MOTT MACDONALD

Cambridge South West Park and Ride Scheme: Outline Business Case

18 June 2019

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Executive Summary

Introduction and Context

The following Outline Business Case (OBC) is for a major enhancement to the Park and Ride facilities in close proximity to the M11 Junction 11 in Cambridgeshire.

Cambridge is one of the UK's most successful, fastest growing and productive cities where the economic success of Greater Cambridge, more broadly, is largely attributed to how well connected and networked the City Region is. With aspirations from the Greater Cambridge Partnership, the local delivery body for the Greater City Cambridge Deal, to instigate 33,500 new homes and 44,000 new jobs by 2031, all connected with 'better greener transport', the opportunity to enhance the Park and Ride facilities near the M11 Junction 11 should be strongly considered.

The Southern Fringe of Cambridge, where the new Park and Ride site is proposed, has substantial employment and residential development opportunity. The strategic vision for the Southern Fringe aggregates these areas by creating attractive, well-integrated, accessible and sustainable new neighbourhoods for Cambridge'[1]. Of significance is the Cambridge Biomedical Campus, a key current and future employer in the Southern Fringe, which is also home to Addenbrooke's hospital. Whilst substantial economic growth is forecasted for the Southern Fringe, unless the existing transport constraints in the area are improved, the economic benefits associated with development could be hampered, or not utilised to their full potential.

The aim, therefore, of this OBC is to expand upon the findings noted in the previous SOBC, update the evidence base and need for intervention and, through an appropriate appraisal process, present a preferred solution. Specifically, this OBC is defined by the following scheme objectives:

1. Reduce (or avoid a negative impact on) general traffic levels and congestion	i. Reduce traffic North East of M11 J11 (along Hauxton Road and through Trumpington), by encouraging trips headed for the city centre and Cambridge Biomedical Campus to transfer to another mode.
	ii. Reduce traffic flow and delay at M11 J11, particularly in the AM peak, including reducing flows associated with non-motorway traffic that pass across the junction (A10-A1309).
	iii. Reduce delays on the A10 through Harston and Hauxton, on the approach to M11 J11.
2. Maximise the potential for journeys to be undertaken by sustainable modes of transport	i. Increase the sustainable transport mode share for trips into the city centre and Cambridge Biomedical Campus, focused on trips orignating from the South and South West (M11 and A10)
	ii. Increase Park and Ride capacity, in particular to serve forecast economic growth at the Cambridge Biomedical Campus key employment area, with delivery aligned to overall Campus development timescales.
	iii. Reduce public transport journey times between Trumpington and the city centre, enabling Park and Ride/other public transport to compete more effectively with the private car.

These objectives have helped define key measures for inclusion in the scheme, which are:

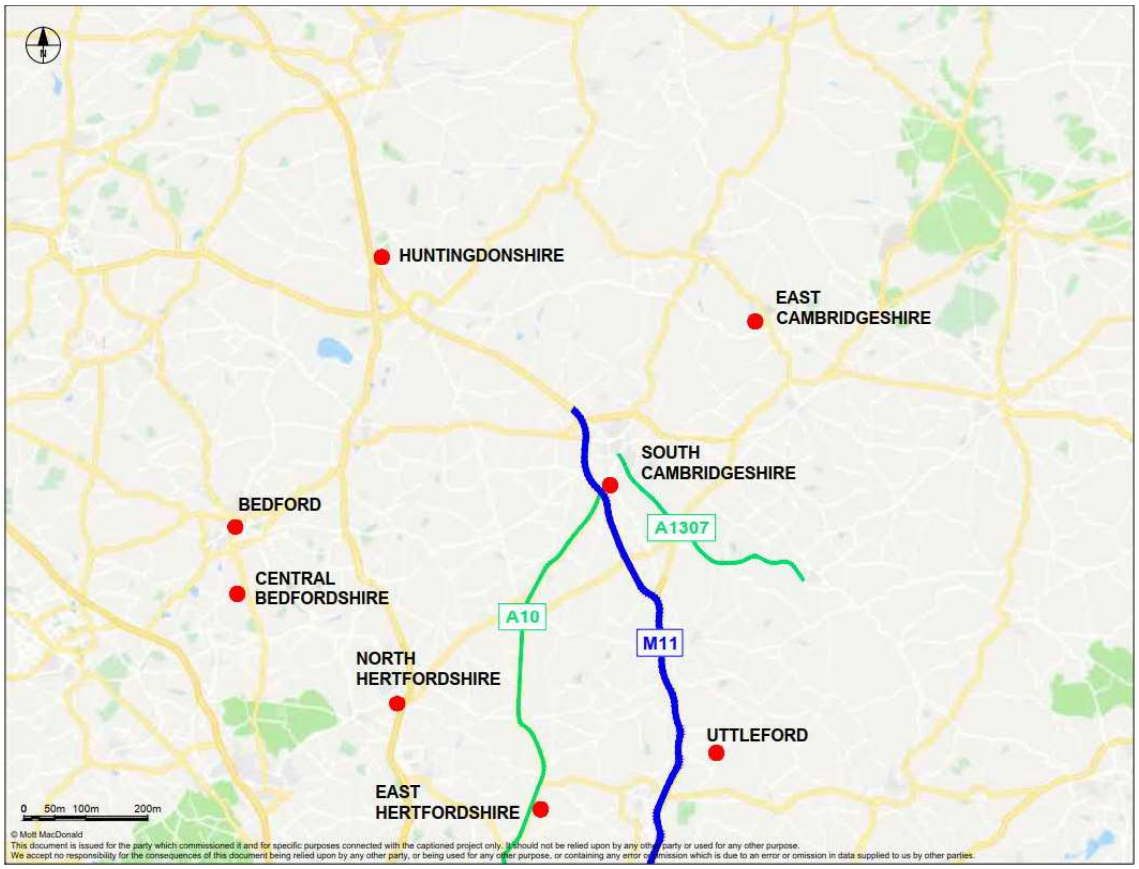
[1] Cambridge Local Plan 2014: Proposed Submission, July 2013

- Major expansion to Park and Ride facilities in close proximity to M11 Junction 11, either by expanding the existing Trumpington site or by delivering a new complementary site;
- Capacity improvements at Junction 11;
- Public transport priority measures along the A1309 Hauxton Road/High Street/Trumpington Road corridor; and
- Enhanced high quality public transport services between the Park and Ride site(s) and Cambridge city centre / Cambridge Biomedical Campus.

Together the measures are expected to relieve congestion and provide additional capacity at Junction 11 and within the Southern Fringe of Cambridge, allowing for continued economic growth in the area.

Figure 1 shows the key driving routes into Cambridge that the Cambridge South West Park and Ride would accommodate inbound traffic from. The map also shows some of the key towns and districts that may be impacted by the scheme.

Figure 1: Surrounding Areas and Districts Map



Source: Mott MacDonald

Strategic Case

The Strategic Case within this OBC details the scheme history and progress to date, the establishment of the need for intervention, the evidence base for that need and the key objectives that have been developed as a result. It also identifies the preferred scheme option and a brief overview of how the option was selected.

Creating the case as to why the M11 J11 Park and Ride facilities should be enhanced, is supported by the Government's intention to invest in transport infrastructure as part of the industrial strategy for post-Brexit Britain. The business strategy section of this OBC also notes the importance of investment more locally in the Southern Fringe to both respond to local growth priorities and support existing and future business entities. Building better and greener transport networks, enables the Greater Cambridge Partnership to secure future growth with the right level of supporting infrastructure.

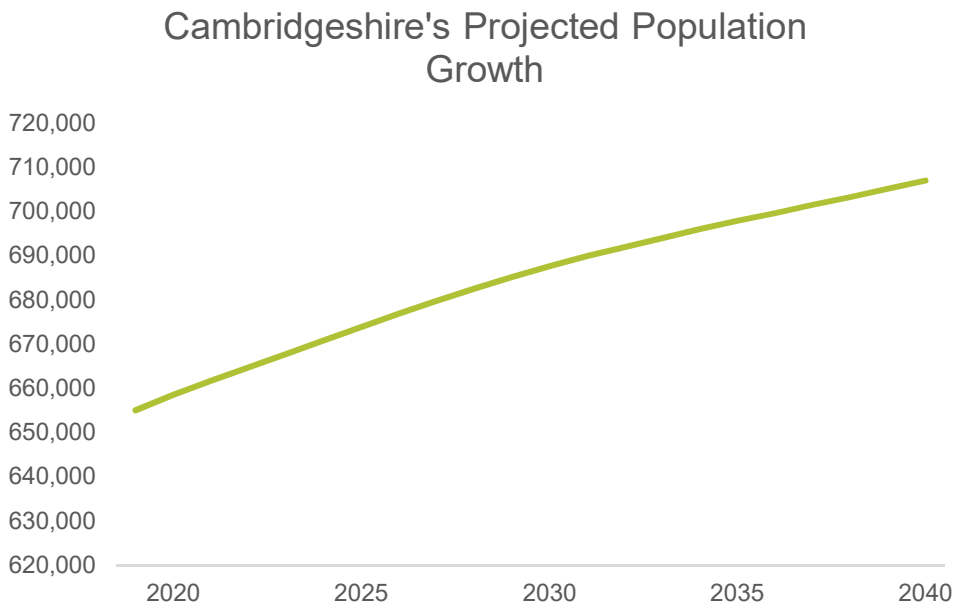
The Cambridge South West Park and Ride scheme aligns with various national, regional and local polices and strategies. Importantly, at the local level the proposed scheme supports the Cambridge City Local Plan, South Cambridgeshire Local Plan and the Cambridge City Access Strategy.

There are number of strategic problems and issues, as well as specific transport concerns, which the Cambridge South West Park and Ride scheme will, in part, help resolve. These include increased transport demand from forecasted population and economic growth, impacts associated with planned developments and environmental considerations. These are noted here.

Population Growth

Cambridgeshire is experiencing substantial population growth, with numbers expected to increase by nearly 10% over the next twenty years, see Figure 2. Cambridgeshire also has a high fluctuating student population meaning the annual peak population could be exceeded each academic year. The existing transport and parking infrastructure in the city is considered insufficient to cope with forecasted demand pressures; worsening congestion and capacity constraints if no investment in transport infrastructure is undertaken. It is important that transport infrastructure is futureproofed to support the requirements of future generations to ensure a successful and sustainable future for the Cambridge City Region.

Figure 2: Cambridgeshire Population Projections



Source: ONS 2018

Economic Growth

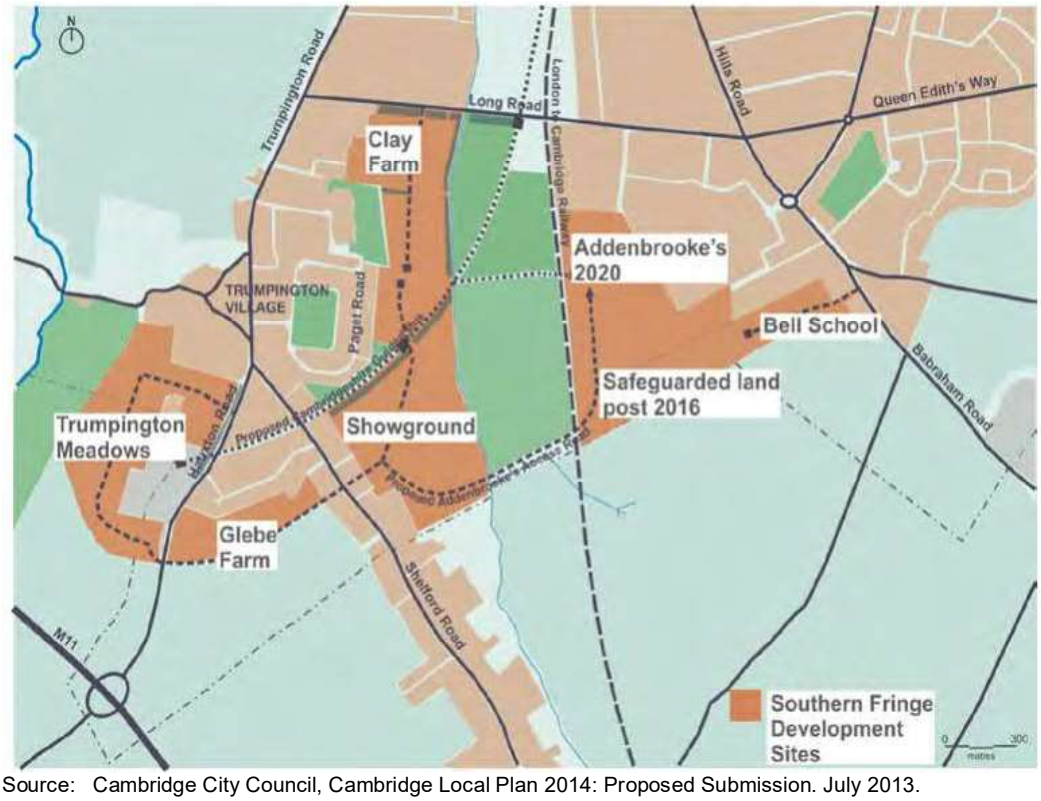
Greater Cambridge is a world-leading centre for research, innovation and technology which is heavily supported by the academic institutions in the city. The inward investment created by the 'Cambridge Phenomenon' is a significant driver in expanding the employment opportunities in the City Region. Whilst the current economic success in Cambridge is founded upon the connectivity across the city, the existing transport infrastructure is insufficient to cater for the increased demand from rapid business creation. Unless, schemes such as the Cambridge South West Park and Ride scheme are progressed, the current rate of investment may be compromised which would impact job opportunities and the wider 'Cambridge Phenomenon'.

Planned Development

A significant level of development is planned in Greater Cambridge over the Local Plan period (2011-2031). This will create significant employment opportunities to achieve the proposed growth targets, as well as enhancing the quality of new neighbourhoods and the hospital provision in Cambridge's Southern Fringe. As further growth is also expected after 2031, investments in transport infrastructure are critical to ensure transport network capacity, high congestion levels and poor reliability issues are addressed to maximise the city's growth potential. The biggest ongoing development in the Southern Fringe to date is the Cambridge Biomedical Campus; a leading international innovation centre focusing on science research, teaching and healthcare. Major enhancements to Park and Ride facilities in close proximity to M11 Junction 11 will be fundamental to secure the rate of growth anticipated in the Southern Fringe, and specifically the Cambridge Biomedical Campus.

Figure 3 shows the proposed development sites in Cambridgeshire's Southern Fringe.

Figure 3: Cambridge's Southern Fringe Major Development Sites



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

Environmental Issues

Although residents in Harston, and the surrounding area, have held concerns about the local air quality, data in Table 1 shows that this is not an issue as pollutant concentrations have remained beneath the threshold of 40µg/m^3 for at least eleven years. Further research, however, is needed to determine if vehicular emissions on the A10 are going to increase if more cars travel to the new Cambridge South West Park and Ride site.

Table 1: NO2 Monitoring Data at 47 High Street, Harston

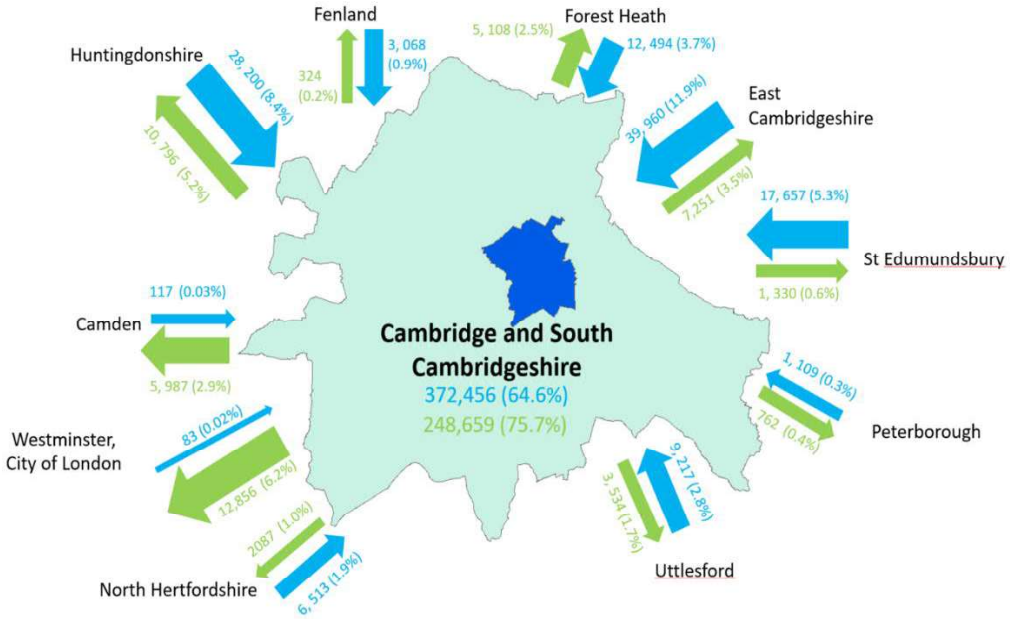
Year	NO2 Concentration (µg/m3)
2006	26.6
2007	26.1
2008	27.0
2009	28.1
2010	29.6
2011	23.7
2012	25.6
2013	25.7
2014	28.0
2015	28.4
2016	28.6
2017	27.3

Source: South Cambridgeshire District Council Review and Assessment Documents

How People Travel

As a large proportion of the workforce in Cambridge and South Cambridgeshire live outside the area and commute, as illustrated in Figure 4, it is essential that key employment sites are easy to access and are fully strategically connected. The current transport network is not sufficient to accommodate inbound commuter flows and this problem will only worsen in the future with increased demand forecasts. Highways congestion, particularly at Junction 11 on the M11, is also hugely problematic as 63% of the workforce in Cambridge and South Cambridgeshire currently commute by car.

Figure 4: Incoming and Outgoing Commuter Flows



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

Highways Connectivity

Congestion on the strategic highway network is a major problem which threatens the liveability and attractiveness of Cambridge and the wider region to residents, employees and visitors. The impact of congestion is so significant that the Cambridgeshire and Peterborough Independent Economic Review (CPIER) suggests that the future economic growth prospects of Greater Cambridge, especially in the Southern Fringe, could be threatened by the insufficient level of transport infrastructure investments that have occurred to date.[2] With limited public transport services connecting settlements along the A10 and M11 to the Southern Fringe and Cambridge City Centre, many commuters have little alternative than to use the car. Although, due to congestion, Park and Ride services and other buses get delayed when travelling on the A1309 towards the City Centre, the sustainable transport offer needs to be increased to help mitigate against this issue.

Trumpington Park and Ride

Trumpington Park and Ride is a well-utilised facility due to its advantageous location within the strategic road network and relative ease for people to make efficient onwards journeys. Whilst there is no charge for drivers to park at the site, the current demand is exceeding supply, see Figure 5. This is problematic as the situation will only worsen in the future as the Southern Fringe, Cambridge Biomedical Campus and Cambridge City Centre continue to grow and develop. The lack of parking means drivers are more inclined to travel by car to their destination rather than waste time circling the Park and Ride car park looking for a space. The difficulty parking at Trumpington Park and Ride also impacts on the usage of the bus service connecting into the Busway. Enhancing overall Park and Ride Capacity will help to:

- Address congestion;
- Improve air quality;

[2] CPIER Final Report, September 2018

- Provide access to opportunity;
- Improve quality of life;
- Support employers; and
- Facilitate sustainable development.

Figure 5: Trumpington Park and Ride

Source: Mott MacDonald

Wider Network Provision

The bus network in Cambridge is primarily provided by Citi buses and the Busway. Whilst the bus coverage in Greater Cambridge is adequate, highway congestion significantly increases the journey length for commuters at peak times. With many people travelling substantial distances into Cambridge, the lack of efficient transport interchanges further discourages commuters from opting to travel by bus. If, though, the journey times from the Southern Fringe into the City Centre could be improved the uptake of bus travel may also increase.

Journeys cannot be completed into the Southern Fringe solely by train, due to poor rail links. This means people have no alternative other than to travel by multiple modes. With the congestion issues noted with the bus, it is difficult therefore to encourage modal shift from the car to other more sustainable modes of transport.

Both the existing Trumpington Park and Ride and any new Cambridge South West Park and Ride would be well-connected to active travel routes. If the parking facilities are insufficient to cope with the level of demand, people may also be deterred from cycling or walking for part of their journey.

The Cambridge South West Park and Ride scheme will provide, therefore, additional capacity to accommodate the overflow from Trumpington Park and Ride whilst also helping increase the uptake of sustainable modes of travel.

Constraints and Interdependencies

There are several constraints associated with developing the Cambridge South West Park and Ride scheme. One example is the Trumpington Meadows Country Park where, if the new site is progressed, mitigation measures would need to be devised as part of the scheme design to minimise detrimental impacts on the green space. The Cambridge South West Park and Ride scheme must also align with the Mayoral Interim Transport Strategy Statement.

As with any scheme, there are also various stakeholders and interdependencies that must be considered. One of the most important interdependencies is to ensure the Cambridge South West Park and Ride scheme aligns with, and compliments, the measures stated in the Cambridge City Access Strategy, see Figure 6. These are necessary to both tackle congestion and ensure a highly efficient transport network is implemented across Cambridge and the wider South Cambridgeshire area.

Figure 6: Measures comprising the Cambridge City Access Strategy

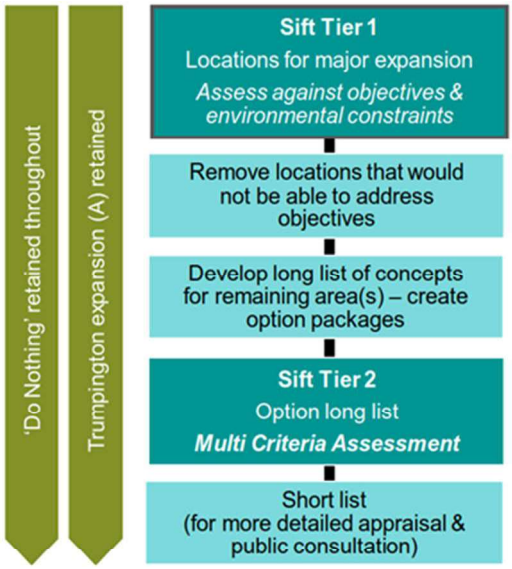
Source: Greater Cambridge Partnership

The Foxton and Whittlesford rural travel hubs along with the Cambridge South railway station are other key interdependencies as the implementation and success of these initiatives will subsequently impact the demand for the Cambridge South West Park and Ride.

Options Appraisal

A robust process has been used to determine the preferred option for the Cambridge South West Park and Ride scheme. At SOBC stage this was undertaken through a two-tiered appraisal process, which is outlined in Figure 7.

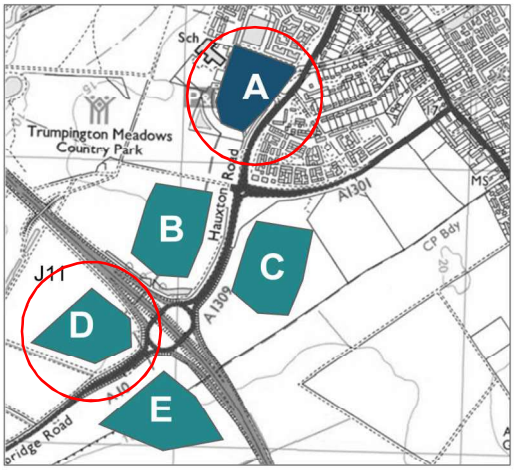
Figure 7: Option Appraisal Process Undertaken at SOBC Stage



Source: Mott MacDonald

Potential locations for Park and Ride enhancements were identified and assessed against the scheme objectives and environmental constraints using an adaptation of the WebTAG seven-point scale, ranging from -3 (large adverse impact or alignment) to +3 (large beneficial impact or alignment). The locations included expanding the existing Park and Ride at Trumpington, as well as entirely new site locations in the study area. Site D as shown in Figure 8 was identified as the preferred location for a new site, with the existing Trumpington site (Site A) remaining in the process as a logical comparator.

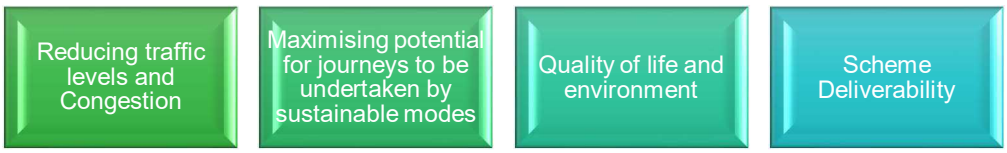
Figure 8: Potential Site Locations



Source: Mott MacDonald

Having identified the preferred location for a new site, concepts for elements such as bus priority, capacity enhancements to Junction 11 and the access/egress arrangements for vehicles at a new Park and Ride site were generated. The various concepts were then packaged into a Long List of 13 options.

The long list of options was sifted using a Multi-Criteria Assessment Framework (MCAF). Scheme objectives and a wide range of scheme impact considerations as listed in WebTAG, the Department for Transport's online appraisal guidance, were used to develop 26 assessment criteria under four themes:



The sift of the Long List resulted in five shortlisted Do Something options at the end of the SOBC stage. These were identified by colours; Magenta, Cyan, Purple, White, and Yellow which are all detailed below. In addition, a Do-Minimum option, was also included as a baseline comparator.

- **Do-Minimum** - no major expansion of the Park and Ride provision in close proximity to Junction 11. There will only be minimal surface level expansion of the existing Trumpington Park and Ride site to include an additional 274 car parking spaces and there will also be 5 additional bus parking spaces;
- **Magenta** - a major expansion of the Park and Ride facility at Trumpington is proposed that will provide an additional 946 spaces, increasing the number to 2560. The option will likely involve the addition decking above the existing site, as there is no available land, to enable expansion, immediately surrounding the site. New dedicated Park and Ride access lanes for general traffic which will extend back to the motorway off slips and the A10 will be installed. As part of this investment, the overbridge at J11 will be widened;
- **Cyan** - a new Park and Ride site will be developed. There will be a dedicated northbound off-slip from the M11 which then passes below the A10 by a tunnel. A dedicated left-turn lane will be installed from the A10 at Hauxton into the Park and Ride site. For traffic travelling southbound on the A10 there will be a dedicated slip road to access the Park and Ride site. The southbound traffic will also use the tunnel to prevent traffic having to turn right across the A10. To avoid the same problem, the traffic using the dedicated exit slip from the Park and Ride site onto the A10 southbound will also make use of the tunnel. A free flow left turn lane from the southbound motorway off slip to the A1309 for Trumpington Park and Ride will be implemented. Buses will cross the motorway using the existing accommodation bridge to the north, then will continue to travel alongside the southbound off-slip;
- **Purple** - a new Park and Ride site will be developed. There is a dedicated northbound off slip from the M11 which passes below the A10 via a tunnel. Traffic will also negotiate a new junction on the A10. A dedicated left turn lane from the A10 at Hauxton into the Park and Ride site will be installed. A free flow left turn lane from southbound motorway off-slip to the A1309 for Trumpington Park and Ride will also be implemented. Buses will pass directly through the centre of J11 using the new bridge structure that runs across the M11;
- **White** – a new Park and Ride site will be developed. There will be a dedicated northbound off slip from the M11 which passes below the A10 by a tunnel. A new junction on the A10 will be created. A dedicated left-turn lane will operate from the A10 at Hauxton into the Park and Ride site. There will also be free flow left turn lane from the southbound motorway off slip to the A1309 for Trumpington Park and Ride. Buses will cross the motorway using the accommodation bridge to the north and will then route alongside the southbound off-slip; and
- **Yellow** – a new Park and Ride site with general traffic and bus access/egress from two new junctions on the A10. A dedicated left turn lane will operate from the A10 at Hauxton into the

Park and Ride site. There will also be additional free flow left turn lanes from both motorways and off slips. Buses will cross the motorway using the existing accommodation bridge to the north and will then route alongside the southbound off slip.

OBC Appraisal Process

At OBC stage the five shortlisted options were exposed to detailed quantitative appraisal, using modelling outputs where appropriate, to arrive at the preferred option. Where quantitative metrics were not available, a more robust analysis than undertaken at SOBC stage was adopted to qualitatively assess the options. Whilst the same multi-criteria assessment framework tool and the same assessment themes from the SOBC were applied to the Options Appraisal process at OBC stage, three additional criteria were added (Red text in Figure 9) and two criteria used at SOBC were amended (Blue Text).

Figure 9: Updated Assessment Criteria for OBC Appraisal

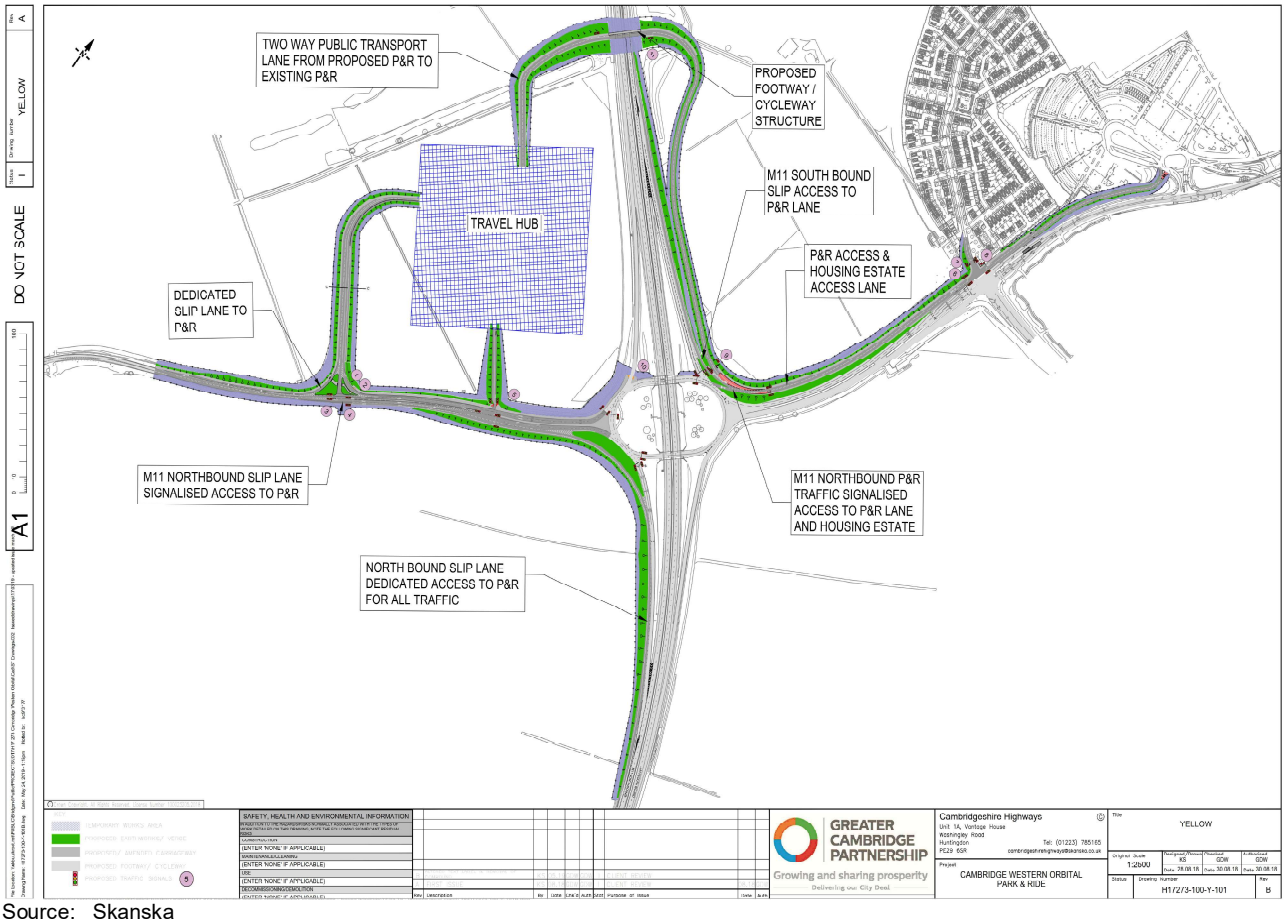
1.) Reducing traffic levels and congestion	2.) Maximising potential for journeys to be undertaken by sustainable modes	3.) Quality of life and environment	4.) Scheme deliverability
• Traffic flow on J11 circulatory • Overall delay at J11 • Traffic flow on A1309 Hauxton Rd • Traffic flow on A1309 High St • Traffic flow on A10, Harston • Delay on A10 between Harston and M11	• Time to access the existing Park and Ride site and the new Park and Ride site from A10 • Time to access the existing Park and Ride site and the new Park and Ride site from the M11 northbound • Time to access the existing Park and Ride site and the new Park and Ride site from the M11 southbound • Park and Ride bus journey time • Potential to link with existing public transport • Potential to link with future public transport proposals	• Potential for road accidents • Walking and cycling networks • Noise • Local air quality • Landscape • Green house gases • Historic environment • Biodiversity • Water environment • Green Belt	• Construction risks • Diruption during construction • Land acquistion requirements • Infrastructure maintenance/renewals complexity • Ongoing cost implications - site • Ongoing cost implications – bus • Likelihood of public support

Source: Mott MacDonald

All four themes were weighted equally and, after quantified appraisal, the Yellow option scored best under Themes 1 and 2, which directly align with the scheme objectives. It scores second best under Theme 4, and only relative to the Do Minimum; this is due to the fact that Theme 4 relates to physical deliverability and doing something naturally incurs more disruption and cost than the Do Minimum, which is effectively doing nothing as this baseline scenario accounts for improvements already committed and are therefore outside the scope of this scheme. The Yellow option scores least favourably under Theme 3 mostly because the exclusion of a dedicated tunnel for access has led to the assessment that this has the potential for a higher level of accidents relative to options that feature a tunnel.

In summary, the Yellow option scores best of all the Do Something Options under three of the four themes which represent 19 or the 29 criteria. It also scored best overall. The outline schematic for the Yellow option is shown in Figure 10.

Figure 10: Preferred Option (Yellow) Outline Schematic



Source: Skanska

The Economic, Financial, Commercial and Management cases of this OBC, focus solely on the impacts, funding, procurement and delivery requirements of the Yellow option, identified through the MCAF process as the best performing option.

Economic Case

The options appraisal process identified the Yellow option as the preferred option when scored against 29 criteria grouped under four themes. These criteria were established to ensure the preferred option was best aligned with scheme objectives, GCP aims and local and national policy. The four themes were:

- Reducing traffic levels and congestion;
- Maximising potential for journeys to be undertaken by sustainable modes;
- Quality of life and environment; and
- Scheme deliverability.

Under three of these themes, representing 19 of the 29 criteria the Yellow option scored best overall relative to the Do Minimum and was therefore taken forward as the preferred option.

The Economic Case assesses options to identity 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 also identifies what economic, environmental,

social and distribution impacts the scheme is expected to deliver, although these are not perfectly reflective of the tailored assessment criteria, developed to ensure the preferred option meets its objectives.

Value for Money

Benefit-Cost Ratios (BCRs) are the ratio of the present value of monetised scheme benefits to the present value of scheme costs.

In accordance with DfT guidance, schemes are judged to offer poor, low, medium, high and very high Value for Money based on the BCR boundaries. These categories are:

- Poor VfM if BCR is below 1.0
- Low VfM if the BCR is between 1.0 and 1.5
- Medium VfM if the BCR is between 1.5 and 2.0
- High VfM if the BCR is between 2.0 and 4.0
- Very High VfM if the BCR is greater than 4.0

However, when the BCR is very low across all options it is more sensible to focus on the relative values of benefits and costs for each of the options.

For this scheme, the present value of benefits (PVB) and present value of costs (PVC) of each option were calculated. For economic appraisal purposes the PVB included the operating and investment costs of the buses, revenue and monetised travel time savings and PVC included design and construction costs with an allowance for operating costs, maintenance and land.

Since the initial publication of this OBC it has been determined that the operating and investment costs of running the buses will be provided either by franchising or by revenues pertaining to the City Access scheme, this is to be developed further at Full Business Case (FBC) Stage. This is included in the economic assessment as a cost to the local authority, and a benefit to the private operator.

From this the Net Present Value (NPV) was calculated, which is the PVB minus the PVC. The BCR from which Value for Money is derived is the PVB/PVC. In this case, once the operating and investment costs of running the new Park and Ride bus services were added in it emerged that they significantly outweighed the revenues therefore the benefits are negative, meaning the Net Present Value was negative, and as a result, the BCR was also negative. This is true of all new site options. Once the subsidy has been added in however the BCR becomes positive, albeit very small, and similar across all options.

It should be noted that the costs are subject to significant change as the preferred option is developed through to a Full Business Case. Value engineering could mean that the cost may come down and the BCR would correspondingly improve. Because the BCRs were so low the decision was to focus on the relative values of benefits and costs for each of the new site options. The cost of the Yellow scheme is £10m less than the other three new site options therefore it currently gives the best value for money as the benefits are virtually identical for all four new site options. As noted in the options appraisal process, on page nine of this Executive Summary, a new site was identified as the best site option and expansion of the existing site at Trumpington only included as a logical comparator.

Although not specifically WebTAG compliant the NPV, rather than the BCR (as it is so low in all cases) has been used to rank the options from 1 to 5, as shown in Table 2, where the option ranked 1 has the highest NPV.

Table 2: Option Ranking based on NPV

Option	Rank
Magenta	1
Yellow	2
Purple	3
Cyan	4
White	5

The Magenta option is ranked as having the greatest NPV, which is to be expected as it has lower costs as it does not require additional bus services. All the new site options have very similar levels of benefits however the Yellow option is substantially cheaper than the other options, and as such places it as the best of the new site options and second overall in terms of NPV.

PVB, PVC and NPV have been calculated using 2010 prices discounted to 2010, however we are not publishing exact numbers at Outline Business Case stage as maintenance costs, operating costs and potential subsidies, all of which could affect the absolute figures but not the order of ranking, are still being negotiated and are subject to change as the scheme develops through to FBC stage.

Peak hour decongestion benefits have not been calculated at this stage but will be included for FBC and should increase the benefits of the scheme. There may also be additional benefits from improvements to Trumpington Road but, as this is likely to be taken forward as a separate scheme, we cannot include those in this assessment.

It should also be noted that the analysis above focused solely on transport benefits and did not take into account wider benefits such as supporting development, job creation, economic growth or social impacts such health benefits resulting from increases in physical activity and improvements to journey quality. Although these benefits are not quantifiable at this stage, qualitative assessment as noted in Sections 4.4 and 4.6 resulted in positive outcomes for the Yellow option.

Wider Economic Impacts

The Wider Economic Impact of the Cambridge South West Park and Ride scheme has not been assessed as it is considered unlikely that the proposals would deliver a wider economic impact that is quantifiable at this time. The scheme is also unlikely to have any notable impact on labour market catchment, due to the close proximity of the proposed new site to the current site, which will remain open irrespective of whether a new site in the form of the Yellow option is built or not.

This scheme can support future development across south Cambridge by increasing accessibility into key growth areas such as the Cambridge Biomedical Campus and other sites yet to be identified in this area. This scheme can substantially increase the viability of such developments, as the enhanced public transport accessibility provided by this scheme will enable more workers to access employment in this area without incurring the congestion likely to result from increase private vehicle use. While this scheme will support future growth in this area, it cannot yet be quantified as the proposals for the development of the biomedical campus and other sites have not yet been brought forward. It is therefore not possible at this stage to accurately quantify the scale of the impact of this scheme on economic growth in the area as no proposals for such growth have yet been presented.

Environmental Impacts

The Yellow option, like all the shortlisted options, was assessed against the environmental impacts for landscape, biodiversity, historic environment, water, local air quality, noise, greenhouses gases and the Green Belt. The scores of all the shortlisted options were similar. The Magenta option potentially results in a slightly less adverse environmental impact compared with the Yellow, White, Cyan, Purple options, which were all assessed as having a similar overall adverse environmental impact.

Social Impact Appraisal (SIA)

An SIA was undertaken for all shortlisted options as part of the appraisal process. The SIA assesses the human experience of the scheme and its impact on wider society on a five-point scale. The social impacts considered are shown in Table 3. This highlights that the Yellow option scores worst of the new site options relative to the Do Minimum, primarily on the basis of accidents as the exclusion of a dedicated tunnel was deemed to potentially affect accidents resulting from traffic turning in and out of the Park and Ride across the A10.The exclusion of the tunnel and dedicated access was also considered to potentially cause minor delays for traffic accessing the site relative to the other new site options. As such only slight beneficial impacts in terms of journey quality were recorded for the Yellow option, compared to beneficial impacts for the other new site options.

Table 3: Summary of SIA Scores for Shortlisted Options

	Existing Site	Proposed New Site				
	Do Minimum	**Magenta**	**Cyan**	**Purple/ Purple (CAP)**	**White**	**Yellow**
Accidents	Slight adverse	Neutral	Beneficial	Beneficial	Beneficial	Slight adverse
Physical activity	Neutral	Slight beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Security	Adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse
Severance	Neutral	Neutral	Adverse	Adverse	Adverse	Adverse
Journey quality	Slight adverse	Slight beneficial	Beneficial	Beneficial	Beneficial	Slight beneficial
Option and non-use values	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out
Accessibility	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out
Personal affordability	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out

Source: Mott MacDonald

Distributional Impact Analysis (DIA)

A DIA was undertaken for all shortlisted options as part of the appraisal process. A DIA considers the variance of a scheme's impact across different social groups and assesses whether these impacts disproportionately affect certain social groups. The impacts considered within scope for the DIA are shown in Table 4 the Yellow option had the most adverse impacts relative to the other options, including the Do Minimum scenario.

Table 4: Summary of Distributional Impact Appraisal Scores for Scheme Options

	Existing Site			Proposed New Site		
	Do Minimum	**Magenta**	**Cyan**	**Purple/ Purple CAP**	**White**	**Yellow**
User benefits	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Noise	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Air quality	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Accidents	Moderate adverse	Neutral	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate adverse
Severance	Neutral	Neutral	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Security	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Accessibility	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out
Personal affordability	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out

Source: Mott MacDonald

By virtue of the guidance issued by the DfT as to what the Economic Case should cover, the Environmental and Social and Distributional findings are focused on in the Economic Case as they are needed to populate the AST. These two areas of potential scheme impact formed the basis of Theme 3 under the MCAF assessment process, the only theme under which Yellow did not score best. The Economic Case does not typically cover the wider appraisal process (i.e. the other three MCAF themes); this is captured in Section 3 of this report. To this extent the reader should take on board the findings from the Economic Case in conjunction with the outcome of the MCAF assessment process in Section 3 where the Yellow Option is clearly identified as the preferred option.

Financial Case

The Financial Case outlines the affordability of the Yellow option for the Cambridge South West Park and Ride scheme, its funding arrangements and technical accounting issues. The Financial Case also presents the financial profile of the Yellow option and an overview of how the Cambridge South West Park and Ride scheme will be funded.

The design and construction costs to actually deliver the scheme total £29,929, 673 and these figures are reflected in Table 5. Figures are based on Q2 2018 prices.

Table 5: Spend by Cost Element per Annum

Cost/Year	2020	2021	2022	2023	TOTAL
Design Costs	£1,549,301	£1,549,301	£774,651		£3,873,253
Preliminaries	£1,755,798	£1,755,798	£877,890		£4,389,486
Project Management			£1,032,868	£1,549,301	£2,582,169
Construction			£7,633,906	£11,450,859	£19,084,765
TOTAL	**£3,305,099**	**£3,305,099**	**£10,289,315**	**£13,000,160**	**£29,929,673**

Source: Mott MacDonald

A further £16.5m has been estimated as being needed for scheme overheads, T&C's, land and an element of risk, however this does not form part of the funding ask.

An allowance for maintenance costs for the upkeep of the Yellow option and its site operating costs have been broadly estimated over a 25-year period, but this also does not form part of the funding ask. Similarly, annual operating costs for the bus operations, based on the maintenance and running of eleven buses have been estimated though this is dependent on many factors including vehicle type and age. Again, this amount does not form part of the funding ask and estimates are not being published at this time as GCP will need to negotiate with potential providers and thus the estimates are classed as commercially sensitive. Such costs will be known with more certainty at FBC stage and published at that time.

£100m of government funding has been made available for investment until 2020. A further fund of up to £400m will be available if initial investments are successful in supporting economic growth.

The Cambridge South West Park and Ride scheme will be funded by the GCP with City Deal funding, however the Greater Cambridge Partnership is also seeking to secure local funding, for example through Section 106 agreements with developers, and to explore other private funding opportunities.

When development proposals come forward and they are judged through the transport assessment process by CCC officers to either directly benefit from the Cambridge South West Park and Ride (CSWP&R) project, and/or the CSWP&R is needed to assist in addressing its transport impacts, CCC will seek to recover an appropriate proportion of the project's cost from developer contributions, secured via Section 106 agreements.

However, at this stage it is not possible to provide a definitive list of developments from which contributions can reasonably be sought as this will depend upon the impact identified through the transport assessment process.

Commercial Case

The Commercial Case for the Yellow option for the Cambridge South West Park and Ride scheme provides evidence on the commercial viability of the proposal and the procurement strategy that will be used to engage the market. The Commercial Case has been prepared jointly with White Young Green consultants.

Procurement

Prior to the procurement process the preliminary design of the Yellow option will be developed by Skanska on behalf of the GCP.

Various procurement strategies, methods, frameworks and contract types have been considered for the Yellow option for the Cambridge South West Park and Ride scheme. The advantages and disadvantages of the options were also evaluated to arrive at a preferred procurement route for delivery of the scheme. This is illustrated in Figure 11.

Figure 11: Preferred Procurement Route

Source: Mott MacDonald/ White Young Green

Contract Length and Management

A tender period of 12-16 weeks is recommended for the Design & Build Contract, given that contractors will have to undertake design development work to support their submission. A period of 18-22 months to construct the scheme is recommended under a Design and Build Contract.

An NEC Project Manager and Supervisor would be appointed, and their main roles would be 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 NEC3 contract communications and maintenance of site records. Liaison with key stakeholders including landowners alongside the GCP would also be a key role.

Management Case

The Management Case for the Yellow option assesses whether the proposal is deliverable. It looks at the project planning, governance structure, risk management, communications and stakeholder management to establish if adequate resources are in place to ensure delivery on time, on budget and in accordance with specifications.

Proven Experience

The constituent members of the GCP have extensive experience in delivering large scale transport projects, including Park and Ride schemes such as Milton Park and Ride valued at £3.1m and the Longstanton and St Ives Park and Ride Schemes estimated at £9m for both sites. GCP have also delivered The Addenbrooke's Access Road valued at £24m and, as this scheme will also include new access provision, these combined proven delivery successes demonstrate that GCP are well placed to deliver the Yellow (preferred) option identified in this OBC.

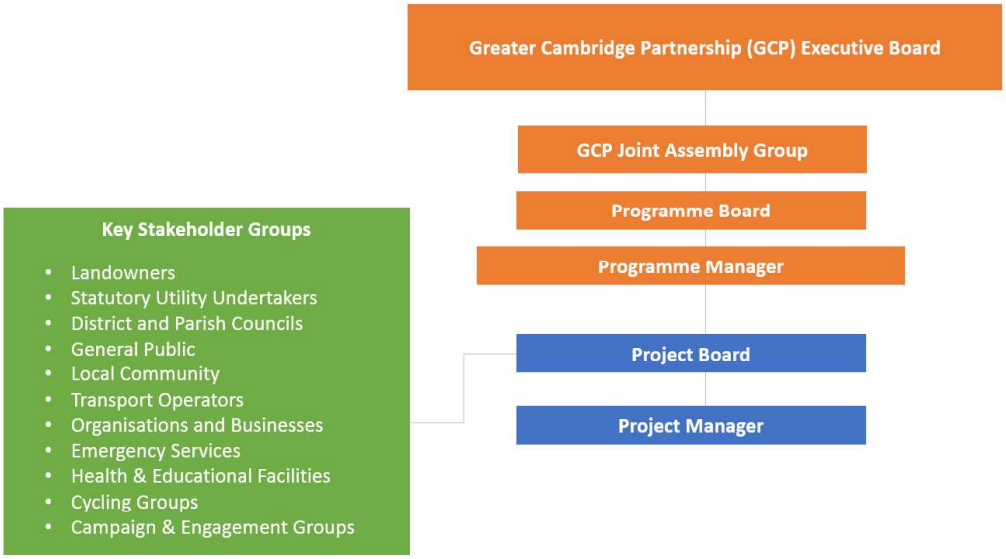
Governance and Reporting

The Cambridge South West Park and Ride scheme will be strategically managed by GCP which is made up from four partner organisations; Cambridge City Council, Cambridgeshire County Council, South Cambridgeshire District Council and the University of Cambridge. Scheme delivery and Project Management will be overseen as illustrated in Figure 12.

In terms of Project Reporting, standard Greater Cambridge Partnership reporting processes are to be adopted. The Project Manager, Tim Watkins, will prepare the Project Manager's Report to present at Project Board meetings. This report is the main source of documentation which summarises progress and change in the scheme. The Project Manager's Report sets out the:

- Progress on each work stream (for example, business case and appraisal, design, consultation);
- Key activities to be undertaken before the next report meeting;
- Budget uptake; and
- Review of strategic risks and issues.

Figure 12: Project Governance

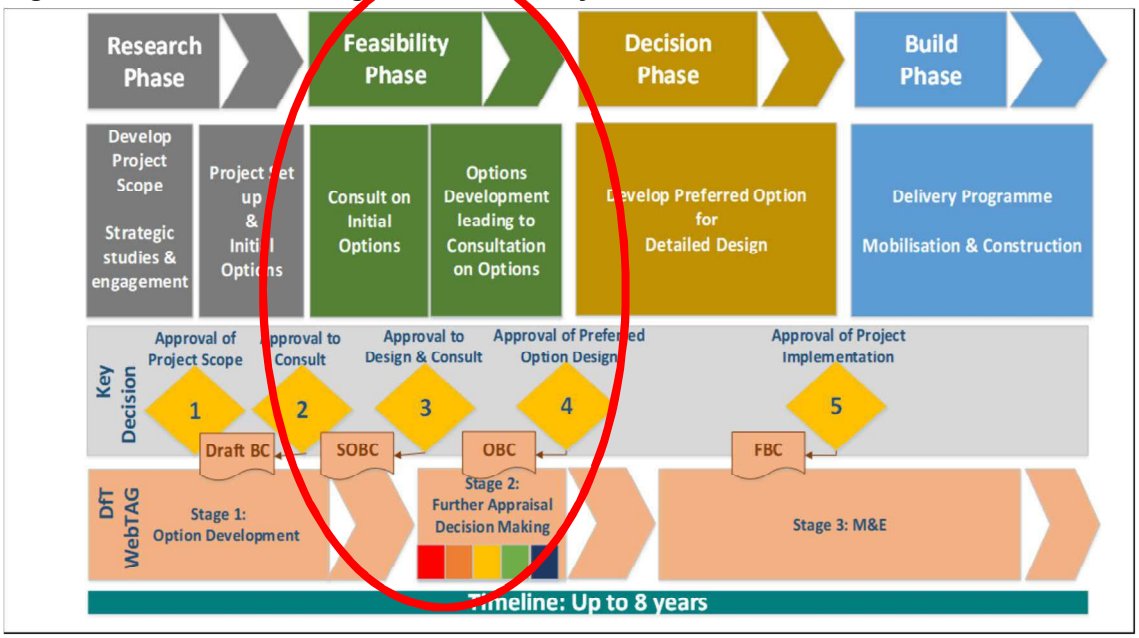


Source: GCP/Mott MacDonald

Project Plan

The scheme will be progressed through GCP's standard appraisal processes and pass through three business case stages, this OBC being the second. GCP have developed their own "Key Decision Points"; this OBC addresses Key Decision points 3 and 4 in the Feasibility Phase of scheme development as shown in Figure 13.

Figure 13: Greater Cambridge Partnership Key Decision Points



Source: Greater Cambridge Partnership

Key milestones have been identified as June 2019 for submission of the OBC, Q2 in 2020 for the completion of statutory processes, Q3 2020 for final Full Business Case (FBC), Q3 2022 for Construction start and Q4 2023 for construction completion.

Risk Management

A risk management strategy has been developed that is based on the principles of PRINCE2 guidance but applied proportionally. As such the procedure for identifying key risks is:

- **Identify:** Complete the risk register (as appropriate to the area of the project and/or the producing organisation) and identify risks, opportunities and threats.
- **Assess:** Assess the risks in terms of their probability and impact on the project objectives.
- **Plan:** Prepare the specific response to the threats (e.g. to help reduce of avoid the threat), and/or plan to maximise opportunity in the case that these threats do occur.
- **Implement:** Carry out the above in response to an identified threat if one occurs.
- **Communicate:** Report and communicate the above to relevant project team members and stakeholders.

Risks have been rated between 1 and 5 on both the likelihood of them happening and their impact; multiplying the two figures provides an overall risk score with the greatest risks having the potential to score 25 and the most minimal risks scoring potentially 1.

The highest risks with a rating of over 10, after mitigation measures are summarised in Figure 14.

Figure 14: Highest Risks from the Scheme Risk Register

Source: Mott MacDonald

Consultation and Stakeholder Management

A Stakeholder Communication Plan has been prepared which outlines the approach to stakeholder and public consultation throughout the development of this OBC. The Plan identifies the key stakeholders, the mechanisms for communication and the scope of the communication. Key Stakeholders have been identified as shown in Table 6.

Table 6: Key Stakeholders

Stakeholder	Stakeholder	Stakeholder
Local Authorities	Campaign Groups	Cycling groups
Greater Cambridge Partnership	Cambridge Ahead	Landowners
Local Engagement Groups	Parish councils	Commuters
Residents	Schools and the Nuffield Hospital	Cambridge University
Highways England	Emergency services	Organisations and businesses that are investing in the Cambridge Biomedical Campus
Papworth Hospital	Groups which represent people with limited mobility or a sensory impairment and wheelchair users	Transport Operators
East West Rail		

Source: Mott MacDonald

Several public consultation events were held in Autumn 2018 as well as a leaflet drop to 13,000 residents in the surrounding villages along the A10 and A1307. Feedback from the consultation is documented in the Statement of Community Involvement Report. Findings from the consultation showed that public preference was for a new site as opposed to expansion of the existing Trumpington Site, although there was support for both options.

Monitoring and Evaluation

An outline Benefits Realisation Plan and an outline Monitoring and Evaluation Plan have been drafted to track performance in terms of physical delivery relative to timescales, budget and specification, as well as delivery of outcomes and impacts once completed. In view of the schemes value this has been aligned with the DfT's Standard Monitoring and Evaluation guidance which states that the following elements should be monitored and evaluated:

- **Scheme Build** – Monitoring of scheme inputs during delivery to ensure scheme is delivered on time, within budget and to specification.
- **Delivered Scheme** – Evaluation of scheme outputs during delivery and post competition to ensure scheme is delivered on time, within budget and to specification.
- **Costs** – Monitoring of scheme inputs during delivery and post opening to ensure scheme is delivered within budget with no cost overruns.
- **Scheme Objectives** – Monitoring of scheme outputs, outcomes and impacts, pre-delivery, during delivery and post-delivery to ensure the scheme delivers on its rationale for investment.
- **Travel Demand** – Monitoring of scheme outcomes pre-delivery, during delivery and post-delivery to ensure the scheme achieves its stated effect on travel demand related objectives.
- **Travel Times and Reliability** – Monitoring of scheme outcomes pre-delivery, during delivery and post-delivery to ensure the scheme achieves its stated effect on journey time related objectives.
- **Impact on the Economy** – Monitoring of scheme impacts pre-delivery, during delivery and post-delivery to ensure the scheme achieves its stated impact on the economy is as presented in the rationale for investment.
- **Carbon**– Monitoring of scheme impacts pre-delivery, during delivery and post-delivery to ensure the scheme achieves targets for carbon reduction as set out in the rationale for investment.

1 Introduction

This Outline Business Case (OBC) is for a major enhancement to Park and Ride facilities in close proximity to the M11 Junction 11 in Cambridgeshire; it also includes complementary public transport priority measures along the A1309 Hauxton Road/High Street/Trumpington Road. Park and Ride and public transport priority measures form a key component of the overall Greater Cambridge Partnership (GCP) West of Cambridge Package, a key transport solution for the Cambridge Southern Fringe development area.

1.1 Context

1.1.1 Cambridge

Cambridge is one of the UK's most successful, fastest growing and productive cities. The high level of innovation in the city is demonstrated through the fact Cambridge has more patents per 100,000 population than Swindon, Edinburgh, Aberdeen, Aldershot and Gloucester combined; the next five most innovative cities in the UK.[3] The economic success in Greater Cambridge is largely attributed to the well-connected and networked the City Region is. The GCP, as the local delivery body for the Greater Cambridge City Deal, has a mandate to maintain and grow Greater Cambridge. It aims to deliver 33,500 new homes and 44,000 new jobs by 2031 with 'better greener transport connecting people to homes, jobs, study and opportunity'. Growth is occurring all around Greater Cambridgeshire including developments at Cambridge North West, Cambridge Southern Fringe, Cambourne, Bourn Airfield and employment hubs at West Cambridge and the Cambridge Biomedical Campus. As these developments come to fruition, they will add pressure to the already congested transport network. In order to ensure continued economic growth, GCP must implement strategies to accommodate new and existing employers and employees which includes ensuring ease of movement.

Cambridge is critical to the UK's long-term economic plan, which seeks to improve productivity and international competitiveness. The city helps the UK economy to compete on the international stage, attracting high calibre knowledge-based individuals to fill skills gaps and increase economic growth.

1.1.2 Future Growth

The next major phase of rapid development in Cambridge is taking place within the Southern Fringe, see Figure 15, incorporating substantial employment and residential development opportunities. Extensive development is to take place over the 2011-2031 local plan period and the vision for the Southern Fringe is 'to create attractive, well-integrated, accessible and sustainable new neighbourhoods for Cambridge'[4].

Addenbrooke's Hospital south of Cambridge is a major employment centre and renowned teaching hospital linked to Cambridge University. The hospital is part of the rapidly growing Cambridge Biomedical Campus which currently employs approximately 17,250 workers and is expected to employ 30,000 workers by the time it is complete in 2031[5]. The Biomedical

[3] Cities Outlook 2014

[4] Cambridge Local Plan 2014: Proposed Submission, July 2013

[5] Cambridgeshire Local Transport Plan 2011-2031 (2015)

Campus, therefore, is expected to house 15-20% of all employment within the Cambridge City boundary[6].

The biomedical industry has a highly skilled and variably skilled workforce. Due to the relatively scarce supply of such a workforce, the catchment area can extend considerable distance from the campus. Consequently, reliable and efficient transport provision will be required so that both the workforce and visitors to the campus are able to reach it by sustainable means. This will further enable the campus to reach its full economic growth potential.

In addition, there are several housing and mixed-use developments west of the Cambridge Biomedical Campus. Development in the Southern Fringe is expected to enable significant economic growth. The existing transport network, however, is already constrained and will need to be improved to cater for the demand associated with this development.

Figure 15: Cambridge Southern Fringe Major Developments

Source: Cambridge Local Plan 2014: Proposed Submission, July 2013

[6] NOMIS official labour market statistics estimate that in 2016 there were 101,000 employee jobs within the Cambridge City area.

1.2 Scheme Objectives

Specific scheme objectives for the Cambridge South West Park and Ride have been developed by Mott MacDonald in consultation with the GCP and other relevant stakeholders, these are set out below. The evidence base upon which these objectives have been developed is expanded on in Section 2, the Strategic Case.

1. Reduce (or avoid a negative impact on) general traffic levels and congestion	i. Reduce traffic North East of M11 J11 (along Hauxton Road and through Trumpington), by encouraging trips headed for the city centre and Cambridge Biomedical Campus to transfer to another mode.
	ii. Reduce traffic flow and delay at M11 J11, particularly in the AM peak, including reducing flows associated with non-motorway traffic that pass across the junction (A10-A1309).
	iii. Reduce delays on the A10 through Harston and Hauxton, on the approach to M11 J11.
2. Maximise the potential for journeys to be undertaken by sustainable modes of transport	i. Increase the sustainable transport mode share for trips into the city centre and Cambridge Biomedical Campus, focused on trips orignating from the South and South West (M11 and A10)
	ii. Increase Park and Ride capacity, in particular to serve forecast economic growth at the Cambridge Biomedical Campus key employment area, with delivery aligned to overall Campus development timescales.
	iii. Reduce public transport journey times between Trumpington and the city centre, enabling Park and Ride/other public transport to compete more effectively with the private car.

1.3 Scope of this Outline Business Case

This Outline Business Case (OBC) is for a major enhancement to Park and Ride facilities in close proximity to M11 Junction 11, along with complementary public transport priority measures along the A1309 Hauxton Road/High Street/Trumpington Road corridor. The purpose of an OBC is to expand upon the findings of the SOBC, update the evidence base and need for intervention and, following an appropriate appraisal process, present a preferred solution. The OBC also defines how the scheme will be funded, procured and delivered.

In line with Department for Transport (DfT) requirements, this OBC will:

- Define the scope of the proposed scheme;
- Refresh the evidence base;
- Confirm scheme objectives;
- Update the case for change (the Strategic Case), confirming how the scheme fits with national, regional and local strategy and policy;
- Develop shortlisted options and document the appraisal process to determine a preferred option;
- Document evidence on expected impacts, including Value for Money (VfM), Wider Economic Benefits (WEB's) and Environmental and Social impacts. State the assumptions made (the Economic Case);
- Provide a breakdown of scheme costs, and funding requirements on a per annum basis. An overview of how costs have been derived will also be provided (Financial Case);
- Detail the procurement options considered and the basis for the selection of a preferred procurement option, as well as contractual arrangements for pricing and payment mechanisms and risk allocations (Commercial Case); and

- Set out clear proposals for governance, project planning, risk management, stakeholder management and evaluation (Management Case).

Best practice suggests that an OBC should start without defining the type of solution required. OBCs are therefore generally 'mode agnostic' and assess a wide range of options to address the issues identified. This OBC, however, has a different starting point and takes its direction from previous published documentation regarding transport issues and solutions for the Cambridge Southern Fringe. The need for a new Park and Ride solution in the vicinity of M11 Junction 11 is well documented and is identified in the Cambridgeshire Local Transport Plan (2011-2031), and the Transport Strategy for Cambridgeshire and South Cambridgeshire (2014).

1.4 The Scheme

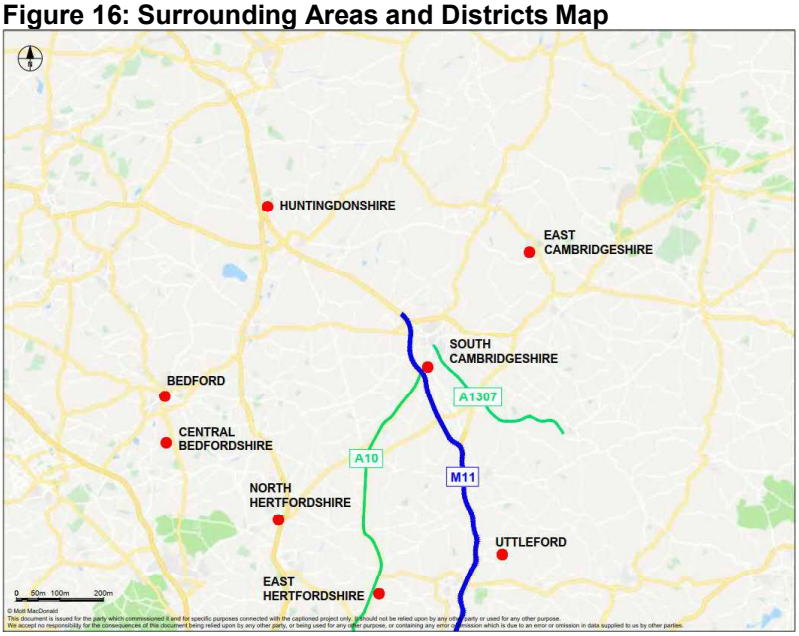
The Cambridge South West Park and Ride scheme is a component of the larger GCP West of Cambridge Package, and will include the following key measures:

- Major expansion to Park and Ride facilities in close proximity to M11 Junction 11, either by expanding the existing Trumpington site or by delivering a new complementary site;
- Capacity improvements at Junction 11;
- Public transport priority measures along the A1309 Hauxton Road/High Street/Trumpington Road corridor; and
- Enhanced high quality public transport services between the Park and Ride site(s) and Cambridge city centre / Cambridge Biomedical Campus.

Together these measures are expected to relieve congestion and provide additional capacity at Junction 11 and within the Southern Fringe of Cambridge, allowing for continued economic growth in the area.

Figure 16 shows the M11 corridor along which the Cambridge South West Park and Ride scheme will be situated. The map also shows some of the key towns and districts that may be impacted by the scheme.

Figure 16: Surrounding Areas and Districts Map



Source: Mott MacDonald

1.5 Document Structure

The remainder of this OBC is structured in accordance with the Five- Case Model for Transport Business Cases. However, it also includes an additional section (3) that re-caps the options development process and sifting of the initial long list that took place at SOBC Stage. That process resulted in the options shortlist for further appraisal that is documented as part of this OBC.

- Section 2 presents the **Strategic Case**, updating the 'case for change', including expected wider economic benefits, policy context, scheme objectives, discussion of options, and key influences on the scheme.
- Section 3 sets out the **Options Appraisal Process**. This section includes a re-cap of the option generation process and appraisal which was undertaken at SOBC stage and resulted in the option shortlist for further appraisal at OBC stage. This is followed by an overview of the appraisal process undertaken at OBC to determine a Preferred Option for this scheme.
- Section 4 sets out the **Economic Case**, identifying the range of economic, environmental, social, and public accounts impacts that are expected to arise from the scheme and, therefore, the scheme's anticipated Value for Money (VfM).
- Section 5 presents the updated **Financial Case**, including anticipated expenditure and a proposed funding breakdown.
- Section 6 contains details of the **Commercial Case** for procuring the scheme, including the potential options for Park and Ride bus service provision.
- Section 7 contains the **Management Case**, including the indicative programme, governance structure and quality, communications, and risk management strategies.

2 Strategic Case

The core elements of this Strategic Case include scheme history and progress to date, the establishment of the need for intervention, the evidence base upon which that need is based and the key objectives that have been developed as a result. It also identifies the preferred scheme option and provides a brief overview of how the option was selected. A recap of the long list generation and sifting process documented at SOBC stage and a full account of the options appraisal process undertaken for the shortlisted options, at OBC stage, is provided in Section 4 as a lead in to the Economic Case.

2.1 Approach

The Strategic Case has been structured to align with 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 7 shows where the relevant information, in accordance with DfT requirements can be found in the subsequent sections and sub-sections that make up the Strategic Case.

Table 7: DfT Requirements for the Strategic Case at Outline Business Case Stage

Content	DfT Requirements	Section Number and Title(s)
Introduction	Outline the approach taken to assess the Strategic Case and the study area	2.1 Approach
Business strategy	Provide the context for the business case by describing the strategic aims and responsibilities of the organisation responsible for the proposal	2.2 Business Strategy 2.3 Policy Review
Internal drivers for change (optional)	What is the driving need to change e.g. improved technology, new business/ service development as a result of policy? (Non-compulsory)	Not included as not compulsory.
External drivers for change (optional)	What is the driving need to change e.g. legislation, pressure from public/ other departments? (Non-compulsory)	Not included as not compulsory.
Problem identified	Describe the problems including the evidence base underpinning this? Justification for intervention?	2.4 Strategic Problems and Issues Identified 2.5 Transport Issues and Opportunities
Impact of not changing	What is the impact of not changing?	2.6 Impact of not Changing 2.7 Need for Intervention
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	2.8 Objective Setting
Measures for success	Set out what constitutes successful delivery of the objectives	2.9 Measure for Success
Scope	Explain what the project will deliver and also what is out of scope	2.10 Geographic Scope
Constraints	High level internal/external constraints e.g. technological environment,	2.11 Constraints

Content	DfT Requirements	Section Number and Title(s)
	capability to deliver in-house major contracts with provider, etc.	
Interdependencies	Internal/ External factors upon which the successful delivery of the project are dependent	2.12 Interdependencies
Stakeholders	Outline the main stakeholder groups and their contribution to the project. Note any potential conflicts between different stakeholder groups and their demands	2.12.1 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	Section 3 Options Appraisal.

Source: DfT

2.2 Business Strategy

The Government intends to continue investing in transport infrastructure across the UK in support of an industrial strategy for post-Brexit Britain which creates the right conditions for businesses to invest for the long term. Achieving economic growth and improved living standards are key objectives for Government.

The 2017 Transport Investment Strategy command paper, prepared by the DfT, states that through investment the Department must seek to:

- Create a more reliable, less congested and better-connected transport network that works for the users who rely on it.
- Build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities.
- Support the creation of new housing.

Providing a sustainable mode of transport for those who would otherwise travel by private car to the Cambridge Southern Fringe or city centre, thereby reducing congestion along the A1309, the A10 and the M11, is aligned with the DfT Strategy. The Park and Ride scheme set out in this OBC will connect major employment sites in the Southern Fringe, such as Addenbrooke's Hospital and the wider Biomedical Campus, and the city centre, to the strategic road network. Investment in this area responds to local growth priorities by supporting existing business entities and encouraging future ones in the Southern Fringe.

The Greater Cambridge Partnership is the local delivery body for a City Deal which aims to deliver up to £1billion 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. The Partnership works with central government, local authorities, businesses, academia and community members to identify potential infrastructure improvements. It envisions creating greener transport networks which connect people, housing, employment and opportunities. The Partnership's aims are to:

- Ease congestion and prioritise greener and active travel, making it easier for people to travel by bus, rail, cycle or foot to improve average journey time.

- Keep the Greater Cambridge area well connected to the regional and national transport network, opening up opportunities by working closely with partners.
- Reallocate limited road space in the city centre and invest in public transport (including Park and Ride) to make bus travel quicker and more reliable.
- Build an extensive network of new cycleways, directly connecting people to homes, jobs, study and opportunity, across the city and neighbouring villages.
- Help make people's journeys and lives easier by making use of research and investing in cutting-edge technology.
- Connect Cambridge with strategically important towns and cities by improving existing rail stations, supporting the creation of new ones and financing new rail links

By investing in better and greener transport networks, the Greater Cambridge Partnership will help secure future growth with the right level of supporting infrastructure. The Partnership is promoting enhancements to the Park and Ride provision in close proximity to M11 Junction 11 due to the scheme's alignment with the Partnership's transport aims and overall vision and strategy for Greater Cambridge.

2.3 Policy Review

Any investment in transport infrastructure in the Southern Fringe must align with national, regional and local policy and strategy. Table 8 provides an overview of the alignment of the M11 J11 Park and Ride scheme with relevant national, regional and local policy and strategy documents.

Table 8: Alignment with National, Regional and Local Policy and Strategy

Policy / Strategy	Scheme Alignment
National Policy and Strategy	
National Planning Policy Framework	The National Planning Policy Framework (NPPF) sets out the UK Governments 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 also 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. • 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 can be undertaken within the transport network that cost, effectively limiting 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.

Policy / Strategy	Scheme Alignment
	The Cambridge South West Park and Ride scheme supports the key principles of the NPPF by: • Providing an attractive and sustainable alternative for commuters. Reducing current reliance on private car travel. • Supporting a decrease in car emissions due to a reduction in congestion on key routes. • Supporting economic growth in Cambridge by ensuring growing employment attractors in the area are accessible and journeys here are safe, easy and quick to travel to.
Strategic Case Supplementary Guidance: Transport Investment Strategy	In July 2017, the government published a Transport Investment Strategy (TIS) setting out objectives and priorities for investment which will guide future decision-making. The Cambridge South West Park and Ride scheme addresses the four main objectives which DfT investment decisions should focus on: • *Create a transport network that works for users, wherever they live*. The proposed scheme aims to intersect users from various townships travelling along the M11 and A10, as well as reduce congestion on Cambridge's transport network, improving conditions for all users in Cambridge. • *Improve productivity and rebalance growth across the UK*. Currently a range of transport problems, such as congestion and a rise in private car trips, have the potential to constrain economic growth and productivity within Cambridge's Southern Fringe. Failure to address these issues will compromise the city's growth. Park and Ride has shown to be successful in many cities, including Cambridge, and will contribute to reducing congestion in the city. • *Enhance our global competitiveness by making Britain a more attractive place to invest* . Cambridge is critical to the UK's long-term economic plan, which seeks to improve productivity and international competitiveness. The city helps the UK economy to compete on the international stage, attracting high calibre knowledge-based individuals to fill skills gaps and increase economic growth. By investing in schemes, such as a Park and Ride, it will ensure the city is physically capable to handle growth. • *Support the creation of new housing*. Investing in traffic reduction measures such as enhanced Park and Ride provision will support future housing by ensuring the transport network will not become overwhelmed and it will more efficiently connect housing to employment.
Regional Policy and Strategy	
Greater Cambridge Greater Peterborough SEP (Strategic Economic Plan)	Building a Park and Ride, located before the southern fringe and central Cambridge, connected to a high-quality public transport system will reduce congestion into Cambridge thereby reducing capacity constraints and allowing for future growth in the city. This fits with the objectives to: • Create a transport network fit for an economically vital high growth area. • Identify interventions, including improving sustainable transport capacity, that open up access along significant growth corridors and hubs. • Improve key corridors to address main barriers, capacity constraints and pinch points thereby enabling more efficient and reliable travel between key destinations and economic clusters. • Implement low cost sustainable transport options which make the best use of existing infrastructure to accommodate housing and employment growth.
Greater Cambridge City Deal (GCCD)	To support economic growth, the region must accommodate new and growing businesses/developments and the people who work in them whilst ensuring ease of movement between key economic hubs. Greater Cambridge needs to connect new and existing centres/developments to each other, and to Cambridge city centre and transport hubs. Building Park & Ride sites linked to high quality public transport, which connects various businesses and services can reduce private car use and congestion within the city, thereby ensuring ease of movement.
Cambridgeshire Local Transport Plan (LTP) 2011-2031 & Cambridgeshire Long	The LTP suggests that growth of the Greater Cambridge economy is already being limited by current congestion levels and will worsen if traffic levels increase unchecked.

