



Cambridge South West Park and Ride Scheme: Outline Business Case

18 June 2019

Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
F +44 (0)1223 461007
mottmac.com

Cambridge South West Park and Ride Scheme: Outline Business Case

18 June 2019

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	04/2019	Lisa Thomas/ Friyana Iranpur/ Beth Rimmer/ Katie Daniels/ Heather Kenyon/Nathalie Gordon/White Young Green	Heather Kenyon/ Heather Clarke/Eddie Jackson	James Pearson	Draft for client review
B	05/2019	Heather Kenyon	Heather Clarke	James Pearson	Final
C	06/2019	Heather Kenyon	Heather Clarke	James Pearson	Revised Final Version
D	06/2019	Heather Clarke	Heather Kenyon	James Pearson	Amended Final Version for publication

Document reference: 393699-MMD-BCA-XX-RP-BC-0046

Information class: Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Executive Summary	1
1 Introduction	23
1.1 Context	23
1.1.1 Cambridge	23
1.1.2 Future Growth	23
1.2 Scheme Objectives	25
1.3 Scope of this Outline Business Case	25
1.4 The Scheme	26
1.5 Document Structure	27
2 Strategic Case	28
2.1 Approach	28
2.2 Business Strategy	29
2.3 Policy Review	30
2.4 Strategic Problems and Issues	34
2.4.1 Population Growth	34
2.4.2 Economic Growth	36
2.4.3 Employment and Skills	38
2.4.4 Planned Development	42
2.4.5 Environmental Issues	47
2.5 Transport Issues and Opportunities	54
2.5.1 How People Travel	54
2.5.2 Highways Connectivity	57
2.5.3 Trumpington Park and Ride	60
2.5.4 Wider Network Provision	65
2.6 Impact of Not Changing	73
2.7 Need for Intervention	74
2.8 Objective Setting	75
2.8.1 Strategic Transport Objectives	75
2.8.2 Scheme Specific Objectives	75
2.9 Measures for Success	76
2.10 Geographic Scope	77
2.11 Constraints	78
2.11.1 Option Alignment with the Mayoral Interim Transport Strategy Statement	80
2.12 Interdependencies	83
2.12.1 Stakeholders	90
2.13 Strategic Case Summary	92
3 Options Appraisal	93
3.1 Summary of SOBC Stage Appraisal Process	93

3.2	Sift Tier 1 Process and Outcomes at SOBC Stage	94
3.3	Sift Tier 2 Process and Outcomes at SOBC Stage	96
3.4	Option Shortlist at the Conclusion of the SOBC	98
3.4.1	Do Minimum (baseline comparator)	98
3.4.2	Magenta	99
3.4.3	Cyan	100
3.4.4	Purple	101
3.4.5	White	102
3.4.6	Yellow	103
3.5	Presentation of Shortlisted Options for Purposes of Consultation	103
3.5.1	Overview of the Options as Presented in Consultation Material	104
3.6	OBC Appraisal Process	111
3.6.1	Theme 1: Reducing Traffic Levels and Congestion	112
3.6.2	Theme 2: Maximising Potential for Journeys to be Undertaken by Sustainable Modes	116
3.6.3	Theme 3: Quality of Life and Environment	128
3.6.4	Theme 4: Scheme Deliverability	142
3.6.5	Multi-Criteria Analysis Framework (MACF) Appraisal Process	147
3.7	MCAF Results	159
3.8	Preferred Option	160
3.9	Option Appraisal Summary	161
4	Economic Case	162
4.1	Approach	162
4.2	Options Appraised	162
4.3	Assessing Value for Money	163
4.3.1	Decongestion Benefits	163
4.3.2	Bus Passenger Benefits	163
4.3.3	PVB Results	168
4.4	Wider Economic Impacts	169
4.5	Environmental Impacts	170
4.6	Social Impacts	171
4.7	Distributional Impacts	172
4.7.1	Impact on Public Accounts	174
4.7.2	Net Present Value (NPV) Calculations of Shortlisted Options	175
4.7.3	Indicative Value for Money (vfm)	176
4.8	Sensitivity Test	177
4.9	Appraisal Summary Table	177
4.10	Conclusion	177
4.11	Economic Case Summary	179
5	Financial Case	180
5.1	Approach	180
5.2	Scheme Costs	180

