk Allocation</p> <ul style="list-style-type: none"> • Risk for LTA that services are not to desired standard (e.g. frequency, hours of operation or vehicle quality) or do not meet the LTA objectives in other ways (e.g. fare discounts for disadvantaged groups). • Risk for LTA that operators do not meet service performance requirements. • Risk for LTA that services may be withdrawn if they are not commercially viable, putting pressure on LTA budgets. • Risk for operator that services provided on a commercial basis may not be viable. • Risk for operator that LTA is not able to meet its commitments. • Risk to both parties that patronage/cost modelling is over optimistic. • Risk that operator's return on investment is undermined by low quality competition from an operator that is not a party to the VPA. 	
	Advanced Quality Partnership Scheme (AQPS)	<p>Key Features</p> <ul style="list-style-type: none"> • An AQPS provides for a "stronger" partnership than the VPA model. • The AQPS is made by the LTA following consultation with operators and places a legal obligation on both parties to deliver on their commitments. Despite the legal obligations, the success of the arrangements depends on good working relationships between the local authority and bus operators. There needs to be consensus on what needs to be done and a degree of trust that everyone will deliver "their part of the bargain". • The LTA commits to take steps ("measures") to support local bus services (e.g. by investing in infrastructure, but not limited to this). 	<p>Practicality</p> <p>An AQPS could be applied to the CSET Phase 2 project but this assumes that the core services are operated on a commercial basis (i.e. without subsidy – subsidy would imply some form of contractual relationship between the operator and the LTA) ⁴.</p> <p>Relevance</p> <p>An AQPS is a development of the Quality Partnership Scheme model introduced by the Transport Act 2000 and successfully adopted for the existing Cambridgeshire Guided Busway.</p> <p>Many of the outcomes that an AQPS has the potential to deliver - such as better buses (e.g. Wi-Fi, lower emissions), improved passenger information, route branding and/or</p>

⁴ An AQPS would not preclude some services within the scope of the scheme, for example evening and Sunday services, being subsidised by and operated under contract to the LTA.

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> In exchange the bus operators are required to meet specific local standards. Operators that do not meet the required standards are unable to use infrastructure provided by the local authority and specified in the scheme. Such standards usually apply to a specific route or corridor, but an AQPS may cover a wider geographical area. The standards that may be specified in an AQPS are: <ul style="list-style-type: none"> Vehicle requirements Requirements about frequency or timing of services Requirements about maximum fares Requirements about emissions and the types of fuel or power used Specifying a ticketing structure and how passengers can pay for journeys Requirements for the provision of passenger Information Specifying how local bus services, fares or ticketing arrangements should be marketed or publicised. The LTA can only implement standards for service frequency and maximum fares if there are no outstanding “admissible objections”³ from operators who would be affected by the scheme. The LTA may refer a breach by an operator of the obligations of an AQPS to the Office of the Traffic Commissioner and the Traffic Commissioner may take enforcement action against the operator. An AQPS must remain in operation for at least five years. An end date must be specified but can be subsequently varied. There is no upper time limit. <p>Asset Ownership</p> <ul style="list-style-type: none"> LTA controls on road and any off-road infrastructure, and back office for concessionary fares, RTPI systems etc. 	<p>marketing, smart cards and contactless payments - are already being delivered by operator and LTA investment on the existing busway.</p> <p>This form of partnership is more prescriptive than the existing Cambridgeshire Guided Busway QBP and has the potential to go further in supporting the delivery of the CSET Phase 2 scheme objectives. However, care should be taken to set standards at a level that does not lead to operators responding in a way that is not intended and could undermine scheme objectives, e.g. by reducing commercial services or increasing fares.</p> <p>The ability to specify requirements for vehicle emissions and the types of fuel or power used by vehicles is of relevance to the aspirations for the operation of electric or other zero-emission vehicles on the High-Quality Public Transport (HQPT) services using the CSET Phase 2 infrastructure.</p> <p>An AQPS should therefore be given further consideration for the CSET Phase 2 project.</p> <p>An AQPS would not give the level of control over bus service provision envisaged in the CPCA Strategic Bus Review report.</p> <p>It is envisaged that the CPCA’s CAM network will be delivered and operational as soon as five years after the CSET Phase 2 scheme becomes operational. This five-year time period aligns well with the minimum duration of an AQPS and a scheme made for a period of five years could be varied to cover a longer period if required.</p>

³ The grounds for such objections are specified in regulations and include that it would not be commercially viable for that operator, acting in a competent and efficient manner, to provide services to the standard specified.

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> Operator owns/leases vehicles, depots etc., and back office for commercial ticketing schemes, on board systems. For a guided system, the LTA would own and maintain the guidance system infrastructure while the operator would own and maintain any equipment required on the vehicles (e.g. guidewheels or sensors). <p>Risk Allocation</p> <ul style="list-style-type: none"> Risk for LTA that services do not meet the LTA objectives in other ways (e.g. fare discounts for disadvantaged groups). Risk for LTA that operators do not meet service performance requirements. Risk for LTA that services may be withdrawn if they are not commercially viable putting pressure on LTA budgets. Risk for operator that services provided on a commercial basis may not be viable Risk to both parties that patronage/cost modelling is over optimistic. 	
	Enhanced Partnership Plan and Scheme (EPP/EPS)	<p>Key Features</p> <p>An Enhanced Partnership (EP) is an agreement between the LTA and the majority of the local bus operators in the area to work together to improve local bus services. It includes a clear vision of the improvements that the EP is aiming for (known as an EP Plan [EPP]) and accompanying actions to achieve them (set out in one or more EP Schemes [EPS]).</p> <p>The Enhanced Partnership Plan:</p> <ul style="list-style-type: none"> Analyses performance of the local bus market; Sets the geographical area or areas of application; Sets bus improvement objectives; Explains how long the proposals will last; Explains how the related scheme will achieve the plan objectives. <p>The Enhanced Partnership Scheme:</p>	<p>Practicality</p> <p>An EPP/EPS could be applied to the CSET Phase 2 project, but this assumes that the services are operated on a commercial basis (i.e. without subsidy – subsidy would imply some form of contractual relationship between the operator and the LTA).</p> <p>Relevance</p> <p>Many of the example outcomes for an EP cited by the Department for Transport (DfT) - better buses (e.g. Wi-Fi, lower emissions), improved passenger information, route branding and/or marketing, smart cards and contactless payments - are already being delivered by operator and LTA investment on the existing busway.</p> <p>A key outcome that is identified for the EPP/EPS model over the AQPS is the delivery of multi-operator tickets, including price setting, common ticket rules and fare zones and uniform discounts for apprentices and other groups.</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> Sets out the detailed actions to be taken by the authority; Sets out the operations requirements for services in the area, for example: vehicle specifications, branding, payment methods, ticketing structure and real-time information requirements; Sets out the route requirements for services in the area including frequency of services and timetables. <p>The bus operators must be given an opportunity to participate in the development of an EP and have a formal say on the process at several key stages. At these points the EP cannot proceed unless formal agreement from a defined proportion of operators is obtained.</p> <p>The EPP/EPS route places a legal obligation on both parties to deliver on their commitments. Once again, the success of the arrangements depends on good working relationships between the local authority and bus operators. There needs to be consensus on what needs to be done and a degree of trust that everyone will deliver "their part of the bargain".</p> <p>Asset Ownership</p> <ul style="list-style-type: none"> LTA controls on road and any off-road infrastructure, and back office for concessionary fares, RTPI systems etc. Operator owns/leases vehicles, depots etc., and back office for commercial ticketing schemes, on board systems. For a guided system, the LTA would own and maintain the guidance system infrastructure while the operator would own and maintain any equipment required on the vehicles (e.g. guidewheels or sensors). <p>Risk Allocation</p> <ul style="list-style-type: none"> Risk for LTA that services may be withdrawn if they are not commercially viable putting pressure on LTA budgets. Risk for LTA that operators do not meet service performance requirements. Risk for operator that services provided on a commercial basis may not be viable 	<p>This third level of partnership is more prescriptive than the existing Cambridgeshire Guided Busway QBP and should therefore be given further consideration for the CSET Phase 2 project.</p> <p>However, the requirements for the EPP/EPS route in terms of the steps towards formal agreement suggest that there would be more advantage in the AQPS approach which requires less by way of plans and is more obviously applied to the CSET corridor.</p> <p>An EPP/EPS would not give the level of control over bus service provision envisaged in the CPCA Strategic Bus Review report.</p> <p>It is envisaged that the CPCA's CAM network will be delivered and operational as soon as five years after the CSET Phase 2 scheme becomes operational. There are no set time limits for an EPP/EPS, but the initial duration of the EPP and associated schemes should be specified together with review dates.</p> <p>Summary</p> <p>DfT admit that most of what can be specified in an AQPS and an EPS can be delivered through a voluntary partnership - which can involve some, but not all, of the local bus operators - provided there is full agreement between the authority and all of the affected operators (for example the West Midlands and Liverpool City Region Bus Alliances, both of which are VPAs).</p> <p>The AQPS/EPS models are of benefit compared to a VPA where:</p> <p>Operators and the authority feel it would help for all parties to have a legislative obligation to deliver "their side of the bargain".</p> <p>There are concerns about operators' return on investment being compromised by the emergence of lower quality competing services.</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> Risk to both parties that patronage/cost modelling is over optimistic. 	
Procurement of Vehicles <ul style="list-style-type: none"> Vehicles specified and procured by promoter Owned or leased from finance provider by promoter Leased to operator by promoter 	Finance or Operating Lease	Key Features <ul style="list-style-type: none"> The vehicles for the route are specified and procured by the promoter. The promoter will need to work with the operator to ensure compatibility of on-board systems to avoid expensive retrofitting. Where the promoter has capital funding available for vehicles and there is certainty regarding the use of the vehicles for their full economic life, outright purchase may be an option. Otherwise, vehicles may be leased by the promoter from an asset finance provider. Finance and operating leases are off-balance sheet finance packages which generally exclude the provision of routine maintenance. The finance company always owns the vehicles and will claim any capital allowances available. Both types of lease are typically for periods of three to seven years. It would therefore be possible to align the primary period of a lease with the duration of a route-based contract if this does not exceed an initial period of seven years. Providing vehicles in this way for an 'operation only' contract requires great care in the contractual specification of responsibilities for maintenance and repairs to the vehicle(s), which would normally lie with the operator. The finance company will expect vehicles to be returned at the end of the lease period in a condition that allows them to be marketable for the age and mileage stated in the lease agreement. The conditions for return of the vehicle will be specified in the lease agreement and additional charges will apply if these are not met. 	Practicality <p>Specification and procurement of the vehicles by the promoter may be advantageous:</p> <p>If the vehicle specification proposed is significantly different to the typical specifications and standards for operators' existing fleets.</p> <p>If commercial operators have no history with the type of vehicle proposed and are unwilling to invest in an unproven product.</p> <p>Where the promoter has access to capital, but no funding to cover revenue costs, to enable the promoter to fund the capital cost of vehicles to reduce the revenue cost of their operation.</p> <p>If the operation on the CSET corridor is expected to be a precursor to a wider CAM network using different vehicles (i.e. the vehicles will only have a short life on CSET corridor services).</p> <p>If the services are operated on a contract/franchise basis. A finance lease would enable the promoter to procure and finance a bus fleet for use by the operator with rental costs spread over the duration of the new route contract if applicable.</p> Relevance <p>Further consideration is relevant, particularly in the event of early market soundings identifying a lack of appetite by operators for investment in clean vehicles to deliver HQPT services on the CSET corridor. However, a verdict on the relevance of this option may well be linked to the outcome of assessment of other options on the table.</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> In order to maximise the residual value of the vehicles it would be in the promoter's interest to ensure that they are maintained in good condition by the operator. It would therefore be advisable for the promoter to institute an annual independent audit of the vehicle fleet and maintenance systems and to include a mechanism within the contract regime to ensure that any issues arising from these audits were promptly addressed by the operator. At the end of the agreement the promoter could either simply hand the vehicles back to the finance company or negotiate an extended period of use in line with any contract extension granted to the operator. The principal differences between a finance lease and an operating lease are as follows: <ul style="list-style-type: none"> Finance Lease: <ul style="list-style-type: none"> The full cost of the vehicle is recovered over the lease period. The final cost to the promoter is not fixed but depends on the proceeds received from the sale of the vehicles at the end of the agreement. The promoter is thus exposed to the risk of the vehicles depreciating in value at a greater rate than expected and the sale proceeds falling short of the anticipated residual value at the end of the agreement At the end of the agreement the vehicle is either sold, with the lessee receiving the major share of the proceeds, or a secondary lease period can be negotiated in line with any contract extension granted to the operator. Operating Lease: <ul style="list-style-type: none"> The finance company takes the risk of the vehicle losing value. The finance company will build the estimated residual value of the vehicle at the end of the agreement term into the transaction. This means that monthly rental charges will be lower than for a finance lease. 	

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> The residual value of vehicles will be affected by their mileage and thus rentals will be based on an agreed mileage allowance with additional charges for excess mileage. A lease agreement for a period in excess of seven years could include provision for the mid-life refurbishment of vehicles, thus enhancing the residual value of the vehicles at the end of the agreement. There may be the option of sharing the residual value risk in return for a reduction in the monthly rental charge. This involves the expected residual value of the leased vehicles being agreed between the finance company and the customer at the outset of the lease. If the agreed residual value is not achieved or exceeded on disposal of the vehicles at the end of the lease, the resultant pain or gain is shared in accordance with a formula specified in the lease agreement. <p>Asset Ownership</p> <ul style="list-style-type: none"> If purchased outright, vehicle ownership lies with the promoter. If leased, the promoter will hold the leases for the vehicles, but ownership lies with the finance company. The LTA controls the back office for concessionary fares, RTP1 systems etc. The operator holds the vehicles on a lease from the promoter but will provide depots and back office for commercial ticketing schemes, on board systems. For a guided system, the LTA would own and maintain the guidance system infrastructure while the operator would maintain any equipment required on the vehicles (e.g. guidewheels or sensors). <p>Risk Allocation</p> <ul style="list-style-type: none"> If purchased outright, the residual value risk lies with the promoter. With a finance lease the residual value risk falls on the promoter. With an operating lease the residual value risk falls on the leasing company. 	

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> • Risk that vehicles, when returned to the promoter, are not in an acceptable condition to be returned to the leasing company or for handover to another operator. • Risk that vehicles when delivered require expensive retrofitting of on-board systems. • Risk to the operator that the vehicles provided by the promoter are unreliable and/or expensive to maintain. 	
Procurement of Operations <ul style="list-style-type: none"> • Vehicles provided by operator • Services delivered by operator under contract to the promoter 	Route-based Contracts	Key Features <ul style="list-style-type: none"> • LTAs have powers under the Transport Act 1985 to secure the provision of local bus services under contract where they consider this appropriate "to meet any public transport requirements within [their area] which would not in their view be met apart from any action taken by them for that purpose". In practice this means where it is considered socially necessary to have a bus service, but no bus operator will provide this service commercially. • The promoter or LTA will develop a specification for the required services to operate on the public transport corridor. • This could be fully detailed covering all aspects of the vehicle specification, routing, timetables, frequencies and fares or it could be less detailed, inviting bidders to suggest their own options. • The contract could be an 'operation only' contract with the promoter providing the vehicles and possibly other vehicle related infrastructure. • Contract length is limited by the Transport Act 2000 to eight years. • The contract could cover all services on the corridor or multiple contracts could be let. • Potentially this gives the LTA full control over all aspects of the services on the corridor. • Use of these powers to provide additional services on a corridor with existing commercial services is likely to be challenging and contentious with operators, particularly if the effect is to abstract revenue from these existing services. • Provides contractual obligations on both parties. 	Practicality <p>A route-based contract or set of contracts would be suitable for delivery of the services along the CSET corridor if:</p> <p>The commercial operation of an HQPT service supporting the delivery of the CSET Phase 2 scheme objectives cannot be achieved.</p> <p>The early years of operation are expected to be a precursor to a wider CAM network and a route/corridor-based contract would facilitate a stable period of operation encouraging passenger growth prior to future phases of CAM coming on stream in later years.</p> <p>The practicality of a route-based contract model may rely on a significant level of revenue funding to kickstart the operation in the early years. It is unlikely that funding on the required scale would be available within existing LTA revenue budgets, but where major developments are planned which would benefit from the new CSET Phase 2 public transport infrastructure, developer contributions may offer an alternative source of short-term kickstart revenue funding.</p> <p>In practice a route-based contract would be little different from a single route franchise.</p> Relevance <p>A route-based contract or set of contracts should be given further consideration for the CSET Phase 2 project. This would give much of the level of control over bus service provision envisaged in the CPCA Strategic Bus Review report on the two corridors but would not prevent competition from overlapping commercial services.</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<p>Types of Contract:</p> <ul style="list-style-type: none"> Gross cost (maximises LTA control, but also its financial exposure - LTA retains revenue, operator receives payment for full cost of operation) Net cost (maximises operator's incentive to invest and grow patronage, limits LTA's financial commitment, as long as contract is stable - operator retains revenue) Diminishing subsidy (operator retains revenue, but has bid on basis of predicted growth in revenue being sufficient to cover reducing the subsidy over time) Revenue share (operator retains revenue but has bid on basis of sharing any revenue above an agreed threshold). <p>Asset Ownership</p> <ul style="list-style-type: none"> LTA controls on road and any off-road infrastructure, and back office for concessionary fares, RTP1 systems etc. Operator owns/leases vehicles, depots etc., and back office for commercial ticketing schemes, on board systems. For a guided system, the LTA would own and maintain the guidance system infrastructure while the operator would own and maintain any equipment required on the vehicles (e.g. guidewheels or sensors). <p>Risk Allocation</p> <ul style="list-style-type: none"> Risk for LTA that tender price is greater than budget available. Risk of challenge to LTA if contracted services are deemed to be competing with commercial bus services. Risk for LTA that operators do not meet service performance requirements, however this would be significantly mitigated by the contractual performance regime. Revenue risk allocation depends on type of contract: <ul style="list-style-type: none"> Gross cost, also known as minimum cost (LTA has revenue risk, operator receives payment for full cost of operation) 	<p>There may be issues to consider in relation to integration with other services and abstraction of revenue from existing commercial services if new operators enter the local market as a result of the procurement process.</p> <p>In such circumstances there is a risk of the incumbent operators responding in a way that is not intended and could undermine scheme objectives, e.g. by reducing commercial services or increasing fares.</p> <p>It is envisaged that the CPCA's CAM network will be delivered and operational as soon as five years after the CSET Phase 2 scheme becomes operational. This five-year time period fits well with the typical length of a route specific contract which could be extended up to a maximum of eight years.</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> – Net cost, also known as minimum subsidy (operator has revenue risk, but risk to LTA if the operator has misjudged the situation) – Diminishing subsidy (operator has revenue risk, but risk to LTA if the operator has misjudged the situation) – Revenue share (operator has revenue risk, but risk to LTA if the operator has misjudged the situation). • Risk that the contracts are not sufficiently responsive to growth in demand, or patronage falling below forecast levels. 	
	Franchising	<p>The Bus Services Act 2017 provides Mayoral Combined Authorities (MCA) with the powers to implement bus franchising in their area – akin to the system operated by Transport for London.</p> <p>The relevant MCA requires consent from the Secretary of State for Transport before they can initiate the franchising process. The Secretary of State's role is to determine whether the authority has clear aspirations which will benefit passengers, a sensible plan in place and the right attributes to make franchising a success.</p> <p>If franchising is taken forward it is not a quick process. At a high-level, there are five key stages:</p> <ul style="list-style-type: none"> • Preparation of an assessment of the proposed franchising scheme – akin to the development of a transport business case including: <ul style="list-style-type: none"> – Requesting any relevant information required from operators to develop the assessment; – Commissioning a report to be prepared by an independent auditor on the assessment. • Consultation and engagement; • Responding to the consultation and, if the decision is to make a scheme, making and publishing the scheme. • Transition, including staff transfers; and • Implementation, including the operation of the service permit scheme. 	<p>Practicality</p> <p>The Bus Services Act powers envisage franchising being introduced over a wider area than the single route corridor of the CSET Phase 2 project. The preparation costs for a franchising scheme limited to the CSET corridor is likely to be prohibitive.</p> <p>CPCA is currently procuring work to review bus service delivery options and develop comparative business cases for a range of operational models, including franchising. The expected timescale for the completion of this work is to form the basis of a mayoral decision on the strategic future approach for bus delivery in early 2021.</p> <p>Some of the benefits of the franchising approach (in terms of control of the specification and provision of the services – at least at an individual route level) could potentially be achieved without the long process within the current “mixed economy” by using the existing tendering powers available to all LTAs.</p> <p>Relevance</p> <p>Given the potential timescale to get to implementation of a franchise scheme it should be given further consideration for the CSET Phase 2 project as it would give the control envisaged by the CPCA Mayor on the corridor.</p> <p>However, the “single corridor” nature of the project perhaps means that a franchise option should be considered across wider areas - CSET plus all bus services in the A1301/A1307 corridors.</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<p>Key Features</p> <p>If the franchising scheme is implemented, the franchise authority will have full control over the operational requirements for services in the area:</p> <ul style="list-style-type: none"> • Vehicle specifications; • Branding; • Payment methods and ticketing structure; • Real-time information requirements; • The route requirements for services in the area including frequency of services and timetables. • The franchising scheme provides contractual obligations on both parties. • The contracts let under the franchising scheme could be single route (as in London) or packages of routes (as is common in Europe). <p>Types of Contract:</p> <ul style="list-style-type: none"> • Gross cost (Maximises authority's control, but also its financial exposure - LTA retains revenue, operator receives payment for full cost of operation) • Net cost (Maximises operator's incentive to invest and grow patronage, limits authority's financial commitment, as long as contract is stable - operator retains revenue) • Diminishing subsidy (operator retains revenue, but has bid on basis of predicted growth in revenue being able to result in reducing the subsidy over time) • Revenue share (operator retains revenue but has bid on basis of sharing any revenue above agreed threshold). <p>Asset Ownership</p> <p>Asset ownership will depend on how the franchising scheme is structured but at its simplest could be this:</p> <ul style="list-style-type: none"> • LTA controls on road infrastructure, and back office for concessionary fares, RTPI systems etc. 	<p>It is envisaged that the CPCA's CAM network will be delivered and operational as soon as five years after the CSET Phase 2 scheme becomes operational. A franchising scheme is likely to be indefinite. The length of individual contracts awarded under such a scheme is flexible but requires further consideration.</p> <p>The potential operating models for the wider CAM network also require consideration, including the following questions:</p> <p>Is CAM to be operated under legislation governing the construction, operation and maintenance of buses, and to be delivered as part of a wider franchised bus network?</p> <p>Is CAM a mode in its own right, part of a system comprising rail, metro and a bus network?</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> Operator owns/leases vehicles, depots etc., and back office for commercial ticketing schemes, on board systems. For a guided system, the LTA would own and maintain the guidance system infrastructure while the operator would own and maintain any equipment required on the vehicles (e.g. guidewheels or sensors). <p>Risk Allocation</p> <ul style="list-style-type: none"> Risk for LTA of legal challenge to franchise scheme. Risk for LTA that tender prices are greater than budget available. Risk for LTA that aspirations are greater than budget available. Risk for LTA that operators do not meet service performance requirements, however this would be significantly mitigated by the contractual performance regime. Revenue risk allocation depends on type of contract: Gross cost, also known as minimum cost (LTA has revenue risk, operator receives payment for full cost of operation); Net cost, also known as minimum subsidy (operator has revenue risk, but risk to LTA if the operator has misjudged the situation). 	
	Use of Transport and Works Act powers	<ul style="list-style-type: none"> Subject to the project being a guided transport scheme within the scope of the Transport and Works Act 1992, a Transport and Works Act Order (TWAo) could be used to obtain the necessary powers to both construct and operate the scheme. The promoter could use operating powers provided by a TWAo to tender an operations contract without the limitations of the powers available to LTAs under the Transport Act 1985, Transport Act 2000 and Bus Services Act 2017. The options available for the form of such a contract, asset ownership and risk allocation would be similar to those outlined above for a route-based contract or a single route franchise. 	<p>Practicality</p> <p>This is a practical option for the project, subject to a Transport and Works Act Order granting operating powers being gained by the promoter.</p> <p>It offers some of the benefits of the franchising approach in terms of control of the specification and provision of the services, while not being dependent on the outcome of the work planned by CPCA to review bus service delivery options and develop comparative business cases for a range of operational models, including franchising.</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
		<ul style="list-style-type: none"> Alternatively, operating powers provided by a TWAO could be used to facilitate the delivery of operations through a Voluntary Partnership Agreement or an Advanced Quality Partnership Scheme. 	<p>Relevance</p> <p>The use of operating powers provided by a TWAO to tender an operations contract should be given further consideration for the project. This would give much of the level of control over service provision envisaged in the CPCA Strategic Bus Review report on the CSET corridor but would not prevent competition from overlapping commercial services not using the scheme infrastructure. There may be issues to consider in relation to integration with other services and abstraction of revenue from existing commercial services.</p> <p>There is a risk of bus operators providing existing commercial services on the corridor objecting to an application for a TWAO including operating powers that would enable the promoter to award exclusive rights to operate services using the scheme infrastructure.</p>
Integrated Procurement of Vehicles and Operations		This approach would combine options discussed above under procurement of vehicles and procurement of operations.	<p>The procurement of vehicles by the promoter would be a prerequisite for this. However, in circumstances where this has been determined to be appropriate and beneficial, an integrated approach to procurement of vehicles and operations would have the following advantages:</p> <p>Providing the opportunity to ensure that the length of an operating contract is aligned with the period for which vehicles are leased by the promoter.</p> <p>Enabling the risk of additional charges being imposed by the finance company if vehicles are not returned at the end of the lease period in the condition specified in the lease agreement to be transferred to the operator through the specification of contractual obligations for inspection, maintenance and repair of the vehicles.</p> <p>Enabling suppliers to bid with the benefit of prior knowledge of the technical specification and performance characteristics of the vehicles that they would be required to operate and maintain, the vehicle manufacturer's recommended preventive maintenance schedule and the condition in which the vehicles must be handed back at the end of the contract.</p>

Category	Option	Description	Gateway Assessment of Practicality and Relevance to CSET Phase 2
Integrated Procurement of Infrastructure, Vehicles and Operations		This approach goes beyond potential operating models	<p>From an operations perspective, a key factor influencing the relevance of this option to the CSET Phase 2 project is the complexity of the interfaces between the vehicles and infrastructure and the associated interface risks to the promoter.</p> <p>For schemes involving the operation of rubber-tyred large passenger vehicles on road-based infrastructure at ground level these interfaces, notably vehicle tracking and docking of vehicles with stop platforms, are not highly complex and well understood. Interface risks to the promoter are therefore likely to be low and manageable.</p> <p>The elements of the wider system infrastructure most closely linked to vehicles and operations are the vehicle depot and control room. If the vehicles are to be procured by the promoter there may be merit in the promoter also procuring and providing the depot. The provision of both vehicles and a depot would reduce barriers to a new operator entering the local market.</p>

Source: Mott MacDonald

3.5 Procurement Options - Maintenance of Infrastructure

Table 3.9 sets out and summarises the potential procurement options for the maintenance of infrastructure, with the advantages and disadvantages of each option.