[7] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/624990/transport-investment-strategy-web.pdf [Accessed 23/04/19]

Policy / Strategy	Scheme Alignment
Term Transport Strategy (LTTS)	The LTP seeks to address existing transport challenges as well as ensuring that planned large-scale development can take place in the county in a sustainable way. Enhancing Park and Ride provision close to M11 Junction 11 will contribute directly to addressing various challenges set out in the LTP. Challenges identified include: • Challenge 1: Improving the reliability of journey times by managing demand for road space, where appropriate, and maximising the capacity and efficiency of the existing network. • Challenge 2: Reducing the length of the commute and the need to travel by private car. • Challenge 3: Making sustainable modes of transport a viable and attractive alternative to the private car. The LTP supports Park and Ride because the expansion of the five main Cambridge Park and Ride sites, in conjunction with other improvements (busways and cycleways), has led to nearly four million Park and Ride journeys per year. The LTP also has objectives which enhanced Park and Ride provision close to M11 Junction 11 will contribute towards: • Objective 3: Managing and delivering the growth and development of sustainable communities. Achieving this will mean encouraging use of sustainable transport. • Objective 5: Meeting the challenges of climate change. Suggested solutions include actions to address traffic growth, particularly car use, encouraging travel behaviour away from single occupancy car use. Other LTP goals to which enhanced Park and Ride provision will contribute are: • To keep Cambridge traffic at current levels while accommodating major growth. • Dropping the transport C02 emissions per person from 2008 and 2020 by 34.2% to meet the Carbon Budget of the Climate Change Act 2008. • Policy TSCSC 17: Improve air quality and achieve targets in Cambridge. The LTTS considers a new Park and Ride as a necessary scheme to support major development.
Local Strategy and Policy	
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 is based on the three principles of sustainability: • Economic – contributing to building a strong, responsive and competitive economy by including the provision of infrastructure. • Social – supporting strong, vibrant and healthy communities…. with accessible local services • Environmental – contributing to protecting and enhancing our environment minimising pollution and mitigating and adapting to climate change including moving to a low carbon economy. 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. Alignment between this OBC and the Local Plan is summarised by: • The common objective to maximise potential for journeys to be undertaken by sustainable modes of transport. • Acknowledgment that high levels of congestion exist on radial routes into Cambridge at peak times. Enhanced Park and Ride provision which intercepts this traffic will reduce the congestion continuing into southern and central Cambridge. By providing a public transport link into the city and reducing car use, air quality and noise pollution will improve within southern and central Cambridge. This will help to address air quality issues within South Cambridgeshire (linked directly to

Policy / Strategy	Scheme Alignment
	the volume of traffic that runs through the district) for which an Air Quality Action Plan has been formulated to bring about improvements in air quality.
Cambridge Local Plan	The Cambridge Local plan was formally adopted by the Council on 18th 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 It includes provision for the extension of existing conventional bus services, the Cambridgeshire Busway and Park and Ride services to Addenbrooke's Hospital and other Southern Fringe developments. This supports the objectives and goals in the Local Plan which include: • Promoting and supporting economic growth in environmentally sustainable and accessible locations while maintaining the quality of life and place that contribute to economic success. • Minimising the distance people need to travel and designing an environment which makes it easy for people to move around the city and access jobs and services by sustainable modes of transport. • Improving the sustainable transport network and capacity around the economic hubs, clusters and where people live and access services in and around the city, by improving linkages across the region and making movement between them straightforward and convenient.
Transport Strategy for Cambridge & South Cambridgeshire (TSCSC), 2014	The TSCSC has 21 policies, many of which Park and Ride solutions support: • Policy TSCSC 2: Catering for travel demand in Cambridge with measures which allow increased demand to be accommodated on the network. • Policy TSCSC 7: Supporting sustainable growth- will seek to make sustainable travel a mode of choice for an increasing proportion of trips. Bus priority measures will be introduced on key links where congestion severely impacts services. Buses linking Addenbrooke's and the Biomedical Campus to other key developments will be developed. Outer Park and Ride sites will be introduced, and existing Park and Ride sites will be expanded or relocated. • Policy TSCSC 9: Access to jobs and services-access to areas of employment and services will be maximised by sustainable modes of travel. This includes providing accessible, efficient, and effective high-quality public transport. • Policy TSCSC 11: Improving community transport services, creating new and improved interchange areas, such as Park and Ride sites which permit commuters to reduce their car journey and switch to sustainable modes. • Policy TSCSC 12: Encouraging cycling and walking- those who live too far to cycle or walk into south or central Cambridge will be able to use the Park and Ride site and cycle/walk the remainder of their journey. • Policy TSCSC 17: Air Quality- by reducing car trips into the south and centre of Cambridge the Park and Ride will help to improve air quality in critical areas. • Policy TSCSC 19: Carbon Emissions- by offering commuters a sustainable option for a portion of their journey, enhanced Park and Ride will reduce carbon emissions per person, helping reduce the transport related carbon emissions and achieve targets. The A10 has been identified as one of the main corridors to improve. The TSCSC plans for vehicular trips to be intercepted further along the A10 through the provision of a new Park and Ride site adjacent to M11 Junction 11. This will intercept Cambridge-bound traffic, freeing up capacity at the existing Trumpington Park and Ride for additional trips from the M11.
Cambridge Biomedical Campus Strategy and Travel Plan (2017-2022) (Full Consultation Version) Draft March 2017	The CBC Strategy and Travel Plan aims to discourage single occupancy car travel by providing and promoting sustainable alternatives to ensure a greater level of travel choice is available. The Cambridge South West Park and Ride scheme thus strongly adheres to this aim. The CBC Strategy and Travel Plan is part of wider initiatives to secure: • Ongoing development of sustainable travel infrastructures, services and behaviours. • Contributions from further new development/site expansion and commercial projects. • Off-site local authority-driven Greater Cambridge transport infrastructure led by other parties.
Atkins Cambridge Biomedical Campus Transport Needs Review	Cambridgeshire County Council, on behalf of the GCP, commissioned Atkins to undertake a transport needs review of the CBC. Together the three reports:

Policy / Strategy	Scheme Alignment
Parts 1, 2 and 3. October/November 2018	• Assessed the existing transport situation and made recommendations on potential interventions to accommodate growth at the CBC over the next five years to 2021. • Reviewed forecast demand data and transport supply for all modes up to 2031 and recommended measures to accommodate growth both with, and without, Cambridge South Rail Station. • Assessed the impact of planned schemes (GCP and Cambridge Autonomous Metro), Cambridge South Station, and other potential interventions on the highway trips to the CBC. The CBC Transport Needs Review is greatly supportive of Cambridge South West Park and Ride scheme as it recognises the importance of encouraging staff and visitors to use sustainable modes of travel to access the CBC and ensure, therefore, the highway trip reduction targets are met or exceeded. The benefits of the Cambridge South West Park and Ride scheme are so significant that the review recommends the implementation of this project along with other schemes such as Greenways and Cambourne to Cambridge are brought forward.
Cambridge City Access Strategy	The Cambridge City Access Strategy is a package of eight measures which aim to tackle congestion within Cambridge and create a highly efficient transport network that supports both the predicted population growth and the increase in vehicle trips. To reduce peak-time traffic levels in Cambridge by 10-15% by 2031 more of the following measures are needed: • Pedestrian and cycling infrastructure • Public space and air quality • Better bus services including park and ride • Travel planning • Smart technology • Traffic management • Workplace parking levy • On-street parking management (including controlled parking zones) The measures contained within this strategy are complimentary to the success of the Cambridge South West Park and Ride scheme as it combines soft measures and traffic management in conjunction with increased park and ride provision that this scheme seeks to deliver.

2.4 Strategic Problems and Issues

The following section provides an overview of strategic trends in Cambridgeshire. Primarily it will identify problems and opportunities associated with Cambridgeshire's population, economic growth and planned development. In assessing pertinent socio-economic trends, this section has relied primarily on data sources from the Office of National Statistics and the National Online Manpower Information System (NOMIS).

2.4.1 Population Growth

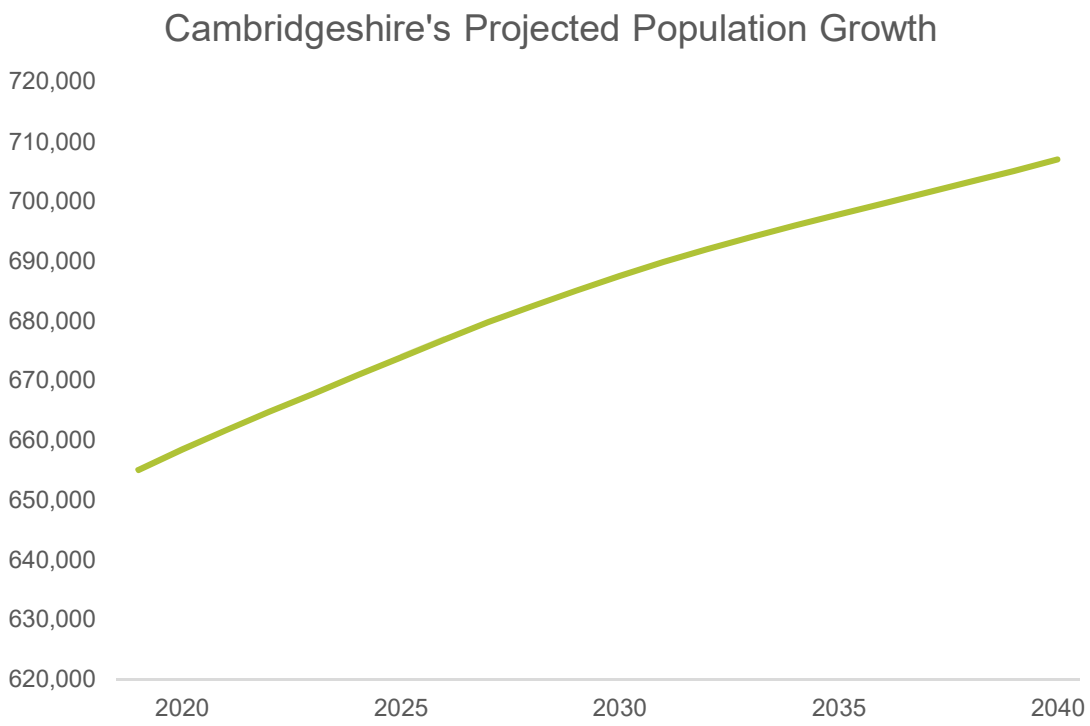
Cambridgeshire's population has grown steadily over previous decades. However, more recently the population has experienced a significantly faster rate of growth, with a total increase of 4.2% over just a five-year period. The latest count in 2017 found Cambridgeshire's total population to stand at 648,237.

It should be noted that students represent a significant proportion of the population in Cambridgeshire, meaning the population can fluctuate during term time[8]. The impact of such fluctuations will become more severe as the student population continues to grow alongside the expansion of the University and associated facilities. As a result, Cambridgeshire may annually exceed peak population as each academic year commences.

[8] http://worldpopulationreview.com/world-cities/cambridge-population [Accessed 17/10/18]

Figure 17 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% compared to the existing population.

Figure 17: Cambridgeshire Population Projections



Source: ONS 2018

The rate of population growth anticipated for Cambridgeshire necessitates improving the transport infrastructure to ensure that congestion and capacity issues do not constrain growth and force individuals to consider relocation. A Park and Ride facility advantageously located close to the M11 J11, a key node on the strategic highway network, would provide the additional parking capacity necessary to reduce private car travel whilst also improving access and egress via the M11.

The issues and opportunities table captures the key points of the section for the Cambridge South West Park and Ride scheme in relation to the population in Cambridgeshire.

Issues	Opportunities
• The population of Cambridgeshire is growing rapidly. Transport infrastructure is not evolving at a pace which matches population increase. • Cambridgeshire's population will outgrow existing parking facilities quicker than expected. • 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. .	• A greater number of people living in the area will create greater demand to buy products and use local services, resulting in growth in the local economy. • Providing transport infrastructure which is futureproofed to support the requirements of future generations will ensure a successful and sustainable future for Cambridgeshire.

2.4.2 Economic Growth

Greater Cambridge is a world-leading centre for research, innovation and technology which has led to the 'Cambridge Phenomenon' – a unique ecosystem of bright minds, commerce and local investment. The inward investment, brought by the 'Cambridge Phenomenon', has created jobs and prosperity in Greater Cambridge.

With the University of Cambridge at its heart, the area's scale and connectedness enables overlapping networks to develop and facilitates a culture of co-operation and cross-fertilisation between entrepreneurs and academics. 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 Cambridgeshire, including Amazon, Apple, HP, Illumina, Microsoft, Sanofi, Siemens and Qualcomm. AstraZeneca has chosen Cambridge for its global research headquarters for 2,000 staff.

The origins of the 'Cambridge Phenomenon' date back to the 1960's. The Greater Cambridge Partnership's (GCP) vision is to now:

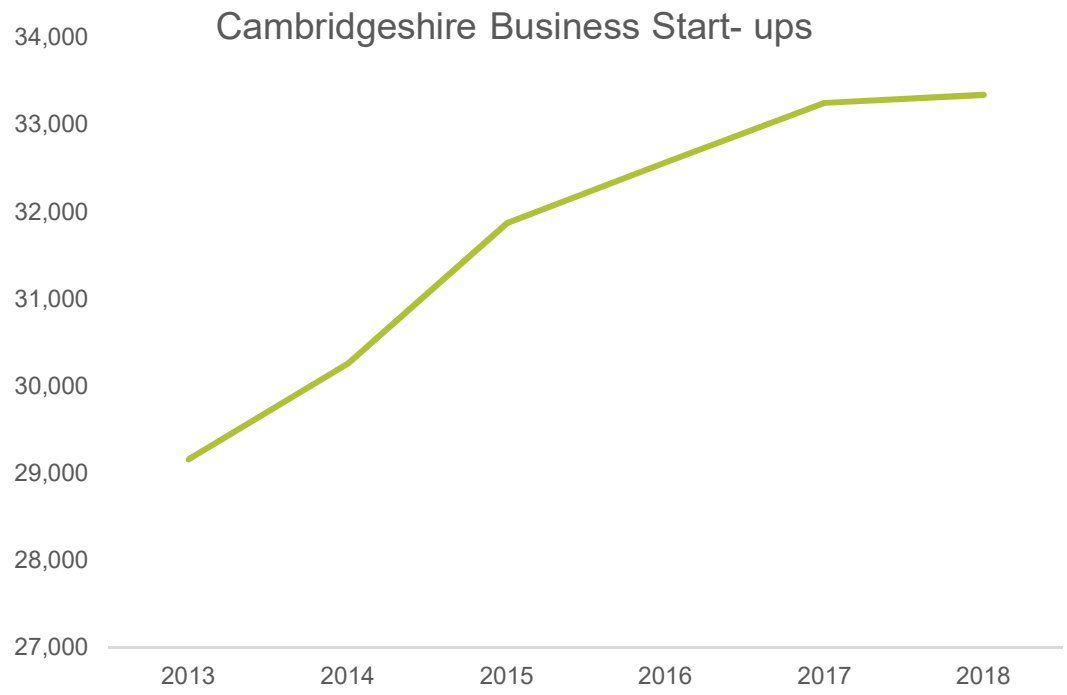
> ***"Unleash a second wave of the 'Cambridge Phenomenon', with the aim of 'securing sustainable economic growth and quality of life for the people of Cambridge and South Cambridgeshire'"***.

The success of the Greater Cambridge City Region brings jobs and opportunities, not only for the City Region, but for the whole region and helps the UK economy to compete on the international stage, attracting high calibre knowledge-based individuals to fill gaps and increase economic growth.

A distinguishing feature of Cambridgeshire is how strongly the area has grown recently. Economic growth has outpaced both the East of England and UK over the last decade. The economic growth experienced has been driven primarily, but not entirely, by rapid business creation and growth in the South of England[9]. Cambridgeshire can be considered a significant contributor to the rapid economic growth experienced in the South, and has successfully built a reputation as an attractive location to invest and expand businesses. This reputation has led to a rapid increase in the number of business start-ups over recent years. The rate of business start-ups over the past five years is indicated in Figure 18.

[9] Cambridgeshire and Peterborough Independent Economic Review (2018)

Figure 18: Cambridgeshire's Business Start-ups



Source: ONS 2018.

Rapid growth 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 this data was published before the end of 2018, it suggests possible growth stagnation and, if this is the case, Cambridgeshire needs to identify and address factors which may have recently deterred businesses from investing at the same rate.

Cambridge's recent economic success is founded upon the connectivity across the city, and its surrounds, so the infrastructure of the area needs to support not only the current pace of growth but also exploit future opportunities to encourage growth and prevent economic stagnation.

However, a recent report published by AstraZeneca found transport and infrastructure to be the biggest local constraint to growth across Cambridge's Science and Technology cluster. Findings of the report suggest that failure to address the constraints associated with transport in Cambridge could result in 270 fewer gross jobs at AstraZeneca's global corporate headquarters by 2032[1].

The issues and opportunities table captures key areas of the section for the Cambridge South West Park and Ride scheme in relation to economic growth in Cambridgeshire.

[1] Cambridge: driving growth in life sciences. Exploring the value of knowledge clusters on the UK economy and life sciences sector. Medimmune & AstraZeneca 2018

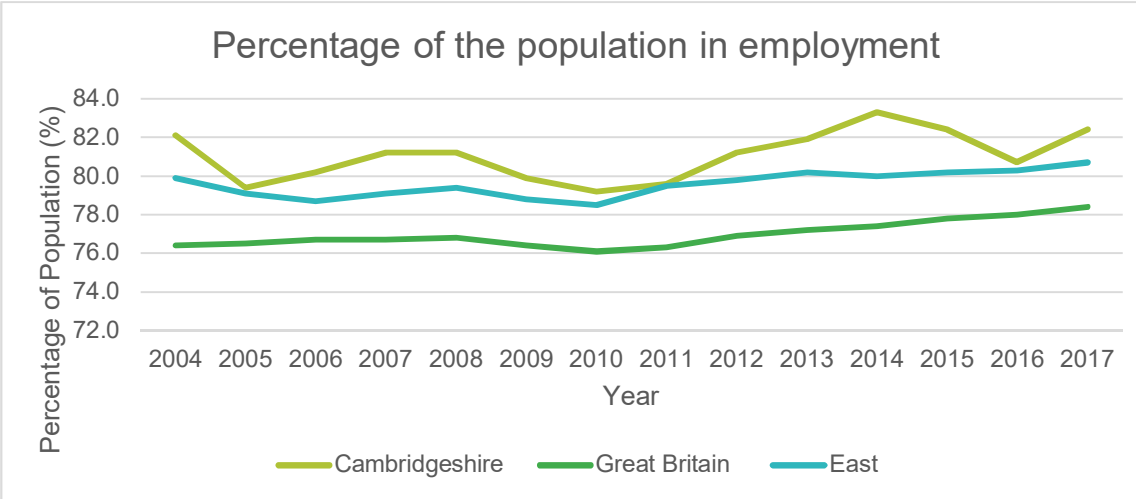
Issues	Opportunities
• Rapid business creation in Cambridgeshire has increased pressure on the existing transport network. • The existing transport network is inadequately equipped to accommodate current demand. If the network does not evolve at the same rate as growth this problem will inevitably worsen. • 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. • The rate of business start-ups has slightly declined over the previous six months. Cambridgeshire must establish the reason for this and seek to address concerns.	• Cambridgeshire has a strong existing economic base, and one which continues to grow. As a result, the economy is likely to benefit from any uplift in infrastructure expenditure if it equips the area to deal with expansion. • The proposed Cambridge South West Park and Ride scheme will improve accessibility to key employment sites, encouraging investment and supporting existing businesses. • 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.

2.4.3 Employment and Skills

Although the population in Cambridgeshire is increasing and is forecast to continue, in order to support economic growth in the aforementioned highly skilled growth sectors the population within the catchment area needs to possess the required skills; or the transport network must be flexible and efficient enough in order to expand the catchment area to ensure that jobs created as a result of growth can be filled. This sub section provides a summary of employment in Cambridgeshire, both in terms of its employment levels and its role as a source of employment within the South East of England.

Figure 19 provides an overview of employment rates in Cambridgeshire. It can be seen that employment rates in Cambridgeshire have remained consistently higher than the East of England and Great Britain throughout the analysis period. The number of people in employment increased rapidly between 2016 and 2017. An increase of 1.7% was observed during this period, the most significant annual increase since 2014. The rapid growth experienced over the between 2016-2017 could be an indication of the growth in employment which can be expected over forthcoming years.

Figure 19: Population in Employment



Source: ONS 2018

Table 9 provides a summary of the number of people who were employed in Cambridgeshire, the East of England and Great Britain between 2015 and 2017.

Table 9: Total Employee Jobs

Year	Cambridgeshire	East England	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 represents a significant proportion of those available in the East of England, an impressive statistic 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.

Cambridgeshire provides a key source of employment in the East of England and continues to grow its employment base. Ensuring the area continues to attract outside investment is crucial to sustaining the recent rate of growth experienced. The provision of adequate infrastructure to accommodate the expansion of existing businesses whilst attracting further public and private sector investors is vital to further growth of the area.

Cambridgeshire's Employment Sectors

A summary of employment by sector is provided in Table 10. Employment is most concentrated in Professional, Scientific and Technical Services and the Education sector. The dominance of these two sectors can largely be attributed to the growing Biomedical Campus and the further expansion of the University of Cambridge and associated facilitates. In addition, the following sectors represent large proportions of Cambridgeshire's employment offer:

- Health;
- Manufacturing;
- Retail;
- Business Administration and Support Services;
- Accommodation and Food Services; and
- Information and Communication.

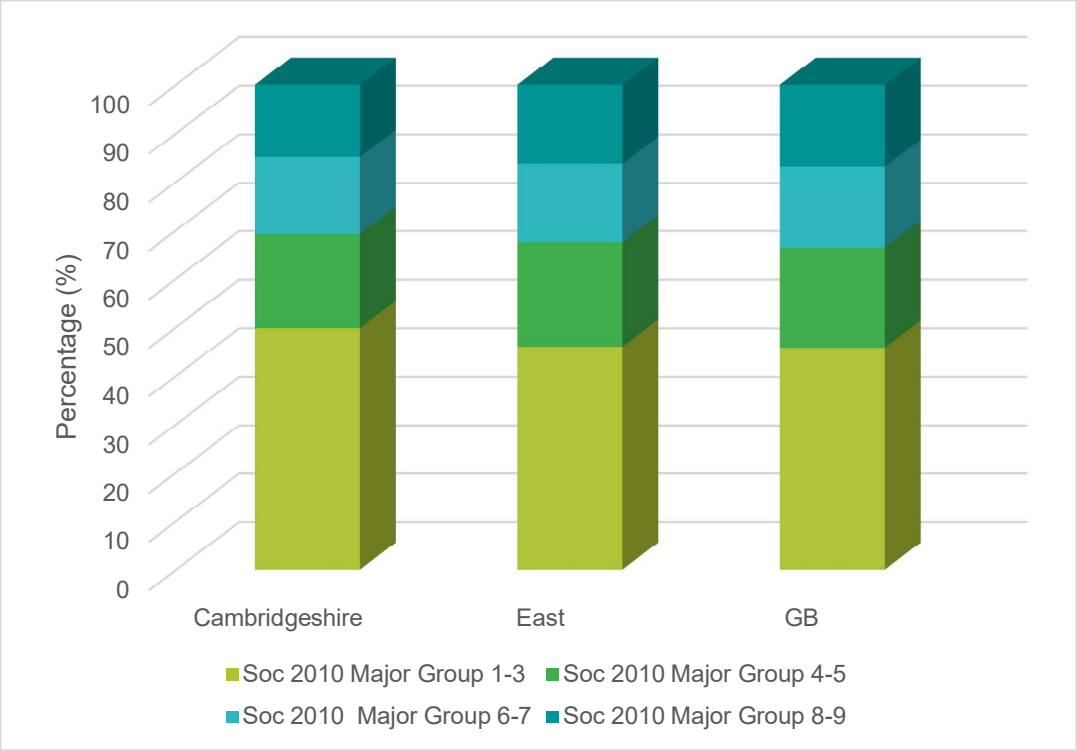
The proportion of jobs in Human Health and Social Work Activities is shown to be significant, representing 12.8% of all jobs in Cambridgeshire. This proportion can also largely be attributed to the significance of the Biomedical sector within Cambridgeshire and the ongoing investment from large pharmaceutical companies such as AstraZeneca in the Southern Fringe. It should be noted that both the Cambridge Biomedical Campus and the headquarters of AstraZeneca are located within the Southern Fringe, indicating the significance of the study area as an employment hub.

Table 10: 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 20: Employment by Standard Occupation Classification (SOC) (October 2015-September 2016)



Source: ONS Annual Population Survey

The standard occupation classification groups referred to in Figure 20 are based on the following classifications:

Table 11: 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 occs
Soc 2010 major group 8-9	8. Process plant and machines operatives
	9. Elementary occupations

Source: ONS Annual Population Survey

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 than the East 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 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.

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

Issues	Opportunities
• Highly skilled professionals are required to fill a large proportion of the jobs on offer in Cambridgeshire. • Employers in Cambridgeshire must recruit from outside of the immediate area to find individuals who meet the specific requirements of the job roles on offer. • The large number of individuals who work in Cambridgeshire but live outside of the area leads to a high number of peak time commuters. • High numbers of commuters are causing congestion problems during peak times, particularly in the southern fringe as individuals travel to employment opportunities at the Cambridge Biomedical Campus and other key employment sites here.	• Cambridgeshire has a larger proportion of people working in professional, scientific and technical activities compared with the national average. Increased employment within these sectors presents the opportunity to further excel Cambridgeshire and, in particular, the Southern Fringe as a destination of excellence in science and industry. Thereby attracting more jobs, employment opportunities and boosting the local economy. • The proposed Cambridge South West Park and Ride scheme presents the opportunity to accommodate commuter demand and provide an attractive alternative mode of transport to private car travel, reducing congestion along key routes.

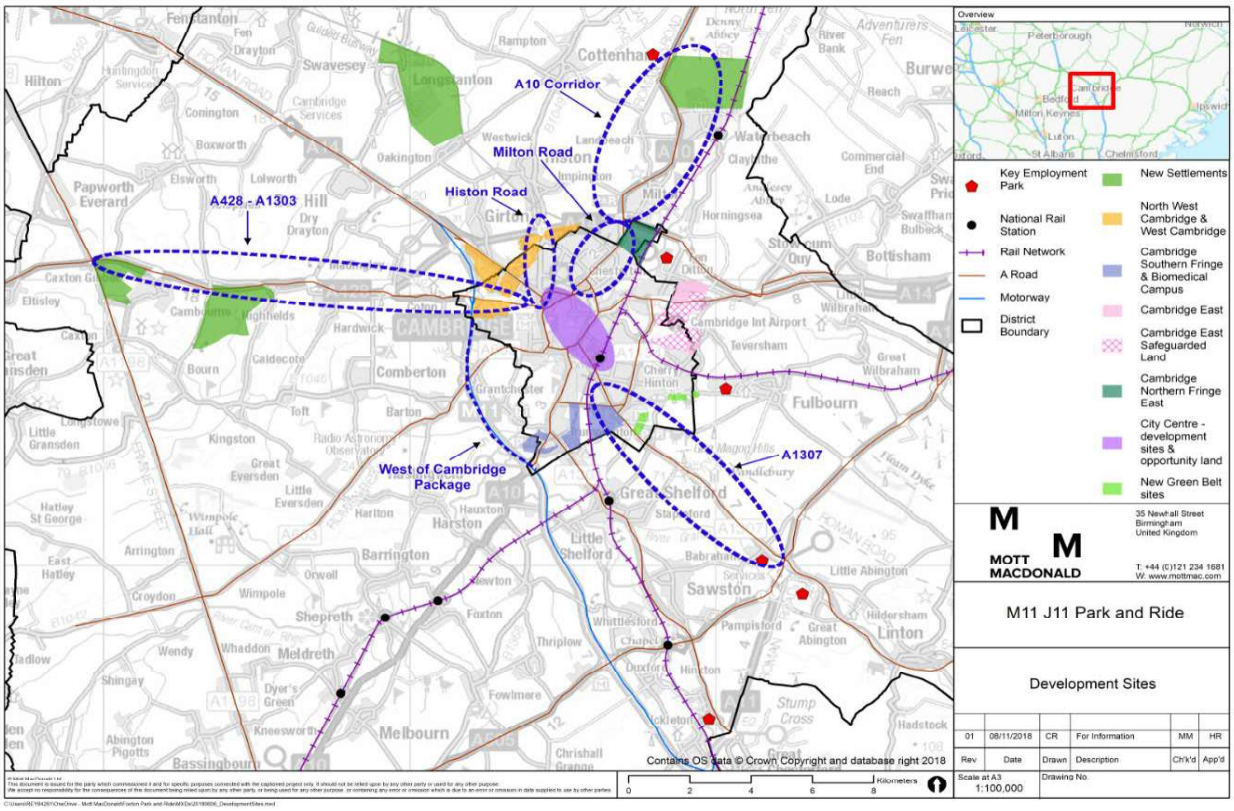
2.4.4 Planned Development

A significant level of development is planned in Greater Cambridge over the Local Plan period (2011-2031), which will provide employment space to underpin the growth targets. The Council's aim is to ensure sufficient land is available to allow the forecast of 22,100 new jobs in Cambridge by 2031, including some 8,800 in B-use class (offices and industry) to come to fruition. 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. Investment in transport infrastructure will be critical, ensuring transport network capacity, high congestion levels, and poor reliability issues are addressed, to unlock the city's growth potential.

Figure 21 provides a comprehensive map of the key 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 Cambridge South West Park and Ride scheme is a component scheme of the West of Cambridge Package indicated on the map.

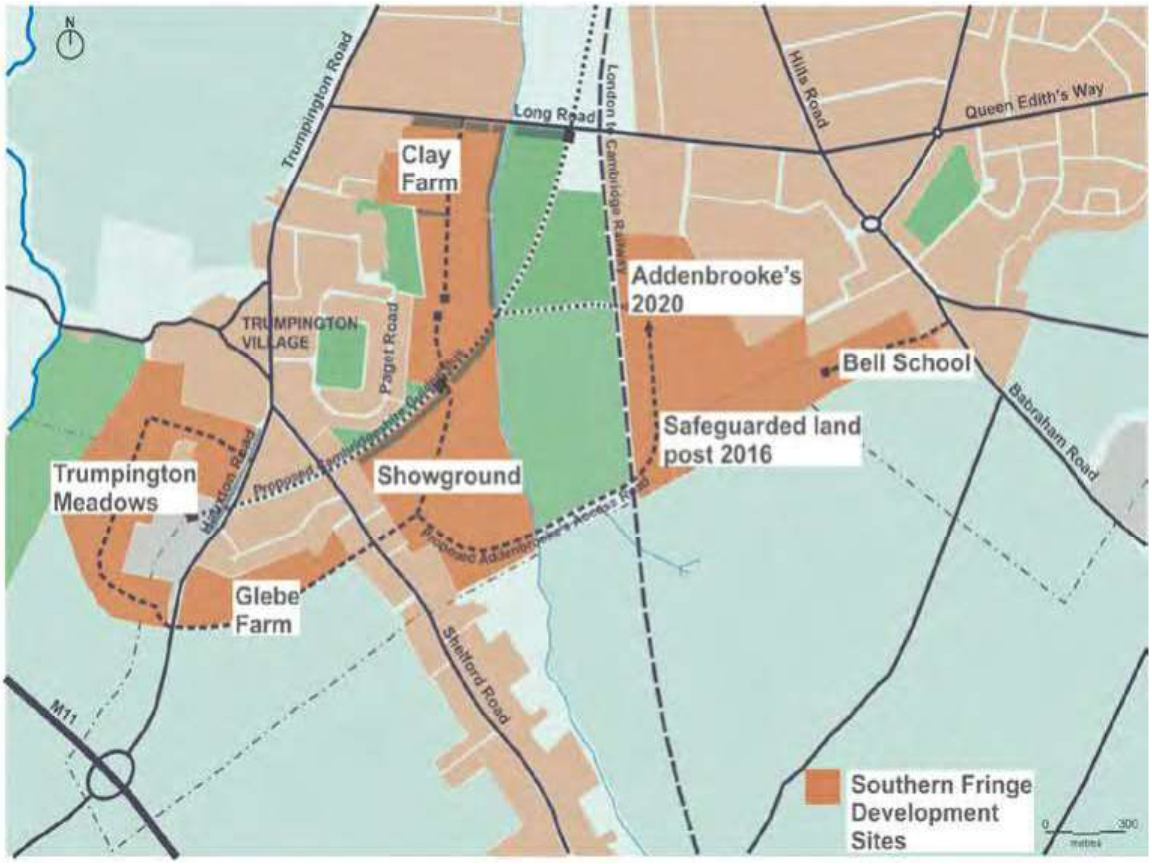
Figure 21: Map of Key Developments and City Deal Schemes



Source: Mott MacDonald, August 2018

Of significance to the Cambridge South West Park and Ride scheme is the level of change and proposed development in Cambridge's Southern Fringe and Biomedical Campus. The illustration in Figure 22 shows the expected change in the area highlighted by the Local Plan.

Figure 22: 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 approximately 50% to 26,000** by 2031[10].
- 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 2031**[11].
- Residential developments at Clay Farm, Glebe Farm, Trumpington Meadows and Bell School could bring up **over 4,000 new homes and new student accommodation**[12].
- AstraZeneca and R&D arm MedImmune are building their new Global Research and Development Centre and Corporate Headquarters on the Campus. Once completed, there will be **more than 2,000 AstraZeneca and MedImmune research and development science jobs** will be created across the Campus[13].

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

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

[12] Cambridge City Council, Growth Site Guide (March 2018): Cambridge Southern Fringe, March 2018

[13] AstraZeneca Website, https://www.astrazeneca.com/our-science/cambridge.html, Accessed 17th October 2018

- The Royal Papworth Hospital is moving to a new 40,000sqm hospital on the Biomedical Campus. The move is planned for Summer 2019.

With such significant increases in the area's workforce, resident, patient and visitor populations, excellent transport provision will be required to accommodate corresponding future increases in travel to and from the sites and to enable the area to reach its full economic potential.

Major enhancements to Park and Ride facilities in close proximity to M11 Junction 11 will be fundamental to secure the rate of growth anticipated for this area of Cambridgeshire, and specifically the Cambridge Biomedical Campus. The enhancements when supported by other planned transport interventions, such as those noted in the City Access Plan will address congestion in the surrounding area by connecting key employment sites with employees and other businesses beyond the Greater Cambridge area.

2.4.4.1 Cambridge Biomedical Campus

The Cambridge Biomedical Campus, on the southern edge of Cambridge, is a leading international innovation centre focusing on science research, teaching and healthcare. Of the planned developments discussed above, the CBC is most significant as substantial growth is scheduled over the next ten to fifteen years, which will impact transport demand. The CBC is already an extensive trip generator fuelling access/egress, congestion and capacity concerns. Examples of existing challenges around the CBC include:

- Highway congestion on Babraham Road (A1307), Addenbrook's Road and Hauxton Road.
- Gaps in the direct bus service provision from key travel origins.
- Concern over the availability of staff parking.

With the proposed growth of the CBC, where an additional 5,231 staff trips, 450 patient trips and 1,450 visitor trips are predicted to occur daily in the next five years, a 30-40% increase from current trip levels, travel demands from employees, patients, visitors will also increase. With the demand for car and cycle parking at the CBC already exceeding supply, and up to 3,000 extra car parking spaces needed going forward, it is vital the Cambridge South West Park and Ride scheme is implemented and access to sustainable modes of transport is improved whilst non-essential car use is discouraged[14]. This, in turn, will maximise capital investment in the area and ensure economic growth is not prohibited. The CBC Transport Strategy highlights the transport needs of the site further.

In the longer term, the CBC is still expected to experience extensive growth. This is shown in Table 12 and Table 13 through the predictions that between 2017 and 2031 staff numbers will increase by 51% whilst patient and visitor levels will rise by 73%. This effectively means there will be an increase in demand of 17,500 one-way person trips per day to the CBC compared to number of trips in 2017. A breakdown of this increase by transport mode is shown in Table 14.

Table 12: Planned Employment Growth at CBC up to 2031

Staff	Baseline 2017	2022	2031
Employment Level	17,250	22,450	26,000
Percentage Change from Baseline		+30%	+51%

Source: SNC Lavalin, Atkins Cambridge Biomedical Campus Transport Needs Review, October 2018.

[14] SNC Lavalin, Atkins Cambridge Biomedical Campus Transport Needs Review, Part 1

Table 13: Predicted Annual Patient Numbers to 2031

Patients	Baseline 2017	2022	2031
Total to the nearest 100 (excluding inpatients as assumed double counting).	798,600	971,500	1,382,800
Percentage Change from Baseline		+21%	+73%

Source: SNC Lavalin, Atkins Cambridge Biomedical Campus Transport Needs Review, October 2018.

Table 14: One-way Daily Person-trips Entering CBC up to 2031 by Mode (includes through trips)

Person-trips to CBC	Baseline 2017	2022 Forecast	2031 Forecast
Car	28,475	35,600	46,400
Bus	4,313	5,400	7,000
Cycle	4,779	6,000	7,800
Pedestrian	3,820	4,800	6,200
Total	41,387	51,700	67,500
Percentage change from Baseline (Table 7)		+25%	+63%

Source: SNC Lavalin, Atkins Cambridge Biomedical Campus Transport Needs Review, October 2018. Numbers have been rounded so may not correspond directly with percentage change.

To accommodate this growth, demand management measures to further restrict parking and non-essential car access to the CBC will need to be implemented, whilst infrastructure improvements to public transport, footways and cycleways will also need to be installed. It is hoped as a result, therefore, that people will be encouraged to change their travel behaviour and choose to car-share and travel by sustainable transport modes.

Whilst the existing bus station at the CBC has capacity constraints in providing additional services, calculations undertaken by Atkins as part of the Cambridge Biomedical Transport Needs Review would suggest that the new Cambridge South West Park and Ride could cause a 14% shift in the number of people using this mode, if all or some of the following Park and Ride interventions are adopted:

- Provide a direct bus service from the Cambridge South West Park and Ride to the CBC.
- Specific spaces at the Park and Ride site are allocated to CBC staff and visitors.
- Buses or autonomous technologies are installed to shuttle shift workers to and from the CBC before and after the main Park and Ride operational hours. The existing patient shuttle bus could be utilised for this purpose when not in use itself.
- Priority access is granted for buses to and from the Cambridge South West Park and Ride at M11 Junction 11.
- Effective vehicular access through, for example, a Park and Ride designated lane or segregated access is installed for the Cambridge South West Park and Ride site.
- Real-time information technology installed on the Park and Ride buses.

The proposed Cambridge South Station would provide direct rail access to the CBC whilst also providing another way to reduce vehicular traffic and thus align with the target from GCP City Access Strategy which aims to maintain traffic at 2018 levels. In addition, the new rail station would help alleviate capacity constraints across the wider transport network, and thus make the Cambridge South West Park and Ride proposal a more viable investment.

The issues and opportunities table captures key points from this section for the Cambridge South West Park and Ride scheme in relation to Planned Development in Cambridgeshire.

Issues	Opportunities
• The level of planned development in Greater Cambridge will increase pressure on the existing transport network. • Increased demand on the transport network will increase congestion and journey times. • Planned employment space may be left vacant if accessing the sites is deemed unattractive by the potential workforce.	• Addressing issues associated with Cambridgeshire's transport network will encourage planned development to come to fruition at the rate which is anticipated. Development will bring forward an unprecedented number of opportunities for economic growth here. • Improvements to Park and Ride facilities will reduce congestion in the study area making travel to existing and proposed employment sites, for example the CBC, more attractive. • The Cambridge South West Park and Ride scheme will provide a sustainable mode of travel for existing and future users of the network. • Preparing the transport network for future growth will secure a prosperous future for Cambridgeshire and encourage growth, post local plan period.

2.4.5 Environmental Issues

2.4.5.1 Air Quality

To support the public consultation events for this scheme, Mott MacDonald prepared a fact sheet on air quality. The fact sheet was prepared using data currently available from local authorities and DEFRA in response to a request from GCP to report on current air quality in Harston. To date, no monitoring has been undertaken for the Cambridge South West Park and Ride scheme. The information here is extracted from the technical note[15] prepared.

South Cambridgeshire District Council started monitoring NO_2 in Harston in 2006. The village of Harston is built around the A10 that connects Cambridge to the south and has a direct junction with the M11. Since monitoring commenced in 2006, the NO_2 concentrations have remained low.

Table 15 presents the NO_2 monitoring data, a general indicator of air quality. The national air quality objective is to have NO_2 lower than 40µg/m³ at sensitive locations such as people's homes, schools and hospitals. The results below show that the air quality in the area is not a concern as concentrations have remained beneath the threshold of 40µg/m^3 between 2006 and 2017.

Table 15: NO2 Monitoring Data at 47 High Street, Harston

Year	NO2 Concentration (µg/m3)
2006	26.6
2007	26.1
2008	27.0
2009	28.1
2010	29.6
2011	23.7
2012	25.6
2013	25.7
2014	28.0
2015	28.4

[15] Mott MacDonald (2018). Air quality information, with a focus on Harston. Fact sheet prepared by MM in November 2018. 2 pages.

Year	NO2 Concentration (µg/m3)
2016	28.6
2017	27.3

Source: South Cambridgeshire District Council Review and Assessment Documents

Additional information has been collated on regional modelled NO_2, $PM_{2.5}$ and PM_{10} levels and from site specific monitoring locations in the Cambridge area for the same parameters[16]. This data is presented in Figures 10, 11, 12.

- NO_2 is the main pollutant of concern from road traffic. The highest pollutant concentrations associated with road traffic are found in busy urban areas. This is shown on the NO_2 map where NO_2 concentrations on busy roads in Cambridge are generally higher than surrounding areas.
- A diffusion tube on the High Street in Harston measured a roadside annual mean nitrogen dioxide (NO_2) concentrations of approximately 28µg/m^3 for the past 4 years. This is relatively low in comparison to the annual mean NO_2 air quality objective of 40µg/m^3 and would suggest air quality is reasonably good in Harston.
- In general, local authorities do not monitor PM_{10}/$PM_{2.5}$ in as many locations as NO_2. Where concentrations of NO_2 are low and road traffic is the primary source of emissions, for example in Harston, the concentration of PM_{10}/$PM_{2.5}$ would not exceed the relevant Defra, UK and EU air quality objectives for PM_{10}/$PM_{2.5}$[17].
- Poor air quality is generally experienced close to roads where the traffic volume is high and there is lots of congestion. Even when this is the case, the contributions from road traffic to pollutant concentrations decline with distance from the road so the highest concentrations are located within a few metres of the road. Government guidance indicates that at distances of more than 200 metres from roads the contribution from road traffic to pollutant concentrations is not distinguishable from the background pollutant concentrations.
- Current air quality monitoring data, undertaken by Cambridge City Council and South Cambridgeshire District Council, is available on their websites. Monitored pollutant concentrations across the area are below air quality objectives except for a few monitoring points within Cambridge City. The available data shows that air quality in the areas of Trumpington, Hauxston and Harston are below the air quality objectives.

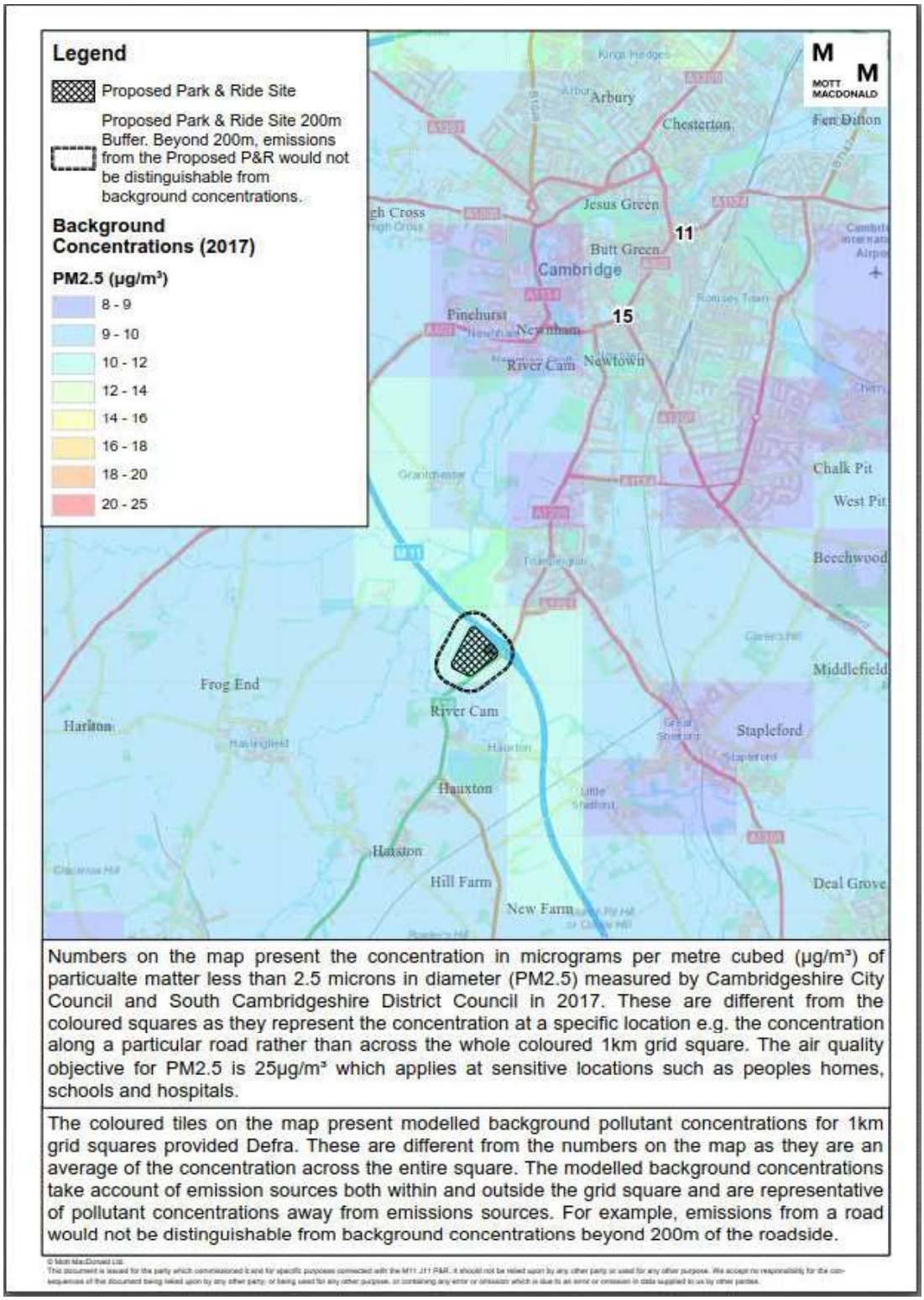
Thus, with minimal air quality impacts recorded in Trumpington, Hauxton and Harston and limited amounts expected for the future, there is a strong case for the Cambridge South West Park and Ride scheme to be implemented. Whilst air quality pollutants associated with vehicles are often localised, the Park and Ride scheme will help reduce levels of congestion more generally. This will in turn limit the idling of engines and the volume of air pollutants produced.

Figure 23, Figure 24, and Figure 25 show the background concentrations of three key air pollutants, PM 2.5, PM 10 and NO2, for Harston and the surrounding area.

[16] PM = particulate matter, 2.5 and 10 refer to the size of the particulates in micrometers.

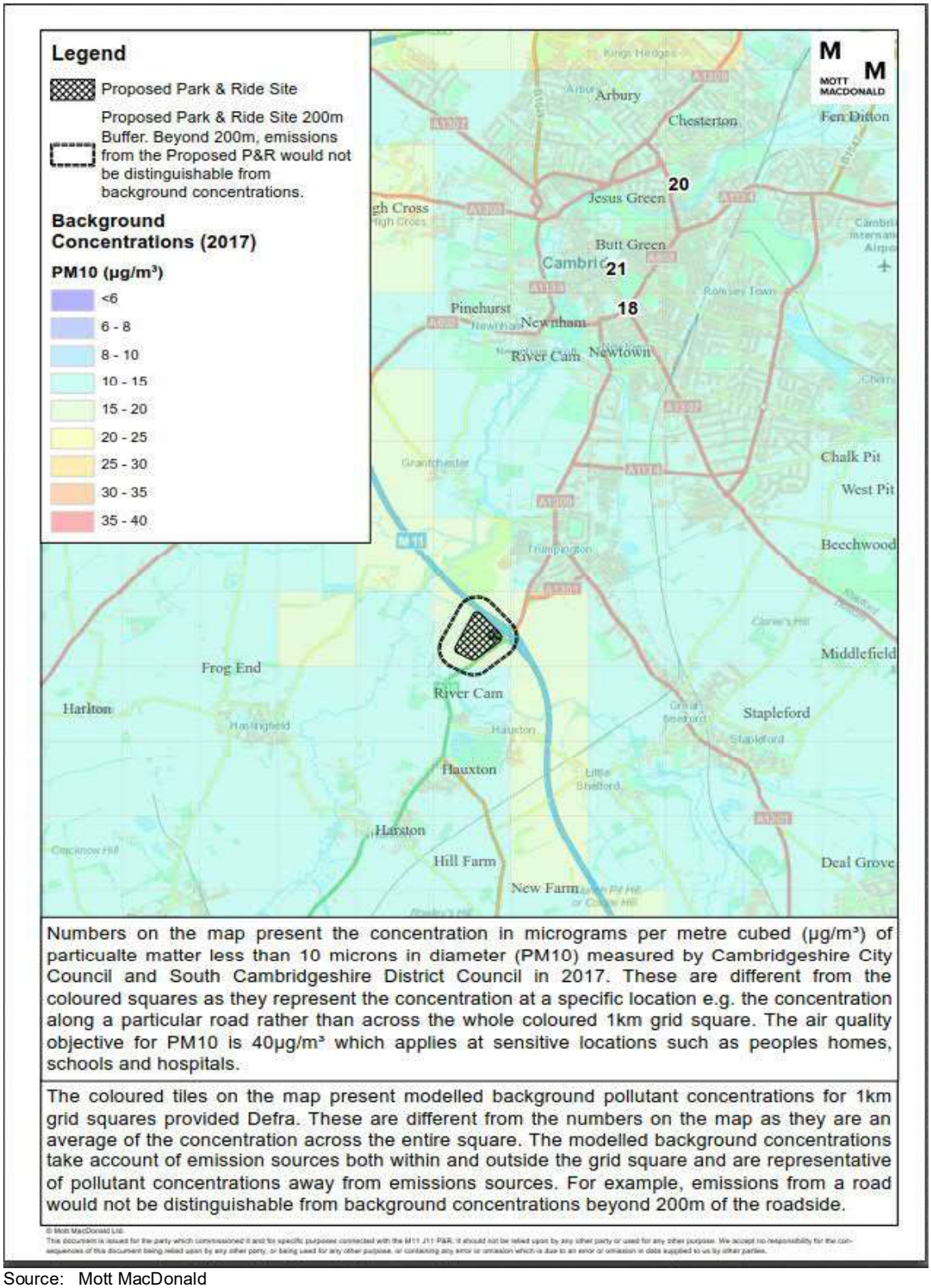
[17] Defra, UK and EU Air Quality Limits. National air quality objectives and European Directive limit and target values for the protection of human health. Available online at: https://uk-air.defra.gov.uk/assets/documents/Air_Quality_Objectives_Update.pdf

Figure 23: Cambridge South West Park and Ride PM2.5 Background Concentrations



Source: Mott MacDonald

Figure 24: Cambridge South West Park and Ride PM10 Background Concentrations

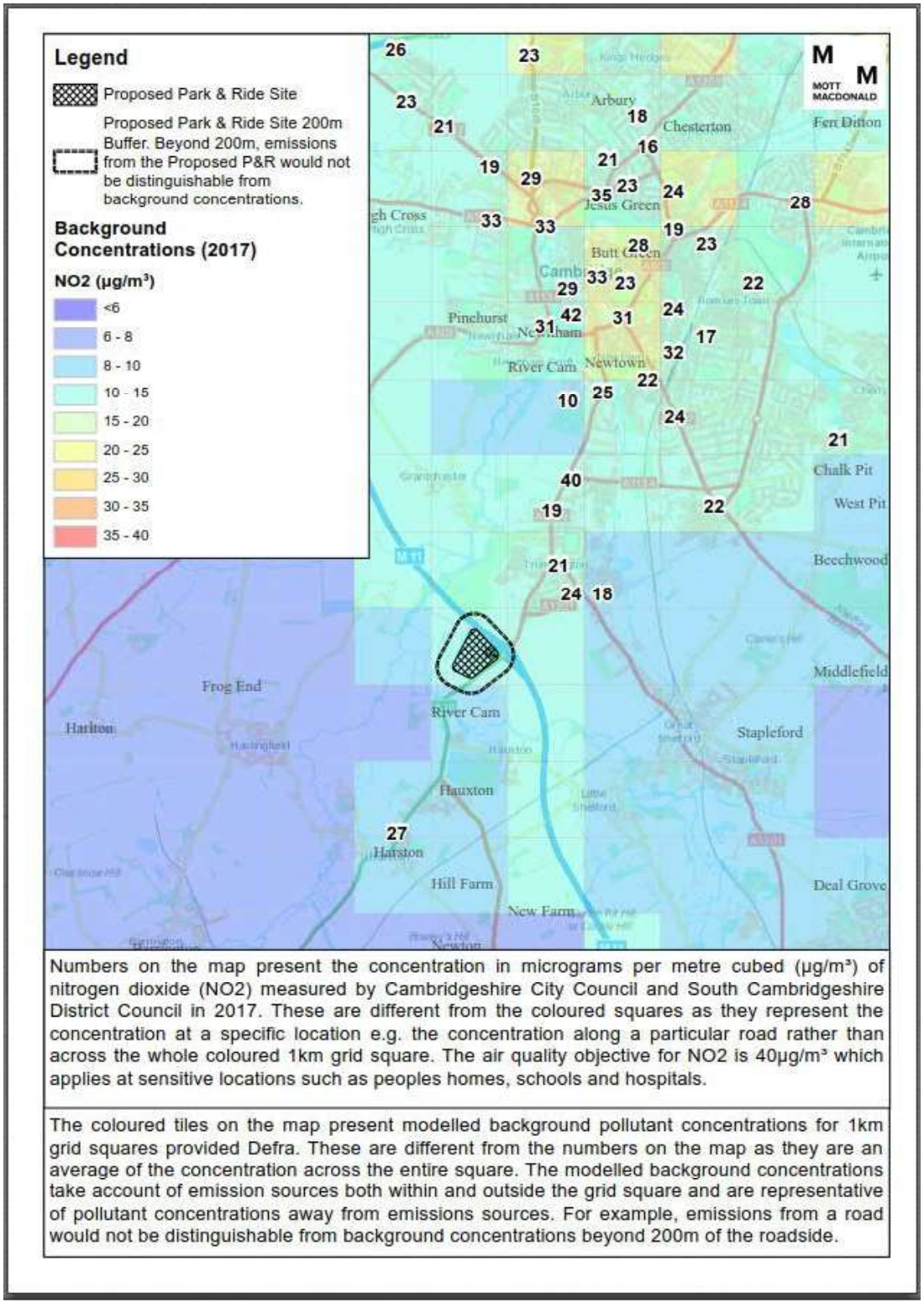


Numbers on the map present the concentration in micrograms per metre cubed (µg/m³) of particualte matter less than 10 microns in diameter (PM10) measured by Cambridgeshire City Council and South Cambridgeshire District Council in 2017. These are different from the coloured squares as they represent the concentration at a specific location e.g. the concentration along a particular road rather than across the whole coloured 1km grid square. The air quality objective for PM10 is 40µg/m³ which applies at sensitive locations such as peoples homes, schools and hospitals.

The coloured tiles on the map present modelled background pollutant concentrations for 1km grid squares provided Defra. These are different from the numbers on the map as they are an average of the concentration across the entire square. The modelled background concentrations take account of emission sources both within and outside the grid square and are representative of pollutant concentrations away from emissions sources. For example, emissions from a road would not be distinguishable from background concentrations beyond 200m of the roadside.

Source: Mott MacDonald

Figure 25: Cambridge South West Park and Ride NO2 Background Concentrations



Numbers on the map present the concentration in micrograms per metre cubed (µg/m³) of nitrogen dioxide (NO2) measured by Cambridgeshire City Council and South Cambridgeshire District Council in 2017. These are different from the coloured squares as they represent the concentration at a specific location e.g. the concentration along a particular road rather than across the whole coloured 1km grid square. The air quality objective for NO2 is 40µg/m³ which applies at sensitive locations such as peoples homes, schools and hospitals.

The coloured tiles on the map present modelled background pollutant concentrations for 1km grid squares provided Defra. These are different from the numbers on the map as they are an average of the concentration across the entire square. The modelled background concentrations take account of emission sources both within and outside the grid square and are representative of pollutant concentrations away from emissions sources. For example, emissions from a road would not be distinguishable from background concentrations beyond 200m of the roadside.

Source: Mott MacDonald

2.4.5.2 Noise

The Trumpington Meadows development adjacent to the existing Trumpington Park and Ride means that additional spaces at this site, and construction works during delivery, would not only increase noise levels at the car park, but also bring those noise levels closer to residences than at present. The new site is considered preferable in terms of noise effects due to the lack of nearby sensitive receptors adjacent to the site.

2.4.5.3 Landscape and Visual Impact

The proposed new Cambridge South West Park and Ride site, whilst located next to a motorway, is situated within the Green Belt area assigned by Cambridge City Council and South Cambridgeshire District Council. The area is thus covered by policies to improve the landscape, specifically focusing on hedge enhancements rather than wider scale re-landscaping of the arable land. The design of the new Park and Ride site would need to align with these policy objectives. In comparison, the existing Trumpington Park and Ride site does not lie in a greenbelt area, potentially making this option more favourable than developing a new Park and Ride site.

Any new Park and Ride site would have some lighting impact in comparison to expanding the existing Trumpington site. This is because the arable land, surrounding the proposed new development, has no lighting. The A10 and M11 are the primary sources of light in the area. A new Park and Ride site would, however, provide good and improved access to Trumpington Meadows Countryside Park. This has potential to encourage more people to access, engage with and benefit from the provision of green space.

2.4.5.4 Historic Environment

The archaeology consultation report suggests the presence of CHER (Cambridgeshire Historic Environment Records) monuments on part of the proposed new Park and Ride site, specifically in quadrant A (ref. MCB20491) [18]. Whilst the report does not suggest archaeological monuments are present elsewhere, due to a lack of investigation undertaken, further heritage records need to be sourced to determine whether other monuments, such as Scheduled Ancient Monuments (SAMs), are situated within the boundaries of the site.

The report also suggests that although no crop marked sites are yet known for the M11 Junction 11 area, the area falls in a zone of archaeological activity and is surrounded by settlement evidence of Prehistoric to early Medieval date. In contrast, no archaeological evidence needs to be considered for the expansion of the existing Trumpington Park and Ride site as proposals involve building upwards rather than excavating more land to build outwards.

2.4.5.5 Biodiversity

The land surrounding the new Cambridge South West Park and Ride site, is all intensively farmed arable fields which suggests a low potential for ecology. Trumpington Meadows Country Park, a nature reserve created for wildlife and people, is located north of the proposed site [19]. There is potential to incorporate mitigation measures into the new site designs to help increase the level of biodiversity immediately adjacent to the country park. This would offset any negative effects of building and operating a new Park and Ride in the area. Moreover, a review of the 2018 MAGIC dataset confirmed there are no designated sites within the area of interest[20]. The

[18] Cambridgeshire City Council (2016). The Western Orbital: Initial ideas for a new bus priority lane in the M11 Cambridge corridor. City Deal Consultation: Archaeology. 5 pages.

[19] The Wildlife Trusts (2012). Trumpington Meadows. Available online at: http://www.wildlifebcn.org/reserves/trumpington-meadows

[20] Natural England (2018). MAGIC. Available online at: http://www.magic.gov.uk/

alternative; the upwards expansion of the Trumpington Park and Ride will have minimal biodiversity impacts.

2.4.5.6 Water Environment/Flooding

According to the Environmental Agency flood maps, the new Cambridge South Park and Ride is located in a Flood Zone 1 area; on land that has a low probability of flooding. The underlying bedrock geology is consistent and the area surrounding the proposed site does not fall within a groundwater protection zone [21]. The proposed new Park and Ride site is also not severed or crossed by surface water features.

2.4.5.7 Townscape

In terms of townscape there is limited comparable differences between expanding the existing Trumpington Park and Ride and implementing a new site. Largely, as the new proposed Park and Ride site is not situated in a town, rather on arable fields, there is no infringement of sightlines and views. In contrast, the upward expansion of the existing site may restrict or hamper the view that new developments will have. Thus, it would seem preferable to construct a new Cambridge South West Park and Ride site.

Issues	Opportunities
• Whilst the results show that the air quality in the area is not a concern, there may be some issues with the emissions discharged from vehicles travelling along the A10 to reach the Cambridge South West Park and Ride site. Further research is needed to determine the extent of these impacts. • Expansion of Trumpington Park and Ride would increase noise levels for nearby residents. • The new site would be constructed on greenbelt land and would cause some lighting impacts, whilst also potentially disturbing archaeological heritage. • The development of a new Park and Ride site may require the effects on biodiversity to be offset.	• Investment in the Cambridge South Park and Ride scheme will encourage a reduction in car use in the city centre, potentially improving air quality levels in the future. • The expansion of Trumpington Park and Ride will alleviate the impacts of building on greenbelt and likely to result in a minimal result impact on biodiversity. • The construction of a new Park and Ride site will inflict less noise disturbance as there are no residents living in close proximity to the proposed site and, as it is understood that design of the new Park and Ride would be landscape-led, impacts on landscape will be minimised. The public may in turn a greater appreciation of green space.

So, what do these strategic issues and opportunities mean for the proposed Cambridge South West Park and Ride scheme?

Increasing pressure is being placed on Cambridgeshire's transport network, particularly in Cambridge itself and the Southern Fringe. Rapid business creation and the ongoing delivery of planned development on a vast scale has rendered the existing transport network inadequate. The Cambridge South West Park and Ride scheme will accommodate increased demand on the network and support the use of sustainable travel modes for the growing number of residents and commuters, both within the area and from further afield, needed to support growth in the highly skilled areas of the biomedical industry. The Cambridge South West Park and Ride scheme in conjunction with other planned transport interventions will also help reduce car reliance and in turn lessen congestion on the A1309, the A10 and the M11; improving both the air quality and the overall attractiveness of travel in the area as a result. This will encourage continued investment enabling additional sustainable strategies/policies to be implemented in the future.

[21] British Geological Survey, 2018 and Environment Agency, 2018

2.5 Transport Issues and Opportunities

The following section provides an overview of the transport issues and opportunities in the study area. Primarily this identifies problems and opportunities regarding how people travel, congestion, existing infrastructure and wider network provision.

2.5.1 How People Travel

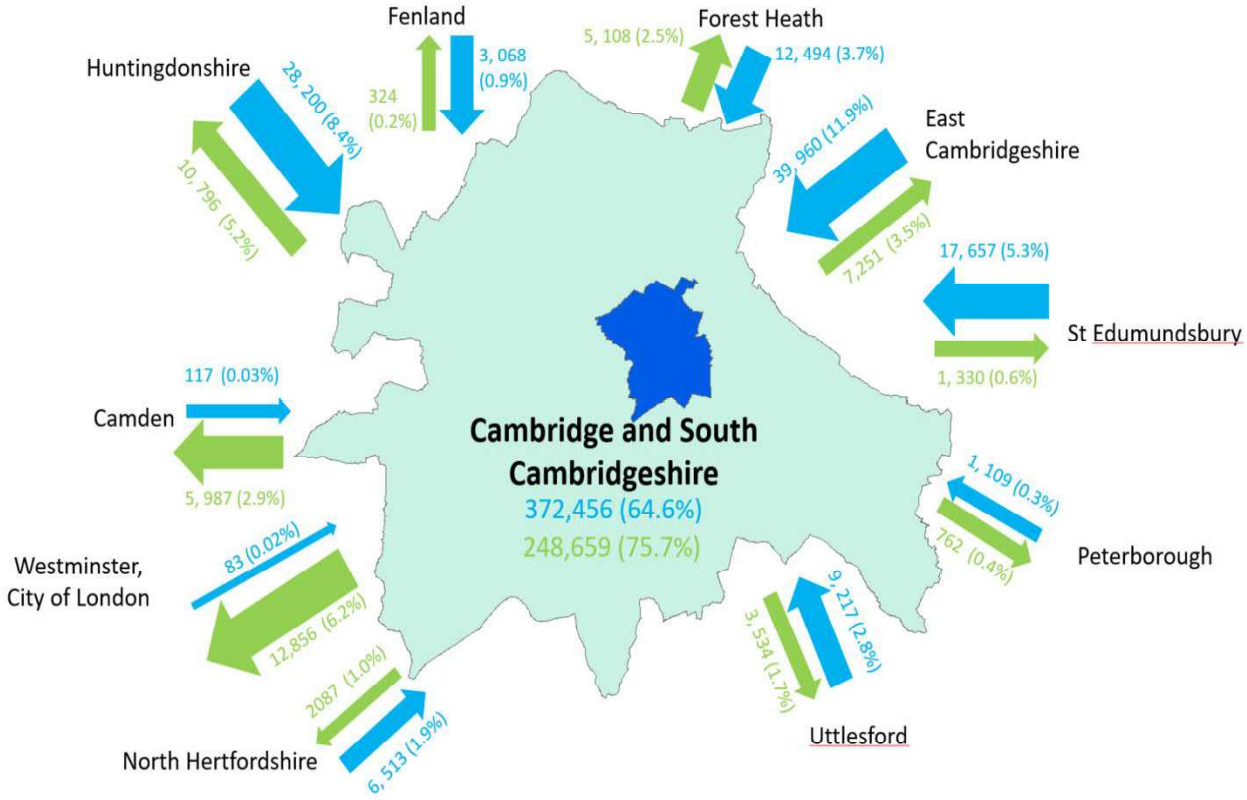
This sub-section explores the travel behaviour of those living/and or working within Cambridge and South Cambridgeshire. Data in this section has been primarily sourced from the Office of National Statistics.

Figure 26 provides an overview of the 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 proportion of outbound flows are to Westminster, City of London and Huntingdonshire, both to the west of Cambridge and South Cambridgeshire.

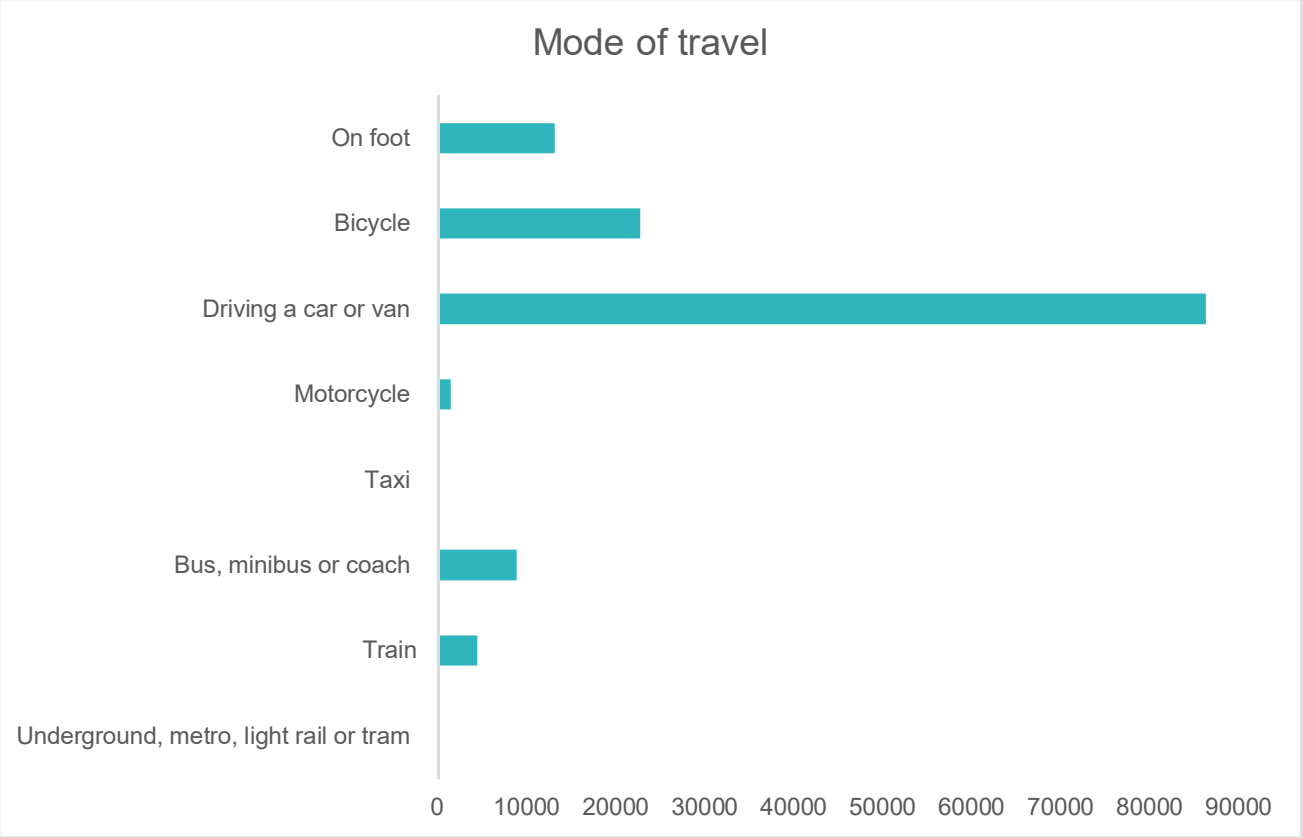
Figure 26: Incoming and Outgoing Commuter Flows



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 connectivity of employment sites crucial to sustaining the necessary workforce. Figure 27 displays the modal split of Cambridge and South Cambridgeshire workforce.

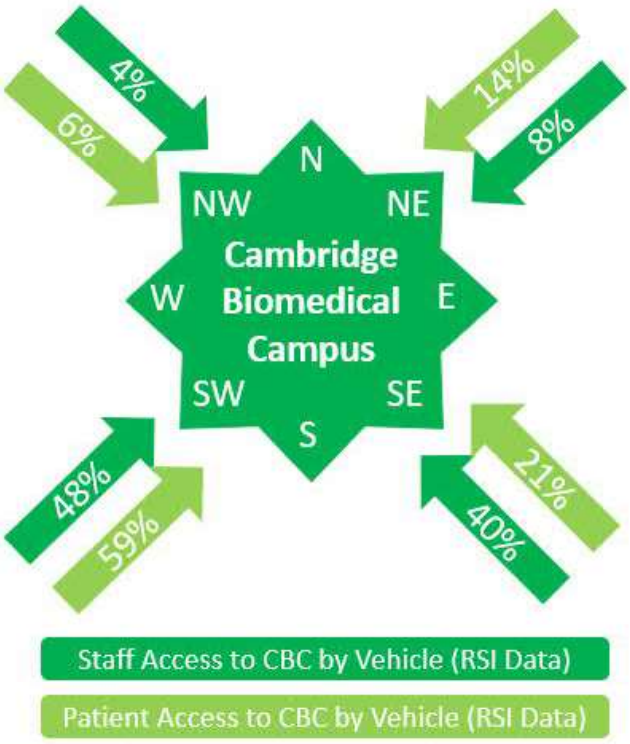
Figure 27: How People Travel



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 commute by car or van, contributing significantly to the congestion experienced across the transport network. In order to reach employment opportunities in the Southern Fringe, including the expanding Cambridge Biomedical Campus, commuters who travel by car from both Huntingdonshire and East Cambridgeshire are likely to use M11 J11 as their access point from the strategic road network. The diagram in Figure 28 shows this through the high percentage of staff and patients travelling from the South West to access the Cambridge Biomedical Campus. The number of inbound commuter flows from M11 J11 causes acute peak time congestion at the junction and along the A10 and A1309 as commuters continue their journey to key employment sites.