5.2.1	Design and Construction Costs (Direct Delivery Costs)	180
5.3	Spend Profile: Scheme Construction	181
5.3.1	Maintenance and Renewals Costs	181
5.3.2	Operating Costs	182
5.4	Budget/Funding Cover	182
5.4.1	Third Party Financial Contributions	183
5.5	Accounting Implications	183
5.6	Financial Case Summary	184
6	Commercial Case	185
6.1	Approach	185
6.2	Output Based Specification	186
6.3	Procurement Strategy	186
6.3.1	Preferred Procurement Strategy	188
6.4	Contract Comparisons	188
6.4.1	Preferred Contract Type	189
6.5	Procurement Method Comparisons	190
6.5.1	Preferred Procurement Method	191
6.6	Contractor Framework Contracts	191
6.6.1	Preferred Framework for Appointment of Contractors	192
6.7	Consultancy Framework Contracts	192
6.7.1	Preferred Framework for Appointment of Consultants	194
6.8	Form of Contract	194
6.8.1	Infrastructure Conditions of Contract (ICC)	194
6.8.2	Joint Contracts Tribunal (JCT)	195
6.8.3	New Engineering Contract (NEC)	195
6.8.4	Preferred Form of Contract	196
6.9	Preferred Procurement Route Summary	199
6.10	Payment Mechanisms	200
6.10.1	Contractor Appointment	200
6.10.2	Consultant Appointment	200
6.11	Pricing Frameworks and Charging Mechanisms	201
6.11.1	Design & Build Contract	201
6.11.2	Professional Services Contract	201
6.12	Risk Allocation and Transfer	201
6.13	Contract Length	203
6.14	Human Resource Issues	203
6.15	Contract Management	203
6.16	Commercial Case Summary	204
7	Management Case	205
7.1	Approach	205
7.2	Evidence of Similar Projects	206
7.3	Project Dependencies	207

7.4	Governance	208
7.4.1	Strategic Management	208
7.4.2	Project Management	209
7.4.3	Project Reporting	211
7.5	Assurance Frameworks	211
7.6	Project Plan	212
7.6.1	Scheme Delivery	214
7.7	Key Issues for Implementation	214
7.8	Risk Management	215
7.8.1	Risk Management Strategy	215
7.8.2	Risk Register	216
7.8.3	Risk Reviewing	221
7.8.4	Contingency Plan	221
7.9	Communications and Stakeholder Management	221
7.9.1	Background	221
7.9.2	Stakeholder Engagement and Communications Plan	221
7.9.3	Key Stakeholders	223
7.9.4	Engagement and Consultation to Date	226
7.10	Implementation of Workstreams	233
7.11	Contract Management	234
7.12	Benefits Realisation	234
7.13	Monitoring and Evaluation	238
7.14	Management Case Summary	243
A.	Annex A - Multi-Criteria Assessment Scores at Shortlist Stage by Theme and Criteria	244

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 Cambridge¹. 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 originating 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:

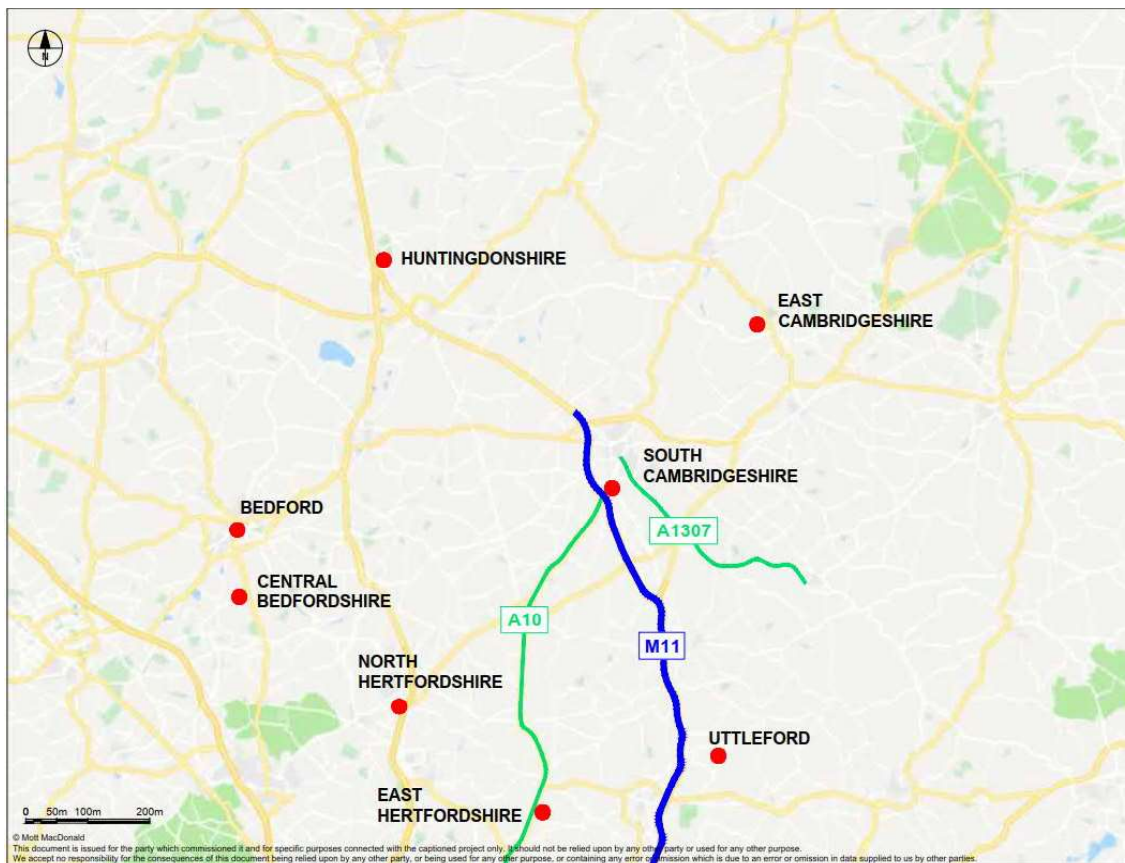
¹ Cambridge Local Plan 2014: Proposed Submission, July 2013