Table 3.9: Maintenance of Infrastructure- Potential Procurement Options

Option no.	Option	Advantages	Disadvantages
1	Employer Managed/Maintained In-House	<ul style="list-style-type: none"> Employer has full control. "Value for money" solutions can be applied. 	<ul style="list-style-type: none"> Requires in-house capabilities (resources, infrastructure, equipment).
2	Employer Management of Approved Supplier(s)	<ul style="list-style-type: none"> Employer retains control over maintenance remedies. 	<ul style="list-style-type: none"> Delays in co-ordination of activities. Employer has less control over "value for money".
3	Employer Term Maintenance contract. Managing Agent Contractor (MAC)	<ul style="list-style-type: none"> Fully managed by MAC(s) who are experienced in maintenance. Reduction of employer risk. 	<ul style="list-style-type: none"> May not be as cost effective as options 1 and 2. Employer has little control over maintenance operations. Employer should monitor quality of maintenance to protect the asset.
4	Extension of construction contract Defects Liability Period	<ul style="list-style-type: none"> Continuity of contractor involvement. Contractor familiarity with assets. Advance agreement and allocation of costs. Reduction of employer risk. 	<ul style="list-style-type: none"> May not be as cost effective as options 1 and 2. Employer has little control over maintenance operations. Employer should monitor quality of maintenance to protect the asset.
5	Bus Service Operator Maintained	<ul style="list-style-type: none"> Operator able to manage maintenance operations to mitigate disruption to level of service. Reduction of employer risk. 	<ul style="list-style-type: none"> Operators may be inexperienced in maintenance of infrastructure. May not be as cost effective as options 1 and 2. Employer has little control over maintenance operations. Employer should monitor quality of maintenance to protect the asset.
6	Management company Joint Venture (Employer /Operator/MAC)	<ul style="list-style-type: none"> All parties have a common interest in maintaining assets. Employer has input into maintenance management. 	<ul style="list-style-type: none"> More difficult to set up contract. Decisions may take longer.
7	Management company Joint Venture (Employer/Operator/ Contractor) - Fixed Price	<ul style="list-style-type: none"> Employer and operator incentivised to protect assets. Contractor has familiarity with assets. Advance agreement and allocation of costs. Operator incentivised to provide high level of service. 	<ul style="list-style-type: none"> More difficult to set up contract. Decisions may take longer.

Source: Mott MacDonald

It should be noted that the option decided upon will depend to an extent on the arrangement used for the operation of the bus service, which is yet to be determined, as noted above.

3.6 Procurement to Date

Procurement to date has essentially been the commission of Mott MacDonald as developers of the preliminary scheme and Outline Business Case; Strutt & Parker as planning consents advisors, Pinsent Mason as legal advisors and Bruton Knowles as land agents and property advisors. No contractors have yet been commissioned for delivery of the physical infrastructure, vehicles or services.

3.7 Lessons Learned

The following subsections, set out in the form of case studies, review similar projects to CSET Phase 2 where lessons have been learned from experience and identify how this experience will aid in ensuring a smoother more streamlined procurement process for this scheme.

3.7.1 Case Study – Cambridge Guided Busway

The Cambridgeshire Guided Busway (CGB), connects Cambridge, Huntingdon and St Ives. It is the longest guided busway in the world.

Two guided sections make up 16 miles (25 km) of the route. The northern section uses the course of the former Cambridge and Huntingdon railway. The southern section uses part of the former Varsity Line to Oxford. Construction began in March 2007 and it was opened on 7 August 2011 after a succession of delays and cost overruns.

The parties to the construction contract, CCC and BAM Nuttall, had significant disputes on the cost of the works and the time for completion.

CCC commissioned EC Harris to undertake an independent review of the project with the objective of identifying any lessons that can be learned and used on future projects. This is documented in the report Cambridgeshire Guided Busway Independent Review, August 2014.

The main conclusions from the review were that:

- The contract conditions and contract administration were appropriate for the time. There have been subsequent improvements made to the New Engineering Contract (NEC) (now edition 4) and increasing use of Early Contractor Involvement (ECI) contracts to de-risk the project by engaging the contractor earlier in the design process.
- The procurement route and form of contract for the CGB project was to some extent driven by the funding regime dictated by DfT's major scheme funding requirements which discouraged an ECI form of contract.
- An ECI contract allows relationships to be built up between client, contractor and the contract administrator. It also allows the contractor to contribute to the design process to ease buildability and enough time to properly plan and de-risk the project, thus overall ensuring delivery to time and budget, if not improving on time and budget.
- At present there remains a significant risk to a Local Authority if, having engaged an ECI contractor to develop the design and de-risk the project the scheme ultimately fails to gain Full Approval from the DfT, in which case the Local Authority is left with a major cost with no benefit.

Relevance to CSET

In May 2019 Mott MacDonald and representatives from GCP undertook a lessons learnt workshop covering all GCP major schemes and previous schemes such as the CGB. Most lessons learnt were more related to contractual matters than procurement strategy although some important features included:

- Gateway reviews are a key tool in scheme development and GCP will continue to adopt this review process in the development of procurement strategies;
- Risk allocations developed within overall procurement strategies should not be modified during contract execution without full understanding of the employer's exposure;
- Procurement should consider how interface risks with external parties are best managed;
- Procurement should consider how to commission services prior to 'final' handover of fixed infrastructure;
- Mechanisms to encourage innovation and efficiencies should be considered early in the procurement/contract strategy process;
- Some aspects of scheme delivery have greater exposure to unforeseen delay (e.g. civil engineering works and weather) and this needs to be taken into account;
- Novation of specific disciplines should be considered if benefits would accrue; and
- Procurement should allow for a final 'benefit realisation' phase.

3.7.2 Case Study – Leigh Salford Manchester Busway

The Leigh Salford Manchester (LSM) Busway opened in April 2016 and has delivered a HQPT service linking Leigh, Atherton, Tyldesley, Ellenbrook, Salford and Manchester via a guided busway and on-highway bus priority measures.

Services run on 21 km of segregated bus measures, of which 7.5 km, between Leigh and Ellenbrook, is a kerb-guided busway, with the remainder on-highway.

The scheme includes:

- A guided section including seven pairs of high-quality stops;
- Park and Ride sites at three locations;
- Enhanced passenger waiting facilities at Leigh Bus Station;
- Highway and bus priority improvements;
- A new premium bus service between Leigh, Atherton, Tyldesley and Manchester city centre; and
- Extensive pedestrian and cycling improvements along the corridor.

Construction started in 2013 and services commenced in 2016.

The procurement strategy implemented the scheme through a range of contractual (conventional design and construct and design and build) packages and responsible authorities which are highlighted in Table 3.10.

Table 3.10: LSM Busway Contractual Packages

Option no.	Option	Advantages	Disadvantages
1	Employer Managed/Maintained In-House	<ul style="list-style-type: none"> Employer has full control. “Value for money” solutions can be applied. 	<ul style="list-style-type: none"> Requires in-house capabilities (resources, infrastructure, equipment).
2	Employer Management of Approved Supplier(s)	<ul style="list-style-type: none"> Employer retains control over maintenance remedies. 	<ul style="list-style-type: none"> Delays in co-ordination of activities. Employer has less control over “value for money”.
3	Employer Term Maintenance contract. Managing Agent Contractor (MAC)	<ul style="list-style-type: none"> Fully managed by MAC(s) who are experienced in maintenance. Reduction of employer risk. 	<ul style="list-style-type: none"> May not be as cost effective as options 1 and 2. Employer has little control over maintenance operations. Employer should monitor quality of maintenance to protect the asset.
4	Extension of construction contract Defects Liability Period	<ul style="list-style-type: none"> Continuity of contractor involvement. Contractor familiarity with assets. Advance agreement and allocation of costs. Reduction of employer risk. 	<ul style="list-style-type: none"> May not be as cost effective as options 1 and 2. Employer has little control over maintenance operations. Employer should monitor quality of maintenance to protect the asset.
5	Bus Service Operator Maintained	<ul style="list-style-type: none"> Operator able to manage maintenance operations to mitigate disruption to level of service. Reduction of employer risk. 	<ul style="list-style-type: none"> Operators may be inexperienced in maintenance of infrastructure. May not be as cost effective as options 1 and 2. Employer has little control over maintenance operations. Employer should monitor quality of maintenance to protect the asset.
6	Management company Joint Venture (Employer /Operator/MAC)	<ul style="list-style-type: none"> All parties have a common interest in maintaining assets. Employer has input into maintenance management. 	<ul style="list-style-type: none"> More difficult to set up contract. Decisions may take longer.
7	Management company Joint Venture (Employer/Operator/ Contractor) - Fixed Price	<ul style="list-style-type: none"> Employer and operator incentivised to protect assets. Contractor has familiarity with assets. Advance agreement and allocation of costs. Operator incentivised to provide high level of service. 	<ul style="list-style-type: none"> More difficult to set up contract. Decisions may take longer.

Source: Mott MacDonald

3.7.3 Case Study – Luton to Dunstable Busway

The Luton Dunstable Busway is a 10 km bus only road that runs from Luton to Houghton Regis in Bedfordshire. It provides a quick and efficient way for passengers to travel between two main town centres, using the disused Luton-Dunstable railway corridor.

The work included the construction of seven new bridges and refurbishment/reconstruction of three bridges along the route, the construction of four new high specification bus stops and a major bus interchange at Luton Railway Station - resulting in links to Luton Town Centre, the railway network and providing easy access to Luton Airport.

A 7.5 km section of the busway is ‘guided’, through which buses use a fixed corridor formed from 6 m long precast concrete beams.

A design and build contract was awarded on 10 May 2010 and the busway was successfully handed over to Luton Borough Council on 16 September 2013.

An integrated joint venture design team supported the main contractor on the tender design of the busway, detail design, construction details, as-built drawings and site support.

3.7.4 Case Study – Belfast Glider

Glider is a bus rapid transit system in Belfast, Northern Ireland, designed to improve the efficiency of mass transit in the city by connecting East and West Belfast and the Titanic Quarter via the city centre. The service is operated by Translink. Translink is the brand name of the Northern Ireland Transport Holding Company (NITHC), a public corporation in Northern Ireland which provides the public transport in the region. NI Railways, Ulsterbus and Metro are all part of Translink.

There are two routes, G1 (West to East Belfast) and G2 (city centre to Titanic Quarter). The busways total 15.2 miles (24.5 km) in length using both dedicated bus lanes and mixed traffic lanes. Costing approximately £100m of public funds, construction started in 2014, with the system opening in late 2018.

In 2014 the first construction began on the transit system and by 2015 several sections were partially built.

In December 2015, the Northern Ireland Executive confirmed that the project would go ahead as planned. Because of budget restrictions, the opening of the system was delayed until 2018.

Infrastructure was procured primarily through a series of conventional design and construction contracts. Van Hool NV were awarded a contract to supply a fleet of 30 articulated vehicles.

Relevance to CSET

Moving into the next phase of scheme development for CSET Phase 2, GCP and the project team shall look to actively engage with the promoters of the aforementioned schemes to understand in further detail, the lessons that can be learnt and best practice that relates to this project.

3.8 Procurement Timescales

Table 3.11 to Table 3.13 illustrate key dates in the procurement process for infrastructure, vehicles and services. No decision has been made as to who will procure vehicles or provide the ongoing public transport service for CSET, and it is not assumed that GCP or CCC will be responsible for their purchase. However, the purchase of vehicles and the provision of services is an integral part of the scheme and as such indicative timescales of when they might be procured are given alongside timescales for infrastructure procurement.

Table 3.11: Procurement Timescales (Infrastructure)

Key Task	Start Date	End Date
Preparation	13-Dec-21	25-Mar-22
Reference design	20-Dec-21	18-Mar-22
Market engagement day	09-Nov-21	09-Nov-21
Expressions of interest (PQQ)	24-Jan-22	25-Feb-22
Return and assessment	28-Feb-22	25-Mar-22
Invitation to tender	28-Mar-22	01-Apr-22
Tender period	04-Apr-22	03-Jun-22
Return and assessment	06-Jun-22	23-Sep-22
Standstill Period (two weeks)	26-Sep-22	07-Oct-22
Award date	10-Oct-22	

Source: Mott MacDonald

Table 3.12: Procurement Timescales (Vehicles)

Key Task	Start Date	End Date
Prepare vehicle specification	30-Oct-23	08-Dec-23
Market engagement day	18-Dec-23	18-Dec-23
Prepare tender documents	02-Jan-24	26-Jan-24
Issue invitation to tender	29-Jan-24	29-Jan-24
Tender period	29-Jan-24	05-Apr-24
Closing date	05-Apr-24	05-Apr-24
Evaluation period	08-Apr-24	05-Jul-24
Standstill period (two weeks)	08-Jul-24	19-Jul-24
Award date (nine months to build/supply)	22-Jul-24	22-Jul-24
Operator receives vehicles	21-Apr-25	21-Apr-25
Start of notification to LTA ⁵ /Traffic Commissioner	21-Apr-25	30-Jun-25
Construction completion/handover date	21-May-25	
Service start date	30-Jun-25	

Source: Mott MacDonald

Table 3.13: Procurement Timescales (Services)

Key Task	Start Date	End Date
Prepare service specification	15-Apr-24	24-May-24
Market engagement day	03-Jun-24	03-Jun-24
Prepare tender documents	10-Jun-24	05-Jul-24
Issue invitation to tender	08-Jul-24	08-Jul-24
Tender period	08-Jul-24	13-Sep-24
Closing date	13-Sep-24	13-Sep-24
Evaluation period	16-Sep-24	13-Dec-24
Standstill period (two weeks)	16-Dec-24	27-Dec-24
Award date (six months to mobilise)	02-Jan-25	02-Jan-25
Start of notification to LTA*/Traffic Commissioner	21-Apr-25	30-Jun-25
Construction completion/handover date	21-May-25	
Service start date	30-Jun-25	

Source: Mott MacDonald

3.9 Procurement Method Comparisons (Consultant and Contractor Services)

This section sets out the in-principle strategy for procurement of consultant and contractor services to deliver the CSET Phase 2 scheme. Consultant services extend to design and advisory services to GCP and contractor services include construction of the scheme.

The highways industry uses a number of recognised procurement methods for delivering civil engineering and highway schemes. Each procurement method can be used for selecting a Service Provider.

Several procurement methods, in this instance Frameworks, have been considered for the CSET scheme. These options are set out in Sections 3.9.1 and 3.9.2 alongside the advantages and disadvantages of each.

3.9.1 Contractor Framework Contracts

Several framework contracts available for appointment of contractors have been considered. These options are set out in Table 3.14 alongside the advantages and disadvantages of each.

⁵ LTA = Local Transport Authority; On this timeline the operator will receive the vehicles 10 weeks before the service starts

Table 3.14: Advantages and Disadvantages of Existing Framework Contracts for Appointment of Contractors

Framework	Advantages	Disadvantages
<p>Eastern Highways Alliance (EHA)</p> <p>Note: Framework concluded March 2020. Replacement date is pending (led by Essex County Council)</p>	<ul style="list-style-type: none"> Cambridgeshire County Council is a member of the EHA Framework is tried and tested in Cambridgeshire The framework has been designed to meet the requirements of current and potential future Alliance members for project delivery specifically in terms of cost, quality, and timescales 	<ul style="list-style-type: none"> Framework contract due to expire on 31/03/20 though we have been advised that it will be re-tendered to extend beyond this date Framework is designed to deliver construction projects costing between £2m and £20m. Estimated construction cost of all the options are in excess of £95m. However, schemes above £20m might be acceptable subject to approval by the EHA Board
SCAPE Civil Engineering Construction Framework	<ul style="list-style-type: none"> The framework is available to local authorities and other public sector bodies SCAPE is an organisation originally set up by a group of Local Authorities in 2006 to deliver greater value for money in the procurement of major building works. They have since diversified into other areas setting up national frameworks for services such as facilities management, project management, QS services and minor works. The SCAPE Group Ltd is still a local authority owned company. These frameworks are open to all public-sector bodies but are specifically tailored towards Local Government Authorities Framework is designed to deliver construction projects costing between £50k and £100m plus Framework free to employers Nationally competitively tendered framework on fixed overheads, profit and preliminaries basis Financial and time savings that are achieved by not having to carry out an OJEU procurement exercise Ability to leverage same advantages of ECI; however, with only one supplier (Balfour Beatty) Sub contracted works packages are carried out via an open book process which allows the client a level of scrutiny and control over who is appointed to carry out works packages 	<ul style="list-style-type: none"> Framework based on a single source direct appointment (Balfour Beatty), i.e. no competitive tender. (The framework includes rates for 'preliminaries' costs with construction rates 'market tested'). Potential that the value for money from the main construction contract may be impacted by awarding the contract to a single supplier Dependence on a single supplier and their associated supply chain Lack of competition when the design and build contract is let Fixed set of 'added value' offered from a single supplier Restricts evaluation of approaches achieved via OJEU tender Opportunity for added value and innovation is reduced
Cambridgeshire County Council's Highways Service Contract	<ul style="list-style-type: none"> The delivery programme can be communicated to existing framework contractors (Skanska) and they can mobilise accordingly. Economies of scale / efficiencies resulting from long-term understanding of local needs and policies. The project maintains the current programme Direct award on agreement of target cost thus increased efficiency in procurement process. 	<ul style="list-style-type: none"> There are 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.

Source: Mott MacDonald

3.9.1.1 Preferred Method for Appointment of Contractors

These routes generally require significant time to do the necessary internal audit checks, delaying procurement. In addition, on other regional frameworks it may not be possible to meet the criteria to join or make use of the framework in the scheme delivery timescales.

None of the framework contracts detailed above can be recommended for appointment of a contractor for delivery of CSET Phase 2 for the following reasons:

- The estimated construction cost of the CSET scheme is greater than the maximum contract value applicable to the EHA framework, although it is possible that the scheme might be approved by the EHA Board.
- The SCAPE framework is based on a single source direct appointment and as such would not give rise to value for money on a commission of this scope.

The availability of suitable frameworks for the appointment of contractors will continue to be reviewed and the preferred method for appointing contractors confirmed at the FBC stage following further assessment.

3.9.2 Consultancy Framework Contracts

GCP may also wish to appoint a consultant, or consultants to provide them with design advice, undertake the role of project manager during construction of the scheme, act as technical approval authority, etc. leading up to and following appointment of a design and build contractor. Given this, several framework contracts currently available for the appointment of consultants have been considered. These options are set out in Table 3.15 alongside the advantages and disadvantages of each.

Table 3.15: Advantages and Disadvantages of Existing Framework Contracts for Appointment of Consultants

Framework	Advantages	Disadvantages
ESPO Consultancy Services Framework	<ul style="list-style-type: none"> • The ESPO framework is compliant with UK/EU procurement legislation. • The framework is not due to expire until 18/04/21. • GCP does not need to run a full EU procurement process. • The service providers on the framework have been assessed during the procurement process for their financial stability, track record, experience and technical & professional ability. • GCP and the service providers have pre-agreed terms and conditions. • ESPO framework tenders have been scored taking into account price and quality factors to determine the most economically advantageous bid. This gives service providers providing high quality services with an opportunity to be awarded a contract even though they may not be the lowest price. • GCP can award a professional services contract direct to a member of the ESPO framework with no limit on value. • GCP can create competition between suitable framework service providers to create competitive tension via the use of a mini-competition. 	<ul style="list-style-type: none"> • GCP is restricted in the value of any direct award by their own financial standing orders when using the direct award approach. • Suppliers pay a levy of 1.0% of fees to ESPO to manage the framework. • Lack of competitive tension if direct award.

	<ul style="list-style-type: none"> GCP and the service provider are able to collaboratively negotiate project specific terms and conditions by the inclusion of replacement clauses. GCP can create competition between suitable framework service providers to create competitive tension. The Lot structures and the ability to tailor further competitions will ensure this supports customers' own delivery considerations such as SMEs and social value. Maximum standard rates are fixed for the first two years of the framework and may be reduced further by suppliers in the pricing models through competitive rates and continuous improvement measures. 	
ConsultancyOne Framework	<ul style="list-style-type: none"> The ConsultancyOne framework is compliant with UK/EU procurement legislation. The service providers on the framework have been assessed during the procurement process for their financial stability, track record, experience and technical and professional ability. GCP and the service provider are able to collaboratively negotiate project specific terms and conditions by the inclusion of replacement clauses. GCP can create competition between suitable framework service providers to create competitive tension. 	<ul style="list-style-type: none"> Large number of pre-approved organisations thus potential for substantial time loss at assessment stage.
Homes England Framework	<ul style="list-style-type: none"> GCP can award a professional services contract direct to a member of the Homes England framework up to the value of £15k. The Framework is not due to expire until February 2022. Framework free to Employers. 20 multi-disciplinary consultants on the approved supplier list. A prequalification process could be used to reduce the number of tenderers for mini-competitions. GCP can create a mini-competition between suitable framework service providers. The day rates for a Professional Services supplier are pre-agreed between GCP and the services provider. GCP and the service provider are able to collaboratively negotiate project specific terms and conditions by the inclusion of replacement clauses. 	<ul style="list-style-type: none"> GCP is restricted to £15k fee limit when using the direct award approach. Lack of competitive tension if direct award.
Cambridgeshire County Council Professional Services Framework	<ul style="list-style-type: none"> Bespoke Cambridgeshire County Council Framework Covers surveys and professional services for <ul style="list-style-type: none"> Cambridgeshire and Peterborough Combined Authority Cambridgeshire County Council Greater Cambridge Partnership (GCP) 	<ul style="list-style-type: none"> Framework not yet in place - expected to be procured for Q2 2020.

	<ul style="list-style-type: none"> Framework procured through competitive process. 	
Crown Commercial Services (CCS) Project Management and Full Design Team Services (PMFDTS) Framework	<ul style="list-style-type: none"> The framework is the recommended route for all central government departments and is available to local authorities and other public sector bodies The framework is not due to expire until 02/05/21 Framework free to GCP GCP can award a professional services contract direct to a member of the framework with no cap on fees GCP can create competition between suitable framework service providers to create competitive tension The Lot structures and the ability to tailor further competitions will ensure this supports customers' own delivery considerations such as SMEs and social value Maximum standard rates are fixed for the first two years of the framework and may be reduced further by suppliers in the pricing models through competitive rates and continuous improvement measures. Savings results will be shared with customers regularly 	<ul style="list-style-type: none"> Challenging terms and conditions for consultants Lack of competitive tension if direct award

Source: Mott MacDonald

3.9.2.1 Preferred Framework for Appointment of Consultants

The preferred framework for appointment of a Consultant for technical support remains to be determined however it is likely to be either:

- ESPO Consultancy Services Framework; or
- Cambridgeshire County Council Professional Services Framework

A decision will be made once the procurement of the new Cambridgeshire County Council Professional Services Framework has been completed and this framework is available for use.

4 Contract and Payment Mechanisms

Payment mechanisms under UK construction contracts are governed by Part II of the Housing Grants, Construction and Regeneration Act 1996 and the Scheme for Construction Contracts (England and Wales) Regulations 1998. All the forms of contract considered for this scheme have mechanisms which comply with this legislation.

The payment mechanism used is to a large extent determined by the form of contract selected and the level of risk to be apportioned to the parties.

4.1 Form of Contract

There are three forms of contract that have been widely used in the UK for major civil and highway engineering schemes over the last 20 years. These are commonly known as:

- Infrastructure Conditions of Contract (ICC);
- Joint Contracts Tribunal (JCT); and
- New Engineering Contract (NEC) published by the Institution of Civil Engineers.

These are detailed in the following sub-sections:

4.1.1 Infrastructure Conditions of Contract (ICC)

The ICC Conditions of Contract is a re-badged version of the Institution of Civil Engineers (ICE) 7th Edition Conditions of Contract which is sponsored by the Association of Consultancy and Engineering (ACE) and Civil Engineering and Contractors Association (CECA).

The ICE 7th Edition has now been updated to ICC 2011 and is based on the traditional pattern of employer designed works constructed by the contractor and paid through re-measurement.