Figure 28: Direction of Staff and Patient Access to CBC by Vehicle (RSI Data)



Source: Mott MacDonald and SNC Lavalin, Atkins Cambridge Biomedical Campus Transport Needs Review Part 1 Report (October 2018).

The second most popular mode of transport is bicycle, possibly as a result of the number of people who both live and work in the area, making journeys by bicycle viable and attractive.

Public transport appears to be less favourable for commuters with only a small number of commuters opting for bus or train travel. However, it should be noted that this data was collected before the delivery of the Cambridgeshire Guided Busway which has experienced high levels of patronage, indicating a potential modal shift which is not represented in this data set. Despite this, research from the GCP would suggest that the main reasons people have for not travelling by public transport in Cambridge are speed, reliability and fare price.

Forecast Increase in Private Car Trips

The Southern Fringe, including the Cambridge Biomedical Campus, 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 trips by employees 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. These trips will be added to an already congested road network.

One of the corridors that is forecast to experience the greatest increase in trips to Cambridge is the A10, which will be affected by a 23% increase in trips (2011-2031) to the Cambridge Biomedical Campus and Addenbrooke's Hospital area[24].

The issues and opportunities table summarises the key points presented in this section on how people travel in relation to the Cambridge South West Park and Ride scheme.

Issues	Opportunities
• Cambridge and South Cambridgeshire are net importers of people for work purposes whilst the transport network is not equipped to accommodate this number of inbound commuter flows. • A large proportion of commuters opt for private car travel as their main mode of travel leading to acute congestion and long delays during peak hours. • East Cambridgeshire and Huntingdonshire represent a large proportion of the workforce in Cambridge and South Cambridgeshire. The most logical route to job opportunities in the Southern Fringe and Cambridge Biomedical Campus from both of these locations is via M11 J11, leading to long delays at the junction which extend along the A10 and A1309, directly to key employment locations.	• The proposed Cambridge South West Park and Ride is strategically located to accommodate the high number of vehicles leaving the M11 at J11, intercepting their journeys and providing a more sustainable mode of travel along key routes to employment destinations. • The number of inbound commuters into Cambridge and South Cambridgeshire provides an indication of the significance of the area as a source of employment. Improved accessibility to key employment sites will further support employers and allow them to continue to grow, encouraging further economic growth here. • Increased capacity at the Cambridge South West Park and Ride site will encourage commuters to opt for the multi modal transport option offered by the facility reducing the risk of congestion on the A10 due to the expansion of the Cambridge Biomedical Campus and Addenbrookes Hospital.

2.5.2 Highways Connectivity

The ambitious economic growth proposals within Cambridgeshire, especially within the Southern Fringe, and the scale and type of growth taking place, necessitates improving the existing transport infrastructure. Congestion and transport network capacity issues will need to be addressed to ensure that they do not become constraints to economic growth, and to keep the city connected as it expands.

A range of existing and future transport problems, which have the potential to constrain economic growth within the Southern Fringe in particular, have been identified and are summarised in this sub-section:

- Congestion along the A1309 Hauxton Rd, which connects the Biomedical Campus to the M11 at Junction 11 and the A1309 High Street/Trumpington Road corridor.
- Congestion at M11 Junction 11, particularly in the AM peak, including the A10 approach through Harston and Hauxton.
- Higher private car mode share for journeys from the south and south-west via the M11 and A10.
- Significant increase in private car trips forecast as result of rapid growth.
- The existing Trumpington Park and Ride has insufficient capacity to cater for employment growth at Cambridge Biomedical Campus.
- Park and Ride buses, and other bus services, are caught in congestion along the A1309 into the city centre.

Congestion along the A1309 Hauxton Road and High Street/Trumpington Road

The A1309 connects the A10 and M11 (at Junction 11) to the Southern Fringe, including Cambridge Biomedical Campus, and onward via the A1134 to Cambridge city centre. Currently the A1309 is congested, with an Annual Average Daily Flow (AADF) of more than 24,000

vehicles and average speeds of less than 10mph on multiple road segments for traffic travelling northbound during the morning (AM) peak period and southbound during the evening (PM) peak period[22]. The A1309 is the most congested of the three main routes that connect the M11 into central Cambridge.

Other than rail services, which by their nature serve a limited number of places (and currently do not serve the Southern Fringe directly), there is limited public transport connecting settlements along the A10 and M11 corridors to the Southern Fringe and Cambridge city centre.

Congestion at M11 J11

Journey to work data for commuters into Cambridge from surrounding areas[23] demonstrates that the car is the dominant mode, reaching 80-90% mode share from some areas. Automatic Traffic Counter (ATC) data provided by the Department for Transport (DfT) indicates that there was a 30% increase in the number of vehicles counted at M11 Junction 11 between 2012 and 2016. As a result, peak period congestion is a significant problem for Cambridge, especially at M11 Junction 11, and particularly during the morning (AM) peak period. This is exemplified through the M11 southbound off-slip, where on average vehicles travel between 10-20 mph during the AM peak periods. Junction 11 is a critical pinch point where two main corridors, the M11 and A10, join.

The congestion issues that already exist around M11 Junction 11 and north-east to the Cambridge Biomedical Campus are concerning, as this will almost certainly be exacerbated by continued employment growth. The sustainable transport offer will need to be increased considerably to mitigate this issue and to prevent congestion becoming a constraint to economic growth.

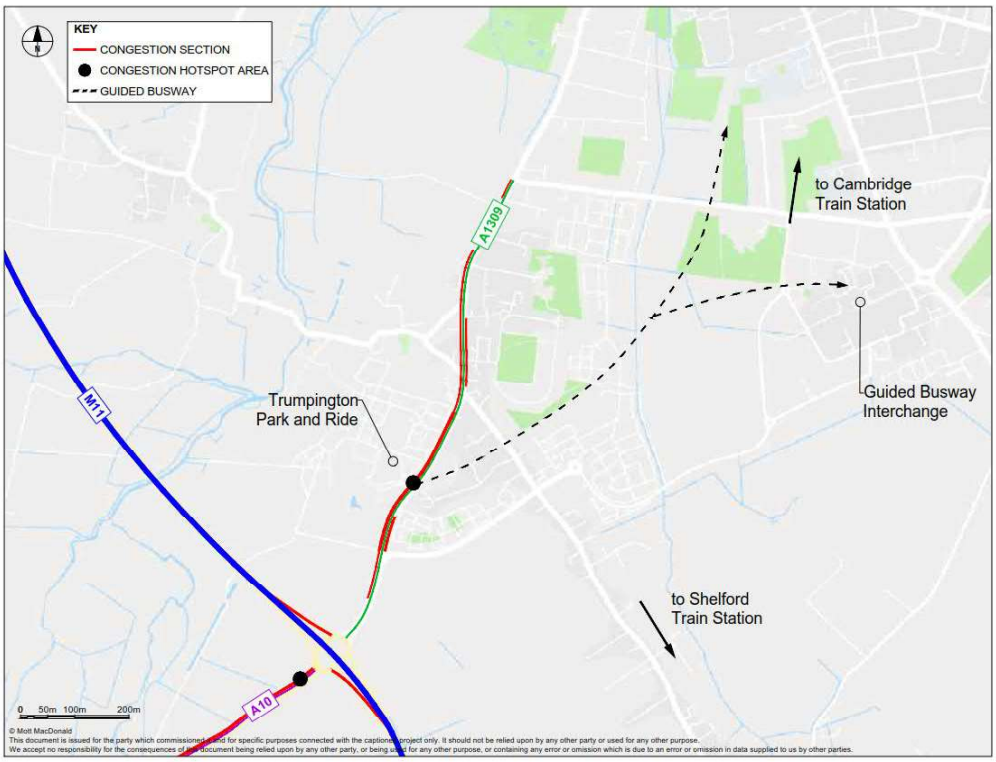
The congestion and delays are exacerbated closer to Cambridge but begin on the periphery. According to Trafficmaster data, the A10 to the south-west of the M11 experiences delays of approximately 16 minutes in the morning peak hour, affecting villages such as Harston and Hauxton[24]. The congestion impacts discussed in this section are shown in Figure 29.

[22] 2015 Western Orbital Study Options Report – Trafficmaster Data

[23] Census 2011

[24] 2015 Western Orbital Study Options Report

Figure 29: Congestion Levels



Source: Mott MacDonald

To summarise, congestion is a major problem which threatens the liveability and attractiveness of Cambridge and the wider region to residents, employees and visitors. The impact of congestion is so significant that the Cambridgeshire and Peterborough Independent Economic Review (CPIER) suggests the future economic growth prospects of Greater Cambridge could be threatened by the insufficient level of transport infrastructure investments that have occurred to date. With the 2011 employment figures for Greater Cambridge expected to increase 30% by 2031, it is important to recognise that an additional 26,000 commuting trips would then need to be accommodated on the road network. A fact which is accurate, if all new workers adopt the same travel behaviours as today. Thus, public transport investments in the short-medium term, such as the Cambridgeshire Park and Ride scheme, are vital if Cambridge is to deliver its future growth aspirations and achieve a 24% reduction in car use by 2030.[25][26]

The issues and opportunities table summarises the key points presented in this section on highways connectivity in relation to the Cambridge South West Park and Ride.

Issues	Opportunities
• Many of Cambridge's key access routes are heavily congested, particularly during peak periods. • Delay and unreliable journey times are common across many key routes to major employment sites and Cambridge City Centre.	• Capacity improvements at M11 J11 will relieve pressure during peak times and accommodate increased demand associated with developments in the area. • Reduced congestion due to a decrease in private car travel could improve journey time reliability and

[25] CPIER Final Report, September 2018

[26] GCP City Access and Bus Service Improvements Update, November 2018,

Issues	Opportunities
• Car is the dominant mode of travel for commuters, adding increased pressure to an ill-equipped transport network. • There are a limited number of alternate modes of transport for commuters. • Congestion issues in the Southern fringe and Cambridge will be exacerbated by the rate of development in the surrounding area.	reduce greenhouse gas emissions due to stop start traffic. • Priority measures along the A1309 could reduce travel times for buses, making bus travel to key employment sites more attractive to commuters. • Potential for enhanced capacity and reduced congestion following the M11 J8 to J14 Smart Motorway upgrade.

2.5.3 Trumpington Park and Ride

Capacity at Existing Trumpington Park and Ride

Parking availability at the existing 1385-space Park and Ride site at Trumpington is constrained and has reached capacity as the Southern Fringe continues to develop. In 2017 the existing Park and Ride at Trumpington was reported to be at 80-85% capacity (on average) and it is generally considered that a car park is operationally approaching capacity when the level of occupancy is at 85-90%. Anecdotal evidence suggests that the site is regularly operating at greater than 90% occupancy, reaching 100% occupancy more frequently in 2018.

The existing Trumpington Park and Ride can be seen in Figure 30. The extent of the capacity issue here is clearly demonstrated in this image.

Figure 30: Trumpington Park and Ride

Source: Mott MacDonald

Whilst, therefore, additional parking at the existing Trumpington Park and Ride site may be needed, enhanced capacity could also be provided through the development of the Cambridge South West Park and Ride facility.

By increasing capacity and providing more Park and Ride spaces the GCP aims to:

- Address congestion
- Improve air quality
- Provide access to opportunity
- Improve quality of life
- Support employers and;
- Facilitate sustainable development

Future Growth of Park and Ride

The Greater Cambridge Partnership commissioned Skanska and Atkins in 2017 to test different scenarios, using the Cambridgeshire Sub-Regional Model (CSRM), to understand how Park and Ride usage would increase in the future. The tests considered whether the existing Trumpington Park and Ride could support future demand[27]. This work has been refined by Mott MacDonald in 2018, also using the CSRM, reaching similar conclusions.

Demand forecasts are summarised in Table 16. The Local Plan levels of development (previously referred to as 'Medium Growth') and Local Plan levels of development plus City Access Penalty capacity restraint measures (CAP) in place, (previously referred to as 'High Growth') have been used. Previous work undertaken by Atkins had also identified a 'Low' demand scenario, limited to Local Plan levels of development only. However, recent work led by the Cambridgeshire and Peterborough Independent Economic Commission has suggested that actual employment growth is running higher than the Local Plan trajectory[28]. The 'Low' demand scenario is therefore already being exceeded and is no longer considered to be relevant.

Table 16: Trumpington Park and Ride Forecast Demand Summary

Year	Local Plan Levels of Development (Medium Growth)	Local Plan Levels of Development with CAP (High Growth)
2022	1,825	2,194
2027	2,049	3,034
2031	2,274	3,874

Source: Mott MacDonald

Taking into account the existing 1,385 spaces at Trumpington, the demand forecasts suggest that approximately 800-900 additional spaces would be required by 2031 to accommodate additional users of the Park and Ride site under the 'Medium' demand scenario. Further expansion would be required, up to almost 2,500 spaces, to cater for the 'High' demand scenario.

Although approximately 274 new spaces are proposed as part of an existing surface level expansion project at Trumpington, the existing site would not be able to accommodate the

[27] Trumpington Park & Ride Assessment Report (2017)

[28] Cambridge & Peterborough Independent Economic Review – Interim Report May 2018

additional 'Medium' demand without major expansion. Due to land availability constraints (with the Park and Ride due to be surrounded by development within the next five years), a multi-storey solution (whether above or below ground) would be required. A new site would be required to cater for 'High' demand as it would not be physically possible to provide a further 2,500 spaces at the existing site.

Onward Journeys from Trumpington Park and Ride

The popularity of the existing Trumpington Park and Ride facility is largely a result of its advantageous location within the strategic transport network and the sites connectivity to efficient onward journeys.

At present there is a dedicated onward on-road bus service from the existing Trumpington Park and Ride site to the city centre and two services along the guided bus busway to Cambridge Central station one of which serves the CBC and Addenbrookes Hospital and one of which is direct to Central Station. These routes are shown in Figure 31.

Figure 31: Bus Routes from Trumpington Park and Ride

Source: Mott MacDonald

Bus Frequency and Journey Times

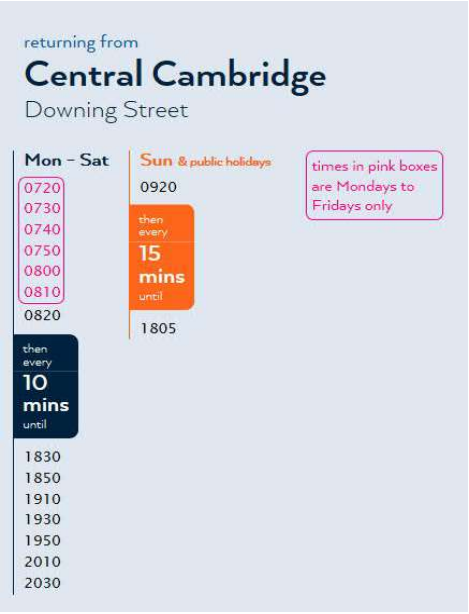
Bus services from the existing Trumpington Park and Ride site to Downing Street in the city centre are frequent and operate seven days a week, including public holidays.

Bus timetables to and from Trumpington Park and Ride to the city centre are provided in Figure 32 and Figure 33.

Figure 32: Departures from Trumpington Park and Ride

Source: cambirdgeparkandride.info

Figure 33: Return Journeys from Central Cambridge



Source: cambridgeparkandride.info

Weekday services from Trumpington Park and Ride, along the guided busway via Addenbrookes hospital to Cambridge Central Station commence from the Park and Ride Facility at 05.49 and run every 15 minutes throughout the day after 06.49, with more frequent services during peak hours. The last service departs Trumpington Park and ride at 20.30. Services in the opposite direction, starting at Cambridge Central Station commence at 05.59 on weekdays and also run every 15 minutes throughout the day after 06.51, again with more frequent services during peak hours. The last service to depart Cambridge Central Station for Trumpington Park and Ride is 20.44. Bus routings, frequency and journey times during the weekday are summarised in Table 17.

Table 17: Summary of Bus Services

Service	Destination	Route	Single Distance (km)	Journey Time (mins)	Service Frequency (mins)	Buses per Hour
Trumpington Park and Ride	Downing Street	via Trumpington	4.7	15	10	6
A	Cambridge Station	via busway and Addenbrooke's	3.7	17	20	3
R	Cambridge Station	via busway weekday peaks only	3.9	9	15	4
Total						13

Source: Mott MacDonald

Saturday services from the Park and Ride all go via Addenbrookes Hospital to Cambridge Central Station and begin at 06.58 with a half hourly service until 08.28. After this a more frequent 15-minute frequency services starts. This continues until 18.28, when the service becomes less frequent, with the last departure at 20.17. Saturday services in the opposite direction commence at 07.06 from Cambridge Central Station and follow a similar pattern with the last service departing at 19.59. Journey times vary between 17 and 20 minutes. There is no Sunday service in operation.

As Trumpington Park and Ride is already at capacity, the impact of increased parking capacity either at the existing site or at a new location, on onward services must be considered, to ensure they are able to accommodate the inevitable increased demand associated with the new Park and Ride.

Bus Journey Time Reliability

The journey time of the Park and Ride bus service is an important determinant of how many people choose to use the facility, particularly if there are other factors involved such as walking time to destination or cost of parking. Although the average bus journey time in to the city centre in free-flowing traffic is 15 minutes, at peak times delays in excess of 4 minutes have been recorded along certain sections of the route.

Park and Ride Pricing

The fares charged for Park and Ride Services are at the discretion of the operator and currently they are:

- £3 return to city centre with up to three children free and use of all Park and Ride buses (but only once from a Park and Ride site);
- £8.50 group return ticket (up to five people);
- £13.50 per week for all Park and Ride services;
- £14.50 per week or £56 per month for all Park and Ride and Stagecoach buses;
- Concessionary passes valid after 9.30 on weekdays and all day at weekends. [29]

[29] http://www.cambridgeparkandride.info/pricing.shtml#ride

No charge is made for parking at the Trumpington Park and Ride at present as a result of an experimental period where drivers were charged £1 which resulted in a reduction in demand for the facility.

The issues and opportunities table summarises they key points presented in this section on the existing Trumpington Park and Ride in relation to the proposed Cambridge South West Park and Ride.

Issues	Opportunities
• Current demand at the existing Trumpington Park and Ride site is exceeding capacity, causing users to opt for private car travel directly to their destination or wasting time circling the car park until a space becomes available. • Demand forecasts indicate that the current problem will be worsened by the level of development in the Southern Fringe, Cambridge Biomedical Campus and Cambridge City Centre. • An efficient onward service from Trumpington Park and Ride is provided by a dedicated bus service and connecting service to the Cambridgeshire Guided Busway. However, the service is not being used to its full potential as users are unable to park at the facility.	• Increased parking capacity could encourage commuters to use the facility, reducing private car trips on key routes. • Priority measures along the A1309 could improve journey times of the onward bus service, improving the attractiveness of this sustainable mode to commuters. • Additional parking capacity at the Cambridge South West Park and Ride site would accommodate the demand created by ongoing development in the surrounding area, encouraging further investment and supporting the economic growth of the area.

2.5.4 Wider Network Provision

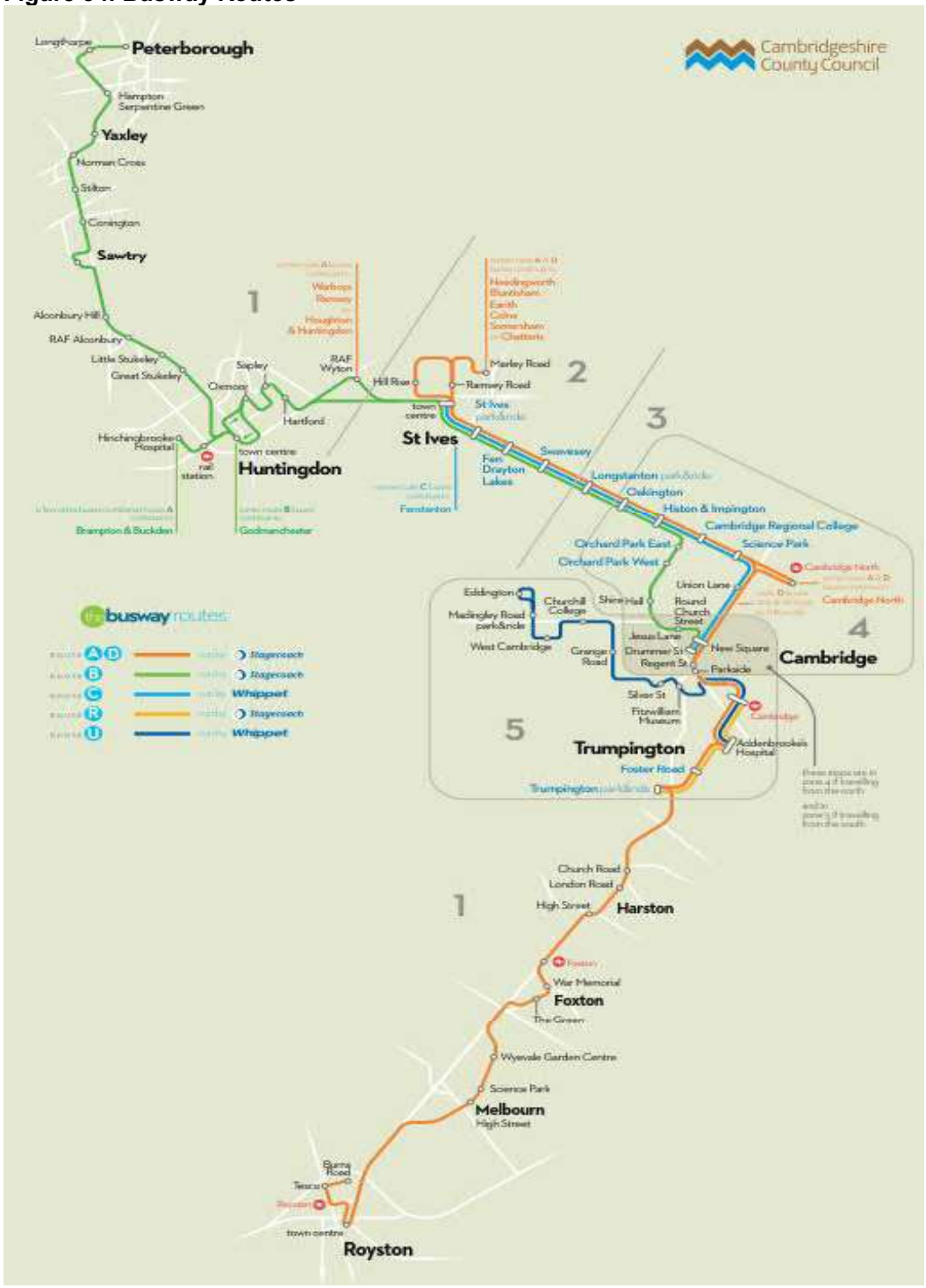
Whilst the scheme to expand Park and Ride provision is primarily focused on supporting growth in the southern fringe and particularly around the Cambridge Biomedical Campus, it is also worth noting that there are existing and potential users of the Park and Ride facilities who live further afield that will wish to continue their journey onward into central Cambridge. In this context it is worthwhile considering what alternative transport choices are available for journeys destined for central Cambridge from further afield. This section reviews bus, train and active travel options into both central Cambridge and the southern fringe taking into account suitable distances and travel times for these modes.

Existing Bus Connectivity

Cambridgeshire's bus network is primarily composed of a wide-reaching traditional bus network named 'Citi buses', and 'The Busway', Cambridgeshire's new Guided Busway, which connects to Trumpington Park and Ride. The total coverage of these two complementary networks can be seen in Figure 36 along with railway connections.

Cambridgeshire's Guided Busway provides coverage from Royston to the south of Cambridge, up to Peterborough to the north of Cambridge. The six routes covered by "The Busway" can be seen in Figure 34 and those covered by "Citi buses in Figure 35.

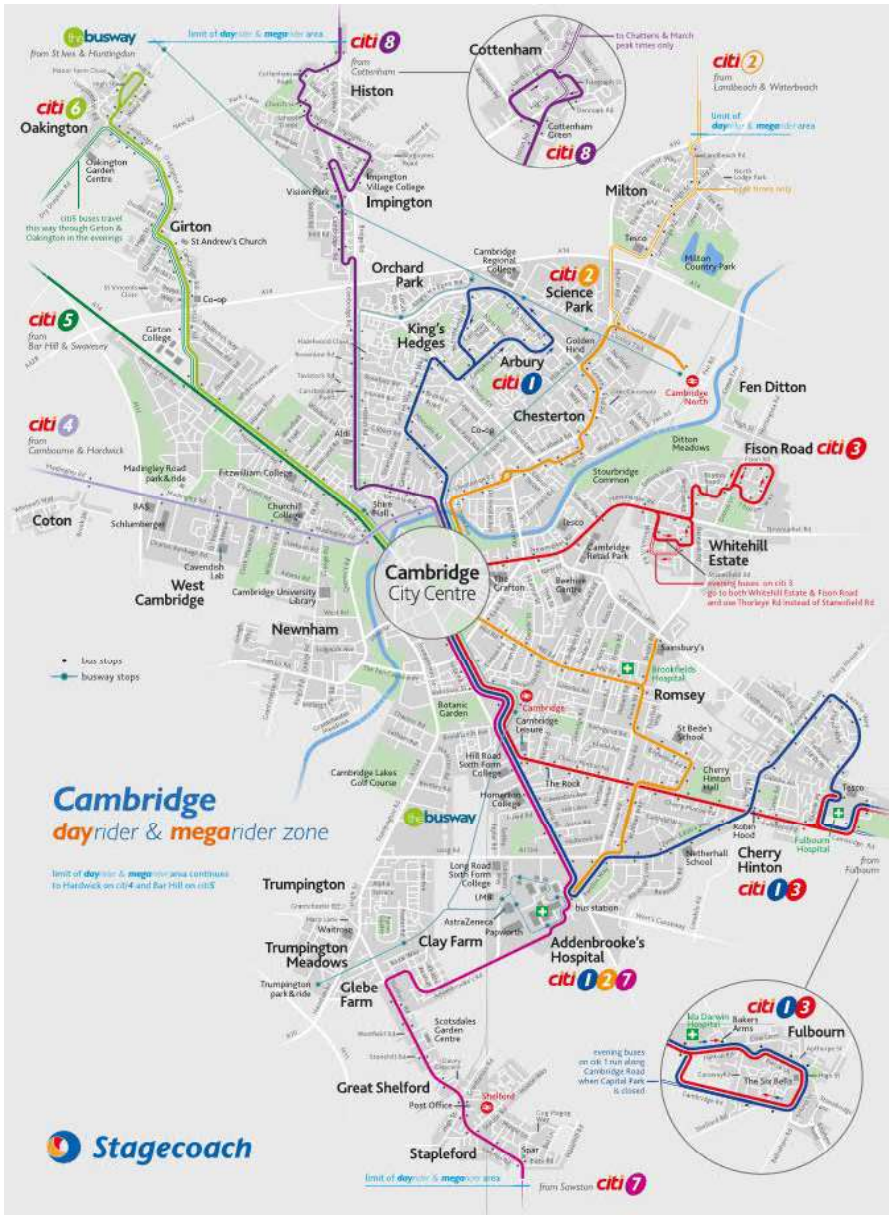
Figure 34: Busway Routes



Source: Cambridgeshire County Council

Four guided bus routes, A, D, R, U serve areas in the Southern Fringe. A direct bus runs between Cambridge City Centre and employment sites in the Southern Fringe, providing an efficient link between the two economic hubs.

Figure 35: Citi Bus Services



Source: Cambridgeshire.gov.uk

The provision and integration of Citi Buses and the Busway provides users with a frequent and all-encompassing public transport service within Greater Cambridge. However, congestion across key routes increases journey times for bus services, particularly during peak times. Lengthy and unreliable journey times discourage commuters from opting to travel by bus.

Furthermore, whilst bus coverage is adequate across Greater Cambridge, as established in previous sections, a large proportion of the workforce here do not originate from the immediate

area, Cambridgeshire's workforce travels lengthy distances for employment opportunities. Thus, the attractiveness of public transport is further restricted by the inefficiency of interchanges between the different transport modes required to travel from key locations in the region.

Potential Future Bus Connectivity

The proposed Cambridge South West Park and Ride scheme could potentially be regarded as a destination for bus services from various smaller settlements that currently terminate in the city centre. This offers the advantage of direct and frequent services between several destinations and the Park and Ride site to connect with a range of rural services. In doing so, the least predictable part of the journey into central Cambridge is avoided which saves time and cost for operators and more certainty of journey times for users. The disadvantage for passengers would be the transfer at the Park and Ride site but there is a potential journey time saving and the facilities (secure waiting area, information, etc.) may compensate for the inconvenience. Transfer from one service to another can be improved if there is a guaranteed connection. Alternatively, depending on the type of buses used for the rural services, they could use the busway also.

Possible services that could be diverted to or terminate at the proposed Park and Ride include:

- 15 Royston, Bassingbourne, Haslingfield (one journey each way on Wednesdays only – operated by CG Myall &Son) could be extended;
- 26 Royston to Cambridge (Mondays to Saturdays – Stagecoach); and
- 31 Fowlmere, Hauxton to Addenbrooke's (four journeys per day Mondays to Saturdays and one to Drummer Street from Barley – Whippet).

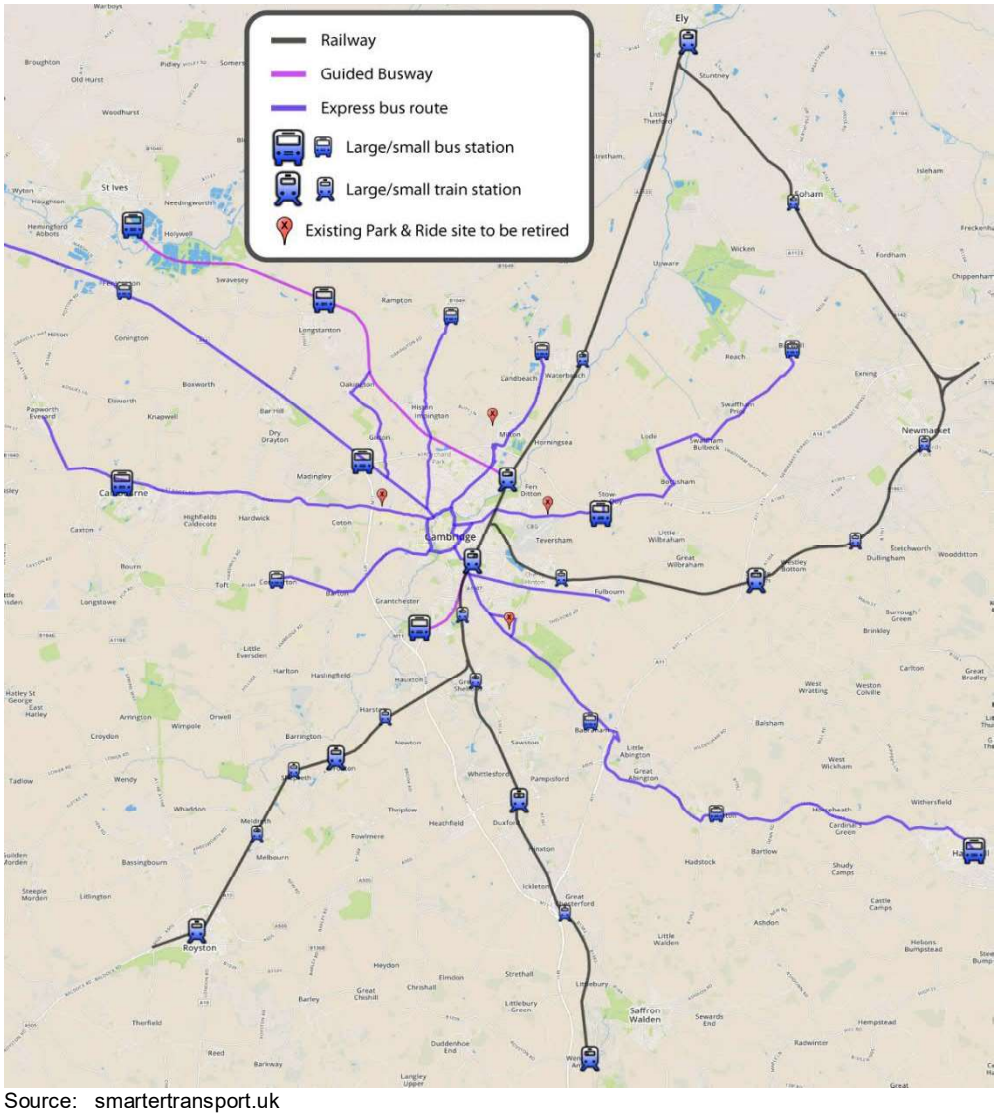
Terminating these services at the proposed Park and Ride site would be beneficial if users can transfer to direct and rapid busway services, although these would need to go beyond Cambridge rail station to the city centre to accommodate passengers working in or visiting the centre.

Issues	Opportunities
• Bus journey times between South Cambridge and central Cambridge are lengthy and unreliable. • Transport interchanges are inefficient, lengthening journey times undertaken by public transport. • Connectivity outside of Greater Cambridge is limited, discouraging large numbers of commuters from opting to use public transport as their main mode of travel. • A number of journeys into Cambridge and South Cambridgeshire are being undertaken by car due to a lack of alternative options.	• Park and Ride offers an attractive alternative to commuters travelling from further afield. • Reduced bus travel times between the Southern Fringe and Cambridge City Centre will encourage users to opt for bus travel for the final leg of their journey. • The Cambridge South West proposed site is excellently positioned to intercept some of the most popular work journeys. Reducing the number of cars travelling into the City Centre and a replacing car travel with a more sustainable modal option. • Potential for an interchange with rural services.

Train Connectivity

Train provision in the Southern Fringe is poor. Journeys to key attractors in the southern fringe cannot be completed solely by train, all journeys must incorporate a second mode of transport to reach the intended destination, making journey times excessive for many commuters. Figure 36 illustrates the train network across Cambridgeshire. Guided busway routes are also overlaid to demonstrate the coverage provided by both modes of transport.

Figure 36: Cambridgeshire's Public Transport Network



Source: smartertransport.uk

Cambridge Biomedical Campus and the surrounding employment sites in the Southern Fringe are approximately 1.8 miles from Cambridge Central Rail Station and 2.0 miles from Shelford Rail Station. The Cambridgeshire Guided Busway provides an onward service from Cambridge Central to key employment sites in the South of Cambridge, including Cambridge Biomedical Campus. Further details on the bus provision within the study area can be found in this sub section.

No direct onward service from Shelford Rail Station is provided, the most logical option of onward travel is by foot. However, footpaths along this route are fragmented in parts and some sections of the route require walking along the road, making the route unattractive and unsafe for pedestrians.

As outlined in Section 2.4.1 a large proportion of Cambridge and South Cambridgeshire's workforce reside outside of the area and commute in for employment. Access and egress from employment sites is crucial to maintaining an adequate workforce. However, many areas which

provide high numbers of employees are poorly connected to Cambridge and South Cambridgeshire by public transport. As a result, a high proportion of commuters opt for private car travel as opposed to enduring excessive journey times and poor connections via public transport, which is further discussed in Section 2.5.1.

Table 18 compares approximate journey times for popular work trips by car and by public transport.

Table 18: Comparison of Public Transport (PT) vs Car Journey in Cambridgeshire (time in hours/mins)

From▼ To►	East Cambridgeshire		Huntingdonshire		St. Edmunds Bury		Forest Heath		Uttlesford	
Mode of Travel	*Car*	*PT*	*Car*	*PT*	*Car*	*PT*	*Car*	*PT*	*Car*	*PT*
Cambridgeshire's Southern Fringe	40m	1h15m	33m	1h29m	42m	1h46m	44m	2h42m	24m	1h28m

Source: Mott MacDonald (Using National Rail & Google Maps API)

In each example journeys undertaken by public transport take much longer than those undertaken by car, despite the current issues with congestion across key access routes to the Southern Fringe. As a result, there is little incentive for commuters to travel by public transport as oppose to travelling by car.

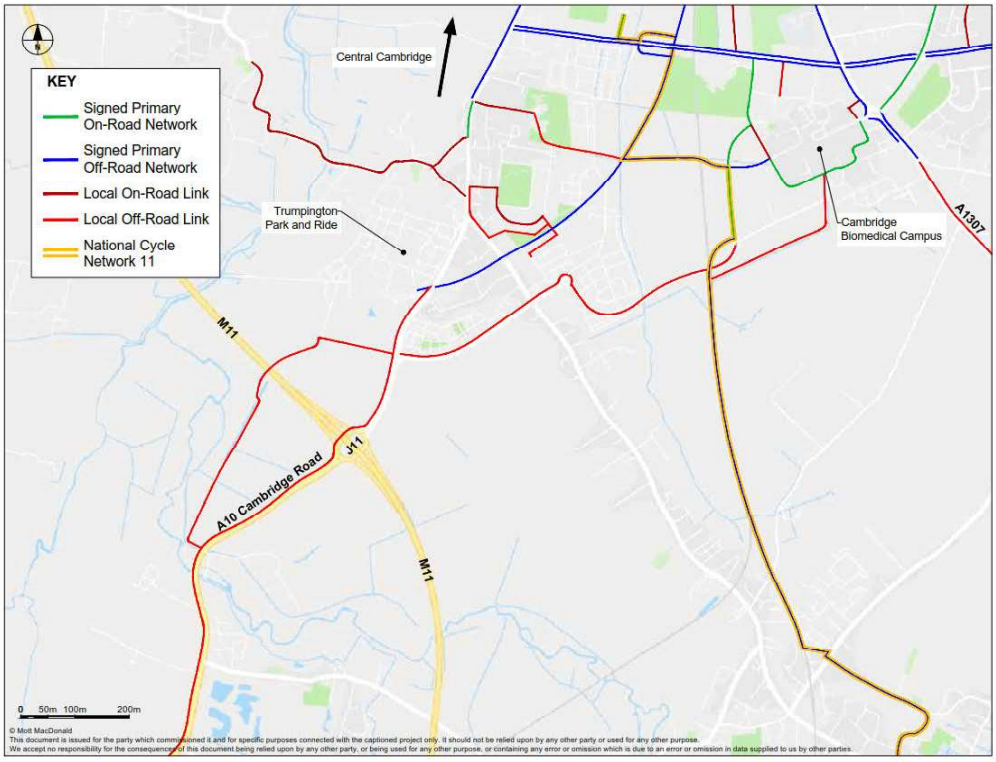
Issues	Opportunities
• Journeys undertaken by public transport are significantly longer than the same journeys undertaken by car. • Cambridgeshire's Southern Fringe is detached from the rail network, making strategic journeys timely and inconvenient for those wishing to use public transport for journeys from southern Cambridge further afield.	• The proposed Cambridge South West Park and Ride scheme will improve Cambridgeshire's public transport offer by the provision of additional buses. Again, reducing reliance on private car travel.

Cycle Connectivity

The existing Trumpington Park and Ride site and proposed Cambridge South West Park and Ride site are well connected to active travel routes, providing an attractive multi modal option for users.

Cycling presents a healthy, affordable and active mode of transport. Cycling is effective for travelling distances under 5km and provides users with greater personal mobility to access locations which are not covered by traditional public transport. Cambridge City Centre can be easily reached by cycling as both Trumpington and Cambridge South West Park and Ride sites are located less than 5km away. Figure 37 provides a cycle map of the study area.

Figure 37: Cycle Routes around the Trumpington and Proposed Cambridge South West Park and Ride Sites.



Source: Mott MacDonald

Several key employment sites are under 5km from the existing Trumpington Park and Ride site and the proposed Cambridge South West Park and Ride site, including the Cambridge Biomedical Campus. Existing segregated and unsegregated cycle routes provide a viable route from the Park and Ride site. In addition to existing cycle routes, Cambridgeshire's Transport Investment Plan proposes several schemes which will improve cycle connectivity between the Cambridge South West Park and Ride site and key employment locations. This includes a new bridge over the M11, which will ensure a safe and holistic cycle route for users. Cycle hire could also be installed at the Trumpington and Cambridge South West Park and Ride sites. With the potential to be offered through an extension of the Ofo bike sharing scheme, people would be equipped to access employment sites without having to worry about the security of their bike.

Existing and future commuters on the A10 or M11 travelling to the Southern Fringe may not have a sustainable form of transport for their entire journey, however by using the facilities at the Park and Ride it is possible to encourage use of a sustainable form of transport for the final leg of the journey. Park and Ride provision has proved successful across Cambridge, most notably at Babraham Road Park and Ride, reducing the strain on key road corridors.

Pedestrian Connectivity

Aside from the cycling provision around Trumpington Park and Ride, it is also important to note alternative active travel routes, which are less than 2km in length, and thus suitable for pedestrians. From Trumpington Park and Ride to the Cambridge Biomedical Campus there is a pedestrian route along the Cambridge Guided Busway. Whilst this footway is well utilised during

peak periods and accessible with even surfacing throughout, the lighting provision is much more intermittent. This, in addition to the segregation of the route from the rest of the transport network, discourages some pedestrians from wanting to use the route during quieter times of the day due to concerns for personal safety. While some people accessing the Cambridge Biomedical Campus are prepared to walk approximately 30 minutes from within the surrounding 2,620m walking catchment, if the pedestrian infrastructure is good quality, the limited lighting provision is a potential barrier in encouraging people to travel by active and sustainable transport options. This is highlighted by the fact that presently only 3% of all staff and 1% of patients walk to the Cambridge Biomedical Campus.

The GCP recognise the need to improve the active travel provision, particularly to key employment sites, in Cambridge and South Cambridgeshire to lessen the perception that 'cycling and walking is all too often an unsafe, inconvenient or unpleasant experience'.

The issues and opportunities table captures the key points of the section for the Cambridge South West Park and Ride scheme in relation to the areas cycling and pedestrian provision.

Issues	Opportunities
• Parking facilities in the study area are inadequate and may deter users from adopting a multi modal journey which would utilise existing cycle infrastructure. • Many commuters are travelling distances which are unconducive to cycling. Without adequate Park and Ride facilities, individuals are opting for private car travel for the duration of their journey causing heavily congested routes in the study area. • The condition of the footpaths along with concern for personal safety discourages pedestrians from choosing to travel by active travel modes.	• Increased cycle storage capacity as a result of the Cambridge South West Park and Ride scheme could encourage cyclists who live further afield and are unable to adopt cycling as their main mode of transport to adopt a multi modal journey, where they drive to the Park and Ride and then cycle for the final leg of the journey. This multi modal journey will provide a high level of personal mobility whilst still reducing congestion in Cambridge city centre. • Improving the attractiveness of active travel routes whilst ensuring footpaths are well-lit might help encourage more pedestrians to live closer to employment sites and walk to work.

So, what does this mean for the Cambridge South West Park and Ride scheme?

The proposed Cambridge South West Park and Ride scheme will provide the additional capacity to accommodate the overflow from the existing Trumpington Park and Ride whilst also encouraging increased use of sustainable transport modes. Whilst the car is the dominant transport mode, the strategic location of the proposed Cambridge South West Park and Ride site will help intercept the large volume of cars leaving the M11 at J11 and encourage drivers to travel by public transport for the rest of their journey. The additional Park and Ride capacity provided by the Cambridge South West scheme will help lessen the problem of cars over-spilling and parking elsewhere and will also enable the Cambridge Guided Busway to be utilised to its full potential. This is because if traffic congestion is reduced, improving the reliability and journey times of Park and Ride and public transport services, more commuters will opt to travel to work by bus.

2.6 Impact of Not Changing

Taking into account the current opportunities, aspirations and issues (and without further significant investment in public transport infrastructure within the Southern Fringe and Cambridge Biomedical Campus area), the following impacts are likely:

- Increased levels of highway congestion at M11 Junction 11, and local routes throughout the Southern Fringe, specifically on the A1309 Hauxton Road/High Street/Trumpington Road corridor and on the A10 approach to Junction 11 through Harston and Hauxton for longer periods of the day. Increased congestion will constrain the connectivity of the Cambridge Biomedical Campus, upon which its success is founded.

  Addressed by scheme objectives 1.i, 1.ii, and 1.iii and GCP transport objectives 1 and 2.

- Accessibility problems for employees and residents in the Southern Fringe due to highway congestion, constrained parking availability and indirect public transport journeys. These accessibility problems have the potential to become a real constraint to economic growth within the Cambridge Biomedical Campus.

  Addressed by scheme objectives 1.i, 1.ii,1.iii, and 2.ii and GCP transport objectives 1 and 2.

- Increase in private car mode share due to increased development and the number of trips generated, especially those originating from the south and south-west, further increasing congestion.

  Addressed by scheme objective 2.i, which seeks to increase the sustainable transport mode share and GCP transport objective 1 which seeks to make it easier for people to travel by more sustainable modes of transport.

- Increase in public transport journey times and reduction in reliability due to congestion, making public transport and Park and Ride comparatively less attractive.

  Addressed by scheme objective 2.iii, which deals with the need to reduce public transport journey times along the A1309 corridor and GCP transport objective 1 which seeks to ease congestion and make public transport more attractive.

- Existing Park and Ride facility at Trumpington reaching full capacity and therefore unable to accommodate any new users. This will lead to overspill parking problems in the local area, at the Biomedical Campus and in the City Centre. An inability to use the Park and Ride would also act as a disincentive for highly skilled workers choosing to work in Cambridge.

  Addressed by scheme objective 2.ii, which seeks to increase Park and Ride capacity.

- An increase in the area's population and economic growth will outpace the evolution of transport infrastructure causing growth of the economy to stagnate and possibly move into a period of decline.

  Addressed by scheme objectives 1i, ii,iii and 2.ii which seek to deliver the capacity necessary to reduce congestion and accommodate future demand. The detrimental economic impact of not changing is also addressed by GCP transport objective 1 which seeks to improve connectivity to the strategic transport network.

- Transport infrastructure will prove unable to cope with the rate of planned development in the Southern Fringe and Cambridge Biomedical Campus area, forcing plans to be left unfulfilled

  Addressed by scheme objectives 1i, ii. Iii and 2.ii which seek to deliver the capacity necessary to accommodate demand associated with the rate of planned development and GCP transport objective 1 which seeks to support development by enhancing strategic connectivity.

- Whilst minimal air quality impacts have been recorded in Trumpington, Hauxton and Harston these statistics will worsen in the future if sustainable transport infrastructures are not implemented and employees/residents in South Cambridgeshire continue to rely on a car.

Addressed by scheme objective 2.i. which seeks to increase the sustainable transport mode share for trips into Cambridge city centre and the Biomedical Campus.

2.7 Need for Intervention

Cambridge is one of the fastest growing cities in the UK, with notable population and economic growth forecasted to occur in the short-medium term. 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, better-connected transport network for the region. Whilst investment in transport infrastructure supports the Government's post-Brexit industrial strategy, it will also create a stronger economy fuelling further investment which will enable new houses to be constructed so a greater population can be supported.

The existing Trumpington Park and Ride site is currently operating at full capacity, which is unsustainable and insufficient given the predicted growth forecasts. With a limited public transport provision connecting the settlements along the A10 and M11 to the key employment areas in the Southern Fringe and Cambridge City Centre, the creation of a new Cambridge South West Park and Ride facility would be a welcomed intervention. This is evidenced through research the GCP has conducted with residents of South Cambridgeshire, where more frequent and faster services, lower fares and more Park and Ride options were the most likely things to influence their mode of travel'.[30] Furthermore, additional Park and Ride capacity is urgently needed, to help alleviate extensive congestion along the A1309, A10 and M11 in particular, and to challenge the predicted trend that unsustainable car usage will continue to increase in the future. The car is the dominant mode of transport in Cambridge and South Cambridgeshire due to the lengthy distances the skilled workforce travel for employment opportunities and the long and convoluted journeys incurred when commuting by public transport.

With a thriving economy, a significant number of new developments are proposed in Cambridge in response to the local growth priorities. In Cambridge's Southern Fringe and Biomedical Campus, the substantial level of development investment planned for the area will create jobs, establish new neighbourhoods and expand the city's hospital provision. Whilst the existing transport infrastructure in the area is largely inadequate, additional demand pressures will only worsen congestion and journey times. Unless changes are made to manage demand and establish an excellent and efficient transport network, through initiatives such as the Cambridge South West Park and Ride, the development of the Southern Fringe and Biomedical Campus may be hampered from reaching its full potential. This would in-turn have serious knock-on effects for Cambridge and wider region of South Cambridgeshire.

Consequently, there is a strong need for intervention and thus the development of the Cambridge South West Park and Ride site. If changes were made to the current Park and Ride provision, key employment sites in the city centre and the Southern Fringe, for example Addenbrooke's hospital and the Biomedical Campus, would be easily connected to the wider road network. This would provide a plausible, more sustainable alternative to travelling to work by car and, in conjunction with other planned transport interventions in the area, would help lessen peak time congestion the Park and Ride site could help intercept the large number of vehicles leaving the M11 at J11 headed for the city centre. With limited public transport provided in the Southern fringe generally, investing in the Park and Ride provision will also help improve

[30] GCP City Access and Bus Service Improvements Update, November 2018.

air quality levels in the future, as lower rates of congestion would limit the idling of engines and the volume of pollutants produced; strengthening the attractiveness of the area. Investing in cleaner technology, improving train stations to enhance strategic connectivity and building new cycleways are further ways Cambridge and South Cambridgeshire can improve the transport offer, develop the local townscape and support the green economy.

2.8 Objective Setting

Both strategic transport and scheme specific objectives have been considered in the development and subsequent appraisal of proposed solutions to the issues and opportunities identified in the immediate areas of growth within the city of Cambridge and in the wider Greater Cambridgeshire Area.

2.8.1 Strategic Transport Objectives

The GCP has developed and agreed six transport objectives, these are set out here. These are considered as overarching objectives for the Cambridge South West Park and Ride scheme and have formed the basis for developing scheme specific objectives that address identified and more localised issues in further detail.

1. Ease congestion and prioritise greener and active travel, making it easier for people to travel by bus, rail, cycle or on foot to improve average journey times.

2. Keep the Greater Cambridge area well connected to the regional and national transport network, opening up opportunities by working closely with strategic partners.

3. Reallocate limited road space in the city centre and invest in public transport to make bus travel quicker and more reliable.

4. Build an extensive network of new cycle ways, directly connecting people to homes, jobs, study and opportunities across the city and neighbouring villages.

5. Help make people's journeys and lives easier by making use of research and investing in cutting edge technology.

6. Connect Cambridge with strategically important towns and cities by improving our rail stations, supporting the creation of new ones and financing new rail links.

2.8.2 Scheme Specific Objectives

Scheme objectives have been established to guide option development and assessment for a significant investment in Park and Ride facilities in the Cambridge Southern Fringe. The objectives take account of the opportunities, aspirations and problems identified. They are also aligned to national, regional and local policy and strategy, including the strategic transport objectives noted in Section 2.8.1. The primary purpose of the objectives was to guide option development, appraisal and option selection, so that the preferred option will meet the needs of Cambridgeshire.

A draft set of five objectives were formulated by Mott MacDonald in consultation with GCP. These were then presented at a stakeholder information meeting in Harston village on 13th February 2018. Based on feedback provided by attendees, an additional objective was added to reflect stakeholder concerns relating to traffic delays that occur on the A10 through the village. The delays are generally associated with traffic heading towards M11 Junction 11 and Cambridge. The additional objective is referenced as 1(iii).

Compared to a future potential scenario in which no major enhancements to Park and Ride facilities are delivered close to M11 Junction 11, the scheme will need to:

1. Reduce (or avoid a negative impact on) general traffic levels and congestion	i. Reduce traffic North East of M11 J11 (along Hauxton Road and through Trumpington), by encouraging trips headed for the city centre and Cambridge Biomedical Campus to transfer to another mode.
	ii. Reduce traffic flow and delay at M11 J11, particularly in the AM peak, including reducing flows associated with non-motorway traffic that pass across the junction (A10-A1309).
	iii. Reduce delays on the A10 through Harston and Hauxton, on the approach to M11 J11.
2. Maximise the potential for journeys to be undertaken by sustainable modes of transport	i. Increase, sustainable transport mode share for trips into the City Centre and Cambridge Biomedical Campus, focused on trips orignating from the South and South West (M11 and A10)
	ii. Increase Park and Ride capacity, in particular to serve forecast economic growth at the Cambridge Biomedical Campus key employment area, with delivery aligned to overall Campus development timescales.
	iii. Reduce public transport journey times between Trumpington and the City Centre, enabling Park and Ride/other public transport to compete more effectively with the private car.

These revised objectives were presented at a stakeholder workshop, also in Harston, on 8 March 2018 for inclusion in the SOBC. Attendees were asked to provide written feedback on the objectives. Additional comments were focused primarily on widening the geographic scope to include the A10 through Foxton and Shepreth. Given that other projects, such as the Foxton rural travel hub are already considering this section of the A10 as part of their scope, the objectives have not been amended to widen the scope further and have been confirmed for use in the Outline Business Case.

2.9 Measures for Success

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 19 and Table 20.

Table 19: Proposed Success Indicators (Strategic Transport Objectives)

Proposed Indicator	Relating to Objective
• Increase in the number of cyclists • Increase in bus patronage • Increase in rail patronage	Ease congestion and prioritise greener and active travel, making it easier for people to travel by bus, rail, cycle or on foot to improve average journey times.
• Increase in inward investment • Increase in number of new business start ups • Increase in number of new jobs	Keep the Greater Cambridge area well connected to the regional and national transport network, opening up opportunities by working closely with strategic partners.
• Increase in bus patronage • Faster bus journey times	Reallocate limited road space in the City Centre and invest public transport to make bus travel quicker and more reliable.

Proposed Indicator	Relating to Objective
• Increase in the number of cyclists • Improved air quality	Build an extensive network of new cycle ways, directly connecting people to homes, jobs, study and opportunities across the city and neighbouring villages.
• Faster bus journey times • Improved air quality	Help make people's journeys and lives easier by making use of research and investing in cutting edge technology.
• Increase in rail patronage • Increased customer satisfaction with rail services	Connect Cambridge with strategically important towns and cities by improving our rail stations, supporting the creation of new ones and financing new rail links.

Source: Mott MacDonald

Table 20: Proposed Success Indicators (Scheme Specific Objectives)

Proposed Indicator	Relating to Objective
Reduced traffic flow on A1309 Hauxton Road	1.i – reduction in traffic north east of M11 J11
Reduced traffic flow on A1309 High Street	1.i – reduction in traffic north east of M11 J11
Reduced traffic flow on J11 circulatory	1.ii – reduction in traffic flow and delay J11
Reduction in overall delay at J11	1.ii – reduction in traffic flow and delay J11
Reduction in journey times on the A10 Harston to J11	1.iii – reduced delays on A10
Increased Park and Ride patronage from Trumpington/J11 area to the City Centre/Cambridge Biomedical Campus	2.i – increase sustainable mode share
Increased number of Park and Ride spaces in Trumpington/J11 area	2.ii – increase Park and Ride parking capacity
Reduced Park & Ride journey time from Trumpington to city centre	2.iii – reduce Park and Ride journey times

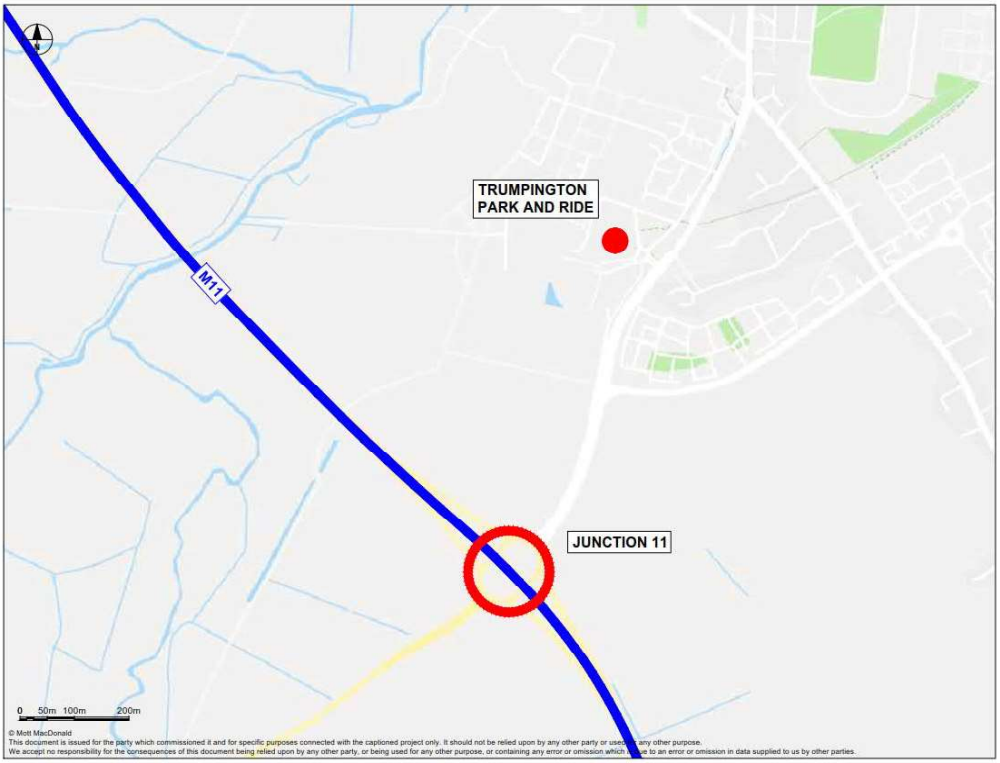
Source: Mott MacDonald

Further detail on how scheme performance is to be assessed will be provided in the Benefits Realisation Plan in Section 7, the Management Case.

2.10 Geographic Scope

The geographic scope of infrastructure options to be assessed extends from land immediately adjacent to M11 Junction 11 (for a potential new Park and Ride site) and along the A1309 through Trumpington to Cambridge City Centre. The geographic scope of the Cambridge South West Park and Ride scheme is indicated in Figure 38.

Figure 38: Cambridge South West Park and Ride Geographic Scope



Source: Mott MacDonald

The benefits associated with a major enhancement to Park and Ride facilities close to M11 J11 are expected to be experienced across a wider area, including:

- M11 J11 and the surrounding road network, in particular the A1309 through Trumpington, but also the A10 between Harston and Junction 11, depending on site access arrangements.
- Cambridge Biomedical Campus and Cambridge City Centre.

Enhanced Park and Ride provision is expected to intercept car trips that would otherwise continue to a location nearer to their destination. For this reason, the scheme is expected to have neither a beneficial nor detrimental impact further afield on the M11 and A10 corridors.

2.11 Constraints

In designing enhanced Park and Ride facilities, scheme designs will need to consider how best to overcome, incorporate or mitigate impacts relating to the following constraints:

- Trumpington Meadows Country Park – a nature reserve created for wildlife and people (The Wildlife Trusts, 2012[31]) located to the north of Junction 11. If a new site is progressed, mitigation measures will be included in the scheme design to avoid detrimental impacts to the Country Park. It might also be feasible to expand the Country Park.
- M11 motorway which creates a severance impact for vehicles, pedestrians and cyclists travelling between Cambridge and areas to the West and South-West of the city. The short

[31] The Wildlife Trusts (2012). Trumpington Meadows. Available online at: http://www.wildlifebcn.org/reserves/trumpington-meadows

list of options include a range of measures to assist public transport, pedestrian and cycle movements crossing the M11.

- Traffic congestion on the A10 and A1309 and surrounding M11 Junction 11 has the potential to delay vehicles entering and leaving the Park and Ride site. This includes public transport vehicles. Through the multi-criteria assessment, the short-listed options have been selected in part on their expected ability to address traffic congestion issues.
- The long list at SOBC stage considered rail-based Park and Ride options which face their own set of constraints including:
  - Building or enlarging Park and Ride sites in a relatively small village, in a manner that is sensitive to the surroundings.
  - Lack of access to Cambridge Biomedical Campus (in the absence of a new station at Cambridge South) from a rail Park and Ride site several miles away.
  - Capacity at the rail stations to serve Park and Ride commuters, including for example ticket purchasing facilities and waiting shelters.
- Any new Park and Ride service will need to be to a standard similar to that currently operating for Cambridge's Park and Ride services as set out in the Access Agreement, which states that the Bus Operator will operate the Park and Ride Bus Services in accordance with the following minimum requirements:
  - Mondays to Fridays (except Bank Holidays, Christmas Day, Boxing Day, New Year's Day): a 15 minute frequency or better from each Site starting by 07:00 through to at least 18:00, then every 30 minutes or better until 20:00 at the earliest for the departure from the city centre to each Site;
  - Saturdays: as per the service provided Mondays to Fridays but starting by 08:00 at the latest.
  - Sundays and Bank Holidays: a 20 minute frequency or better from each Site starting by 09.00 through to at least 18.00 at the earliest for the departure from the city centre to each Site.
  - The Park and Ride bus services to be provided by the Bus Operator on Bank Holidays, evenings and/ or the 3 Sundays prior to Christmas, on special occasions and from 24 December to 2 January inclusive or any combination of these dates, may be amended by written agreement between the Parties.
  - In the cases referred to in paragraph 2.2, the amended Park and Ride bus services must be agreed in advance between the Council and the bus operator.
  - The Council shall have no obligation to agree to amend the Park and Ride Bus Services and may at its sole discretion refuse a request for amendment from the Bus Operator and /or may at its sole discretion determine to invite tenders for the additional services.
- All buses are now required to be accessible for all including wheelchair users.
- Bus emissions are improving over time and Euro VI emission standard is now required for new buses.

A further constraint exists as a result of the Cambridge and Peterborough Combined Authority review of transport schemes and subsequent recommendations in response to guidance in the Mayoral Interim Transport Strategy Statement. This is detailed as a sub-section in its own right.

2.11.1 Option Alignment with the Mayoral Interim Transport Strategy Statement

The purpose of the Mayoral Interim Transport Strategy Statement published in the spring of 2018 was to guide the development of the new Cambridgeshire and Peterborough Combined Authority Local Transport Plan (LTP), which will be completed by Spring 2019. It is intended to provide clear direction to transport projects that are either underway or soon to be developed, such as the Cambridge South West Park and Ride Scheme.

The guiding principles that will shape the new LTP include:

- Economic Growth & Opportunity –connecting the workforce with a growing number of well-paying and lasting jobs, particularly those in key and new-economy sectors.
- Equity –transport systems will address transport and infrastructure gaps across the region and especially those in badly served communities and help all areas to be prosperous.
- Environmental Responsiveness & Sustainability –develop a network that encourages active and sustainable travel choices, such as walk, cycling and public transport.

The Statement recognised that there were a number of transport schemes at various stages of design and development and that those schemes need to ensure the design and policies used to guide their development were consistent with the approach set out within it. The Greater Cambridge Partnership (GCP), through the policy review undertaken as an integral part of the Outline Business Case, have ensured that the Cambridge South West Park and Ride scheme aligns with the fundamental guiding principles, noted here, that shape the new LTP.

Scheme Review by the Combined Authority

The Mayoral Interim Transport Strategy Statement at the time of its publication stated that “in the interim and specifically, all current bus way and Park and Ride plans must be paused until the Combined Authority is confident there is full alignment with its plans”. As such a review of the features and timeframes for all transport corridor schemes was undertaken by the Combined Authority in July 2018. The review set out to encompass the Combined Authority Transport schemes as shown in Table 21 and:

- A10 including the A14 interchange
- A1307
- A428 Cambridge to Cambourne

Table 21: Combined Authority Priority Transport Projects

Corridor/Area	Projects
Metro	Cambridge Autonomous Metro (CAM)
North – South	A10 upgrade, M11 extension, Ely Rail Improvements, Soham Station, Cambridge Rail Capacity Study, Huntingdon Third River Crossing; A141
East – West (North)	A47 Dualling Peterborough to Wisbech, Wisbech Rail, Wisbech Access, Wisbech Garden Town
East – West (South)	Oxford to Cambridge Expressway (A428), Cambridge South Station; A505 corridor, East-West Rail

Source: Mayoral Interim Transport Strategy Statement

However, the findings of the review also note that the M11 Junction 11 scheme, as the Cambridge South West Park and Ride Scheme was previously referred to, supported the delivery of CAM and had the full support of the Combined Authority to proceed subject to certain proposed changes which are noted here.

Summation of Proposed Key Changes

Park and Ride elements are to be designed and constructed to be only temporary features that can potentially be built at lower cost and be progressively removed as alternate travel solutions are delivered, specifically:

- Only the core of the sites will be tarmacked to meet normal and not peak usage. The remainder of the areas will consist of temporary ground coverings that can be removed easily.
- Construction standards that only give a limited life will be used, for example reducing the depth of construction of the tarmacked areas.
- The sites will not have any central buildings or waiting facilities
- Land scaping and other physical works will be kept to a minimum

The Combined Authority have proposed the concept of temporary Park and Ride facilities on the basis that Park and Ride in its current permanent and bus-based form could become redundant once the extended CAM system and the associated innovative transit solutions connecting to CAM stops are fully implemented. However, there are some issues evident with the concept of temporary Park and Ride features which are outlined in Section 2.11.1.1

2.11.1.1 Addressing Proposed Changes

In response to the changes proposed by the Combined Authority that would impact design and delivery of the Cambridge South West Park and Ride and other current GCP transport schemes, GCP commissioned Mott MacDonald to investigate and report on the issues associated with the concept of temporary Park and Ride facilities to inform development. The key issues arising from the Combined Authorities proposed changes are summarised below:

Timescale Issues

It is currently anticipated that GCP will deliver the Cambridge South West Park and Ride scheme in 2023 however the extended CAM network and connecting transit solutions to extend its reach are only expected to be delivered after 2029 and up to 2041. Thus, even in the most optimistic scenario for metro delivery, the new Park and Ride site would have a life of at least six years and probably more, given that in its initial form CAM would only replace the current ‘ride’ element of Park and Ride. Replacing the ‘park’ element would also require metro extensions and delivery of innovative transit solutions to connect CAM stops with the wider population

Land and Planning Issues

In terms of planning consents, a life span of at least six years is a significant duration and the assessment of material effects and impacts for a temporary facility with a minimum life of at least that length is likely to be the same as if the proposed development was permanent. In addition, given the uncertainties over delivery timescales, it would be risky for a promoter to pursue a temporary application as the relevant planning authority would seek to impose conditions on the removal of the facility and reinstatement of the land after the specified temporary period.

The tenure of the land is also a relevant factor and the emerging preference of GCP is to acquire required land outright rather than lease land due to the risks and costs associated with lease agreements. This is especially relevant where a phased approach would create a complicated lease.

Environmental Issues

In terms of environmental assessment, a life span of at least six years is a significant duration and the assessment of material effects and impacts for a temporary facility with a minimum life of at least that length is likely to be the same as if the proposed development was permanent.

The relaxation of environmental requirements for a temporary facility is unlikely as there would be too many uncertainties for planning officers unless the removal of facilities and reinstatement of land was guaranteed by means of a planning condition.

Design Specification Issues

For access roads and junctions with existing highway network, a permanent specification is required to reflect traffic volumes and meet highway safety standards furthermore, for bus access, circulation areas and stands a permanent specification is also required due to onerous loading conditions.

A temporary specification using geo-grids or grasscrete could be considered for car parking and circulation areas with an operational life of ten years or less, but it is important to note that temporary pavements would require a more frequent inspection and maintenance regime than permanent bound pavements.

In regard to core buildings and facilities consideration could be given to high quality modular buildings, which can be easily dismantled and reused. However, planning authorities may insist on building designs that require bespoke architectural treatment given the site's location.

In summary, the opportunities to significantly reduce capital costs by changing from permanent to temporary specifications or by de-scoping facilities are essentially limited to car parking and circulation areas and facilities buildings. In addition, it should be recognised that providing and maintaining high quality facilities at a Park and Ride site plays a key role in its attractiveness and if quality is compromised then the use of the site may be lower, in turn impacting on the commercial viability of Park and Ride bus operations.

Conclusions

On this basis of these issues, a completely temporary facility is an unlikely scenario as it is possible that the requirement to provide car parking on any Park and Ride site would exceed the expected minimum period of circa five years. This would trigger the need to apply for permanent planning permission from the Local Planning Authority. In addition, the environmental impacts associated with a temporary planning permission and impacts on the Green Belt would be similar to those of a permanent Park and Ride facility. Furthermore, opportunities to significantly reduce capital costs by changing from permanent to temporary specifications or by de-scoping facilities are essentially limited to car parking and circulation areas and facilities buildings. Even then overall savings of circa.14% over 25 years and 12% over 60 years are considered moderate.

2.11.1.2 Sustainable Park and Ride

In recognition that a completely temporary facility is not likely to be feasible, consideration will be given to developing options where:

- The construction of car parking and associated circulation areas within the site is done to temporary standards, using permeable ground reinforcement systems. This will result in cost savings of around 20% though these will be partially offset by higher maintenance and renewal costs relative to a permanent bound surface, reducing overall savings to circa.14% over 25 years and 12% over 60 years.
- A flexible, phased approach to planning and implementation of Park and Ride facilities to enable them to meet the forecast demands pre-CAM and then be reconfigured and downsized as appropriate once CAM and its connecting public transport network are progressively implemented.

2.12 Interdependencies

Other schemes currently being progressed or considered to serve trips arriving into Cambridge along the A10 and M11 corridors will influence the level of demand for Park and Ride at Junction 11, as well as affecting travel flows in the local area. These have the ability to affect the level of success of the Cambridge South West Park and Ride Scheme to varying degrees and need to be considered in conjunction with delivery of this scheme.

City Access Strategy

The Cambridge City Access Strategy is a key dependency for the Cambridge South West Park and Ride scheme. To optimise success of the scheme, to enhance the Park and Ride capacity near the M11 J11, it is vital that it is not delivered in isolation, rather in conjunction with the eight packages comprising the City Access Strategy, see Figure 39.

Figure 39: Cambridge City Access Strategy Measures

Source: Greater Cambridge Partnership

The proposed Do-Something options for Cambridge South West Park and Ride, therefore, have been designed based on the assumption that multiple benefits will arise and come to fruition from the packages displayed in Figure 39. These benefits include:

- Reduced congestion within the city centre;
- Faster, cheaper and more reliable bus journeys, enabling expansion of existing Park and Ride capacity and facilities;
- Safer, easier and more attractive walking and cycling journeys;
- Reduced pollution and cleaner air;
- Fewer stationary or slow-moving vehicles;
- More cycling and pedestrian infrastructure;
- Preservation and enhancement of Cambridge's historic environment;
- Improvements to the quality and reliability of public transport; and
- Continued growth in cycling.

Foxton Rural Travel Hub and Bridge Replacement for Level Crossing

The Foxton rural travel hub scheme is expected to include a larger car park at Foxton rail station, providing trips approaching Cambridge along the A10 with the option to transfer to rail. Cambridge-bound trips that might be attracted to transfer to rail at Foxton are expected to be those with a destination within a short walk of Cambridge or Cambridge North stations. This would represent a small proportion of total trips and a smaller proportion of trips than would be attracted to use a Park and Ride site that can serve Cambridge City Centre directly.

The Foxton scheme might also attract trips in the opposite direction, from developments across the Cambridge Southern Fringe (such as Trumpington Meadows), to transfer to rail at Foxton for London.

Together with avoiding the level crossing, the Foxton rural travel hub could change the traffic flow profile in both directions on the A10 through Harston and at M11 Junction 11. The location of the Foxton rural travel hub is shown in Figure 40.

Figure 40: Foxton Location Plan

Source: SKANSKA Rural Travel Hubs Feasibility Study Report

Whittlesford Rural Travel Hub

The Whittlesford rural travel hub would include a larger car park at Whittlesford Parkway station, providing an improved access for trips approaching Cambridge from the South along the M11 to leave at Junction 10 (A505), park at the station and transfer to rail. As with the Foxton rural travel hub, Cambridge-bound trips that might be attracted to transfer to rail at Whittlesford Parkway are expected to be those with a destination within a short walk of Cambridge or Cambridge North stations. Again, this would represent a small proportion of total trips and a smaller proportion of trips than would be attracted to use a Park and Ride site that can serve

Cambridge City Centre directly. The location of Whittlesford rural travel hub is highlighted in Figure 41.