- 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.

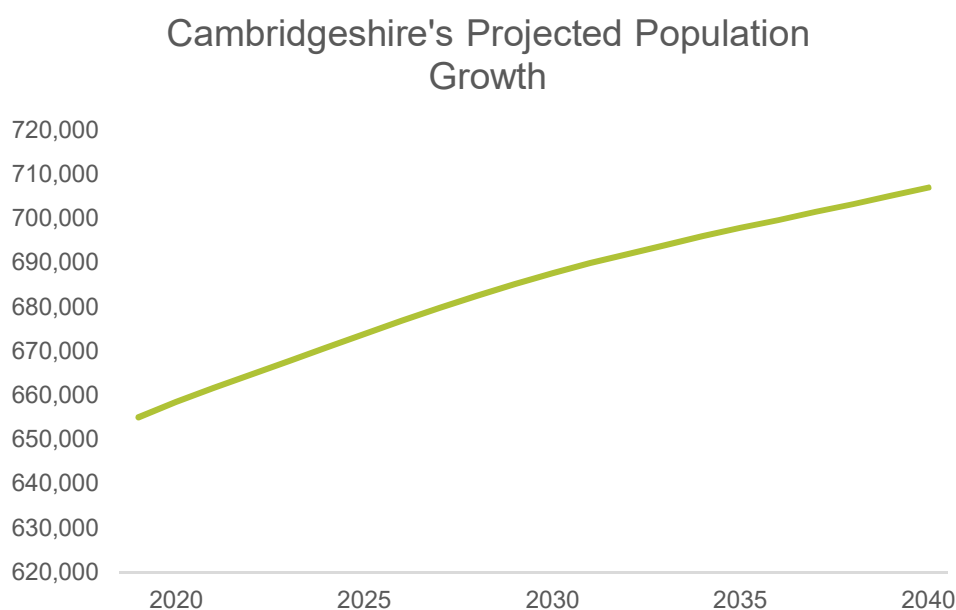
The Cambridge South West Park and Ride scheme aligns with various national, regional and local policies and strategies. Importantly, at the local level the proposed scheme supports the Cambridge City Local Plan, South Cambridgeshire Local Plan and the Cambridge City Access Strategy.

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 $40\mu\text{g}/\text{m}^3$ 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.