4.1.2 Joint Contracts Tribunal (JCT)

The JCT produces a range of contracts for construction, guidance notes and other standard documentation for use in the construction industry. The JCT contracts comprise a suite of mutually consistent contracts which enable them to be used together. These include:

- Designer agreements;
- Main contracts between the employer and the main contractor;
- Sub-contracts between the main contractor and its sub-contractors. Includes for both sub-contractors selected by the employer and for other sub-contractors;
- Standard forms of sub-sub-contract between a sub-contractor and such sub-contractor's sub-sub-contractors;
- Design agreements between an employer and a specialist designer;
- Forms of tender for issue by an employer to prospective main contractors and for issue by a main contractor to prospective sub-contractors and for issue by a sub-contractor to prospective sub-sub-contractors;
- Forms of contract for the supply of goods; and
- Forms of bond, including performance bonds and collateral warranties.

JCT contracts tend to be used for building contracts rather than civil engineering and highways contracts. However, some local authorities favour this suite of contracts due to a lack of in-house expertise in other forms of contract.

4.1.3 New Engineering Contract (NEC)

The NEC is a family of contracts that facilitates the implementation of sound project management principles and practices as well as defining legal relationships. It is suitable for procuring a diverse range of works, services and supply, spanning major framework projects through to minor works and purchasing of supplies and goods. 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.

The NEC was developed to offer an improvement on traditional forms of contracts. The strengths of the NEC can be summarised as follows:

- **Flexibility** - the NEC Professional Services Contract (PSC) can be applied to a 'design only' contract. The NEC Engineering Construction Contract (ECC) can be applied to all engineering disciplines and includes the option for contractor design with a variety of options for financial arrangements for arranging for payment to the Contractor.
- **Clarity and simplicity** - the NEC uses words that are commonly used. It reduces the number of clauses compared with other forms of contract. It uses shorter sentences and does not cross reference clauses.
- **Stimulus to good management** - the concept of the ECC is that its implementation contributes to the effective management of the work. It promotes cooperative management of the interactions between the parties and can reduce the risks for all parties that are inherent in the work.
- **Sub-contracts** - the ECC has been designed so that works can be sub-contracted and provides separate contracts for construction and design services.
- **Nominated sub-contractors** - the ECC precludes nominated sub-contractors to eliminate the clouding of responsibility that the process of nomination causes. This approach reduces disputes and strengthens the motivation for the parties to manage their activities.
- **Financial control** - both the PSC and the ECC use the activity schedule or bill of quantities as a mechanism for payment to the contractor for works done.
- **Cost certainty.**

The NEC ECC form of contract has been recommended by the Office of Government and Commerce (OGC), the Cabinet Office UK and is Highways England's contract of choice on prestigious construction projects.

The relative advantages and disadvantages of the three forms of contract are summarised in Table 4.1.

Table 4.1: Comparison of Forms of Contract

Form of Contract	Advantages	Disadvantages
ICC	<ul style="list-style-type: none"> Encourages co-operation between parties Contractor takes full responsibility for nominated sub-contractors 	<ul style="list-style-type: none"> Lump sum terms can result in contractors allowing for costs for risks that do not arise No Early Warnings – retrospective approach to risk mitigation
JCT	<ul style="list-style-type: none"> Potentially more familiar to Local Authority officers Ground risk rests with the contractor Clear payment section Comprehensive detail regarding insurances 	<ul style="list-style-type: none"> Emphasis on the obligations of the parties under the contract Programme – not a contractual document and updates of the initial programme are not mandatory Time and financial aspects of claims are dealt with separately No Early Warnings – retrospective approach to risk mitigation Contractor only obliged to make a claim after the risk event has occurred No obligation to notify regarding defects Contractors may include costs for risks that do not arise due to risk transfer Tends to be used for building contracts rather than civil engineering and highways contracts
NEC	<ul style="list-style-type: none"> Clarity and simplicity – written in plain English Flexibility – adaptable to various forms of construction Stimulus to proactive management Encourages co-operation between parties The programme – a key contractual document which must be regularly updated Early Warnings – promotes proactive approach to problem resolution Obligation on both parties to notify each other regarding defects 	<ul style="list-style-type: none"> Requires substantial administration with higher administration costs as a consequence Processes are prescriptive Significantly less case law to provide guidance in dispute resolution compared with other forms of contract Employer has a wider ownership of risk

Source: Mott MacDonald

4.1.3.1 Preferred Form of Contract

The preferred Form of Contract for delivery of CSET Phase 2 is NEC for the following reasons:

- Recommended by the Office of Government and Commerce and written in plain English;
- Encourages co-operation between parties (other forms of contract more liable to create confrontation);
- Early Warnings promote a proactive approach to risk resolution (other forms of contract do not include Early Warnings);
- More flexibility than ICC, which only provides for payment through re-measurement; and
- JCT contracts tend to be used for building contracts rather than civil engineering and highways contracts.

4.2 NEC ECC Conditions of Contract

The NEC ECC is packaged into six main options to suit the scope of works and appetite for risk between the employer and contractor. These are divided into two types, 'Priced' and 'Cost Reimbursable' type contracts with the payment mechanism based on activity schedule, Bill of Quantities (BoQ) or actual work undertaken.

In the priced options, traditionally known as lump sum or priced BoQ, the contractor is paid for the works he has completed based on his tendered price. In the cost option, the contractor's costs are reimbursed with a fee percentage for overheads and profit for the works that he has completed. The cost options are divided between Target Cost and Cost Reimbursable. The Target Cost options introduce a pain/gain mechanism which provides the contractor with financial incentive/gain to complete the works for less than the Target Cost and dis-benefit/pain for completion over the Target Cost. Savings for underspend or costs of overspend are shared with the employer.

The ethos of the ECC is to apportion the risk fairly between the employer and the contractor and this is reflected in each option which uses different arrangements for payment to the contractor as the allocation of risk between the employer and contractor is different.

The incentives and main risks for the various options of the NEC ECC Conditions of Contract are set out in Table 4.2.

Table 4.2: NEC ECC Conditions of Contract - Incentives and Risks for GCP

NEC Option	Incentives	Financial Risk	Other Risks
Option A Priced Contract with Activity Schedule	Payment on completion of activities encourages progress. Contractor motivated to keep within his tendered price. Option suitable for 100% contractor design.	Contractor under pressure to complete within the tendered price.	Completeness and accuracy of activity schedule is the contractor's risk. GCP would pay a premium for contractor's risk.
Option B Priced Contract with BoQ	GCP would have responsibility for design and re-measuring the works for payment.	Contractor bears the risk on undertaking the works within the tendered priced rates. GCP would bear the risk if the BoQ is inaccurate. No incentive for the contractor to produce an economic design.	Completeness and accuracy of BoQ would be GCP's risk.
Option C Target Cost with Activity Schedule	Shared financial pain/gain encourages collaborative working, early finish and control costs. Provides best value.	Shared between parties on pain/gain on late/early finish.	Completeness and accuracy of activity schedule is the contractor's risk.
Option D Target Cost with BoQ	Shared financial pain/gain encourages collaborative working though open book accounting. GCP would have responsibility for design and re-measuring the works for payment.	Shared between parties on pain/gain on late/early finish. GCP would bear the risk on inaccurate BoQ. No incentive for the contractor to produce an economic design.	Completeness and accuracy of BoQ would be GCP's risk.
Option E Cost Reimbursable Contract	GCP would have a quick start. contractor incentivised on ECI by sharing savings on employer's budget by providing cost effective solution.	GCP	Project outturn cost uncertain.
Option F Management Contract	No real incentive.	GCP	Project outturn cost uncertain.

Source: Mott MacDonald

Options A and B place the main financial risks on the contractor and the cost reimbursable Options E and F would place the main risks with GCP. These risks would be shared between the Contractor and GCP in the target cost Options C and D where the contractor is incentivised to finish early.

- **Option A** can be used when GCP has a well-defined scope of works and the works can be influenced by buildability. Under this option, GCP would appoint the Contractor to 'Design and Build' the works within the tendered price; this approach is particularly relevant where price and Design and Build are the overriding factors for the employer.
- **Option B** can be used when GCP has a well-defined scope of works and wants full control over the design. GCP would appoint the contractor to price the works for construction only based on the GCP's scheme design.
- **Option C** can be used when GCP has adequately defined the scope of works and wants to further develop it through design before construction. GCP would appoint the contractor on a Design and Build arrangement and manage the cost through pain/gain incentive on the target cost with open book accounting. This option would give GCP an element of control over design and the open book accounting on cost.
- **Option D** should be used when GCP has adequately defined the scope of works and wants to further develop it through its own designer. GCP would appoint the contractor to construct only but would incentivise through pain/gain share on the target cost through open book accounting. The Option D procurement route is not recommended given that the accuracy of the BoQ would be GCP's risk, and the contractor has no incentive to produce an economic design.
- **Option E** should be used if GCP only had a loosely defined scope of the works and wanted the contractor to develop it without delay. In this scenario GCP would be uncertain of the project outturn cost but would be prepared to appoint a contractor on a Design and Build arrangement and manage the cost through open book accounting with incentive on sharing the savings on GCP's budget. This option is not appropriate given that there will be a well-defined scope of works for the preferred option.
- **Option F** should be used when the project is complex requiring several specialists and the GCP has a well-defined scope of the works. Under this scenario GCP would appoint the contractor to manage the specialists through separate sub-contracts.

Table 4.3: NEC ECC Conditions of Contract - Incentives and Risks for GCP

	Activity Schedule	Bill of Quantities	Reimbursable
Priced Contract	A	B	
Target Contract	C	D	
Cost Reimbursable			E
Management Contract			F

Source: Mott MacDonald

One of the advantages of the NEC suite of construction contracts is the flexibility the contracts provide to users. This is particularly so when it comes to payment arrangements where, in each of its main forms of contract (not the 'short' contract) the NEC provides options for how payment is to be made. Table 4.4 highlights the advantages and disadvantages of the main payment options.

Table 4.4: NEC ECC Conditions of Contract - Incentives and Risks for GCP

ECC Option	Advantages	Disadvantages	Potential Suitability
A	<ul style="list-style-type: none"> • Simplicity of payment assessment and forecasting of cashflow. • Clarity of passing of financial risk to contractor. • Simple to pass down financial risk to smaller sub-contractors familiar with priced contracts. • Direct link between activity schedule and programme. 	<ul style="list-style-type: none"> • No direct commercial incentive for Project Manager (on behalf of employer) to collaborate – any saving or overspend compared with total of the prices is taken by the contractor only. • No commercial incentive for contractor to suggest changes to employer's works information (this can be added). • No openness of contractor's costs required. • Assessment of the cost of compensation events uses a model of cost that is not in use for regular payment assessment and so is less familiar to those using it. • In assessment of compensation events, a sub-contractor's fee is not included in the contractor's actual cost. The tenderer therefore must make an allowance in his own fee percentage for possible sub-contractor's fees for possible work under compensation events (this can be modified). 	<ul style="list-style-type: none"> • Will be paying a premium for passing the financial risk to the contractor. However, this is mitigated by the cost savings in not having to pay for production of a BoQs. Also, the risk and thus cost of any measurement inaccuracies sits with the contractor. Further, contract administration is simpler and not having to undertake monthly measurements of progress reduces waste. • Provides the greatest level of cost certainty to the employer.
B	<ul style="list-style-type: none"> • Allows employer, if appropriate, to take the risk of accuracy in tender quantities e.g. where he has been responsible for the preparation of BoQs and the (outline) design leading to them. • Similar payment mechanism to 'traditional' measure and value contracts (e.g. ICE 5th, 6th, 7th) (although this is now much less of an advantage as use of the NEC ECC increases compared with that of traditional forms). • Allows bill rates to be used for rapid assessment of compensation events but only when agreed by both Project Manager and contractor. (The default, like all other ECC main options is to consider the effect of the compensation event on Defined Cost plus fee). 	<ul style="list-style-type: none"> • Requires monthly 'measurement' of progress of the works that is clearly not a 'value adding' activity. • Requires an 'activity schedule' of sorts linked with programme to generate a predicted cash flow, even though the activity schedule is not required for payment. • Requires an appropriately detailed method of measurement that can be a cause of misunderstanding and or disagreement. (The employer takes the risk of all errors in the BoQ). • Unlikely to be appropriate if contractor is responsible for the design and so for the quantities required. • Assessment of the cost of compensation events uses a model of cost (Defined Cost + Fee) that is not in use for regular payment assessment and so is less familiar to those using it. • Similar payment mechanism to 'traditional' measure and value contracts can lead to users not paying the required attention to the many features of the NEC 	<ul style="list-style-type: none"> • Producing a detailed BoQ would add time to the programme. • Less incentive to improve performance and employer does not benefit. • Contractor shall be responsible for the design.

	ECC that are completely different.		
C	<ul style="list-style-type: none"> Direct commercial incentive to collaborate for Project Manager (on behalf of employer) and contractor – any saving or overspend compared with total of the prices – the project target is shared and so all 'contractor risks' are really 'project risks' and the Project Manager has a direct commercial incentive to help manage them. Visibility of Defined Cost to all. Complete flexibility in selection of share ranges and share percentages to develop an appropriate commercial incentive structure. In the extreme this is from 0% share (effectively reimbursable) to 100% share (effectively lump sum). Requirement to present (or collaboratively develop) target cost encourages openness relating to resource planning and risk allocation and pricing. (Particularly appropriate if contractor is part of integrated team developing design and target). Assessment of the cost of compensation events uses a model of cost that is in use for regular payment assessment and so is familiar to those using it. Can be adapted to support a procurement strategy allowing target costs for successive sections of work to be developed through the contract. Can be adapted to include employer's own costs in overall project target. 	<ul style="list-style-type: none"> No direct linkage between activity schedule and programme. Cashflow is less certain than with e.g. Option A (although a modification can be made to pay according to a predetermined cashflow and correct according to actual costs). Assessment and audit of 'Defined Cost' costs is time-consuming (although it is possible to use the contractor's own 'model' of cost rather than the ECC's 'Schedule of Cost Components'). Systems for monitoring Disallowed Cost must be set up from the start. Drafting issues: The definition of Defined Cost requires a forecast of what will be due to paid (to sub-contractors and directly by the contractor) at the next assessment date. Definitions within 'Disallowed Cost' are subject to interpretation and have caused disagreements. (These can and should be reviewed in tender documents). Timing of payment of the contractor's share is unacceptable to some employers. (This can and should be modified). 	<ul style="list-style-type: none"> As noted in the NEC3 Guidance Notes, target cost contracts can be useful where the extent of the work to be done is not fully defined or where the risks anticipated are, for some reason, greater than usual. The financial risks are shared between the employer and the contractor in a way which is meant to ensure that the contractor is motivated to carry out the works as cost efficiently as possible. The separation of target and actual costs before completion creates the potential for loss of control in predicting the final cost to the employer. Thus, there is less certainty for the employer under target cost arrangements about what the actual final cost will be. The nature of the target cost contract is such that the employer also shares in the contractor's risk. Requires best practice in project administration and a suitably skilled Project Manager. Disputes and adversarial behaviours can occur when the employer scrutinises the contractor's cost records to ensure they are valid. It would provide the contractor with an incentive to improve performance.
D	<ul style="list-style-type: none"> Allows the employer, if appropriate, to take the risk of accuracy in tender quantities where he has been responsible for the preparation of BoQs and the (outline) design leading to them. Visibility of Defined Cost to all. Allows bill rates to be used for rapid assessment of compensation events but only when agreed by both Project Manager and contractor. (The default, like all other ECC main options is to consider the effect of the compensation event on 'Defined Cost plus Fee). Direct commercial incentive to collaborate for Project Manager (on behalf of employer) and contractor – any saving or overspend compared with total of the prices – the project target is shared. 	<ul style="list-style-type: none"> As for Option C and Requires remeasurement of the works that is clearly not a 'value adding' activity – in addition to assessment of actual costs. Requires an appropriately detailed method of measurement that can be a cause of misunderstanding and or disagreement. Unlikely to be appropriate if contractor is responsible for the design and so for the quantities required. 	<ul style="list-style-type: none"> As noted in the NEC3 Guidance Notes, target cost contracts can be useful where the extent of the work to be done is not fully defined or where the risks anticipated are, for some reason, greater than usual. The financial risks are shared between the employer and the contractor in a way which is meant to ensure that the contractor is motivated to carry out the works as cost efficiently as possible. The separation of target and actual costs before completion creates the potential for loss of control in predicting the final cost to the employer. Thus, there is less certainty for the employer under target cost arrangements about what the

	<ul style="list-style-type: none">• Complete flexibility in selection of share ranges and share percentages to develop an appropriate commercial incentive structure. In the extreme this is from 0% share (effectively reimbursable) to 100% share (effectively lump sum).• Requirement to present (or collaboratively develop) target cost encourages openness relating to resource planning and risk allocation and pricing. (Particularly appropriate if Contractor is part of integrated team developing design and target).• Assessment of the cost of compensation events uses a model of cost that is in use for regular payment assessment and so is familiar to those using it.• Can be adapted to include employer's own costs in overall project target.	<p>actual final cost will be. The nature of the target cost contract is such that the employer also shares in the contractor's risk, which may be seen as undesirable in this instance.</p> <ul style="list-style-type: none">• Requires best practice in project administration and a suitably skilled Project Manager.• Disputes and adversarial behaviours can occur when the employer scrutinises the contractor's cost records to ensure they are valid.• It would provide the contractor with an incentive to improve performance.	
E	<ul style="list-style-type: none">• Appropriate when time or quality are valued more highly than cost by the employer – e.g. in emergency or R&D works or where scope cannot be defined well enough to make setting a target useful.• Allows contractor's team to be considered (and paid for) as an extension to that of the employer. (Although contractor may still take on various liabilities).	<ul style="list-style-type: none">• No direct incentive for contractor to control costs. (Although other appropriate incentives can be included based on performance against pre-determined performance targets (e.g. using option X20).• Assessment of 'actual costs' can be time-consuming (although it is now common practice to use the contractor's own 'model' of cost rather than the ECC's 'Schedule of Cost Components')• Drafting issues as option C (except comment re Contractor's Share)	<ul style="list-style-type: none">• More suited to emergency works or where the scope is not well defined. This is not the case in this instance.
F	<ul style="list-style-type: none">• Provides the employer with a contractor with single point responsibility for project delivery even though the employer pays all sub-contract costs plus the management contractor's submitted fee percentage.• Makes it easier (than other options) for employer to contribute to sub-contract procurement strategy and sub-contractor selection post award of contract.	<ul style="list-style-type: none">• No specific option for target cost mechanism – although contract could require some or all sub-contracts to be under a target option.• Works Information must be very clear regarding:<ul style="list-style-type: none">• Work which the contractor is required to sub-contract• Work which the contractor must not sub-contract – which, along with all other costs and any work which the contractor chooses to sub-contract must be covered by contractor's submitted prices <p>Also:</p> <ul style="list-style-type: none">• If, post-contract, the contractor wanted to change these restrictions on sub-contracting, Project Manager might choose to	<ul style="list-style-type: none">• Required where the employer wishes to specify work which is required to be sub-contracted and not. This is not the case in this instance.

- do so but changes to method of payment would have to be in separate post-contract agreement.
- Contract has no mechanism to value change in the works information concerning work not sub-contracted as the Schedule of Cost Components is not included.

Source: Mott MacDonald

4.2.1 Assessment of Compensation Events

Under each option assessment of the financial impact of a compensation event is made by reference to the impact on defined cost and the resulting fee. Changes to the prices are assessed as the impact of the compensation event on the actual defined cost for work that has been done, the forecast defined cost of work not yet done and the resulting fee. Table 4.5 highlights the incentives and risks associated with each of the payment options under the NEC ECC conditions of contract.

Table 4.5: NEC ECC Conditions of Contract - Incentives and Risks for GCP

Payment Option	Price for Work Done to Date	Defined Cost and Schedule of Cost Components
Option A	The total of the lump sum prices in the activity schedule for each group of completed activities and each completed activity not in a group.	Relevant to assessment of compensation events only. Shorter Schedule of Cost Components.
Option B	The quantity of work which the contractor has completed for each item in the Bill of Quantities multiplied by the relevant rate and a proportion of any lump sum item in the Bill of Quantities to the extent that the lump sum item has been completed.	Relevant to assessment of compensation events only. Shorter Schedule of Cost Components.
Options C, D and E	The total Defined Cost which the Project Manager forecasts will have been paid by the contractor before the next assessment date plus the fee.	Applicable to both Price for Work Done to Date and assessment of compensation events. Defined Cost based on the (main) Schedule of Cost Components unless agreed between the parties to use Shorter Schedule of Cost Components for compensation events only.
Option F	The total Defined Cost which the Project Manager forecasts will have been paid by the contractor before the next assessment date plus the fee.	No Schedule of Cost Components. Defined Cost is the amount of payments due to sub-contractors for work which is sub-contracted and the prices for work done by the contractor directly, less Disallowed Cost.

Source: Mott MacDonald

It is important to note that in Options C, D, E and F the Defined Cost is the cost that will be incurred before the next assessment date, as forecast by the Project Manager. This keeps the contractor in a cash neutral position because he is paid in advance what is forecast to be incurred, rather than what has actually been incurred.

4.2.2 Preferred Payment Mechanism

On the basis of the above assessment, the preferred NEC ECC Conditions of Contract option for appointing a contractor to deliver CSET Phase 2 is Option C, Target Cost with Activity Schedule for the following reasons:

- Direct commercial incentive to collaborate for Project Manager (on behalf of the employer) and contractor – any saving or overspend compared with total of the Prices – the project target is

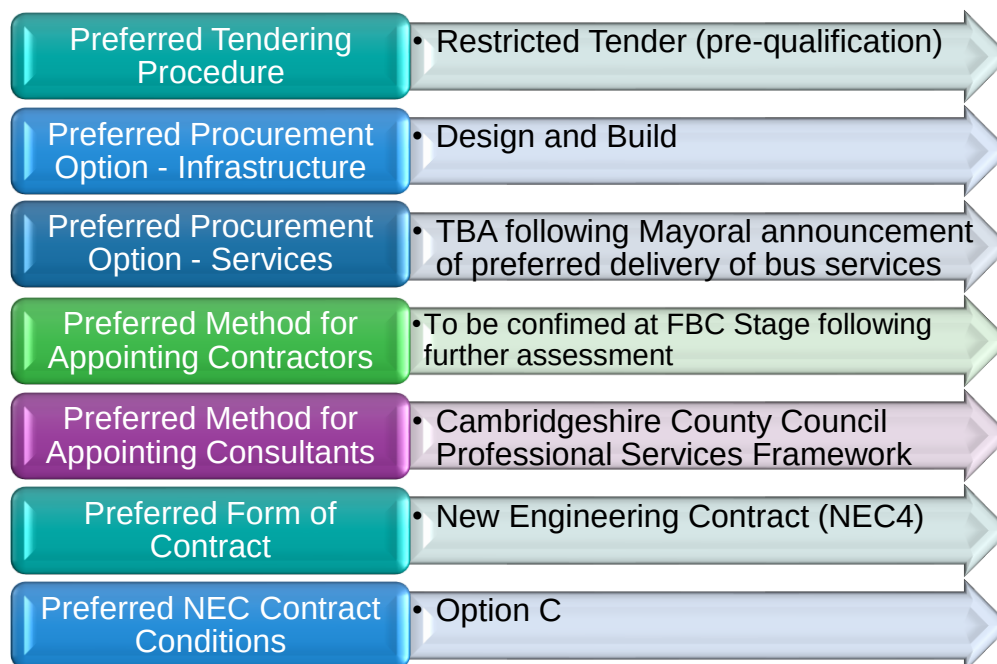
shared and so all 'contractor risks' are really 'project risks' and the Project Manager has a direct commercial incentive to help manage them;

- Visibility of Defined Cost to all;
- Complete flexibility in selection of share ranges and share percentages to develop an appropriate commercial incentive structure. In the extreme this is from 0% share (effectively reimbursable) to 100% share (effectively lump sum);
- The requirement to present (or collaboratively develop) target cost encourages openness relating to resource planning and risk allocation and pricing. (Particularly appropriate if the contractor is part of an integrated team developing design and target);
- Assessment of the cost of compensation events uses a model of cost that is in use for regular payment assessment and so is familiar to those using it;
- Can be adapted to support a procurement strategy allowing target costs for successive sections of work to be developed through the contract; and
- Can be adapted to include the employer's own costs in overall project target.

4.3 Preferred Procurement Strategy Summary

The preferred 'procurement options' are summarised in Figure 4.1.

Figure 4.1: Preferred Procurement Strategy Summary



Source: Mott MacDonald

5 Pricing Framework and Charging Mechanisms

5.1 Prices

The ECC uses the term 'Prices', which has a different meaning in each of the options and is analogous to a contract sum in other contract forms.

In Options A and C, 'Prices' means each of the lump sum prices against each of the activities in the activity schedule. In Option A the total of the Prices is therefore, in effect, the contract sum. In Option C the total of the Prices is the target price for the purposes of the pain/gain share mechanism.

In Options B and D, 'Prices' means the lump sums and the amounts obtained by multiplying the rates by the quantities for the items in the bill of quantities. Again, in Option B the total of the Prices is in effect the contract sum. In Option D the total of the Prices is the target price for the purposes of the pain/gain share mechanism.

5.2 Payment Process

Under each of the ECC payment options the contractor is entitled to interim payments which are certified by the Project Manager at each assessment date. The assessment dates are identified by the parties in the contract. The first assessment date is chosen by the Project Manager. The 'assessment interval' for subsequent payments is set in the contract.

The Project Manager certifies the 'amount due' at each assessment date. The first certified payment is the amount due and subsequent payments are changes in the amount due from the previous certification. Certification is therefore based on the cumulative assessment less sums previously certified.

The amount due is the 'Price for Work Done to Date' (the calculation of which varies between options as identified below), plus other amounts due, less other amounts due to be paid by or retained from the contractor.