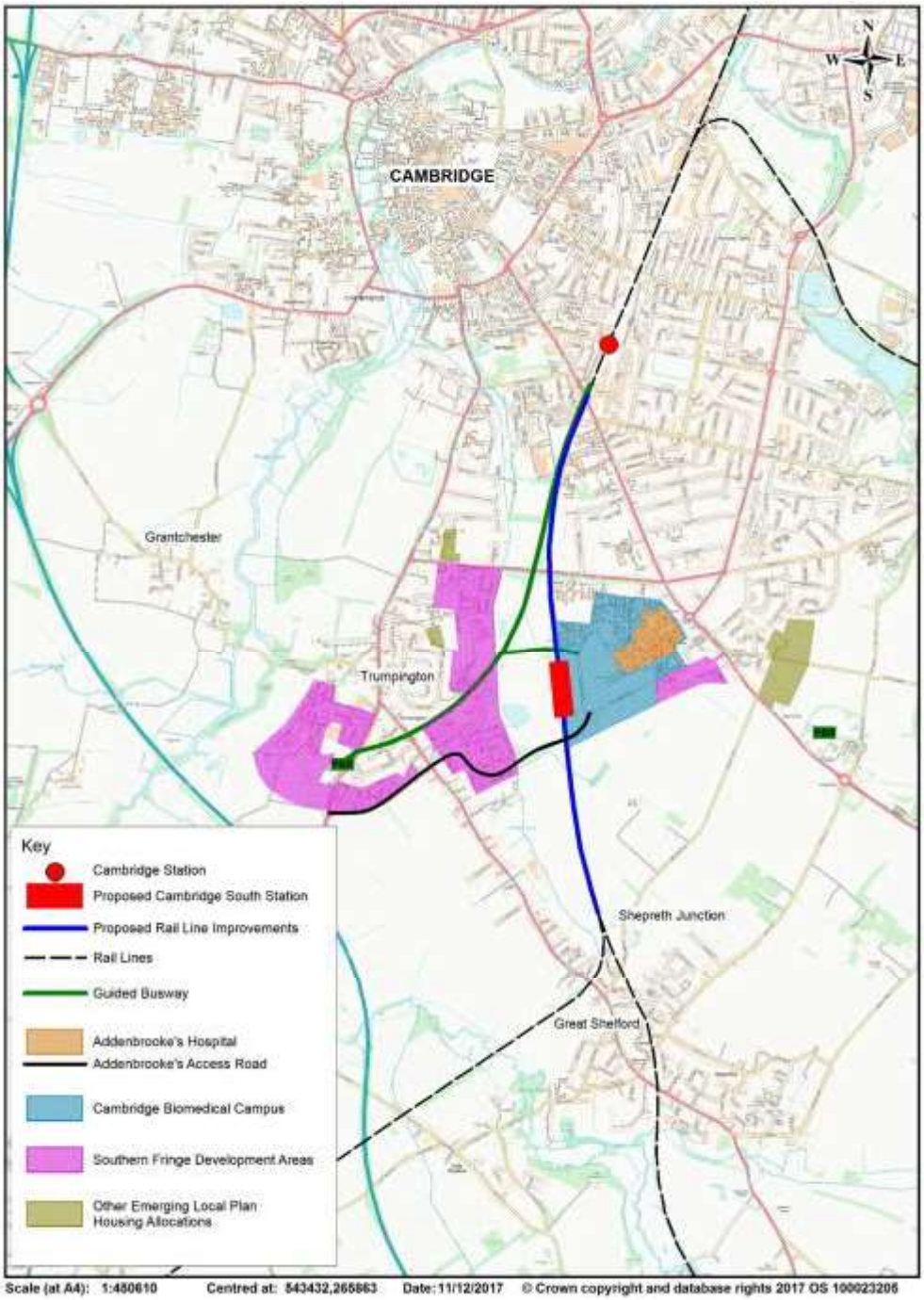
Figure 41: Whittlesford Location Plan

Source: SKANSKA Rural Travel Hubs Feasibility Study Report

Cambridge South Station

The proposed new rail station at Cambridge South, serving the Biomedical Campus, aims to improve connectivity between the emerging 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. A new station is likely to remove some car trips from the M11 and A10 corridors.

Figure 42: Cambridge South Station



Source: Cambridge South Station Briefing Note, 2018

Interdependencies between Foxton/Whittlesford and Cambridge South

The interdependencies between the Foxton and Whittlesford rural travel hubs and Cambridge South will also have an impact on the level of demand for Park and Ride at Junction 11. For example, if either or both of the rural travel hubs are progressed but Cambridge South station is not, then the rural travel hubs will not be suitable facilities for trips to the Cambridge Biomedical

Campus. The Park and Ride facilities at Junction 11 would therefore need to cater for a larger number of trips to the Biomedical Campus.

Cambourne to Cambridge Scheme

The Cambourne to Cambridge scheme is at an early stage of development. It seeks to deliver improved, faster and more reliable public transport services, high quality walking and cycling facilities, and a new travel hub for people arriving into Cambridge along the A428 from the West. This scheme would be expected to remove some trips that might otherwise use Park and Ride facilities close to Junction 11, approaching from the A428/A1303 on the M11 southbound.

M11 Smart Motorway

Highways England is currently progressing with a modernisation programme of technology-led 'smart motorway' upgrades, to increase capacity, improve journey time reliability and therefore reduce congestion on the motorway network. As part of Highways England's second Road Investment Strategy (RIS1), for the 2020/21 to 2024/25 period, a smart motorway upgrade for the M11 between Junctions 8 and 14 is being considered.

The case for a smart motorway upgrade to this section of the M11 was made in the London to Leeds (East) Route Strategy, published by Highways England in April 2015. The upgrade is likely to include measures that will increase the throughput of traffic on the M11, with a resulting increase in flow at motorway junctions including Junction 11.

While the smart motorway scheme might not lead to an increase in Park and Ride demand, increased flows on the motorway slip-roads and changes to the motorway mainline and slip-road layout will need to be incorporated into Park and Ride scheme designs.

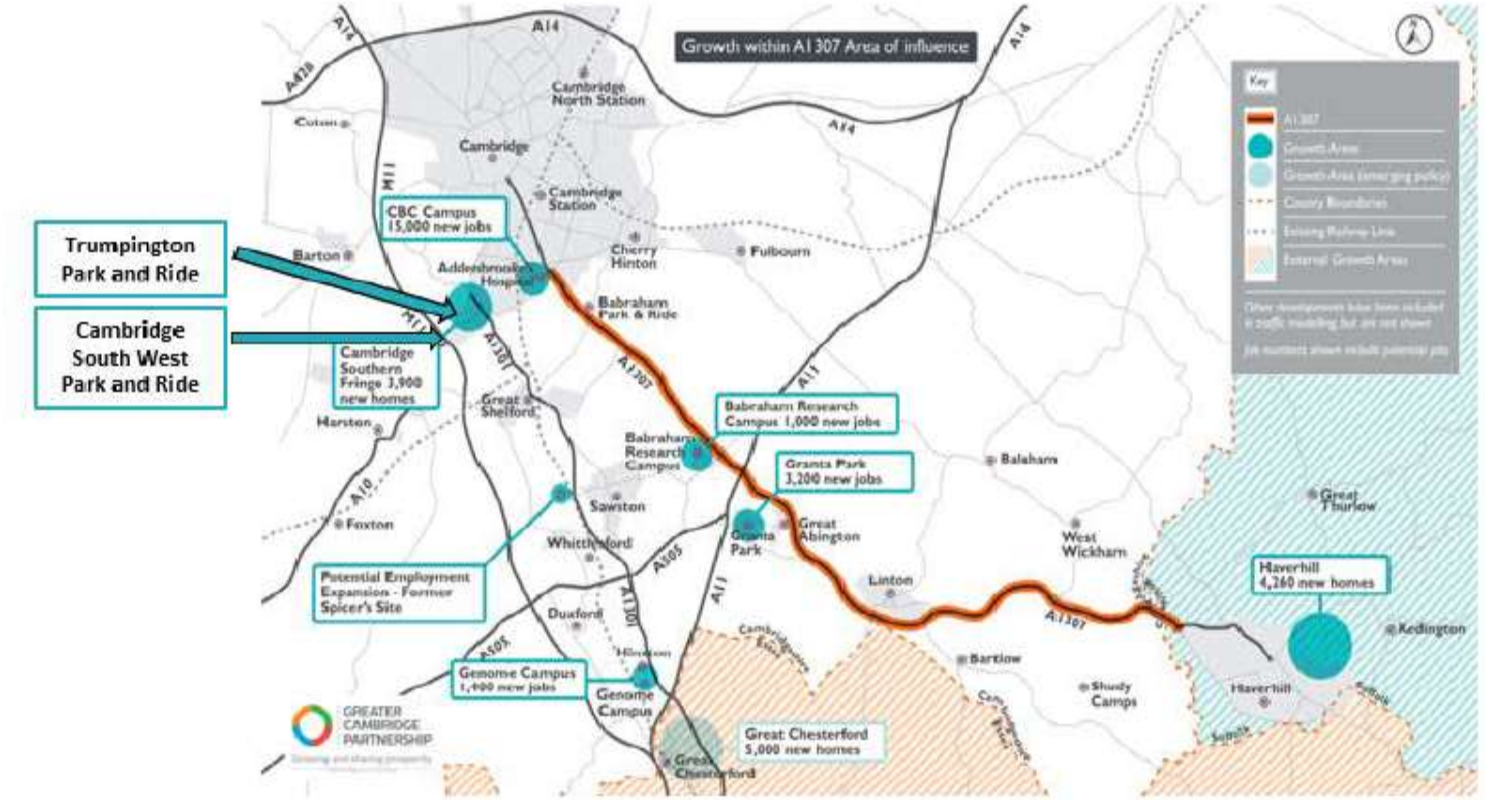
Cambridge South East Transport Study

The Cambridge South East Transport Study (CSETS) aims to provide better public transport, walking and cycling options for those who travel in the A1307 and A1301 area, improving journey times and linking communities and employment sites in the area South East of Cambridge. These measures will be implemented in two phases. Phase 1 has identified 17 discrete minor works packages to improve public transport into Cambridge and Haverhill along the A1307 corridor whilst Phase 2 will deliver transformational change to the modal choice in this area of Cambridgeshire. The CSETS will improve access to the growing number of opportunities in the Southern Fringe and the Cambridge Biomedical Campus altering the flow of traffic along the corridor and providing more attractive modal options for users.

The improvements to the A1307 corridor would support sustainable travel in the Southern Fringe, similar to the proposed Cambridge South West Park and Ride scheme. Both schemes will provide those who travel in the south of Cambridge and central Cambridge with attractive alternatives to private car travel, reducing congestion on key routes.

Figure 43 shows the potential route alignment of the Cambridge South East Transport Study.

Figure 43: Potential Route Alignment of the Cambridge South East Transport Study



Source: Greater Cambridge Partnership

Cambridge Autonomous Metro (CAM)

The Cambridgeshire and Peterborough Combined Authority is investigating the potential for a Cambridgeshire Autonomous Metro (CAM) system which would serve central Cambridge, the Cambridge Biomedical Campus and the surrounding regional network. This proposal is supported by the Mayor and local authorities and is considered crucial to create a world class transit system in Cambridgeshire. It would have autonomous capabilities and potentially operate without rails or physical guidance. The network could be approximately 42 kilometres in length and would integrate with existing modes, including busways. The network could begin operations in 2021 with potential for the full network to be operating by 2027[32].

To be successful in terms of maximising patronage and minimising service subsidy requirements, the CAM proposal will need to include sites on the edge of the Cambridge urban area where trips from outside the area can be aggregated and loaded onto the system. Park and Ride facilities close to M11 Junction 11 would provide such a site for aggregating trips from the A10 and M11 (south) corridors. Public transport priority measures could be integrated into CAM and amended as appropriate. The CAM, which would link to various destinations in Cambridge, would arguably support the Cambridge South West Park and Ride scheme as the CAM would encourage drivers from outside the area to leave their vehicles at a Park and Ride facility near Junction 11.

2.12.1 Stakeholders

The key stakeholders for the proposed major enhancements to the Park and Ride provision close to M11 Junction 11 are:

- Local authorities – Cambridgeshire County Council (CCC) as the Local Highway Authority, and Cambridge City Council and South Cambridgeshire District Council as the local planning authorities. The local authorities have identified the opportunity for a major enhancement to the Park and Ride provision close to M11 Junction 11 as part of their Transport Strategy for Cambridge and South Cambridgeshire (TSCSC) 2014.
- Greater Cambridge Partnership is the local delivery body for the City Deal. The Partnership includes the three local authorities, University of Cambridge and the Greater Cambridge Greater Peterborough Local Enterprise Partnership.
- Organisations and businesses that are investing in the Cambridge Biomedical Campus, including AstraZeneca, Cambridge University Hospitals NHS Foundation Trust, The MRC Laboratory of Molecular Biology, and Papworth Hospital NHS Foundation Trust. Cambridge University NHS Foundation Trust has a vision to be one of the best academic healthcare organisations in the world and, as such, requires good accessibility to specialist staff and visiting experts who may travel long distances. The Trust has made great progress in encouraging sustainable travel by staff but has ambitions to improve levels of public transport use among visitors. Patients and visitors travelling from a wide area would benefit from a major enhancement to the Park and Ride provision.
- Cambridge Ahead, a business and academic member group dedicated to the successful growth of Cambridge and its region in the long-term.
- Highways England as the organisation responsible for the M11.
- Parish councils, including Harston, Hauxton, and Trumpington.
- Residents in Cambridge City and South Cambridgeshire local authority areas will be affected by the changes to the transport network that result from the scheme.

[32] Cambridge Rapid Mass Transit Options Appraisal - Cambridgeshire Autonomous Metro' (CAM): The Proposition (2018)

- Schools and the Nuffield Hospital located along Trumpington Road who may benefit from complementary public transport priority measures.
- Network Rail and the Train Operating Companies of Greater Anglia and Govia may also have a periphery interest as a new Park and Ride site at M11 J11 or expansion of the Trumpington site may impact levels of parking and commuters currently using Whittlesford Parkway and Foxton rail-based Park and Ride sites, which is served by these providers.
- East West Rail may have an interest in Cambridge South West Park and Ride as some of proposed alignments for the Bedford to Cambridge route potentially impact the area around Junction 11 of the M11.

Other stakeholders, who will need to be involved during the design process are:

- Emergency services
- Groups which represent people with limited mobility or a sensory impairment and wheelchair users
- Cycling groups
- Landowners
- Campaign Groups
- Commuters
- Local Engagement Groups
- Cambridge University

The methods through which stakeholders have been engaged up to SOBC stage and at OBC stage of the project are set out in the Outline Business Case Consultation Plan, which has been prepared in draft and is appended to this OBC as Cambridge South West Park and Ride Stakeholder Engagement and Communication Plan.

2.13 Strategic Case Summary

- Greater Cambridge is a world-leading centre for research, innovation and technology, with significant levels of inward investment creating jobs and prosperity. Its success brings jobs and opportunities for the whole region and beyond and helps the UK economy to compete on the international stage. The Cambridge Southern Fringe is home to the internationally significant Cambridge Biomedical Campus, which is expected to employ 30,000 people by 2031.
- Despite this economic success, Cambridge faces supply side threats to its economic growth. Investment in transport infrastructure will be critical, ensuring transport network capacity, high congestion levels and poor reliability issues are addressed, unlocking the city's growth potential. Major enhancements to Park and Ride facilities in close proximity to M11 Junction 11 can contribute to the economic growth of Cambridge, in particular the Cambridge Biomedical Campus, and complement the Cambridge Autonomous Metro proposals supported by the electoral mayor.
- A range of existing and future transport problems which have the potential to constrain economic growth within the Southern Fringe have been identified in relation to congestion, high private car mode share and lack of Park and Ride capacity to cater for future employment growth. These problems have been translated into a set of six specific objectives to guide solution and option selection.
- The limited rail provision in the Southern Fringe constrains the opportunities workers have to access jobs at the Cambridge Biomedical Campus, Addenbrookes Hospital and other key employment sites elsewhere in the area. Whilst the integration of the Citi buses and The Busway, in effect, provide an all-encompassing public transport service lengthy and unreliable journeys along with inefficient transport interchanges discourage people from choosing to travel by bus in the region. Thus, continuous efforts must be made to reduce congestion and lessen the notable car dependency to encourage modal shift and ensure people can travel more sustainably.
- Active travel routes are in place around the Trumpington and Cambridge South West Park and Ride sites which have the potential to be utilised and developed further.
- When enhancing the Park and Ride provision various constraints must be considered. These include the impact proposed schemes will have on natural assets and the local surroundings, in addition to how congestion, capacity and severance issues will be accommodated and addressed.
- Stakeholders views and a range of interdependencies will also impact and shape the development of the Cambridge South West Park and Ride scheme. Specifically, the Foxton and Whittlesford rural travel hubs along with the Cambridge South railway station are key interdependencies as the implementation and success of these initiatives will subsequently impact the demand for the Cambridge South West Park and Ride.
- Lastly, the Cambridge South West Park and Ride scheme needs to align with, and compliment, the Cambridge City Access Strategy to both tackle congestion and ensure a highly efficient transport network is delivered across Cambridge and the wider South Cambridgeshire area.

3 Options Appraisal

The popularity of Park and Ride and the need for new, expanded or relocated Park and Ride sites, is set out in the Cambridgeshire Local Transport Plan (2011-2031). More specifically, the requirement for new Park and Ride facilities near to the M11 Junction 11 is identified in the Transport Strategy for Cambridgeshire and South Cambridgeshire (2014). Section 2 of this OBC documents the rationale for enhancing Park and Ride provision. This section summarises the option assessment process undertaken to arrive at a preferred option for the Cambridge South West Park and Ride scheme.

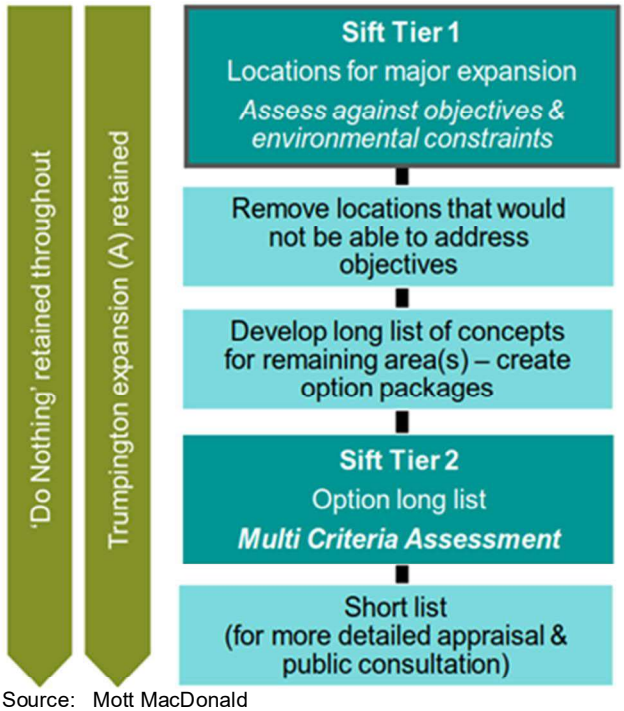
This section should be considered as a condensed substitute for a separate Options Appraisal Report (OAR), as it is considered proportionate in the case of this scheme to integrate the options development and selection process within the OBC.

This section starts by providing a summary of the options development and appraisal that was undertaken as part of the SOBC to arrive at a shortlist of options. Further details of this process are found in the M11 J11 P and R SOBC, document reference 393699-MMD-BCA-XX-RP-BC-0046. The section then documents the appraisal process undertaken at OBC stage to determine a preferred option which is the subject of further appraisal in the Economic Case.

3.1 Summary of SOBC Stage Appraisal Process

A two-tiered appraisal process was undertaken at SOBC stage. The process is outlined in Figure 44, followed by a brief explanation of each step and the resultant outcomes of each step.

Figure 44: Option Appraisal Process Undertaken at SOBC Stage



Source: Mott MacDonald

3.2 Sift Tier 1 Process and Outcomes at SOBC Stage

It was agreed at SOBC stage that a major expansion to Park and Ride facilities in close proximity to M11 Junction 11 could be delivered by expanding the existing Trumpington site or by delivering a new complementary site. Given that the objectives point to a need to reduce traffic flows on the A1309 and to intercept trips from the both the M11 and A10 then the most suitable locations were identified as being immediately adjacent to Junction 11. Potential locations are shown in Figure 45, comprising the existing Trumpington site (A) and the four quadrants adjacent to Junction 11 (B to E).

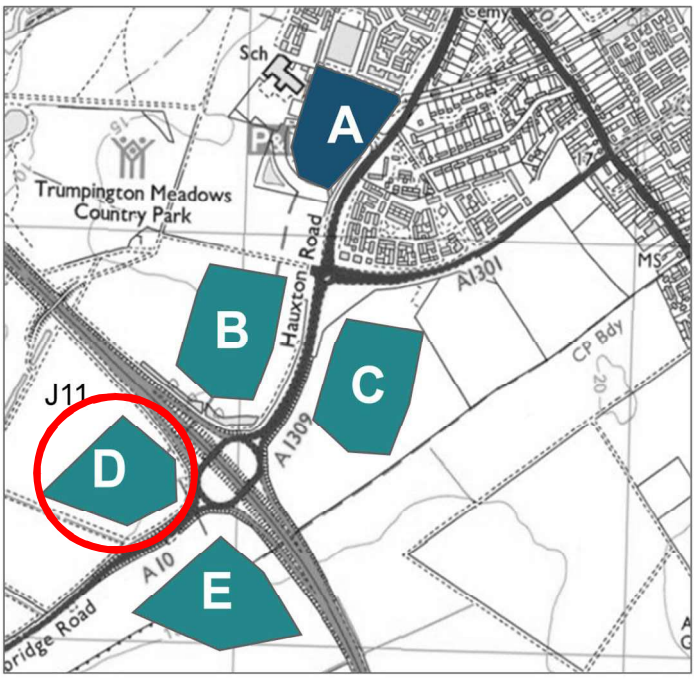
The five locations were assessed on the extent to which they would be able to meet the six scheme objectives and against the number and complexity of environmental constraints. Scoring was based on the seven-point scale recommended in WebTAG, from -3 (large adverse) to +3 (large beneficial) and where 0 indicated a neutral impact.

The assessment process showed that a Park and Ride at Site D would be best able to meet the scheme objectives as it would be able to intercept trips along the A10 before they reach Junction 11 and is expected to be more deliverable within the required timescales due to land availability.

Sites D and E have equal best environmental ranking, but the opportunities to provide enhancements at Site D, contiguous with the Trumpington Meadows Country Park mean this is the preferred location for a new Park and Ride site in close proximity to M11 Junction 11.

Although major expansion of the existing Trumpington site (A) is not expected to meet the objectives particularly well and is likely to have a negative impact on local air quality close to sensitive residential receptors, both existing and under development (Trumpington Meadows), it remained under consideration as a logical comparator to new site provision.

Figure 45: Proposed Park and Ride Locations



Source: Mott MacDonald

Following the qualitative high-level Tier 1 assessment of suitable locations for Park and Ride expansion based on scheme objectives and environmental constraints, and identification of Site D as the most suitable location for a new Park and Ride. Ten initial options were developed by Mott MacDonald in partnership with the GCP. The options included a Do Minimum and nine Do Somethings. The Do Somethings were all assigned colour coded names and are noted in Table 22. This includes expansion of the existing Trumpington site, which although not meeting objectives particularly well is, as noted previously, included as a logical comparator.

Further to feedback from early consultation a further four options were considered; these were assigned the letters F, G, H and I in Table 22 to distinguish them from those developed prior to consultation. Together these 13 options along with the Do Minimum scenario, see Table 22, constituted the long list for appraisal; the Do Something options being compared against the Do Minimum.

Table 22: Park and Ride Options Long List

Option	Description/Elements
Do Minimum	• No major expansion of Park and Ride provision close to Junction 11. Minimal surface level expansion of existing Trumpington site only, being developed as part of a separate planning application.
Magenta	• Major Park and Ride expansion at Trumpington, likely to involve adding two new decks above the existing site (as there is no available land for expansion immediately surrounding the site). • New dedicated Park and Ride access lanes for general traffic extended back to the motorway off-slips and A10. Likely to involve overbridge widening at J11.
Red	• New site with general traffic and bus access/egress at a single new junction on the A10. • Dedicated left turn lane from the A10 at Hauxton into the Park and Ride site. • Buses to pass across the Junction 11 with general traffic.
Blue	• New site with general traffic and bus access /egress at two new junctions on the A10. • Dedicated left turn lane from the A10 at Hauxton into the Park and Ride site. • Additional free flow left turn lanes from both motorway off slips • Widening the existing J11 overbridges to provide a bus lane in each direction.
Purple	• New site with dedicated northbound off slip from the M11, passing below the A10 through a tunnel, and a new junction on the A10. • Dedicated left turn lane from the A10 at Hauxton into the Park and Ride site. • Free flow left turn lane from southbound motorway off slip to A1309 for Trumpington Park and Ride. • Buses pass directly through the centre of J11 using new bridge structure across M11.
Orange	• New site with dedicated northbound off slip from the M11, passing below the A10 through a tunnel, and a new junction on the A10. • Reconfigured J11 with larger circulatory and realigned slip roads, allowing greater stacking capacity on the roundabout. Includes new bridge structure on the southern side. • Dedicated left turn lane from the A10 at Hauxton into the Park and Ride site. • Buses pass directly through the centre of J11 using former circulatory alignment.
Yellow	• New site with general traffic and bus access/egress at two new junctions on the A10. • Dedicated left turn lane from the A10 at Hauxton into the Park and Ride site. • Additional free flow left turn lanes from both motorway off slips. • Buses cross the motorway using existing accommodation bridge to the north, then run alongside southbound off slip.
Black	• As yellow option, but with buses crossing the motorway using existing accommodation bridge and then running directly across existing open land to the Trumpington Meadows development.
White	• New site with dedicated northbound off slip from the M11, passing below the A10 through a tunnel, and a new junction on the A10. • Dedicated left turn lane from the A10 at Hauxton into the Park and Ride site. • Free flow left turn lane from southbound motorway off slip to A1309 for Trumpington Park and Ride. • Buses cross motorway using existing accommodation bridge to the north, then run alongside southbound off slip.

Option	Description/Elements
Cyan	• New site with dedicated northbound off slip from the M11, passing below the A10 through a tunnel. • Dedicated left turn lane from the A10 at Hauxton into the Park and Ride site. • Dedicated slip road for southbound A10 traffic to access the site without needing to turn right across the A10, using the same tunnel as for the dedicated M11 northbound off slip. • Dedicated exit slip from the Park and Ride site on the A10 southbound, avoiding the need for vehicles leaving the site to turn right across the A10, again using the same tunnel. • Free flow left turn lane from southbound motorway off-slip to A1309 for Trumpington Park and Ride. • Buses cross motorway using existing accommodation bridge to the north, then run alongside southbound off slip.
All options set out above include the following: • retaining the existing Park and Ride site at Trumpington. • complementary bus priority measures between Trumpington and the City Centre. • (other than Do-Nothing) include enhanced bus services between the Park and Ride site (s) and Cambridge City Centre/Cambridge Biomedical Campus	
F	• Major rail-based Park and Ride adjacent to Foxton rail station. • Direct site access from the A10 for light vehicles. • Possible platform lengthening at Foxton rail station to avoid the need to use selective door opening. • Safe, direct and short pedestrian route between the car park and station platforms.
G	• Major rail-based Park and Ride at Whittlesford Parkway close to M11 Junction 10. • Direct site access from Station Road East. • Safe, direct and short pedestrian route between the car park and station platforms.
H	• Major rail-based Park and Ride site at both Foxton and Whttlesford Parkway stations. • Safe, direct and short pedestrian route between the car park and station platforms.
I	• Additional onsite parking at the Cambridge Biomedical Campus

Source: Mott MacDonald

3.3 Sift Tier 2 Process and Outcomes at SOBC Stage

To arrive at a short list of options, a multi criteria assessment was applied to the long list. Although the assessment process was qualitative, in comparison to the approach adopted in the first sift, it was much more detailed and looked at a broad range of assessment criteria grouped under the four themes shown in Figure 46.

The first two themes are aligned with the scheme specific objectives detailed in Section 2.8.2. Two additional themes that addressed wider strategic objectives, such as quality of life and the environment in line with WebTAG guidance, and the practical issue of deliverability were also included.

Figure 46: Assessment Criteria applied to the Long List of Options

Source: Mott MacDonald

Each of the 13 long listed options was assessed against each of the 26 themed sub-criteria noted above and compared to the Do Minimum scenario. Using the same approach as for the Park and Ride location assessment, scores were awarded to each option using the WebTAG seven-point scale, ranging from -3 (large adverse) to +3 (large beneficial). Scores within each theme were then normalised to provide a score out of ten, which avoided the results being skewed by the number of indicators within each theme. Weightings were then applied to reflect the relative importance of each theme. Two scenarios were agreed with GCP and tested with different relative weightings applied to each. The two scenarios tested are:

- Weighting scenario 1: Equal 25% weighting per selection theme.
- Weighting scenario 2: Greater emphasis on indicators that relate to the strategic scheme objectives – 40% (Theme 1), 40% (Theme 2), 10% (Theme 3), 10% (Theme 4).

From this sifting process, five short-listed options and a Do Minimum scenario for comparison, were selected for further detailed appraisal and public consultation.

This short-listed selection was based on the normalised multi-criteria assessment scores and option rankings for both weighting scenarios. Following assessment of both scenarios, initially the three top scoring options were shortlisted and taken forward to OBC stage. These were; Cyan, Purple and White. Options Orange, Red and Blue and Black were not shortlisted.

Whilst performing well against the assessment criteria, Cyan, Purple and White are also the highest cost options due to the inclusion of a dedicated M11 northbound off-slip into the Park and Ride site and a tunnel under the A10. Yellow was also shortlisted to provide a low-cost option, in line with WebTAG guidance to facilitate appraisal against the three high cost options which were shortlisted. The Yellow option does not include the dedicated off-slip and tunnel features and so is, therefore, lower in cost.

The Magenta option, which proposes a major expansion at Trumpington Park and Ride performed poorly under both scenarios. Whilst ranking ninth of nine options, it was decided Magenta would also be shortlisted to the OBC stage as it seen as a logical comparator to providing a new site. The shortlist of six options was completed by a Do-Minimum option, which consists of already committed improvements and expansion at the Trumpington site.

More detailed information on this option sifting process can be found in the M11 J11 P and R SOBC, document reference 393699-MMD-BCA-XX-RP-BC-0046

3.4 Option Shortlist at the Conclusion of the SOBC

The five shortlisted Do Something options at the end of SOBC stage were Magenta, Cyan, Purple, White, and Yellow and are detailed in this Section. These, alongside a Do-Minimum Option, as a baseline comparator, have been subject to a detailed quantitative appraisal at OBC stage to arrive at a preferred option. This quantitative appraisal process is detailed in Section 3.6.

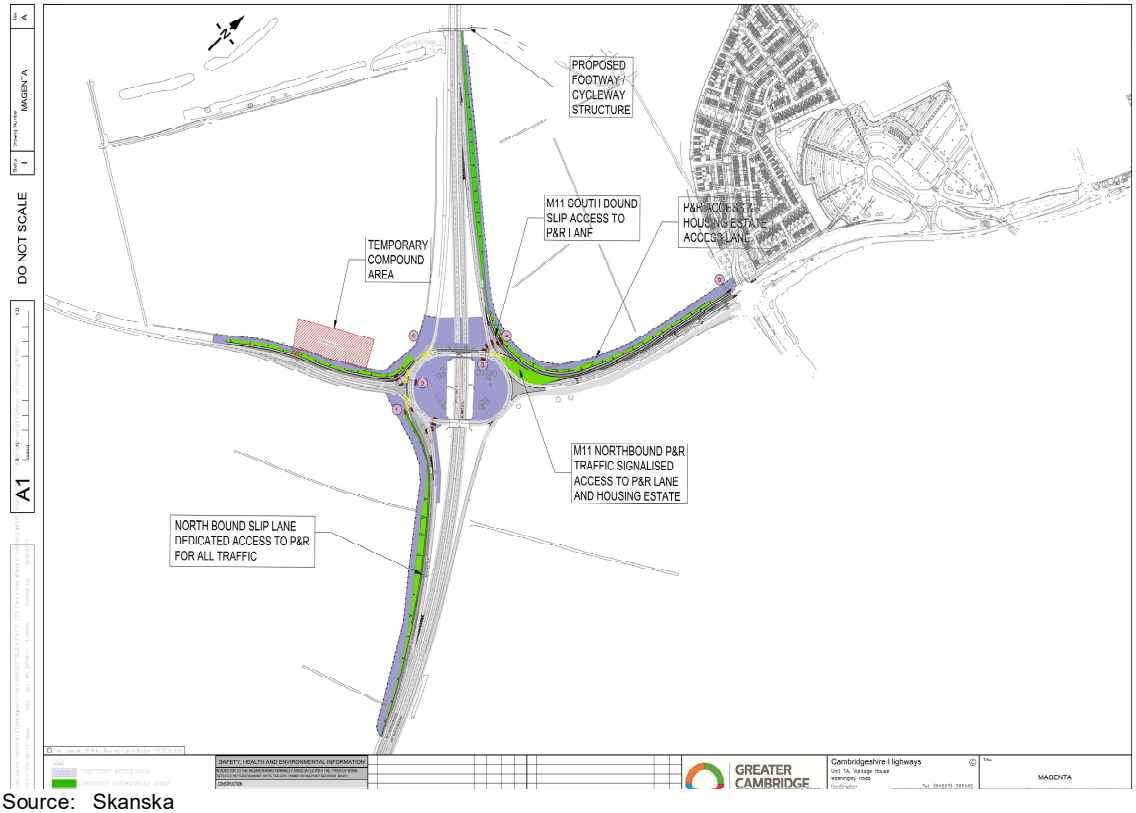
3.4.1 Do Minimum (baseline comparator)

For the Do Minimum option there will be no major expansion of the Park and Ride provision in close proximity to Junction 11. There will only be minimal surface level expansion of the existing Trumpington Park and Ride site to include an additional 274 car parking spaces and there will also be an additional five bus parking spaces, which is all being developed as part of a separate planning application. If nothing more than the Do Minimum option is adopted it will cause the demand at Trumpington Park and Ride to exceed capacity in the future.

3.4.2 Magenta

For the Magenta option a major expansion of the Park and Ride facility at Trumpington is proposed, providing an additional 946 spaces, increasing the number to 2560. The option will involve the addition of two new decks above the existing site, as there is no available land to enable expansion immediately surrounding the site. New dedicated Park and Ride access lanes for general traffic which will extend back to the motorway off slips and the A10 will be installed. As part of this investment, the overbridge at J11 will most likely need widening. The diagram in Figure 47 shows the plan for the Magenta option.

Figure 47: Magenta Option

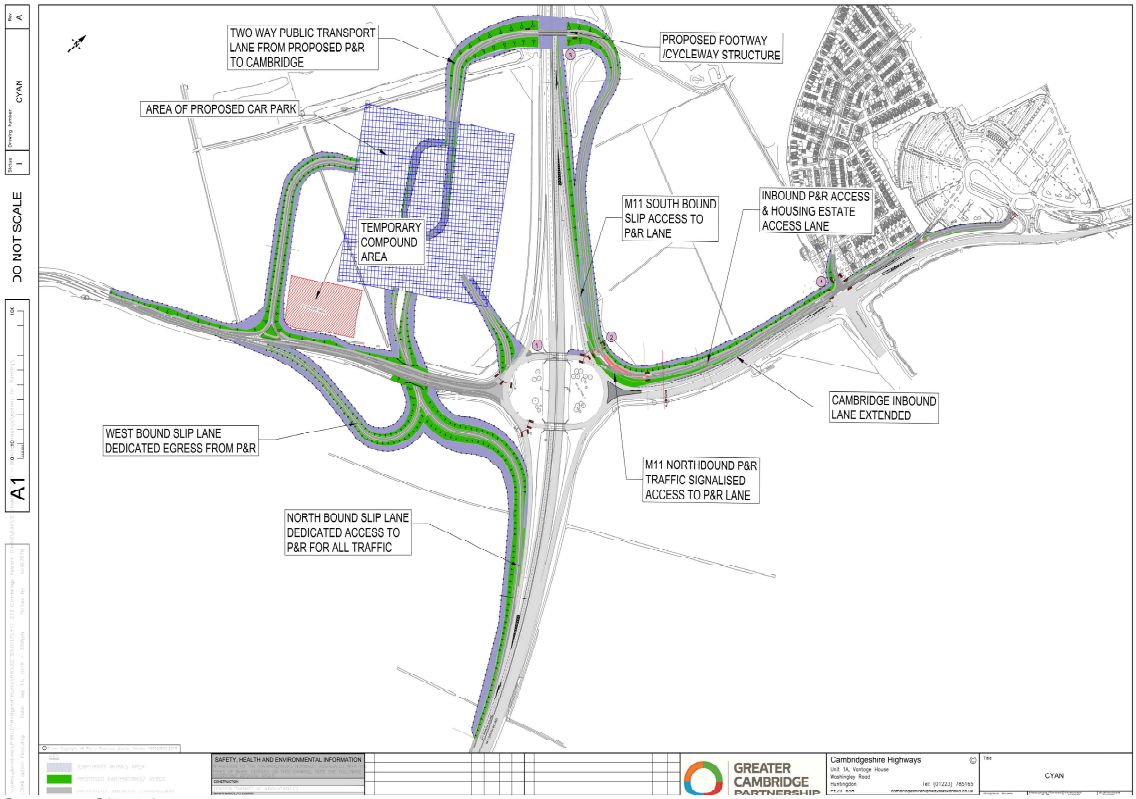


Source: Skanska

3.4.3 Cyan

The proposed plan for the Cyan option is to develop a new Park and Ride site. There will be a dedicated northbound off-slip from the M11 which then passes below the A10 in a tunnel. A dedicated left-turn lane will be installed from the A10 at Hauxton into the Park and Ride site. For traffic travelling southbound on the A10 there will be a dedicated slip road to access the Park and Ride site. The southbound traffic exiting the site will also use the tunnel to prevent traffic having to turn right across the A10. A free flow left turn lane from the southbound motorway off slip to the A1309 for Trumpington Park and Ride will be implemented. Buses will cross the motorway using the existing accommodation bridge to the north, then will continue to travel alongside the southbound off-slip. A detailed diagram of this option is provided in Figure 48.

Figure 48: Cyan Option

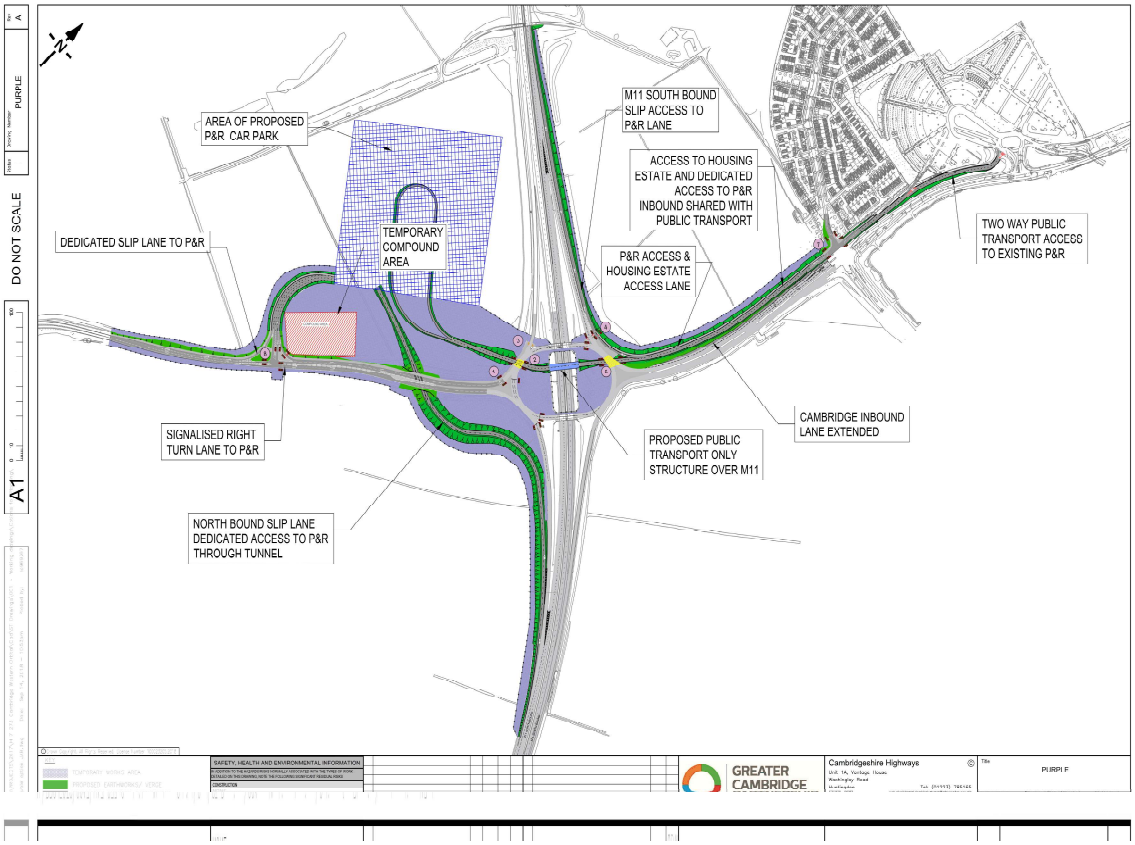


Source: Skanska

3.4.4 Purple

For the Purple option a new Park and Ride site will be developed. There is a dedicated northbound off slip from the M11 which passes below the A10 via a tunnel. Traffic will also negotiate a new junction on the A10. A dedicated left turn lane from the A10 at Hauxton into the Park and Ride site will be installed. A free flow left turn lane from the southbound motorway off-slip to the A1309 for Trumpington Park and Ride will also be implemented. Buses will pass directly through the centre of J11 using a new bridge structure that runs across the M11. Figure 49 shows the proposed plan for the Purple Option.

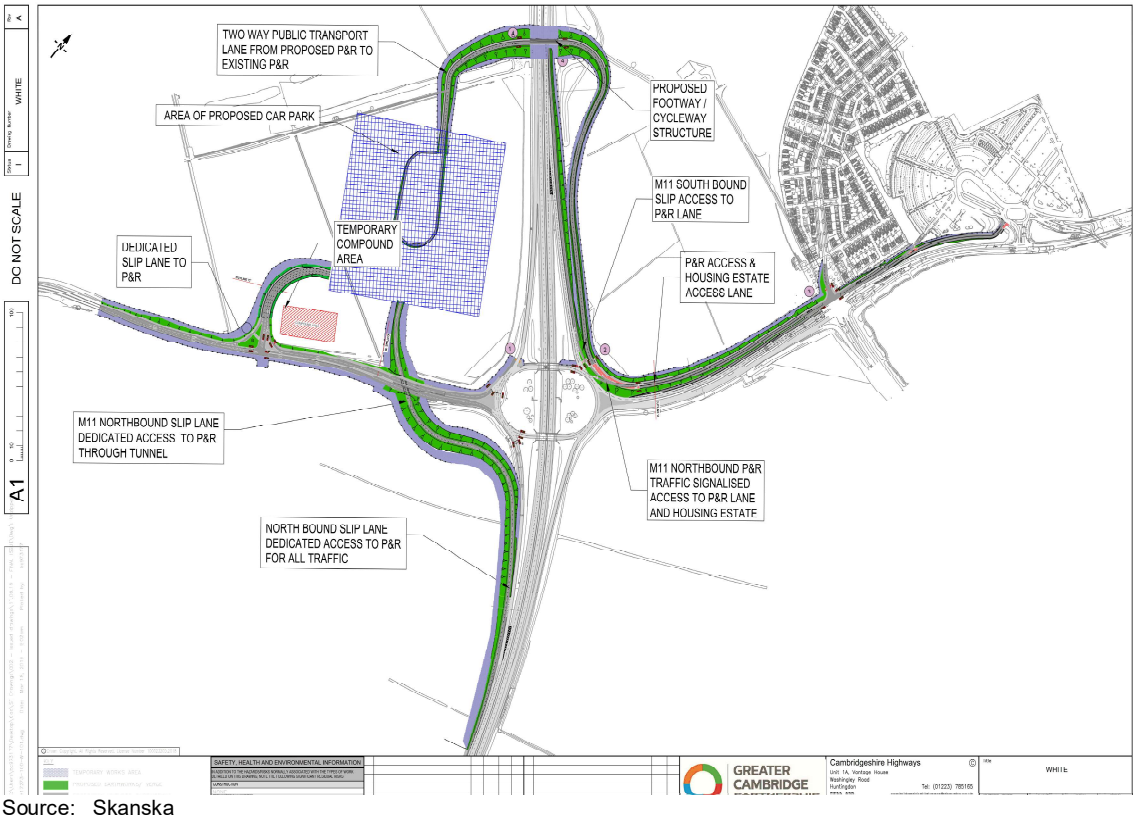
Figure 49: Purple Option



3.4.5 White

The White option involves establishing a new Park and Ride site. There will be a dedicated northbound off slip from the M11 which passes below the A10 in a tunnel. A new junction on the A10 will be created. A dedicated left-turn lane will operate from the A10 at Hauxton into the Park and Ride site. There will also be a free flow left turn lane from the southbound motorway off slip to the A1309 for Trumpington Park and Ride. Buses will cross the motorway using the accommodation bridge to the north and will then route alongside the southbound off-slip. Figure 50 shows the proposed plan.

Figure 50: White Option

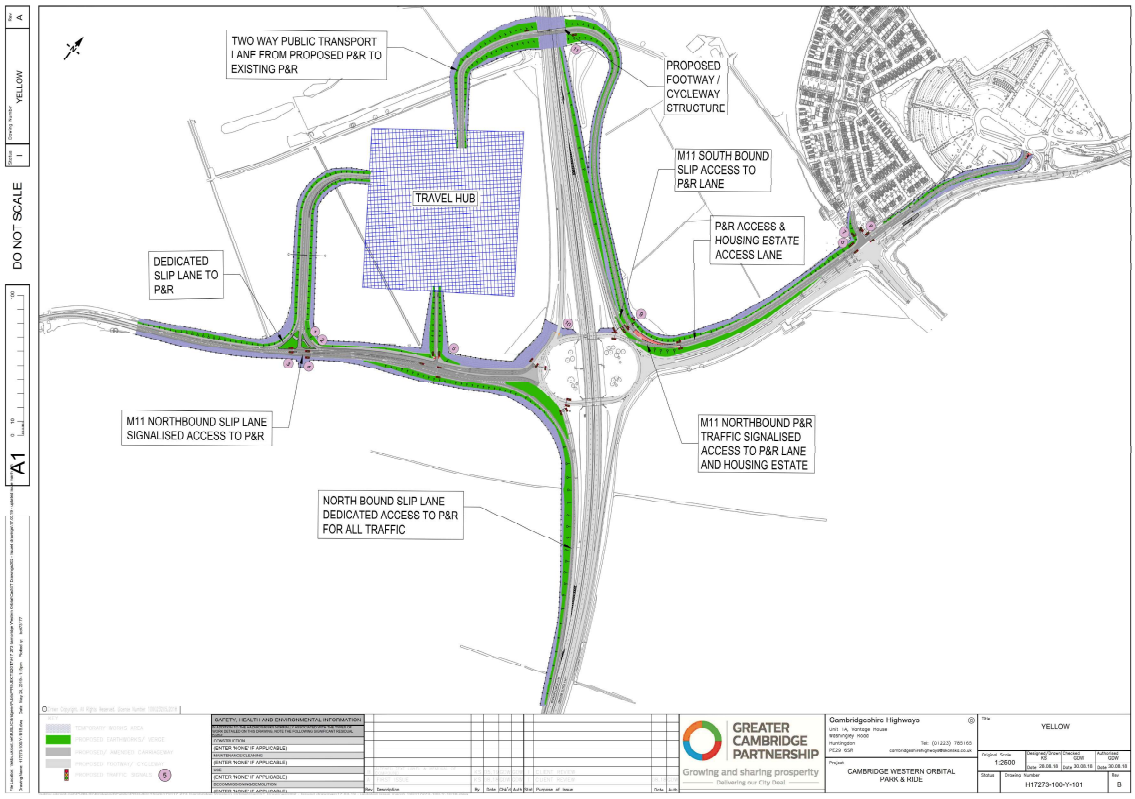


Source: Skanska

3.4.6 Yellow

The Yellow option will involve the development of a new Park and Ride site with general traffic access/egress from two new junctions on the A10. A dedicated left turn lane will be provided from the A10 at Hauxton into the Park and Ride site. There will also be additional free flow left turn lanes from both motorway carriageways and off slips. Buses will cross the motorway using the existing accommodation bridge to the north and will then route alongside the southbound off slip. The plan for the Yellow option is displayed in Figure 51.

Figure 51: Yellow Option



Source: Skanska

3.5 Presentation of Shortlisted Options for Purposes of Consultation

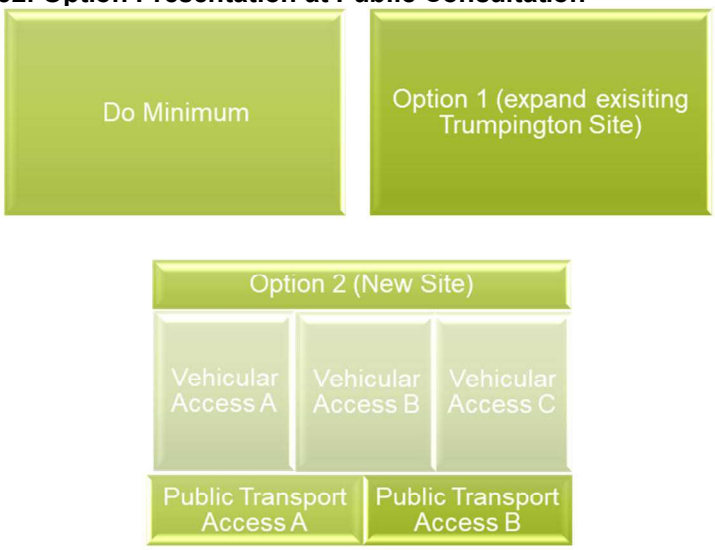
As some of the short-listed options are similar in their approach, it was agreed to present the options for public consultation in a less technical and detailed manner. For example, the Cyan, Purple, White and Yellow options are all essentially variants of the same option at the same site and thus it would be difficult for the general public to differentiate between them,

For consultation, the Cyan, Purple, White and Yellow options were combined and presented as Option 2. All four options propose a new site in the same location but have subtle differences in the agreed access arrangements. Three different variants for vehicular access were presented - Options 2A, 2B and 2C, as were two variants for public transport access, known as Option 2PTA and 2PTB.

The Do Minimum and the Magenta Options, with the latter now known as Option 1, were presented for public consultation without revision.

This approach is shown in Figure 52 and more detail is provided in Section 3.5.1.

Figure 52: Option Presentation at Public Consultation



3.5.1 Overview of the Options as Presented in Consultation Material

Do Minimum: Accept that the Park and Ride, with a capacity of 1614 spaces (taking into account the 274 new car spaces and five new bus spaces, to be built in 2019), will only address the current capacity issues; there would be insufficient capacity as a result of future developments such as those at the Cambridge Biomedical Campus.

Option 1 see Figure 53: Expansion of the existing Trumpington site by adding two additional storeys over part of the site that would provide an additional 946 spaces, increasing capacity to 2560. This would support additional parking capacity for a future CAM network stop and support the growth forecast in the local plan. It would not, however, support the GCP's aspirations to reduce peak-time congestion. Approximate cost would be £9m and construction would be complete by the end of 2023.

Figure 53: Option 1: Expansion at Existing Trumpington Park and Ride

Source: Mott MacDonald

Option 2 see Figure 54**:** No further work would be undertaken at Trumpington after the 274 new car spaces and five new bus spaces are completed in 2019. Instead a new site that could provide an additional 2260 spaces would be built north west of J11 alongside the M11 and A10 which would increase car parking spaces in the area to 3874.This would be a ground level Park and Ride located in the greenbelt, that could also form part of a future CAM network. This option would fully meet the growth aspirations set out in the South Cambridgeshire Local Plan and support the GCP's target to reduce peak-time congestion. The approximate cost would be £11m and construction would, as with Option 1, be complete by the end of 2023.

Figure 54: Option 2: New Site

Source: Mott MacDonald

In addition to the actual construction of the new spaces in Option 1 and the new site in Option 2, both options would also include changes to the road network to allow for dedicated access for private vehicles to get to the sites.

The key changes to the road network to allow for vehicle access under Option 1 are noted in Table 23. The approximate construction costs for the implementation of the proposed access is £13.5m. This is in addition to the approximate £9m required to expand the Trumpington site.

Figure 55: Proposed Changes to the Road Network – Option 1

Source: Mott MacDonald

Table 23: Option 1: Key Road Network Changes to allow Private Vehicular Access

Option 1
• New dedicated Park and Ride access lanes on the M11 and A10 exit slip roads
• Southbound M11 Park and Ride exit slip road to bypass J11 and tie in to the existing Park and Ride lane on the A1309
• Widening of the A10 roundabout bridges over the M11 at J11
• The changes would cause some disruption to the local highways network including the M11, M11 slip roads and A10 during construction

Option 2 has three possible variants for private vehicle access and two for public transport access. The key features of the three private vehicular access option variants A, B and C are noted in Table 24 and the two public transport access option variants in Table 25

Option 2 could also include the following elements of Option 1:

- A southbound M11 Park and Ride exit slip road bypassing J11 and tying into the existing Park and Ride lane to Trumpington Park and Ride.
- An additional dedicated left-turn lane on the A10 for a new site.

However, these are not included in the costs noted in Table 24.

Table 24: Option 2: New Site - Private Vehicular Access Variants

Option A	Option B	Option C
• Two signalised junctions on the A10	• One signalised junction on the A10 at the entrance to the Park and Ride site	• Dedicated slip roads to the Park and Ride site so vehicles do not need to turn right across the A10
• New left turn filter lane on to the A10 for traffic from the M11 northbound	• New dedicated northbound slip exiting the M11 at J11, passing under the A10 directly into the Park and Ride site.	• Junction entrance to the site on the A10 for left in and left out turns only
• Medium construction impact	• High construction impact	• High construction impact
• Approximate construction cost £4m	• Approximate construction cost £12m	• Approximate construction cost £11m

The construction costs noted for each private vehicular vehicle access option in the table above are in addition to the approximated £11m required to build the new site.

Illustrations of the three proposed private vehicular access options are shown in Figure 56, Figure 57 and Figure 58

Figure 56: Private Vehicular Access: Option A

Source: Mott MacDonald

Figure 57: Private Vehicular Access: Option B

Source: Mott MacDonald

Figure 58: Private Vehicular Access: Option C

Source: Mott MacDonald

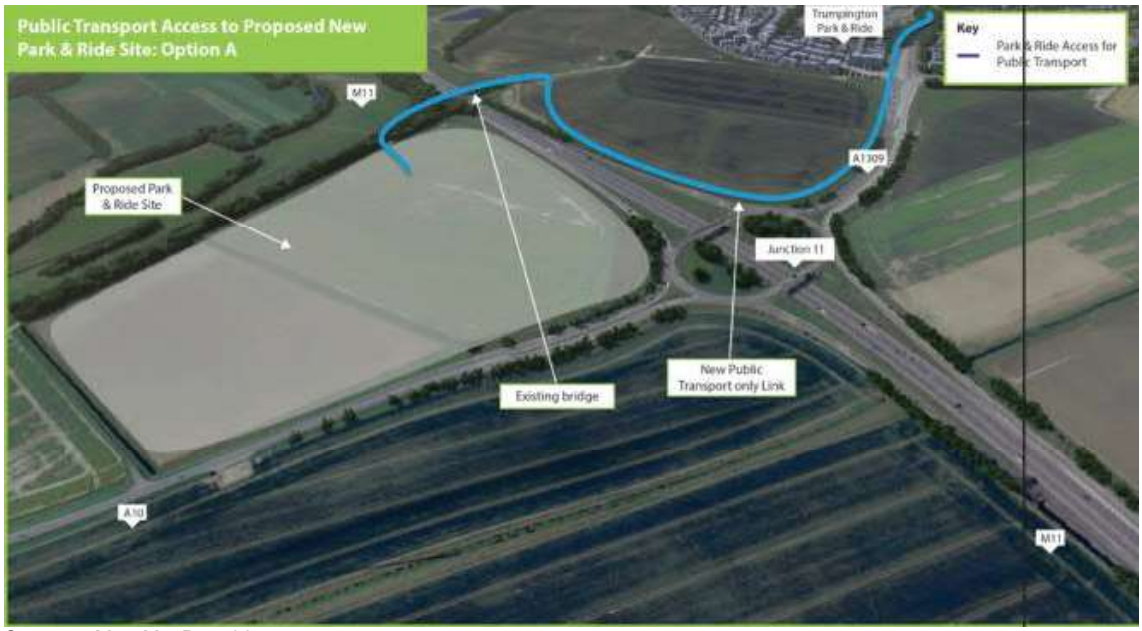
Table 25: Option 2: New Site - Public Transport Access Variants

Option (PT) A	Option (PT)B
• Dedicated busway from the north of the site crossing the M11 using an existing bridge north of J11 and then running alongside the M11 southbound exit slip road on a dedicated bus only lane which will continue alongside the A1309 to the existing Trumpington site	• Buses to pass through J11 over a new dedicated public transport bridge and then run alongside the A10 on a dedicated lane to the existing Trumpington site
• Construction would require some lane restrictions or temporary signals on the A1309 and at the junction of the A10/M11. Bridge works will require some overnight closures of the M11	• Construction would require some lane restrictions or temporary signals on the A1309 and at the junction of the A10/M11. Bridge works will require some overnight closures of the M11. There is also likely to be some reduction in capacity at Junction 11
• Approximate construction cost £4.5m	• Approximate construction cost £11.5m

The construction costs noted for each public transport access option variant in Table 25 are in addition to the approximated £11m required to build the new site and the costs associated with private vehicular access noted in Table 24.

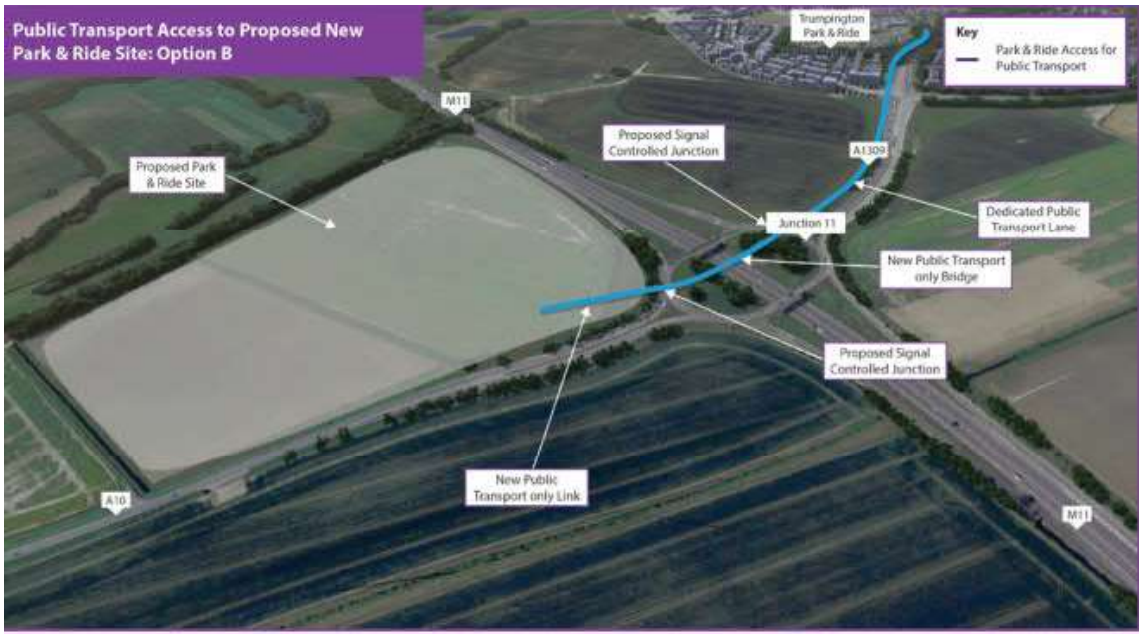
Illustrations of the proposed access options are shown in Figure 59 and Figure 60.

Figure 59: Public Transport Access Option (PT) A



Source: Mott MacDonald

Figure 60: Public Transport Access Option (PT) B



3.6 OBC Appraisal Process

The following subsection details the Options Appraisal process undertaken at OBC stage to determine a preferred option for the Cambridge South West Park and Ride scheme.

Whilst the same multi-criteria assessment framework tool and the same assessment themes in the SOBC were applied to the Options Appraisal process at OBC stage, three additional criteria were added. The first was “Time to access the Park and Ride site from the M11 southbound”, under the theme of “Maximising Potential for Journeys to be Undertaken by Sustainable Modes”. This was because initially it was thought in the early stages of SOBC development that the study would not consider expansion of the existing Trumpington Park and Ride site and focus was on access to the proposed new site. Any southbound traffic would have exited the M11 at J11 and used the Trumpington site, not the new site, so initially this criterion was not deemed necessary.

However, stakeholder feedback throughout advancement of the SOBC and OBC indicated that expansion of the existing Trumpington Park and Ride was viable for consideration and so time to access this site for southbound traffic is now relevant. Furthermore, the original criteria for access to the Park and Ride site from the A10 and northbound traffic on the M11 have been expanded to assess access from these locations to both the new site (for options that are applicable – as the Do Minimum and Magenta options do not feature a new site), and the existing Trumpington site.

The second new criterion was the likelihood of public support which was based on feedback from consultation. In-depth consultation on specific options had not been undertaken at SOBC stage and so it was not appropriate to include this as a criterion at that time. Three public consultation events were held in November and December 2018 to seek feedback on the shortlisted options from the general public and specifically from those living in the area of the proposed changes; their responses have been considered at OBC stage as part of the appraisal process. The criterion “Likelihood of Public Support” has therefore been added to the deliverability theme, as without public support, deliverability may become untenable.

The third new criterion related to the impact on greenbelt land under the Environment theme. Although impact on the landscape was previously included as one of the assessment criteria, it was felt that ‘landscape’ was quite broad and may not capture impacts specifically relating to greenbelt land.

These changes (highlighted in blue) and additions to the criteria (highlighted in red) are shown in Figure 61.

Where available, at OBC stage appraisal against the themed criteria used quantitative metrics but where this was not possible a more robust analysis was undertaken to qualitatively assess options.

Figure 61: Revised Assessment Criteria

Source: Mott MacDonald

The four assessment themes are listed in Table 26, together with the method(s) of assessment used for each theme:

Table 26: Assessment Themes and Data/Evidence Sources used for Assessment

Assessment Theme	Data/Evidence Sources
Theme 1: Reducing traffic levels and congestion	Saturn modelling
Theme 2: Maximising potential for journeys to be undertaken by sustainable modes	Saturn modelling
Theme 3: Quality of life and environment	Traffic data, social impact analysis and assessment of potential impacts on air quality, noise, greenhouse gases, landscape, biodiversity, water, historic environment and green belt.
Theme 4: Scheme deliverability	Contractors/designers risk register and planning assessments/consultation feedback

Source: Mott MacDonald

The detail of each of these processes is noted by theme in the following sections, followed by the results of the assessment.

3.6.1 Theme 1: Reducing Traffic Levels and Congestion

The CSRM SATURN model was used to quantitatively appraise the shortlisted options against criteria under this theme. Models have been built representing the AM peak (08:00-09:00) and PM peak hour (17:00-18:00), also an average Interpeak hour between 10:00-16:00.

3.6.1.1 Cambridge Sub-Regional Model (CSRM) SATURN Highway Assignment Model

The CSRM C-Series 2015 base year highway traffic model was reviewed and re-calibrated to improve the suitability of use of the SATURN highway model for the assessment of the proposed Cambridge South West Park and Ride scheme.

For a more detailed report about the calibration of received model please refer to the appended Cambridge South West Park and Ride- SATURN Modelling and Economic Assessment, .

Forecast Year Models

The 2031 CSRM2 C-series Foundation Case networks and matrices were used as the starting point for the assessments. The Foundation Case represents a scenario which is consistent with the current Local Plans draft 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 projects which are either committed or expected to be required to support development.

Changes made to the base year network have been included in the 2031 forecast networks together with optimisation of signal timings at key junctions along the Trumpington Road.

Matrix Changes

To model how traffic would behave with the addition of a new Park and Ride, three changes had to be made to the trip matrix as follows:

- Creation of a Trumpington 'drop-off zone'
- Creation of a 'new' Park and Ride zone
- Re-allocation of traffic to and from these new zones

Options

In addition to assessing the five shortlisted Do Something options which were modelled using Local Plan levels of development (previously referred to as 'Medium Growth'), a sensitivity test was also applied which assessed the overall best performing[1] Do Something option (Purple – identified using early indicators) against a scenario with Local Plan levels of development plus City Access Penalty capacity restraint measures (CAP) in place. As identified in the City Access Strategy, these capacity restraint measures could include workplace parking levies, traffic management and improved cycling provision. The measures are therefore expected to increase numbers of people wanting to use Park and Ride sites.

A Do Minimum scenario, which is effectively 'Do Nothing' as it accounts for already committed change, was also modelled to show how the network operates with forecast levels of traffic and no additional Park and Ride changes; this enabled comparison of the Do Something options to effectively doing nothing.

The results for each of the option assessments, including the Purple option with CAP measures, are shown for both the AM and PM peak in Table 27 and Table 28. A narrative regarding the best and worst performing options against each criterion follows on from this and is concluded by an overall summary of the best and worst performing options under the theme as a whole, based on the established criteria.

[1] Defined as the number of processed vehicles, which is the number of vehicles to pass through the network

Table 27: AM Peak 08:00-09:00

Option/criteria	Traffic Flow on J11 Circulatory (total number of vehs entering)	Overall Delay at J11 (total in secs)	Traffic Flow on A1309 Hauxton (average number of vehs)	Traffic Flow on A1309 High St (average number of vehs)	Traffic Flow on A10, Harston (average number of vehs)	Delay on A10 Between Harston and M11 (average in secs)
			North bound	North bound	North bound	North bound
DM	4125	464	1891	874	893	154
Magenta	4105	972	2026	862	884	179
Cyan	4061	532	1707	860	924	279
Purple	3816	493	1856	874	909	302
White	4029	314	1739	883	917	255
Yellow	4090	253	1796	904	909	263
Purple CAP*	3305	421	1531	874	878	231

Source: Mott MacDonald

Table 28: PM Peak 17:00-18:00

Option/criteria	Traffic Flow on J11 Circulatory (total number of vehs entering)	Overall Delay at J11 (total in secs)	Traffic Flow on A1309 Hauxton (average number of vehs)	Traffic Flow on A1309 High St (average number of vehs)	Traffic Flow on A10, Harston (average number of vehs)	Delay on A10 Between Harston and M11 (average in secs)
			South bound	South bound	South bound	South bound
DM	3831	798	1762	1106	711	214
Magenta	3770	943	1671	895	705	152
Cyan	3892	902	1440	972	704	140
Purple	3671	782	1498	859	707	195
White	4046	454	1622	921	741	174
Yellow	3911	442	1574	861	703	140
Purple CAP*	3401	667	1528	1032	718	301

Source: Mott MacDonald

*Option with City Access Plan penalty (CAP) measures assumed to also be in place.

The performance of the options against each of the individual criteria compared to the Do Minimum, and where applicable sub criteria are summarised as follows (note that Purple with CAP is not considered as best/worst performing as it is run with different levels of traffic growth):

Traffic Flow on the J11 Circulatory

In terms of the total traffic flow entering the junction, measured in vehicles, all options reduce the flows in the AM peak with Purple showing the largest reduction. The pattern is more varied in the PM peak with higher total flows in some options, but again Purple shows the biggest reduction. This is in consideration of the fact that the aim of the theme is to reduce traffic levels (flow) and congestion (delay).

Overall Delay at Junction 11

Measured as the total number of seconds delay, the worst performing option with greatest delay in both AM and PM peaks is Magenta, the best performing option with lowest delay is Yellow.

Traffic Flow on A1309 – Hauxton

In terms of the average traffic flows northbound in the AM peak, the Magenta option performs the worst with highest flows, the Cyan option performs best with the lowest flows.

In a southbound direction in the PM peak, again Magenta performs the worst and Cyan has the lowest flow.

Traffic Flow on A1309 – High Street

In terms of the average traffic flows northbound in the AM peak, the flows are all very similar with only 40 vehicles difference from lowest (Cyan) to highest (Yellow).

In the southbound direction in the PM peak Cyan has the highest flow, with Purple showing the biggest reduction in flow.

Traffic Flow on A10 – Harston

In terms of the average traffic flows northbound in the AM peak, the White option performs worst with the highest flow although again the flows are very similar across all options with a difference of only 33 vehicles from highest to lowest (Magenta).

In the southbound direction in the PM peak the flows are also very similar across all options with a difference of 38 vehicles between highest (Purple) and lowest (Yellow)

Delay on the A10 between Harston and the M11

Measured as the average number of seconds, the worst performing option in the northbound direction in the AM peak is the Purple option. The best performing option in the AM Peak is the Magenta option.

In a southbound direction the Purple option is again the worst performing option. The Yellow option is the best performing option with the least delay.

Summary of Assessment of Options against Theme 1

In looking at each of the criteria and sub-criteria under both the AM and PM peaks, the Yellow option performs the best on more occasions than any other option, performing best under 4 out of the 12 sub criteria, noting that on occasions performance is very close across all options.

The Magenta and White options perform worst against the greatest number of sub criteria, again noting that some of these performances are very close across all options under some of those criteria.

3.6.1.2 Sensitivity Testing Background and Conclusion

A sensitivity test was also run with Local Plan development levels, but with the application of City Access (CAP) measures for private vehicles accessing the city centre and reassigning those trips to public transport; increasing the number of people using Park and Ride sites. It was decided to only run this test on one option as it is only to show how an option performs with higher Park and Ride numbers. Based on work using the microsimulation VISSIM model, the best performing Do Something Option had been assessed as Purple; based on the number of vehicles processed through the network. Further detail on the process undertaken in respect of the VISSIM modelling process and additional findings outside the scope of the options appraisal criteria, regarding overall network performance, junction performance and journey time can be found in the appended Cambridge M11 J11 VISSIM Model Assessment Report, document reference 393699-MMD-TMO-XX-RP-TA-0038.

Purple (CAP) performs better than Purple for 8 out of the 12 sub-criteria shown above. This illustrates the importance of ensuring that this scheme is delivered as part of a wider package of schemes to reduce congestion and improve connectivity in Cambridge.

3.6.2 Theme 2: Maximising Potential for Journeys to be Undertaken by Sustainable Modes

The Cambridge Sub-Regional Model (CSRM) SATURN highway assignment model was also used to quantitatively appraise four of the six Cambridge South West Park and Ride Scheme criteria under this theme, namely:

- Time to access both the proposed, new and existing Trumpington Park and Ride site from A10
- Time to access both the proposed, new and existing Trumpington Park and Ride site from the M11 northbound
- Time to access both the proposed, new and existing Trumpington Park and Ride site from the M11 southbound
- Park and Ride bus journey time

The model was used to show the effect of transport interventions, such as a new Park and Ride site, and the effect on general traffic conditions of housing or employment developments that have an impact on the levels of traffic trying to use the available network. It uses the relationship between traffic demand and capacity to send traffic via the best available route in a representative average peak hour (AM 08:00-09:00 and PM 17:00-18:00).

Following a brief overview of the general modelling process initially noted in section 3.6.1 and further elaborated on in section 3.6.1.1, the process and results of the options appraisal against the first three criteria for both the AM and PM peaks are shown in section 3.6.2.1 in Table 29, Table 30 and Table 31. The results of option performance against the criterion of Park and Ride bus journey time are shown in Table 34 and with CAP measures applied against the best performing Do Something option at the new site (Purple) in Table 36

The remaining two criteria under this theme noted here, were assessed qualitatively and the assessment outcomes are noted in sections 3.6.2.3 and 3.6.2.4:

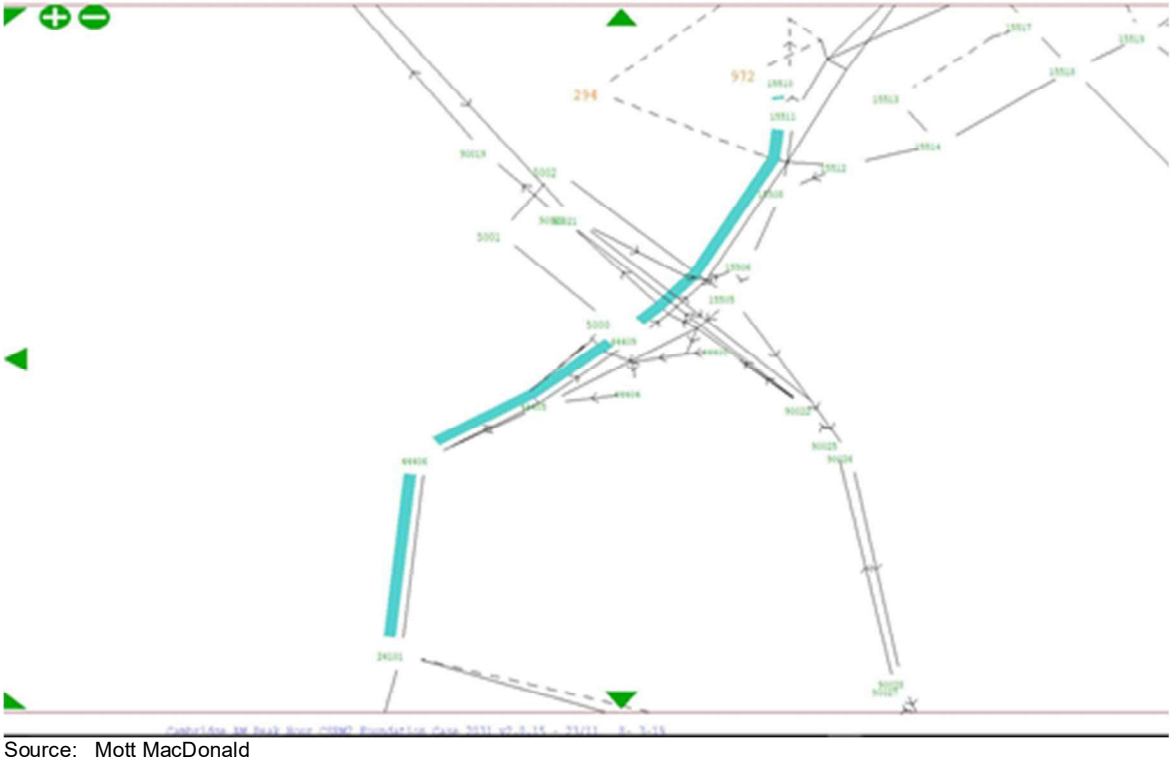
- Potential to link with existing public transport; and
- Potential to link with future public transport proposals.

3.6.2.1 Assessment of Journey Times to/from the M11 Northbound and Southbound and from the A10 to both the Proposed New Park and Ride Site and the Existing Trumpington Site

Figure 62 to Figure 67 depict the routes for the extracted data from the SATURN model used to derive the journey times to both the new Park and Ride site and the existing Trumpington Park and Ride Site from the A10, M11 Northbound and M11 Southbound, which are the first three of the assessment criteria under this theme.

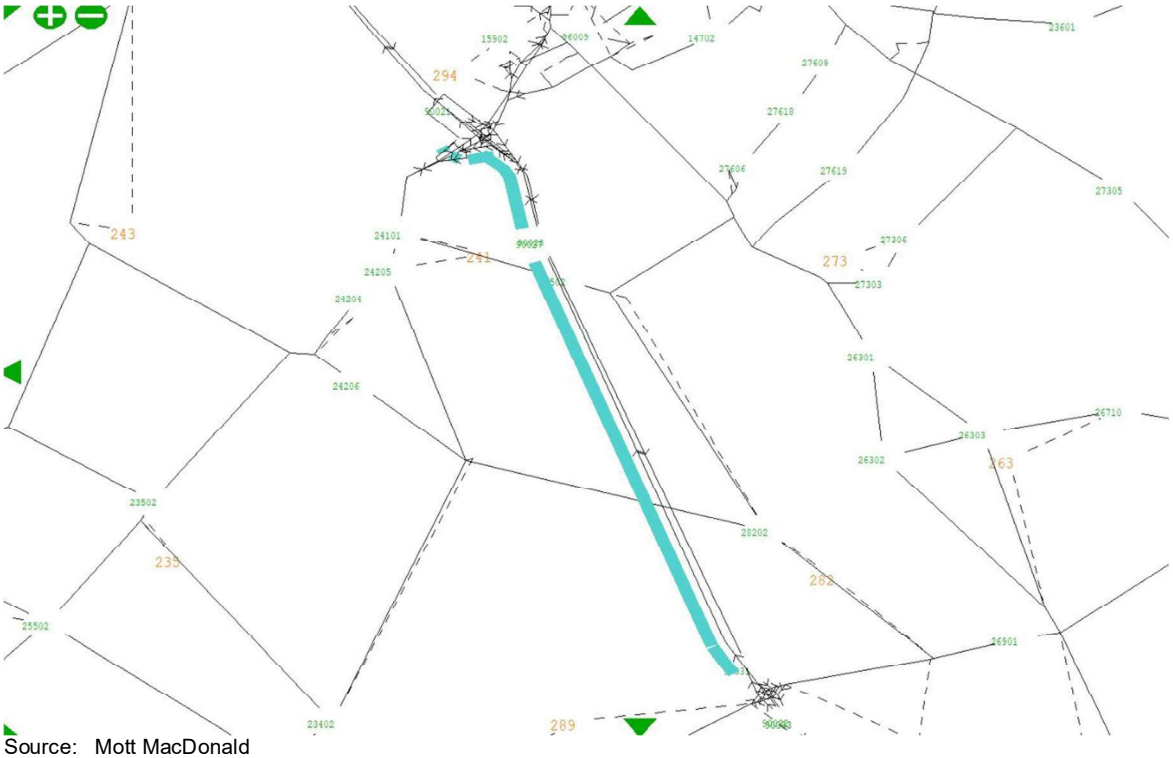
Figure 62: Journey Time Route from A10 to New Park and Ride Site

Figure 63: Journey Time Route from A10 to Existing Trumpington Park and Ride Site



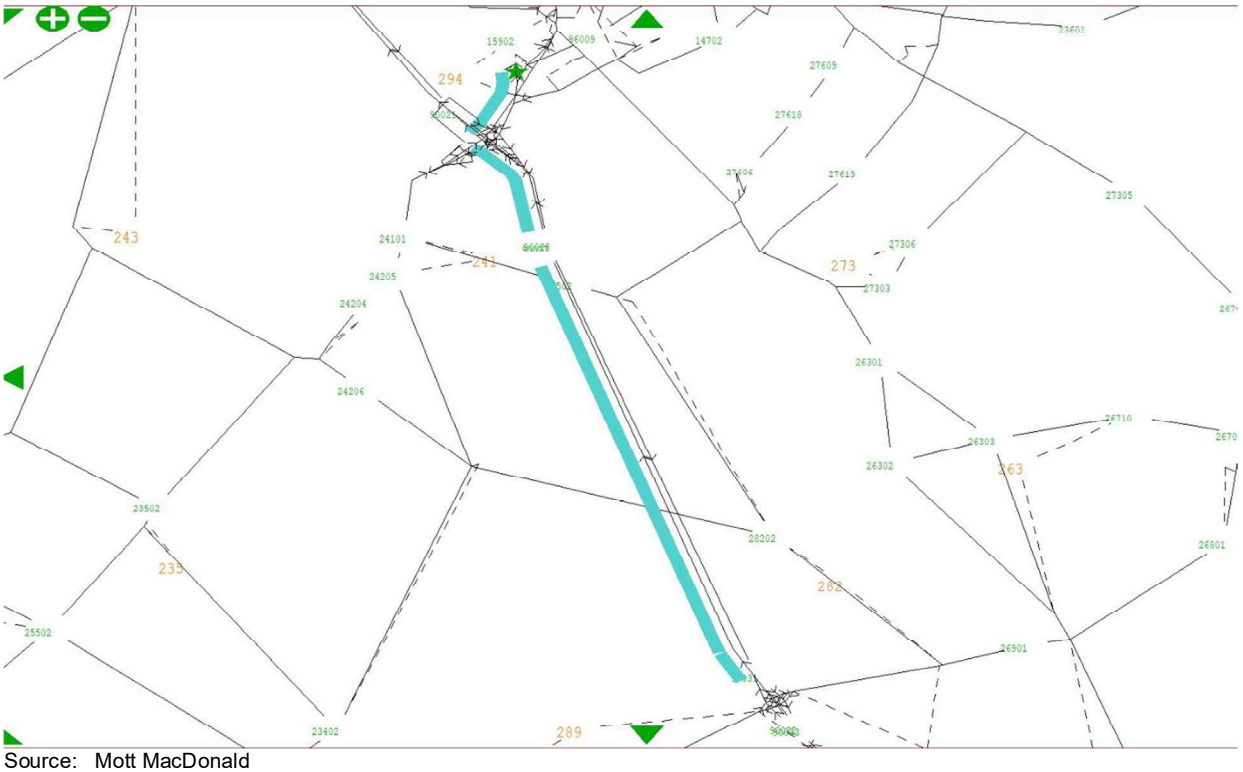
Source: Mott MacDonald

Figure 64: Journey Time Route from M11 Northbound to New Park and Ride Site



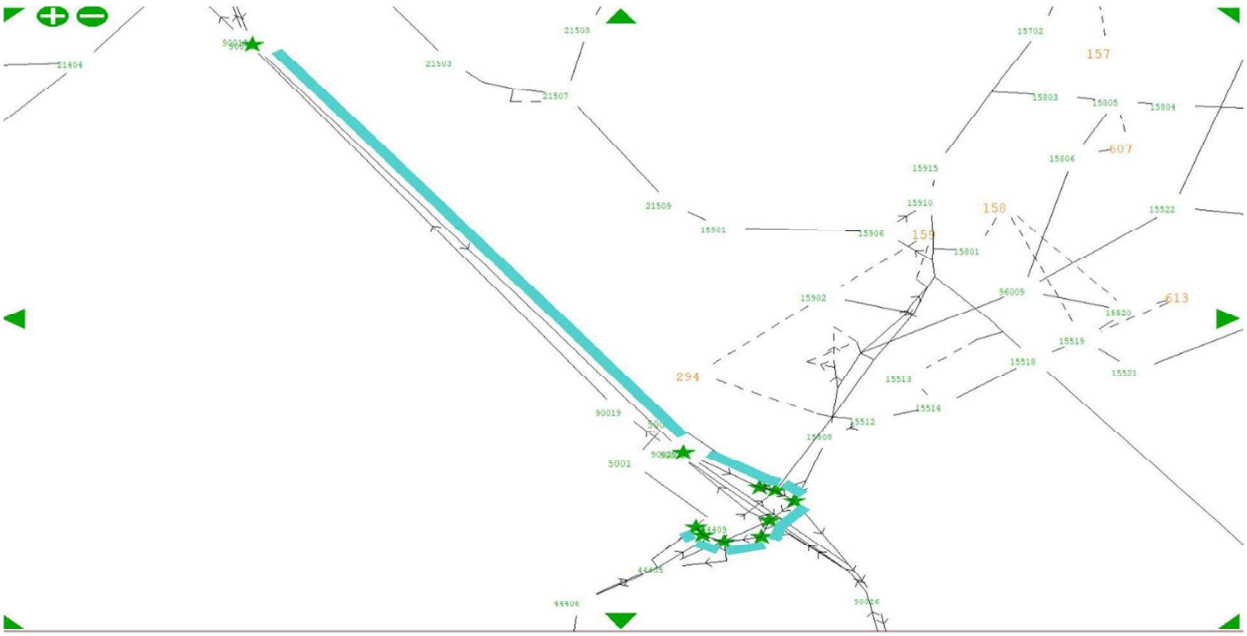
Source: Mott MacDonald

Figure 65: Journey Time Route from M11 Northbound to Existing Trumpington Park and Ride Site



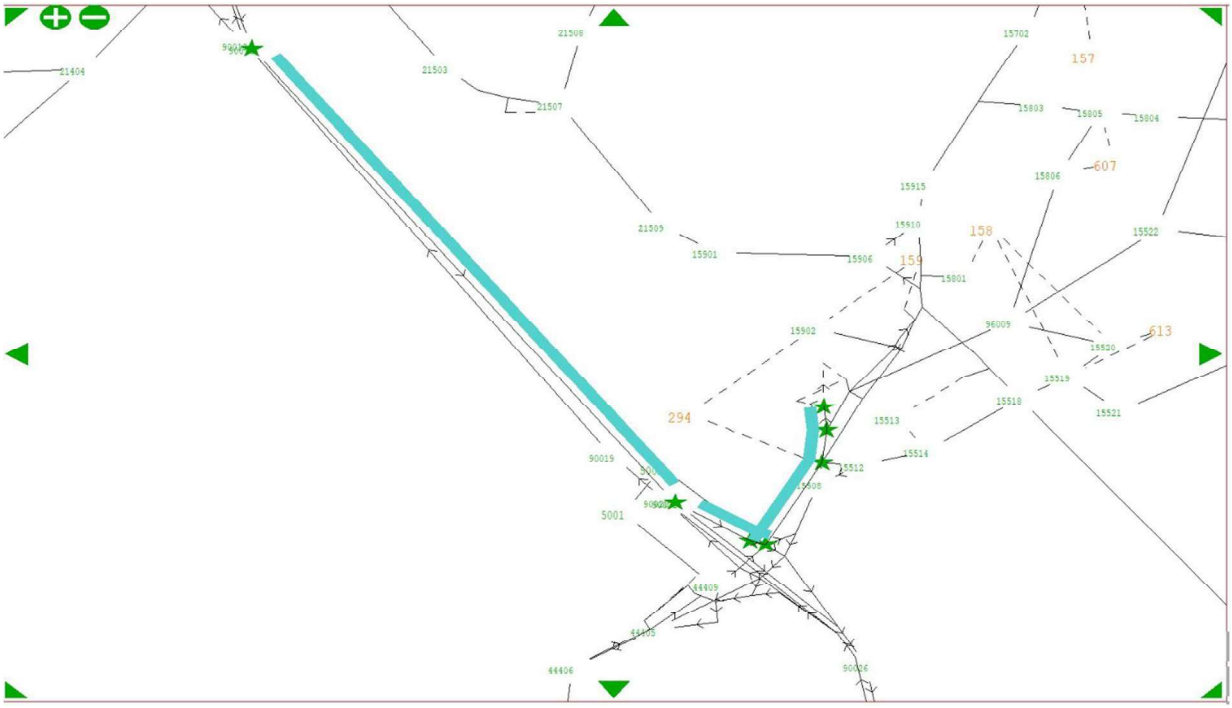
Source: Mott MacDonald

Figure 66: Journey Time Route from M11 Southbound to New Park and Ride Site



Source: Mott MacDonald

Figure 67: Journey Time Route from M11 Southbound to Existing Trumpington Park and Ride Site



Source: Mott MacDonald

The results of modelling the options for each of the six potential journey time routes are noted in Table 29 to Table 31. Figures for inbound traffic to the Park and Ride sites are given for the AM peak, to account for commuters into the city, and for the PM peak to account for evening leisure traffic. Outbound figures are given only for the PM peak to account for commuters travelling home, as there is no provision for overnight parking that would warrant any traffic leaving the Park and Ride sites in the AM peak.

Traffic from the M11 southbound has been assumed to use the existing site, while traffic from the M11 northbound and from the A10 has been assumed to use the new site.

The red numbers in Table 29 to Table 31indicate travel time for traffic from each approach to the other Park and Ride site ie. the one they are not assumed to use in the model but have been included for completeness. Only the black numbers have been used in consideration of which option provides quickest access/egress to the most logical Park and Ride site for the direction of traffic flow. Journey times have been taken back to the next junction prior to the M11 J11 along both the A10 and the M11 for all options.

As discussed previously, all options were modelled using Local Plan levels of development. A sensitivity test was also applied which assessed the overall best performing[1] Do Something option (Purple) with a scenario encompassing Local Plan levels of development plus City Access Penalty capacity restraint measures (CAP) in place. As identified in the City Access Strategy, these measures could include workplace parking levies, traffic management, improved cycling provision etc and are therefore expected to increase numbers of people wanting to use Park and Ride sites.

A narrative regarding the best and worst performing options against each criterion follows on from the tables.

[1] Defined as the number of processed vehicles, which is the number of vehicles to pass through the network

Table 29: Inbound 2031 AM Peak 08:00-09:00

Option/criteria	Time to Access Park and Ride Site from A10/Church Rd Junction (secs)		Time to Access Park and Ride Site from M11 J10 Northbound on-slip merge (secs)		Time to Access Park and Ride Site from M11 J12 Southbound on-slip merge (secs)	
	New Site	Existing Site	New Site	Existing Site	New Site	Existing Site
DM	n/a	452	n/a	643	n/a	297
Magenta	n/a	501	n/a	698	n/a	324
Cyan	70	319	359	641	341	323
Purple	83	458	360	585	421	310
White	76	392	355	596	369	321
Yellow	76	350	444	601	386	321
Purple CAP	85	387	354	554	367	290

Source: Mott MacDonald

Table 30: Inbound 2031 PM Peak 17:00-18:00

Option/criteria	Time to Access Park and Ride Site from A10/Church Rd Junction (secs)		Time to Access Park and Ride Site from M11 J10 Northbound on-slip merge (secs)		Time to Access Park and Ride Site from M11 J12 Southbound on-slip merge (secs)	
	New Site	Existing Site	New Site	Existing Site	New Site	Existing Site
DM	n/a	240	n/a	850	n/a	278
Magenta	n/a	339	n/a	649	n/a	299
Cyan	62	274	368	601	472	298
Purple	74	335	373	600	458	282
White	75	335	364	628	454	299
Yellow	75	314	446	612	480	300
Purple CAP	69	318	363	576	335	266

Source: Mott MacDonald

Table 31: Outbound 2031 PM Peak 1700-1800

Option/criteria	Time to Exit Park and Ride site to Access A10/Church Rd Junction (secs)		Time to Exit Park and Ride site to M11 J10 Southbound off-slip diverge (secs)		Time to Exit Park and Ride site to M11 J12 Northbound on-off-slip diverge (secs)	
	New Site	Existing Site	New Site	Existing Site	New Site	Existing Site
DM	n/a	464	n/a	570	n/a	980
Magenta	n/a	792	n/a	822	n/a	1049
Cyan	106	892	481	923	291	1141
Purple	118	525	496	587	379	935
White	158	581	513	650	346	824
Yellow	129	656	504	713	345	856
Purple CAP	122	711	516	878	435	997

Source: Mott MacDonald

Time to Access/Exit Park and Ride Site from/to A10

Under the criterion 'Time to access/exit Park and Ride from/to the A10' considering only the available or logical choices of Park and Ride for the direction of travel (indicated by black figures in the table), the Cyan option has the quickest inbound access time in both the AM and PM peak and it also offers the quickest outbound times. The Magenta option is the worst performing

in both the AM and PM, and both inbound and outbound, as would be expected as trips have to pass through J11.

Time to Access/Exit Park and Ride from/to M11 J10

Under the criterion 'Time to access/exit Park and Ride from/to M11 J12' it is assumed that all inbound traffic travelling north would logically only use the new Park and Ride site, if available. In both the AM and PM peaks, the White option is the best performing option with Magenta the worst in both the AM and PM peaks as this involves turning right through J11.

On exit this traffic will logically be heading to the southbound M11 towards J10. Time to access the M11 southbound figures are therefore all based on vehicles travelling from the new site where the option features a new site and from the existing Trumpington Site where the option does not feature a new site. Under this scenario the Cyan option performs the best and the Magenta option the worst.

Time to Access/Exit Park and Ride from/to M11 J12

Under the criterion 'Time to access/exit Park and Ride from/to M11 J10' it is assumed that all inbound traffic travelling south would logically only use the existing Trumpington Park and Ride site. In both the AM and PM peaks, the times across all options are very close with only 14 seconds in the AM between the lowest (Purple) and highest (Magenta), and only 18 seconds in the PM between the lowest (Purple) and highest (Yellow).

On exit, this traffic will logically be heading to the northbound M11 towards J12. Time to access the M11 northbound figures are therefore all based on vehicles travelling from the existing Trumpington Site. Under this scenario the White option performs the best and the Cyan option the worst.

These results address the first three of the assessment criteria under this theme; the fourth, Park and Ride Bus Journey Times is detailed in Section3.6.2.2 following a brief overview of the assessment process.

3.6.2.2 Park and Ride Bus Journey Time

The process and results of the appraisal process against the fourth criterion under this theme are noted here, following an overview of the context in which the appraisal was undertaken.

Bus Improvement Schemes North of Trumpington

As well as modelling the proposed changes to the Park and Ride provision and access/egress from it, additional bus priority measures are proposed north of the existing Trumpington site as part of the Cambridge South West Park and Ride project for all shortlisted options. These include new bus lanes, bus lane extensions, road widening and improved signalling. These have been considered in assessing how well the shortlisted options perform against the criteria of Park and Ride Bus Journey Times under a Local Plan Growth scenario.

A summary of these northern improvements are shown in Table 32 and are depicted in Figure 68, Figure 69 and Figure 70. Proposed changes to the north of, and including, the two mini-roundabouts at Trumpington Road/A1134 Fen Causeway and A603 Lensfield Road have not been modelled as part of this study.

Table 32: Summary of Northern Bus Scheme Improvements

Description
Utilisation of existing segregated lane for Park and Ride buses from Trumpington Park and Ride to the Waitrose access in the north-eastbound direction

Description
Utilisation of existing segregated lane for Park and Ride buses from Consort Avenue to Trumpington Park and Ride in the south-westbound direction.
Southbound right turn lane into Maris Lane extended approximately 40m northwards
Southbound bus gate on Trumpington Road to the north of Long Road moved approximately 80m further south with dedicated bus lane extended from existing
Creation of dedicated northbound bus lane on Trumpington Road for a distance of approximately 230m starting from Brooklands Ave
Creation of dedicated southbound bus lane on Trumpington Road for a distance of approximately 270m starting from approximately 65m south of the Trumpington Road/A1134 Fen Causeway mini-roundabout.

Source: Mott MacDonald

Figure 68: Waitrose Junction Improvements

Source: Mott MacDonald

Figure 69: Bus Lane Extension, Trumpington Road

Source: Mott MacDonald

Figure 70: New Bus Lane, Trumpington Road

Source: Mott MacDonald

As highlighted in Table 32, the majority of improvements to the north of Trumpington are focused on south-bound bus trips. With additional bus lanes and bus lane extensions aiming to decrease journey times for buses returning from the city centre.

However, more significant changes are highlighted at the Waitrose Junction (Figure 68), where a series of improvements ease access in and out of the Park and Ride. These include dedicated bus lanes.

Sensitivity Tests

Sensitivity tests were also run which assessed the overall best performing[1] Do Something option (Purple) with a scenario encompassing Local Plan levels of development with City Access Penalty capacity restraint measures (CAP) in place. As identified in the City Access Strategy, these measures could include workplace parking levies, traffic management, improved cycling provision etc.

The capacity reduction was implemented in CSRM by assuming a 30-minute time penalty for entering the city centre within the demand model. This had the effect of increasing demand for the Park and Ride sites.

Park and Ride Flows

In order to establish bus journey times for each of the options it was first necessary to establish how many people may require outbound bus services.

Traffic flows to and from the Park and Ride sites have been extracted from the SATURN model assignments to inform how many bus passengers may require services from the Park and Ride sites onward into the city centre or Biomedical Campus under both the assumptions of expansion at the existing Trumpington site only, or of the addition of a new site with the Trumpington site remaining open.

Park and Ride flows for the AM peak are the number of car trips accessing the Park and Ride sites while flows for the PM Peak period are the number of car trips exiting the Park and Ride sites. For the interpeak period an average of car trips arriving and leaving the Park and Ride was used.

A conservative assumption for car occupancy rate of 1.00 was used to convert these car trips into bus passengers. The final Park and Ride flows for each site in each time period are shown in Table 33.

Table 33: 2031 Park and Ride Bus Passengers

Time Period	Do Minimum	Magenta	Two Park and Ride sites: new Park and Ride option (either Cyan, Purple, White, and Yellow) and existing Trumpington site remaining open	
	Existing Trumpington Park and Ride	Existing Trumpington Park and Ride	Existing Trumpington Park and Ride	New Park and Ride site
AM	314	448	231	217
IP	109	153	72	81
PM	426	568	301	267

Columns two and three of Table 33 show the existing Park and Ride demand for the Do Minimum and Magenta options which focused on expansion of differing levels at the existing Trumpington site. When a new site is opened, demand for the existing Park and Ride has been

[1] Defined as the number of processed vehicles, which is the number of vehicles to pass through the network

assumed to be trips accessing it from the north of Junction 11 of the M11 as well as trips using the Grantchester Road and Addenbrooke's Road or Shelford Road (A1301) approaches. The number of trips from these approaches is slightly higher in the AM and PM peak periods than demand for the new Park and Ride site which access the site from the southeast and southwest approaches of Junction 11 of the M11 and the A10.

Bus Journey Time Savings

Provision of bus priority measures along Trumpington Road is expected to improve bus journey times between Trumpington Park and Ride and Cambridge City Centre. Consistent with the assumptions on demand estimation (based on the number of cars entering and leaving the car park with an assumption of one passenger per car), bus journey time savings for the inbound routes and for the outbound routes were used to calculate the total time savings in the AM and PM Peak periods respectively relative to the Do Minimum. Meanwhile, the average of inbound and outbound journey time savings was used for the interpeak period. Bus journey time changes relative to the Do Minimum are presented in Table 34.

Positive figures indicate an improvement on bus journey times relative to the Do Minimum, negative numbers indicate a deterioration on bus journey times relative to the Do Minimum.

Table 34: 2031 Bus Journey Time Savings (mins) between Existing Park and Ride to City Centre

Option	AM	IP	PM
Magenta	1.8	0.9	0.9
Cyan	2.2	0.9	1.5
Purple	1.6	1.0	-2.1
White	1.6	1.0	-2.0
Yellow	1.8	1.1	-1.6

All reductions in bus journey times are impacted by the northern changes made between Trumpington Park and Ride and Cambridge noted in Table 32, but are also influenced by the knock-on effects of localised congestion improvements in the surrounding area; these are predominantly Junction 11 improvements, but also altered signal timings for each option. This combination of congestion improvements surrounding Junction 11 in the Cyan option shows the most positive time saving value of 2.2 minutes in the AM peak.

Changes in bus journey time in the IP period are marginally positive across all options. Inbound journey time savings are observed for all options with minimal changes in outbound journey times.

In the PM peak, again inbound journey time savings occur for all options and outbound journey time savings occur for the Magenta and Cyan options, but not for the remaining three options.

The assessment of Purple, White, and Yellow options indicate the signal junction between Trumpington Road and Long Road is a bottleneck in the PM peak period; with long delays especially for Southbound trips. Further signal timing adjustments are recommended to reduce, if not eliminate, the congestion at this junction and substantially improve bus journeys between Trumpington and the city centre.

Journey times from the existing Trumpington Park and Ride site to the biomedical campus are not affected by the scheme as the bus priority improvement schemes are located between Trumpington and Cambridge city centre.

Sensitivity Test Results

Comparing the results in Table 35 (Purple option with CAP measures applied) to those in Table 33 (Purple option without CAP measures applied), bus passenger numbers increase across all time periods when access to Cambridge City centre is reduced. When comparing the Purple with CAP option with the Purple without CAP option, the increases in demand are consistent across all time frames. With total demand across both sites (new site and existing Trumpington site) increasing by approximately 30-55%.

Table 35: 2031 Sensitivity Test: Number of Park and Ride Bus Passengers

Time Period	Two Park and Ride sites: New Park and Ride Option (Purple) and Existing Trumpington Site which is assumed to remain open	
	Existing Trumpington Park and Ride	New Park and Ride site (Purple Option)
AM	415	301
IP	158	121
PM	530	337

The results of this increased demand caused by a reduction in city centre access can be seen in the reduction in bus journey times, presented in Table 36. This is shown alongside the options modelled under the Local Plan scenario. Positive figures indicate an improvement on bus journey times relative to the Do Minimum, negative numbers indicate a deterioration on bus journey times relative to the Do Minimum.

Table 36: 2031 Sensitivity Test: Bus Journey Time Savings (mins) from Existing Park and Ride to City Centre

Option	AM	IP	PM
Magenta	1.8	0.9	0.9
Cyan	2.2	0.9	1.5
Purple	1.6	1.0	-2.1
White	1.6	1.0	-2.0
Yellow	1.8	1.1	-1.6
Purple Sensitivity Test (CAP)	1.1	0.7	-0.3

The Purple option with CAP portrays similar time saving characteristics as without CAP, with time savings in both the AM and IP periods.

Due to the reduced levels of general traffic exiting the city centre in the PM peak with the CAP, the journey time increases are reduced during the sensitivity test. As before, the signalised junction between Trumpington Road and Long Road acts as a bottleneck in the PM peak period with long delays especially for southbound trips. However, this delay is reduced from 2.1 to 0.3 minutes with CAP implementation.

The remaining two assessment criteria under the theme of Maximising For a more detailed report about the modelling of forecast bus journey time savings please refer to the appended report entitled Cambridge M11 Junction 11- VISSIM Model Assessment Report, Document reference 393699-MMD-TMO-XX-RP-TA-0038.Potential for Journeys to be Undertaken by Sustainable Modes were assessed qualitatively and the outcomes are noted in Sections 3.6.2.3 and 3.6.2.4

3.6.2.3 Potential to Link with Existing Public Transport

The assessment of options against this criterion was qualitative in nature and considers public transport links to the existing bus network and Cambridge rail station under various scenarios.

Given that the Do Minimum option and Magenta option would result in no change in regard to new links with existing services, this criterion could potentially be viewed as not applicable, although Magenta has to have more potential than the Do Minimum as there are more car parking spaces available for use. Alternatively, these could be regarded as the more preferable of the options as the route into the city centre is closer in distance than the Purple, White, Yellow and Cyan options which are based on development of a new site.

Section 2.5.4 assesses how existing inter-urban bus services could be integrated with any new Park and Ride facility. This is the case regardless of which option is selected, hence there is no preference other than providing the most direct services to the city centre. Given that the Purple and White options offer shorter routes than the Cyan and Yellow options, the former would be preferable under this criterion, in combination with development of a new site.

3.6.2.4 Potential to Link with Future Public Transport Proposals

Assessment of options against this criterion was also undertaken on a qualitative basis in the context of current transport issues and plans to develop a network of public transport services across and beyond Cambridge. These plans could involve tunnels beneath the city centre for transit services and could include existing and new busways. Any rapid transit system is likely to feature bus-based services and under this scenario all shortlisted options are equally compatible with any proposed rapid transit services. However, if the possible Park and Ride bus services were to be rapid transit in some other form, then the Purple and White options are better than Cyan and Yellow. On the basis that future rapid transit is likely to be bus based, all two site options (a Do Something in conjunction with keeping the existing Trumpington Site open) were assessed equally in terms of their potential to link with future transport proposals.

All have more potential than Magenta, but this in itself has more potential than Do Minimum, because of the number of spaces available.

Summary of Assessment of Options against Theme 2

The assessments of the options under this theme are somewhat inconclusive. In terms of the worst option, the results of the assessment show that the Magenta option scores least favourably most often. The four two site options score more or less the same across all sub-criteria, with only minor differences between time to access and egress the sites and bus journey times.

3.6.3 Theme 3: Quality of Life and Environment

This Section provides an overview of the assessment used to evaluate each of the shortlisted options under the theme of Quality of Life and Environment. The process used to assess each of the options against each of the criteria under this theme are listed here:

3.6.3.1 Quality of Life Assessments

A Social Impact Appraisal (SIA) was undertaken to assess the two Quality of Life criteria, 'Potential for Accidents' and 'Walking and Cycling Networks'. For the 'Potential for Accidents' criterion, the SIA specifically looks at changes in the likelihood of accidents for each option. For the 'Walking and Cycling Networks' criterion, the impact on changes to the walking and cycling network is derived from expected changes in levels of physical activity.

For both criteria, each option was qualitatively assessed, and a five-point scale was used to determine whether there is likely to be an adverse, beneficial or neutral impact, as summarised in Table 37.

Table 37: Five-point Scale to Determine Impacts of Each Option

Adverse
Slight adverse
Neutral
Slight beneficial
Beneficial

Source: Amended from the Department for Transport (Dec 2015) TAG Unit A4.2 Distributional Impact Appraisal

Potential for Accidents

At the time of writing, modelling data and data showing the forecasted numbers and severity of accidents, and the associated monetary value, were not available and therefore a full appraisal could not be carried out. However, the methods prescribed in WebTAG Unit A4.1 (Social Impact Appraisal) have been used as a guide to appraise each of the options and to determine any impacts. These are shown in Table 38.

Table 38: Summary of Accident Impacts

Option	Rationale for Assessment	Assessment Score
Do Minimum	The 'Do Minimum' approach will cause the facility at Trumpington Park and Ride to exceed capacity in future. With an additional 247 car parking spaces and five additional bus parking spaces proposed as part of a separate development at the site and only minimal surface expansion planned, there is potential for an increased number of accidents at the site. There will be an increased number of individuals using the site because of the additional parking but no extra capacity to accommodate them. This could result in more pedestrians in the vicinity of the scheme, therefore increasing the risk of accidents.	Slight adverse
Magenta	It is expected that there will be a reduction in vehicle kilometres on the road network leading to a reduced number of accidents within Cambridge centre. Appropriate entrance and exit points to the new decks for both vehicles and pedestrians would be installed, reducing the risk of pedestrians being involved in accidents. Additional dedicated park and ride lanes could introduce conflict points which could increase the risk of accidents.	Neutral
Cyan	The provision of a tunnel as part of the Cyan option prevents the need for westbound A10 and north and southbound M11 traffic to turn right across the A10 upon entry and exit from the site, therefore reducing the risk of accidents. Buses will use an existing accommodation bridge to the north of the site with a segregated cycle/footbridge over the M11 for cycle and pedestrian use next to it. As the two routes would be segregated, the risk of accidents to non-motorised users whilst on the bridge would be reduced. On the eastern side of the M11, cyclists and pedestrians would follow another segregated route away from the traffic flow, reducing accident risk associated with interaction with motorised vehicles. Reduced vehicle kilometres on the road network could lead to a reduced number of accidents within Cambridge City centre.	Beneficial
Purple	The Purple option prevents the need for northbound M11 traffic from turning right into the site, instead using a dedicated tunnel. All other traffic will use a signal-controlled junction. Traffic will be required to turn right across the A10, though a signal-controlled junction which will prevent the need for right turns into free-flowing traffic, reducing the risk of accidents. Buses will pass directly through J11 using a bus only bridge structure while cyclists and pedestrians will use a dedicated existing bridge to the north of the site. On the eastern side of the M11, cyclists and pedestrians would follow another segregated route away from the traffic flow, reducing accident risk associated with interaction with motorised vehicles	Beneficial
White	The White option is similar to the purple option and will reduce the need for traffic to make right turns into free-flowing traffic, instead using dedicated tunnels and signal-controlled junctions. Buses will use an existing accommodation bridge to the north of the site with a separate, segregated bridge over the M11 for cycle and pedestrian use next to it. As the two routes would be segregated, the risk of accidents to non-motorised users whilst on	Beneficial

Option	Rationale for Assessment	Assessment Score
	the network would be reduced. On the eastern side of the M11, cyclists and pedestrians would follow another segregated route away from the traffic flow, reducing accident risk associated with interaction with motorised vehicles. As part of this option, both buses and cyclists/pedestrians will use existing accommodation to the north of the site, increasing the risk of accidents for cyclists and pedestrians compared to the purple option. Reduced vehicle kilometres on the road network could lead to a reduced number of accidents within Cambridge City centre.	
Yellow	The Yellow option could increase the likelihood of accidents occurring as westbound traffic turns right from the A10 into the Park and Ride and, upon exit, the traffic turning right onto the westbound A10.Traffic signals on the A10 could result in queueing traffic, increasing chances of accidents. In addition, of the four options with a proposed new park and ride site, this is the only option without a dedicated and segregated tunnel access for northbound M11 traffic. Increased interaction between the A10 traffic and the park and ride traffic could increase the risk of accidents. Buses will use an existing accommodation bridge to the north of the site with a separate, segregated bridge over the M11 for cycle and pedestrian use next to it. As the two routes would be segregated, the risk of accidents to non-motorised users whilst on the network would be reduced. On the eastern side of the M11, cyclists and pedestrians would follow another segregated route away from the traffic flow, reducing accident risk associated with interaction with motorised vehicles	Slight adverse
Purple with CAP	The Purple option prevents the need for northbound M11 traffic from turning right into the site, instead using a dedicated tunnel. All other traffic will use a signal-controlled junction. Traffic will be required to turn right across the A10, though a signal-controlled junction will prevent the need for right turns into free-flowing traffic, reducing the risk of accidents. Buses will pass directly through J11 using a bus only bridge structure while cyclists and pedestrians will use a dedicated existing bridge to the north of the site. On the eastern side of the M11, cyclists and pedestrians would follow another segregated route away from the traffic flow, reducing accident risk associated with interaction with motorised vehicles. Improved pedestrian and cycling infrastructure into the city centre as a result of the City Access Plan could result in safer walking and cycling journeys, therefore reducing the risk of accidents and giving beneficial accident impacts.	Beneficial

Source: Mott Macdonald

From Table 38 under this criterion the Cyan, White and Purple Option either with or without CAP are the most beneficial in terms of reducing the risk of accidents for both users of motorised and non-motorised modes.

Walking and Cycling Networks

Although this qualitative assessment related to the impact of options on physical activity, the basis for assessing those changes was additions or enhancements to the existing walking and cycling network included in the options. As such the scores assigned for changes in physical activity can be used as a proxy for how well the scheme compliments or improves walking and cycling networks as shown in Table 39.

Table 39: Summary of Impacts on Walking and Cycling Network

Option	Rationale for Assessment	Assessment Score
Do Minimum	The Do Minimum approach will have neither beneficial nor adverse impacts on physical activity. There are no additional cycle hire and storage facilities proposed in addition to current provision and there are no proposed improvements to existing pedestrian and cycle infrastructure.	Neutral
Magenta	Additional cycle storage and hire facilities could increase cycle connectivity for commuters, therefore providing beneficial physical activity impacts. The park	Slight beneficial

Option	Rationale for Assessment	Assessment Score
	and ride site would be located to the east of the site and therefore users would not be required to cross	
Cyan	Cycle storage and hire facilities could encourage cyclists who live further afield to adopt a multi-modal journey whereby they drive to the Park and Ride and cycle the rest of the journey. While the proposed site is located to the west of the M11 and would require cyclists and pedestrians to cross this, a dedicated, segregated cycle/pedestrian route is proposed to the north of the site which could encourage and promote safer cycling and walking, therefore increasing the attractiveness of active travel routes and increasing physical activity. Cyclists and pedestrians would follow a completely segregated route away from the main flow of traffic, offering a more pleasant journey for these users.	Beneficial
Purple	Cycle storage and hire facilities could encourage cyclists who live further afield to adopt a multi-modal journey whereby they drive to the Park and Ride and cycle the rest of the journey. While the proposed site is located to the west of the M11, a dedicated, segregated cycle/pedestrian route is proposed to the north of the site which could encourage and promote safer cycling and walking, therefore increasing the attractiveness of active travel routes and increasing physical activity. Cyclists and pedestrians would follow a completely segregated route away from the main flow of traffic, offering a more pleasant journey for these users.	Beneficial
White	Cycle storage and hire facilities could encourage cyclists who live further afield to adopt a multi-modal journey where they drive to the Park and Ride and cycle the rest of the journey. While the proposed site is located to the west of the M11 and would require cyclists and pedestrians to cross this, a dedicated, segregated cycle/pedestrian route is proposed to the north of the site which could encourage and promote safer cycling and walking, therefore increasing the attractiveness of active travel routes and increasing physical activity. Cyclists and pedestrians would follow a completely segregated route away from the main flow of traffic, offering a more pleasant journey for these users.	Beneficial
Yellow	Cycle storage and hire facilities could encourage cyclists who live further afield to adopt a multi-modal journey where they drive to the Park and Ride and cycle the rest of the journey. While the proposed site is located to the west of the M11 and would require cyclists and pedestrians to cross this, a dedicated, segregated cycle/pedestrian route is proposed to the north of the site which could encourage and promote safer cycling and walking, therefore increasing the attractiveness of active travel routes and increasing physical activity. Cyclists and pedestrians would follow a completely segregated route away from the main flow of traffic, offering a more pleasant journey for these users.	Beneficial
Purple with CAP	Cycle storage and hire facilities could encourage cyclists who live further afield to adopt a multi-modal journey whereby they drive to the P&R and cycle the rest of the journey. While the proposed site is located to the west of the M11, a dedicated, segregated cycle/pedestrian route is proposed to the north of the site which could encourage and promote safer cycling and walking, therefore increasing the attractiveness of active travel routes and increasing physical activity. City Access Plan aims to encourage more people to travel by bike or on foot, and will work to provide safer, easier and more attractive walking and cycling routes, giving rise to beneficial physical activity impacts	Beneficial

Under this criterion all Do Something options at the new site are equally beneficial in terms of potential to increase the attractiveness of active travel routes and increasing physical activity. This is as a result of superior walking and cycling networks, relative to the Do Minimum or expanding the existing Trumpington Park and Ride site (Magenta option)

3.6.3.2 Environmental Assessments

In order to assess the performance of each of the shortlisted options, a set of WebTAG compliant worksheets were compiled by Mott MacDonald specialists for each of the criteria falling under the Environmental assessments umbrella, namely:

- Landscape
- Biodiversity
- Historic environment

- Water
- Air quality
- Noise
- Greenhouse gases (GHG)
- Green Belt

These were then collated, and a table prepared similar to an Appraisal Summary Table that assigned scores to each of the options based on their impact on each of the above criteria.

For air quality, greenhouse gases and noise, the approach was semi-quantitative instead of quantitative and an overall summary of likely impacts has been provided, but not an economic valuation. This is because, at the time of writing, the current traffic models that are available do not adequately cover the required scenarios to fully inform the WebTAG assessment of these criteria and it is not considered proportionate to further develop the models to inform the assessment.

Therefore, this semi-quantitative analysis has been provided by looking at the change in traffic flows on affected roads with and without each of the options and the subsequent impacts that would occur in terms of changes in air quality, noise levels and greenhouse gas emissions. Affected roads are those in the traffic model which meet the following Design Manual for Roads and Bridges (DMRB) criteria:

- Road alignment will change by 5m or more; or
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) flow or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- Daily average speed will change by 10km/hr or more; or
- Peak hour speed will change by 20km/hr or more.

The outputs of these analyses are a statement on the likely effects (either beneficial or adverse) and whether the scheme would likely cause any exceedances of objectives for these criteria - or make any areas currently in exceedance worse.

All environmental criteria were assessed qualitatively scored using a -3 to +3 scale, where -3 was a large adverse impact and +3 a large beneficial impact.

The assessment findings are set out on a criterion by criterion basis for each of the options in Table 40 to Table 47. With the exception of the Magenta option (decking at the existing Trumpington Park and Ride) the shortlisted options are similar and as such the content of the worksheets and the scores assigned show very little differentiation.

It should be noted that the Do Minimum option was not assessed against landscape, heritage, biodiversity or water. It is understood that the Do Minimum option refers to the small expansion of the existing Trumpington Park and Ride for which planning consent has already been given. Therefore, an assessment score of 0 has been assigned on the basis that the Do Minimum will not result in additional impact in respect to the proposed scheme, rather than the effects of Do Minimum being 'Neutral'.

Table 40: Summary of Potential Landscape Impacts

Option	Impact	Assessment Score	Rationale for Assessment
Do Minimum	Neutral	0	The addition of the extra parking spaces on the existing ground level site would have no landscape impacts.

Option	Impact	Assessment Score	Rationale for Assessment
Magenta	Slightly adverse	-1	This option would result in adverse impacts due to the construction of a car park on a an existing landscaped, surface level car park. There would be a loss of semi-mature trees. Impacts would be largely contained within the car park from the east, south and west due to the retention of surrounding vegetation, but highly visible from flats to the north and the A1309 Hauxton Road where it crosses the A1301.
Cyan	Moderate adverse	-2	This option would result in adverse impacts due to the introduction and operation of a car park and access roads into arable fields and the addition of a new junction on the A10 and a road tunnel under the A10. There would be a loss of farmland and roadside 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, tunnel and access roads into their landscape setting, however buses using the farm access bridge over the M11 would remain prominent in the landscape.
Purple	Slightly adverse	-1	This option would result in adverse impacts due to the construction of a car park and access roads in arable fields, the construction of a bridge over Junction 11 and the construction of a junction on and a tunnel under the A10. There would be a loss of farmland and roadside vegetation and street lighting and vehicles would be introduced into an area on the rural-urban fringe. The extensive proposed landscape mitigation would in time screen and integrate the car park, bridge, tunnel and access roads into their landscape setting.
White	Moderate adverse	-2	This option would result in adverse impacts due to the introduction and operation of a car park and access roads into arable fields and the addition of a new junction on the A10 and a road tunnel under the A10. There would be a loss of farmland and roadside 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, tunnel and access roads into their landscape setting, however buses using the farm access bridge over the M11 would remain prominent in the landscape.
Yellow	Moderate adverse	-2	This option would result in adverse impacts due to the introduction and operation of a car park and access roads into arable fields and the addition of a new junction on the A10. There would be a loss of farmland and roadside 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, tunnel and access roads into their landscape setting, however buses using the farm access bridge over the M11 would remain prominent in the landscape.
Purple with CAP	Slightly adverse	-1	Purple with CAP has the same landscape impacts as the Purple without CAP option

Source: Mott MacDonald

Table 41: Summary of Potential Biodiversity Impacts

Option	Impact	Assessment Score	Rationale for Assessment
Do Minimum	Neutral	0	The addition of the extra parking spaces on the existing ground level site would have no biodiversity impacts.
Magenta	Slight adverse	-1	The proposed scheme is unlikely to impact Byron's Pool Local Nature Reserve, River Cam County Wildlife site, Old Mill Plantation City Wildlife site, River Rhee County Wildlife site, Grantchester Road Plantations City Wildlife site or Eight Acre Wood and Seven Acres Wood City Wildlife site. However, as the northern edge of the site is within the country park, the proposed scheme could result in a slightly adverse effect on Trumpington Meadows Country Park. The site also has a potential to hold reptiles. The proposed scheme could also result in a slightly adverse effect on reptiles, which may be present in the semi-improved grassland, hedgerows, scrub and tall ruderal vegetation along the slip road.

Option	Impact	Assessment Score	Rationale for Assessment
Cyan	Moderate adverse	-2	The proposed scheme is unlikely to impact Byron's Pool Local Nature Reserve, River Cam County Wildlife site, Old Mill Plantation City Wildlife site, River Rhee County Wildlife site, Grantchester Road Plantations City Wildlife site or Eight Acre Wood and Seven Acres Wood City Wildlife site. However, as the northern edge of the development site is within the Country Park, the proposed scheme could result in a slightly adverse effect on Trumpington Meadows Country Park. The site also has a potential to hold roosting bats, commuting bats, foraging bats, badgers, water voles, great crested newts and otters. Presence of priority habitats (semi-natural broadleaved woodland, ponds) and native hedgerows. The proposed scheme could result in a moderate adverse effect on these species and/or habitats. The site has the potential to hold reptiles, brown hare, hedgehogs, breeding birds and wintering birds. Presence of arable fields, semi-improved grassland field margins, dense scrub, scattered trees. The proposed scheme could result in a slightly adverse effect on these species and/or habitats.
Purple	Moderate adverse	-2	Same rationale as Cyan
White	Moderate adverse	-2	Same rationale as Cyan
Yellow	Moderate adverse	-2	Same rationale as Cyan
Purple with CAP	Moderate adverse	-2	Same rationale as Cyan

Source: Mott MacDonald

Table 42: Summary of Potential Historic Environment Impacts

Option	Impact	Assessment Score	Rationale for Assessment
Do Minimum	Neutral	0	The addition of the extra parking spaces on the existing ground level site would have no heritage impacts.
Magenta	Moderate adverse	-1	Scheduled Monuments: They will not be physically impacted by the construction of the scheme and the setting are unlikely to be harmed. However, there is potential to impact associated archaeological remains, as the archaeological remains form part of a large late prehistoric/Roman occupation/settlement pattern. Slightly adverse effect on context, otherwise neutral. Grade 1 Listed Buildings: There are no Grade 1 Listed Buildings within 500m of the site. Neutral. Grade 2 Listed Buildings: There are six Grade 2 Listed Buildings within 500m of the site. Loss of the milestone would result in a large adverse effect. However, design will ensure the milestone is preserved. Neutral. Conservation Areas: Trumpington Conservation Area is located 270m to the north of the site and Hauxton Conservation Areas is located outside the study area, 700m to the south. Both Conservation Areas are in good condition. Neutral. Buried Archaeology: Although significant archaeological remains have been encountered within the footprint of the option. The development of the Park and Ride and the M11 junction has removed these remains. Neutral.
Cyan	Moderate adverse	-2	Scheduled Monuments: They will not be physically impacted by the construction of the scheme and the setting are unlikely to be harmed. However, there is potential to impact associated archaeological remains, as the archaeological remains form part of a large late prehistoric/Roman occupation/settlement pattern. Slightly adverse effect on context,

Option	Impact	Assessment Score	Rationale for Assessment
			otherwise neutral. Grade 1 Listed Buildings: There are no Grade 1 Listed Buildings within 500m of the site. Neutral. Grade 2 Listed Buildings: There are four Grade 2 Listed Buildings within 500m of the site. Loss of the milestone would result in a large adverse effect. However, design will ensure the milestone is preserved. Neutral. Conservation Areas: Trumpington Conservation Area is located 400m to the north of the site and Hauxton Conservation Areas is located outside the study area. Both Conservation Areas are in good condition. Neutral. Buried Archaeology: In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the scheme. In addition, there is potential to impact remains associated with the World War POW Camp, potential archaeological remains identified by the geophysical survey, and remains associated with the late prehistoric/Roman remains recorded by the investigation for the Trumpington Meadows development. Although the form, nature and extent of potential remains is unknown there is regionally/nationally significant archaeology within the vicinity of the proposed option and the area is considered to have a moderate to high archaeological potential in areas outside of the existing road corridor. This assessment is subject to change following proper assessment and investigation of archaeological potential and finalisation of construction methodology. Moderate adverse effect.
Purple	Moderate adverse	-2	Same rationale as Cyan
White	Moderate adverse	-2	Same rationale as Cyan
Yellow	Moderate adverse	-2	Same rationale as Cyan
Purple with CAP	Moderate adverse	-2	Same rationale as Cyan

Source: Mott MacDonald

Table 43: Summary of Potential Water Impacts

Option	Impact	Assessment Score	Rationale for Assessment
Do Minimum	Neutral	0	The addition of the extra parking spaces on the existing ground level site would have no water impacts.
Magenta	Neutral	0	Change to surface water runoff quantity and quality: The proposed scheme is unlikely to impact on biodiversity from the nature reserve. It is also unlikely to affect recreation associated with River Cam. Neutral. Potential impact on floodplain: The proposed scheme is unlikely to result in a loss of floodplain. Neutral. Quality impacts on surface water runoff quality and quantity: The proposed scheme is unlikely to impact the ponds in the study area and intends to keep onsite ditch feature. Neutral. Spillage of contaminants infiltrate the ground: The groundwater below the site is not identified as a source protection zone therefore unlikely to be used as potable water supply. Scheme design will include the provision for collection of spillages in drainage, which will likely minimise the risk of spillages. The proposed development is largely on area of existing hard standing/road surfaces. Neutral. Reduction in flow in groundwater: The proposed scheme is unlikely to impact on conveyance. The existing low permeability car park surface are is not expected to increase. All works are expected to be mainly

Option	Impact	Assessment Score	Rationale for Assessment
			above ground. Foundation work may be required for the decking, however unlikely to have any significant impact on groundwater flow. Neutral.
Cyan	Neutral	0	Change to surface water runoff quantity and quality: The proposed scheme would not affect any abstraction from River Cam and unlikely to impact on biodiversity from the nature reserve. It is also unlikely to affect recreation associated with River Cam. Neutral. Potential impact on floodplain: The proposed scheme is unlikely to result in a loss of floodplain. Neutral. Quality impacts on surface water runoff quality and quantity: The proposed scheme is unlikely to impact the ponds in the study area and intend to keep onsite ditch feature. Neutral. Spillage of contaminants infiltrate the ground: The groundwater below the site is not identified as a source protection zone therefore unlikely to be used as potable water supply. Scheme design will include the provision for collection of spillages in drainage, which will likely minimise the risk of spillages. Neutral. Reduction in flow in groundwater: The proposed scheme is unlikely to impact on conveyance. The low permeability car park surface may lead to change in recharge but on a very small percentage area of aquifer outcrop, and much of the runoff is expected to be collected and discharged to SUDS draining to ground. Neutral.
Purple	Neutral	0	Same rationale as Cyan
White	Neutral	0	Same rationale as Cyan
Yellow	Neutral	0	Same rationale as Cyan
Purple with CAP	Neutral	0	Same rationale as Cyan

Source: Mott MacDonald

Table 44: Summary of Potential Local Air Quality Impacts

Option	Impact	Assessment Score	Rationale for Assessment
Do Minimum	Neutral	0	The addition of the extra parking spaces on the existing ground level site would have no air quality impacts.
Magenta	Neutral	0	The semi-quantitative appraisal is based on the sum of the AM peak and PM peak SATURN model periods. Where the sum of these periods has a change in flow greater than 200 vehicles the road is considered to be 'affected'. There is a decrease in vehicle movements on the A10 between Church Road and the M11 and on the A1134 Trumpington Road in the opening year between the southern point of the Cambridge Air Quality Management Area (AQMA) and Long Road. There is an increase in vehicle movements along Church Road through Hauxton and on the M11 (between Junction 11 and Junction 10). This option is unlikely to cause non-compliance with the EU Air Quality Directive Limit Value (NO_2 concentration in the opening year for the network overlap with Pollution Climate Mapping link = 22.4µg/m^3). Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site. Overall: The proposed option has the largest affected road network of all the options and therefore affects the most receptors with more improvements in air quality than deteriorations.

Option	Impact	Assessment Score	Rationale for Assessment
Cyan	Neutral	0	The semi-quantitative appraisal is based on the sum of the AM peak and PM peak SATURN model periods. Where the sum of these periods has a change in flow greater than 200 vehicles the road is considered to be 'affected'. There is an increase in the vehicle movements on the southern edge of the Cambridge AQMA which could lead to a net worsening of air quality at receptors within the AQMA. The change in vehicle movements caused by this option is unlikely to cause annual mean concentrations of NO2 to exceed the annual mean NO2 air quality objective of 40µg/m3. There is a decrease in vehicle movements on the A1134 Trumpington Road from southern tip of the Cambridge AQMA to Long Road. Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site. This option is unlikely to cause non-compliance with the EU Air Quality Directive Limit Value (NO2 concentration in the opening year for the network overlap with Pollution Climate Mapping link = 22.4µg/m3). Overall: The proposed option has a relatively small affected road network and causes more improvements in air quality than deteriorations.
Purple	Neutral	0	The semi-quantitative appraisal is based on the sum of the AM peak and PM peak SATURN model periods. Where the sum of these periods has a change in flow greater than 200 vehicles the road is considered to be 'affected'. There are no AQMAs within the schemes Affected Road Network (ARN). There is a decrease in vehicle movements on the A1134 Trumpington Road in the opening year between the southern point of the Cambridge AQMA and Long Road and an increase in flows located on the northern/eastern side of J11 of the M11 heading east bound towards Cambridge. There is an increase in vehicle movements on the M11 (between Junction 11 and Junction 10) and on the A1309 close to the J11 of the M11. Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site. This option is unlikely to cause non-compliance with the EU Air Quality Directive Limit Value (NO_2 concentration in the opening year for the network overlap with Pollution Climate Mapping link = 22.4µg/m^3). Overall: The proposed option has a relatively large affected road network and causes more improvements in air quality than deteriorations.
White	Neutral	0	The semi-quantitative appraisal is based on the sum of the AM peak and PM peak SATURN model periods. Where the sum of these periods has a change in flow greater than 200 vehicles the road is considered to be 'affected'. There are no AQMAs within the schemes Affected Road Network (ARN). There is a decrease in vehicle movements on the A1134 Trumpington Road between southern tip of the Cambridge AQMA and Long Road. There is an increase in vehicle movements on the M11 (between Junction 11 and Junction 10) and on the A1309 close to the J11 of the M11. There is an increase in vehicle movements on Church Road through Hauxton.

Option	Impact	Assessment Score	Rationale for Assessment
			Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site. This option is unlikely to cause non-compliance with the EU Air Quality Directive Limit Value (NO_2 concentration in the opening year for the network overlap with Pollution Climate Mapping link = 22.4µg/m^3). Overall: The proposed option has a relatively small affected road network and causes more improvements than deteriorations.
Yellow	Neutral	0	The semi-quantitative appraisal is based on the sum of the AM peak and PM peak SATURN model periods. Where the sum of these periods has a change in flow greater than 200 vehicles the road is considered to be 'affected'. There is a decrease in vehicle movements on the A1134 Trumpington Road in the opening year between the Cambridge AQMA and Long Road. Part of this change is with the Cambridge AQMA and could improve NO2 concentrations at receptors within the AQMA. There is an increase in vehicle movements on the M11 (between Junction 11 and Junction 12). Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site. This option is unlikely to cause non-compliance with the EU Air Quality Directive Limit Value (NO_2 concentration in the opening year for the network overlap with Pollution Climate Mapping link = 24.8µg/m^3). Overall: The proposed option has a relatively small affected road network and causes more improvements in air quality than deteriorations.
Purple with CAP	Neutral	0	The semi-quantitative appraisal is based on the sum of the AM peak and PM peak SATURN model periods. Where the sum of these periods has a change in flow greater than 200 vehicles the road is considered to be 'affected. There are no AQMAs within the schemes Affected Road Network (ARN). There is an increase in flows located on the northern/eastern side of M11 J11 heading east bound towards Cambridge, and an increase in vehicle movements on the M11 between Junction 11 and Junction 10 and on the A1309 close to the M11 J11. There is a decrease in vehicle movements on the west of the proposed development heading towards Hauxton along the A10. There are additional changes in vehicle movements around the M11 junction. However, there are no receptors within 200m of this location. The affected road network overlaps with a PCM link that has an NO2 concentrations of 22.4µg/m3 in the opening year. This option is therefore unlikely to cause non-compliance with the EU Air Quality Directive Limit Value. Overall: The proposed option has a relatively large affected road network and causes more deteriorations than improvements. "

Source: Mott MacDonald

Table 45: Summary of Potential Noise Impacts

Option	Impact	Assessment Score	Rationale for Assessment
Do Minimum	Neutral	0	The addition of the extra parking spaces on the existing ground level site would have no or negligible noise impacts.
Magenta	Slightly adverse	-1	As current traffic model outputs do not provide the relevant parameters necessary to complete the WebTAG assessment in accordance with the requirements of Calculation of Road Traffic Noise and DMRB HD213.11, a semi-quantitative assessment based on AM and PM peak hour values to understand noise changes based on traffic flow changes was undertaken. Within the study area, the majority of receptors near roads which will experience a 1dB or greater change are located on Hauxton Road and in Hauxton village. Decreases are noted for sections of Hauxton Road where new bus routes alter traffic flow. Overall: It is expected that noise level increases and decreases from identified road links within the study area are unlikely to significantly affect absolute noise levels at the majority of receptors where road traffic using the M11 dominates ambient noise levels in the surrounding nearby areas.
Cyan	Slightly adverse	-1	As current traffic model outputs do not provide the relevant parameters necessary to complete the WebTAG assessment in accordance with the requirements of CRTN and DMRB HD213.11, a semi-quantitative assessment based on AM and PM peak hour values to understand noise changes based on traffic flow changes was undertaken. Within the study area, the majority of receptors near roads which will experience a 1dB or greater change are located along the Cambridgeshire Guided Busway and on Hauxton Road. Decreases are noted at for sections of Hauxton Road where new bus routes alter traffic flow. Overall: It is expected that noise level increases and decreases from identified road links within the study area are unlikely to significantly affect absolute noise levels at the majority of receptors where road traffic using the M11 dominates ambient noise levels in the surrounding nearby areas.
Purple	Slightly adverse	-1	Same rationale as for Cyan
White	Slightly adverse	-1	Same rationale as for Cyan
Yellow	Slightly adverse	-1	Same rationale as for Cyan
Purple with CAP	Slightly adverse	-1	Same rationale as for Cyan

Source: Mott MacDonald

Table 46: Summary of Potential Greenhouse Gas Impacts

Option	Impact	Assessment Score	Rationale for Assessment
Do Minimum	Neutral	0	The addition of the extra parking spaces on the existing ground level site would have no GHG impacts.
Magenta	Neutral	0	All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed. The Magenta option has the smallest increase in total vehicles (0.181%) against the Do Minimum. This option does also decrease average speeds by 0.031% which implies a less constant flow of traffic will be achieved that may worsen the GHG emissions.

Option	Impact	Assessment Score	Rationale for Assessment
			Overall: Without a full assessment of modelled traffic data, it is not possible to determine the direction of change or the magnitude of change due to some of the scheme elements.
Cyan	Neutral	0	All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed. The Cyan option has a small increase in total vehicles (0.275%) against the Do Minimum. This option does however, have an increase in average speeds by 0.175% which implies a more constant flow of traffic will be achieved that may slightly improve GHG emissions. Overall: Without a full assessment of modelled traffic data, it is not possible to determine the direction of change or the magnitude of change due to some of the scheme elements.
Purple	Neutral	0	All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed. The Purple option has an increase in total vehicles (0.565%) against the Do Minimum. This option does also decrease in average speeds by 0.025% which implies a less constant flow of traffic will be achieved that may worsen the GHG emissions. Overall: Without a full assessment of modelled traffic data, it is not possible to determine the direction of change or the magnitude of change due to some of the scheme elements.
White	Neutral	0	All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed. The White option has an increase in total vehicles (0.6%) against the Do Minimum. This option does also decrease in average speeds by 0.025% which implies a less constant flow of traffic will be achieved that may worsen the GHG emissions. Overall: Without a full assessment of modelled traffic data, it is not possible to determine the direction of change or the magnitude of change due to some of the scheme elements.
Yellow	Neutral	0	All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed. The Yellow option has the greatest increase of all options for total vehicles (0.652%) against the Do Minimum. This option also has the greatest decrease in average speeds by 0.052% which implies a less constant flow of traffic will be achieved that may worsen the GHG emissions. Overall: Without a full assessment of modelled traffic data, it is not possible to determine the direction of change or the magnitude of change due to some of the scheme elements.
Purple with CAP	Slightly adverse	-1	All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed. This option is the same as the Purple Option with the addition of the City Access Penalty measure. The Purple with CAP option has an increase in total vehicles (0.72%) against the Do Minimum. This option does increase average speeds by 0.003% which implies a slight improvement in flow of traffic will be achieved that may reduce the GHG emissions against the baseline. With the addition of CAP there is a large increase in proportion of HGVs (2.1%) however this is due to the number of other vehicles decreasing which will result in the percentage of HGVs increasing. Overall: Without a full assessment of modelled traffic data, it is not possible to determine the direction of change or the magnitude of change due to some of the scheme elements.

Source: Mott MacDonald

Table 47: Summary of Impacts on Green Belt

An initial high-level Green Belt appraisal of the various site options has been undertaken of the different site options for the Park and Ride around junction 11. This assessment determined that the preferred site to the north- west of the M11/A10 contributes to a slightly lesser extent to Green Belt purposes than the other parcels. The Green Belt assessment did not review the access options for the preferred application site.

Therefore this section has been prepared by our planning consultant Strutt & Parker. A more detailed assessment will be prepared as part of the planning application process. Whilst the park & ride itself is likely to have the most significant impact on the Green Belt, the access routes to the site may have an additional impact, depending upon the option selected. An assessment is provided as follows:

Option	Impact	Assessment Score	Rationale for Assessment
Do Minimum	Neutral	0	The addition of the extra parking spaces on the existing ground level site would have no Green Belt impacts
Magenta	Neutral	0	This option limits the extent of development to the Park and Ride site itself, with minimal additional highway works outside of the application site. Therefore in Green Belt terms, this scheme would not have any additional/negligible impact on both the openness of the Green Belt other than the impact of the Park and Ride site itself. It is also not considered to conflict with the purposes for including land within the Green Belt, either at local or national level.
Cyan	Moderate adverse	-2	This option proposes a slip road from the M11 across the agricultural field and a west bound slip lane from the Park and Ride also within the agricultural field to the south of the A10. The parcel of land to the south of the A10 has been identified by Liz Lake associates as being sensitive in Green Belt terms, having regard to the purposes for including land in the Green Belt. Therefore the extent of development to the south of the A10 under this option will have additional impact upon the Green Belt. This option does also propose use of the agricultural bridge to the north side of the M11. This will have additional impact, in relation to the purposes for including land within the Green Belt, in that it will introduce an additional busway route to the north of the site. It will also have some impact upon the purposes for including land within the Green Belt with the busway route intersecting over some of the land to the east side of the M11, which was identified by Liz Lake as being sensitive in terms of the setting of Cambridge. This is therefore considered to be the worst option in terms of potential additional impact on the Green Belt.
Purple	Slightly adverse	-1	This option also proposes a slip road from the M11 across the agricultural field, however the extent of works is reduced from the Cyan option, which will reduce the impact upon the Green Belt in terms of conflict with the purposes for including land within the Green Belt. Access is proposed through the central part of the junction gyratory, which is less sensitive in Green Belt terms and is not likely to result in any additional impact on the Green Belt having regard to the purposes for including land in the Green Belt or the openness of the Green Belt.
White	Moderate adverse	-2	In Green Belt terms, this option is similar to Cyan option having regard to the impact upon the purposes for including land within the Green Belt, however it is likely to have a slightly reduced impact given that it does not proposed the West bound slip lane dedicated for access from the Park and Ride.
Yellow	Moderate adverse	-2	This option proposes a slip road immediately adjacent to the west side of the M11, rather than it being separated from the M11 as proposed as part of the other options. This is considered to be beneficial in terms of reducing the conflict of the scheme with the purposes for including land within the Green Belt and will contain the extent of encroachment on the south side of the M11. This option does, however, propose use of the

Option	Impact	Assessment Score	Rationale for Assessment
			agricultural bridge to the north side of the M11. This will have additional impact upon the purposes for including land within the Green Belt, in that it will introduce additional busway route to the north of the site. It will also have some impact upon purposes on the land to the east side of the M11, which was identified by Liz Lake as being sensitive in terms of the setting of Cambridge.
Purple with CAP	Slightly adverse	-1	As with the Purple without CAP option this option also proposes a slip road from the M11 across the agricultural field, however the extent of works is reduced from the Cyan option, which will reduce the impact upon the Green Belt. Access is proposed through the central part of the junction gyratory, which is less sensitive in Green Belt terms and is not likely to result in any additional impact on the Green Belt. The addition of Cap measures have no additional impact on Green Belt land.

Source: Mott MacDonald

The impact of the preferred scheme upon openness of the Green Belt, will be dependent upon detailed design and the size of any proposed buildings, structures and means of enclosures at the site. As identified within the Green Belt Options report, prepared by Liz Lake the extent of conflict of the proposals with purposes for including land within the Green Belt could be mitigated against by providing substantial landscaping enhancements/mitigation as part of the proposed development.

Summary of Assessment of Options against Theme 3

In terms of Quality of Life criteria, all the Do Something options at the new site perform equally best relative to the Do Minimum or the expansion of the existing Trumpington Park and Ride (Magenta option), and have beneficial impacts. The only differentiation in the performance of the new sites is the Yellow option in respect of accidents where there is expected to be a slight adverse impact, when the other Do Something options at the new sites are expected to have beneficial impacts. This is because Yellow is the only new site option without dedicated and segregated tunnel access.

For the environmental criteria there is very little differentiation between any of the options, with all Do Something options having detrimental impacts. Most detrimental impacts that are likely to occur as a result of 'Doing Something' are all equal in magnitude for all options against all criteria with a few exceptions. The first is the Magenta option which has slightly less negative impact on Biodiversity and Heritage compared to the options for a new site, and the second is the Purple with CAP which has a slightly more detrimental effect than other options against GHG impacts. The other slight differentiations are related to the impact of options on Green Belt and landscape; here Magenta is the best option in that it has no additional impact on the Green Belt and Purple has the least detrimental impacts for a new site option, followed by Yellow, then White and Cyan.

3.6.4 Theme 4: Scheme Deliverability

This section provides an overview of the assessment process used to evaluate each of the shortlisted options against each of the criteria under the theme of Scheme Deliverability and the assessment outcomes. Process and outcomes of option assessment under this theme are presented on a criterion by criterion basis:

Construction Risks

A qualitative assessment of construction risks was compiled, and the relative severity of those risks qualitatively scored using a -3 to +3 scale, where -3 was indicative of the most serious construction risks. By nature, all risks are negative impacts and so all options scored negatively.

The results of assessment against this criterion are shown in Table 48 with a brief narrative for the scoring rationale.

Table 48: Construction Risks

Option	Assessment Score	Rationale for Assessment
Magenta	-2	Geo-technical risk, possible underground apparatus, as-built drawings for structure not correct. Issues working near a high-pressure gas main.
Cyan	-3	Underpass construction, overbridge construction, diversion of underground apparatus, geo-technical risk, extensive cut and fill operation risks e.g. unknown material.
Purple / Purple (CAP)	-2	Underpass construction, overbridge construction, diversion of underground apparatus, geo-technical risk, cut and fill operation risks e.g. unknown material.
White	-2	Underpass construction, overbridge construction, geo-technical risk, cut and fill operation risks e.g. unknown material.
Yellow	-1	Geotechnical risk, possible underground apparatus, overbridge construction.

Source: Skanska

Under this criterion, the Yellow option yielded the least risks during construction, with the Cyan option yielding the most. The other options including both expansion at the existing Trumpington site and the development of a new site all scored equally in terms of construction risks.

Disruption During Construction

As with construction risks, a qualitative assessment was undertaken and the relative severity of disruption during construction scored using a -3 to +3 scale, where -3 was indicative of the most serious disruption during construction. Again, by nature, disruption is a negative impact and so all options scored negatively. The results of assessment against this criterion are shown below in Table 49 with a brief narrative for the scoring rationale.

Table 49: Disruption During Construction

Option	Assessment Score	Rationale for Assessment
Magenta	-2	Limited to initial setting out however possible diversion issues with high-pressure gas main.
Cyan	-2	Limited to initial setting out plus constructing overbridge. Possible A10 traffic disruption if 'top-down' underpass construction is chosen.
Purple / Purple (CAP)	-3	Potential narrow lane running on M11 during overbridge construction plus initial setting out. Possible A10 traffic disruption if 'top-down' underpass construction is chosen.
White	-2	During traffic signal installation and constructing over the bridge, there is likely to be A10traffic disruption if 'top-down' underpass construction is chosen.
Yellow	-1	During traffic signal installation and constructing overbridge.

Source: Skanska

Under this criterion, the Yellow option was assessed as causing the least disruption during construction, with the Purple option causing the most. The other options including both expansion at the existing Trumpington site and the development of a new site all scored equally in terms of disruption during construction.

Land Acquisition Requirements

A qualitative assessment of the complexities of land acquisition was undertaken and the relative complexity of this activity scored using a -3 to +3 scale, where -3 was indicative of the most problematic land acquisition requirements. Again, by nature, land acquisition cannot be regarded as a positive factor and so all options scored negatively. The results of assessment against this criterion are shown below in Table 50 with a brief narrative for the scoring rationale.

Table 50: Land Acquisition Requirements

Option	Assessment Score	Rationale for Assessment
Magenta	-2	Limited land take for northbound and southbound slips
Cyan	-3	Significant land take required for underpass, access and egress from new structure, north west access from roundabout and westbound dedicated egress.
Purple / Purple (CAP)	-2	Land take for underpass, southbound off-slip and land through central disc of roundabout.
White	-2	Land take for underpass, for footway/cycleway structure and for land connecting structure to southbound off-slip
Yellow	-2	Land take for northbound off-slip to P&R, land both sides of pedestrian/cycle overbridge and land for connecting structure to off-slip.

Source: Skanska

Under this criterion, the Cyan option was assessed as having the most complex or problematic land acquisition requirements, with all other options assessed as having equal complexities.

Infrastructure Maintenance/Renewals Complexity

A qualitative assessment of the cost and complexities of infrastructure maintenance and renewal was undertaken and the relative complexity of this activity again scored using a -3 to +3 scale, where -3 was indicative of the most costly/complex maintenance and renewals requirements. Again, by nature, this criterion cannot be regarded as a positive factor and so all options scored negatively. The results of assessment against this criterion are shown below in Table 51 with a brief narrative for the scoring rationale.

Table 51: Infrastructure Maintenance/Renewals Complexity

Option	Assessment Score	Rationale for Assessment
Magenta	-2	Road markings and traffic signals. Structural maintenance of bridge over M11. Maintenance of multi-storey car park.
Cyan	-2	Structural maintenance of overbridge and underpass. Maintenance of dewatering apparatus. Maintenance of traffic signals.
Purple / Purple (CAP)	-2	Structural maintenance of overbridge and underpass. Maintenance of dewatering apparatus. Maintenance of road markings and traffic signals.
White	-2	Structural maintenance of overbridge and underpass. Maintenance of dewatering apparatus. Maintenance of traffic signals. Maintenance of road markings.
Yellow	0	Structural maintenance of overbridge. Maintenance of traffic signals.

Source: Skanska

Under this criterion, only the Yellow option was assessed as having a neutral impact in regard to maintenance and renewals complexity. All other options, including the remaining new site options and expansion of the existing Trumpington site (Magenta) scored equally.

Ongoing Cost Implications – Site

Table 52 shows the estimated costs of the varying options and are quoted in Q2 2018 prices. Construction cost is an element of the total costs but has been shown separately to enable analysis of non-construction related costs. Cost does not include land or any allowance for risk nor does it include maintenance or ongoing operating costs of the site.