5.3 Pricing Documents

Option C relies on a pricing document, the activity schedule. The activity schedule is a list of activities with priced amounts against each activity. The contractor prices a lump sum for each activity that it identifies it needs to undertake in order to complete the works in accordance with the scope. It is not necessary for the employer to provide quantities and the contractor takes the quantity risk.

In principle, it is for the contractor to identify how it intends to deliver the works and therefore to identify the activities that it considers necessary. In practice, however, the employer is likely to want to specify at least a structure for the activities to create some consistency during the tender process.

It is important that the activities are clear and distinct so that the parties know when they are completed.

Option C uses an activity schedule, but it is used differently to that in Option A. In Option C, the contractor is paid its actual expenditure on the project. The activity schedule is used only to record and track changes to the 'Prices', and for the purposes of calculating the contractor's share at the end of the project. It has no effect on routine payment.

5.4 Defined Cost-Plus Fee

In the cost-based Options, (C, D, E and F), the 'Price for Work Done to Date' is based on 'Defined Cost' plus fee. In Options A and B, 'Defined Cost' plus fee is only relevant to the assessment of the cost consequences of a compensation event.

Across each of the contracts the fee is calculated by the application of an agreed percentage against Defined Cost. The fee percentage needs to cover:

- All costs of the contractor not covered by Defined Cost;
- Disallowed Cost; and
- The contractor's profit.

Under ECC3, the parties agree two separate fee percentages: one for sub-contracted work; and one for other work. This reflects the possibility that the risk and profit for (and the work required in managing) direct work as against sub-contracted work may well be different. Often the percentages are agreed at the same figure, but if there is a difference, the percentage for sub-contracted work is likely to be higher. Under ECC4 however, there is just a single fee percentage applied to all Defined Cost.

5.5 Defined Cost and the Schedule of Cost Components

In Option C, Defined Cost is the principal constituent of the contractor's payment for work done (the "cost" in the cost-plus contract). In Options A and B Defined Cost is used only in the assessment of compensation events.

In Option C, Defined Cost of sub-contracted work is the amount of payments due to the contractor's sub-contractors. This highlights the need for the Project Manager to be aware of the terms of the sub-contracts and to operate the sub-contract approval processes under the ECC.

For the contractor's own costs, Defined Cost is established by reference to the 'Schedule of Cost Components' within the ECC. In ECC3, depending upon the pricing option selected, there may be two Schedules of Cost Components, the standard Schedule and the Shorter Schedule of Cost Components.

Under Option C, the Schedule of Cost Components is used for assessing the Price for Work Done to Date. The Shorter Schedule of Cost Components may be used instead for assessing compensation events if both the Project Manager and the contractor agree.

Both schedules define categories of cost that the contractor may recover. These include costs for people, equipment, plant and materials, charges, manufacture and fabrication, design and insurance. (In ECC4 the cost of sub-contractors has been included in the Schedules.)

The significance of the Schedules of Cost Components, and the manner in which Defined Cost is established needs to be understood. They identify a specific level of detail that needs to be established. Some costs are very close to 'real' costs. For example, in respect of people costs the contractor will be required to provide details of how its people costs are built up, including salaries, bonuses, any incentives, any allowances, details of absence due to sickness and holidays, subsistence and lodging, medical examinations, travel insurances, pensions and life assurances. Certain costs are not paid directly but are instead based on rates and percentages tendered by the contractor in contract data part two.

It is essential that the contractor recognises the need to maintain the relevant records to justify all of its costs. It is also necessary for the Project Manager to have appropriate resources to be able to properly analyse, audit and deal with the detail in the applications by the contractor when received.

The contractor and Project Manager need to establish a process and the nature of records required early in the contract to ensure that the mechanism can work. For Option C this will become apparent on day one, or at the first assessment date, when the Price for Work Done to Date is calculated.

5.6 Disallowed Costs

Under Option C, the employer is entitled to deduct Disallowed Cost from what would otherwise be Defined Cost.

Disallowed Cost is a cost which the Project Manager decides falls within the categories of Disallowed Cost in the contract. These include, for example, cost not justified by accounts and records, cost that should not have been paid in accordance with the terms of the contractor's sub-contracts, cost incurred in preparation for and conduct of dispute proceedings and the cost of plant and materials not used to provide the works.

5.7 Option C: Pain/Gain Share Mechanism

As noted above, under Option C, the total of the Prices is the 'Target Price', as part of the contractor's share mechanism (commonly referred to as pain/gain share).

The pain/gain share is assessed by reference to the difference at completion of the whole of the works between the total of the Prices (as impacted by compensation events) and the Price for Work Done to Date.

The assessment is first made at completion based on a forecast of the two figures. The ECC provides for a final assessment once the final figures are known.

The ECC provides flexibility around how the share works. It is for the employer to specify at tender stage what the share percentages under the contract are to be. At its most simple, whatever proportion of the Price for Work Done to Date exceeds the total of the Prices is shared in agreed percentages between the parties, and likewise in respect of any savings below the total of the Prices. The ECC allows greater sophistication by allowing for different share percentages to be agreed for 'share ranges'. The key from the employer's perspective is to motivate performance and to encourage the contractor to deliver a Price for Work Done to Date which is less than the target total of the Prices.

There is no interim assessment, in advance of completion, of the difference between the total of the Prices and the Price for Work, and so what the contractor's share is going to be. That can mean that an employer may find that at completion of the works the Price for Work Done to Date exceeds the total of the Prices, such that the employer needs to seek recovery of any contractor's share. This issue often leads employers to modify the clause to allow them to retain a forecast of the contractor's pain.

5.7.1 Pricing Framework and Charging Mechanisms

With regard to the pricing and charging of fares for the service, there are a number of options available, according to the level of risk and responsibility that the promoter or employer wishes to retain or pass over to the service operator and whether, for example, franchising of the service is attractive.

6 Risk Allocation and Transfer

This sub-section sets out the types of risk and how these will be shared amongst relevant parties for CSET Phase 2. At this stage in the development of the project, prior to any procurement process, all liabilities and risks rest with GCP. It should be noted that although GCP may obtain a lower tender price by accepting a higher degree of risk, this is not guaranteed to result in a lower out-turn cost.

The emerging preferred option, Option C – Target Cost Contract with Activity Schedule, 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 design and build contractor will be assigned 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 Case have been summarised in Table 6.1 below.

Table 6.1: Key Risks Identified in the Risk Register relevant to the Commercial Case

Risk	Risk Event	Consequence	Mitigation
Construction programme risk	The construction of the physical 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. Negative impact on achieving scheme benefits and loss of reputation for GCP.	Set in place robust reporting and monitoring process during construction phases. Draft construction contract with appropriate share of programme risk. Appoint Supervisor and Project Manager to monitor quality and progress.
Lack of interest in scheme from suitable contractors	Low level of participation in procurement process	Unable to deliver competitive procurement	Early contractor involvement to encourage participation. Liaise with TfGM for recent experience on Leigh guided busway
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.	
Cost risk	The scheme escalates in cost e.g. cost of materials and infrastructure	CSET client team required to investigate the provision of additional funds internally or via alternative sources. CSET required to cancel the scheme or agree to additional borrowing.	Ensure periodic cost reviews are held and ensure that value engineering is undertaken at key stages of the project
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	Ensure that decision making members are well briefed on the reasons for the scheme and any opposition members are kept appropriately informed of the reasons and justifications for the scheme.

Source: Mott MacDonald

7 Contract Length

It is recommended that a tender period of 12-16 weeks is included within the procurement programme for the Design and Build Contract given that contractors will have to undertake design development work during the tender period to support their submission.

It is anticipated the CSET Phase 2 project may procure services using several types of contract at different future stages of the project. Table 7.1 shows those possible contracts which could be used within the project, plus an estimate of use during the relevant stage and the approximate length of time each contract will be used.

Table 7.1: Proposed Contracts for use on CSET Phase 2

Contract Type	Stage	Length
Restricted procedure, OJEU, Public Contracts Regulations (NEC4 Option C)	Construction (Infrastructure)	20 months
Cambridgeshire County Council Professional Services Framework	Design and Construction (Infrastructure)	23 months
To be confirmed at FBC stage	Maintenance	To be confirmed at FBC stage

Source: Mott MacDonald

8 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 are tendering for a framework for the provision of Professional Services. This would 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 his 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.

8.1 Design

During the design period, the Project Management Team 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.

8.2 Construction

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.

8.3 Defects Period

Following completion of the works, there will be continued monitoring of any outstanding defects, which will be managed in order to rectify them before any final agreement is reached on the final account. The Defects Certificate, defining the end of the defects liability period will be issued upon completion of the Contractor As-Built Records and Health and Safety File.

8.4 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 CSET Phase 2 scheme shall also undertake the Infrastructure and Project Authority's Project Initiation Routemap, utilising its associated tools and following its approach.

Capable delivery via the utilisation of best practice in project management shall maintain a focus on delivery, programme, cost and quality. Further, governance arrangements are to be put in place, these are outlined within Section 1.4 of the Management Case.

The CSET project delivery team structure is shown in Figure 8.1.

Figure 8.1: CSET Phase 2 Delivery Team Structure



Source: GCP

This adopts an integrated team approach without unnecessary duplication of functions between client and supplier. Thus, some of the workstream manager roles would be filled by the supply chain and the workstream managers together with the cost manager/PMO would form the Project Management Team. Operations would include technology, agreements with operators, asset management and handover into operation.

8.5 Human Resources

GCP will be responsible for oversight of the project on the client side of the delivery arrangements. The relevant professional activities to appropriately resource this aspect (procurement and delivery) of the project include a Project Manager who will oversee day to day management of each of the workstream leads as well as providing liaison between GCP, technical and design consultants, and contractors that will be appointed in line with the process and recommendations outlined earlier.

There are no trade union or Transfer of Undertakings (Protection of Employment) Regulations, otherwise known as TUPE, implications arising from this contract.

9 Commercial Case Summary

- This Commercial Case provides evidence on the commercial viability of the A1307 CSET Phase 2 scheme proposal and the procurement strategy that will be used to engage the market.
- A number of procurement strategies, methods, frameworks and contract types have been considered 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 at this stage (OBC) is a Restricted Procedure, giving bidders a well-defined tender package to price against, with variant tenders accepted to allow for alternative solutions to be proposed.
- The emerging preferred procurement strategy at this stage (OBC) in the development of A1307 CSET Phase 2 is the appointment of a contractor under a design and build contract. As GCP would enter into a single contract relationship, there would be early collaboration between the contractor and designer. Further, it is also the most cost-effective procurement method and allows the scheme programme to progress without significant delay.
- Currently there is not a preferred framework for the appointment of Contractors as the estimated construction cost of the CSET scheme is greater than the maximum contract value applicable to the EHA framework and the SCAPE framework is based on a single source direct appointment and as such would not give rise to value for money on a commission of this scope.
- The preferred framework for appointment of a Consultant remains to be determined, however it is recommended that any consultancy services are directly awarded under the dedicated CCC Project Management and Services Framework.
- It is recommended that NEC4 contract is adopted for delivery as it is recommended by the Cabinet Office, encourages co-operation between parties and has an 'Early Warning' feature to promote a proactive approach to risk resolution. The recommended preferred contract conditions at this stage are a Target Cost Contract with Activity Schedule as the financial risks are shared between by the employer and the contractor in a way which should ensure the contractor is motivated to carry out the works as cost efficiently as possible. Further, payment on completion of activities encourages progress.
- 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.





Cambridge South East Transport Phase 2

Outline Business Case - Management Case

15 May 2020

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Cambridge South East Transport Phase 2

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Glossary of Terms

Analysis of Monetised Cost and Benefits (AMCB) table: Summarises the monetised impacts of a scheme that are included in the scheme's Net Present Value and Benefit-Cost Ratio.

Appraisal Summary Table (AST): Provides a complete summary of the scheme impacts, including the scheme's monetised impacts and non-monetised impacts (both quantitative and qualitative).

Assumption: A statement which is not yet known to be true. It can be a bridge in the planning process to answer an uncertainty, and to allow scope and plans to be developed

Benefit Cost Ratio (BCR): Benefit Cost Ratio, is an indicator of the overall value for money of a project or proposal.

CaCC: Cambridge City Council

CCC: Cambridgeshire County Council

Cambridge Autonomous Metro (CAM): CAM is the proposed metro style system for Greater Cambridge.

Committed Schemes: Where a scheme has been deemed likely to proceed and is therefore included within the option appraisals.

Conservation Area: An area designated under Section 69 of the Planning (Listed Buildings and Conservation Areas) Act 1990 as being of special architectural or historic interest and with a character or appearance which is desirable to preserve or enhance.

Context: The setting of a site or area, including factors such as traffic, activities and land uses as well as landscape and built form.

Controls: Risk response activities that are undertaken as business as usual. These are identified as an aide-memoire, to draw attention to the purpose and aim of standard procedures and drive appropriate focus. Typically, controls will not incur any additional cost to delivery.

Countryside: The rural environment and its associated communities.

Cumulative Impact: The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.

Department of Transport (DfT): is a ministerial department, supported by 24 agencies and public bodies that plans and invests in transport infrastructure in the UK.

Dependency: An activity or activities which cannot be undertaken or completed until another scope of work has completed or reached a defined stage or point.

Early Assessment Sifting Tool (EAST): Early Assessment Sifting Tool is used by DfT, to quickly summarise and present evidence on options. INSET is an enhancement of EAST and follows the same broad principles and approach.

Effect: The consequence of the scale of any change to the baseline environment, i.e. impact, on the environmental receptor, taking account of its particular value or sensitivity.

Element: A component part of the landscape (for example, roads, hedges, woods).

Emerging Scheme: The best performing route alignment option for CSET phase 2 based on assessment to date.

Enhancement: Landscape improvement through restoration, reconstruction or creation.

Environment: Our physical surroundings including air, water and land.

Environmental Impact Assessment (EIA): A formal, structured process of evaluating the likely environmental impacts of a proposed scheme, considering inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Exclusion: An activity or product that has been specifically removed or omitted from the scope of work for the defined project.

Fall-backs: Contingency actions taken in response to a risk impact. Generally, risks that are tolerated should have fall-back actions identified, as should significant risks that are being treated, where the treatment has a significant likelihood of not fully mitigating the risk.

Full Business Case (FBC): The culmination of the three-stage business case process is the Full Business Case. This follows on from initial exploratory work to establish the strategic need for intervention in the Strategic Outline Business Case and the optioneering and appraisal work undertaken in the Outline Business Case. Generally, an investment committee will consider the Full Business Case then make a recommendation to ministers. Ministers will decide whether a proposal should proceed to implementation, however as funding and powers for transport investment have been devolved to the Greater Cambridge Partnership (GCP) as part of the Greater Cambridge City Deal, the decision to implement the scheme resides with GCP.

Form: The layout (structure and urban grain), density, scale (height and massing), appearance (materials and details) and landscape of development.

Gross Domestic Product (GDP): A measure of the total value of goods produced and services provided in an area.

Gross Value Added (GVA): A measure of the economic productivity of an area.

High Quality Public Transport (HQPT): High Quality Public Transport, is a transport system that includes a range of features such as high levels of segregation, junction priority, high quality infrastructure (shelters, CCTV, real time, lighting, seating, help points etc), and high quality vehicles to name but a few.

Heritage Asset: A building, monument, site, place, area or landscape of historic value.

Investment Sifting and Evaluation Tool (INSET): INSET is Mott MacDonald's evaluation tool used in the optioneering process. INSET is an enhancement and expansion of EAST.

Issue: A significant unanticipated event, or a risk which has impacted or has a >99% likelihood of occurrence, that affects the achievement of the project objectives.

Landform: Combination of slope and elevation that produce the shape and form of the land.

Landscape: The character and appearance of land, including its shape, form, ecology, natural features, colours and elements and the way these components combine. Landscape character can be expressed through landscape appraisal, and maps or plans. In towns 'townscape' describes the same concept.

Landscape Character: The distinct and recognisable pattern of elements that occur consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape.

Landscape Feature: A prominent eye-catching element, for example, wooded hilltop or church spire.

Landscape Quality: Based on judgements about the physical state of the landscape, and about its intactness, from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.

Landscape Sensitivity: The extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects on its character.

Land Use: The primary use of the land, including both rural and urban activities.

Local Liaison Forum (LLF): The LLF provide a link between a project team and the local community.

Multi Criteria Assessment Framework (MCAF): Multi-Criteria Assessment Frameworks are used in the optioneering assessment process and allow options to be assessed against a range of criteria linked to the scheme objectives as well as wider policy and strategy objectives.

Methodology: The specific approach and techniques used for a given study.

Mitigation: Measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development project.

Modal Shift: A shift from one transport type to another e.g. road travel to rail travel.

Movement: People and vehicles going to and passing through buildings, places and spaces. The movement network can be shown on plans, by space syntax analysis, by highway designations, by figure and ground diagrams, through data on origins and destinations or pedestrian flows, by desire lines, by details of public transport services, by walk bands or by details of cycle routes.

Nomis: A service provided by the Office for National Statistics, ONS, that provides free access to the most detailed and up-to-date UK labour market statistics from official sources.

Option Appraisal Report (OAR): The Options Appraisal Report sets out the process undertaken to identify and assess options, leading to the selection of the preferred option.

Outline Business Case (OBC): Is the second phase of the process which reconfirms the conclusions set out in the Strategic Outline Business Case (SOBC). The OBC focuses on the detailed assessment of the options to find the best solution.

Prince 2: PRjects IN Controlled Environments is a process-based method for effective project management, used extensively by the UK Government. It adopts a product-based planning approach to project management with emphasis on dividing projects into manageable and controllable stages.

Public Accounts (PA) table: Records the investment and operating costs incurred by a public sector in delivering the scheme.

Receptor: Something that makes up the environmental baseline e.g. humans or other biological species, elements of the physical environment including water, air and soil assets that make up the cultural heritage of an area.

Risk (Threat): An uncertain event or set of circumstances that, should it occur, will have an adverse effect on the achievement of the objectives of the project.

Risk (Opportunity): An uncertain event or set of circumstances that, should it be exploited, will have a positive effect on the achievement of the objectives of the project.

SATURN: Simulation and Assignment of Traffic in Urban Road Networks, is a computer program that calculates route choices between origin and destination.

Social and Distributional Impacts (SDI): considers the variance of transport intervention impacts across different social groups.

Strategic Outline Business Case (SOBC): This sets out the need for intervention (the case for change) and how this will meet strategic aims and objectives (the strategic fit). It provides suggested or preferred ways forward and presents the evidence for a decision.

Strategic View: The line of sight from a particular point to an important landmark or skyline.

Sustainability: The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs.

Topography: A description or representation of artificial or natural features on or off the ground.

Townscape: Physical and social characteristics of the built and unbuilt urban environment and the way in which those characteristics are perceived. The physical characteristics are expressed by the development form of buildings, structures and space, whilst the social characteristics are determined by how the physical characteristics are used and managed.

Transport Appraisal Guidance (TAG): The DfT's Transport Appraisal Guidance (often referred to as WebTAG)

Transparent Economic Assessment Model (TEAM): TEAM is a tool designed to calculate the economic impacts and benefits of proposed infrastructure interventions and policy measures.

Tranquillity: A state of calm or quiet.

Transport Economic Efficiency (TEE) table: Summarises the monetised impacts against different user groups.

Transport User Benefit Appraisal (TUBA): TUBA is an economic appraisal computer program developed for the Department for Transport (DfT) for appraising multi modal transport studies.

Uncertainty: A condition where the outcome can only be estimated.

Visual Impact: Change in the appearance of the landscape as a result of development. This can be positive (i.e. beneficial or an improvement) or negative (i.e. adverse or a detraction).

Wider Economic Benefits (WEBs): improvements in economic benefits that are acknowledged, but which are not typically captured in traditional transport cost-benefit analysis.

1 Introduction

The Management Case is one of the five cases that form the DfT's Transport Business Case process. The Management Case assesses whether a proposal is deliverable. It tests the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance (e.g. a Gateway Review).

The other four cases which make up the Transport Business Case Process are:

- The **Strategic Case** which determines whether an investment is needed, either now or in the future. It demonstrates the case for change – that is, a clear rationale for making the investment and its strategic fit – how an investment will further the aims and objectives of the organisation. The Strategic Case is presented in document 403394-MMD-BCA-00-RP-BC-0247.
- The **Economic Case** which assesses options to identify all their impacts, and the resulting value for money, to fulfil Treasury's requirements for appraisal and demonstrating value for the taxpayers' money. The Economic Case is presented in document 403394-MMD-BCA-00-RP-BC-0292.
- The **Financial Case** which outlines the affordability of the preferred option, its funding arrangements and technical accounting issues. The case also presents the financial profile of the preferred option and an overview of how the scheme will be funded. The Financial Case is presented in document 403394-MMD-BCA-00-RP-BC-0293.
- The **Commercial Case** which provides evidence on the commercial viability of a proposal and the procurement strategy that is used to engage the market. It presents evidence on risk allocation and transfer, contract timescales and implementation timescale as well as details of the capability and skills of the team delivering the project. The Commercial Case is presented in document 403394-MMD-BCA-00-RP-BC-0231.

The following is the Management Case for Phase 2 of the Cambridge South East Transport (CSET) project.

1.1 Approach to the Development of the Management Case

The DfT guidance document, 'The Transport Business Case: Management Case', outlines the areas that should be covered in the Management Case and these have been used to structure the development of this section of this Outline Business Case (OBC) for the preferred option package for Phase 2 of the CSET project. The DfT requirements are set out in Table 1.1 below together with the relevant sections of this document where they can be found.

Table 1.1: DfT Requirements for the Management Case at OBC Stage

Content	DfT Requirements	Section Number and Title
Introduction	Outline the approach taken to assess if the proposal is deliverable.	1. Approach to Development of the Management Case
Evidence of similar projects	If possible, provide evidence of similar projects that have been successful, to support the recommended project approach. If no similar project approach. If no similar projects are available for comparison, outline the basis of assumptions for delivery of this project e.g. comparison with industry averages for	2. Evidence of Similar Projects

Content	DfT Requirements	Section Number and Title
	this kind of work	
Project dependencies	Set out deliverables and decisions that are provided/received from other projects.	3. Project Dependencies
Governance, organisational structures & roles	Describe key roles, lines of accountability and how they are resourced.	4. Governance
Assurance & approvals plan	Plan with key assurance and approval milestones.	5. Project Management 7. Assurance and Approvals Plan
Project plan	Plan with key milestones and progress, including critical plan.	6. Project Plan 8. Delivery Programme
Risk management strategy	Arrangements for risk management and its effectiveness so far.	9. Risk Management Strategy
Communications and stakeholder management	Development communications strategy for the project.	10. Communications and Stakeholder Management
Project reporting	Describe reporting arrangements.	5.4 Project Status Report 9.4.4 Risk Reporting 12.1 Monitoring and Evaluation Reporting
Benefits realisation plan	Set out approach to managing realisation of benefits.	11. Benefits Realisation
Monitoring and evaluation	Summarise outline arrangements for monitoring and evaluating the intervention.	12. Monitoring and Evaluation
Options	Summarise overall approach for project management at this stage of the project.	13. Summary

Source: DfT

2 Evidence of Similar Projects

As a relatively new consortium, the GCP have delivered a limited number of schemes within the current City Deal. However, the constituent members of the GCP have a long history of successfully delivering schemes both large and small in scale, to time and budget.

Cambridgeshire County Council (CCC) in particular have delivered a number of large-scale transport projects across the County in recent years which are described below in Table 2.1. The successful delivery of these projects demonstrates CCC's ability and experience in relation to major infrastructure projects and ultimately GCP's capability to ensure successful scheme delivery. This valuable experience has not been without challenges, but these have provided valuable learning in the planning and delivery of future projects including CSET Phase 2.