There is no capital cost implication for the Purple with CAP measures included and so the cost for the Purple option either with or without CAP is the same. The Do Minimum has effectively no additional costs as measures under the Do Minimum are already committed and are not a part of this scheme.

Table 52: Estimated Site Costs

Option	Construction Cost £	Total Cost (Inc. Prelims, OH&P, T&C, Design and Project Management £
Magenta	21,270,118	36,260,872
Cyan	27,039,284	46,096,031
Purple/Purple with CAP	26,452,206	45,095,192
White	26,287,238	44,813,957
Yellow	19,084.765	32,535,325

Source: Mott MacDonald

Ongoing Cost Implications – Bus

Table 53 shows the annual indicative cost and revenue for the Park and Ride bus service under the various options. This assumes, for the purpose of assessment and comparison between options that:

- The average revenue per passenger is £2.50 – the price per passenger is £3.00 but there are a number of discounts for season tickets and concessionary travel users;
- Daily revenue is annualized by a factor of 300 to take account of variations by day and season;
- Service R is currently peak periods only but is regarded as being free-standing for the purposes of this analysis, although it is likely that vehicles are deployed elsewhere during the day;
- The total number of buses required to cover the Peak Vehicle Requirement (PVR) and spares is determined by a factor of 15%; and
- The estimated annual operating cost of a bus is £140,000, although there could be economies of scale if all Cambridge's Park and Ride services are provided by one operator.

Table 53: Estimated Annual Bus Operating Cost and Revenue

Option	Daily Park and Ride Users (no.)	Daily Revenue 2.50 (£ day)	Annual Revenue 300 (£ annum)	PVR all Routes (no.)	Fleet 15% (no.)	Annual Cost 140,000 (£)	Surplus/ Deficit 80 seats (£)
Existing	1,327	3,317	994,950	9	10	1,400,000	-405,050
Do Minimum: existing with extension	1,598	3,995	1,198,395	9	10	1,400,000	-201,605
Magenta: existing with decking	2,534	6,336	1,900,800	11	13	1,820,000	80,800
Cyan / Yellow: new Park and Ride with northern bus access	2,237	5,594	1,678,050	19	22	3,080,000	-1,401,950
Purple / Purple (CAP) / White: new Park and	2,237	5,594	1,678,050	16	18	2,520,000	-841,950

Option	Daily Park and Ride Users (no.)	Daily Revenue 2.50 (£ day)	Annual Revenue 300 (£ annum)	PVR all Routes (no.)	Fleet 15% (no.)	Annual Cost 140,000 (£)	Surplus/ Deficit 80 seats (£)
Ride with southern bus access							

Source: Mott MacDonald

In relation to this criterion, these figures suggest that the existing Trumpington Park and Ride service currently operates at a loss if all the services are taken into account and that only the Magenta option would result in a profit.

Likelihood of Public Support

The criteria of likelihood of public support was based on feedback from consultation events which are detailed in Section 7.9.4.3. The five coloured Do Something options were presented slightly differently for consultation for the reasons and rationale noted in Section 3.5. Two main options were presented; either build a new site or expand Trumpington. The Trumpington expansion aligns with the Magenta Option and the new site options align with the other coloured options. For the new site, the varying access options differentiated what was presented to the public as Option 2 into the Purple, White, Cyan and Yellow Options. The table below illustrates this concept:

Table 54: Consultation Option Elements Aligned with Standard Shortlisted Options

Consultation Option Name	Description	Standard Option Name
Option 1	Expansion of existing Trumpington Site	Magenta
Option 2 with vehicular access option A and PT access option A	New site with vehicular access signalised junctions and left turn filter lane on to the A10 for traffic from the M11 northbound. PT access across the existing bridge north of the M11 junction.	Yellow
Option 2 with vehicular access option B and PT access option B	New site with one signalised junction on the A10 at the entrance to the Park and Ride site and new dedicated northbound slip exiting the M11 at J11, passing under the A10 directly into the Park and Ride site.PT access across the M11 junction	Purple/Purple (CAP)
Option 2 with vehicular access option B and PT access option A	New site with one signalised junction on the A10 at the entrance to the Park and Ride site and new dedicated northbound slip exiting the M11 at J11, passing under the A10 directly into the Park and Ride site.PT access across the existing bridge north of the M11 junction.	White
Option 2 with vehicular access option C and PT access option A	New site with dedicated slip roads to the Park and Ride site so vehicles do not need to turn right across the A10, provision of a tunnel and junction entrance to the site on the A10 for left in and left out turns only. PT access across the existing bridge north of the M11 junction.	Cyan

Source: Mott MacDonald

The broad results of the consultation revealed that 71% of respondents favoured a new site as opposed to only 56% favouring expansion of Trumpington (Magenta). Of those that favoured the new site, most support was for a new site in combination with vehicular access Option B (Purple/Purple with CAP) with second most support for a new site with vehicular access option C. No one responded that Doing the Minimum was the best option. The full results of

consultation are included in the appended “Cambridge South West Park and Ride Summary Report of Consultation Findings” produced by CCC. However, based on these overarching high-level responses the order of preference is as shown in Table 55

Table 55: Likelihood of Public Support

Rank	Option
1	Purple/Purple CAP
2	White
3	Cyan
4	Yellow
5	Magenta
6	Do Minimum

Source: Mott MacDonald

Summary of Assessment of Options against Theme 4

The Yellow option performs best against the criteria under this theme with the fewest negative impacts or costs implications against four of the seven criteria. Cyan performs the worst with the most negative impacts or cost implications against four of the criteria. However public opinion suggests that the Purple and White options are most likely to be supported.

3.6.5 Multi-Criteria Analysis Framework (MACF) Appraisal Process

Based on the highly differentiated appraisal criteria and the manner in which options could be assessed against them, some quantitative and others qualitative, the assessment outcomes reported for each option against the themed criteria in sections 3.6.1 to 3.6.4 were calibrated into scores ranging from -3 to +3. This was so they could be inputted into the established Multi-Criteria Analysis Framework (MCAF) used at SOBC stage. The following sections explain how both quantitative metrics and qualitative scoring of options have been calibrated. This is documented on a theme by theme basis. Following this, the summarised results of the MCAF assessment are presented. It is the final scoring from the MCAF assessment that has been used to determine the preferred option.

3.6.5.1 Theme 1: Reducing Traffic Levels and Congestion

Options were assessed against all six criteria under this theme on the basis of quantitative metrics resulting from SATURN modelling as shown in Table 27 (AM peak) and Table 28 (PM Peak).

As the aim of this theme is to reduce traffic levels and congestion, each option was compared to the Do Minimum, which shows what will happen if nothing is done.

Based on the seven-point scoring scale used in the MCAF (-3, -2, -1,0,1,2,3), percentage differences compared to Do Minimum were then divided into seven bands and assigned an appropriate score. Metrics for AM and PM peaks were scored independently and input into MCAF as individual sub-criteria.

Table 56 shows the scoring rationale for any metric relating to flow differences, and Table 57 shows the scoring rationale for any metric relating to increases or decreases in delay. Table 58 to Table 63 show the MCAF scores assigned to options based on those bands. The tables are presented criterion by criterion.

It should be noted that although Purple with CAP has been scored for comparison, it will not be included in the final ranking of options, as it should be regarded as a sensitivity test on traffic flows rather than a separate 'option'.

Table 56: Traffic Flows: Scoring Rationale

Change in Flows compared to Do Min	Input MCAF Score	Range
> -15%	+3	84.9% or less
> -10%	+2	85%-89.9%
> -5%	+1	90%-94.9%
-5% to +5%	0	95%-105%
> +5%	-1	105.1%-110%
> +10%	-2	110.1%-115%
> +15%	-3	115.1% or more

Source: Mott MacDonald

Table 57: Delays: Scoring Rationale

Change in Delays compared to Do Min	Input MCAF Score	Range
> -30%	+3	69.9% or less
> -20%	+2	70%-79.9%
> -10%	+1	80%-89.9%
-10% to +10%	0	90%-110%
> +10%	-1	110.1%-120%
> +20%	-2	120.1%-130%
> +30%	-3	130.1% or more

Source: Mott MacDonald

Traffic Flow on J11 Circulatory

Based on the approach described above and using the scoring rationale shown in Table 56 the scores for each of the options in both AM and PM peaks are shown in Table 58.

Table 58: Traffic Flow on J11 Circulatory: Option MCAF Scores

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
Option	**Flow (vehs)**	**% Difference**	**MCAF Score**	**Flow (vehs)**	**% Difference**	**MCAF Score**
DM	4125			3831		
Magenta	4105	99.5%	0	3770	98.4%	0
Cyan	4061	98.4%	0	3892	101.6%	0
Purple	3816	92.5%	1	3671	95.8%	0
White	4029	97.7%	0	4046	105.6%	-1
Yellow	4090	99.2%	0	3911	102.1%	0
Purple CAP	3305	80.1%	3	3401	88.8%	2

Source: Mott MacDonald

In the AM peak, all options show a reduction in traffic through J11. In the PM peak the differences vary between slight reductions and slight increases, except for the White option where flows increase by just over 5% and therefore fall just inside the -1 scoring band.

Overall Delay at J11

Using the scoring criteria in Table 57, the scores for each of the options in both AM and PM peaks are shown in in Table 59.

Table 59: Overall Delay at J11: Option MCAF Scores

	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
Option	**Delay (secs)**	**% Difference**	**MCAF Score**	**Delay (secs)**	**% Difference**	**MCAF Score**
DM	464			798		
Magenta	972	209.5%	-3	943	118.2%	-1
Cyan	532	114.7%	-1	902	113.0%	-1
Purple	493	106.3%	0	782	98.0%	0
White	314	67.7%	3	454	56.9%	3
Yellow	253	54.5%	3	442	55.4%	3
Purple CAP	421	90.7%	0	667	83.6%	1

Source: Mott MacDonald

There are large increases in delay at J11 for Magenta in both AM and PM peaks, as would be expected as all traffic still has to pass through the junction to get to Trumpington Park and Ride. Cyan and Purple both also increase delay slightly in the AM peak. Purple has an arrangement where the buses pass through the middle of J11, therefore three stage signal phasing is required at both sides of the junction.

Yellow and White result in the biggest reductions in delay, both scoring the maximum +3.

Traffic Flow on A1309 – Hauxton Road

Based on the approach described previously, and using the scoring rationale shown in Table 56, the scores for each of the options in both AM and PM peaks are shown in Table 60.

Table 60: Traffic Flow on A1309 – Hauxton Road: Option MCAF Scores

	Northbound AM Peak (08:00-09:00)			Southbound PM Peak (17:00-18:00)		
Option	**Flow (vehs)**	**% Difference**	**MCAF Score**	**Flow (vehs)**	**% Difference**	**MCAF Score**
DM	1891			1762		
Magenta	2026	107.1%	-1	1671	94.8%	1
Cyan	1707	90.3%	1	1440	81.7%	3
Purple	1856	98.1%	0	1498	85.0%	2
White	1739	92.0%	1	1622	92.1%	1
Yellow	1796	95.0%	0	1574	89.3%	2
Purple CAP	1531	81.0%	3	1528	86.7%	2

Source: Mott MacDonald

All options except Magenta reduce traffic in the AM peak Northbound direction on A1309 Hauxton Road (north of J11), with Cyan showing the biggest reduction. In the PM Southbound peak all options reduce traffic, with Cyan showing the biggest reduction once more.

Traffic Flow on A1309 - High Street

Based on the approach described previously and using the scoring rationale shown in Table 56, the scores for each of the options in both AM and PM peaks are shown in Table 61.

Table 61: Traffic Flow on the A1309 - High Street: Option MCAF Scores

	Northbound AM Peak (08:00-09:00)			Southbound PM Peak (17:00-18:00)		
Option	**Flow (vehs)**	**% Difference**	**MCAF Score**	**Flow (vehs)**	**% Difference**	**MCAF Score**
DM	874			1106		
Magenta	862	98.6%	0	895	80.9%	3
Cyan	860	98.4%	0	972	87.9%	2
Purple	874	100.0%	0	859	77.7%	3
White	883	101.0%	0	921	83.3%	3
Yellow	904	103.4%	0	861	77.8%	3
Purple CAP	605	69.2%	3	1032	93.3%	1

Source: Mott MacDonald

Traffic flows remain similar to the Do Minimum in all options in the AM peak, with all options therefore soring zero. In the PM peak, there is a more significant reduction in flow in all options with scores of +3 for all options except Cyan.

Traffic Flow on A10 - Harston

Based on the approach described previously,and using the scoring rationale shown in Table 56, the scores for each of the options in both AM and PM peaks are shown in Table 62.

Table 62: Traffic Flow on A10 - Harston: Option MCAF Scores

	Northbound AM Peak (08:00-09:00)			Southbound PM Peak (17:00-18:00)		
Option	**Flow (vehs)**	**% Difference**	**MCAF Score**	**Flow (vehs)**	**% Difference**	**MCAF Score**
DM	893			711		
Magenta	884	99.0%	0	705	99.2%	0
Cyan	924	103.5%	0	704	99.0%	0
Purple	909	101.8%	0	707	99.4%	0
White	917	102.7%	0	741	104.2%	0
Yellow	909	101.8%	0	703	98.9%	0
Purple CAP	878	98.3%	0	718	101.0%	0

Source: Mott MacDonald

Traffic flows through Harston in the peak direction i.e. towards Cambridge in the AM and away from Cambridge in the PM remain very similar to Do Minimum for all options, as would be expected as the Park and Ride sites are situated closer to J11. All options therefore score zero.

Delay on A10 between Harston and M11

Using the scoring criteria in Table 57, the scores for each of the options in both AM and PM peaks are shown in Table 63.

Table 63: Delay on A10 between Harston and M11: Option MCAF Scores

	Northbound AM Peak (08:00-09:00)			Southbound PM Peak (17:00-18:00)		
Option	**Delay (secs)**	**% Difference**	**MCAF Score**	**Delay (secs)**	**% Difference**	**MCAF Score**
DM	154			214		
Magenta	179	116.2%	-1	152	71.0%	2
Cyan	279	181.2%	-3	140	65.4%	3
Purple	302	196.1%	-3	195	91.1%	0
White	255	165.6%	-3	174	81.3%	1
Yellow	263	170.8%	-3	140	65.4%	3
Purple CAP	231	150.0%	-3	301	140.7%	-3

Source: Mott MacDonald

Delays on the A10 between Harston and M11 improve in the PM peak, but almost double for many options in the AM peak. This is due to increased delays at the signalised junction with London Road, and may be able to be mitigated in reality by changes to timings or phasing.

3.6.5.2 Theme 2: Maximising Potential for Journeys Undertaken by Sustainable Modes

There are six criteria under this theme. The first three assessed the time it would take to reach the most logical Park and Ride (for the direction of travel) for each option from the:

- A10;
- M11 northbound; and
- M11 southbound.

Access times for the AM peak inbound, and access/egress times for the PM peak inbound and outbound, were input into MCAF as individual sub-criterion for each of the three directions of travel noted above. The scoring rationales used were those used previously to assess changes in delay, under Theme 1, shown in Table 57.

For the Do Minimum and Magenta options, only the existing Trumpington Park and Ride would be available, so access time was based on using Trumpington irrespective of direction of travel. For the other options, a choice of Park and Ride sites was available and it was assumed that inbound flows from the A10 and M11 northbound traffic would use the new site, but traffic from the M11 southbound would still use the existing Trumpington site. For outbound flows the reverse was assumed with traffic coming from the M11 southbound in the AM assumed to return to the M11 northbound in the PM.

The resulting scores for each option for access/egress times from/to A10 are shown in Table 64.

Table 64: Time to Access/Egress the Most Logical Park and Ride Site to/from the A10: Option MCAF Scores

	Inbound Access AM Peak (08:00-09:00)			Inbound Access PM Peak (17:00-18:00)			Outbound Egress PM Peak (17:00-18:00)		
Option	**Time to access P&R**	**% diff from Do Min**	**MCAF Score**	**Time to access P&R**	**% diff from Do Min**	**MCAF Score**	**Time to egress P&R**	**% diff from Do Min**	**MCAF Score**
DM	452			240			464		
Magenta	501	110.8%	-1	339	141.3%	-3	792	144.2%	-3
Cyan	70	15.5%	3	62	25.8%	3	481	84.4%	1
Purple	83	18.4%	3	74	30.8%	3	496	87.0%	1
White	76	16.8%	3	75	31.3%	3	513	90.0%	0
Yellow	76	16.8%	3	75	31.3%	3	504	88.4%	1
Purple CAP	85	18.8%	3	69	28.8%	3	516	90.5%	0

Source: Mott MacDonald

Magenta shows an increase in journey time for all three criteria and therefore scores negatively, as would be expected as traffic still has to pass through J11. All other options benefit from reduced journey times as the traffic accesses the new Park and Ride site south of J11.

The resulting scores for each option for access/egress times from/to M11 Northbound are shown in Table 65.

Table 65: Time to Access/Egress the Most Logical Park and Ride Site to/from the M11 Northbound: Option MCAF Scores

	Inbound Access AM Peak (08:00-09:00)			Inbound Access PM Peak (17:00-18:00)			Outbound Egress PM Peak (17:00-18:00)		
Option	**Time to access P&R**	**% diff from Do Min**	**MCAF Score**	**Time to access P&R**	**% diff from Do Min**	**MCAF Score**	**Time to access P&R**	**% diff from Do Min**	**MCAF Score**
DM	643			850			570		
Magenta	698	108.6%	0	649	76.4%	2	822	144.2%	-3
Cyan	359	55.8%	3	368	43.3%	3	481	84.4%	1
Purple	360	56.0%	3	373	43.9%	3	496	87.0%	1
White	355	55.2%	3	364	42.8%	3	513	90.0%	0
Yellow	444	69.1%	3	446	52.5%	3	504	88.4%	1
Purple CAP	354	55.1%	3	363	42.7%	3	516	90.5%	0

Source: Mott MacDonald

Magenta shows an increase in journey time for accessing Trumpington Park and Ride from the northbound M11 in AM, and also for returning to the M11 southbound in the PM peak and therefore scores negatively, as would be expected as traffic still has to pass through J11. All other options benefit from reduced journey times as the traffic accesses the new Park and Ride site south-west of J11 via a dedicated left-turn slip and/or tunnel passing under the A10.

The resulting scores for each option for access/egress times from/to M11 Southbound are shown in Table 66.

Table 66: Time to Access/Egress the Most Logical Park and Ride Site to/from the M11 Southbound: Option MCAF Scores

	Inbound Access AM Peak (08:00-09:00)			Inbound Access PM Peak (17:00-18:00)			Outbound Egress PM Peak (17:00-18:00)		
Option	**Time to access P&R**	**% diff from Do Min**	**MCAF Score**	**Time to access P&R**	**% diff from Do Min**	**MCAF Score**	**Time to access P&R**	**% diff from Do Min**	**MCAF Score**
DM	297			278			980		
Magenta	324	109.1%	0	299	107.6%	0	1049	107.0%	0
Cyan	323	108.8%	0	298	107.2%	0	1141	116.4%	-1
Purple	310	104.4%	0	282	101.4%	0	935	95.4%	0
White	321	108.1%	0	299	107.6%	0	824	84.1%	1
Yellow	321	108.1%	0	300	107.9%	0	836	85.3%	1
Purple CAP	290	97.6%	0	266	95.7%	0	997	101.7%	0

Source: Mott MacDonald

Traffic from M11 southbound in the AM peak (and therefore returning to M11 northbound in the PM peak) has been assumed to continue to use the existing Trumpington Park and Ride in all options. There is a small increase in access times in most options in the AM peak, but a reduction in egress times in Purple, White and Yellow in the PM peak, as other Park and Ride traffic is no longer using J11 and therefore delays through this junction are reduced, as shown previously in Table 59.

Park and Ride Bus Journey Times

The fourth criterion under this theme 'Park and Ride Bus Journey Time' looked at journey times savings (in minutes) in the AM, PM and interpeak periods relative to the Do Minimum option. The results of this assessment are shown in Table 36 in Section 3.6.2.2.The scoring for this criterion was again based on time savings against the Do Minimum expressed as a percentage, shown in Table 57.

Table 67 shows the MCAF scores for each of the options. Positive figures indicate an improvement on bus journey times relative to the Do Minimum, and negative numbers indicate a deterioration on bus journey times relative to the Do Minimum.

For the AM Peak, Park and Ride Bus Journey Time Savings relative to the Do Minimum ranged from 1.1 minutes (66 seconds) to 2.2 minutes (132 seconds), a differential of 1.1 minutes, or 66 seconds.

For the Interpeak period, Park and Ride Bus Journey Time Savings relative to the Do Minimum ranged from 0.7 minutes (42 seconds) to 1.5 minutes (66 seconds), a differential of 0.4 minutes, or 22 seconds.

For the PM Peak, Park and Ride Bus Journey Time Savings ranged from 0.9 minutes (54 seconds) to 1.5 minutes (90 seconds), a differential of 0.6 minutes, or 36 seconds. In the PM Peak there were however increases to bus journey times (noted as negative numbers), associated with some options. These increases ranged from 0.3 minutes (18 seconds) to 2.1 minutes (126 seconds), a differential of 1.8 minutes or 108 seconds.

Table 67: Park and Ride Bus Journey Times: Option MCAF Scores

	AM Peak (08:00-09:00)			InterPeak			PM Peak (17:00-18:00)		
Option	**Journey Time saving**	**% difference**	**MCAF Score**	**Journey Time saving**	**% difference**	**MCAF Score**	**Journey Time saving**	**% difference**	**MCAF Score**
DM									
Magenta	1.78	87%	1	0.93	90%	0	0.91	93%	0
Cyan	2.16	84%	1	0.87	91%	0	1.51	89%	1
Purple	1.62	88%	1	0.97	90%	0	-2.08	116%	-1
White	1.58	89%	1	1.01	90%	0	-1.99	115%	-1
Yellow	1.75	87%	1	1.08	89%	1	-1.57	112%	-1
Purple CAP	1.10	92%	0	0.70	93%	0	-0.30	102%	0

Source: Mott MacDonald

Both the criteria “Potential to Link with Existing Public Transport” and “Potential to Link with Future Public Transport Proposals” were qualitatively assessed and the findings described in Section 3.6.2.3 and Section 3.6.2.4. These qualitative findings have been assigned MCAF scores in the following manner:

Table 68: Potential to Link with Existing Public Transport: Scoring Rationale and Option MCAF scores

Option	MCAF Score	Rationale
Purple (CAP)	2	Purple with or without CAP measures, along with White offers a quicker access to the city centre than either Yellow of Cyan and so scores higher
Purple	2	Purple with or without CAP measures, along with White offers a quicker access to the city centre than either Yellow of Cyan and so scores higher
White	2	White, like Purple with or without CAP measures, offers a quicker access to the city centre than either Yellow of Cyan and so scores higher
Yellow	1	Yellow scores less than Purple and White because of longer access into the city centre, but there is no differential between any of the options relating to a new site in terms of potential links with existing public transport
Cyan	1	Cyan, like Yellow, scores less than Purple and White because of longer access into the city centre, but there is no differential between any of the options relating to a new site in terms of potential links with existing public transport
Magenta	0	The Magenta option would result in no change in regard to new links with existing services but does provide extra capacity and has therefore been assigned a neutral score
Do Minimum	-1	The Do Minimum option would result in no change in regard to new links with existing services and has no additional capacity and has been assigned a slightly negative score

Source: Mott MacDonald

Potential to Link with Future Public Transport Proposals: Scoring Rationale

On the basis that future rapid transit is likely to be bus based, all options were assessed equally in terms of their potential to link with future transport proposals. An MCAF score of 2 was assigned to all, as all were positive, except for the Do Minimum which was given a lower positive score of one to reflect no additional capacity, which limits potential. These are shown in Table 69.

Table 69: Potential to Link with Future Public Transport Proposals: Option MCAF scores

Option	MCAF Score
Purple (CAP)	+2
Purple	+2
White	+2
Yellow	+2
Cyan	+2
Magenta	+2
Do Minimum	+1

Source: Mott MacDonald

3.6.5.3 Theme 3: Quality of Life and Environment

Quality of Life Criteria

Both criteria classed as being related to Quality of Life (Accidents and Walking and Cycling Networks) were assessed qualitatively using a five-point scale as shown in Table 37. The rationale for conversion is shown in Table 70. The assessment criteria used were modified from a DFT approved 7-point scale which includes the categories “Moderate Beneficial” and “Moderate Adverse”, these would normally correspond with the +2 and -2 MCAF scores. However, because of the similarity between options it was not possible to differentiate on a qualitative manner between “slight” and “moderate” and so the scale was compressed into a 5-point scale using only “slight”.

Table 70: Accidents and Walking and Cycling Networks : Scoring Rationale

Impact	Input MACF Score
Beneficial	+3
N/A	+2
Slight Beneficial	+1
Neutral	0
Slight Adverse	-1
N/A	-2
Adverse	-3

Source: Mott MacDonald

Based on this approach how the options scored against these two criteria in MCAF are shown in Table 71.

Table 71: Accidents and Walking and Cycling Networks: Option MCAF Scores

Accidents		Walking and Cycling	
Option	**MCAF Score**	**Option**	**MCAF Score**
Purple (CAP)	+3	Purple (CAP)	+3
Purple	+3	Purple	+3
Cyan	+3	Cyan	+3
White	+3	White	+3
Magenta	0	Yellow	+3
Do Minimum	-1	Magenta	+1
Yellow	-1	Do Minimum	0

Source: Mott MacDonald

Environmental Criteria

All eight environmental criterion were qualitatively scored using the same -3 to +3 scales as required for inputting into the MCAF, therefore no conversion of metrics into scores and scoring ranges was required. The scores as shown in Table 40 to Table 46 were therefore input directly into MCAF but are summarised here for consistency in Table 72 and Table 73.

It should be noted that the Do Minimum option was not assessed against landscape, historic environment, biodiversity, or water. It is understood that the Do Minimum option refers to the expansion of the existing Trumpington Park and Ride for which planning consent has already been given. Therefore, an assessment score of 0 has been assigned on the basis that the Do Minimum will not result in additional impact in respect to the proposed scheme, rather than the effects of Do Minimum being 'Neutral'.

Table 72: Environmental Criteria: Option MCAF Scores

Landscape		Biodiversity		Historic Environment		Water	
Option	**MCAF Score**	**Option**	**MCAF Score**	**Option**	**MCAF Score**	**Option**	**MCAF Score**
Do Minimum	0	Do Minimum	0	Do Minimum	0	Do Minimum	0
Magenta	-1	Magenta	-1	Magenta	-2	Magenta	0
Purple	-1	Cyan	-2	Cyan	-2	Cyan	0
Purple (CAP)	-1	Purple	-2	Purple	-2	Purple	0
White	-2	Purple (CAP)	-2	Purple (CAP)	-2	Purple (CAP)	0
Yellow	-2	White	-2	White	-2	White	0
Cyan	-2	Yellow	-2	Yellow	-2	Yellow	0

Source: Mott MacDonald

Table 73: Environmental Criteria: Option MCAF Scores

Air Quality		Noise		GHG		Greenbelt	
Option	**MCAF Score**	**Option**	**MCAF Score**	**Option**	**MCAF Score**	**Option**	**MCAF Score**
Do Minimum	0	Do Minimum	0	Do Minimum	0	Do Minimum	0
Magenta	0	Magenta	-1	Magenta	0	Magenta	0
Cyan	0	Cyan	-1	Cyan	0	Purple	-1
Purple	0	Purple	-1	Purple	0	Purple (CAP)	-1
Purple (CAP)	0	Purple (CAP)	-1	White	0	White	-2
White	0	White	-1	Yellow	0	Yellow	-2
Yellow	0	Yellow	-1	Purple (CAP)	-1	Cyan	-2

Source: Mott MacDonald

3.6.5.4 Theme 4: Scheme Deliverability

Deliverability Criteria: Scoring Rationale

The criteria of Construction Risk, Disruption During Construction, Land Acquisition and Infrastructure/Maintenance Renewals were all qualitatively scored using the same -3 to +3 scales as required for inputting into the MCAF, therefore no conversion of metrics into scores and scoring ranges was required. The scores as shown in Table 48,Table 49,Table 50 and Table 51 were input directly into MCAF, but are summarised in Table 74.

Table 74: Deliverability Criteria: Option MCAF Scores

Construction Risk		Disruption during Construction		Land Acquisition		Infrastructure /Maintenance Renewals	
Option	**MCAF Score**	**Option**	**MCAF Score**	**Option**	**MCAF Score**	**Option**	**MCAF Score**
Do Minimum	0	Do Minimum	0	Do Minimum	0	Do Minimum	0
Yellow	-1	Yellow	-1	Yellow	-2	Yellow	0
Magenta	-2	Magenta	-2	Magenta	-2	Magenta	-2
Purple	-2	Cyan	-2	Purple	-2	Purple	-2
Purple (CAP)	-2	White	-2	Purple (CAP)	-2	Purple (CAP)	-2
White	-2	Purple	-3	White	-2	White	-2
Cyan	-3	Purple (CAP	-3	Cyan	-3	Cyan	-2

Source: Mott MacDonald

Ongoing Cost Implications – Site

Assignment of MCAF scores for "Ongoing Cost Implications - Site" was based on total cost which includes:

- Construction;
- Preliminaries;
- Overheads and Profit;
- Design;
- Testing and Commissioning; and
- Project Management costs.

Costs do not include any allowance for risk or the purchase of land.

The costliest option at £46,096,031 was assigned as top of the scoring range and the least costly at £32,535,325, the bottom; a price range of £13,560,706. Based on the assumption that cost in its own right is not a positive impact (as opposed to value), it was assumed that the Do Minimum would score neutral on the MCAF scale as this is committed intervention that has no cost implication for this scheme. All other options would score negatively. Using this approach, the positive scores in the MCAF scale would not be applicable and with the Do Minimum assumed to be no cost and scoring a zero the cost range was the divided into equal bandwidths of £4,520,235 between the three valid scoring options (-1, -2 and -3).

Table 75: Ongoing Cost Implications-Site: Scoring Rationale

Cost Range	Input MACF Score
N/A	+3
N/A	+2
N/A	+1
No Cost	0
£32,535,325 - £37,055,560	-1
£37,055,560 - £41,575,795	-2
£41,575,795- £46,096,030	-3

Source: Mott MacDonald

Based on this approach, how the options scored against this criterion in MCAF is shown in Table 76.

Table 76: Ongoing Cost Implications-Site: Option MCAF Scores

Option	MACF Score
Do Minimum	0
Yellow	-1
Magenta	-1
White	-3
Purple	-3
Purple (CAP)	-3
Cyan	-3

Source: Mott MacDonald

Ongoing Cost Implications - Bus

Assignment of MCAF scores for "Ongoing Cost Implications - Bus" was undertaken based on the estimated annual surplus/deficit amounts for each option. On the assumption that a break-even situation (£0 surplus or deficit) equates to a score of zero, any deficit amount will score a negative value on the MCAF scoring scale of -3 to +3. The greatest deficit noted, as shown in Table 53, is £1,401,950 and was therefore assigned a value of -3. The difference between the amount of the greatest deficit and £0 was then divided into three, creating equal bands of monetary values, each £467,316 wide; in this manner scores of -3 to 0 could be assigned to each band. On the basis that the monetary bandwidth needs to be consistent for surplus as well as deficit amounts, the following scores shown in Table 77 were assigned to options with surplus or deficit amounts falling within the indicated ranges.

Table 77: Ongoing Cost Implications-Bus: Scoring Rationale

Range of Surplus or Deficit	Input MACF Score
£934,633+	+3
£467,317 to £934,633	+2
£1 to £467,316	+1
0	0
-£1 to -£467,316	-1
-£467,317 to -£934,633	-2
-£934,634 to -£1,401,950	-3

Source: Mott MacDonald

Based on this approach how the options scored against this criterion in MCAF is shown in Table 78.

Table 78: Ongoing Cost Implications-Bus: Option MCAF Scores

Option	MACF Score
Magenta	+1
Do Minimum	-1
Purple	-2
Purple (CAP)	-2
White	-2
Cyan	-3
Yellow	-3

Source: Mott MacDonald

Likelihood of Public Support

Feedback from consultation and questionnaire responses formed the basis for assignment of scores to options under this criterion.

Likelihood of Public Support: Scoring Rationale

With the exception of the Do Minimum, all options received some level of positive feedback. The Purple, White and Cyan options scored the best and were very close to each other in popularity with Yellow not as popular. All new site options received more support than expanding the existing site, so on this basis Magenta is considered to have been the worst performing Do Something option. As not all respondents answered all questions and questions were based on option elements (site, vehicular access and PT access), rather than as whole packages it is not possible to provide meaningful statistics against the overarching findings. But based on the fact that all Do Something options had at least a measure of positive response, the following MCAF scores have been assigned.

Table 79: Liklehood of Public Support: Option MCAF Scores

Option	MCAF Score
Purple/ Purple (CAP)	3
White	3
Cyan	3
Yellow	2
Magenta	1
Do Minimum	-3

Source: Mott MacDonald

3.7 MCAF Results

Each option was assigned a -3 to +3 score for each of the themed criteria based on the rationale and approach detailed in Section 3.6.5. Then, as at SOBC stage, the scores assigned to the criteria within each theme were normalised to provide a score out of ten, to avoid the results being skewed by the number of criteria within each theme. The result was an overall score for each option under each of the four themes, based on the scores assigned to each of the criteria under those themes.

Weightings were then applied to reflect the relative importance of each theme. For consistency, the same two scenarios were tested as at SOBC stage with different relative weightings applied to each:

- Weighting scenario 1: Equal 25% weighting per selection theme.
- Weighting scenario 2: Greater emphasis on indicators that relate to the strategic scheme objectives – 40% (Theme 1), 40% (Theme 2), 10% (Theme 3), 10% (Theme 4).

The summarised results of the MCAF scoring on a theme by theme basis are shown in Figure 71. Although the Purple option with CAP has been scored it has been removed from the ranking as it uses different levels of traffic and is therefore not a direct comparison.

Under both weighting scenario's the ranking is the same:

- 1st: Yellow;
- 2nd: White; and
- 3rd: Purple.

The Yellow option scores best under Themes 1 and 2, which directly align with the scheme objectives. It scores second best under Theme 4, only relative to the Do Minimum; this is due to the fact that Theme 4 relates to physical deliverability and doing something naturally incurs more disruption and cost than the Do Minimum, which is effectively doing nothing as this baseline scenario accounts for improvements already committed and are therefore outside the scope of this scheme. The Yellow option scores least favourably under Theme 3 mostly because exclusion of a dedicated tunnel for access has led to the assessment that this has the potential for a higher level of accidents relative to options that feature a tunnel.

In Summary, the Yellow option scores best of all the Do Something Options under three of the four themes which represent 19 or the 29 criteria. It also scored best overall.

A full breakdown of the MCAF scores against each individual criterion under each theme is included in Annex A within this main OBC report.

Figure 71: MCAF Results, Shown by Assessment Theme, Overall Score and Rank with Varied Weightings

Cambridge South West Park and Ride **Multi-Criteria Assessment Summary**

Normalised scores (unweighted)

Max score = 10	PURPLE	PURPLE (CAP)	WHITE	YELLOW	CYAN	D0 MINIMUM	Major Trumpington expansion (MAGENTA)
Selection Theme 1: Reducing (or avoiding negative impact on) traffic levels and congestion	5.4	6.3	6.1	**6.5**	5.6	5.0	5.0
Selection Theme 2: Maximising potential for journeys to be undertaken by sustainable modes	7.4	7.3	7.4	**7.5**	7.4	5.0	4.4
Selection Theme 3: Quality of life & environment	**4.8**	4.7	4.5	3.8	4.5	**4.8**	4.5
Selection Theme 4: Scheme deliverability	2.4	2.4	2.6	3.6	1.9	**4.0**	3.3
Weighting test 1							
Normalised score (max.10)	5.00	5.14	5.15	5.36	4.84	4.72	4.31
Rank	**3**		**2**	**1**	4	5	6
Weighting test 2							
Normalised score (max.10)	5.84	6.11	6.11	6.35	5.82	4.89	4.55
Rank	**3**		**2**	**1**	4	5	6

Apply Weighting *Total weightings must equal 100%*

Central Case	PURPLE	PURPLE (CAP)	WHITE	YELLOW	CYAN	D0 MINIMUM	Major Trumpington expansion (MAGENTA)
25%	5.4	6.3	6.1	6.5	5.6	5.0	5.0
25%	7.4	7.3	7.4	7.5	7.4	5.0	4.4
25%	4.8	4.7	4.5	3.8	4.5	4.8	4.5
25%	2.4	2.4	2.6	3.6	1.9	4.0	3.3
100%							
	5.00	5.14	5.15	5.36	4.84	4.72	4.31
	3		**2**	**1**	4	5	6

Selectio	Version	PURPLE	PURPLE (C	WHITE	YELLOW	CYAN	D0 MINIMU	Major
1	**40%**	8.7	10.0	9.8	10.4	8.9	8.0	8.0
2	**40%**	11.8	11.6	11.8	12.0	11.8	8.0	7.0
3	**10%**	1.9	1.9	1.8	1.5	1.8	1.9	1.8
4	**10%**	1.0	1.0	1.0	1.4	0.8	1.6	1.3
	100%							
		5.84	6.11	6.11	6.35	5.82	4.89	4.55
		3		**2**	**1**	4	5	6

Source: Mott MacDonald

3.8 Preferred Option

It was agreed that all themes should be weighted equally and, as such, it is the Yellow option that has been identified as the preferred option to be taken forward for further assessment in the Economic Case. This is based on the overall total score shown in Figure 71. The Financial, Commercial and Management Cases of this OBC also focus solely on the funding, procurement and delivery requirements of the Yellow Option.

In recognition that minor amendments could be made to the Yellow option to improve performance against themes where it did not score as well, design tweaks will be made at Full Business Case stage to optimise the performance of this option relative to scheme objectives and assessment criteria.

3.9 Option Appraisal Summary

- This Options Appraisal Section is effectively an Options Appraisal Report that has been integrated into the wider OBC.
- The appraisal process has been undertaken in three key steps. The first two steps were undertaken at SOBC Stage.
- The first step was to identify potential sites for expansion of Park and Ride facilities in South West Cambridge. In addition to expanding the existing Trumpington site, a further four site locations were identified; two adjacent to the M11 and A10, and two adjacent to the A1307 and M11. A high level sift, taking into account alignment with scheme objectives and environmental constraints was undertaken. A scoring system of -3 to + 3 was applied where -3 was assigned to the most poorly aligned and +3, to the best aligned. Site D, north of the M11 J11 adjacent to the A10 and M11 was found to be the most suitable site, however it was also decided that expansion of the existing Trumpington site in addition to development of options for a new site should be taken through to the next stage of appraisal.
- The next step in the appraisal process was to develop a 'long list' of 13 expansion options to compare against a Do Minimum scenario. These were assessed in a Multi Criteria Analysis Framework (MCAF) against 26 criteria under 4 separate themes (Th.): Reducing traffic levels and congestion (Th. 1); Maximising potential for journeys to be undertaken by sustainable modes (Th.2); Quality of life and environment (Th.3), and Scheme deliverability (Th, 4). The same -3 to + 3 scoring scale was applied. Two alternative weighting scenarios were applied to the appraisal of the long list, one with equal weighting across all four themes and one with greater weighting applied to Th.1 and Th.2. The top performing four options under both weighting scenarios, Purple, White, Cyan and Yellow were taken through to the options shortlist. Although expansion of the existing Trumpington site (Magenta) performed poorly, it was also taken through to the shortlist as it was seen as being a logical comparator to providing a new site.
- In Step 3 the shortlisted options were taken forward for public consultation and consultation feedback was added to the assessment criteria, along with two additional criteria, in view of the more detailed design that was now available.
- Both quantitative and qualitative processes were used to assess the shortlisted options against the revised criteria. The CSRM Saturn Model was used to quantitatively assess criteria under Th.1 and Th.2, whilst a set of WebTAG compliant worksheets were compiled by Mott MacDonald specialists for each of the criteria falling under the Environmental assessments umbrella in Th.3. A Social and Distributional Analysis was undertaken to assess the performance of options against the Quality of Life criteria under Th.3 and a qualitative assessment of criteria pertaining to deliverability issues such as land acquisition and disruption during construction were applied to criteria under Th.4
- Quantitative metric and qualitative scores were calibrated into the -3 to +3 scoring range and inputted into the MCAF. The same two weighting scenarios from Step 2 were applied.
- On the basis of this assessment the Yellow option was found to be the best performing option. The Yellow option is a new Park and Ride site with general traffic and bus access/egress from two new junctions on the A10. A dedicated left turn lane will operate from the A10 at Hauxton into the Park and Ride site. There will also be additional free flow left turn lanes from both motorways and off slips. Buses will cross the motorway using the existing accommodation bridge to the north and will then route alongside the southbound off slip.

4 Economic Case

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 distribution impacts the scheme is expected to deliver.

4.1 Approach

The Economic Case for Cambridge South West Park and Ride has been developed to ensure that it follows in a proportionate manner, the requirements of the DfT's *'The Transport Business Case: Economic Case'* which are noted in Table 80.

Table 80: Compliance with DfT Requirements for the Economic Case at OBC Stage

Content	DfT Requirements	Section Number and Title(s)
Introduction	Outline approach to assessing value for money.	4.1 Approach
Options appraised	A list of the options (set out in the Options Appraisal Chapter) that have been appraised.	4.2 Options Appraised and Section 3: Shortlisted Options Appraised
Assumptions	WebTAG sets out assumptions that should be used in the conduct of transport studies. List any further assumptions supporting the analysis.	4.3 Assessing Value for Money – assumptions are included in narrative.
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.	4.8 Sensitivity Test
Appraisal Summary Table	See WebTAG for detailed guidance on producing the Appraisal Summary Table.	4.9 and separate appendix for Appraisal Summary Table
Value for Money Statement	See Value for Money guidance on producing the VfM statement.	4.7.2 NPV Calculation of Shortlisted Options 4.7.3 Indicative Value for Money

Source: DfT

4.2 Options Appraised

Section 3 documented the options appraisal process that resulted in the Yellow option being identified as the preferred option when scored against 29 criteria grouped under four themes. These criteria were established to ensure the preferred option aligned best with scheme objectives, GCP aims and local and national policy. The four themes were:

- Reducing traffic levels and congestion;
- Maximising potential for journeys to be undertaken by sustainable modes;
- Quality of life and environment; and
- Scheme deliverability.

Under three of these themes, representing 19 of the 29 criteria, the Yellow Option scored best overall relative to the Do Minimum and was therefore taken forward as the preferred option. The Economic Case focuses on the calculation of the Net Present Value (NPV) and relative Value

for Money (VfM) of the Preferred option which, although not one of the assessment criteria, is necessary in the development of a WebTAG compliant Business Case.

4.3 Assessing Value for Money

Section 4.3 details the approach to assessing value for money and includes key assumptions in its narrative.

4.3.1 Decongestion Benefits

Vehicle, time, and distance matrices were extracted from the SATURN Do Minimum and Do Something 2031 assignments for each option and time period. Other Goods Vehicles (OGVs) were split into OGV1 and OGV2 using proportions for built up principal roads from the COBA manual (Part 4 Chapter 8, Table 8/1).

TUBA was run for a single forecast year of 2031 with benefits for that year extrapolated over the appraisal period using WebTAG databook values of time growth but no allowance for fuel cost growth.

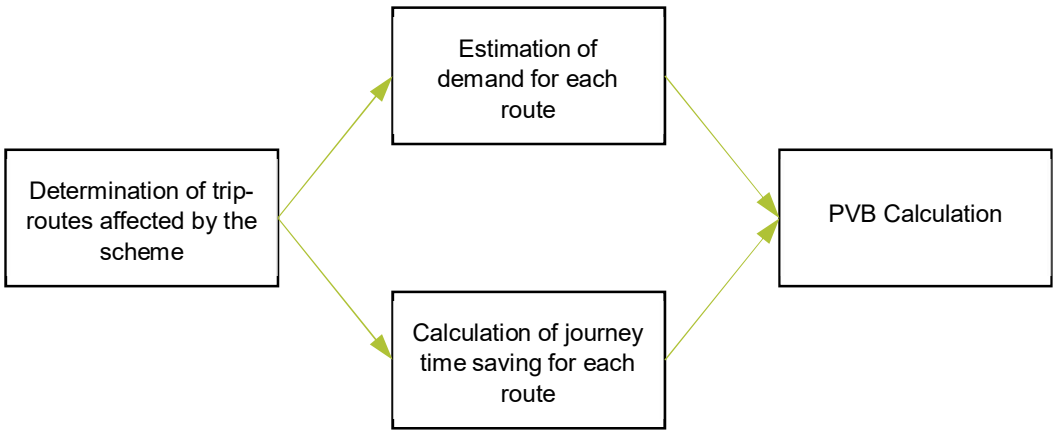
Standard annualisation factors of 759 for the AM peak, 1518 for the interpeak and 759 for the PM peak were used. These assume that the benefits in the modelled AM peak hour of 0800-0900 will be the same for 0700-0800 and 0900-1000. Similarly, they assume that the benefits in the modelled PM peak hour of 1700-1800 will be the same for 1600-1700 and 1800-1900.

The TUBA assessments run for each option resulted in 'model noise' outweighing any possible decongestion benefits along the route as a result of the options tested, i.e. small changes in flows and delays at various locations across the rest of the CSRM network due to slight differences in model convergence have produced levels of benefits and disbenefits that outweigh any discernible impacts due to the scheme. Therefore, it has been assumed that there are no significant decongestion benefits resulting from the project.

4.3.2 Bus Passenger Benefits

PVBs for bus passengers only were therefore calculated by comparing demand and journey time changes along the routes affected by the scheme. The general steps of this comparison follow the diagram shown in Figure 72.

Figure 72: PVB Calculation Process



As explained previously in Section 4.3.1, standard annualisation factors of 759 for the AM peak, 1518 for the interpeak and 759 for the PM peak were used.

No growth in public transport passengers was assumed over the appraisal period. No journey time benefits to public transport passengers were assumed off-peak or at weekends.

Determination of Routes Affected by The Scheme

The scheme options affect the access routes to the existing and proposed new Park and Ride sites and include bus services from the new Park and Ride site to Cambridge City Centre and Cambridge Biomedical Campus.

The complete journeys of these trips consist of both a bus and a car section. Based on the bus journey, these trips use one of two routes depending on the bus service they use; either between Trumpington and Cambridge City Centre or between Trumpington and Cambridge Biomedical Campus. Meanwhile, based on their car journeys, the routes differ according to the approaches (or exits) used to access (or egress) the park and ride. These approaches are as follows:

1. **North approach –** approach to the Park and Ride from north west of Junction 11 of the M11.
2. **South approach –** approach to the Park and Ride from south east of Junction 11 of the M11.
3. **West approach –** approach to the Park and Ride from south west of Junction 11 of the M11.
4. **Other approach –** approaches to the Park and Ride from elsewhere.

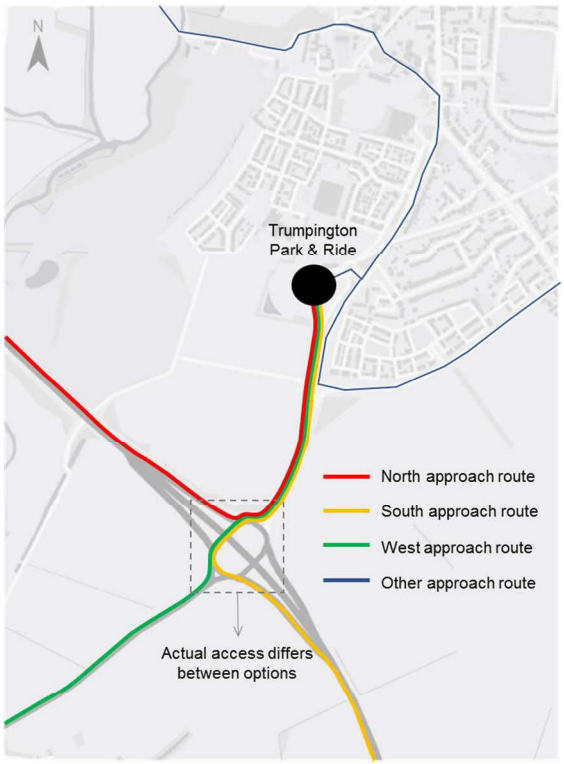
The first three approaches represent the main ways drivers are accessing the Park and Ride facility which are along both directions of the M11 and the A10. The fourth route represents two additional approaches that are being used as cut-throughs to Trumpington Park and Ride, these are Addenbrooke's Road and Shelford Road east of the Park and Ride and Grantchester Road West of the Park and Ride. Accesses from these approaches were combined as the scheme is chiefly concerned with Junction 11 of the M11 and these approaches are not directly affected by the changes in Junction 11.

In the Do Minimum and Magenta options where there is only the expanded existing Park and Ride facility, all approaches access Trumpington Park and Ride. Meanwhile, in Cyan, Purple, White and Yellow options, where there are two Park and Ride sites, the South and West approaches are linked to the new Park and Ride. This assumption was based on the relative ease of accessing the new Park and Ride site from these approaches as cars would not need to go through Junction 11 of the M11. The car-journey routes to enter and exit each Park and Ride in the one and two Park and Rides sites scenarios are presented in Figure 73 and Figure 74 respectively.

Additionally, the inbound and outbound Park and Ride bus routes in the different Scenarios are presented in Figure 75. The inbound Park and Ride bus route between Trumpington and Cambridge City Centre goes north of the Park and Ride towards Trumpington Road and on to the city centre whereas the Park and Ride bus route from Trumpington to the Biomedical Campus utilises the guided busway from the Park and Ride towards Addenbrooke's Hospital. The outbound routes of these services generally follow the reverse of their inbound routes.

The four car-journey routes and two bus-journey routes therefore made up a total of eight routes to be considered in the PVB calculation. Journey time and trip demand along these eight routes for each option were extracted from SATURN assignments.

Figure 73: Entry and Exit Car Routes for the expanded existing Park and Ride Site Scenario



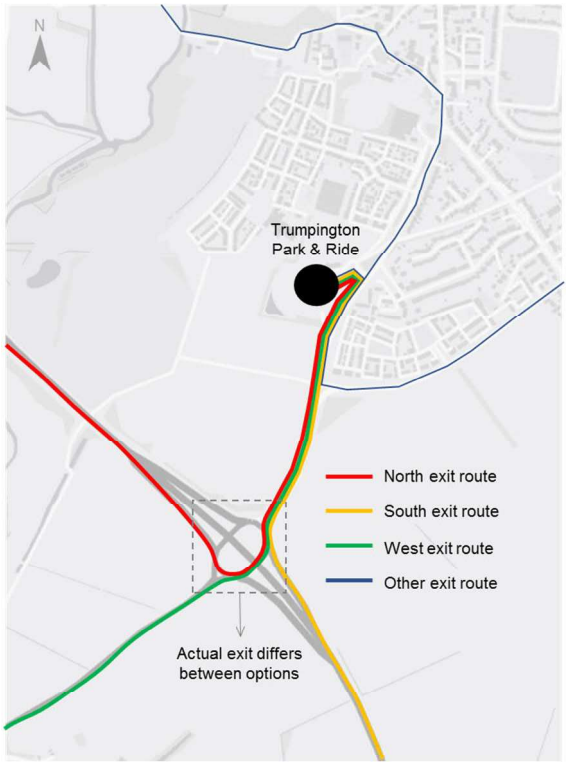
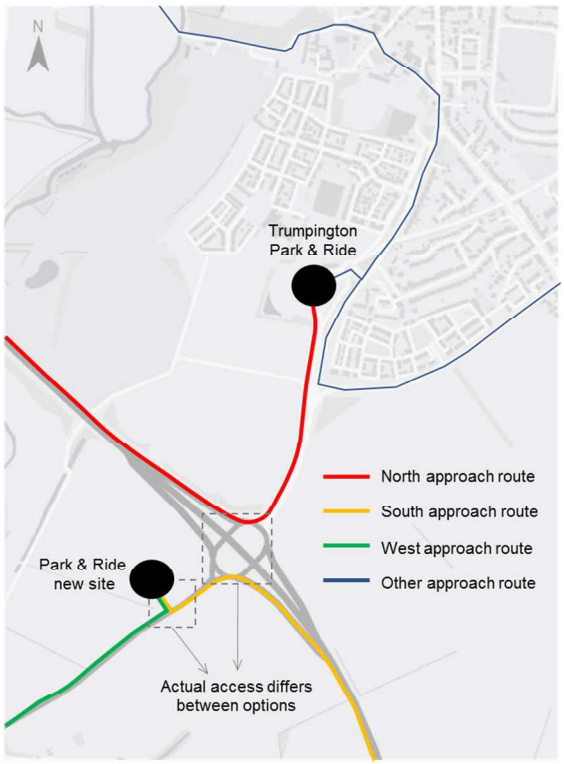


Figure 74: Entry and Exit Car Routes for the existing Park and Ride plus new Park and Ride Site Scenario



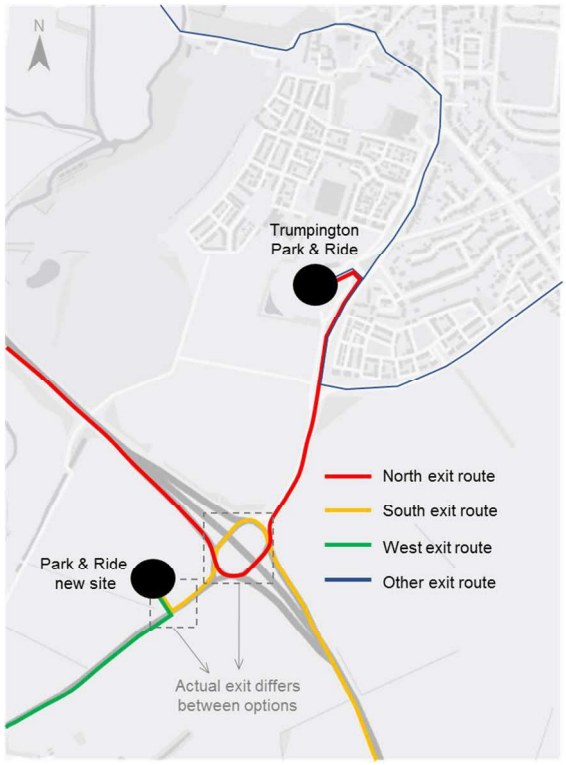
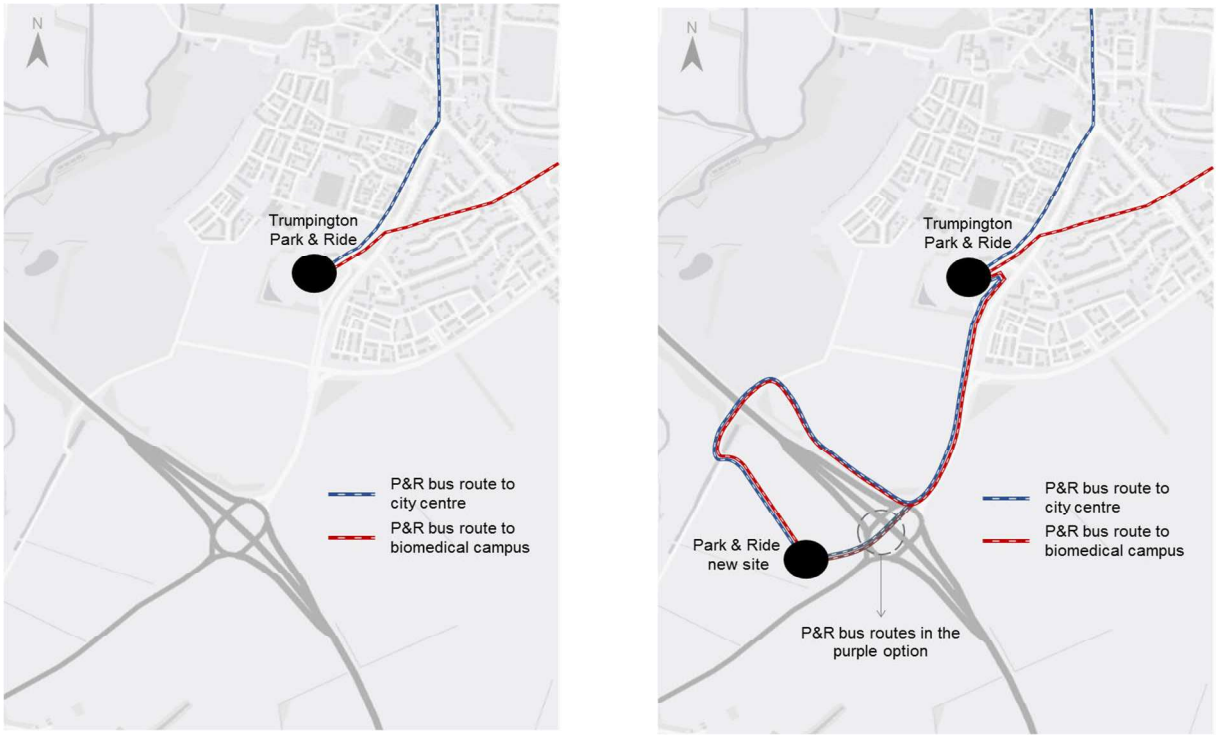


Figure 75: Inbound and Outbound Bus Routes for the existing Park and Ride plus new Park and Ride Sites Scenario



Estimation of Demand for Each Route

To obtain Park and Ride demand along each entry route within each time period, a series of select link analyses have been conducted for the car-journey routes as described in section 5.2.1.

Park and Ride demand is estimated as the inbound trips in the AM period, outbound trips in the PM period and average between inbound and outbound in the interpeak period. Therefore, select link analyses were carried out in the entry approaches in the AM Peak period, the exit routes in the PM Peak period and both for the IP period. A conservative assumption for car occupancy rate of 1.00 was used to convert these car trips into bus passengers. Of the total Park and Ride demand, 50% are assumed to go to the city centre and the remaining 50% are assumed to go to the biomedical campus.

The select link analyses indicated that in the PM Peak period across all options (including Do Minimum), a large portion of the outbound trips from the existing Park and Ride do not utilise the main exit (M11 Northbound). Instead, these trips avoid Junction 11 and go through Grantchester village to either join the M11 at Junction 12, then continue towards the A1303 Madingley Road, or towards Barton. This rat-running can be explained by the congestion at Junction 11 of the M11.

The high level of traffic through Grantchester could have a detrimental effect to the local area as the road network in this village has not been designed to handle such a high level of traffic. In the options with the existing plus the additional Park and Ride site, traffic through Grantchester is considerably lower. This is because the new Park and Ride site eliminates the necessity of trips going Westbound on the A10 to go through Junction 11. Nevertheless, there is still a need for further traffic calming measures in Grantchester to deter drivers from using it as a cut-through.

Calculation of Journey Time Saving for Each Route

Journey time savings for these eight routes were calculated by comparing journey times on each option against the Do Minimum option. The journey time changes included the car trip from the approaches to the Park and Ride and then the individual bus trip to either New Fen Causeway, south of Cambridge City Centre or Cambridge Biomedical Campus.

Consistent with the assumptions on demand estimation, journey time savings for the Park and Ride for the inbound routes and outbound routes were used to calculate the total trips-minutes saving in the AM and PM Peak periods respectively. Meanwhile, the average of inbound and outbound journey time savings was used for the interpeak period.

Apart from changes in in-vehicle journey time, any increase in bus services frequency would incur benefits from waiting time saving. There are currently six buses per hour servicing the route between Trumpington Park and Ride and Cambridge city centre. A similar level of bus provision from the new Park and Ride site has been assumed so there would be no change in waiting time for this route.

There are currently four buses per hour between Trumpington Park and Ride and biomedical campus with six buses per hour between the new Park and Ride and biomedical campus proposed. This results in a 2.5-minute waiting time reduction for passengers traveling to biomedical campus from the new Park and Ride site.

The time savings for trips using Addenbrooke's Road or Grantchester Road were considered as the changes in the bus part of the journey only. The time saving for only the bus part of the journey has been shown in Table 67 which presents the total journey time saving for traffic using the three main approaches.

Table 81: Total Route Time Saving (minutes)

Approach	Park and Ride Buses to/from City Centre			Park and Ride Buses to/from Biomedical Campus		
North Approach						
	AM inbound	**IP average**	**PM outbound**	**AM inbound**	**IP average**	**PM outbound**
Magenta	0.8	0.5	-1.8	-1.0	-0.5	-2.7
Cyan	0.5	0.6	-2.3	-1.7	-0.3	-3.8
Purple	1.5	1.0	-1.3	-0.2	0.0	0.8
White	0.0	0.9	-0.1	-1.6	-0.1	1.9
Yellow	-0.1	0.9	-0.6	-1.9	-0.2	1.0
South Approach						
	AM inbound	**IP average**	**PM outbound**	**AM inbound**	**IP average**	**PM outbound**
Magenta	0.6	0.8	-3.0	-1.2	-0.1	-3.9
Cyan	2.9	0.3	0.0	3.3	1.9	1.0
Purple	3.6	1.6	-3.2	4.5	3.1	1.4
White	2.8	0.5	-3.8	3.7	2.1	0.9
Yellow	2.3	0.5	-3.0	3.0	1.9	1.0
West Approach						
	AM inbound	**IP average**	**PM outbound**	**AM inbound**	**IP average**	**PM outbound**
Magenta	1.3	0.6	-4.2	-0.5	-0.3	-5.1

Approach	Park and Ride Buses to/from City Centre			Park and Ride Buses to/from Biomedical Campus		
Cyan	5.9	1.6	4.6	6.2	3.2	5.6
Purple	5.7	2.5	2.0	6.6	4.0	6.6
White	4.7	1.3	0.4	5.9	3.0	5.1
Yellow	5.1	1.6	1.5	5.9	3.1	5.6

Note: Total time savings include car and bus journeys and bus waiting time reductions where available
All time savings are in minutes

Table 81 shows that total time savings across Magenta are generally negative, particularly in the PM peak period. Despite the positive bus time savings on inbound journeys to the City Centre, Magenta suffers negative time savings across the whole journey. Delay at Junction 11 of the M11 causes an increase in car trip travel time as far as the Trumpington Park and Ride site. In the Magenta option, to separate Park and Ride traffic from general traffic an additional stage has to be added in two of the three signalised junctions at Junction 11; the entry arms from the A10 and from the M11 northbound off slip.

In contrast, in the Cyan, White, and Yellow options, only the M11 Southbound off slip requires an additional stage. Additionally, in Magenta option there are no additional Park and Ride buses to provide waiting time saving benefits.

Entries through the North approach suffer negative time savings across all options, indicating a problem at the Southbound off-slip of Junction 11.

The Purple option also benefits from having shorter bus routes between the new and existing Park and Rides. Exits through the South approach in the PM peak period generally suffer negative time saving as the options put people through the congested Junction 11 twice; once as a bus trip and the second time as a car trip accessing the M11 southbound on-slip from the new Park and Ride. This, however, is negated by the reduction in waiting time for people using the biomedical campus route.

The Cyan option, while promising higher inbound to City Centre bus time saving benefits, does not perform particularly better than the Purple, White, and Yellow options in terms of total time savings. The reduced delay in the junction between Trumpington Road and Long Road has made the southbound route through Trumpington more attractive than in the other options. This, by extension, increases the traffic flow through Junction 11 and adds to the delay. This delay has the most obvious effect on the exit through the North approach in the PM Peak period where Cyan performs consistently worse than other options.

4.3.3 PVB Results

The PVB includes operating and investment costs of running the buses, revenue and monetised travel time savings.

Standard annualisation factors of 759 for the AM peak, 1518 for the interpeak and 759 for the PM peak were used for travel time savings. No journey time benefits to public transport passengers were assumed off-peak or at weekends in line with the approach taken at SOBC. No growth in public transport passengers was assumed over the appraisal period of 60 years starting from the opening year of 2022. A discount rate of 3.5% per year is used for the years up to 30 years after the current year (2018) while a 3% discount rate is used for the remaining years. Benefits are discounted to 2010 prices in line with the current WebTAG standard.

WebTAG PSV purpose splits for average weekday were used to divide total trips into three groups. These splits assume 1.8% of bus users are traveling for business purposes (Employers Business - EB), 16.0% for commuting, and the remaining 82.2% for other trip purposes. The

Value Of Time for EB follows the WebTAG standard for car driver/passenger rather than PSV for working purpose as Park and Ride passengers use cars for part of their journeys.

Benefits for the new site options were negative as the cost of running the additional bus services currently outweighs the cost of providing the service, however this is subject to change as the scheme develops and negotiations with potential operators are entered in to. As such subsidy or grant to cover the costs of investing in and operating the new buses has been included in the economic assessment as a cost to the local authority, and a benefit to the private operator.

Since the initial publication of this OBC it has been determined that the above-mentioned operating and investment costs of running the buses will be provided either by franchising or by revenues pertaining to the City Access scheme, this is to be developed further at Full Business Case Stage. The PVB for all options are shown in Table 82.

Table 82: Present Value Benefits for all Options

Options	Present Value Benefits
Magenta	-£3,327,000
Cyan	£3,166,000
Purple	£3,091,000
White	£1,474,000
Yellow	£1,498,000

Note: All PVB values are in 2010 market prices, discounted to 2010

The travel time benefits are currently only calculated for bus passengers and for modelled hours. For the preferred option the full demand model will be run, and benefits calculated including decongestion benefits. There may also be additional benefits from improvements to Trumpington Road but, as this is likely to be taken forward as a separate scheme, we cannot include those in this assessment.

4.4 Wider Economic Impacts

The Wider Economic Impact of the Cambridge South West Park and Ride scheme has not been assessed as it is considered unlikely that the proposals would deliver a wider economic impact that is quantifiable at this time. The scheme is also unlikely to have any notable impact on labour market catchment, due to the close proximity of the proposed new site to the current site, which will remain open irrespective of whether a new site in the form of the Yellow option is built or not.

This scheme can support future development across south Cambridge by increasing accessibility into key growth areas such as the Cambridge Biomedical Campus and other sites yet to be identified in this area. This scheme can substantially increase the viability of such developments, as the enhanced public transport accessibility provided by this scheme will enable more workers to access employment in this area without incurring the congestion likely to result from increase private vehicle use. While this scheme will support future growth in this area, it cannot yet be quantified as the proposals for the development of the biomedical campus and other sites have not yet been brought forward. It is therefore not possible at this stage to accurately quantify the scale of the impact of this scheme on economic growth in the area as no proposals for such growth have yet been presented.

4.5 Environmental Impacts

An Environmental Appraisal Report will be prepared as an appendix to the Full Business Case (FBC) for this scheme and will support the findings of this OBC and the preferred option. It will include the following key sections:

- An introduction, stating the purpose of the report, overview of the scheme and the legislative and policy framework;
- Environmental assessment methodology
- One section covering legislation, assessment methodology, study area, existing and baseline information, resources and receptors, assessment, conclusion for each of the environmental topics of
  - Landscape
  - Biodiversity
  - Historic environment
  - Water
  - Local air quality
  - Noise
  - Greenhouse gases (GHG)
  - Greenbelt

The key findings at OBC stage regarding the preferred (Yellow) option are as follows:

Landscape

There was no difference in the qualitative impact assessment of the Yellow Option in comparison to the other do something options; all were found to have slight detrimental impacts relative to the Do Minimum scenario.

Biodiversity

There was no difference in the qualitative impact assessment of the Yellow Option in comparison to the other do something options at the new site; all were found to have moderately detrimental impacts relative to the Do Minimum scenario. However, the Do Something option at the existing Trumpington site (Magenta option) had only slight detrimental effects on biodiversity relative to the Do Minimum scenario.

Historic Environment

There was no difference in the qualitative impact assessment of the Yellow Option in comparison to the other do something options at the new site; all were found to have moderately detrimental impacts relative to the Do Minimum scenario. However, the Do Something option at the existing Trumpington site (Magenta option) had only slight detrimental effects on the historic environment relative to the Do Minimum scenario.

Water

There was no difference in the qualitative impact assessment of the Yellow Option in comparison to the other do something options; all were found to have neutral impacts relative to the Do Minimum scenario.

Local Air Quality

There was no difference in the qualitative impact assessment of the Yellow Option in comparison to the other Do Something options; all were found to have neutral impacts relative to the Do Minimum scenario.

Noise

There was no difference in the qualitative impact assessment of the Yellow Option in comparison to the other do something options; all were found to have slight detrimental impacts relative to the Do Minimum scenario.

Greenhouse Gases (GHG)

There was no difference in the qualitative impact assessment of the Yellow Option in comparison to the other do something options; all were found to have neutral impacts relative to the Do Minimum scenario. Only the Purple option, with City Access Penalty (CAP) measures applied, had a slight detrimental effect compared to the other options; however, the assessment of the Purple option with CAP measures was only included as a sensitivity test and is not being considered as an option in its own right.

Green Belt

An initial high-level Green Belt appraisal of the various site options was undertaken by our planning consultant Strutt & Parker. A more detailed assessment will be prepared as part of the Planning Application process. The assessment found that whilst the new Park and Ride site itself is likely to have the most significant impact on the Green Belt, the access routes to the site may have an additional impact. In summary it was found that the Yellow option was the second best performing new site option relative to the Do Minimum; only the Purple option at the new site had fewer detrimental impacts.

4.6 Social Impacts

To support the development of the OBC, a Social Impact Appraisal (SIA) has been carried out for the shortlisted options. The SIA assesses the human experience of the scheme and its impact on wider society. The impacts included are:

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

Each option was assessed using guidance from WebTAG, though due to a lack of quantitative data in some instances, this has been a qualitative assessment. A five-point scale was used:

Adverse
Slight adverse
Neutral
Slight beneficial
Beneficial

Across all options, ‘Option and non-use values’, ‘Accessibility’ and ‘Personal Affordability’ were scoped out. The results of the SIA applied to the shortlisted options are shown in Table 83. Overall, the Magenta option has been assessed as having the fewest adverse social impacts while the new site options will likely give rise to the most beneficial impacts. The preferred

(Yellow) option however scores worst of all the Do Something options relative to the Do Minimum, primarily on the basis of accidents as the exclusion of a dedicated tunnel was deemed to potentially affect accidents resulting from traffic turning in and out of the Park and Ride site across the A10. The exclusion of the tunnel and dedicated access was also considered to potentially cause minor delays for traffic accessing the site relative to the other new site options. As such only slight beneficial impacts in terms of journey quality were recorded for the Yellow option, compared to beneficial impacts for the other new site options.

Table 83: Summary of SIA Scores for Shortlisted Options

	Existing Site		Proposed New Site			
	Do Minimum	**Magenta**	**Cyan**	**Purple/ Purple (CAP)**	**White**	**Yellow**
Accidents	Slight adverse	Neutral	Beneficial	Beneficial	Beneficial	Slight adverse
Physical activity	Neutral	Slight beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Security	Adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse
Severance	Neutral	Neutral	Adverse	Adverse	Adverse	Adverse
Journey quality	Slight adverse	Slight beneficial	Beneficial	Beneficial	Beneficial	Slight beneficial
Option and non-use values	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out
Accessibility	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out
Personal affordability	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out

Source: Mott MacDonald

4.7 Distributional Impacts

A Distributional Impact Appraisal (DIA) was also undertaken for all the Cambridge South West Park and Ride shortlisted options. DIAs consider the variance of a scheme's impact across different social groups and assess whether these impacts disproportionately affect certain social groups.

Both beneficial and adverse distributional impacts of proposed interventions have been considered, along with the identification of social groups likely to be affected. The impacts which have been considered are:

- User benefits;
- Noise;
- Air quality;
- Accidents;
- Security;
- Severance;
- Accessibility; and
- Personal affordability.

The social groups that require assessment for each impact, in accordance with WebTAG A4.2, are set out in Table 84.

Table 84: DIA Social Groups

Social Group (bullet indicates impact analysis required)	User benefits	Noise	Air quality	Accidents	Security	Severance	Accessibility	Affordability
Income distribution	•	•	•				•	•
Children under 16		•	•	•	•	•	•	
Young Adults aged 16-25				•			•	
Older People Aged 70+		•		•	•	•	•	
Proportion of population with a disability					•	•	•	
Proportion of population of BME origin					•		•	
Proportion of households without access to a car						•	•	
Carers: proportion of households with dependent children							•	

Source: Department for Transport (Dec 2015) WebTAG Unit A4.2 Distributional Impact Appraisal

The DIA was conducted using guidance from WebTAG though, due to a lack of quantitative data in some instances, this has been a qualitative assessment. Furthermore, due to a lack of modelling data at this stage, impacted areas have been estimated as one kilometre around both the existing Trumpington site and the proposed site. At the Full Business Case (FBC) stage this could be reviewed if more accurate data becomes available and more detailed analysis will be undertaken.

The following seven-point grading system was used to determine the distributional impacts. Variances that were +/-5% of the national average were assumed to be significant.