Table 2.1: Similar Projects to A1307 CSET Phase 2

Project	Description	Cost
The Cambridge Core Traffic Scheme	<p>This scheme delivered improved access for pedestrians, cyclists and public transport through traffic management and priority measures in the area bounded by the inner ring road.</p> <p>Delivery of this project demonstrates an ability of the promoters to think about the full impacts of a public transport scheme.</p> <p>The measures were implemented in phases from 1997, promoting sustainable travel modes to improve the city centre environment. Between 1993 and 2003 the number of private vehicles in the city centre fell by 15%. Public transport patronage on routes into Cambridge also increased.</p>	£6.9m ¹
Milton Park & Ride	<p>This site was constructed to replace the Cowley Road Park & Ride Site which was closed by Cambridgeshire County Council. The opening of the new site at Milton was therefore an immediate success. This site has approximately 800 parking spaces and a heated waiting area building with toilet and baby changing facilities.</p> <p>The scheme was completed within just two years from the planning application being submitted in October 2006, with construction commencing in Summer 2007 and the site opening in Spring 2008.</p> <p>The above timescale was for a 531-space car park and building. Due to the success of the scheme, the scale of the site has increased beyond its first built capacity and now provides 792 car parking spaces to cater for the high level of continued demand.</p>	£3.1m
The Addenbrooke's Access Road	<p>This access road is a single carriageway route with a number of junctions and structures that connects Hauxton Road in Trumpington, on the south side of the city, to Addenbrooke's Hospital.</p> <p>The route provides access to the expanding hospital and Biomedical Campus, together with development on the Cambridge Southern Fringe, and reduces traffic in the Trumpington area, and on Long Road. The scheme was completed in October 2010.</p>	£24m

¹ This is an estimate as the scheme was implemented over a number of phases since 1996 and includes a range of supporting measures including streetscape works

Project	Description	Cost
The Cambridgeshire Guided Busway	<p>This busway provides a high-quality public transport connection between Huntingdon and St Ives, to the north west of Cambridge, and Addenbrooke's Hospital and Trumpington Park & Ride to the south of Cambridge.</p> <p>Access to Cambridge City Centre is provided via on-street running. The overall route is 42km long with 25km of that being guided busway and 17km of on-street provision including bus priority measures.</p> <p>Construction began in July 2006 with the busway opened in August 2011.</p> <p>Although there were challenges during the delivery of the scheme, learning from this can benefit the delivery of future significant transport measures in the County.</p>	£150m ²
Longstanton and St Ives Park & Ride	<p>Two Park & Ride sites were constructed in 2011 alongside the Cambridgeshire Guided Busway, providing connectivity to Cambridge and Huntingdon. These sites have been a success in intercepting traffic and have both also increased beyond their first built capacity.</p> <p>The Longstanton Park and Ride Site now provides 350 parking spaces. St Ives Park and Ride has capacity for 1,000 vehicles. Covered cycle parking is also provided at both sites.</p> <p>In addition to the number of spaces being increased as a result of the scheme's success, the number of bus services serving these sites has also been increased to ensure the service is efficient in catering for the increased demand; Buses now run into Cambridge from both sites every 7-8 minutes (eight services per hour).</p>	Estimated at £9m for both sites ³ .
The Ely Southern Bypass	<p>This bypass is a single carriageway highway, connecting the A142 at Angel Drove to Stuntney Causeway. Recently constructed, the Bypass was opened to traffic on 31 October 2018 and the bridge walkway opened three months later in January 2019.</p> <p>The scheme includes bridges over the railway line and the River Great Ouse and its floodplains. It will relieve heavy traffic around Ely station, remove the need for heavy goods vehicles to use the railway level crossing, and avoid a low bridge with a history of vehicle strikes.</p>	£43m

Source: DfT

When considering the experience outlined in Table 2.1, CCC has shown its ability to deal with a variety of major issues and has demonstrated experience in key areas important to the delivery of Phase 2 of the CSET project. The key issues relevant to CSET include:

- Dealing with statutory permissions and legal procedures, especially the Transport and Works Act Order (TWAO) process, which Cambridgeshire County Council followed to secure delivery of the Cambridgeshire Guided Busway;
- Establishing and maintaining relationships with the relevant statutory agencies involved in the delivery of major infrastructure schemes;
- Delivering schemes that are shown to generate economic growth and then putting in place programmes of work to maximise that economic opportunity;
- Engaging extensively with the public and relevant stakeholders, ensuring wide dissemination and understanding of information;
- Experience of running a procurement exercise and selecting a suitably qualified contractor;
- Negotiating, acquiring and assembling land required for scheme delivery through a variety of different mechanisms; and
- Designing and delivering major civil engineering projects.

² This is the total cost of the Cambridgeshire Guided Busway and include £109m contribution from CCC.

³ This is an estimate as the costs were part of a wider package of Busway costs

3 Project Dependencies

CSET forms part of the GCP's wider strategy working with partners to create better and greener transport networks. To realise Phase 2 of CSET, a set of project dependencies have been produced in Table 3.1 below, these relate to items outside of the Phase 2 project team's control and upon which progression or completion of the scheme depends:

Table 3.1: CSET Phase 2 Project Dependencies

Dependency	Possible Scheme Impacts
Delivery of expanded/new employment sites	The strategic case for the CSET project is largely part built around the need to improve connectivity to key employment locations within Greater Cambridge in line with their planned growth. If planned growth and expansion at these sites does not materialise then the need for CSET Phase 2 is reduced.
Emerging CPCA Policy and Cambridgeshire Autonomous Metro (CAM)	<p>CSET Phase 2 must be cognisant of future emerging policy and therefore will need to be reviewed against the adopted version of the new Local Transport Plan⁴ and any future transport system proposals for Cambridge in order to ensure it continues to be aligned with both current and emerging policy. In developing CSET Phase 2 the project will seek to agree design requirements with the CAM project that will enable the CSET Phase 2 project to be developed in a way that, as far as practically possible, provides futureproofing for CAM. This is particularly pertinent as the CSET Phase 2 scheme, alongside the Cambourne to Cambridge project, make up the first phase of infrastructure for the larger CAM network.</p> <p>Cambridgeshire has now produced a Transport Delivery Plan (TDP) which provides a forward look at all planned highway and transport capital schemes on the local network to be delivered on a three-year time frame. CSET Phase 2 features in the Transport Investment Plan (TIP) scheme list which has been developed alongside the TDP to identify schemes to support growth.</p>
City Access Strategy	<p>In order to provide improved end to end connectivity between settlements along the A1307 and employment sites along the corridor and within the city centre, CSET Phase 2 will to some degree rely on the City Access Strategy to tackle the issues of congestion within the city centre and enhance the ability for people to get into, out of and around the city.</p> <p>Schemes within this strategy aim to improve congestion on routes into the City Centre which will be key to reducing the journey times for buses, therefore making the Travel Hub attractive and successful. In addition, the removal of traffic from the city centre will help create additional demand for the facility.</p>
Whittlesford Rural Travel Hub	<p>Rural Travel Hubs are small, flexible transport interchanges at key locations in South Cambridgeshire, allowing more people to access sustainable transport networks. The Whittlesford Rural Travel Hub would include a larger car park at Whittlesford Parkway station.</p> <p>Improvements to connectivity along the A1307 corridor as a result of Phase 2 could encourage demand at Whittlesford Rural Hub as well as at the new CSET Travel Hub as individuals travelling to Cambridge from the south east could utilise parking facilities at either location. It is possible that the Whittlesford site may attract some of the potential users of the CSET Travel Hub and route and negatively impact utilisation.</p>
Cambridge South Station	<p>The proposed new rail station at Cambridge South aims to improve connectivity between the growing Biomedical Campus and international gateways, to reduce reliance on Cambridge station for travel to the southern fringe, and to improve sustainable transport access into the Southern Fringe.</p> <p>The proposed Cambridge South Station will further improve the public transport offer of south Cambridge but may attract some of the potential users of the CSET Travel Hub and negatively impact scheme utilisation.</p>

⁴ The draft Local Transport Plan from the Combined Authority was published for consultation in June 2019.

Dependency	Possible Scheme Impacts
Oxford-Cambridge Arc	Proposals for an Expressway and Railway for the Oxford-Cambridge Arc and associated development are emerging. Both the Expressway and Railway will impact CSET Phase 2 and whilst the scheme is not dependent directly upon these proposals, they may have a significant influence.
Emerging Technologies	GCP is committed to the promotion of the use of new technologies to create a clean and efficient public transport system. The final specification of CSET Phase 2 will be driven by technological advances and the range of solutions available at the procurement stage.
CPCA Strategic Bus Review	The outcome of this review, which can be sourced at https://cambridgeshirepeterborough-ca.gov.uk/assets/Uploads/Strategic-Bus-Review2.pdf , and recommends development of a business case comparison of alternative delivery models, including both Enhanced Partnership and Franchising of the bus network, will influence selection of the preferred model for the procurement and operation of the HQPT services to be delivered as part of the CSET Phase 2 project.

Source: Mott MacDonald/GCP

4 Project Governance

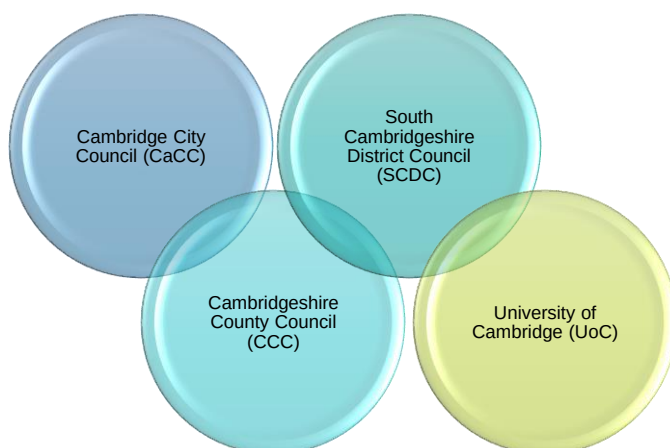
This section outlines the organisational structure and roles and responsibilities for project governance.

4.1 Strategic Management

CSET Phase 2 is being promoted and managed by the GCP, the delivery body for the Cambridge City Deal with central Government. With specific reference to transport, the GCP seek to deliver better, greener transport which will connect people to homes, jobs, study and opportunity.

The GCP is made up of representatives of several organisations as shown in Figure 4.1 plus a Business Representative. The partnership of councils, business and academia seeks to work together to grow and share prosperity and improve quality of life for the people of Greater Cambridge.

Figure 4.1: GCP Representative Organisations



Source: Mott MacDonald

The GCP operates as a Joint Assembly, under powers delegated by its three local authority partners (CCC, CaCC and SCDC). It is led by a decision-making Executive Board which coordinates the overall strategic vision and drives forward the partnership's programme of work and is run in accordance with a clear governance structure, agreed by all partners.

Both the Executive Board and the Joint Assembly meet at least four times a year. Papers relating to public meetings are published online and members of the public have the opportunity to participate in meetings of the Executive Board by submitting questions to be discussed in public during these meetings.

It should also be noted that the Greater Cambridge and Greater Peterborough Local Enterprise Partnership (LEP), which were previously represented independently on the GCP Executive Board, joined the Combined Authority in September 2018. Now known as the Business Board, the LEP committee advise on strategy development and decision making relating to the

Combined Authority area⁵. The GCP Executive Board includes a nominated business representative.

4.2 GCP Executive Board

The Executive Board is made up of five partners; one representative from each of the four City Deal partners plus the Business Representative.

While the law governing Joint Committees only allows the three local authority representatives voting rights, they consider the advice of the Combined Authority's Business Board and University of Cambridge representatives, to make sure decisions take account of the views of the business and academic sectors.

4.3 GCP Joint Assembly

The Board is advised and informed by a Joint Assembly (which is an example of a Joint Committee of multiple Local Authorities). The Joint Assembly provides advice to the Executive Board, drawing on the broad expertise of its 15 members. The Assembly's membership is made up of three elected councillors from each of the three councils in the Greater Cambridge area, and reflects the political composition of their council. The Combined Authority's Business Board and University of Cambridge also each nominate three representatives, as stakeholders from a range of organisations within the business and academic sectors.

4.4 Transport Projects Board and Programme Manager

The GCP Transport Projects Board is responsible for governing all major transport schemes being delivered as part of the City Deal⁶.

The purpose of the Board is to:

- Provide visible governance;
- Advise on decisions before they go to the GCP Executive Board or on major but non-key decisions;
- Guide the Project Manager in developing proposals to meet the agreed objectives;
- Review the proposals and challenge solutions on impact, benefits and value for money; and
- Act as a sounding board for concepts and ideas.

The membership of the Transport Projects Board is set out in Table 4.1 below.

Table 4.1: Transport Projects Board Membership

Role	Named Member (as of October 2019)
Executive	Peter Blake (CCC)
Senior Supplier	Eddie Mellor (Mott MacDonald)
Senior User	Andrew Preston (CCC)
Finance	Sarah Hayward (CCC)
Programme Manager	Debbie Bondi/Andrew Munro
Project Managers	For projects in scope

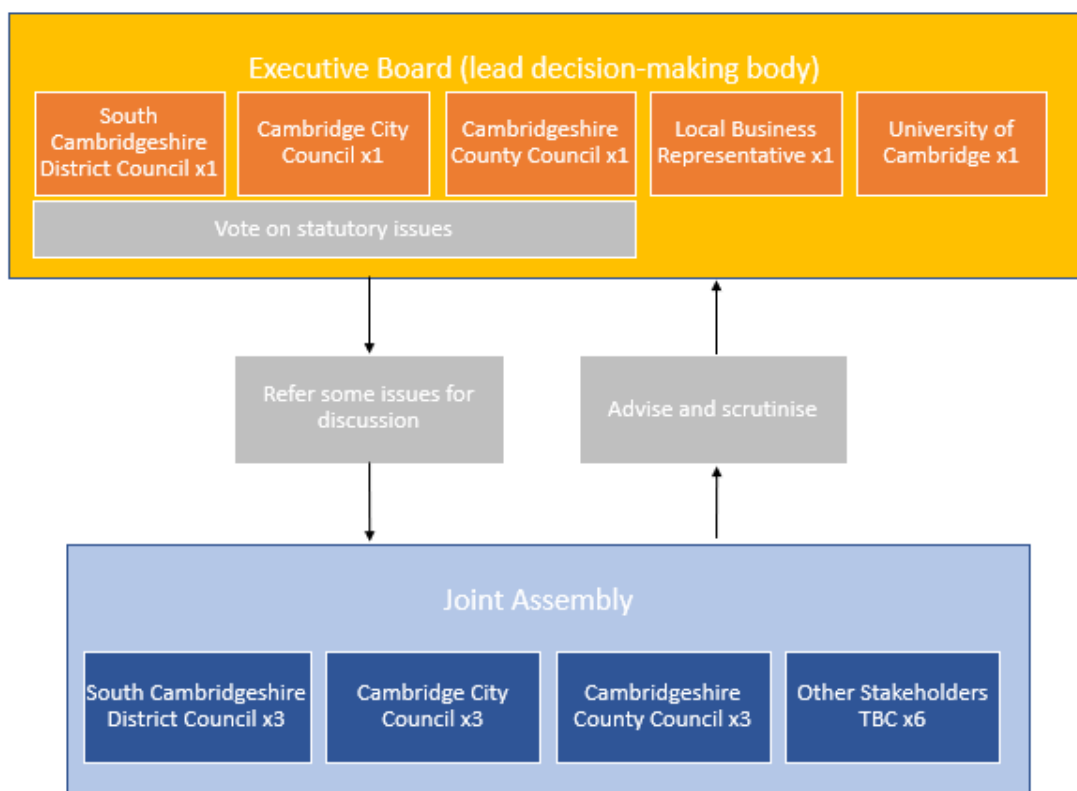
Source: Mott MacDonald/GCP

⁵ <http://cambridgeshirepeterborough-ca.gov.uk/business-board> [Accessed 10/06/19]

⁶ Cambourne to Cambridge Better Public Transport Project, Cambridge South East Transport project, West of Cambridge Package, Ely to Cambridge A10 Transport Study and Eastern Access

Figure 4.2 illustrates the strategic governance arrangements for the project within GCP. The Executive Board consists of the Leader, or equivalent, of each of the partner organisations as the key decision-making group. There will also be a 15-person Assembly with appropriate representation from the Local Authorities and other stakeholders, which will play an advisory and scrutiny role.

Figure 4.2: GCP Strategic Governance Structure



Source: Mott MacDonald

4.5 Role of the Cambridgeshire and Peterborough Combined Authority

The Cambridgeshire and Peterborough Combined Authority (CPCA) was established to pursue a devolution deal with Central Government that included the devolution of both decision-making powers and funding to the Cambridgeshire and Peterborough sub-region. Following the signing of the devolution deal in November 2016, the CPCA was formally established in March 2017.

The Combined Authority (CA) is led by a Mayor, elected in May 2017, who gives the CPCA a focal point and is the contact for Central Government. The Mayor also exercises certain powers and functions that were devolved from Central Government as part of the devolution deal, these include:

- Responsibility for a multi-year devolved transport budget;
- Responsibility for an identified key route network of local authority roads, and
- Responsibility for the development and delivery of the Local Transport Plan.

The devolution deal agreed with Central Government also gives the Mayor and the CPCA power over certain transport functions, with the body taking the role of the Local Transport Authority, assuming strategic transport powers for the areas previously covered by CCC and Peterborough City Council. As part of the Mayor's devolved powers, the CPCA is therefore responsible for producing the updated Local Transport Plan and for the development of all future transport strategies for the CPCA area. The CPCA published a first draft Cambridgeshire and Peterborough Local Transport Plan (CPLTP) in June 2019. Following consultation, a final version was adopted in February 2020.

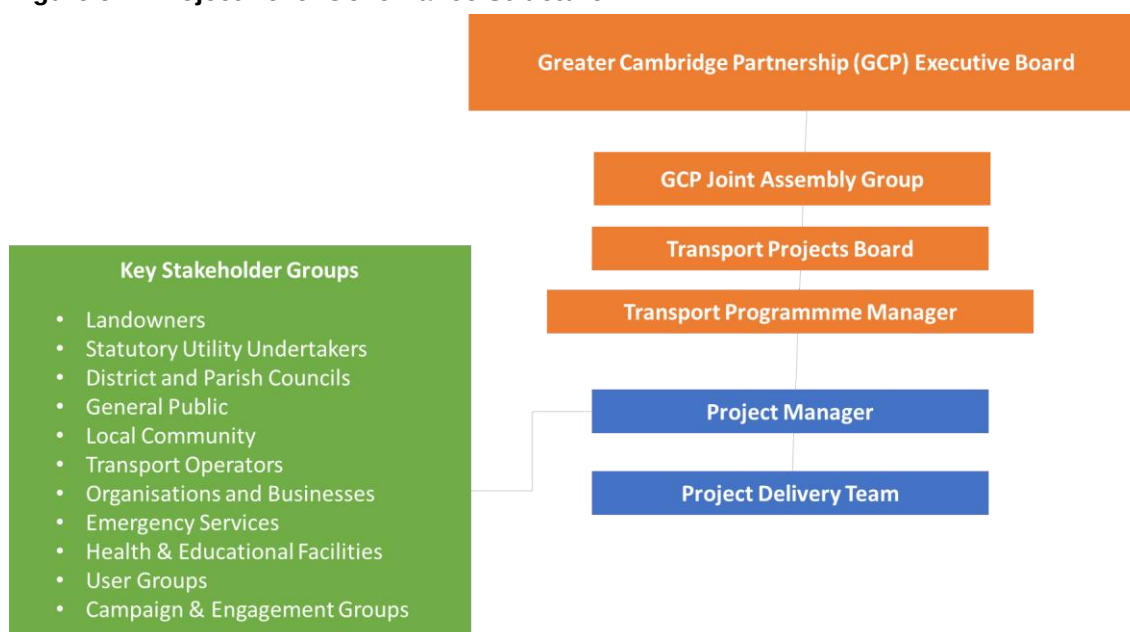
Given the over-arching transport role of the CPCA, there is a need for GCP and CPCA to collaborate closely on transport priorities and delivery programmes to ensure successful coordination and integrated delivery.

5 Project Management

5.1 Project Level Management

Delivery of the CSET Phase 2 project will be managed in accordance with the structure outlined in Figure 5.1. The organogram outlines the structure and reporting relationships of the various groups at both strategic and project management levels.

Figure 5.1: Project Level Governance Structure



Source: GCP/Mott MacDonald

The strategic management levels, highlighted above in orange, have been described in detail in Sections 4.2 to 4.4. Technical issues are addressed by the CSET Phase 2 Project Delivery Team, overseen by the appointed Project Manager, as highlighted in blue. These are described below, and the specific roles of both strategic and project level management are summarised in Table 5.1.

5.2 Project Manager and Project Delivery Team

The CSET Phase 2 Project Delivery Team is accountable to the Transport Projects Board and ultimately the GCP Executive Board. It is the Project Delivery team who will manage the delivery of CSET Phase 2. The Project Management Team will be responsible for the day to day delivery of the scheme and will ensure technical and financial control.

The team coordinates inputs from technical advisors responsible for the delivery of the key workstreams in pursuit of the agreed programme, including:

- Design development;
- Transport modelling;
- Environment assessment;
- Procurement;

- Business Case development;
- Planning;
- Communications; and
- Land and Compulsory Purchase Orders.

The CSET Phase 2 Delivery Team structure is illustrated in Figure 5.2 below:

Figure 5.2: CSET Phase 2 Delivery Team Structure



Source: GCP/Mott MacDonald

The roles and responsibilities of strategic and project level management are summarised in Table 5.1 below.

Table 5.1: CSET Governance Roles

Management Level	Function
Greater Cambridge Partnership (GCP) Executive Board	The key decision-making group. Overall strategic direction of the City Deal programme and overall scope of projects aligned with GCP aims and local and national policy. Leader from each partner organisation. Members of the public can participate in meetings, posing questions to be discussed in public.
GCP Joint Assembly	Strategic, local advisory, and scrutiny body for GCP Executive Board. Elected members from the constituent local authorities and representatives from other constituent organisations – 15 members in total.
Transport Projects Board	Key officers and stakeholders, prioritising schemes, managing programme level risks and capturing shared benefits.
Programme Manager	Technical and procedural oversight of projects and programme level benefit management. Reports to the Project Boards.
Project Manager	Overall control of each element of the project. Senior representative from each partner organisation.
Project Delivery Team	Day to day management of each project and delivery of technical work streams. Leads project team.

Source: GCP

5.3 Local Liaison Forum

To support the Project Board and Project Team in discharging their roles, a Local Liaison Forum (LLF) of locally elected Members and stakeholders has been formed for the project. As part of wider stakeholder engagement, the LLF provides a means of capturing local views and for the Project Team to regularly update the local community on progress. While not able to work outside of the scope of the key decisions made by the GCP Executive Board, the LLF can consider project specific issues in more detail and provide suggestions, which form part of the project considerations.

The members, function and operation of the LLF are agreed through terms of reference and state that all Local County, District and Parish Members on the route are to be invited and that the LLF does not make decisions but can make suggestions.

5.4 Project Status Report

The fundamental process of capturing change in the project is through the Project Status Report. The Status Report is presented at the regular meetings of the Project Board and if necessary, can be submitted separately between Project Boards at the Project Manager's discretion. The Project Status Report is the main input to the Project Board and summarises progress and change on the project.

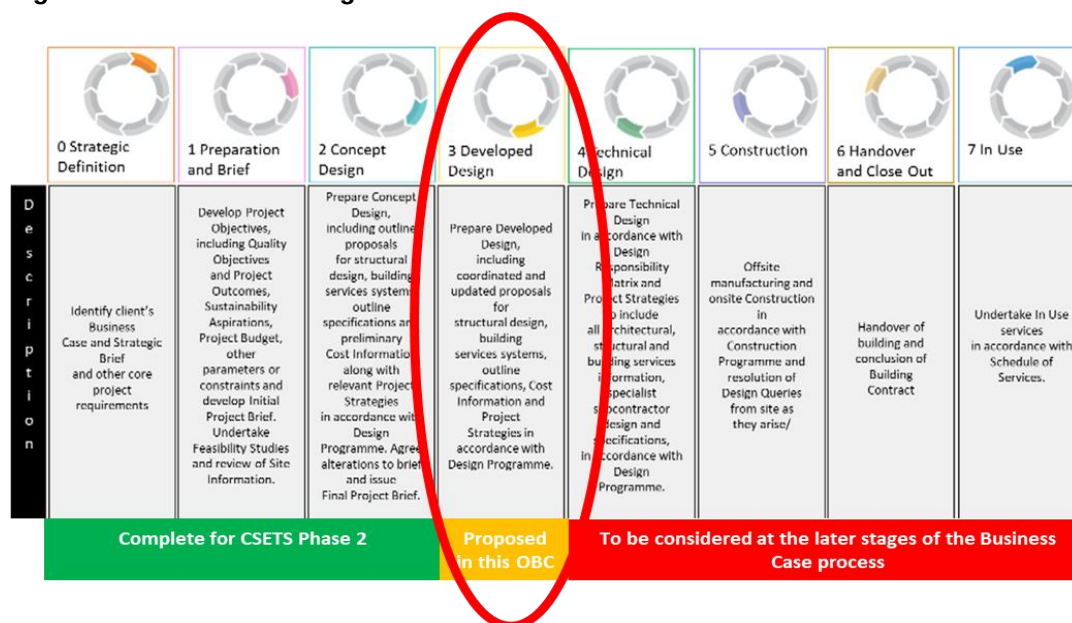
The following is the format of the Project Status Report:

- Key activities and achievements in report period;
- Serious issues and actions required by governance body;
- Key activities in the forthcoming period;
- Key milestones update – including RAG rating;
- Key issues;
- Key risks; and,
- Budget update.

6 Project Plan

Figure 6.1 illustrates the RIBA (Royal Institute of British Architects) work stages. CSET is currently at RIBA Stage 3.

Figure 6.1: RIBA Work Stages



Source: Mott MacDonald

GCP have however developed their own work and reporting stages which are based on key decision points aligned with the DfT Business case process, but is also closely related to the RIBA work stages; this is the plan that will be followed and is illustrated in Figure 6.2.

From Figure 6.2 it can be seen that development of the OBC aligns with the Feasibility Phase of the GCP Key Decision Framework and Stage 2 of the DfT WebTAG Business case process. Work contained within this OBC is intended to allow CSET Phase 2 to successfully reach GCP's Key Decision Point 4 (approval of preferred option design) and progress to the Decision Phase.