Adverse and the population impacted is significantly greater than the proportion of the group in the total population	Large adverse
Adverse and the population impacted is broadly in line with the proportion of the population of the group in the total population	Moderate adverse
Adverse and the population impacted is smaller than the proportion of the population of the group in the total population	Slight adverse
There are no significant benefits or disbenefits experienced by the group for the specified impact	Neutral
Beneficial and the population impacted is smaller than the proportion of the group in the total population	Slight beneficial
Beneficial and the population impacted is broadly in line with the proportion of the group in the total population	Moderate beneficial
Beneficial and the population impacted is significantly greater than the proportion of the group in the total population	Large beneficial

The summary appraisal scores for the Distributional Impacts are displayed in Table 85.

Across all options, accessibility and personal affordability have been scoped out. The options with the proposed new site would realise more distributional impact benefits than the existing site option; with Cyan, Purple, either with or without CAP, and White performing the best. The preferred (Yellow) option had the most adverse impacts to some degree relative to the other options, including the Do Minimum scenario.

Table 85: Summary of Distributional Impact Appraisal Scores for Scheme Options

	Existing Site		Proposed New Site			
	Do Minimum	**Magenta**	**Cyan**	**Purple/ Purple CAP**	**White**	**Yellow**
User benefits	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate beneficial
Noise	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Air quality	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Accidents	Moderate adverse	Neutral	Moderate beneficial	Moderate beneficial	Moderate beneficial	Moderate adverse
Severance	Neutral	Neutral	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Security	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Accessibility	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out
Personal affordability	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out

Source: Mott MacDonald

For further detail on the Social and Distributional Impacts Analysis please refer to the appended Cambridge South West Park and Ride Social and Distributional Impact Appraisal.

4.7.1 Impact on Public Accounts

Total scheme costs for each option were produced consisting of:

- Design costs;
- Construction costs;
- Estimated allowances for land costs, maintenance costs; and bus operating costs;
- Cost of subsidy/grant to private operator.

Design costs were assumed to be spent between 2020 and 2022 with construction occurring between Q3 2022 and Q3 2023. For the purposes of appraisal, a risk allowance of 40% was included in the design and construction costs.

Estimated Land costs were assumed to be spent in 2022. Annual maintenance costs for the existing Trumpington Park and Ride site were extrapolated to provide estimated maintenance costs for the Magenta option. Separate estimates for maintenance costs were produced for the proposed Park and Ride site within the Cyan, Yellow, White and Purple options over a 25-year period and extrapolated for the full 60-year appraisal period.

Bus maintenance and operating costs were produced for the new buses associated with the new Park and Ride site only, with no additional bus costs assumed for the Magenta option.

The costs were then converted to 2010 market prices and discounted to 2010 to give the Present Value costs shown in Table 86 for each option.

Table 86: Scheme Costs (PVC in £000's, 2010 prices discounted to 2010)

Option	Present Value Costs
Magenta	36,607
Cyan	79,134
Purple	78,267
White	78,046
Yellow	66,219

4.7.2 Net Present Value (NPV) Calculations of Shortlisted Options

Benefit-Cost Ratios (BCRs) are the ratio of the present value of monetised scheme benefits to the present value of scheme costs.

In accordance with DfT guidance, schemes are judged to offer poor, low, medium, high and very high Value for Money based on the BCR boundaries. These categories include:

- Poor VfM if BCR is below 1.0
- Low VfM if the BCR is between 1.0 and 1.5
- Medium VfM if the BCR is between 1.5 and 2.0
- High VfM if the BCR is between 2.0 and 4.0
- Very High VfM if the BCR is greater than 4.0

However, when the BCR is very low across all options it is more sensible to focus on the relative values of benefits and costs for each of the options.

For this scheme, the present value of benefits (PVB) and present value of costs (PVC) of each option were calculated. For economic appraisal purposes the PVB included the operating and investment costs of the buses, revenue and monetised travel time savings and PVC included design and construction costs with an allowance for operating costs, maintenance and land.

Following the initial publication of the OBC it has been determined that the operating and investment costs of running will be provided either by franchising or by revenues pertaining to the City Access scheme, this is to be developed further at Full Business Case stage. This is included in the economic assessment as a cost to the local authority, and a benefit to the private operator.

From this the Net Present Value (NPV) was calculated, which is the PVB minus the PVC. The BCR from which Value for Money is derived is the PVB/PVC. In this case, once the operating and investment costs of running the new Park and Ride bus services were added in it emerged at this time that they significantly outweighed the revenues therefore the benefits are negative, meaning the NPV is also negative, and as a result, the BCR is also negative. This is true of all new site options. Once the subsidy has been added in however the BCR becomes positive, albeit very small, and similar across all options.

It should be noted that the costs are subject to significant change as the preferred option is developed through to a Full Business Case. Value engineering could mean that the cost may come down and the BCR would correspondingly go up.

Because the BCRs were so low the decision was to focus on the relative values of benefits and costs for each of the new site options. The cost of the Yellow scheme is £10m less than the other 3 new site options therefore it currently gives the best value for money as the benefits are virtually identical for all four options. As noted in the options appraisal process, in Section 3.2 a new site was identified as the best site option and expansion of the existing site at Trumpington only included as a logical comparator.

The PVB for each option summarised in 4.3.3 have been combined with the PVC of costs to provide NPV's for each of the shortlisted options as shown in Table 88.

Although not specifically WebTAG compliant the NPV has been used to rank the options from 1 to 5, as shown in Table 87 where the option ranked 1 has the highest NPV.

Both the PVB and PVC are highly subject to change as the scheme develops which will impact the absolute figures quoted here but will not affect the ranking. The calculations have been provided at OBC stage to facilitate a comparison between options.

Table 87: Option Ranking based on NPV

Option	Rank
Magenta	1
Yellow	2
Purple	3
Cyan	4
White	5

The Magenta option is ranked as having the greatest NPV, which is to be expected as it has lower costs as it does not require additional bus services. All the new site options have very similar levels of benefits however the Yellow option is substantially cheaper than the other options, and as such that places it as the best of the new site options and second overall in terms of NPV.

PVB, PVC and NPV have been calculated using 2010 prices discounted to 2010, however we are not publishing exact numbers at Outline Business Case stage as maintenance costs, operating costs and potential subsidies, all of which could affect the absolute figures but not the order of ranking, are still being negotiated and are subject to change as the scheme develops through to FBC stage.

It should also be noted that the analysis here focused solely on transport benefits and did not take into account wider benefits such as supporting development, job creation, economic growth or social impacts such as health benefits resulting from increases in physical activity and improvements to journey quality. Although these benefits are not quantifiable at this stage, qualitative assessment as noted in Sections 4.4 and 4.6 of this report resulted in positive outcomes for the Yellow option.

Table 88: Net Present Value

	Magenta	Cyan	Purple	White	Yellow
Present Value of Benefits	-£3,327	£3,166	£3,091	£1,474	£1,498
Present Value of Costs	£36,607	£79,134	£78,267	£78,046	£66,219
Net Present Value	-£39,934	-£75,968	-£75,176	-£76,572	-£64,720
Ranking	1	4	3	5	2

Source: PVB, PVC and NPV above are in £000's, 2010 prices discounted to 2010

4.7.3 Indicative Value for Money (VfM)

The Magenta option is ranked as having the greatest NPV which is to be expected as it has lower costs as it does not require additional bus services. However, this site was not identified as the preferred site at SOBC stage and was included only as a logical comparator (see Section

3). All the new site options have very similar levels of benefits however the cost of the Yellow scheme is however substantially less than the other 3 new site options therefore it currently gives the best indicative value for money as the benefits are virtually identical for all four options.

4.8 Sensitivity Test

Sensitivity tests were conducted on a scenario that was run with Local Plan development levels but with the application of City Access Plan (CAP) measures to reduce private vehicles accessing the city centre and reassigning those trips to using Park and Rides. This test was run on only one option, the Purple option, for the purposes of comparing how an option would perform with higher Park and Ride patronage. Purple was selected for this test because, based on the work using the Microsimulation model VISSIM, the best performing Do Something option had been identified as Purple; based on the number of vehicles processed through the network. This rationale was also used in the options appraisal process prior to the identification of Yellow as the preferred option.

For the test it was assumed that operating and investment costs were the same, in other words using the same number of buses but with more passengers. The resulting PVB for the Purple option with CAP was £3,219,000 in 2010 prices discounted to 2010. This is better than the equivalent assessment of Purple without the capacity reduction where PVB was £3,091,000. This improvement is a result of travel time benefits being slightly higher with a monetized value of £4,411,000 compared to £4,282,000 without CAP measures.

The PVC of scheme costs is unchanged at £78,267,000 as the CAP measures do not affect the cost of the scheme, so as a result although PVB has improved NPV is also still negative at -£75,048,000 (again in 2010 prices discounted to 2010) but it is marginally better than the Purple without the CAP measures where NPV was -£75,176,000. These Figures are shown in Table 89.

Table 89: Sensitivity Test Key Results using Purple with CAP

	Magenta	Cyan	Purple	Purple CAP	White	Yellow
Present Value of Benefits	-£3,327	£3,166	£3,091	£3,219	£1,474	£1,498
Present Value of Costs	£36,607	£79,134	£78,267	£78,267	£78,046	£66,219
Net Present Value	-£39,934	-£75.968	-£75,176	-£75,048	-£76.572	-£64,720

Source: Figures above are in £000's, 2010 prices discounted to 2010

If CAP was applied to the Yellow option, similar improvements would be seen in that travel times would improve, thus increasing the PVB relative to the PVC.

4.9 Appraisal Summary Table

An Appraisal Summary Table (AST) has been completed for the preferred Yellow option summarising the results of the different assessment types described in this section. The AST is appended to this report in the form of a Microsoft Excel spreadsheet and is entitled 'Cambridge South West Park and Ride AST'.

4.10 Conclusion

The PVC of building the new site and running additional Park and Ride bus services at the new site significantly outweigh the PVB therefore the NPVs are negative. The cost of the Yellow

scheme is however substantially less than the other three new site options therefore it currently provides the best indicative value for money as the benefits are virtually identical for all four options.

It should also be noted that the NPVs produced for this scheme focus solely on transport benefits and do not take into account wider benefits such as supporting development, job creation, economic growth or social impacts such as health benefits resulting from increases in physical activity and improvements to journey quality. Although these benefits are not quantifiable at this stage, qualitative assessment as noted in Sections 4.4 and 4.6 resulted in positive outcomes for the Yellow option.

Furthermore, it should also be recognised that the NPV and Value for Money do not form part of the themed assessment criteria used in the MCAF assessment process. The themed criteria were developed to ensure that selection of a preferred option was based on meeting GCP aims and scheme objectives; objectives which were agreed with GCP following the identification of the evidence based strategic problems and opportunities documented in detail in the Strategic Case in Section 2.

The MCAF assessment process showed that Yellow was the best scoring “Do Something” option against three of the four assessment themes, namely:

- Reducing traffic levels and Congestion;
- Maximising potential for journeys to be undertaken by sustainable modes; and
- Scheme deliverability.

These three themes represented 19 of the 29 criteria; Yellow also scored best overall.

It is by virtue of the guidance issued by the DfT as to what the Economic Case should cover, namely the Appraisal Summary Table (AST), that this section has in part focused on the Environmental and Social and Distributional impact findings as they are needed to populate the AST. These two areas of potential scheme impact formed the basis of Theme 3, “Quality of Life” under the MCAF assessment process, the only theme under which Yellow did not score best. The Economic Case does not typically cover the wider appraisal process (i.e. the other three MCAF themes) as this is usually documented in a separate Options Appraisal Report, but in the case of the Cambridge South West Park and Ride is captured in Section 3. To this extent the reader should take on board the findings from the Economic Case in conjunction with the outcome of the MCAF assessment process in Section 3 where the Yellow Option is clearly identified as the preferred Option.

Finally, it has to be remembered that the Cambridge South West Park and Ride scheme is just one of a much larger strategic package of transport improvements being undertaken as a result of City Deal funding. Other schemes include the Cambridge South East Transport Study (CSETS), Phase1 and Phase 2, Foxton Rural Travel Hub and Cambourne to Cambridge; collectively all these schemes will deliver benefits for Cambridge and Cambridgeshire. The schemes, although not dependant on one another for delivery, are all interrelated and in essence are all “pieces of a jigsaw” in that all component parts are needed to realise the complete product and wider benefits of economic growth.

4.11 Economic Case Summary

- Economic assessment of possible decongestion benefits was undertaken but this showed that 'model noise' outweighed any possible decongestion benefits along the route as a result of the options tested. Therefore, it has been assumed that there are no significant decongestion benefits resulting from any of the options assessed
- Bus passenger benefits were calculated by comparing demand and journey time changes along the routes affected by the scheme. All of the options, including Yellow, that provide a new Park and Ride site resulted in benefits.
- The Yellow option, like all the shortlisted options, was assessed against the environmental impacts of landscape, biodiversity, historic environment, water, local air quality, noise, greenhouses gases and greenbelt. Against all criteria the Yellow option scored equally as poorly as the worst preforming option(s).
- A Social Impact Analysis was undertaken for all shortlisted options as part of the appraisal process. The SIA assesses the human experience of the scheme and its impact on wider society. The social impacts considered within scope for the SIA included accidents, physical activity, security, severance, journey quality. The Yellow option scores worst relative to the Do Minimum, primarily on the basis of accidents and journey quality, as the exclusion of a dedicated tunnel was deemed to potentially affect accidents resulting from traffic turning in and out of the Park and Ride across the A10.
- A Distributional Impact Analysis was also undertaken for all shortlisted options as part of the appraisal process. DIA's consider the variance of a scheme's impact across different social groups and assess whether these impacts disproportionately affect certain social groups. The impacts considered within scope for the DIA included user benefits, noise, air quality, accidents, security and severance. The Yellow option had the most adverse impacts to some degree relative to the other options, including the Do Minimum scenario.
- The Wider Economic Benefits of this option were not assessed as it is considered unlikely that the proposals would deliver any measurable or quantifiable wider economic impact. The scheme is also unlikely to have any notable impact on labour market catchment, due to the close proximity of the proposed new site to the current site, which will remain open irrespective of whether a new site in the form of the Yellow options is built or not.
- As the scheme benefits for all new site options are less than the scheme costs, focus has been shifted to the relative benefits and costs. The benefits for all new site options are low with little differential between them, however the cost of the Yellow option is £10m less than the other new site options and therefore gives the best value for money.

5 Financial Case

The Financial Case outlines the affordability of the Cambridge South West Park and Ride preferred option, its funding arrangements and technical accounting issues; value for money is scrutinised in the Economic Case. The case presents the financial profile of the preferred scheme option and an overview of how the scheme will be funded.

5.1 Approach

The DfT's guidance document, '*The Transport Business Case: Financial Case*', outlines the areas that should be covered as part of the Financial Case; this has been used as a guide in developing the structure and content of this OBC. Table 90 shows where the information on required content can be found in this document.

Table 90: Compliance with DfT requirements for the Financial Case at OBC Stage

Content	DfT Requirements	Section Number and Title
Introduction	Outline the approach taken to assess affordability	5.1 Approach
Costs	Provide details of: • 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)	5.2 Scheme Costs 5.3 Spend Profile
Budget/Funding Cover	Provide analysis of the budget/ funding cover for the project. Set out, if relevant, details of other funding sources (e.g. third-party contributions, fees)	5.4 Budget Funding Cover 5.4.1 Third Party Contributions
Accounting Implications	Describe expected impact on organisation's balance sheet.	5.5 Accounting Implications

Source: DfT

5.2 Scheme Costs

Total scheme costs needed to actually deliver the project amount to £29,929,673 in Q2 2018 market prices and are shown in Table 91**.** These costs constitute the funding ask.

An additional amount of £16,619,783 has been estimated to cover overheads, and T&Cs, an amount for an element of risk and an estimate of the purchase price of any additional land that is required. However, this additional amount is an estimate and subject to change as the scheme develops. This amount does not form part of the funding ask.

5.2.1 Design and Construction Costs (Direct Delivery Costs)

The indicative estimated direct delivery cost for the Cambridge South West Park and Ride preferred scheme option (Yellow) is £29,929,673 excluding any allowance for risk, land or on-costs. Scheme costs have been developed based upon the designs included in Section 3 of this OBC and in the scheme drawings. Costs include:

- Design;
- Preliminaries;

- Project Management; and
- Construction.

The 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. Assumptions

Key assumptions made with regards to deriving scheme costs include:

- The project began in 2017 with the preparation of a Strategic Outline Business Case and the preferred option is expected to be completed by 2023
- Total funding ask consists of base costs and on-costs quotes in Q2 2018 prices and a risk allowance has been applied against the combined total of direct delivery costs plus overheads and T&C's.
- An opening year of 2023

Table 91: Design and Construction Costs

Construction	Preliminaries	Design	Client Project Mgmt.	Total
£19,084,765	£4,389,496	£3,873,253	£2,582,169	£29,929,673

Source: Mott MacDonald

5.3 Spend Profile: Scheme Construction

Table 92: Spend by Cost Element per Annum

Cost/Year	2020	2021	2022	2023	TOTAL
Design Costs	£1,549,301	£1,549,301	£774,651		£3,873,253
Preliminaries	£1,755,798	£1,755,798	£877,890		£4,389,486
Project Management			£1,032,868	£1,549,301	£2,582,169
Construction			£7,633,906	£11,450,859	£19,084,765
TOTAL	**£3,305,099**	**£3,305,099**	**£10,289,315**	**£13,000,160**	**£29,929,673**

Source: Mott MacDonald

5.3.1 Maintenance and Renewals Costs

Maintenance costs for the delivery of the preferred option are liable to include those shown in Table 93. For annual maintenance costs it is assumed that payments will be in equal instalments across a 25-year period and will commence once year after the scheme opens, which is assumed to be 2023. However, at this time maintenance costs are subject to negotiation with potential providers and are therefore commercially sensitive and so are not published in this OBC. They will be known with more clarity at FBC stage and published at that time, though again they do not form part of the funding ask.

Table 93: Maintenance and Renewals Costs

Maintenance Item	Years Over Which Cost is Incurred
Resurfacing Car Park	Once, 25 years post opening
Resurfacing Roads	Once, 25 years post opening
Resurfacing Cycle Route	Once, 25 years post opening
Landscaping Maintenance	Annually for 25 years
Street Cleaning	Annually for 25 years
Gully Cleansing / Emptying	Annually for 25 years

Maintenance Item	Years Over Which Cost is Incurred
Street Lighting - Park and Ride	Once, 25 years post opening
Street Lighting - Roads	Once, 25 years post opening
Street Lighting - Cycle Route	Once, 25 years post opening
CCTV - Park and Ride	Once, 25 years post opening
General Maintenance - Building	Annually for 25 years
Cycle Parking - Park and Ride	Once, 15 years post opening

Source: Mott MacDonald

5.3.2 Operating Costs

Bus operating costs for the new scheme are based on the assumption that 11 buses will be needed, and estimated costs used in the calculation of NPV in the Economic Case include both their operation and ongoing maintenance.

In addition to operating cost items for buses servicing the Park and Ride site, there are also operational cost items associated with the Park and Ride site itself and the roads constructed to provide access to the new site. These are noted in Table 94 along with assumptions and estimated quantities. As with maintenance costs, operating costs for both the site and the buses are subject to negotiation with potential providers and are therefore commercially sensitive and so are not published in this OBC. They will be known with more clarity at FBC stage and published at that time, though again they do not form part of the funding ask.

Table 94: Operating Costs Road and Park and Ride Site

Operating Cost Item	Assumptions	Quantity	Unit
Park and Ride			
General Cleaning for the P&R building	Daily and 2 people for 2hrs	1,460	hr
Utilities cost for the P&R building	Yearly	35.00	m2
Monitor CCTV cameras	Allow 1-person hour per day to monitor the cameras (overtime paid to cover additional requirement)	365	hr
Power Consumption - Lighting - Park & Ride	37nr lights x 254w = 9398w per hour = 9.398kW x 4,380 hours year = 41163kW (as advised by DW Windsor)	41,163	kW
Power Consumption - CCTV Cameras	Allow 25% of the above	10,291	kW
Roads			
Power Consumption - Lighting - Roads	387nr lights x 254w = 98298w per hour = 98.298W x 4,380 hours year = 430545kW (as advised by DW Windsor)	430,545	kW
Power Consumption - Lighting - Cycle Route	48nr lights x 254w = 12192w per hour = 12.192W x 4,380 hours year = 53400W (as advised by DW Windsor)	53,400	kW

Source: Mott MacDonald

5.4 Budget/Funding Cover

At present all funding cover to deliver the capital scheme is guaranteed by the GCP. Though as noted in Section 5.4.1, where future development benefits from the scheme, appropriate contributions will be sought via the planning process.

It is expected that CCC will maintain the Park and Ride after it is built and there will need to be a commuted sum of money set aside for site maintenance and ongoing operation. However, this would be a privately negotiated sum paid to CCC and would have commercial sensitivities.

5.4.1 Third Party Financial Contributions

The Greater Cambridge Partnership is the local delivery body for the City Deal with central Government, bringing powers and investment, worth up to £1 billion over 15 years, to vital improvements in infrastructure, supporting and accelerating the creation of 44,000 new jobs, 33,500 new homes and 420 additional apprenticeships. With the central Government contribution being only half of this amount, there is an expectation that other funding will also be sought from other local sources including developer contributions.

To meet this funding requirement, and to address the impacts and transport requirements of development in the area, Cambridgeshire County Council (CCC) as a statutory consultee on the transport aspects of planning applications, will seek to recover an appropriate proportion of scheme costs from local developer contributions through the planning process.

The level of local developer contribution to be secured will vary on a site-by-site basis and will depend upon the levels of impact, and the extent to which a development benefits from the scheme. This will be determined through the transport assessment process.

In securing developer contributions towards the scheme CCC, working with Cambridge City and South Cambridgeshire District Councils as Local Planning Authorities, will apply the 3 statutory tests on the application of Planning Obligations (also known as Section 106 agreements) in the Community Infrastructure Levy Regulations 2010 and as policy tests in the National Planning Policy Framework.

These are that a planning obligation may only constitute a reason for granting planning permission for a development if the obligation is:

- Necessary to make the development acceptable in planning terms;
- Directly related to the development; and
- Fairly and reasonably related in scale and kind to the development.

5.5 Accounting Implications

The project costs as set out in Table 92 can be funded by GCP as a result of City Deal funding, without incurring the need to borrow funds to finance the scheme. However as set out in Section 5.4.1 City Deal funding covers only half of all expected transport infrastructure and investment and so alternative sources of funding will be sought, primarily through developer contributions.

The level of local developer contribution to be secured will vary on a site-by-site basis and will depend upon the levels of impact, and the extent to which a development benefits from the scheme. This will be determined through the transport assessment process.

5.6 Financial Case Summary

- The total funding ask from the City Deal funds is £29,929,673 which includes total direct delivery costs of design, preliminaries, project management and construction
- The balance of required funding, currently estimated at £16,619,783 is comprised of allowances for risk, land purchase, overheads and testing. This is not however part of the funding ask from the City Deal Fund and will be financed by CCC through other funding streams.
- Maintenance and operating costs of the site over a 25-year period have been estimated but are commercially sensitive at this time and do not form part of the funding ask from the City Deal Fund. The same is true of annual operating costs for the bus operations, based on the maintenance and running of 11 buses
- The project will be funded by GCP with City Deal funding, however alternative sources of funding will be secured, primarily through developer contributions. The level of local developer contribution to be secured will vary on a site-by-site basis and will depend upon the levels of impact, and the extent to which a development benefits from the scheme.
- There is no borrowing requirement for GCP to deliver the project.

6 Commercial Case

This Section sets out the Commercial Case for the preferred option for the Cambridge South West Park and Ride scheme and provides evidence on the commercial viability of the proposal and the procurement strategy that will be used to engage the market. The Commercial Case has been prepared jointly with White Young Green consultants.

Here, risk allocation and transfer, contract timescales, implementation timescales, capability and skills of the team delivering the project and personal implications from the proposal are all documented.

6.1 Approach

The DfT's guidance document sets out the issues that should be covered as part of the Commercial Case. This has been used as a basis for our approach to development of our Commercial Case for the preferred option (Yellow) for the Cambridge South West Park and Ride scheme.

Table 95 shows how this section aligns with DfT's requirements.

Table 95: DfT Commercial Case Requirements at OBC Stage

Content	DfT Requirements	Section Number and Title
Introduction	Outline the approach taken to assess commercial viability.	6.1 Approach
Output based specification	Summarise the requirement in terms of outcomes and outputs, supplemented by full specification as an appendix.	6.2 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	6.3 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.	6.4 Contract Comparisons 6.5 Procurement Method Comparison 6.6 Contractor Framework Contracts 6.7 Consultancy Framework Contracts 6.8 Form of Contract
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.)	6.10 Payment Mechanisms
Pricing framework and charging mechanisms	To include incentives, deductions and performance targets.	6.11 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.	6.12 Risk Allocation and Transfer
Contract length	Set out scenarios for contract length (with rationale) and proposed key contractual clauses.	6.13 Contract Length
Human resource issues	Personnel/people management/trade union implications, where applicable, including TUPE regulations.	6.14 Human Resource Issues

Content	DfT Requirements	Section Number and Title
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.	6.15 Contract Management

Source: DfT

6.2 Output Based Specification

The Commercial Case shows how procurement and commercial viability of the project will ensure scheme delivery. The following outputs/deliverables are required

- Scheme design and associated preparatory works;
- Park and Ride site main works at the new site; and
- Associated main works beyond Park and Ride site boundary.

Separate procurement exercises might also be required for operation and maintenance activities:

- Bus or other high quality public transport services to connect the Park and Ride site to Cambridge city centre and the Cambridge Biomedical Campus, whether new services or enhancements to existing services; and
- Site operation and maintenance of the new site.

In order to deliver the scheme outputs, a procurement strategy and methodology are required that deliver the following:

- **Cost Certainty**- Achieve cost certainty, or certainty that Cambridge South West Park and Ride can be delivered within the funding constraints.
- **Minimise Costs**- Minimise preparation costs in regard to scheme design and minimise construction delivery costs.
- **Programme**- Achieve an efficient delivery programme that ensures an opening year for the scheme of 2023
- **Quality**- Achieve appropriate quality of design and end produce.
- **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.
- **Risk**- Obtain contactor 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 buildable and deliverable proposals.

These are the criteria by which procurement strategies and methods have been assessed and the subsequent sections in this chapter detail the results of this assessment.

6.3 Procurement Strategy

The preliminary design of the Yellow option will be developed by Skanska on behalf of GCP in advance of the procurement process. In order to progress to the next stage, Sections 6.3 to 6.9 of this OBC consider how design and construction services will be procured, given the numerous options for procurement.

To note, Highways England (HE) is currently liaising with GCP regarding entering into a Section 6 Agreement under the Highways Act to cover works required to the HE Highway (the M11 motorway). HE has verbally confirmed that they would not object to GCP procuring delivery of the Yellow option by whatever means they wish, provided HE grant their approval of the works contractor and appropriate details included in the Section 6 Agreement.

This Section therefore sets out the in-principle strategy for procurement of consultant and contractor services to deliver the Cambridge South West Park and Ride scheme. Consultant services extend to design and advisory services to GCP, and contractor services include construction of the scheme.

A number of procurement strategies have been considered for the Yellow option of the Cambridge South-West Park and Ride scheme. These strategies are set out in Table 96 alongside the advantages and disadvantages of each.

Table 96: Alternative Procurement Strategy Options

Strategy	Advantages	Disadvantages
Design & Build Contract Appointment of a Contractor	• Established form of contract • Single stage tender process may reduce overall programme compared with other options • Early collaboration between Contractor & Designer may reduce construction cost • Contract tender price agreed at an early stage • All liabilities (design and construction) in one place • Designer incentivized to produce a value engineered design	• High tender cost for Contractors given design required to support tender submission • Longer tender period required to allow Contractors to undertake design to support their submission • Contractor risks are higher and may raise the price of the contract • Quality of final product can be compromised as contractor is incentivized to minimize scheme costs post award to maximise their return
Appointment of a Consultant to progress the design, following by procurement of a Design & Build Contract with the Consultant novated to the successful Contractor	• Reduced tender period compared with a traditional Design and Build tender • GCP will retain control of the design during the Design & Build procurement process • GCP's Consultant can further develop design during the Design & Build procurement process • Contract tender price agreed at an early stage • All liabilities (design and construction) in one place • Designer incentivized to produce a value engineered design	• Two stage tender process with resulting cost to GCP • No early collaboration between Contractor & Designer • Contractor risks are higher and may raise the price of the contract • Consultants may be reluctant to novate to a Contractor though this can be written into the contract with the Consultant • As the design will continue to be developed in parallel with the D&B tender process, GCP will have to negotiate with the successful Contractor to reach a final agreement on price. LGSS Procurement has advised that such a process might be subject to legal challenge
'Design' stage followed by 'Build' stage. (Two stage tender process) Appointment of a Consultant in stage 1 with a requirement to obtain ECI advice from a Contractor Appointment of a Contractor in stage 2.	• Established form of contract • Option of either stage 1 Design becoming 'GCPS's Design', or transfer risk by novating stage 1 Consultant to the stage 2 Contractor • Maintains competitive tension in both the stage 1 (design) and stage 2 (construction) tenders thereby offering excellent value for money	• Two stage tender process may increase overall programme compared to single stage tender • May prove difficult to procure ECI advice from contractors as they may be excluded from the construction tender • If a different works contractor is procured compared to the ECI contractor, approach to build may vary and ECI input may be discarded/ abortive. • Liabilities for construction methodology/ phasing may become blurred between the main works contractor and the ECI contractor/ client

Strategy	Advantages	Disadvantages
Developed Design then D&B (akin to Ely Bypass) Appointment of a Contractor Single stage tender process with a 'Developed Design' stage to develop/ agree a Target Cost prior to proceeding to 'D&B' stage GCP has the option of terminating the contract on completion of Developed Design (i.e. 'break point')	• Single stage tender process may reduce overall programme compared with other options • Break point provides an opportunity to mitigate risk in advance of D&B stage • GCP does not have to award D&B stage if tender price is too high and could go back to the market • Same contractor involved in both phases thereby maintaining continuity • Requires a longer first stage to allow the design to be developed sufficiently for a robust price to be agreed	• Political pressure can result in shorter stage 1 period and commencement of D&B stage 'too early'. This may mean that the agreed Target Cost may not be robust • No incentive for Contractor to collaborate with Consultant in the Developed Design stage to reduce construction cost given that Target Cost is not defined until end of this stage • Contractor may raise the price in the knowledge that the GCP does not want to go back to the market • If "break" clause is enacted, significant delays to programme as a new procurement process will be required • Lack of competitive tension when Target costs is agreed
Detailed Design then Build (akin to Kings Dyke) Appointment of a Contractor Single stage tender process with a 'Design' stage to develop/ agree a Target Cost price prior to proceeding to 'Build' stag. GCP has the option of terminating the contract on completion of Design (i.e. 'break point')	• Single stage tender process may reduce overall programme compared with other options • Break point provides an opportunity to mitigate risk in advance of Build stage • GCP does not have to award Build stage if tender price is too high and could go back to the market • Same contractor involved in both phases thereby maintaining continuity • Requires a longer first stage to allow the design to be developed sufficiently for a robust price to be agreed	• Potential for political pressure to commence Build 'too early' • No incentive for Contractor to collaborate with Consultant in the Design stage to reduce construction cost given that Target Cost is not defined until end of this stage • Contractor may raise the price in the knowledge that GCP does not want to go back to the market • Carefully worded contract required to ensure that Contractor's liability for any defects in the 'Design' stage is carried forward to the 'Build' stage • If "break" clause is enacted, significant delays to programme as a new procurement process will be required • Lack of competitive tension when target costs are agreed

Source: White Young Green

6.3.1 Preferred Procurement Strategy

The preferred procurement strategy option is appointment of a Contractor under a Design and Build Contract (highlighted in green in Table 96) for the following reasons:

- That GCP would enter into a single contract relationship;
- Potential legal challenge to design novation option;
- Guaranteed early collaboration between Contractor and Designer;
- The tender price would be known at an early stage; and
- It is the most cost-effective procurement method for GCP.

6.4 Contract Comparisons

There are several industry recognised generic types of contract in current use. Each type of contract is set out in Table 97 alongside the advantages and disadvantages of each.

Table 97: Advantages and Disadvantages of Types of Contract

Type of Contract	Advantages	Disadvantages
Negotiated	• Both GCP and the Service Provider are content to work together where a high level of trust and collaboration exists • The negotiated tender cost can be independently checked against market rates to demonstrate value for money	• There will be a potential challenge from unsuccessful Service Providers not included in the negotiation process • This approach could alienate a section of the supply chain. Some Service Providers will be excluded from the procurement process • The wider stakeholders that are not included in procurement process of a negotiated contract can sometimes perceive that the cost does not demonstrate value for money given that they will not have full transparency of the specific contract details
Competitive tender	• Value for money can be demonstrated in financial terms. The cost is dictated by market forces • There is clarity on what is included in the cost for the given scope of works. The cost can be fixed for a fixed amount of work	• The cost cannot be fixed if the scope of works is not fully defined at the time of tender process • A competitive tender process is unlikely to give a fixed outcome cost, especially if the design is not fully complete.at the time of tender • The lowest cost does not always indicate value for money. GCP will need to carry out due diligence checks to make sure that quality services and products are included in the offer
Cost reimbursable	• GCP can engage with service providers at short notice • This approach is often taken when a clear scope of works cannot be fully defined, but time is of the essence • A cost reimbursable contract is especially useful if GCP is under time pressure to deliver a project for the benefit of end-users. In this case, a need has been identified that will improve the way of travelling for members of the public wanting to use the park and ride facility, so a quick procurement process would be beneficial • GCP and the service provider can enter into an open-book agreement. This approach gives both parties full transparency on the expended quantity and rates used to deliver a known piece of work • The final cost is based on works carried out at pre-agreed rates. The rates will vary for the different staff grades and levels of experience • The time spent and agreed rates for a given activity are auditable	• If the duration and quantity of work is unknown, between GCP and the service provider, at the start of the contract then it is difficult to forecast the final out-turn costs on award • Ambiguity in the final cost can be mitigated. The service provider can give an estimated cost along with a guaranteed maximum cost for a given piece of work • This approach will give GCP an improved degree of confidence on final costs • Generally, all or most, risks are carried by GCP (i.e. they pay whatever the works cost to deliver) • No/ little incentive on the contractor to keep costs under control
Managed	• GCP appoints the Contractor to manage the specialists through separate sub-contracts	• A managed contract should only be used when the project is complex requiring several specialists • GCP must have a well-defined scope of works

Source: White Young Green

6.4.1 Preferred Contract Type

The preferred type of contract for delivery of the Yellow option is competitive tender (highlighted in green in Table 97) for the following reasons:

- Value for Money can be demonstrated;
- Clarity regarding what is included in the tendered cost;
- Fully transparent tender process - which is not the case with a negotiated contract

- Less potential for 'challenge' from unsuccessful Service Providers;
- A cost reimbursable contract is not recommended given the difficulty in forecasting the final out-turn cost of the scheme on award; and
- A managed contract is not recommended because it is inappropriate for the scale and scope of works in this case.

6.5 Procurement Method Comparisons

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 have been considered for the Yellow option for the Cambridge South West Park and Ride scheme. These options are set out in Table 98 alongside the advantages and disadvantages of each.

Table 98: Advantages and Disadvantages of Procurement Methods

Procurement Method	Advantages	Disadvantages
Direct Award through competitive dialogue	• GCP has a reduction in procurement administration costs when compared to other procurement methods • GCP can use a direct award procedure to appoint a Service Provider without the need for a formal procedure • GCP would usually use this approach for low cost and short duration works • GCP has an existing working relationship with the workforce contracted to deliver the works	• Competitive Dialogue procedure is unlikely to be justified. Procedure must be justified in accordance with Regulation 26(4) of the Public Contracts Regulations 2015 • It would be difficult for the GCP to demonstrate value for money as there is no market testing or competition involved with the direct award method • GCP has a lack of transparency on selection of sub-contractors and supply chain • Direct award does not provide a fixed and final cost
Existing Framework Contract. Scheme specific award uses existing pre - qualified Service Provider	• The Framework Service Provider has already been through a suitability exercise based on a quality submission • GCP has confidence in the quality and competency of the Service Provider • GCP can demonstrate compliance with procurement regulations that are applied to local government organisations • GCP will have expended cost in setting up the framework that can be recouped through reduced procurement and administration costs for each scheme that is procured through the framework • GCP and Service Providers will incur procurement costs at pre-determined intervals • GCP will be able to demonstrate efficiency saving through working with the Service Providers over an extended period beyond the current scheme • GCP and the Service Providers have established working practices and relationships • GCP can monitor performance of Service Providers through outcome targets and benchmarking	• Local Authority Direct Labour Organisations (DLO) are potentially excluded from the procurement process. The DLOs will need to be treated the same as the other tendering Service Providers • Framework contracts for Service Providers need to be renewed at pre-determined intervals. The Framework appointment is for a pre-determined service period • Framework contracts are usually awarded for period of three years with options for extension through mutual agreement
Open Tender Procedure All tendering organisations responding to the	• The open tender procedure is fair and transparent • The open tender procedure can be a shorter tendering programme than other procurement methods	• GCP may have multiple tender submissions to evaluate. The evaluation process can be time consuming. Longer evaluation process that other procurement methods • GCP attracts the risk that an unknown tenderer could be successful. This can be

Procurement Method	Advantages	Disadvantages
Official Journal of the European Union (OJEU) notice as an invitation to bid for the scheme in an open tender procedure.	• GCP will receive tenders that reflect the market costs for the scheme as there is open and competitive competition • GCP can weigh the evaluation process by quality and cost to represent value for money • The open tender procedure allows the quality and competency of the tenderers to be established at the time of tender • The open tender procedure provides an opportunity to expand the approved suppliers list and develop new partnerships	viewed as both an opportunity or a threat depending on the scope of works and the risks associated with the scheme construction methods • There is a cooling off period when using the OJEU procedure. This period introduces a potential risk for GCP. A challenge to the tender process can be made by the non-preferred Service Provider and can lead to legal proceedings
Restricted or Closed Tender Procedure. Pre-qualification process with only short-listed candidates being invited to tender	• The closed tender procedure is a restricted process. Only shortlisted tenderers will submit a tender for the scheme • GCP can select suitable tenderers from a pre-known list of preferred Service Providers. The list is based on previous experiences and known competencies and working relationships of the Service Providers • GCP has transparency on the number of tender submissions that will require evaluation	• All tender documents must be made available to all candidates at the start of the pre-qualification process • GCP has a longer procurement process when compared to other procurement method options. The two-stage process steps are often run in series protracting the procurement process. Attempts to run the two-stage steps in parallel can often lead to confusion, making the procurement process longer than intended

Source: White Young Green

6.5.1 Preferred Procurement Method

The preferred procurement method is an existing Framework Contract (highlighted in green). This option is considered the quickest and most cost-effective procurement method for GCP. In addition, the Service Providers can be put to work as soon as their contract terms and conditions have been agreed.

In the event that there is not an appropriate Framework contract, the second preference is for a restricted tender procedure.

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.

6.6 Contractor Framework Contracts

Given the recommendations in Sections 6.3.1 and 6.5.1 for delivery of the Yellow option for the Cambridge South-West Park and Ride scheme as a Design and Build Contract using an existing Framework Contract, several Framework Contracts available for appointment of Contractors have been considered. These options are set out in Table 99 alongside the advantages and disadvantages of each.

Table 99: Advantages and Disadvantages of existing Framework Contracts for appointment of Contractors

Framework	Advantages	Disadvantages
Eastern Highways Alliance (EHA)	• Cambridgeshire County Council is a member of the EHA • Framework is tried and tested in Cambridgeshire • The Framework 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	• 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 the Yellow options is circa £25m. However, schemes above £20m might be

Framework	Advantages	Disadvantages
		acceptable subject to approval by the EHA Board • Framework has a total value capped at £600m. Risk that this value might be exceeded in advance of procuring Yellow option
Cambridgeshire County Council's Framework for Project Management Services	• The Framework will be available to local authorities and other public sector bodies • Framework is designed to deliver all construction projects of all values including those costing £80m plus • Framework Contract would not expire before December 2026	• Framework not yet in place - currently being procured though award not anticipated before the end of the year which might be too late.
SCAPE Civil Engineering Construction Framework	• The framework is available to local authorities and other public sector bodies • Framework is designed to deliver construction projects costing between £50k and £100m plus • Framework free to Employers • Framework Contract would not expire before February 2023	• 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').

Source: White Young Green

6.6.1 Preferred Framework for Appointment of Contractors

None of the Framework Contracts detailed above can be recommended at this stage for appointment of a Contractor for delivery of the Yellow option for the following reasons:

- Estimated construction cost of the Yellow options is circa £25m. This is greater than the maximum contract value applicable to the EHA framework, although it is possible that the scheme might be approved EHA Board.
- The CCS framework is not anticipated to come into existence until the end of 2019 which might be too late for the project.
- 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.

6.7 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 & Build Contractor for delivery of the Yellow option. Given this, several Framework Contracts currently available for the appointment of Consultants, have been considered. These options are set out in Table 100 alongside the advantages and disadvantages of each.

Table 100: Advantages and Disadvantages of existing Framework Contracts for Appointment of Consultants

Framework	Advantages	Disadvantages
ESPO Consultancy Services Framework	• 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 & 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 • GCP and the Service Provider are able to collaboratively negotiate project specific terms and conditions by the inclusion of replacement clauses	• GCP is restricted in the value of any direct award by their own financial standing orders when using the direct award approach • Challenging terms and conditions for Consultants. (The standard terms and conditions of the ESPO framework are disproportionate to the scale of the fee for services procured on some projects) • Suppliers pay a levy of 1.0% of fees to ESPO to manage the framework • Lack of competitive tension if direct award
Homes England Framework	• 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	• GCP is restricted to £15k fee limit when using the direct award approach • Challenging terms and conditions for Consultants • Lack of competitive tension if direct award
Cambridgeshire County Council Framework	• Bespoke Cambridgeshire County Council Framework	• Framework not yet in place - expected to be procured during 2019 but appointment not anticipated with the next 12 months
Crown Commercial Services (CCS) Project Management and Full Design Team Services (PMFDTS) Framework	• 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	• Challenging terms and conditions for Consultants • Lack of competitive tension if direct award

Framework	Advantages	Disadvantages
	• 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	
Framework Agreement for the Provision of Consultancy and Project Management Services	• Cambridgeshire County Council specific framework • Local knowledge and experience • Framework free to employers • Single supplier with agreed rates so no competition necessary • Framework procured through competitive process	

Source: White Young Green

6.7.1 Preferred Framework for Appointment of Consultants

The preferred Framework for appointment of a Consultant is direct award under the dedicated Cambridgeshire County Council Project Management Services Framework (highlighted in green) for the following reasons:

- Dedicated framework for Cambridgeshire County Council;
- Local suppliers with local knowledge;
- Direct appointment is the most cost-effective procurement method for GCP;
- No fee cap on direct appointment;
- Employer has the option of negotiating reductions in fee rates; and
- Cambridgeshire County Council Framework is unlikely to be in place in time.

6.8 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:

6.8.1 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, ICC 2011 and is based on the traditional pattern of Employer designed works constructed by the Contractor and paid through re-measurement.

6.8.2 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 to include:

- Designer agreements;
- Main contracts between the Employer and the main Contractor;
- Sub-contracts between the main Contractor and its subcontractors. Includes for both sub-contractors selected by the Employer and for other sub-contractors;
- Standard forms of sub-sub-contract between a subcontractor 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 subcontractors and for issue by a subcontractor to prospective sub-sub-contractors;
- Form of contracts 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.

6.8.3 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 following:

- 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.
- Subcontracts – the ECC has been designed so that works can be sub-contracted and provides separate contracts for construction and design services.

- Nominated subcontractors – the ECC precludes nominated subcontractors 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.

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 101.

Table 101: Comparison of Forms of Contract

Form of Contract	Advantages	Disadvantages
ICC	• Encourages co-operation between parties • Contractor takes full responsibility for nominated sub-contractors	• 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	• Potentially more familiar to Local Authority officers • Ground risk rests with the Contractor • Clear payment section • Comprehensive detail regarding insurances	• 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	• 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	• 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: White Young Green

6.8.4 Preferred Form of Contract

The preferred Form of Contract for delivery of the Yellow option 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 Warning promote a proactive approach to risk resolution. (Other forms of contract do not include Early Warning);
- 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.

6.8.4.1 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 arrangement 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 EEC Conditions of Contract are set out in Table 102.

Table 102: NEC EEC 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 with in the tendered price.	Completeness & accuracy of activity schedule is the Contractors 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 & 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. Early Contractor Involvement provides best value and has the option for GCP to appoint a consultant or Contractor to design in stage 1 though open book accounting. (Build in Stage 2)	Shared between parties on pain/gain on late/early finish	Completeness & 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	Shared between parties on pain/gain on late/early finish. GCP would bear the risk on inaccurate BoQ.	Completeness & accuracy of BoQ would be GCP's risk.

NEC Option	Incentives	Financial Risk	Other Risks
	re-measuring the works for payment.	No incentive for the Contractor to produce an economic design	
Option E Cost Reimbursable Contract	GCP would have a quick start. Contractor incentivised on ECI by sharing savings on Employers Budget by providing cost effective solution.	GCP	Project outturn cost uncertain.
Option F Management Contract	No real incentive.	GCP	Project outturn cost uncertain.

Source: White Young Green

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.

GCP's appetite for risk, programme pressures, control over design and price/cost will provide the basis in defining the most desirable procurement route. The incentives and penalties for early or late completion are managed through the secondary clauses and therefore are not considered part of the deciding factors. These are detailed below:

- **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 Design & Build and Price are the overriding factors for the Employer.
- **Option B** can be used when the GCP has 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 in stage 1 would give GCP an element of control over design and the open book accounting in stage 2 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 Yellow 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.

On the basis of the above, the preferred NEC ECC Conditions of Contract for appointing a Contractor to deliver of the Yellow option is Option A for the following reasons:

- It provides the greatest level of certainty over the final out-turn price (although not truly a “fixed” price);
- Places the majority of the commercial risk onto the Contractor;
- A Design and Build contract is not geared towards a Bill of Quantities type contract, and as such;
- Options B and D are not recommended;
- Option C (and D) are not recommended given uncertainty that an accurate Target Cost can be agreed based on a tender design;
- Option E is not recommended given difficulty in forecast the final out-turn costs on award;
- Option F is unnecessary and not recommended given that the scheme that the works are not complex.;
- Payment on completion of activities encourages progress; and
- The main financial risk is placed on the Contractor.

6.8.4.2 Preferred NEC Professional Services Contract

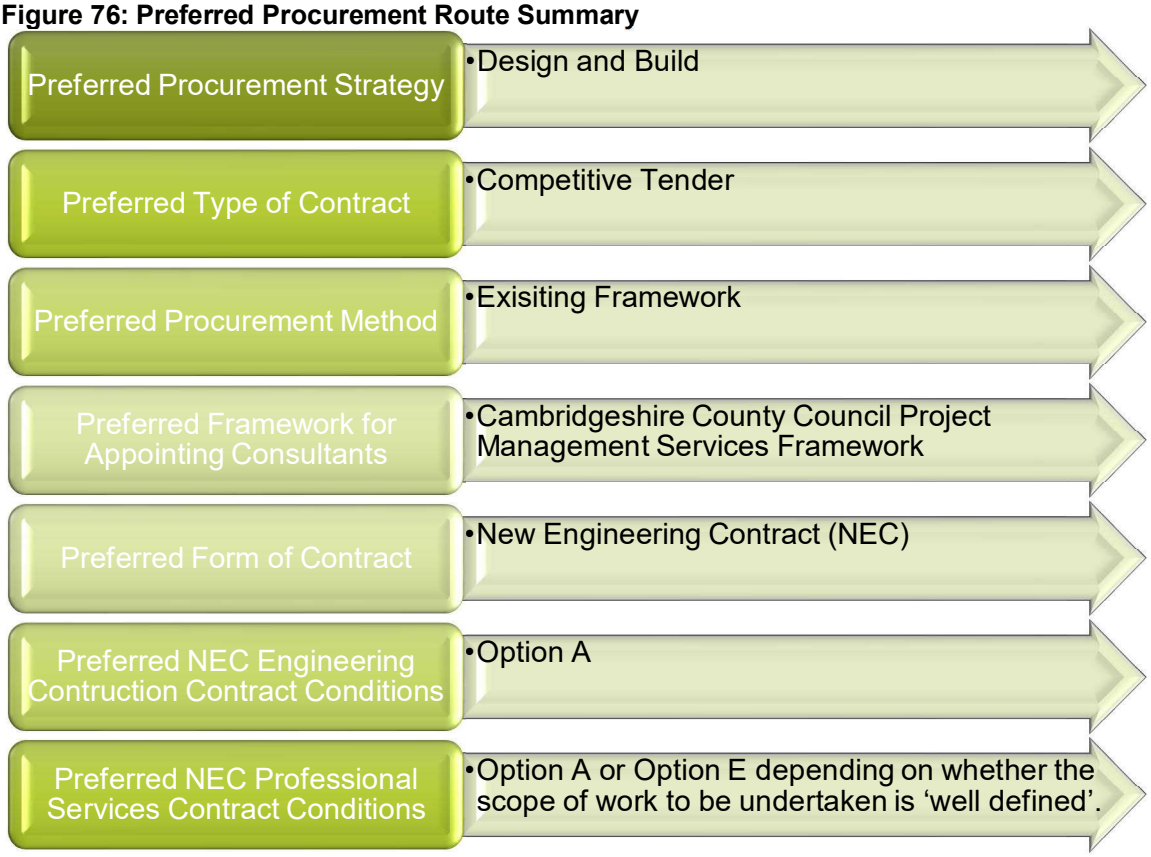
Section 6.7.1 included a preference for appointment of a Consultant by direct award through the existing Cambridgeshire County Council Project Management Framework.

The recommended NEC3 Professional Service Agreement Contract for appointing a Consultant is either Option A (priced contract with activity schedule) or Option E (cost reimbursable). Option A is recommended when the scope of work to be undertaken is well defined (e.g. preparation of contract documents as part of the procurement process), or Option E when the amount of work required is unknown (e.g. Technical Approval Authority role).

6.9 Preferred Procurement Route Summary

The preferred ‘procurement options’ detailed in sections 6.3 to Form of Contract 6.8 are summarised in Figure 76.

Figure 76: Preferred Procurement Route Summary



Source: Mott MacDonald/White Young Green

6.10 Payment Mechanisms

6.10.1 Contractor Appointment

The preferred option for appointing a Contractor to deliver the Yellow option is an NEC EEC Option A (priced contract with activity schedule) Design and Build Contract procured under a restricted competitive tender process.

The Contractor would be paid for each individual construction item included on the scheme activity schedule following completion of said item in accordance with the Contract on the basis of monthly valuations unless otherwise agreed between the NEC3 Project Manager and Contractor. The contract clearly defines payment mechanisms including payment periods and mechanisms for withholding payments for incomplete of non-conforming work.

Dispute resolution procedures are also clearly defined with the first point of resolution, should the issue not be resolved within the team, generally being adjudication.

6.10.2 Consultant Appointment

The preferred options for appointing a Consultant to support GCP during procurement and delivery of the Yellow option is direct award under the existing Cambridgeshire County Council Project Management Framework

Under an this Contract the Consultant would be paid on a time-charge basis up to the maximum agreed fee.

6.11 Pricing Frameworks and Charging Mechanisms

6.11.1 Design & Build Contract

The Contractor's tendered lump sum for the Design & Build Contract would be developed based on their estimated cost of designing and constructing the works plus a percentage for overheads and profit. A specific 'pricing framework' is not applicable to a NEC3 EEC Option A Contract.

The Contractor would charge GCP their tendered lump sum for the works in accordance with the NEC3 Contract EEC on the basis of monthly valuations (unless otherwise agreed). However, the final out-turn cost of the Contract will differ from the tendered lump sum in the event of variations to the contract, i.e. Compensation Events.

Incentives, deduction and performance targets are not relevant to NEC3 EEC Option A.

6.11.2 Professional Services Contract

The Consultant's tendered lump sum under Option A of the Professional Services Contract would be developed based on their estimated cost of providing support to GCP plus a percentage for overheads and profit. A specific 'pricing framework' is not applicable to the Professional Services Contract.

Under Option A, the Consultant would charge GCP their tendered lump sum for the works in accordance with the Professional Services Contract on the basis of monthly valuations (unless otherwise agreed). However, the final out-turn cost of the Contract will differ from the tendered lump sum in the event of variations to the contract.

Incentives, deductions and performance targets are not relevant to the Option A or E of the Professional Services Contract.

6.12 Risk Allocation and Transfer

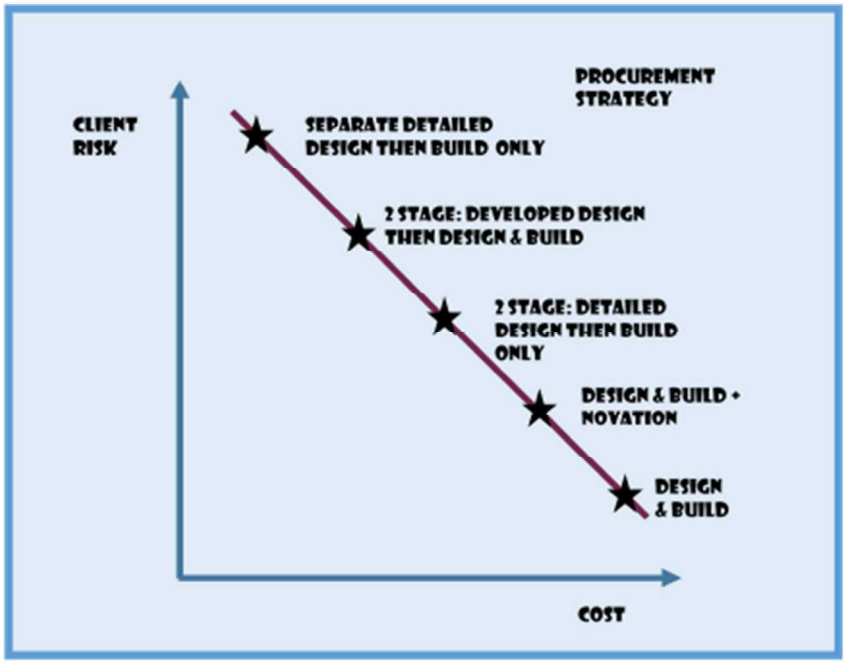
At this stage in the development of the project, prior to any procurement process, all liabilities and risks rest with GCP.

One of the key issues in assessing which procurement methodology to follow will be GCP's appetite for risk; if GCP prefers to accept a degree of risk they can potentially achieve a lower tender price. However, should GCP be risk averse, they can transfer a higher degree of risk to the contractor, but this is likely to be reflected in a higher tender price. 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

In terms of the procurement strategy, Figure 77 indicates the risk vs cost profile of each of the options considered.

The preferred option, Design and Build, provides the lowest risk option and most of the commercial risk is transferred to the contractor. However, it is likely that this will result in a higher tender price as tenderers will allocate financial value to the risks that they are asked to accept.

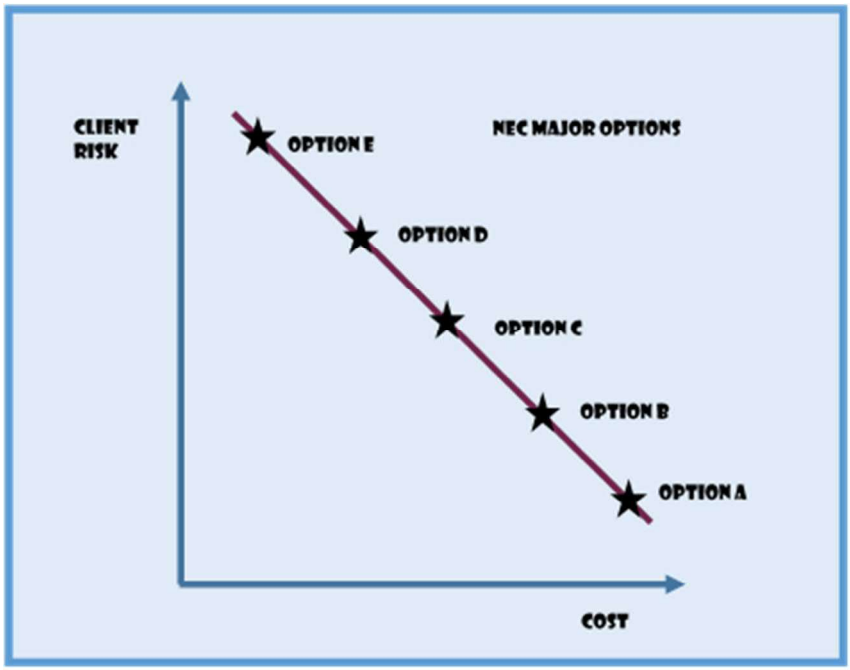
Figure 77: Risk vs Cost Profile- Procurement Strategy



Source: White Young Green

Figure 78 indicates the risk vs cost profile of the NEC Major Options. Again, the level of risk that GCP is prepared to accept impacts on the likely tender costs.

Figure 78: Risk vs Cost Profile- NEC Major Options



Source: White Young Green

The preferred option, Option A - Priced Contract with Activity Schedule, provides GCP with the lowest levels of risk but is likely to lead to a higher tender price. It gives a greater level of certainty that the tendered price will closely resemble the final out-turn construction cost of the project.

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. In addition, all risks on cost overruns remain with GCP as there is no pain-share mechanism.

6.13 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 also recommended that the programme includes a period of between 77 and 96 weeks (18-22 months) to construct the scheme under a Design and Build contract.

6.14 Human Resource Issues

GCP will be responsible for oversight of the project on the client side of the delivery arrangement. The relevant professional activities to appropriately resource this aspect (procurement and delivery) of the project include a Programme Manager who will provide technical and procedural oversight of programme level benefit management, and a Project Manager who will oversee day to day management of each of the work stream 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 in sections 6.3 to 6.10.

There are no trade union or TUPE implications arising from this contract.

6.15 Contract Management

GCP already has a framework for the provision of Project Management and Contract Administration services in place. This would be used to appoint an NEC3 Project Manager and Supervisor to undertake the following during construction of the scheme:

The NEC Project Manager & Supervisor construction phase roles will be:

- 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 NEC3 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 report on payment certificates and compensation events.

In addition, the Project Management team would:

- Liaise with, and advise, GCP on current contractual, commercial, programme and risk activities;
- Represent the 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 & Safety legal and site-specific requirements for safe operating and duty of care are implemented throughout.

6.16 Commercial Case Summary

- A number of procurement strategies, methods, frameworks and contract types have been considered for the Yellow option for the Cambridge South-West Park and Ride scheme and the advantages and disadvantages of each evaluated to arrive at a preferred procurement route for delivery of the scheme.
- The preferred procurement strategy is the appointment of a Contractor under a design and build contract because GCP would enter into a single contract relationship and there would be guaranteed early collaboration between the Contractor and Designer; it is also the most cost-effective procurement method.
- The preferred procurement method is to use existing Framework contracts, which is considered to be the most cost effective for GCP and service providers can commence work as soon as contract terms and conditions have been agreed. It is recommended that any consultancy services are directly awarded under the dedicated Cambridgeshire County Council Project Management and Services Framework.
- It is recommended that a New Engineering Contract (NEC) is adopted for delivery as it is recommended by the Office of Government and Commerce, encourages co-operation between parties and has an 'Early Warning' feature to promote a proactive approach to risk resolution. The preferred contract conditions would be a Priced Contract with Activity Schedule as payment on completion of activities encourages progress and the Contractor is motivated to keep within the tendered price and the main financial risk is with the Contractor, not GCP. Under this contract type, payment mechanisms including payment periods and approaches for withholding payment for non-conformance are clearly defined.
- A tender period of 12-16 weeks included within the procurement programme is recommended for the Design & Build Contract, given that contractors will have to undertake design development work to support their submission. A period of 18-22 months to construct the scheme is recommended under a Design and Build Contract
- An NEC Project Manager and Supervisor would be appointed, and their main roles would be 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 NEC3 contract communications and maintenance of site records. Liaison with key stakeholders including landowners alongside GCP would also be a key role

7 Management Case

The Management Case assesses whether a proposal is deliverable. It looks at the project planning, governance structure, risk management, communications and stakeholder management to establish if adequate resources are in place to ensure delivery on time, on budget and in accordance with specifications.

7.1 Approach

The DfT guidance document, '*The Transport Business Case: Management Case'*, outlines the areas that should be covered in the Management Case. These have been used to structure the development of the Management Case for the preferred option for the Cambridge South West Park and Ride scheme. The DfT requirements are set out in Table 102 together with the relevant sections of this report in which they can be found.

Table 103: 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.	7.1 Approach
Evidence of similar projects	If possible, provide evidence of similar projects that have been successful, to support the recommended 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 this kind of work.	7.2 Evidence of Similar Projects
Project dependencies	Set out deliverables and decisions that are provided/received from other projects.	7.3 Project Dependencies
Governance, organisational structures & roles	Describe key roles, lines of accountability and how they are resourced.	7.4 Governance
Assurance & approvals plan	Plan with key assurance and approval milestones.	7.5 Assurance Frameworks
Project plan	Plan with key milestones and progress, including critical plan.	7.6 Project Plan
Risk management strategy	Arrangements for risk management and its effectiveness so far.	7.8 Risk Management
Communications and Stakeholder management	Development communications strategy for the project.	7.9 Communications and Stakeholder Management
Project reporting	Describe reporting arrangements.	7.4.3 Project Reporting
Implementation of work streams	Summary of key work streams for executing the work.	7.10 Implementation of Workstreams
Key issues for implementation	Issues likely to affect delivery and implementation.	7.7 Key Issues for Implementation
Contract management	Summarise outline arrangements. Confirm arrangements for continuity between those involved in developing the contract and those who will subsequently manage it.	7.11 Contract Management
Benefits realisation plan	Set out the approach to managing realisation of benefits.	7.12 Benefits Realisation
Monitoring and evaluation	Summarise outline arrangements for monitoring and evaluating the intervention.	7.13 Monitoring and Evaluation
Contingency plan	Summarise outline arrangements for contingency management such as fall-back plans if service implementation is delayed.	7.8.4 Contingency Plan

Content	DfT Requirements	Section Number and Title
Conclusion	Summarise overall approach for project management at this stage of project.	7.14 Management Case Summary

Source: DfT

7.2 Evidence of Similar Projects

The constituent members of the Greater Cambridge Partnership have an extensive record of delivering large-scale transport projects across the County in recent years which are described in Table 104. The successful completion of these projects demonstrates Cambridgeshire County Council's ability and experience in relation to delivering major transport infrastructure projects. This valuable experience has not been without challenges, but these have provided valuable lessons in the planning and delivery of future projects including the Cambridge South West Park and Ride.

Table 104: Similar Projects to Cambridge South West Park and Ride

Project	Description	Cost
Milton Park and Ride	This site was constructed to replace the Cowley Road Park and 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. The scheme was completed within just 2 years from the planning application being submitted in October 2006, to the construction period which began in Summer 2007 and ended in Spring 2008 when the site opened. 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.	£3.1m
Longstanton and St Ives Park and Ride	A further two Park and Ride sites were constructed in 2011 alongside the Cambridgeshire Guided Busway providing connectivity to Cambridge and Huntington. These sites have been a success in intercepting traffic and have both also increased beyond their first built capacity. The Longstanton Park and Ride Site now provides 350 parking spaces. St Ives Park and Ride has capacity for 1000 vehicles. Both sites are also provided with covered cycle parking. In addition to the number of spaces being increased as a result of the schemes 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 minutes, or 8 per hour.	Estimated at £9m for both sites[33].
The Cambridge Core Traffic Scheme	This scheme delivered improved access to public transport through traffic management and priority measures in the area bounded by the inner ring road. Delivery of this project demonstrates an ability of the promoters to consider the full impacts of a public transport scheme. 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.	£6.9m[34]
The Addenbrooke's Access Road	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. 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.	£24m

[33] This is an estimate as the costs were part of a wider package of Busway costs

[34] 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	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 and Ride to the south of Cambridge. 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. Construction began in July 2006 with the busway opened in August 2011. 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.	£150m[35]
The Ely Southern Bypass	This bypass is a single carriageway highway, currently under construction, connecting the A142 at Angel Drove to Stuntney Causeway. The scheme includes bridges over the railway line and the River Great Ouse and its floodplains and, when open to traffic, will relieve heavy traffic around Ely station, remove the need for heavy goods vehicles to use the railway level crossing, and avoid an accident-prone low-bridge. The route opened to traffic in October 2018.	£43m

Source: Mott MacDonald

Relevance to Cambridge South West Park and Ride

These projects demonstrate the GCP's ability to deliver transport schemes of a similar scale to the Cambridge South West Park and Ride across the County. Challenges experienced during the delivery of the Cambridgeshire Guided Busway have also provided GCP with valuable lessons which can be taken forward to ensure the successful delivery of this scheme within time and budget restrictions.

7.3 Project Dependencies

The success and financial viability of a major enhancement to Park and Ride facilities in close proximity to M11 Junction 11, will be dependent on several factors. Scheme design and delivery will therefore need to take the following dependencies into account:

- The extent and rate of growth of development at the Cambridge Biomedical Campus, which is expected to provide a significant proportion of the demand for any Park and Ride close to M11 Junction 11. Enhanced Park and Ride facilities will need to keep pace with Biomedical Campus growth.
- Interdependencies with other proposed schemes affecting demand on the A10 and M11:
  - New station at Cambridge South, potentially reducing the proportion of commuters travelling by car to the Cambridge Biomedical Campus, however it should be noted that this scheme is not committed but has been considered in terms of potential future interdependency issues.
  - Foxton rural travel hub, which includes expanding the car park capacity at Foxton rail station (on the London Kings Cross to Cambridge line), potentially intercepting a proportion of Cambridge-bound trips in advance of them reaching M11 Junction 11. However, as with the new station at Cambridge South, this scheme is not committed but has been considered in terms of potential future interdependency issues.
  - Travel hubs in other locations to serve trips into Cambridge, including at Whittlesford Parkway station close to M11 Junction 10.
  - New Park and Ride to serve the Cambourne to Cambridge (A428/A1303) corridor, which may reduce the number of vehicles approaching Junction 11 along the M11 southbound carriageway.

[35] This is the total cost of the Cambridgeshire Guided Busway and includes a £109m contribution from CCC.

  - M11 smart motorways upgrade, which is likely to allow for increased traffic flows on the M11 and its junctions.
  - City Access Strategy - 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 and therefore making the Park and Ride attractive and successful. In addition, the removal of traffic from the city centre would create additional demand for any additional Park and Ride facility.
- Timescales in relation to statutory processes that must be followed in order to deliver the scheme, for example the need to obtain planning permission.

7.4 Governance

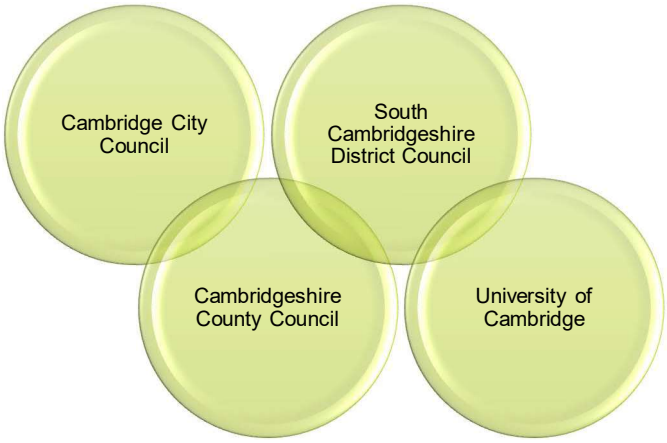
The governance of this project operates at several levels; strategically by the Greater Cambridge Partnership executive board and at a lower level by the project team, which will be influenced by key stakeholders and external partners. This section sets out how this project will be governed and managed and the various responsibilities of the key management levels.

7.4.1 Strategic Management

The Cambridge South West Park and Ride scheme is being promoted and managed by the Greater Cambridge Partnership (GCP), which is the new name for the Cambridge City Deal delivery body. The Greater Cambridge Partnership is the local delivery body for the City Deal with central Government, bringing powers and investment worth up to £1 billion over 15 years, forming the largest of several City Deals which have been approved in the UK. The City Deal seeks to deliver vital improvements in infrastructure, supporting and accelerating the creation of 44,000 new jobs, 33,500 new homes and additional apprenticeships[36]. With specific reference to transport, the GCP seeks to deliver better, greener transport which will connect people to homes, jobs, places of study and opportunity.

The GCP is made up of representatives from four partner organisations as shown in Figure 79. The partnership of councils, businesses and academia seek to work together to grow and share prosperity and improve quality of life for the people of Greater Cambridge.

Figure 79: The Greater Cambridge Partnership

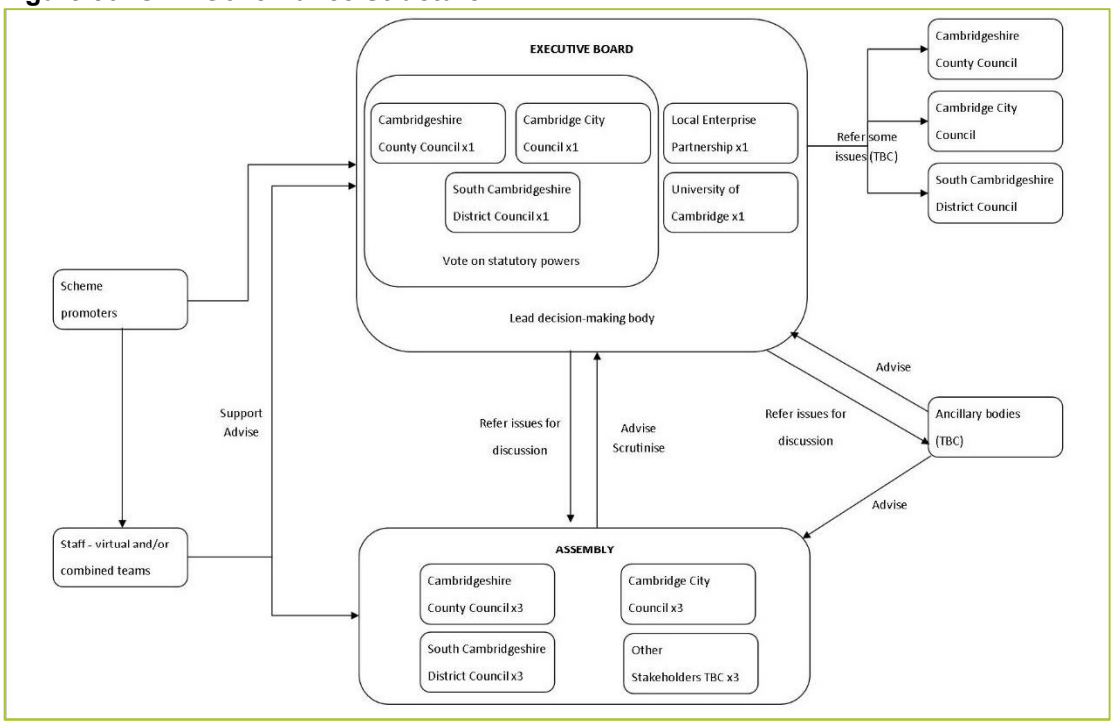


Source: https://www.greatercambridge.org.uk/

[36] www,greatercambridge.org.uk/about-city-deal

The GCP has two layers of governance, possibly with associated ancillary bodies. Figure 80 illustrates the proposed governance arrangements. The Executive Board will consist of the Leader, or equivalent, of each of the partner organisations as the key decision-making group. There will also be a 12-person Assembly with appropriate representation from the Local Authorities and other stakeholders, which will play an advisory and scrutiny role.

Figure 80: GCP Governance Structure

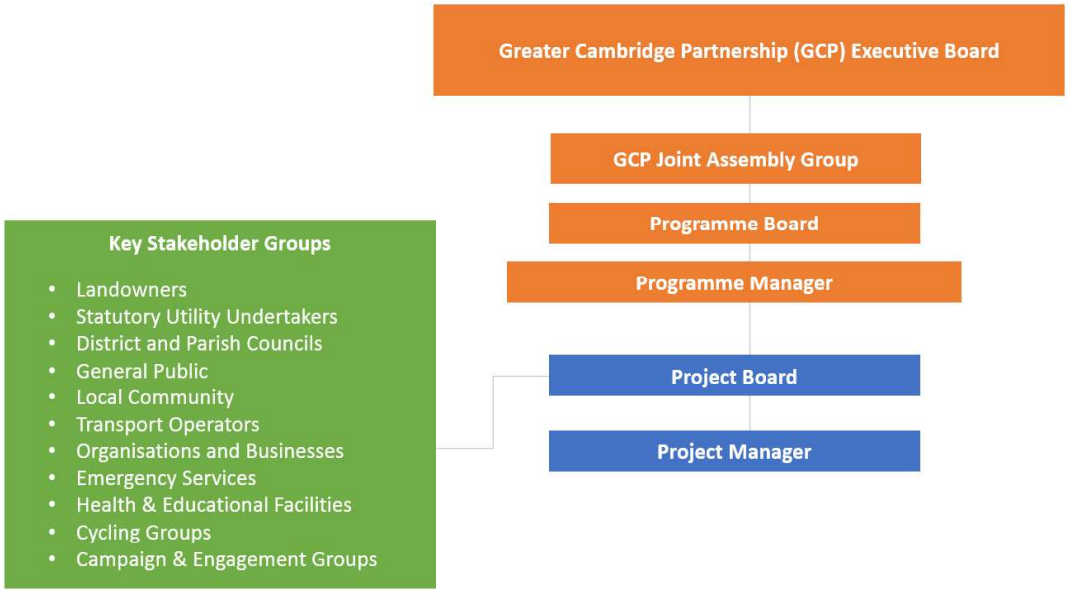


Source: Greater Cambridge City Deal (Draft) Assurance Framework

7.4.2 Project Management

Scheme delivery will be managed in accordance with the structure outlined in Figure 81. The organogram outlines the structure and reporting relationships of the various groups. Their respective roles are then detailed in Table 105.