Figure 6.2: GCP Key Decision Framework

Major Infrastructure Project Development Key Phases	RESEARCH PHASE	GATEWAY		RESEARCH PHASE	GATEWAY		FEASIBILITY PHASE	GATEWAY	
	Policy/ Local transport plan (LTP3), Strategic Studies/ Engagement	1		Initial Options	2		Consultation on Initial Options	3	
	Strategy Stage	Key Decision		Delivery Stage	Key Decision		Delivery Stage	Key Decision	
	SS0	EKD1		DS1	EKD2		DS2	EKD3	
Delivery Stage/ Executive Key Decision	Policy & Strategy	Approval of Project Scope		Project Set Up / Initial Options	Approval to consult on initial options		Feasibility Study	Approval to design and consult on preferred option(s)	
Definition	<p>1. Development of a scope which sets out: the issues & problems the scheme will address, wit past lessons learnt, together with outline costs and potential funding sources.</p> <p>2. Identify: the objectives/ approach Governance/ decision stream Exec key decision stages key stakeholders, key opportunities and key risks.</p> <p>3. Hold a resources meeting using the agreed PID/ Agree QAA project team</p>	<p>Document Checklist</p> <ol style="list-style-type: none"> 1. Project Scope 2. Project Initiation Document (PID) 3. Project Management Plan 4. Initial Budget Estimate 5. Initial Risk Register 6. Communications Plan 7. Draft Business Case 8. Quality assurance audit (QAA) Resources plan 		<ol style="list-style-type: none"> 1. Transport modelling, 2. Conceptual design, 3. Initial engagement with stakeholders & initial options to take forward to first round public consultation. 4. Data collection and analysis, 5. environmental constraints mapping, 6. identify land requirements. 7. Route or other intital options development, 8. high level transport and environmental assessment. 9. Public consultation planning. 10. QAA Options workshop 	<p>Document Checklist</p> <ol style="list-style-type: none"> 1. Scheme Definition Report: <ul style="list-style-type: none"> Consents strategy, Land strategy, Options strategy, Modelling strategy, Procurement strategy 2. Initial Options Report Plan 3. Public Consultation 4. Budget Estimate 5. Communications Plan 6. Quality assurance audit 		<ol style="list-style-type: none"> 1. Public and stakeholder consultation on initial options 2. Analysis of feedback and identification of shortlist options, 3. Technical appraisal, 4. Environmental assessment, 5. Traffic assessment 6. Public consultation planning. 7. Strategic Outline Business Case (SOBC) 8. QAA Feasibility workshop 	<p>Document Checklist</p> <ol style="list-style-type: none"> 1. Strategic Outline Business Case 2. Options Appraisal Report (OAR) 3. Public Consultation Plan 4. Communications Plan 5. Budget Estimate 6. Quality assurance audit 	

Major Infrastructure Project Development Key Phases	FEASIBILITY PHASE	GATEWAY	DECISION PHASE	GATEWAY	BUILD PHASE	END PHASE	MAINTENANCE
	Options Development & Consultation on Options	4	Develop Preferred Option	5	Delivery Programme		
Delivery Stage/ Executive Key Decision	Delivery Stage DS3	Key Decision EKD4	Delivery Stage DS4	Key Decision EKD5	Delivery Stage DS5	Post Project	
	Preliminary Design	Approval of preferred option design	Detailed Design	Approval of project implementation	Construction (Mobilisation and Construction)	Key Documents	Maintenance
Definition	<ol style="list-style-type: none"> Public consultation on feasible options and analysis leading to preferred option selection. Further stakeholder consultation. Value Engineering. Further preliminary design of preferred option. Traffic assessment. Environmental assessment leading to Outline Business Case for preferred option. Road Safety Audit Stage 1 Buildability Design sufficient for planning. Prepare planning application & statutory consents. Early Contractor Involvement. QAA Prelim design workshop 	Document Checklist <ol style="list-style-type: none"> Public Consultation Report Preferred Options Report Outline Business Case Communications Plan Procurement Plan Budget Estimate Land identification schedule Approve land acquisition Quality assurance audit 	<ol style="list-style-type: none"> Development of preferred option for: environmental impact assessment, land reprofiling, land requirements, accommodation works, property cost estimates. Negotiations with landowners and stakeholders. Planning Application, Orders, Compulsory Purchase, Statutory Consents. Public Inquiry Detailed design Value Engineering, Early Contractor Involvement. Update risk register. Full Business Case (FBC). Prepare firm budget estimate based on contractor pricing and risk register. Construction plan. Maintenance and legacy arrangements. Stage 2 Road Safety Audit. QAA Detailed design workshop 	Document Checklist <ol style="list-style-type: none"> Environmental Impact Assessment Land schedule Risk register Construction Plan Communications Plan Budget Full Business Case Quality assurance audit 	<ol style="list-style-type: none"> Mobilisation and Construction Stage 3 Road Safety Audit Public Liaison 	<ol style="list-style-type: none"> Post project evaluation & Lessons learnt Health & Safety file As Built Records. 	
Risk	<ol style="list-style-type: none"> Environment Contractor Procurement 		<ol style="list-style-type: none"> Environment Contractor Procurement 		<ol style="list-style-type: none"> Environment Contractor 		
Web-TAG (Web Based Transport Analysis Guidance)	Stage 2 Further appraisal: <ol style="list-style-type: none"> Undertake Further Appraisal Public Consultation on Appraised Options Outputs from the Study 	OBC	Stage 3 Monitoring & Evaluation: <ol style="list-style-type: none"> Implementation Programme Monitoring and Evaluation 	FBC			

Source: Mott MacDonald

7 Assurance and Approvals Plan

7.1 Assurance and Approvals

As detailed in the previous section, the approvals process at each development phase dictates that the project must pass through a number of key decision points where assurance will be carried out in order to ensure the project meets the required standards to be approved and progressed to the next phase of work. These key decision points are known as Gateway Reviews.

The assurance process which Phase 2 of CSET is following is set out in the Draft Assurance Framework for the City Deal.

7.2 Assurance Frameworks

As outlined, there are a number of key milestones where internal and/or external approvals will be required in order for the project to progress. CSET Phase 2 will be progressed through GCP's standard approval processes, inclusive of Gateway Reviews. For the varying level of project decisions that are made in relation to the scheme, the Project Manager has authority to determine in which of four categories a decision falls under:

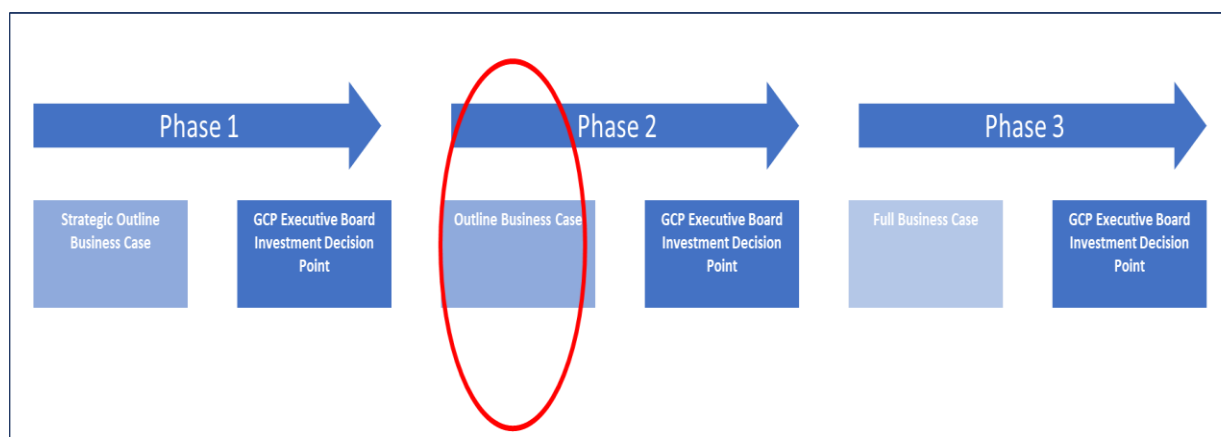
- **Key Decision:** These decisions are as defined in the GCP paper agreed in January 2015 and are the major 'gateway' decisions to allow the overall project progress. These key decisions form the outer scope of the project and define the 'project parameters'. Key decisions are the sole responsibility of the GCP Executive Board with advice from the GCP Joint Assembly and Chief Executives' Group.
- **Scope Change Decisions:** These decisions are those which will take the project out of the scope of the project parameters agreed at the key decision-making stage. These decisions will impact cost, quality or time. As such these decisions are the sole responsibility of the GCP Executive Board with advice from the GCP Joint Assembly and Chief Executives' Group.
- **Major Decisions Within Scope:** These decisions are within the agreed project parameters but are still considered 'major decisions' because they have an impact on cost, quality and time and will require a change to the Project Plan. A major decision is the sole responsibility of the Project Board.
- **Project Management Decisions:** These are decisions which do not impact cost, quality or time (an example may be technical decisions on detailed options). These decisions include moving budget between work streams. These are the responsibility of the Project Manager.

The scheme will pass through three business case stages as part of the overall approval process. The first stage of the business case process has been approved by the GCP Executive Board, progressing the scheme to Outline Business Case stage. A further two stages will now require approval by the GCP Executive Board to secure funding for this scheme. The three-stage process which is being undertaken for this scheme is aligned to the Department for Transport's 'The Transport Business Cases' (January 2013) approach:

- **Strategic Outline Business Case (SOBC):** consisting of high-level analyses which establish the need for the project and identify the options to be shortlisted.

- **Outline Business Case (OBC):** containing more detailed analysis of shortlisted options to identify a preferred option, and setting out the financial, commercial, and management strategies.
- **Full Business Case (FBC):** updating the preferred option analysis and confirming the final financial, commercial, and management strategies.

Figure 7.1: Business Case Approval Process



Source: Mott MacDonald

7.3 Approvals to Date

The timescales for the various assurance approvals are outlined in Table 7.1.

Table 7.1: Assurance Approvals - Key Milestones

Key Project Milestone	Completion Date
Phase 1 signed off	July 2018
Approved Public Transport Strategies for further development	October 2018
Approved shortlist of options for consultation	June 2019
OBC Submission	May 2020
GCP Executive Board Decision/approval of OBC	June 2020
Approval to submit Transport & Works Act Order (TWAo) application	May 2021
FBC Submission	December 2021
GCP Executive Board Investment Decision on FBC	TBC
FBC Submission (Final)	TBC
Approval to proceed with construction	TBC

Source: GCP/Mott MacDonald

8 Delivery Programme

Table 8.1 provides a draft outline programme of the key milestones and associated delivery dates for Phase 2 of CSET, following on from the scheme's progression to date.

Table 8.1: Delivery Programme - Key Milestones

Key Project Milestone	Date
Option Development and Appraisal	
Review initial optioneering undertaken by WSP	September-October 2018
Option development	January - March 2019
Option appraisal	March – September 2019
Public Consultation on shortlisted options	September 2019
Options Appraisal Report	October 2019
Option Refinement	
Draft Outline Business Case (OBC)	February 2020
OBC completion	May 2020
Final (preferred) option recommendation to GCP Executive Board	June 2020
GCP confirmation of preferred option recommendation	June 2020
FBC Development	
Detailed design completion	TBC
Statutory procedures completion	April 2022
Draft FBC	December 2021
Final FBC submission	TBC
Construction and Hand Over to Final Operator	
Appoint contractor	TBC
Construction start	April 2023
Construction completion and hand over	May 2025
Scheme opening	June 2025

Source: GCP/Mott MacDonald

9 Risk Management Strategy

Risk is defined as ‘the effect of uncertainty on objectives’, or ‘uncertainty that matters’⁷, therefore all risks arise from there being an uncertainty during the project.

Risk management is an integral element of project management and is crucial to the achievement of objectives (time, cost, scope), the realisation of any opportunities for acceleration and cost reduction, and the avoidance of delivery issues and crises. In support of this, the prime goal of risk management is the early identification and resolution of uncertainties – as far as possible to eliminate uncertainty at the paper design stage, when it is cheaper and quicker than during the construction stage.

Critical success factors for risk management are shown in Figure 9.1.

Figure 9.1: Risk Management Critical Success Factors



Source: Practice Standard for Project Risk Management – PMI 2009

The risk management strategy developed for CSET Phase 2 establishes roles and responsibilities for management of risk by stakeholders and describes principles for escalation of risks from the project to more senior levels within the governance structure. It also addresses identification and capture of risk statements from delivery plans and the wider context, and provides a structured approach relating responses to the identified risks. The key output of the risk management strategy is the risk register which will remain live through development and delivery of the project.

⁷ Hillson, How to manage the risks you didn't know you were taking, 2014

The risk management methodology identified in this section draws on industry standard guidance, including ISO 31000:2009, BSI 31100:2011, Management of Risk⁸, Practice Standard for Project Risk Management⁹

9.1 Risk Management Objectives

The objectives of risk management for CEST Phase 2 are to:

- Increase knowledge about all aspects of the scheme and its delivery, to inform the production of plans, schedules and estimates that describe the work that will be conducted to deliver the scheme;
- Identify and provide for areas of uncertainty and ambiguity that may result in future change to scheme delivery, and identify ownership and responsibility for those changes;
- Develop and manage execution of plans that eliminate or minimise the effects of threats to the scheme, to minimise the occurrence of unanticipated issues that may delay progress, increase costs, or detract from the quality of the delivered scheme at all stages of delivery;
- Identify and develop plans that exploit opportunities for quicker, cheaper, or better delivery that arise from circumstances being more favourable than those assumed in the planning;
- Develop fall-back or contingency plans to expedite the handling of risks that are realised, thereby minimising downside and maximising upside of risk impacts.

The scope of risk management addressed by this strategy extends to event and knowledge risks but excludes consideration of variability risks which are concerned with uncertainty in estimation of productivity, effort, duration, cost, or other variable parameters and the modelling of their effect on cost and timescales.

9.2 Prioritisation of Risks

Project risks have been defined in terms of the 'Iron Triangle' of time, cost, and scope (quality).

Scope is the highest priority, with extensions to time and costs being permitted to deliver a compliant scheme capable of realising the predicted benefits. The second priority is cost; incurring additional costs to shorten timescales is not generally under consideration.

9.3 Risk Management Activities

Table 9.1 outlines the key activities either have been or will be undertaken in the ongoing management of risks throughout the development and delivery of CSET Phase 2.

Table 9.1: Risk Management Activities and Timings

Meeting	Agenda Items	Inputs	Timing
Kick off meeting	<ul style="list-style-type: none"> • Review objectives and delivery plans • Review of any previous risk register • Identification of new risks 	<ul style="list-style-type: none"> • Contract / scope of work • Delivery plans • Risk register • Issues log • Schedule • Cost Estimate 	Commencement of the project
Design review meetings by workstream	<ul style="list-style-type: none"> • Review of risk register • Review of assumptions register 	<ul style="list-style-type: none"> • Risk register • Assumptions register • Issues log 	As and when required for the design phase – to be detailed in the

⁸ Management of Risk: Guidance for Practitioners 3rd Edition – AXELOS 2012

⁹ Practice Standard for Project Risk Management – PMI 2009

Meeting	Agenda Items	Inputs	Timing
	<ul style="list-style-type: none"> Review of any mitigation actions Identification of new risks 	<ul style="list-style-type: none"> Updated plans Change orders 	Project Management Plan. After any significant changes to scope or budget.
Project progress meetings including with the client and relevant workstream leads	<ul style="list-style-type: none"> Review of all open risks Review of any mitigation actions Identification of new risks 	<ul style="list-style-type: none"> Risk register Assumptions register Issues log Updated plans Change orders 	Monthly as a minimum. After any significant changes to scope or budget.
Subcontractor meetings	<ul style="list-style-type: none"> Review of top risks Review of risks ≥ 6 months in advance Review of any mitigation actions Identification of new risks 	<ul style="list-style-type: none"> Summary risk register Assumptions register Issues log 	Following appointment of key subcontractors Monthly as a minimum.
Risk workshops (Joint team)	<ul style="list-style-type: none"> Purpose of workshop Identification techniques to be used Outputs to be produced Timescales 	<ul style="list-style-type: none"> Risk register Assumptions register Issues log Updated plans 	Quarterly. As and when required. After any significant changes to scope or budget.

Source: GCP/Mott MacDonald

9.4 Approach to Risk Identification and Assessment

This section provides an overview on how identified risks were categorised into homogenous groups and articulated as risk statements. It then goes to explain how risks were scored based on their probability of occurrence and the impact they would have should they materialise.

9.4.1 Risk Categorisation

Risks were identified and grouped into one of 11 categories as shown Figure 9.2.

Figure 9.2: Risk Register Risk Categories



Source: Mott MacDonald

9.4.2 Risk Statement Metalanguage

Risk statements have therefore been constructed in the format set out in Table 9.2.

Table 9.2: Risk Statement Format

Cause		Event		Impact	
Because of ... / Due to ...	<Description of unknowns, and assumptions made to develop plans>	There is a risk that ...	<Assumption may prove incorrect; project may diverge from the plan by ...>	Leading to ...	<Description of the effect on objective(s) for the workstream, stage, or project.>

Source: Mott MacDonald

9.4.3 Risk Scoring

Risks have been scored by assessing their likelihood and impact ratings and combining these scores to prioritise actions. Parameters for assigning Red, Amber and Green (RAG) ratings to likelihood and impact of risks are based on of likelihood values, and consideration of the impact as a proportion of the scheme cost estimate.

Likelihood

Likelihood has been specified using a score of 1-5. The bands equate to single values of likelihood shown in Table 9.3, considered to represent a reasonable range of confidence in planning assumptions.

Table 9.3: Scoring Parameters for the Likelihood of Risk Occurrence

Score	Likelihood
1	5%
2	10%
3	25%
4	50%
5	90%

Source: Mott MacDonald

In terms of RAG ratings Red, Amber and Green have been assigned to Likelihood scores as noted in Table 9.4.

Table 9.4: Risk Likelihood Ratings

Description	Descriptor	Scale
May only occur in exceptional circumstances, highly unlikely	Very Low	1
Is unlikely to occur in normal circumstances, but could occur at some time	Low	2
Likely to occur in some circumstances or at some time	Moderate	3
Is likely to occur at some time in normal circumstances	High	4
Is highly likely to occur at some time in normal circumstances	Very High	5

Source: Mott MacDonald

Impact

Impact has been specified by specified using a score of 1-5. When a score is selected, a three-point estimate has been produced in the risk register based on the overall scheme costs.

Table 9.5: Scoring Parameters for Risk Impact

Score	% of scheme cost		
	Optimistic	Most Likely	Pessimistic
1	2%	5%	15%
2	10%	20%	45%
3	35%	50%	75%
4	50%	60%	90%
5	85%	90%	100%

Source: Mott MacDonald

In terms of RAG ratings Red, Amber and Green have been assigned to Impact scores as noted in Table 9.6.

Table 9.6: Risk Impact Ratings

Description	Descriptor	Scale
Insignificant disruption to internal business or corporate objectives Little or no loss of front line service No environmental impact No reputational impact Low financial loss (proportionate to budget involved)	Negligible	1
Minor disruption to internal business or corporate objectives Minor disruption to front line service Minor environmental impact Minor reputational impact Moderate financial loss (proportionate to budget involved)	Marginal	2
Noticeable disruption to internal business and corporate objectives Moderate direct effect on front line services Moderate damage to environment Extensive reputational impact due to press coverage Regulatory criticism High financial impact (proportionate to budget involved)	Significant	3
Major disruption to corporate objectives or front line services High reputational impact – national press and TV coverage Major detriment to environment Minor regulatory enforcement Major financial impact (proportionate to budget involved)	Critical	4
Critical long term disruption to corporate objectives and front line services Critical reputational impact Regulatory intervention by Central Govt. Significant damage to environment Huge financial impact (proportionate to budget involved)	Catastrophic	5

Source: Mott MacDonald

9.4.4 Risk Reporting

There are three key recipients of reports from the risk management process,

- Project Delivery Team;
- Transport Projects Board; and
- GCP Executive Report Board.

Reporting schedules are driven by gated reviews and major delivery milestones.

9.5 Quality Assurance of Deliverables

Delivery of the risk register follows these steps:

- Internal review with discipline leads and Project Manager to update risks and progress against responses; and
- Review of key risk areas with GCP team to identify activities that GCP owns.

During the risk register reviews with workstream leads and the Project Manager the following checks will be made:

9.5.1 Risks

- That the date of last review was not greater than two months ago;
- The project stage agrees with the schedule;
- Risk titles remain meaningful, describing the impact and event at a high level;
- A three-part risk statement (Cause, Event, Impact) exists for each risk that describes the risk in detail;
- Verification that each risk has an owner;
- Each risk category is populated to allow filtering;
- Risks are correctly allocated to the employer or suppliers/contractors; and
- That review comments are being acted upon to show development of risk and response.

9.5.2 Actions

- Action descriptions in the register are Specific, Measurable, Achievable, Relevant and Time-based (SMART), and their outcomes are clearly identified;
- Verification that all actions have owners;
- Verification that all actions have due dates; and
- Action due dates in the future are included for all open actions.

9.5.3 Assessments

- Where there are no mitigation activities, post-mitigation assessments remain the same as current assessments.

9.6 Risk Register

In accordance with the above activities a risk register has been developed. Noting that this is a live document, it is included as it stood at 15 May 2020, in full, in Appendix L document reference 403394-MMD-BCA-00-RP-BC-0373.

Based on the product of the likelihood of a risk occurring with its associated impact, the highest possible risk score is 25 (5, where the likelihood of occurrence is very high multiplied by 5, where the impact is catastrophic). The highest scoring inherent risks are noted in Table 9.7; only those with a score of over 15 are included, with 13 risks exceeding this value at the time of writing.

Table 9.7: Top Risks from the Risk Register

Risk	Impact	Inherent Risk Rating	Mitigation Measure	Post Mitigation Risk Rating
Ongoing funding subject to changes in priorities for allocation of finite resources. Competing schemes within City Deal programme.	Support may be withdrawn, or the continuation of the scheme may be conditional on a review, which would incur delay and additional cost preparing business justification for the review.	20	Escalate: Maintain good relationships with funding bodies and submit detailed and rigorous funding bids. Adequate resources will be devoted to maintaining funding bids.	15
COVID-19 situation and Government guidance do not permit programme-critical activities to be progressed	Delays and additional costs associated with prolongation.	20	Treat: Review current activities and those planned for the next 3 months. Identify those that can and can't be progressed. For those that can't be progressed, identify actions that can be taken to mitigate impact on overall programme.	15
A shortlist of route and travel hub site options has been produced.	Extensive rework to identify further options and develop to a stage where they can be supported by CPCA.	20	Escalate: Work closely with CPCA (but it should be noted this is a strategic risk not a project level risk).	12
Political considerations that may influence the selection of a preferred option have not been available.			At a project level, collaborate with CAM consultants to develop a preferred option that supports regional CAM extension to Haverhill.	
The scheme schedule assumes that third party technical approvals are granted according to 'normal' timescales.	Delay pending processing of approvals. Additional costs, if further information is required	16	Treat: Early engagement with relevant contacts in Highways England, Environment Agency, Network Rail, etc. to agree programme for technical approvals. Develop alignment to minimise impact and interface with third party stakeholders.	4
It is known that where there are sensitive issues, or where the granting authority has resource constraints or competing demands, permissions and consents may take longer.				
Planning assumes that third party plans for other transport schemes do not introduce dependencies that affect scheme progress.	Delays are introduced into plans, delaying milestone achievement and increasing costs due to prolongation.	16	Treat: High level programme management is to undertake thorough liaison with all relevant transport authorities and scheme promoters. Collaborative planning between affected parties to align plans and share awareness of constraints.	6
The OBC is based on estimated values for land acquisition. Local land values may be volatile as the requirement for development land increases. Individual landholders may inflate demands for land critical to the scheme.	Increased costs for scheme delivery. Possible delay and cost impact if alternative designs/routes are considered to avoid contentious areas.	16	Treat: Ensure land cost estimates are robust and consider compensation payable. Negotiate with developers	8

Risk	Impact	Inherent Risk Rating	Mitigation Measure	Post Mitigation Risk Rating
The scheme is dependent on the development and production of the technological solution that is capable of running guided vehicles at the required speeds.	Delay and possible additional costs for the design and delivery of infrastructure associated with implementing a kerb-guided system.	16	<p>Treat: Review state of art in technology areas and establish maturity at early stage.</p> <p>Avoid reliance on emerging technology unless risk can be managed.</p> <p>Development and implementation of testing programme to provide assurance of capability of the selected technology to support running guided vehicles at the required speeds, and associated design requirements.</p>	12
Scheme design assumes that technological guidance will be approved in time for in-service dates to be achieved.	Design change to kerb-guided system.	16	<p>Treat: Activities to promote change to GTMO.</p> <p>Engagement with CPCA, CCC, etc. Support to Mayoral engagement with DfT and Ministers.</p> <p>Need to understand parallelism in plan between legislation and scheme.</p> <p>Allow the possibility of a change to kerb-guided within the envelope and design.</p>	12
GTMO does not currently provide for technological forms of guidance. Assumed that legislation will have amended the GTMO to accommodate technological guidance.	Delay pending alternative approach to consents, or to allow the presentation of a kerb-guided scheme.	16	Treat: Legal advice and promotion of a revision to the GTMO.	12
It is intended to use the TWAO process as a route to gain planning consent.	<p>DfT TWA unit may require additional information and justification to accept the application.</p> <p>Delay and additional cost may be incurred if the challenge has to be addressed during the inquiry.</p>	16	<p>Treat: Continue dialogue with DfT.</p> <p>Use of legal advice. Ensure consistent approach and decision making across C2C and CSET Phase 2 schemes.</p>	9
Planning constraints protect the Green Belt. Two shortlisted sites for the Travel Hub are within the Green Belt. The Green Belt may	<p>Additional work (cost and delay) to justify the use of a Green Belt location.</p> <p>Additional mitigations required to landscape and/or hide the facility, incurring additional cost and</p>	15	Treat: GCP to commission assessment of the impact of the project on the Green Belt, consistent with other GCP transport projects. Report to be completed by end of Q1 2020 and included in evidence base for scheme.	10

Risk	Impact	Inherent Risk Rating	Mitigation Measure	Post Mitigation Risk Rating
lead to a lower performing site being favoured, if that site is outside the Green Belt, leading to a sub-optimal solution or the loss of user benefits in order to maintain protection of the Green Belt.	time into the programme. Other option preferred, outside the Green Belt, delivering (potentially) lower user utility.		Early discussions with Planning Authority to understand key issues and evidence base required. Early discussions with key stakeholders. Development of a robust design and evidence base.	
Some elements of the design have not been costed in detail, but an allowance has been made based on estimates and previous works.	Re-evaluation, design changes, and value engineering will result in delays and additional costs.	15	Treat: During design development, cost estimates will be reviewed, and allowances replaced with detailed costings where possible. Client property consultants will develop detailed costs based on land acquisition plans. Regular liaison meetings to progress land costs.	6
Procedure for scheme submission has options around approach that affect submitted materials, consultation, form of application.	Responding to a legal challenge incurs additional time and cost, delaying the start of the scheme and its final delivery.	15	Capture every product required legally in the plan and programme for the next stage. Create plan and programme for next stage of the project to prepare and deliver the TWAO submission, following completion of the governance process to select a preferred option. Ensure that all statutory procedures are followed to ensure that there is no scope for a judicial review - use of GCP legal advisors. Identify potential vectors for challenge and review actions required to achieve compliance in these areas.	5

Source: Mott MacDonald

9.7 Key Issues for Implementation

Key issues for implementation usually arise when identified risks to the project materialise and therefore become issues rather than risks. In order to prevent delays to the project, where key issues are identified, it is assumed that project work will progress while they are being considered by the Transport Projects Board and that the issues will be resolved promptly or escalated to the Joint Assembly and Executive Board, as deemed necessary. All issues are recorded in the Project's Issues Log, which is regularly reviewed and updated. Each issue is assigned an impact level, a corresponding mitigation measure and ownership.

9.8 Contingency Plan

When reviewing risk, as outlined here, it is also important to consider what might happen to the project should there be a threat to delivery. Given that delivery of the CSET Phase 2 project will primarily be funded through City Deal funding, which has already been successfully secured in principle by GCP, a Contingency Plan has not been deemed necessary at this stage in the

scheme's development. GCP have advocated their support for the scheme in advance of this OBC.

10 Communications and Stakeholder Management

Public and stakeholder consultation is essential to ensure that the various aspirations of the general public and key stakeholders are taken into account throughout development and delivery of the project and to manage the communication and flow of information relating to the scheme.

This section outlines the key stakeholders who are involved in the CSET Phase 2 project and is supported by the Stakeholder Engagement and Communication Plan (Appendix F, document reference 403394-BCA-00-RP-BC-0371) which has been prepared by GCP.

10.1 Communications Plan

The Stakeholder Engagement and Communication Plan has been guided by the principles of the City Deal wide communication strategy. The strategy outlines how all internal and external stakeholders are informed of relevant project information. Table 10.1 highlights the key Phase 2 activities extracted and updated from the aforementioned Plan.

Table 10.1: Project Dates and Tactical Communication Plan

Date	Project Element	Duration	Key Communications Activities and Comments
20 Sept 2018	Assembly		<ul style="list-style-type: none"> Recommendations for Phase 2 for further development. Social Media.
11 Oct 2018	Board		<ul style="list-style-type: none"> Recommendations for Phase 2 for further development Social Media Web page Press release
5 Nov 2018	Assembly Papers		<ul style="list-style-type: none"> Social Media
15 Nov 2018	Assembly		<ul style="list-style-type: none"> Social Media
6 Dec 2018	Board		<ul style="list-style-type: none"> Social Media
6 June 2019	Assembly		<ul style="list-style-type: none"> Recommended route and travel hub site options for consultation Social Media
27 June 2019	Board		<ul style="list-style-type: none"> Recommended route and travel hub site options for consultation Social Media Web page Press release
Summer 2019	Community events		<ul style="list-style-type: none"> Providing information material for and/or attending some key events in villages along route
9 Sept - 4 Nov 2019	Consultation on Phase 2 route details and travel hub site options	8 weeks	<ul style="list-style-type: none"> Pre-consultation briefing for local Councillors Leaflet and questionnaire Online Direct door to door distribution Email/letter to ALL stakeholders and keep informed Councillor and business briefings

Date	Project Element	Duration	Key Communications Activities and Comments
			<ul style="list-style-type: none"> Public exhibition events Social Media Advertising and promotions
Spring 2020	Phase 2 Summary Report of Consultation Findings published		<ul style="list-style-type: none"> Consultation report Update to web page Email/letter to ALL stakeholders and keep informed Social media
22 May 2020	Assembly Papers		<ul style="list-style-type: none"> Social Media
4 June 2020	Assembly		<ul style="list-style-type: none"> Recommended preferred route and travel hub site option Social Media
25 June 2020	Board		<ul style="list-style-type: none"> Recommended preferred route and travel hub site option Social Media Web page Press release
Autumn 2020	Environmental Impact Assessment consultation		<ul style="list-style-type: none"> Web page Events Promotion
August 2021	Transport and Works Act Order application submitted		<ul style="list-style-type: none"> Web page Email/letter to ALL stakeholders & keep informed Social media Press release
Spring 2022	Transport and Works Act Order Inquiry		<ul style="list-style-type: none"> Web page Email/letter to ALL stakeholders & keep informed Social media Press release
2022	Pre-construction		<ul style="list-style-type: none"> Councillor briefing Attending Parish Council meetings Community information events
Summer 2022	Community events		<ul style="list-style-type: none"> Providing information materials for and/or attending some key community events in villages along route
Spring 2023	Start of Phase 2 construction		<ul style="list-style-type: none"> Start of Works ceremony Email/letter to ALL stakeholders and keep informed Social Media
2023-2025	Construction		<p>Ongoing communication activities:</p> <ul style="list-style-type: none"> Updates, social media, emails, letter, press releases on road works and closures Photos, videos or project progress Regular Councillor/Parish Council meetings Bi-monthly newsletter to keep informed
May 2025	Whole scheme complete		<ul style="list-style-type: none"> Opening event (larger scale): ribbon ceremony, community event such as bike ride fun run Web page Email/letter to ALL stakeholders and keep informed Social media

Source: Mott MacDonald

10.2 Stakeholder Engagement

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

The key objectives for stakeholder engagement for CSET Phase 2 are to:

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

GCP has grouped stakeholders into four distinct groups in order to develop an appropriate communications approach to successfully engage necessary parties. The four overarching approaches are set out below.

Manage Closely

Stakeholders which are considered to have high influence and high interest need to be actively and closely managed through frequent communications to keep this group fully engaged with the project.

This should include regular face to face meetings and activities to allow for active discussion and consultation, supported by tailored communications that maintain an open dialogue between those solely involved with the project.

Keep Satisfied

Stakeholders which are considered to have high influence and low interest are regarded as 'opinion formers' and should be managed through regular, tailored communications that satisfy their needs. Pro-active consultation on specific areas can be used to increase their interest and support for the project. Communications to this group need to be timely and relevant, with opportunities for face-to-face and two-way communication to help build relationships.

Keep Informed

Stakeholders which are considered to have high interest and low influence need to be kept informed of developments through regular communications providing general updates and relevant information. Offering opportunities to share their views on specific areas that may affect them can help to increase support and goodwill for the project. Communication channels could include newsletters, emails, direct mail, forums and questionnaires and social media opportunities.

Monitor

Stakeholders who are considered to have low interest and low influence are unlikely to be actively seeking information about the project. This group can be kept informed through easily accessible, general communications, e.g. news articles, social media, website, brochures. Reactive communications may also be required, for example, to respond to specific queries.

Details of all identified stakeholders and the group to which they belong are set out in Section 10 of the Strategic Case.

Figure 10.1 illustrates the relative position of stakeholder groups in terms of their levels of interest and influence on the progression of the scheme.

Figure 10.1: Stakeholder Mapping



Source: Mott MacDonald

10.3 Engagement and Consultation at SOBC Stage

The consultation strategy at SOBC stage was designed by the GCP Communications Team with input from the County Council's Research Team.

The consultation adopted a multi-channel approach to promote and seek feedback including through traditional and online paid-for, owned and earned media, community engagement events in key or high footfall locations along the route and through the widespread distribution of around 22,000 consultation leaflets.

Public consultation events took place between February and April 2018; Quantitative data was recorded through a formal consultation questionnaire (online and hard copy) with 1,785 complete responses in total recorded. In addition, a significant amount of qualitative feedback

was gathered via the questionnaire, at events, via email and social media and at other meetings.

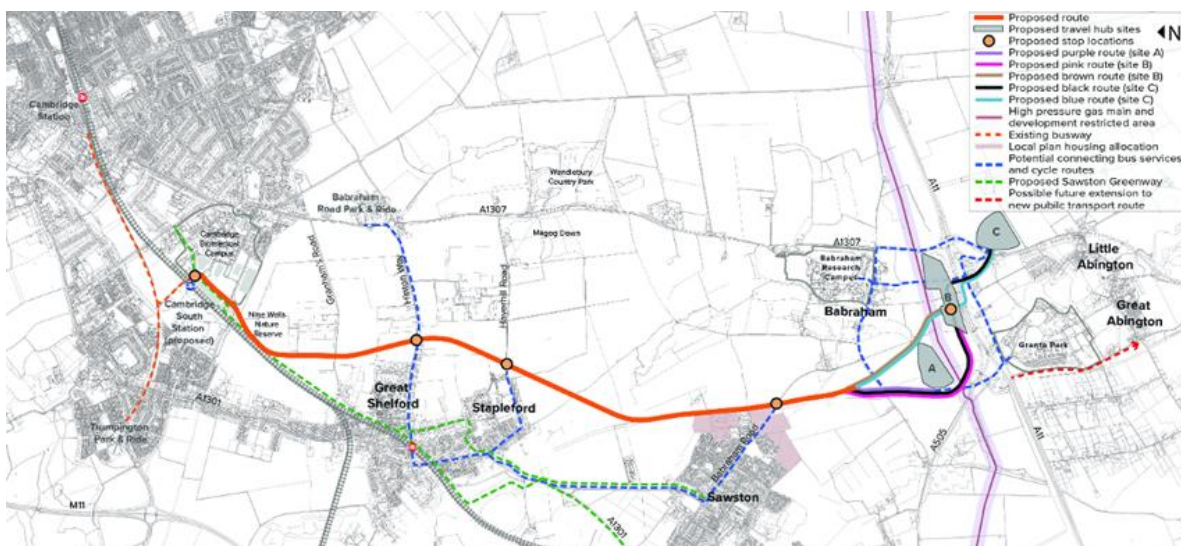
10.4 Key Findings from Consultation at SOBC Stage

Consultation focused on three alignments, referred to at SOBC stage as Strategies 1, 2 and 3. Strategies 2 and 3 were on-line options, making use of or running alongside the existing A1307 highway corridor. Strategy 1 was a new offline route that would provide dedicated infrastructure for public transport vehicles and non-motorised users. Strategy 1 was found to have the most support with 64% of responses in favour of this proposal.

10.5 Engagement and Consultation at OBC stage

Consultation at OBC stage ran for 8 weeks from 9 September to 4 November 2019 and sought the views of the general public on the proposed alignment for the new route (Strategy 1 at SOBC Stage) with alternative route options to the east of Sawston, linking to three potential Travel Hub locations, annotated A, B and C, near the A11/A1307/A505 interchange. This is shown in Figure 10.2.

Figure 10.2: Proposed Alignment for New Route taken for Public Consultation at OBC Stage



Source: Mott MacDonald

The dates and locations of the events are set out in Table 10.2.

Table 10.2: Public Consultation Events

Location	Date	Time	Address
Full Public Exhibition (Residents, general public, potential users and directly affected residents)			
Cambridge	Wednesday 9 October 2019	5:00-7:00pm	Long Road 6 th Form College, CB2 8PX
Haverhill	Thursday 10 October 2019	5:00-7:00pm	Haverhill Arts Centre, High Street, CB9 8AR
The Shelfords and Stapleford	Monday 14 October 2019	5:30-7:30pm	Stapleford Pavilion, Gog Magog Way, CB22 5BQ

Location	Date	Time	Address
Sawston	Thursday 15 October 2019	5:30-7:30pm	Spicers Pavilion, Cambridge Road, CB22 3DG
The Abingtons	Monday 21 October 2019	5.30-7:30pm	The Abington Institute, 66 High Street, CB21 6AB

Source: GCP

As at SOBC stage, the OBC consultation adopted a multi-channel approach to promote and seek feedback to either provide advance information ahead to those attending the events noted in Table 10.2 or to supplement feedback from those events. The following channels and materials were used:

- Social Media campaigns (Facebook, Twitter, Instagram);
- Door to door distribution (Leaflets flyers and posters to 18,500 households and businesses, see Figure 10.3);
- Direct email (GovDelivery to stakeholders, interested parties, schools and businesses);
- Advertising (Newspapers, magazines, bus stops and Park & Ride sites);
- GCP Web page and on-line survey (promoted on all materials);
- Display boards (featured at events and key locations such as libraries and parish council buildings); and
- Press releases (through local media).

Figure 10.3: Extent of Door to Door Distribution of Leaflets, Flyers and Posters

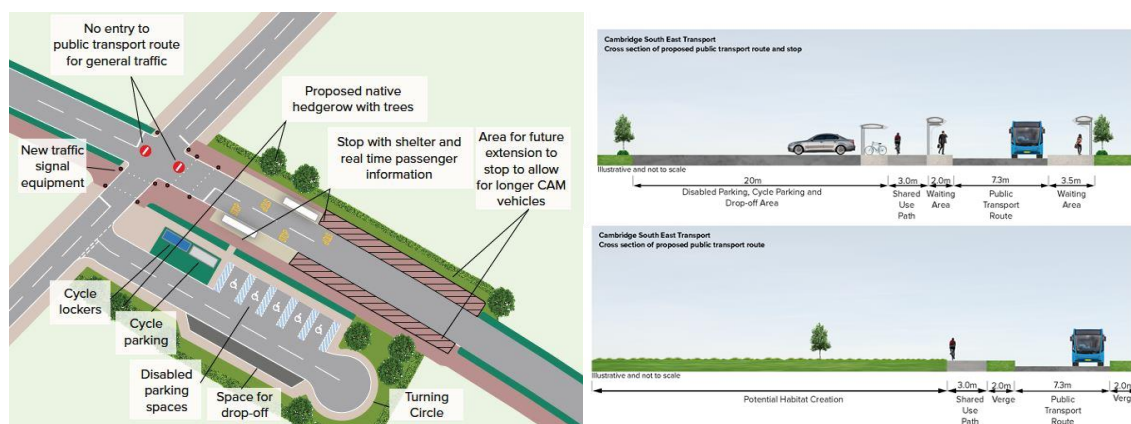


Source: Mott MacDonald

10.6 Consultation Materials

Background information in the public consultation materials noted that the proposed new public transport route would link the Cambridge Biomedical Campus via Great Shelford, Stapleford and Sawston to a new travel hub near the A11/A1307/A505 with connections to Babraham, the Babraham Research Campus and Granta Park. It was noted that the route would be entirely off-road, only interacting with other traffic at junctions. Junctions between existing roads and the new public transport route would be controlled by traffic lights. The same schematic as shown in Figure 10.2 was provided for reference. Consultees were also provided with a schematic of the typical layout of the stops along the proposed route alignments and cross sections of the proposed route and at a stop were provided as shown in Figure 10.4.

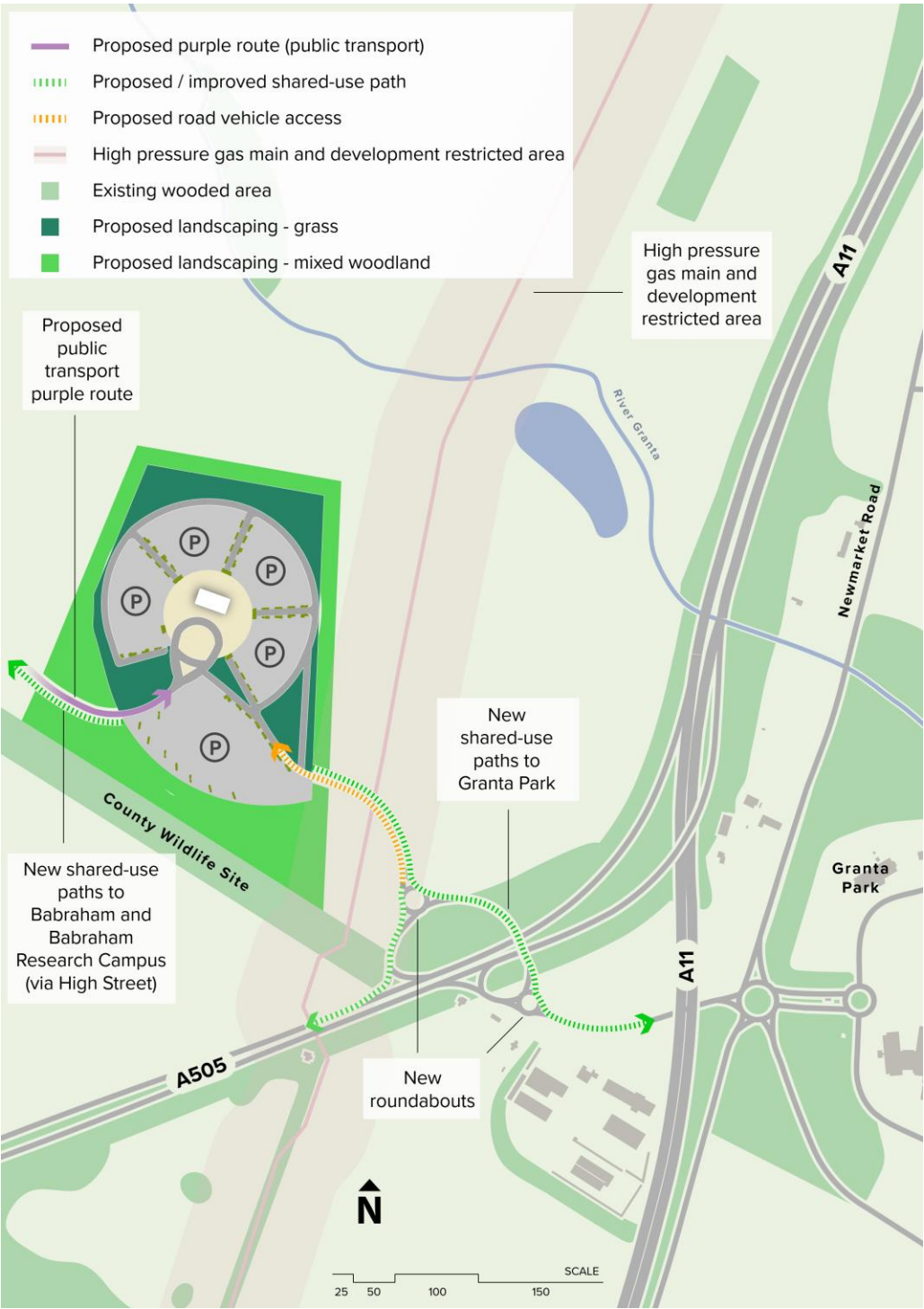
Figure 10.4: Typical Stop Layout and Cross Section of Route Stop



Source: GCP

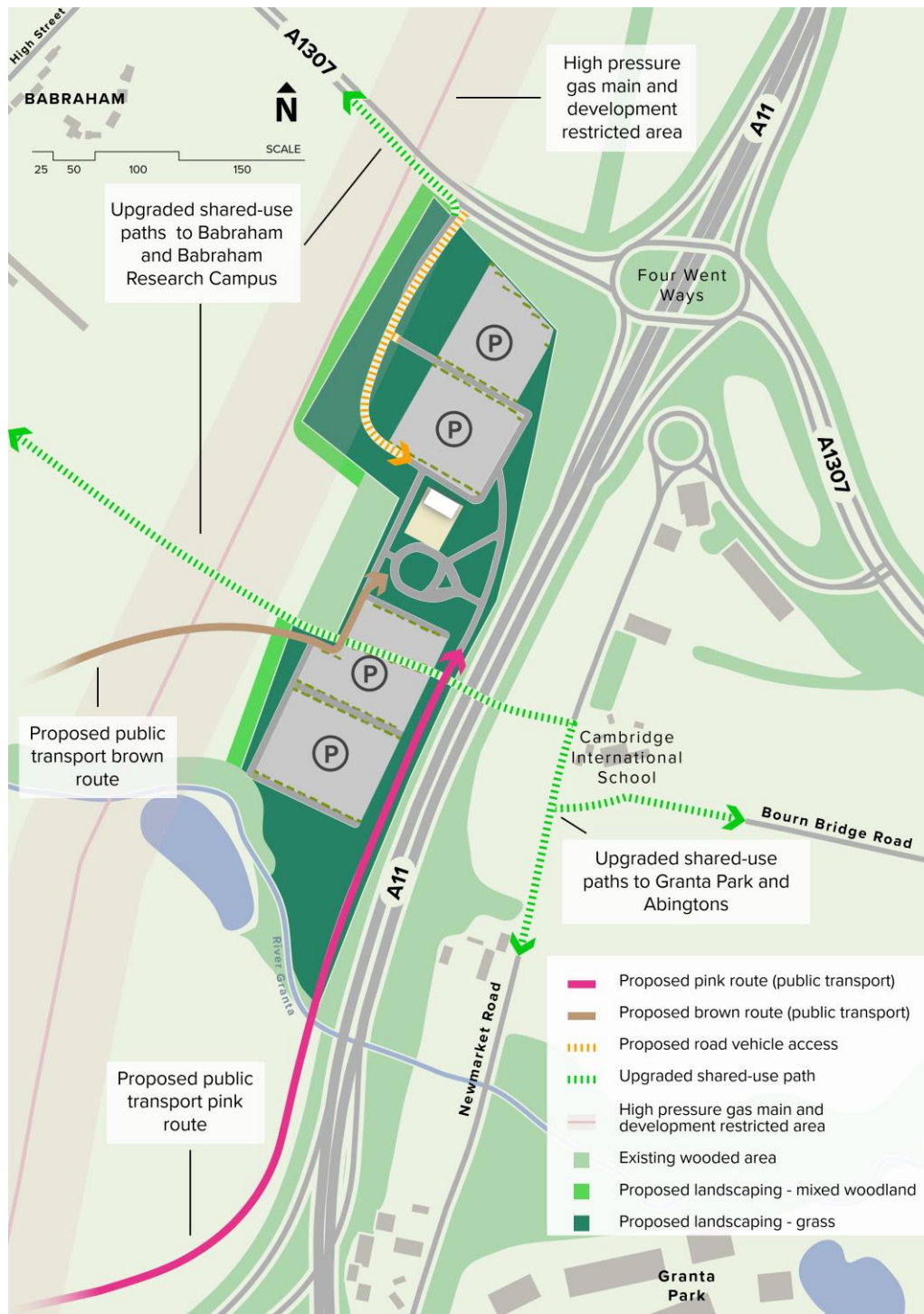
The three Travel Hub locations were presented for public consultation in the level of detail as shown in Figure 10.5, Figure 10.6 and Figure 10.7. Consultees were asked for their views on the proposed alternative options linking to three potential locations for a new Travel Hub site near the A11/A1307/A505.

Figure 10.5: Travel Hub Site A



Source: GCP

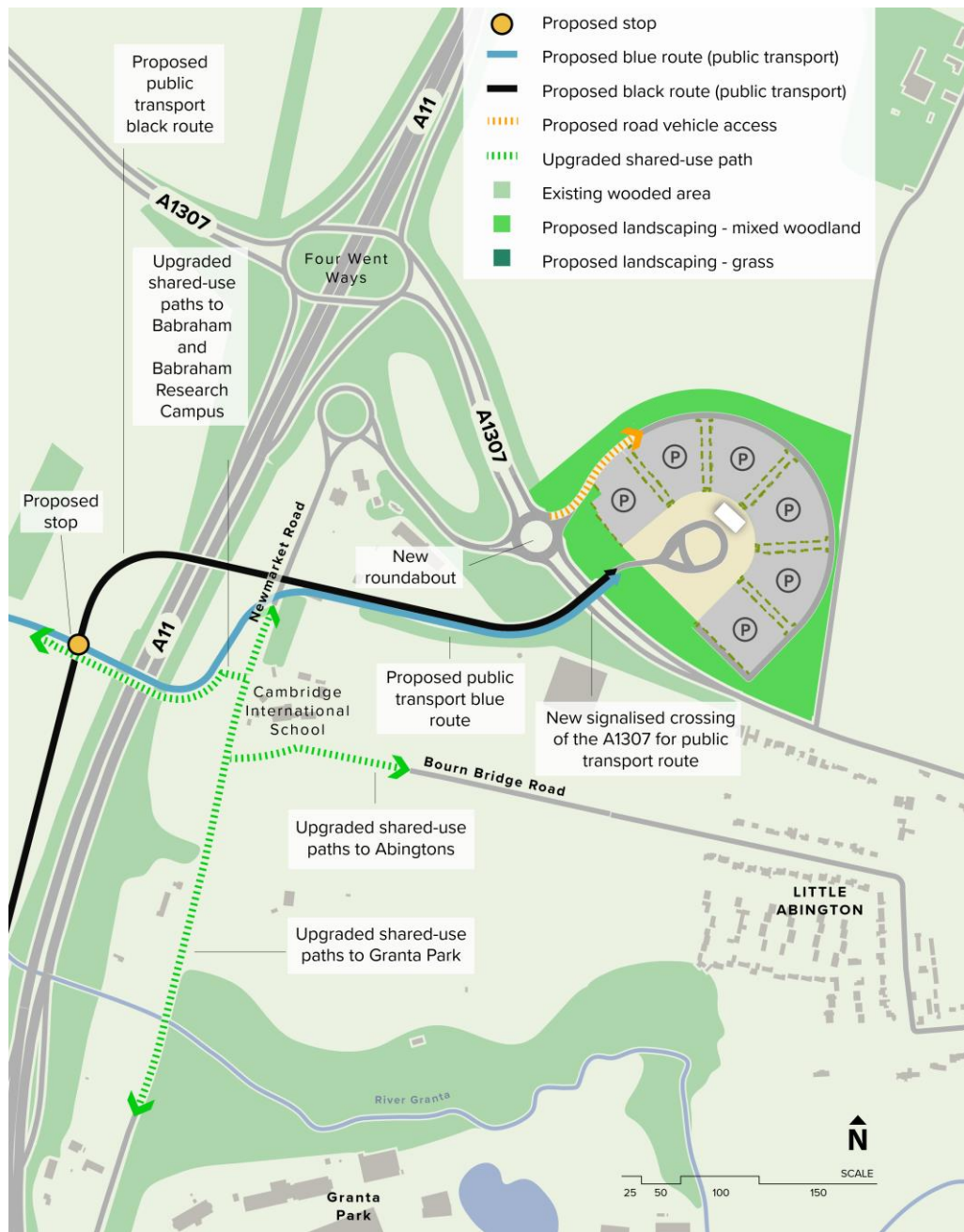
Figure 10.6: Travel Hub Site B



Source: GCP

Unlike site A, where only one possible access route (Purple) was proposed, two possible access routes to site B were proposed, the Pink and the Brown Route.