Figure 81: Project Governance Structure



Source: GCP/Mott MacDonald

The upper management levels, highlighted in orange, focus on key issues at a programme and project level, while technical issues are addressed by the Project Board and appointed Project Manager, highlighted in blue. The roles and responsibilities of these management levels are outlined in further detail in the table below.

Table 105: Roles and Responsibilities

Management Level	Function
Greater Cambridge Partnership (GCP) Executive Board	This is the key decision-making group and will ensure overall strategic direction of the City Deal programme and overall scope of projects aligned with GCP aims and local and national policy. Includes leaders from each partner organisation and 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.
Programme 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 Board	Overall control of each project. Senior representative from each partner organisation.
Project Manager	Day to day management of each project and delivery of technical work streams. Leads project team.

Source: Mott MacDonald

On completion, it is expected that the enhanced Park and Ride facilities will be managed by CCC in line with the five existing Park and Ride sites in Cambridge.

Although not yet confirmed, Park and Ride bus services could operate on a commercial or part-commercial basis. The ability to attract interest from commercial operators will be dependent on expected patronage.

7.4.3 Project Reporting

Standard Greater Cambridge Partnership reporting processes are to be adopted. The Project Manager, Tim Watkins, will prepare the Project Manager's Report to present at Project Board meetings. This report is the main source of documentation which summaries progress and change in the scheme. The Project Manager's Report sets out the:

- Progress on each work stream (for example, business case and appraisal, design, consultation);
- Key activities to be undertaken before the next report meeting;
- Budget uptake; and
- Review of strategic risks and issues.

Although adherence to PRINCE2 reporting procedures have not been adopted, the core principles of this approach have been adapted to fit with the scope and scale of the scheme.

7.5 Assurance Frameworks

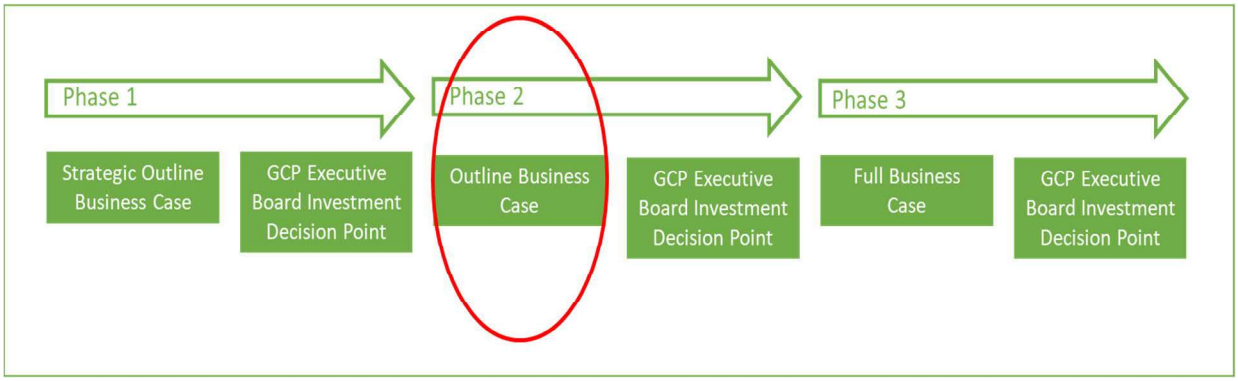
The scheme will be progressed through the Greater Cambridge Partnership's standard approval processes, with all decisions made by management with the appropriate level of authority. There are four main types of decision:

- Key decisions – to define the scope of the project and provide overall approval for the scheme. Key decisions are the responsibility of the GCP Executive Board.
- Scope change decisions – these decisions take the project outside the originally agreed scope and impact cost, quality and/or time. Scope change decisions are the responsibility of the GCP Executive Board.
- Major decisions within scope – these decisions are within the agreed project parameters, but have an impact on cost, quality, and/or time. Major decisions within scope are the responsibility of the Project Board.
- Project management decisions – these decisions do not impact cost, quality and/or time and 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 is 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 establishes the need for the project and identifies the options to be short listed.
- Outline Business Case (OBC), containing more detailed analysis of short list 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 82: Business Case Approval Process



Source: Mott MacDonald

The timescales for the various assurance approvals are outlined in Table 105:

Table 106: Assurance Approvals – Key Milestones

Key Project Milestone	Completion Date
OBC Submission	26th April 2019
GCP Executive Board Decision/approval of OBC	27th June 2019
Submit planning application	13th December 2019
FBC Submission (draft)	1st May 2020
GCP Executive Board Investment Decision on preferred option	27th July 2020
Amend FBC following feedback from planning application	14th August 2020
FBC Submission (final)	17th August 2020

Source: GCP/Mott MacDonald

7.6 Project Plan

The project and actions required for delivery are well understood. They have been assessed in consultation with the full project team and have the support of key stakeholders. Figure 83 illustrates the RIBA work stages covered to date and those that will be covered as well as those that are described in this OBC, namely RIBA stage 3.

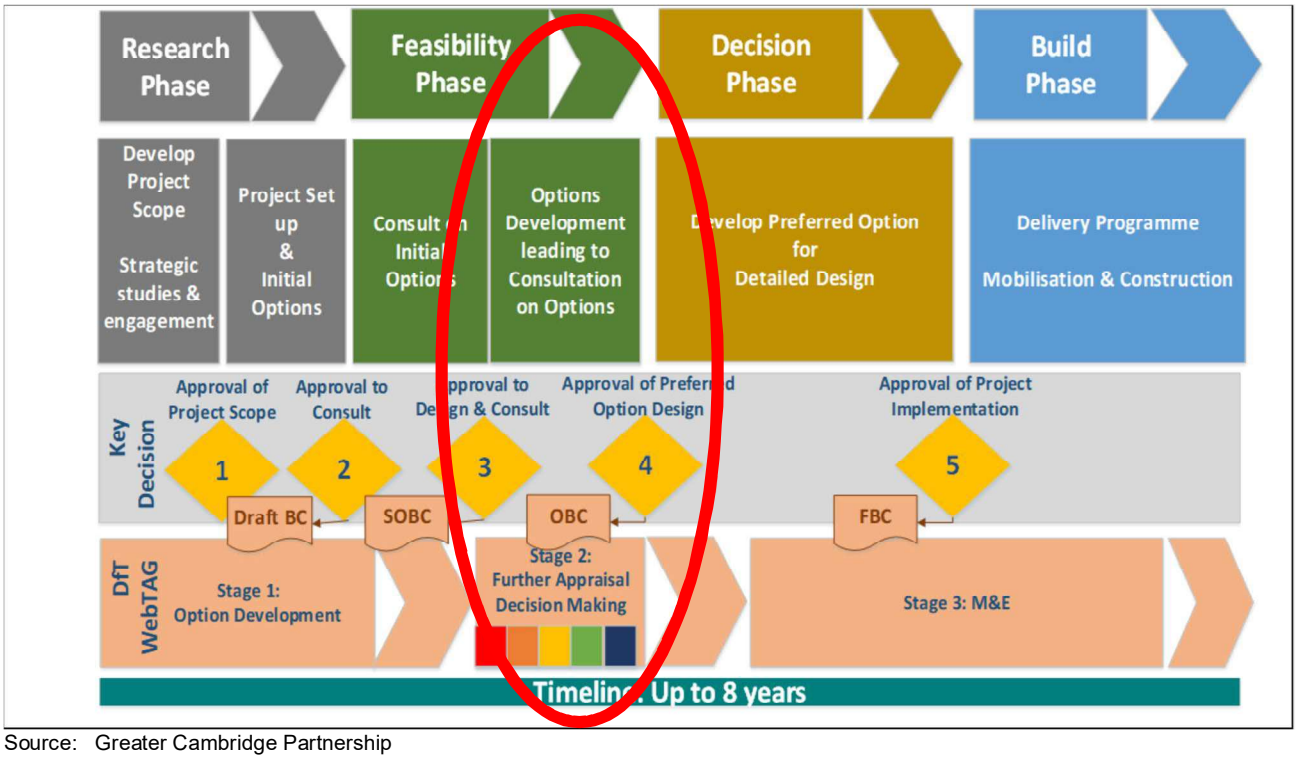
GCP have however developed their own work and reporting stages which are based on key decision points aligned with the DfT Business case process, but is also closely related to the RIBA work stages; this is the plan that will be followed and is illustrated in Figure 84

Figure 83: RIBA Work Stages

Source: Mott MacDonald

From Figure 84, it can be seen that development of the OBC, Stage 2 in the DfT, process aligns with GCP Key Decisions Points 3 and 4 and RIBA Stage 3.

Figure 84: Greater Cambridge Partnership Key Decision Points

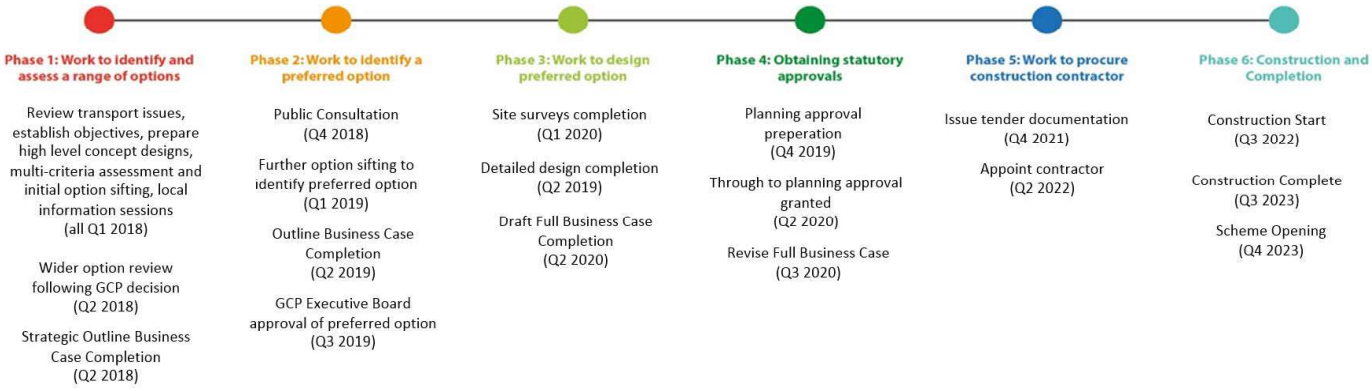


Source: Greater Cambridge Partnership

7.6.1 Scheme Delivery

Figure 85 provides a draft outline programme of the key milestones and associated delivery dates for the Cambridge South West Park and Ride scheme, following on from the scheme's progression to date. For further clarity these are outlined within Table 107.

Figure 85: Delivery Programme – Key Milestones



Source: Mott MacDonald

Table 107: Delivery Programme – Key Milestones

Key Project Milestone	Date
Public Consultation on short list options	November 2018
Draft Outline Business Case (OBC)	March 2019
Final (preferred) option recommendation to Greater Cambridge Partnership Executive Board	April 2019
GCP confirmation of preferred option recommendation	June 2019
OBC completion	June 2019
Detailed design completion	August 2019
Statutory procedures completion	Q2 2020
Draft FBC	Q2 2020
Final FBC Submission	Q3 2020
Appoint Contractor	Q2 2022
Construction start	Q3 2022
Construction completion	Q3 2023
New Park and Ride site opening	Q4 2023

Source: GCP/Mott MacDonald

7.7 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 Project 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. The subsequent sections outline a detailed strategy for managing and identifying risks to prevent these issues arising.

7.8 Risk Management

The management of risk and uncertainty will be key to the successful delivery of the scheme, as it will identify threats to project delivery and enable effective risk management actions to be assigned. A risk management strategy has been developed and reviewed at key stages of project development. An effective risk management strategy should include:

- A continuous approach;
- Thorough identifications of risks;
- Active risk avoidance and mitigation;
- Effective communication of the risks to the project team; and
- The delivery of scheme objectives to cost, quality and time indicators.

7.8.1 Risk Management Strategy

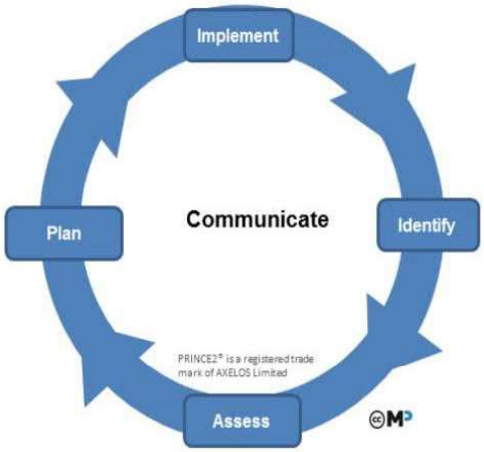
The GCP has adopted a robust strategy to ensure effective management of risks in order to enable the successful delivery of all City Deal funded projects, including the Cambridge South West Park and Ride scheme.

The risk management strategy for this project, though not specifically PRINCE2, is based on the core principles for risk management contained within the OGC PRINCE2 guidance and applied proportionally to the value of the scheme. Therefore, the procedure for identifying key risks follows this process:

- **Identify:** Complete the risk register (as appropriate to the area of the project and/or the producing organisation) and identify risks, opportunities and threats.
- **Assess:** Assess the risks in terms of their probability and impact on the project objectives.
- **Plan:** Prepare the specific response to the threats (e.g. to help reduce of avoid the threat), and/or plan to maximise opportunity in the case that these threats do occur.
- **Implement:** Carry out the above in response to an identified threat if one occurs.
- **Communicate:** Report and communicate the above to relevant project team members and stakeholders.

Risk management must be an ongoing process, as shown in Figure 86.

Figure 86: Risk Management Process



Source: PRINCE 2

To facilitate the effective management of risks associated with the scheme's delivery, risks have been organised into two overarching categories:

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

These categories are further broken down within the risk register noted within Table 111.

Risk management processes will be employed and recorded throughout the project lifecycle. The risk register will be monitored and updated at regular workshops and meetings. The Project Manager, Tim Watkins has responsibility for overseeing the Risk Management process. Roles, responsibilities and reporting lines for risk management should be clearly defined within the project team.

Meetings are held with the project team every six weeks to review the identified risks and their potential impact on the scheme. This will ensure all risks are up to date and their impact and likelihood are relevant to the current stage of project development. High impact or high probability risks are proactively managed and may be escalated to the GCP Transport Programme Board.

7.8.2 Risk Register

A risk register has been developed and updated throughout the development of the OBC, in order to continually manage risks and mitigate impacts on the scheme delivery. Risks have been grouped into categories and scored based on their likelihood of occurring and expected impact on the scheme.

Scores for each of the identified risks have been broken down into Inherent Risks and Residual Risks. Inherent risk represents the amount of risk that exists in the absence of controls or mitigation measures. Residual risk is the amount of risk that remains after the measures are considered.

Risks were given a number on a scale of 1 to 5 for both likelihood and impact which has been multiplied together to give an overall score for both inherent risk and residual risk. The likelihood and impact ratings and descriptions are summarised in Table 108 and Table 109.

Table 108: 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

Table 109: 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	Negligible	1

Description	Descriptor	Scale
• Low financial loss (proportionate to budget involved)		
• 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 Government. • Significant damage to environment • Huge financial impact (proportionate to budget involved)	Catastrophic	5

Source: Mott MacDonald

Based on the this methodology, a RAG rating was then calculated for each inherent and residual risk and the average of these two risk elements was taken so that they could be categorised as High, Medium or Low as specified in Table 110. This provides a robust way to easily identify the risks which may need to be considered in more detail.

Table 110: RAG Appraisal Ratings

RAG Appraisal Rating	Description
Red	High Risk (Average score >10)
Amber	Medium Risk (Average score 6-10)
Green	Low Risk (Average score 0-5)

Source: Mott MacDonald

Table 111 summarises the project risks, their likelihood and impact scores as identified in the Risk Register. Risks have been grouped into the following categories:

- City Deal Governance
- Consultation/Communications
- Design
- External Stakeholders
- Internal Stakeholders
- Project Funding
- Project Management
- Scheme Development
- Statutory Process
- Supply Chain

The full Risk Register is appended as part of this submission.

Table 111: Risk Register

Risk Category	Project Risk Description	Risk Owner	Inherent Risk Rating			Mitigation Measures	Residual Risk Rating			RAG Appraisal
			Likelihood	Impact	Score		Likelihood	Impact	Score	
Strategic Risks										
City Deal Governance	Political/governance change within the City Deal could introduce new or conflicting priorities	Greater Cambridge Partnership	3	3	9	Continued communication with senior officers/project board on benefits of the project	2	3	6	Medium Risk
	Difficulty in developing options that work in both managed motorways and current layout	Project Team	3	3	9	Ensure flexibility to ensure some of the options can accommodate either scenario	2	3	6	Medium Risk
Consultation	Recommended option is opposed by local residents.	Project Team	3	4	12	Engagement with stakeholders and effective project governance	3	4	12	High Risk
External Stakeholders	Delay in receipt of procurement information from WYG	Project Team	3	3	9	Early and timely supply of information to WYG to ensure sufficient time for procurement information to be developed	2	3	6	Medium Risk
	Discrepancy with AECOMs modelling approach at J11	Project Team	3	4	12	Ongoing management to ensure both modelling teams communicate early on to prevent change for the project	2	4	8	Medium Risk
	J11 structure cannot be easily widened	Project Team	3	3	9	Early assessment of structures / obtain as-built drawings from HE	1	3	3	Medium Risk
	Delay in receipt of HE models	Project Team	3	3	9	Liaise with HE on obtaining all relevant information to enable model alignment and consistency	3	3	9	Medium Risk
	Scoping for Environmental Impact Assessment not well defined	Environmental Impact Assessment Lead	2	4	8	Carry out scoping and consultation with statutory bodies and LPA urgently once preferred scheme defined. This will require scoping to commence before final OBC produced	1	4	4	Medium Risk
Internal Stakeholders	Lack of Combined Authority support	Greater Cambridge Partnership	3	4	12	Escalation of issues via political process. Continue to develop compliant business case	3	4	12	High Risk
	Other schemes are brought forward on Trumpington Rd in the short term	Greater Cambridge Partnership	3	3	9	Regular communication with other department heads to ensure schemes along the corridor are cognisant of each other	2	3	6	Medium Risk

Risk Category	Project Risk Description	Risk Owner	Inherent Risk Rating			Mitigation Measures	Residual Risk Rating			RAG Appraisal
			Likelihood	Impact	Score		Likelihood	Impact	Score	
	Decision has not been made on the mode of PT links and therefore infrastructure required is not clearly defined	Greater Cambridge Partnership	3	3	9	Design needs to be developed so as to be CAM-compliant as much as possible	2	3	6	Medium Risk
	Emerging recommended scheme not supported by the Board	Greater Cambridge Partnership	2	5	10	Inform board of preferred option prior to board meeting	2	5	10	Medium Risk
Project Funding	Development of processes and procedures related to GCP funding introduces new decision points and reporting requirements.	Greater Cambridge Partnership	3	4	12	Emphasis on need for clear decision-making framework	3	4	12	High Risk
Project Management	Surveys not carried out in time to inform Environmental Impact Assessment process	Environmental Impact Assessment Lead	3	4	12	Agree planning programme with Environmental Impact Assessment so we can properly plan for survey works (to cover all appropriate seasons). Ensure business case programme is aligned with Environmental Impact Assessment and planning application programme	2	4	8	Medium Risk
	Access to land denied	Environmental Impact Assessment Lead	3	3	9	Early identification of land ownership and discussion with owners to seek approval to gain access. Where access not likely, develop approach to Environmental Impact Assessment that ensures this is not a show stopper for the Environmental Appraisal Report	1	3	3	Medium Risk
Technical Risks										
Scheme Development	Conflict with other scheme sensitivities, aims or objectives. e.g. Foxton, Cambridge South Station East West Rail, A1307 project, C2C	Greater Cambridge Partnership	3	5	15	Regular communication with other department heads to ensure adjacent or overlapping schemes are cognisant of each other. Develop a shared approach to assessment	2	5	10	High Risk
	Impact of new P&R on existing local bus services	Project Manager	3	4	12	Liaise with bus service providers	3	4	12	High Risk
	Incomplete traffic modelling	Project Team	3	4	12	Agree all modelling assumptions and early warning if results suggest any issues	3	4	12	High Risk

Risk Category	Project Risk Description	Risk Owner	Inherent Risk Rating			Mitigation Measures	Residual Risk Rating			RAG Appraisal
			Likelihood	Impact	Score		Likelihood	Impact	Score	
	Emerging Greenways project proposals complicate options across the M11	Project Manager	3	4	12	Engage with Greenways team	3	4	12	High Risk
	Scheme BCR shows Poor or Low Value for Money (VfM)	Project Team	3	5	15	Scheme shortlisting process (MCA criteria) will need to direct sifting towards schemes likely to offer higher VfM. Consideration of wider economic benefits to inform wider business case issues.	1	5	5	Medium Risk
	The addition of further development sites in the area leads HE to look at introducing an additional junction	Project Team	3	3	9	Maintain engagement with HE to monitor the likely path of their decision making	2	3	6	Medium Risk
	Public opposition to the M11 to City Centre bus priority improvements	Project Team	3	4	12	Early identification of proposals to ensure options taken to public consultation already have stakeholder support	3	4	12	High Risk
Statutory Process	New LTP does not support Park & Ride	Greater Cambridge Partnership	3	2	6	Escalation of issues via political process. Engagement with CCC policy team	3	2	6	Medium Risk
	Consequences of planning process results in reassessment of site selection	Project Team	3	5	15	Continue to develop the business case to set out the implications clearly and concisely	3	5	15	High Risk
Supply Chain	Significant Statutory Undertakers diversions required	Project Team	3	5	15	Early consultation with Stats bodies to understand the need for diversionary works. C3 estimates to be sent out to provide accurate cost estimates	2	5	10	High Risk
Design	Designs require amendment of existing GCP Schemes	Project Team	3	3	9	Designs require amendment of existing GCP Schemes	2	3	6	Medium Risk

Source: Mott MacDonald

7.8.3 Risk Reviewing

Risk information is required to be up to date at all times to facilitate reporting. Active risks and actions are updated to support monthly reporting requirements. The Project Manager, Tim Watkins, will be responsible for reviewing and updating risks and reporting to the GCP Transport Programme Board on a monthly basis.

7.8.4 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. However, given that delivery of the Cambridge South West Park and Ride scheme will primarily be funded through City Deal funding, which has already been successfully secured by GCP, a Contingency Plan has not been deemed necessary. GCP have advocated their support for the scheme in advance of this OBC. There is also an expectation that developer contributions will be secured through Section 106 agreements to support delivery of the scheme.

7.9 Communications and Stakeholder Management

7.9.1 Background

Cambridge South West Park and Ride Scheme has the potential to impact various members of the public and a number of key stakeholders. Public and stakeholder consultation is therefore essential to ensure that all aspirations are taken into account throughout development and delivery of the project, and to manage the communication and flow of information relating to the scheme. The key aims of the consultation process were to:

- Inform all affected parties, local communities and road users of the scheme's development and programme;
- Consult with all stakeholders, receive their views and identify potential objections; and
- Take issues and objections on board whenever possible in the design of the scheme, including mitigation and compensation measures.

Consultation for the Cambridge South West Park and Ride is based upon three stages to determine the preferred option;

- Option shortlisting – early stakeholder engagement to review scheme objectives and option selection criteria and help identify the options to be taken forward for public consultation. This stage took place from 2015.
- Public consultation – a public consultation on shortlisted options will take place in Autumn 2018 from 5 November until 21 December. The consultation will seek feedback from stakeholders and the public on the options and will inform the appraisal process to determine a preferred option. The consultation will be led by GCP, in line with Cambridgeshire County Council's Consultation Guidelines.
- Consultation on the preferred option – further engagement with stakeholders on the preferred option will help inform more detailed design considerations. This stage is likely to take place from late 2019 onwards.

The various stages of public and stakeholder engagement are set out in sections 7.9.2 to 7.9.4

7.9.2 Stakeholder Engagement and Communications Plan

The Stakeholder Engagement and Communication Plan is guided by the principles of the Greater Cambridge Partnership communication strategy. The strategy outlines how the project

will ensure that both the general public and all internal and external stakeholders are informed of relevant project information throughout development of the OBC.

An outline of the Communications Plan is set out in Table 112. The full document is also appended and entitled “Cambridge South West Park and Ride Stakeholders Engagement and Communications Plan”.

Table 112: Cambridge South West Park and Ride Communications Plan

Type of Communication	Purpose / Description	Target Audience	Timescales / Duration
Greater Cambridge Partnership’s Website	Provide access to consultation document and summary, questionnaire, information pack and other background documents and supporting materials. – Platform to complete questionnaire online	• Invited residents and businesses • General public	Autumn 2018 ongoing for 6 weeks. Background materials, business case documents uploaded to website once published. Consultation materials published early November.
Social Media- GCP Facebook, Twitter and LinkedIn	Promote consultation. – Social advertising will be used to extend the reach of selected posts and target younger age groups	• General public	Autumn 2018 ongoing for 6 weeks
Public Information events and pop up events	Provide local residents and businesses with opportunities to discuss the proposed Park & Ride/s and bus route/s face-to-face with project officers and technical consultants. – Record comments in writing through formal questionnaires available on site and ad hoc feedback at events	• Residents • Local businesses • General public	November 20th-6thDecember 2018
Advertisements	The consultation will be advertised through local newspapers, on buses and bus shelters and radio. Posters will be sent to Parish Councils and other contacts for local display, as well as paid distribution in the city centre. Targeted social advertising will be used. Schools will be asked to forward on information to their school communities via Parent Mail. Publicity on partners’ internal and external channels will also be sought. A free telephone number is in operation via CCC’s helpdesk	• General public	Autumn 2018 ongoing for 6 weeks
Email	Provide detail on the project and offer opportunity to attend briefings and links to online consultation materials. The monthly Greater Cambridge Partnership Newsletter also served the same purpose	• Stakeholders	Start of / prior to consultation period / monthly
Leaflet	Principle paper-based mechanism for providing information about the project to people in the area. Delivered to homes and made available at consultation events. Sent to approximately 13,000 addresses.	• Residents • Local businesses • General public	Autumn 2018 ongoing for 6 weeks
Questionnaire	Invite comments on proposals and importance of tackling congestion. – Seek profile and travel information about the individual or business responding	• Residents • Local businesses • General public	Autumn 2018 ongoing for 6 weeks
Briefings	Held at key stages of the proposal development, including around consultation. Provide opportunity to talk and. ask questions about the project	• Stakeholders	Prior to and at the start of the consultation period
Information pack	A non-technical summary of the project. Provide more details than that included in the leaflet. – Links to the Consult Cambs website and the project webpage which cover	• General public • Stakeholders • Parish Councils	Published on GCP website in November

Type of Communication	Purpose / Description	Target Audience	Timescales / Duration
	– Sent electronically with paper copies available at the public exhibitions		
Meeting with the general public, local businesses and stakeholders	– For information sharing and questions and answers	• Engagement Group (EGG)	Two weeks before GCP Assembly when an item it to be presented

Source: GCP

7.9.3 Key Stakeholders

Key stakeholders have been identified and have already been involved in the delivery of the project in a number of ways. Engagement undertaken throughout the development of this scheme aims to inform, involve, collaborate with and empower stakeholders to understand the issues and enable them to make informed choices.

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

- Keep stakeholders aware of the schemes progression and give an opportunity for feedback to 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 of groups both during delivery and once operational; and
- Address perceptions of the scheme where these are inconsistent with the scheme objectives and forecast outcomes.

Table 113 presents GCP's stakeholder engagement plan for the Cambridge South West Park and Ride scheme going forward. In it, the stakeholder interest and strategy for managing stakeholder expectations is outlined. Stakeholders are not listed in any particular order and feedback from all is considered key to the success of the scheme.

Table 113: Stakeholder Engagement Plan

Stakeholder	Role / Interest	Management Strategy	Statutory Consultee	Local Interest Group / Organisation	Wider Interest Group / Organisation	The Public
Local Authorities	Cambridgeshire County Council as the lead planning authority and Local Highway Authority, and Cambridge City Council and South Cambridgeshire District Council as the local planning authorities who will be key consultees on the application.	Regular updates and involvement where appropriate as the scheme progresses.	✔			
Greater Cambridge Partnership	Local delivery body for the City Deal.	Regular meetings with GCP representatives.	✔			
Local Engagement Groups/Residents	Group represents local residents' interests and forms a communication channel.	Close engagement on scheme development, proposals and construction.		✔		
Individual Residents	Potential users, interest in the impact of scheme on the local community and sensitive to disruption during construction.	Public consultation and regular communication in the lead up to, and during, construction.				✔
Highways England	Organisation responsible for the M11.	Close engagement on scheme development, proposals and construction.	✔			
Natural England	Advisory body on conservation, biodiversity and landscape.	Close engagement on scheme development, proposals and construction.	✔			
Historic England	Public body advising on protection and enjoyment of heritage and historic places.	Close engagement on scheme development, proposals and construction.	✔			
Campaign Groups	Represents local residents' interests and forms a communication channel.	Close engagement on scheme development, proposals and construction.		✔		
Cambridge Ahead	Represents businesses and academics dedicated to growth in the region.	Close engagement on scheme development, proposals and construction.			✔	
Parish Councils	Interest of the proposed scheme on the Parish Council area. Represents local residents' interests and forms a communication channel.	Close engagement on scheme development, proposals and construction prior to statutory consultation.		✔		

Stakeholder	Role / Interest	Management Strategy	Statutory Consultee	Local Interest Group / Organisation	Wider Interest Group / Organisation	The Public
Schools and the Nuffield Hospital	The scheme will offer the opportunity for staff and patients to access employment and health care sustainably.	Regular updates and involvement where appropriate as the scheme progresses.		✔	✔	
Emergency services	Interest from the Emergency Services on potential impact on local bus services.	Close engagement on traffic management of scheme construction.	✔			
Cycling groups	To represent the views and interests of active travel users.	Meetings with key representatives to comment on scheme proposals.		✔		
Landowners	Required to allow the scheme to progress. Interest in the impacts of the proposed scheme on environment and proposed mitigation / enhancement.	Close engagement on scheme development, proposals and construction prior to statutory consultation.	✔			
Commuters	To represent the views and interests of regular travellers	Close engagement on traffic management of scheme construction.				✔
Cambridge University	Sustainable travel will offer the opportunity for students to access employment and education opportunities.	Regular updates and involvement where appropriate as the scheme progresses.			✔	
Organisations and businesses that are investing in the Cambridge Biomedical Campus	Impact of the scheme on employees, patients and visitors travelling from a wide area.	Close engagement on traffic management of scheme construction.		✔		
Papworth Hospital	Impact of the scheme on employees, patients and visitors travelling from a wide area.	Close engagement on traffic management of scheme construction.		✔		
Groups which represent people with limited mobility or a sensory impairment and wheelchair users	Interest in the impact of proposed scheme on people with reduced or limited mobility.	Regular updates and involvement where appropriate as the scheme progresses.		✔		

Source: Mott MacDonald

7.9.4 Engagement and Consultation to Date

7.9.4.1 Preliminary Engagement and Consultation

Prior to the development of this OBC and the SOBC, which was dated April 2018, multiple consultation meetings and events had taken place dating back to 2016. These were undertaken to gain an initial understanding of need and potential support for a scheme of this nature. These meetings, together with the attendees are detailed in the table below.

Table 114: Pre SOBC and OBC Preliminary Consultation and Meetings

Date	Meeting/Consultation	Attendees
22/09/2016	A428 and Western Orbital Bus Operating Case - Astra Zeneca/ CBC	Astra Zeneca, NHS, Atkins
18/10/2016	A428 and Western Orbital Bus Operating Case - Consultation Whippet Coaches	Whippet, CCC, Atkins
27/09/2016	A428 and Western Orbital Bus Operating Case - Travel Plan Plus	Travel Plan Plus, CCC, Atkins
08/08/2016	City Deal Discussion with LIH / Pigeon	AECOM, Pigeon, CCC, CODE, LIH
06/05/2015	Meeting: City Deal and Cambourne West/Bourn Airfield	CCC
05/04/2016	Strategic Appraisal of Greater Cambridge Bus Priority Proposals	CCC, Mott MacDonald
10/01/2019	HE/GCP Liaison meeting	HE, CCC, Mott MacDonald, Skanska
27/04/2016	Meeting Agenda	CCC, HE
07/09/2018	Highways England meeting	CCC, HE, Aecom, Skanska, Mott MacDonald
13/02/2018	M11 Junction 11 Park & Ride: Engagement Group, Harston Village Hall	Engagement Group
30/10/2017	LLF - Trumpington Community College	LLF
11/09/2017	LLF - Comberton Sports & Arts	LLF
21/06/2017	LLF - Hauxton Primary School	LLF
13/12/2017	Pre-Application Meeting	Agent, Motts, CCC
24/01/2017	LPA Briefing Meeting	GCP, Mott MacDonald, Strutt & Parker, SCDC, City
13/12/2017	Trumpington Park & Ride pre-application meeting	CCC, City, SCDC, Mott MacDonald
06/06/2018	Planning Steering Group	LPAs
11/04/2018	Planning Steering Group	LPAs
21/08/2018	Planning Steering Group	LPAs
24/01/2019	Planning Steering Group	LPAs
10/12/2014	Pre Start	CCC, Atkins
24/11/2016	A428-A1303/ Western Orbital Project Board	CCC Project Board
26/04/2016	A428-A1303/ Western Orbital Project Board	CCC, City, SCDC, LEP, LGSS, University of Cambridge
21/01/2016	A428-A1303/ Western Orbital Project Board	CCC, City, SCDC, LEP, LGSS, University of Cambridge
06/04/2018	Western Orbital site visit	CCC, City, SCDC, Skanska, Mott MacDonald
30/07/2015	A428 / M11 Junctions 11 / 13 Bus Only Slip Roads - Stakeholder Engagement	CCC, University of Cambridge, AECOM, Peter Brett Associates
12/08/2015	A428, Western & Junction Study	CCC, Cambridge City, SCDC
10/09/2015	A428, Western & Junction Study	CCC, Cambridge City, SCDC
22/10/2015	A428, Western & Junction Study	CCC, Cambridge City, SCDC

Date	Meeting/Consultation	Attendees
30/07/2015	Landowner Engagement	CCC (TW) and Landowner (Mr & Mrs Foster)
19/05/2017	Trumpington Residents Association	CCC, TRA
21/07/2015	Western Orbital and Biomedical Campus development	CCC, Addenbrookes
30/09/2015	Cambridge Biomedical Campus development	CCC, Addenbrookes
27/04/2016	Highways England - Western Orbital, A428 and J13 & J11 Study	CCC, HE, Atkins
20/06/2015	Highways England - Western Orbital, A428 and J13 & J11 Study	CCC, HE, Atkins
12/06/2016	West Central Area Committee	Area Committee Members (City, SCDC), LLF, CCC, Senior Anti-Social Behaviour Officer
10/05/2016	City Deal Success Criteria for Recommended Options	CCC/GCP, LEP, SCDC, Cambridge City, Mott MacDonald, Atkins
Public Consultation		
22/02/2016	Newnham	
23/02/2016	Harston	
24/02/2016	Grantchester	
02/03/2016	Comberton	
03/03/2016	Coton	
08/03/2016	Lucy Cavendish College Cambridge	
09/03/2016	Barton	
10/03/2016	Trumpington	

Source: Greater Cambridge Partnership

Following on from the preliminary consultation process noted in Table 114, which fed into the first stage of the WebTAG complaint business case, additional consultation was undertaken at SOBC stage. This sub section provides a brief overview of those additional consultation events that fed into the SOBC.

7.9.4.2 Engagement and Consultation at SOBC Stage

Emails were written to number of key stakeholders to invite them to attend briefings and workshops, at the start of the consultation period, where they could ask questions about the project to assist with their response. Examples of key stakeholders contacted include local politicians, Parish Councils, business groups, Residents' Associations, transport user groups, disability groups and representatives from historic and environmental organisations relevant to the Cambridge South West area.

Details of these meetings are summarised in the following points:

- **Tues 13th Feb 2018 evening, Harston Village Hall** – an information session, sharing the approach to the business case and option assessment. The session included presentations from GCP and Mott MacDonald to present the project background, approach to business case / option assessment and the long list of options.
- **Thurs 8th March 2018, 6pm Harston Village Hall** – objectives review / long list scoring session. Attendees were split into groups and asked to comment on the objectives and then to score the various long list options. Detail given on the multi-criteria assessment framework and how it fits into business case development.

Feedback from this stage was later used to refine the scheme objectives, refine the assessment criteria and gain general opinions in advance of actual option short listing and SOBC completion.

7.9.4.3 Engagement and Consultation at OBC Stage

Following completion of the SOBC and options shortlisting, further engagement with both stakeholders and the public was undertaken on the proposed options for the OBC.

A further stakeholder meeting was held with the M11 Park and Ride Provision Engagement Group, following the publication of GCP Assembly papers on Monday 17th September 2018. This provided an update on the current scheme position and overview of the project and was followed by a 45-minute Q&A session with the J11 Engagement Group. This ensured stakeholders remained updated about the scheme development and were aware of upcoming plans for further consultation in which they could participate.

Public consultation was carried out between 5th November and 21st December 2018.This stage of the consultation presented details of the option short list to all stakeholders and the general public via a range of communication channels. The public consultation materials set out the case for change, explaining why the Greater Cambridge Partnership is proposing the scheme. To better understand opinion, a survey was developed to provide an opportunity for participants to indicate their preferred option.

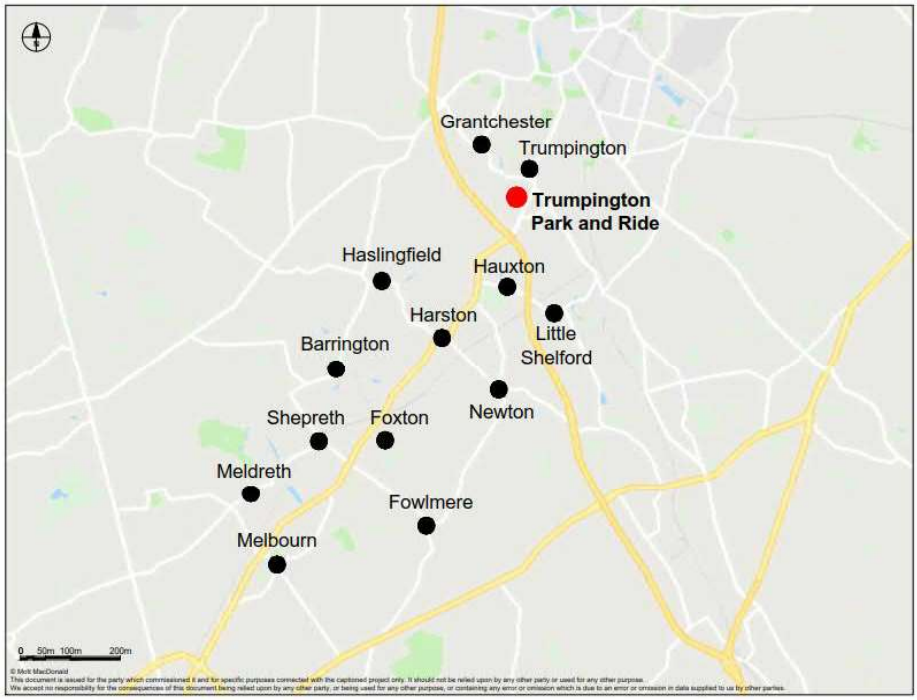
Whilst separate to the scheme objectives noted in Section 1.2, the aim of the public consultation process was to:

- Present the options to the widest range of people and representative groups affected by the proposals.
- Provide the public with an opportunity to give their views on:
  - Extra Park and Ride spaces to the South West of Cambridge
  - Bus priority measure into the City Centre
- Give full consideration to the views received in reporting to aid the Executive Board reaching a decision.

Promoting Public Consultation

Before the public consultation events were held, approximately 13,000 leaflets were distributed to numerous towns and villages in South West Cambridge to help capture not only the local residents' views but also the views of current and potential Park and Ride users. The map in Figure 87 shows the towns and villages where the leaflets were delivered. Copies of the leaflets were also issued to the Parish Council and were available at the Park and Ride sites and consultation events.

Figure 87: Public Consultation Leaflet Distribution



Source: Mott MacDonald

The events were further advertised via radio, Facebook, in the Royston Crow, on buses and on City Centre poster boards. The consultation was promoted to the press and covered in both the Cambridge Independent and Cambridge News. Emails with information and the offer of meetings with the Project Manager were sent to Councillors and stakeholders, whilst schools in the area were also contacted and requested to raise awareness of the consultation opportunities via their regular parent mailings.

All information available in the leaflet and the questionnaire was made available online via ConsultCambs, which was in turn promoted through the GCP and partner's social media channels.

Consultation Events

Public consultation on the options was conducted and delivered through three public consultation events held across different venues in South West Cambridge. As noted in Section 3, the six shortlisted options were consolidated into two main Do Something options – either expand Trumpington Park and Ride or build a new site and several variants in terms of access presented in respect of both these options. This approach was taken because of the similarity between the options and it was felt presenting as a two-tiered approach, to first choose a main option and then choose the associated detail in terms of access, was more amenable for public consultation.

A booklet containing information on the study area, the proposed options and a timeline for the Cambridge South West Park and Ride scheme was available both online and at all public consultation events. Specifically, the booklet issued by the GCP comprised of twelve pages, explaining the proposals in an accessible format, with a separate Frequently Asked Questions sheet and a 'Have your say' questionnaire. This enabled the public to voice their opinion on the options presented and return their feedback via the enclosed freepost envelopes.

The printed document contained the following information: Overview, Location Context, Presentation of Options 1 and 2, alternate Private Vehicle Access to Options 1 and 2, and alternate Public Transport Access to Option 2, Bus Journey Improvements, Cycling, Timeline and Contact Details. Extracts from the booklet can be found in Figure 88 and Figure 89.

Figure 88: Public Consultation Cambridge South West Park and Ride Booklet

Source: Greater Cambridge Partnership

Figure 89: Public Consultation Cambridge South West Park and Ride Booklet

Source: Greater Cambridge Partnership

The three main public consultation events were undertaken during November and December 2018. The dates of the events and their attendance can be found in Table 115. The consultations were hosted at a variety of venues within the Cambridge South West area to give as many Cambridge residents and stakeholders the opportunity to attend the event as possible.

Table 115: Greater Cambridge Partnership Public Consultation Events – November/December 2018

Date	Time	Location	No. of Attendees
Wednesday 21 November 2018	18:00 – 20:00	Hauxton Primary School	30
Thursday 29 November 2018	17:30 – 20:00	Trumpington Village Hall	20
Thursday 06 December 2018	18:00 – 20:00	Harston Village Hall	66

Source: Greater Cambridge Partnership

A further three pop-up public consultation events were also held. These events mainly involved the distribution of the GCP consultation leaflets rather than having technical experts available for the public to ask questions. Details of these pop-up events are noted in Table 116.

Table 116: Pop-Up Consultation Events

Date	Time	Location
Tuesday 20 November 2018	07.30 – 09.00	Trumpington Park and Ride
Wednesday 05 December 2018	12:00 – 14:00	Addenbrooke's Treatment Centre
Tuesday 11 December 2018	07.30 – 09.00	Trumpington Park and Ride

Source: Greater Cambridge Partnership

Consultation Response

The consultation responses received from stakeholder engagement and public consultation have helped shape the development of the Cambridge South West Park and Ride scheme by raising local issues and concerns and providing a steer on public views. Key comments from the consultation are summarised in Table 117. Further detail of the consultation feedback can be found in the report "Cambridge South West Park and Ride: Summary Report of Consultation Findings" produced by the Cambridgeshire Research Group on behalf of GCP.

Table 117: Summary of Consultation Feedback

Topic	Comments Received
Importance of improving bus, cycling and walking journeys to the south west of Cambridge to help ease congestion	• 92% of the 1569 respondents who provided complete responses suggested there is a need to improve bus, cycling and walking journeys to the South West of Cambridge to help alleviate congestion into and out of the city centre and Cambridge Biomedical Campus,
Park and Ride Options	• Strongest support was seen for Option 2, with 71% supporting the option. Responses to Option 1 were more varied although 56% of respondents still supported the option. • Overall 89% of respondents felt improvements to the bus journey times, between the Park and Ride and Cambridge City Centre, should be made.
Proposed access arrangements	• The preferred private vehicle access for Option 2 was Option B, with 53% of respondents in support, with Option C close behind with 52% respondents providing positive responses. • As noted, the feedback supports the public transport access proposals for Option 2 but the divisional split between the two options highlights a greater support for Option A with 67% of respondents supporting the Option, while 44% responded positively to Option B. • Further support was shown for the extra elements that could be implemented alongside Options 2 A, B or C. 59% of people supported a southbound M11 Park and Ride exit slip road, whilst 58% of respondents approved of an additional dedicated left turn lane. • The majority of people (56% respondents) also supported the private access vehicle arrangements from Option 1.
Measures that would help reduce bus journey times between Trumpington Park and Ride and Downing Street	• 32% of the responses referenced the implementation/extension of dedicated bus lanes. Often a particular need for bus lanes into the city only was inferred while a tidal system was also regularly mentioned. • Other key measures mentioned a number of times include: – Additional bus services and frequencies, generally in the hope that improving the service would decrease other road users and reduce journey times. – Dedicated cycle lanes, often including the need to improve provisions along Hauxton Road with additional safety features such as CCTV and better lighting also requested. – Congestion charge – as a good solution with many suggesting that revenue could be put towards other solutions or making the P&R cheaper to use. – Drop-off / pick-up of private school children identified as causing major delays on the route. Dedicated school bus services or parking facilities from the P&R was seen as a popular solution. – Traffic light signal optimisation for bus prioritisation. – Non-stop bus service to help reduce journey times. – More use to be made out of the existing guided busway. • In general, there was a popular consensus of a need to focus on reducing traffic by incentivising alternative transport modes.
Affect / impact of proposals on groups or individuals	• 28% of responses were negative with issues being identified. However, 86% of participants skipped the question which suggests they had no desire to express a concern. • Positive comments noted a positive impact on residents and commuters including supporting greater independence of the elderly. • Negative comments noted issues for people with mobility impairments such as being unable to find disabled Park and Ride spaces and the need for improved wheelchair facilities.
Further comments on scheme options	• Additional comments also highlighted the strongest support for Option 2 over Option 1. • A significant number of respondents mentioned a need for additional measures to be implemented regarding cycling. • Cheaper buses serving the P&R were noted, including particular requests for lower prices on longer distance services.

Topic	Comments Received
	• Responses referenced a need for improved access in and out of the existing P&R, with many calling for a second exit point and separate bus exits. There were also requests to increase bus frequency.

Source: Greater Cambridge Partnership

The full consultation report, including anonymised individual and stakeholder responses, is available both on the GCP website and in the appended Cambridge South West Park and Ride entitled "Summary Report of Consultation Findings" produced by CCC. A consultation summary will also be emailed to those respondents who have requested it, whilst in person feedback will be presented to key stakeholder groups.

7.9.4.4 Stage 4: Planned Consultation at FBC Stage

Further engagement is planned after the preferred option has been selected which will involve three additional workshops with stakeholders. For further engagement to be productive and informative, more details on the preferred option will be required. Full details on plans for future consultation will therefore be confirmed once the preferred site is selected in June 2019 and sufficient work has been completed on the preferred option.

7.10 Implementation of Workstreams

This section sets out and describes the key workstreams for delivering the Cambridge South West Park and Ride scheme.

Table 118: Workstream Breakdown Descriptions

Workstream Name	Description
Project Management	All activities related to the management of technical work streams throughout the project and general day to day communication and engagement.
Early Option Identification	The identification of all concepts which could meet the objectives of the schemes.
Shortlisting Options	Reducing concepts to a limited number of feasible options.
Public Consultation	The formal public consultation processes on high level options during Phase 3, emerging scheme during Phase 4 and public consultation linked to statutory processes.
Outline Business Case	The processes of identifying a Preferred Option using technical assessment methods.
Legal Compliance	All necessary legal activities necessary for supporting delivery of the scheme.
Modelling	All necessary strategic and traffic modelling necessary for supporting delivery of the scheme.
Preferred Option Assessment	The identification of a Preferred Option for FBC.
Emerging Scheme	All necessary bus planning and operational considerations to support the planning of bus priority infrastructure.
Statutory Processes	All activities related to securing the necessary statutory processes.
Procurement	All necessary procurement activities to support the delivery of the scheme.
Traffic Management Planning	The planning of temporary traffic management throughout the course of the Project.
Construction Design	The design of the scheme suitable for construction purposes.
Mitigation Planning	Design of measures necessary to mitigate the environmental impact of the scheme.
Main Works	Construction of the scheme.
Snagging	Rectifications of defects prior to completions.
Demobilisation	All activities related to clearing the site and mothballing as required.
Handover	All activities related to handing over infrastructure to operators.
Rectifications	Rectification of defects after completion under warranty or otherwise.
Legacy	All activities associated with managing information from the project for future reference e.g. as built drawings, lessons learned, discharge of outstanding issues.

Source: GCP

7.11 Contract Management

The existing contracts in place for the Cambridge South West Park and Ride project have been established through existing frameworks and specific commercial arrangements and are all managed by GCP. These include contracts with the following advisors for technical services:

- Mott MacDonald – scheme coordination, transport modelling, environmental advisors, business case development and communications with stakeholders.
- GCP also has a framework for the provision of Project Management and Contract Administration services in place. This would be used to appoint an NEC3 Project Manager and Supervisor to undertake the following during construction of the scheme:

7.12 Benefits Realisation

This section outlines the approach to managing the realisation of benefits of the Cambridge South West Park and Ride scheme. 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 119. It defines how the identified benefits of Cambridge South West Park and Ride align with the scheme objectives, who the key beneficiaries would be and the outputs required to realise the benefit. Table 118 also notes that some benefits will be realised at project level, but others are a programme level concern i.e. delivering the wider growth and therefore may not be realised directly by the scheme.

Table 119: Cambridge South West Park and Ride Benefits Realisation Plan Overview

Benefit	Objective Alignment	Beneficiary	Benefit Owner	Key Outputs / Deliverables Required to Realise the Benefit	Expected Level of Benefit	
Improved accessibility to key employment and education sites within and around Cambridge City Centre	1i, 1ii, 1iii 2i, 2ii, 2iii	• Stakeholder • Education establishments i.e. UoC • Businesses i.e. Biomedical Campus	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride • Reduced congestion on routes into city centre as result of less private vehicles • Marketing and education plan for use of Cambridge South West Park and Ride	Programme	An increase in the number of key employment centres within Cambridge City Centre
Improved accessibility to Cambridge Biomedical Campus particularly from the South and South West	2i, 2i	• Employees • Visitors • Businesses	• Cambridge Biomedical Campus	• Completion of Cambridge South West Park and Ride • Implementation of City Access Measures • Completion of other transport schemes e.g. A1307, Cambourne to Cambridge • Marketing and education plan for use of Cambridge South West Park and Ride aimed at employees and visitors	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
Reduction in traffic around M11 J11, A10, along Hauxton Road and through Trumpington	1i	• Commuters • Visitors • Residents of Trumpington and Hauxton Road	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride • Implementation of City Access Measures • Completion of other transport schemes e.g. A1307, Cambourne to Cambridge	Project	Reduction in congestion along Hauxton Road and through Trumpington indicated by an increase in average speeds and a reduction in journey time variability
More reliable commuter times as a result of reduced congestion	1i, 1ii, 1iii	• Local stakeholders • Businesses • Commuters	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride • Implementation of City Access Measures • Completion of other transport schemes e.g. A1307, Cambourne to Cambridge	Programme	Increase in service reliability during the AM and PM peak periods and reduction in people commuting to City Centre by car
More reliable journey times for leisure and other trips into the city centre	1i, 1ii, 1iii	• Local stakeholders • Businesses • Visitors	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride • Implementation of City Access Measures • Completion of other transport schemes e.g. A1307, Cambourne to Cambridge	Programme	Increase in service reliability and reduction in journey times around the M11 J11, along Hauxton Road and through Trumpington during the off-peak period

Benefit	Objective Alignment	Beneficiary	Benefit Owner	Key Outputs / Deliverables Required to Realise the Benefit	Expected Level of Benefit	
Reduction in NO_2 around the M11 J11 and along the A10	1i, 1ii, 1iii	• Commuters • Visitors • Residents within the surrounding area	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride		Reduction in measurable levels of NOx and PM10 pollution
Reduction in public transport journey times between Trumpington and the City Centre	2iii	• Residents • Public transport operators • Commuters	• Park and Ride service operators	• Completion of Cambridge South West Park and Ride • Implementation of City Access Measures • Completion of other transport schemes e.g. A1307, Cambourne to Cambridge	Programme	Reduction in journey times for buses operating between the M11 J11 and Cambridge City Centre through Trumpington
Reduction in number of car trips into the City Centre	1i, 1ii, 1iii 2i, 2ii, 2iii	• Local stakeholders • Businesses	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride • Implementation of City Access Measures • Completion of other transport schemes e.g. A1307, Cambourne to Cambridge	Project	Reduction in car park occupancy rates for areas within the City Centre, reduced congestion between M11 and City Centre through Trumpington
Increase in sustainable travel mode share for City Centre commuter journeys	2i	• Local stakeholders • Commuters • Visitors • Businesses	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride • 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 Park and Ride service as an alternative to driving car into the City Centre
Growth of Cambridge's key employment sectors	1i, 1ii, 1iii 2i, 2ii, 2iii	• Businesses • Stakeholder • CCC / CaCC / SCDC	• Local businesses • UoC	• Completion of Cambridge South West Park and Ride • Aligned business marketing programmes to promote development of scheme and the economic benefits to businesses. • Marketing for future investment and development opportunities	Programme	An increase in employment levels within Cambridge's professional services, manufacturing and education sectors
Increase in economic activity within	1i, 1ii, 1iii 2i, 2ii, 2iii	• Businesses • Tourist attractions • Visitors	• Retail and leisure businesses	• Completion of Cambridge South West Park and Ride	Programme	An increase in productivity of retail and leisure businesses within Cambridge

Benefit	Objective Alignment	Beneficiary	Benefit Owner	Key Outputs / Deliverables Required to Realise the Benefit	Expected Level of Benefit	
Cambridge's retail and leisure industries		• Local stakeholders	• CCC / CaCC / SCDC - tourism/visitor support department	• Aligned business marketing programmes to promote development of scheme and the economic benefits to businesses. • Marketing for future investment and development opportunities		
Improved business and workforce productivity	1i, 1ii, 1iii 2i, 2ii, 2iii	• Businesses • Stakeholder • CCC / CaCC / SCDC	• Local Businesses	• Completion of Cambridge South West Park and Ride • Marketing of Cambridge South West Park and Ride to potential users	Programme	An increase in the average level of GVA output per employee
Increased attractiveness of new and future housing settlements around the M11 J11 and along the A10	1i, 1ii, 1iii 2i, 2ii, 2iii	• Local stakeholders • Housing developers	• GCP - scheme promoter • Housing developers	• Completion of Cambridge South West Park and Ride	Programme	Increase in number of new housing units built within developments around the M11 J11 and along the A10
Reduction in accident rates around the M11 J11	1	• Local stakeholders • Visitors • Commuters	• GCP - scheme promoter • CCC Highways department	• Completion of Cambridge South West Park and Ride • Effective Integration of Cambridge South West Park and Ride with existing highways network.	Programme	Reduction in the number Killed or Severely Injured (KSI) around the M11 J11
Improved cycle safety for people travelling between north-east and south-west Cambridge	2	• Cyclists • Local stakeholders • Visitors	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride	Project	Increase in the number of people cycling between the M11 J11 area and Cambridge City Centre as a result of safer more attractive routes
Greater opportunities for cycle access into the City Centre from peripheral or longer distances.	2	• Cyclists • Local stakeholders • Visitors	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride	Project	Increase in the number of people cycling between the M11 J11 area and Cambridge City Centre
Improved journey quality and user experience	1i 1ii 1iii	• Local stakeholders • Commuters • Visitors	• GCP - scheme promoter	• Completion of Cambridge South West Park and Ride • Implementation of City Access Measures	Project	Improvement in commuters' journey satisfaction along the A10 and around the M11 J11

Source: Mott MacDonald

7.13 Monitoring and Evaluation

Monitoring and evaluation are essential parts of any infrastructure project. It 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.

The DfT guidance '*Monitoring and Evaluation Framework for Local Authority Major Schemes*' forms the basis of this monitoring and evaluation strategy alongside the Greater Cambridge Partnership's Assurance Framework.

The DfT guidance outlines three tiers of monitoring and evaluation, which will guide the monitoring and evaluation processes of this scheme. They are:

- Standard monitoring
- Enhanced monitoring
- Fuller evaluation

Cambridge South West Park and Ride will broadly follow the standard monitoring practice as the scheme is less than £50m in value. The scheme will be monitored against a set of standard measures, which can be found in Table 120. 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 roads built, bus services delivered).
- Outcomes (i.e. intermediate effects, such as changes in traffic flows, modal shifts).
- Impacts (i.e. longer-term effects on wider social and economic outcomes, such as supporting economic growth).

Table 120: Components of Standard Monitoring

Item	Stage	Type of Information Provided	Data Collection Timing	Rationale
Scheme build	Input	• Programme / project plan assessment • Stakeholder management approaches • A review of the risk register and assessment of the impacts • Assessment to determine whether the scheme is on track to deliver anticipated benefits	During delivery	Knowledge
Delivered scheme	Output	• 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	• 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

Item	Stage	Type of Information Provided	Data Collection Timing	Rationale
Scheme Objectives	Output/ Outcome/ Impact	• Identification of the main objectives	Pre or during delivery / post opening (up to 5 years)	Accountability
Travel demand	Outcome	• Road traffic flows on corridors of interest • 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	• Travel times in the corridors of interest • Variability in travel times in the corridors of interest	Pre or during delivery / post opening (up to 5 years)	Knowledge / Accountability
Impact on the economy	Impact	• Travel times / accountability changes to businesses • Employment levels and • Rental values	Pre or during delivery / post opening (up to 5 years)	Knowledge / Accountability
Carbon	Impact	• Effect of the scheme on carbon in the area of interest	Pre or during delivery / post opening (up to 5 years)	Knowledge / Accountability

Source: DfT

To evaluate the impact and understand the effectiveness of the scheme, data will be collected to measure the success of the scheme against the themed assessment criteria which were identified as measures of success in Section 2. To this extent, the approach to monitoring and evaluation goes beyond the basic requirements of the DfT's standard monitoring guidance and is closely aligned with the Benefits Realisation Plan outlined in Table 119.

Monitoring and evaluation activities also need to be undertaken during scheme delivery to ensure the scheme is delivered on time, on budget and to specification. To this extent monitoring and evaluation has been split into two categories which align with both the themes of the appraisal criteria and DfT guidance:

1. Monitoring of project delivery (deliverability theme, covering inputs and outputs); and
1. Monitoring the achievement of scheme objectives (themes of reducing traffic levels and congestion; maximising the potential for journeys to be undertaken by public transport and quality of life covering outcomes and impacts)

Table 121 outlines the aspects of project delivery which will be monitored to ensure the scheme is delivered on time, on budget and to specification. It covers the DFT standard measures of:

- Scheme Build;
- Delivered Scheme; and
- Costs.

Table 122 then outlines the monitoring and evaluation plan which identifies how the successful achievement of the objectives and will be measured, using the measures of success identified in Section 2. It covers the DFT standard measures of:

- Scheme Objectives
- Travel Demand
- Travel Times and Reliability and Carbon

The Greater Cambridge Partnership will arrange to collect and publish relevant data, comparing the conditions before and after scheme opening.

Table 121: Monitoring of Project Delivery (Inputs and Outputs)

Aspect of Deliverability	Method of Monitoring	Timeframe	Responsibility
Construction risks	• 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	Greater Cambridge Partnership
Disruption during construction	• 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	Greater Cambridge Partnership
Land acquisition requirements	• Programme / project plan assessment • Ongoing engagement and negotiation with landowners	Ongoing throughout delivery and construction	Greater Cambridge Partnership
Infrastructure maintenance / renewals complexity	• 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	Greater Cambridge Partnership
Changing cost implications	• 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	Greater Cambridge Partnership
Likelihood of public support	• Programme / project plan assessment • Robust stakeholder engagement and communications plan	Ongoing throughout delivery and construction	Greater Cambridge Partnership

Source: Mott MacDonald

Table 122: Monitoring and Evaluation Plan (Outcomes and Impacts)

Theme	Specific Object / Criteria	Performance Indicator	Methodology	Timescale
Reducing traffic levels and congestion	Reduce traffic North East of M11 J11 (along Hauxton Road and through Trumpington), by encouraging trips headed for the city centre and Cambridge Biomedical Campus to transfer to another mode	• Traffic flows on A1309 Hauxton Road • Traffic flows on A1309 High Street	• Traffic master data • analysis • ATC counters	Prior to or during delivery to assess baseline data and one and four years post completion
	Reduce traffic flow and delay at M11 J11, particularly in the AM peak, including reducing flows associated with non-motorway traffic that pass across the junction (A10-A1309)	• Traffic flows on J11 circulatory • Overall delay at J11	• Traffic master data analysis • ATC counters • Analysis of junction capacity and queue lengths of A51 junctions	Prior to or during delivery to assess baseline data and one and four years post completion
	Reduce delays on the A10 through Harston and Hauxton, on the approach to M11 J11	• Journey times on the A10 Harston to J11	• Traffic master data analysis • ATC counters	Prior to or during delivery to assess baseline data and one and years years post completion
Maximising the potential for journeys to be undertaken by sustainable modes of transport	Increase sustainable transport mode share for trips into the City Centre and Cambridge Biomedical Campus, focused on trips originating from the South and South West (M11 and A10)	• P&R bus patronage from Trumpington / J11 area to city centre / Cambridge Biomedical Campus	• Analysis of bus patronage data from relevant bus operators	Prior to or during delivery to assess baseline data and one and four years post completion
	Increase Park and Ride capacity, in particular to serve forecast economic growth at the Cambridge Biomedical Campus key employment area, with delivery aligned to overall Campus development timescales	• Number of Park and Ride spaces in Trumpington / J11 area • Increase in business start-ups at Cambridge Biomedical Campus	• Count of parking spaces at P&R site • Business surveys & economic evaluation surveys • Market Analysis study	Prior to or during delivery to assess baseline data and one and four years post completion
	Reduce public transport journey times between Trumpington and the City Centre, enabling Park and Ride / other public transport to compete more effectively with the private car	• P&R bus journey times Trumpington to city centre	• Analysis of bus journey times between Trumpington and city centre	Prior to or during delivery to assess baseline data and one and four years post completion

Theme	Specific Object / Criteria	Performance Indicator	Methodology	Timescale
	Time to access both the new P&R site and existing Trumpington site from the A10	• Journey time to access Trumpington site from the A10	• Analysis of journey times between Trumpington and A10	Prior to or during delivery to assess baseline data and one and four years post completion
	Time to access both the new P&R site and existing Trumpington site from the M11 Northbound	• Journey time to access Trumpington site from the M11 Northbound	• Analysis of journey times between Trumpington and M11 Northbound	Prior to or during delivery to assess baseline data and one and four years post completion
	Time to access both the new P&R site and existing Trumpington site from the M11 Southbound	• Journey time to access Trumpington site from the M11 Southbound	• Analysis of journey times between Trumpington and M11 Southbound	Prior to or during delivery to assess baseline data and one and four years post completion
Quality of Life and Environment	Potential for road accidents	• Number of accidents at the M11 J11, along the A10 and Hauxton Road	• Analysis of highways incidents	Prior to or during delivery to assess baseline data and one and four years post completion
	Walking and cycling networks	• Increase in people walking and cycling	• Non-motorised user counts and active travel surveys	Prior to or during delivery to assess baseline data and one and four years post completion
	Noise	EIA to identify requirement (if any)		
	Local air quality	EIA to identify requirement (if any)		

Source: Mott MacDonald

7.14 Management Case Summary

- The constituent members of the GCP have extensive experience in delivering large scale transport projects, including Park and Ride schemes such as the Milton Park and Ride and the Longstanton and St Ives Park and Ride Schemes and are therefore well placed to deliver the Yellow (preferred) option identified in this OBC.
- There are several interdependencies with other proposed schemes that will need to be managed, including the proposed new rail station at Cambridge South, other travel hubs, including the Foxton rural travel hub and the new Park and Ride to serve the Cambourne to Cambridge corridor which may affect demand.
- The Cambridge South West Park and Ride scheme will be strategically managed by GCP which is made up from four partner organisations; Cambridge City Council, Cambridgeshire County Council, South Cambridgeshire District Council and the University of Cambridge. Scheme delivery and Project Management will be overseen by the GCP Executive Board and a Programme Manager and Programme Board will focus on key programme issues, reporting back to the Executive Board. A Project Manager and Project Board will focus on technical and day to day issues; they in turn will be accountable to the Programme Manager and Board. The Project Manager has been identified as Tim Watkins who will be responsible for preparing the Project Managers Report to present at Project Board meetings which will set out progress, key activities to be undertaken, budget uptake and review of risks and issues.
- The scheme will be progressed through GCP's standard appraisal processes and pass through three business case stages, this OBC being the second. In terms of RIBA work stages this OBC addresses RIBA work stage 3, however GCP have also developed their own "Key Decision Points"; this OBC addresses Key Decision points 3 and 4 in the Feasibility Phase of scheme development.
- Key milestones have been identified as June 2019 for submission of the OBC, Q2 in 2020 for the completion of statutory processes, Q3 2020 for final Full Business Case (FBC), Q3 2022 for Construction start and Q4 2023 for construction completion.
- A risk management strategy has been developed that is based on the principles of PRINCE2 guidance, but applied proportionally. As such the procedure for identifying key risks is to: identify; assess; plan; implement and communicate. A risk register has been developed and will be continually updated throughout the life of the project. Risks are rated between 1 and 5 on both the likelihood of them happening and their impact; multiplying the two figures provides an overall risk score with the greatest risks having the potential to score 25 and the most minimal risks scoring potentially 1.
- A Stakeholder Communication Plan has been prepared which outlines the approach to stakeholder and public consultation throughout the development of this OBC. The Plan identifies the key stakeholders, the mechanisms for communication and the scope of the communication. Several public consultation events were held in Autumn 2018 as well as a leaflet drop to 13,000 residents in the surrounding villages along the A10 and A1307. Feedback from consultation is documented in the Statement of Community Involvement Report. Findings from consultation showed that public preference was for a new site as opposed to expansion of the existing Trumpington Site, although there was support for both options.
- An outline Benefits Realisation Plan and an outline Monitoring and Evaluation Plan have been drafted to ensure the scheme is monitored in terms of on track performance in terms of physical delivery relative to timescales, budget and specification, as well as delivery of outcomes and impacts once completed. It is these outcomes and impacts that will enable benefits to be realised and ensure scheme objectives are met.

A. Annex A - Multi-Criteria Assessment Scores at Shortlist Stage by Theme and Criteria

Criteria/Option	PURPLE	WHITE	YELLOW	CYAN	DO MINIMUM	MAGENTA	PURPLE (CAP)
THEME 1: Reducing (or avoiding negative impact on) traffic levels and congestion - Linked to objectives 1.i, 1.ii, 1.iii							
Total traffic flow on J11 circulatory AM	1	0	0	0	0	0	3
Total traffic flow on J11 circulatory PM	0	-1	0	0	0	0	2
Overall delay at J11 AM	0	3	3	-1	0	-3	0
Overall delay at J11 PM	0	3	3	-1	0	-1	1
Traffic flow on A1309 Hauxton Rd (between J11 and Addenbrooke's Road, bi-directional) AM Northbound	0	1	0	1	0	-1	3
Traffic flow on A1309 Hauxton Rd (between J11 and Addenbrooke's Road, bi-directional) PM Southbound	2	1	2	3	0	1	2
Traffic flow on A1309 High Street, Trumpington (bi-directional) AM Northbound	0	0	0	0	0	0	3
Traffic flow on A1309 High Street, Trumpington (bi-directional) PM Southbound	3	3	3	2	0	3	1
Traffic flow on A10 at Harston (bi-directional) AM Northbound	0	0	0	0	0	0	0
Traffic flow on A10 at Harston (bi-directional) PM Southbound	0	0	0	0	0	0	0
Delay on A10 NE-bound between Harston and J11 AM Northbound	-3	-3	-3	-3	0	-1	-3
Delay on A10 NE-bound between Harston and J11 PM Southbound	0	1	3	3	0	2	-3
TOTAL SCORE: Theme 1	**3**	**8**	**11**	**4**	**0**	**0**	**9**
THEME 2: Maximising potential for journeys to be undertaken by sustainable modes - Linked to objectives 2.i, 2.ii, 2.iii							
Time to access the new P&R site/the existing Trumpington site, whichever is most logical from the A10 (Inbound AM Peak)	3	3	3	3	0	-1	3
Time to access the new P&R site/the existing Trumpington site, whichever is most logical from the A10 (Inbound PM Peak)	3	3	3	3	0	-3	3

Time to exit the new P&R site/the existing Trumpington site, whichever is most logical to reach the A10 (Outbound PM Peak)	3	3	3	3	0	-3	3
Time to access the new P&R site/the existing Trumpington site, whichever is most logical from the M11 northbound (Inbound AM Peak)	3	3	3	3	0	0	3
Time to access the new P&R site/the existing Trumpington site, whichever is most logical from the M11 northbound (Inbound PM Peak)	3	3	3	3	0	2	3
Time to exit the new P&R site/the existing Trumpington site, whichever is most logical and reach the M11 northbound (Outbound PM Peak)	1	0	1	1	0	-3	0
Time to access the new P&R site/the existing Trumpington site, whichever is most logical from M11 southbound (Inbound AM Peak)	0	0	0	0	0	0	0
Time to access the new P&R site/the existing Trumpington site, whichever is most logical from M11 southbound (Inbound PM Peak)	0	0	0	0	0	0	0
Time to exit the new P&R site/the existing Trumpington site, whichever is most logical to reach the M11 southbound (Outbound PM Peak)	0	1	1	-1	0	0	0
P&R bus journey time (AM)	1	1	1	1	0	1	0
P&R bus journey time (IP)	0	0	1	0	0	0	0
P&R bus journey time (PM)	-1	-1	-1	1	0	0	0
Potential to link with existing public transport services	2	2	1	1	-1	0	2
Potential to link with wider Western Orbital public transport proposals / CAM	2	2	2	2	1	2	2
TOTAL SCORE: Theme 2	**20**	**20**	**21**	**20**	**0**	**-5**	**19**
THEME 3: Quality of life & environment – Linked to WebTAG compliant AST							
Potential for road accidents	3	3	-1	3	-1	0	3
Number of people walking and cycling	3	3	3	3	0	1	3
Noise	-1	-1	-1	-1	0	-1	-1
Local air quality	0	0	0	0	0	0	0
Landscape (visual impact)	-1	-2	-2	-2	0	-1	-1
Heritage	-2	-2	-2	-2	0	-1	-2

Biodiversity	-2	-2	-2	-2	0	-1	-2
Water Impacts / flooding	0	0	0	0	0	0	0
Greenhouse Gases	0	0	0	0	0	0	-1
Greenbelt	-1	-2	-2	-2	0	0	-1
TOTAL SCORE: Theme 3	**-1**	**-3**	**-7**	**-3**	**-1**	**-3**	**-2**
THEME 4: Deliverability							
Level of construction risk (engineering feasibility)	-2	-2	-1	-3	0	-2	-2
Expected impact of construction on the existing network (level of disruption to road users)	-3	-2	-1	-2	0	-2	-3
Land acquisition requirement (extent & complexity of acquisition)	-2	-2	-2	-3	0	-2	-2
Infrastructure maintenance and renewals complexity (risk)	-2	-2	0	-2	0	-2	-2
Ongoing cost implications - site operations	-3	-3	-1	-3	0	-1	-3
Ongoing cost implications - bus operations	-2	-2	-3	-3	-1	1	-2
Likelihood of public support	3	3	2	3	-3	1	3
TOTAL SCORE: Theme 4	**-11**	**-10**	**-6**	**-13**	**-4**	**-7**	**-11**

Source: Mott MacDonald

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