Figure 10.7: Travel Hub Site C



Source: GCP

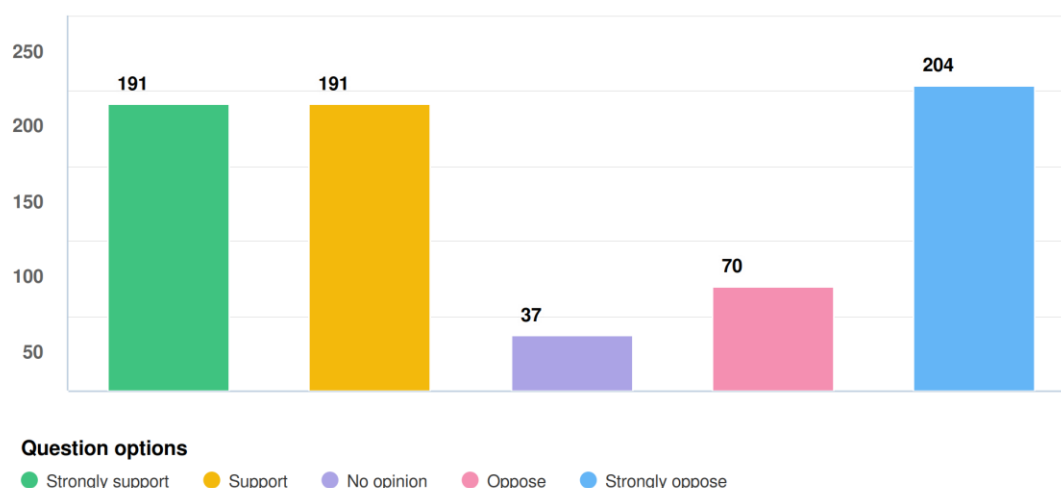
As with Travel Hub site B, two access options were proposed, the Blue route and the Black route.

10.7 Key Findings from Consultation at OBC Stage

Quantitative data was recorded through the consultation questionnaire (online and hard copy) with 702 responses in total recorded, though not all respondents answered all questions. A detailed account of the feedback can be found in the Statement of Community Involvement that accompanies this OBC as Appendix E, document reference 403394-MMD-BCA-00-RP-BC-0371, however the high-level responses to key questions that influenced the selection of the preferred option are noted here.

In terms of general support for the scheme proposals it was found that 382 (55%) out of 693 responses received to this question supported them to some extent compared to 274 (40%) who opposed the proposals to some degree; 37 (5%) of the respondents expressed no opinion. This is illustrated in Figure 10.8.

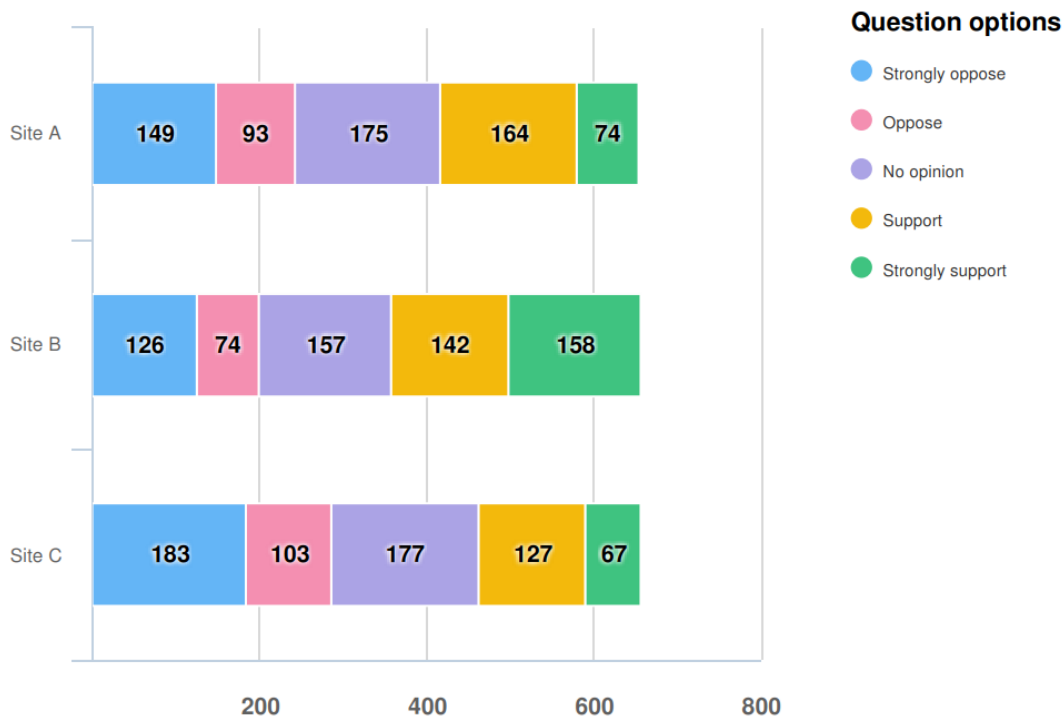
Figure 10.8: Level of Support for the Scheme Proposals in General



Source: GCP

Regarding the preferred location for the Travel Hub most support was expressed for Site B, with 300 (45%) of the 668 responses either supporting or strongly supporting this option and 200 (30%) opposing the site to some degree. Site C proved to be the least supported site with only 194 (30%) supporting it to some extent and 286 (43%) opposing it. This is illustrated in Figure 10.9.

Figure 10.9: Level of Support for the Travel Hub Sites



Source: GCP

When asked about the route alignments the Brown option, which connects to the most strongly supported Travel Hub site (Site B), received the greatest level of approval with 228 out of the 651 responses received supporting the option to some extent, compared with 198 opposing it to some degree. This was closely followed by the Pink option, also connecting to Site B, with 218 responses supporting the option, compared with 200 opposing.

The Purple option, connecting to Site A, received less support than either of the options connecting to Site B, with 201 responses supporting and 209 opposing this option.

The Black and Blue options which connect to Site C, the least popular Travel Hub site, received the least support with only 158 and 173 respondents respectively showing some level of support. This is shown in Figure 10.10.

Figure 10.10: Level of Support for the Complete Option Packages



Source: GCP

On this basis consultation concluded that, from a public acceptability standpoint, the Brown option was the indicative preferred option. This aligns with the findings of the formal INSET appraisal process.

11 Benefits Realisation

This section outlines the approach to managing the realisation of benefits of the CSET Phase 2 project. Benefits in this context are referred to as ‘a measure of the improvement that will be enjoyed by the organisation’. The benefits of any transport investment often play a crucial part in the justification for intervention. Therefore, identification of the benefits of the scheme and how they will be measured is fundamental to making the case for investment.

An outline Benefits Realisation Plan has been produced and is set out in Table 11.1. The plan defines how the identified benefits of CSET Phase 2 align with the scheme objectives, who the key beneficiaries would be, and the outputs required to realise the benefits. The table below also notes that some benefits will be realised at project level, whilst others are considered to be at a programme level i.e. delivering the wider growth and therefore may not be realised directly by the scheme.

Table 11.1: CSET Phase 2 Benefits Realisation Plan

Benefit	Objective Alignment	Who Benefits	Benefit Owner	Key Outputs / Deliverables Required to Realise the Benefit	Expected Level of Benefit	
Improved accessibility to key employment and education sites within south east Cambridge and Cambridge City Centre	1iii, 5i	<ul style="list-style-type: none"> Stakeholders Education establishments i.e. UoC Businesses i.e. Biomedical Campus 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of CSET Phase 2 	Programme	An increase in the number of employment and education opportunities in south east Cambridge and central Cambridge.
Improved accessibility to Cambridge Biomedical Campus particularly from the South and South East	5i	<ul style="list-style-type: none"> Employees Visitors Businesses 	<ul style="list-style-type: none"> Cambridge Biomedical Campus 	<ul style="list-style-type: none"> Completion of CSET Phase 2 Completion of other transport schemes e.g. Cambridge South West Park & Ride 	Project	Reduction in journey times for people travelling to Cambridge Biomedical Campus and a reduction in the number of vehicles accessing the Campus each day
Reduced congestion along one of Cambridge's key radial routes	2, 2ii	<ul style="list-style-type: none"> Commuters Visitors Residents Businesses 	<ul style="list-style-type: none"> GCP- scheme promoter 	<ul style="list-style-type: none"> Completion of CSET Phase 2 Implementation of City Access Measures 	Project	Reduction in journey time for people travelling to key employment sites and central Cambridge from the south east. Improved journey experience.
Reduction in NO ₂ along the A1307 corridor	2	<ul style="list-style-type: none"> Commuters Visitors Residents within the surrounding area 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of CSET Phase 2 Implementation of City Access Measures 	Programme	Reduction in measurable levels of NOx and PM10 pollution
Reduction in public transport journey times between Haverhill and the City Centre	1i, 3ii,	<ul style="list-style-type: none"> Residents Public transport operators Commuters 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of CSET Phase 2 	Project	Reduction in journey times for public transport operating between Cambridge and Haverhill.
Increase in sustainable travel mode share for commuter journeys	2i, 3iiii, 5ii	<ul style="list-style-type: none"> Local stakeholders Commuters Visitors Businesses 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of CSET Phase 2 Effective marketing campaigns to encourage use of buses and active travel amongst local stakeholders and businesses Implementation of City Access Measures 	Project	Increase in number of people using public transport and active travel modes as an alternative to private car for commuter journeys.
Growth of Cambridge's key employment sectors	1, 1iii,	<ul style="list-style-type: none"> Businesses Stakeholders 	<ul style="list-style-type: none"> Local businesses UoC 	<ul style="list-style-type: none"> Completion of CSET Phase 2 Aligned business marketing programmes to promote development 	Programme	An increase in employment levels within Cambridge's professional

Benefit	Objective Alignment	Who Benefits	Benefit Owner	Key Outputs / Deliverables Required to Realise the Benefit	Expected Level of Benefit	
		<ul style="list-style-type: none"> • CCC/CaCC/SCDC 		<ul style="list-style-type: none"> • of scheme and the economic benefits to businesses. • Marketing for future investment and development opportunities 		services, manufacturing and education sectors
Increased attractiveness of land for commercial and residential developments along the A1307 corridor	1, 1iii	<ul style="list-style-type: none"> • Local stakeholders • Housing developers 	<ul style="list-style-type: none"> • GCP - scheme promoter • Housing developers • Commercial investors 	<ul style="list-style-type: none"> • Completion of CSET Phase 2 	Programme	Increase in number of new housing and commercial units delivered along and close to the A1307 corridor.
Reduction in accident rates along the A1307	4, 4i, 4ii, 4iii	<ul style="list-style-type: none"> • Local stakeholders • Visitors • Commuters 	<ul style="list-style-type: none"> • GCP - scheme promoter • CCC Highways department 	<ul style="list-style-type: none"> • Completion of CSET Phase 2 	Programme	Reduction in KSI along the A1307 corridor
Improved pedestrian and cycle safety for people travelling along the A1307	3iii, 4iii,	<ul style="list-style-type: none"> • Cyclists • Local stakeholders • Visitors 	<ul style="list-style-type: none"> • GCP - scheme promoter 	<ul style="list-style-type: none"> • Completion of CSET Phase 2 	Project	Increase in the number of people cycling and walking along the A1307 as a result of safer, more attractive routes
Greater opportunities for cycle access into the City Centre from peripheral or longer distances.	2i, 3iii, 5ii	<ul style="list-style-type: none"> • Cyclists • Local stakeholders • Visitors 	<ul style="list-style-type: none"> • GCP - scheme promoter 	<ul style="list-style-type: none"> • Completion of CSET Phase 2 	Project	Increase in the number of people cycling between Haverhill and Cambridge City Centre and interim rural towns and villages.
Improved journey quality and user experience	1i, 1ii,	<ul style="list-style-type: none"> • Local stakeholders • Commuters • Visitors 	<ul style="list-style-type: none"> • GCP - scheme promoter 	<ul style="list-style-type: none"> • Completion of CSET Phase 2 	Project	Improvement in commuters' journey satisfaction along the A1307 corridor.

Source: GCP

12 Monitoring and Evaluation

Monitoring and evaluation are essential parts of any infrastructure project. This provides an opportunity to improve performance by reviewing past and current activities, with the aim of replicating good practice in the future and eliminating mistakes in future work. GCP have a responsibility to report on how funding is being utilised and how its expenditure represents value for money to the taxpayer and how spending aligns with the scheme objectives. This section outlines the Monitoring and Evaluation Plan for the CSET Phase 2 project.

The DfT guidance 'Monitoring and Evaluation Framework for Local Authority Major Schemes' forms the basis of this monitoring and evaluation strategy, alongside GCP's Assurance Framework.

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 CSET Phase 2 to broadly follow the DfT's enhanced monitoring practice as the total scheme cost, from inception in 2015 through to completion in 2025, of £132.3m exceeds the £50m mentioned in the DfT framework. This is shown in Table 12.1 below.

Following the enhanced monitoring guidance, the scheme will be monitored against a set of standard measures. The various monitoring measures are considered in terms of the key stages of the scheme, these are:

- 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).

Upon the development of final scheme specifics at FBC stage, the monitoring and evaluation plan will be reviewed and re-confirmed.

Table 12.1: Components of Enhanced Monitoring

Item	Stage	Type of Information Provided	Data Collection Timing	Rationale
Scheme build	Input	<ul style="list-style-type: none"> • Programme/project plan assessment • Stakeholder management approaches • A review of the risk register and assessment of the impacts • Assessment whether the scheme is on track 	During delivery	Knowledge
Delivered scheme	Output	<ul style="list-style-type: none"> • Full description of scheme outputs • Identification of any changes to the scheme since funding approval • Identification of any changes to assumptions • Assessment of whether the scheme has reached the intended beneficiaries • Identification of changes to mitigation measures 	During delivery/post opening	Accountability
Costs	Input	<ul style="list-style-type: none"> • 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	Accountability
Scheme Objectives	Output/ Outcome/ Impact	<ul style="list-style-type: none"> • Identification of the main objectives 	Pre or during delivery / post opening (up to 5 years)	Accountability
Travel demand	Outcome	<ul style="list-style-type: none"> • Junction delay across the network • Patronage of the public transport system in the area • Counts of pedestrians and cyclists 	Pre or during delivery / post opening (up to 5 years)	Knowledge/ Accountability
Travel times and reliability	Outcome	<ul style="list-style-type: none"> • Travel times in the corridors of interest • Junction delay across the network 	Pre or during delivery / post opening (up to 5 years)	Knowledge/ Accountability
Impact on the economy	Impact	<ul style="list-style-type: none"> • Travel times/accountability changes to businesses • Employment levels and • Rental values 	Pre or during delivery / post opening (up to 5 years)	Knowledge/ Accountability
Noise	Impact	<ul style="list-style-type: none"> • Effect of the scheme on noise levels at important receptor locations. 	Pre or during delivery/post opening (up to 5 years)	Knowledge/ Accountability
Local Air Quality	Impact	<ul style="list-style-type: none"> • Effect of the schemes on local air quality in the area of interest. 	Pre or during delivery/post opening (up to 5 years)	Knowledge/ Accountability
Accidents	Impact	<ul style="list-style-type: none"> • Effect of the scheme on traffic accidents in the area of interest. 	Pre or during delivery/post opening (up to 5 years)	Knowledge/ Accountability

Source: Mott MacDonald

12.1 Reporting

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.

GCP will publish an initial report based on data collected at least one-year post scheme opening, and a final report based on further data collected approximately three years after scheme opening. The results of the evaluation will be independently reviewed and will be made available, including publication on the relevant website.

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 indicator is proposed to allow the performance of any scheme that is delivered to be measured over time, as shown in Table 12.3.

12.2 Evaluation

To evaluate the success of the scheme, and whether the objectives defined for CSET have been met, a structured outline monitoring and evaluation plan has been established which is divided into two parts:

- Monitoring of project delivery, which focuses on scheme inputs and outputs; and
- Monitoring of the achievement of the scheme objectives, which focuses on impacts and outcomes.

The monitoring and evaluation of the project's construction and delivery is set out in Table 12.2.

Table 12.2: Monitoring of Project Delivery (Inputs and Outputs)

Aspect of Project Delivery	Method of Monitoring	Timeframe	Responsibility
Delivery of CSET Phase 2 to timeframe	<ul style="list-style-type: none"> • Programme/project plan assessment • Review of risk register and assessment of impacts • Project review during scheme design and build. • Site inspections 	Ongoing throughout delivery and construction	GCP
Delivery of CSET Phase 2 to budget	<ul style="list-style-type: none"> • Programme/project plan assessment • Identification of any changes to assumptions. • Analysis of risk in the elements of costs. • Project review during scheme design and build. • Site inspections 	Ongoing throughout delivery and construction	GCP
Delivery of CSET Phase 2 to specification	<ul style="list-style-type: none"> • Programme/project plan assessment • Review of risk register and assessment of impacts • Project review during scheme design and build. • Site inspections 	Ongoing throughout delivery and construction	GCP

Source: Mott MacDonald

Table 12.3 below shows how the achievement of scheme objectives will be monitored. Each objective has a performance indicator which acts a proxy for the success of the scheme. The methodology for the associated data collection is also listed.

Table 12.3: Monitoring of Meeting Objectives (Outcomes and Impacts)

Main Objective	Sub-Objective	Performance Indicator	Methodology	Timescale
Support the continued growth of Cambridge and south east Cambridge	Deliver journey time savings for commuters travelling by public transport to job opportunities in south east Cambridge and central Cambridge	<ul style="list-style-type: none"> Public transport journey times for commuter journeys 	<ul style="list-style-type: none"> Analysis of bus journey times from Haverhill to CBC, Granta Park, Babraham Research Park and central Cambridge 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Improve journey time reliability for public transport users along the A1307 corridor	<ul style="list-style-type: none"> Journey time reliability for journeys undertaken by public transport 	<ul style="list-style-type: none"> Analysis of bus journey times and reliability from Haverhill to CBC, Granta Park, Babraham Research Park and central Cambridge 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Provide the transport infrastructure necessary to sustain economic growth	<ul style="list-style-type: none"> Economic growth across south east Cambridge 	<ul style="list-style-type: none"> Market Analysis Study 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
Relieve congestion and improve air quality in south east Cambridge	Encourage use of sustainable transport modes for journeys through south east Cambridge and central Cambridge	<ul style="list-style-type: none"> Number of people cycling and walking Public transport patronage 	<ul style="list-style-type: none"> NMU counts and active travel surveys Analysis of bus patronage data from relevant bus operators 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Enhance quality of life by relieving congestion and improving air quality in south east Cambridge	<ul style="list-style-type: none"> Number of reported health problems associated with traffic congestion- including respirator and health related illnesses in south east Cambridge Levels of PM¹⁰ and NO² in study area. 	<ul style="list-style-type: none"> Analysis of air quality receptors in south east Cambridge Statistical analysis 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Relieve congestion at network pinch points	<ul style="list-style-type: none"> Junction delay at identified pinch points along the A1307 corridor 	<ul style="list-style-type: none"> Trafficmaster data analysis 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Deliver a High Quality Public Transport (HQPT) offer between Cambridge and Haverhill	<ul style="list-style-type: none"> Patronage of public transport along the A1307 between Cambridge and Haverhill 	<ul style="list-style-type: none"> Analysis of patronage from relevant public transport operators 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Increase frequency of public transport services during peak periods	<ul style="list-style-type: none"> Number of public transport services during peak periods 	<ul style="list-style-type: none"> Analysis of public transport frequency during peak periods 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion

Table 12.3: Monitoring of Meeting Objectives (Outcomes and Impacts)

Improve active travel infrastructure and public transport provision in south east Cambridge	Reduce severance for cyclists, pedestrians and equestrians	<ul style="list-style-type: none"> Number of cyclists, pedestrians and equestrians along the A1307 corridor Number of crossing movements by cyclists, pedestrians and equestrians along the A1307 corridor 	<ul style="list-style-type: none"> NMU counts and active travel surveys 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Increase uptake of sustainable transport modes for commuter journeys	<ul style="list-style-type: none"> Number of cyclists, pedestrians and equestrians along the A1307 corridor Reduction in private car journeys 	<ul style="list-style-type: none"> NMU counts and active travel surveys ATC counts 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
Improve road safety for all users of the A1307 corridor	Reduce the number of accidents at identified accident cluster sites along the corridor	<ul style="list-style-type: none"> Number of reported accidents at identified accident cluster sites Number of KSI along the A1307 	<ul style="list-style-type: none"> Accident data analysis 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Reduce the number of speed related incidents along the corridor	<ul style="list-style-type: none"> Number of reported accidents related to speed 	<ul style="list-style-type: none"> Accident data analysis 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Improve the safety of crossing movements for cyclists, pedestrians and equestrians to encourage use of these modes	<ul style="list-style-type: none"> Number of cyclists, pedestrians and equestrians along the A1307 corridor Number of crossing movements by cyclists, pedestrians and equestrians along the A1307 corridor 	<ul style="list-style-type: none"> NMU counts and active travel surveys 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
	Provide improved access to Granta Park, Addenbrooke's Hospital, Cambridge Biomedical Campus (CBC) and other employment sites in south east Cambridge	<ul style="list-style-type: none"> Uptake of employment opportunities at employment sites in south east Cambridge 	<ul style="list-style-type: none"> Market Analysis Study 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion

Table 12.3: Monitoring of Meeting Objectives (Outcomes and Impacts)

Improve connectivity to employment sites in south east Cambridge and central Cambridge	Increase modal options for commuters travelling to and from employment sites in south east Cambridge and central Cambridge by delivering a HQPT network and improved active travel route for users	<ul style="list-style-type: none"> Number of cyclists and pedestrians travelling to CBC, Granta Park, Babraham Research Campus and central Cambridge Patronage of public transport services serving CBC, Granta Park, Babraham Research Campus and central Cambridge 	<ul style="list-style-type: none"> NMU counts and active travel surveys Analysis of patronage from relevant public transport operators 	Prior to or during delivery to assess baseline data and 1 and 3 years post completion
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Source: Mott MacDonald

13 Summary

- CSET Phase 2 is being promoted and managed by the GCP, the delivery body for the Cambridge City Deal comprised of representatives from several partner organisations who form an Executive Board and Joint Assembly.
- The GCP Transport Projects Board is responsible for governing all major transport schemes being delivered as part of the City Deal, whilst the Mayor and the Cambridgeshire and Peterborough Combined Authority (CPCA) have power over certain transport functions.
- The strategic management levels include the GCP Executive Board and Joint Assembly, the Transport Projects Board, and the Transport Programme Manager. Technical issues are addressed by the CSET Phase 2 Project Delivery Team, overseen by the appointed Project Manager.
- The Project Delivery team will manage the delivery of CSET Phase 2. The Project Delivery Team will be responsible for the day to day delivery of the scheme and will ensure technical and financial control.
- The GCP Key Decision Framework aligns with the DfT Business Case process and RIBA work stages. The OBC currently aligns with the Feasibility Stage of the GCP Key Decision Framework with this document intended to allow the scheme to reach GCP's Key Decision Point 4 (approval of preferred option) and progress to the Decision Stage.
- The approvals process at each development phase dictates that the project must pass through several Gateway Reviews. The assurance process is set out in the Draft Assurance Framework for the City Deal. The scheme will also pass through a total of three business case stages as part of the approval process. The SOBC has previously been approved however the OBC and FBC still require approval for the scheme to be funded.
- Risk management is an integral element of project management and is crucial to the achievement of objectives (time, cost, scope). The risk management methodology identified in this section draws on industry standard guidance, including ISO 31000:2009, BSI 31100:2011, Management of Risk, Practice Standard for Project Risk Management. Scope is the highest priority, followed by cost and then time. All risks for the project have been reviewed with mitigation measures outlined to reduce the potential impact on the project.
- Public and stakeholder consultation is essential with stakeholders grouped into four groups based on their influence and interest. The four overarching approaches to these stakeholders are: manage closely; keep satisfied; keep informed; and monitor.
- Multi-channel consultations occurred at the SOBC and OBC stages. The OBC consultation found a majority of respondents supported the scheme proposals in general, with the most support shown for Travel Hub Site B. Out of the five route options consulted on, the Brown route received the highest levels of support, closely followed by the Pink route; both routes would serve Site B.
- An outline Benefits Realisation Plan has been produced defining how the identified benefits of CSET Phase 2 align with the scheme objectives, who the key beneficiaries would be, and the outputs required to realise the benefits.
- Monitoring and evaluation provide an opportunity to improve performance by reviewing past and current activities. The DfT guidance 'Monitoring and Evaluation Framework for Local Authority Major Schemes' forms the basis of this monitoring and evaluation strategy, alongside GCP's Assurance Framework.