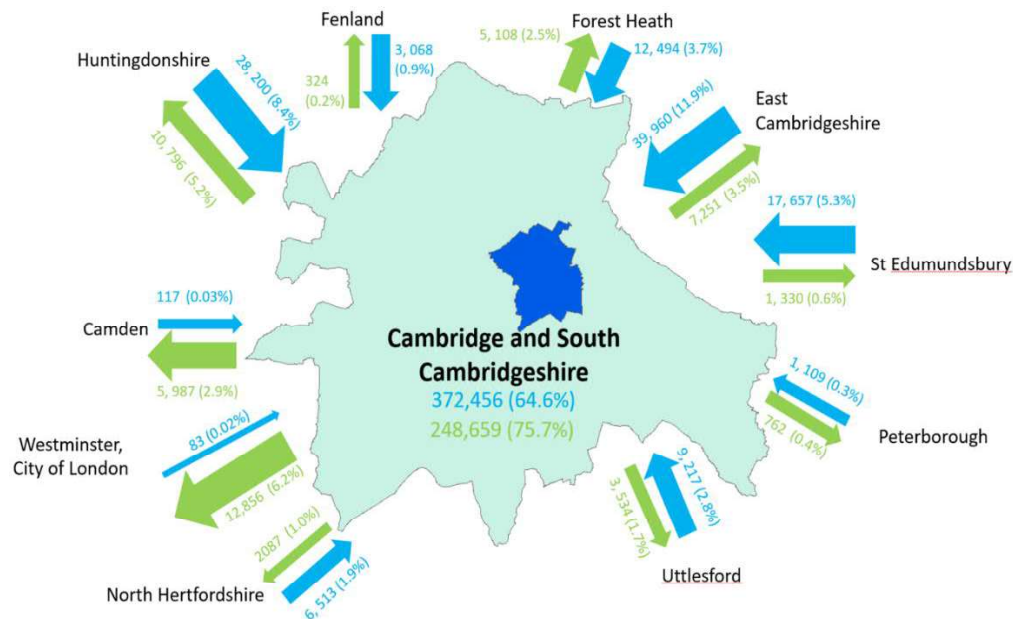
Table 1: NO2 Monitoring Data at 47 High Street, Harston

Year	NO2 Concentration ($\mu\text{g}/\text{m}^3$)
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

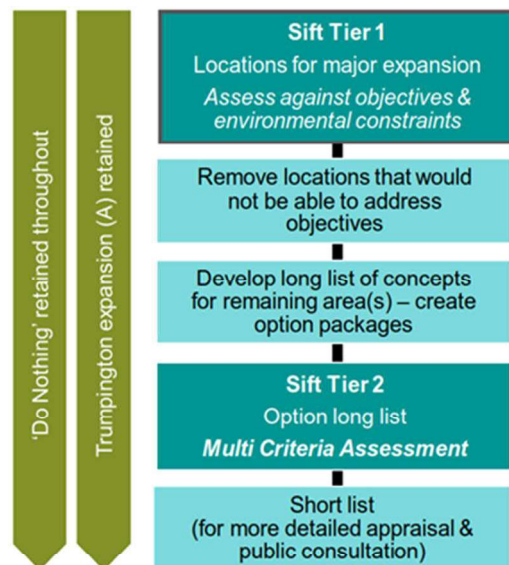


Source: Greater Cambridge Partnership

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.

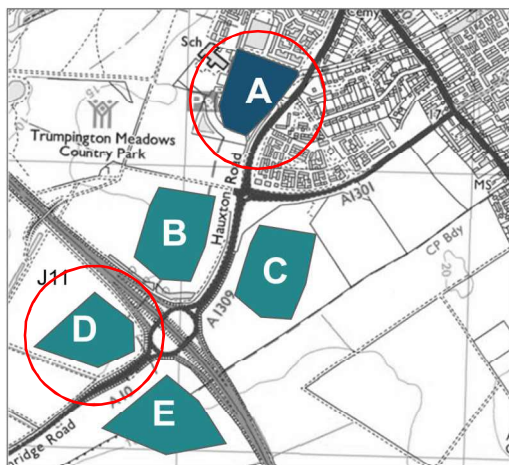
Options Appraisal

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

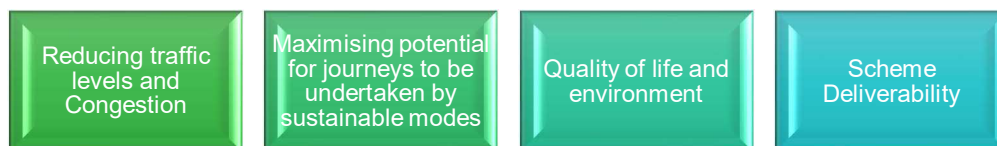
Potential locations for Park and Ride enhancements were identified and assessed against the scheme objectives and environmental constraints using an adaptation of the WebTAG seven-point scale, ranging from -3 (large adverse impact or alignment) to +3 (large beneficial impact or alignment). The locations 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).

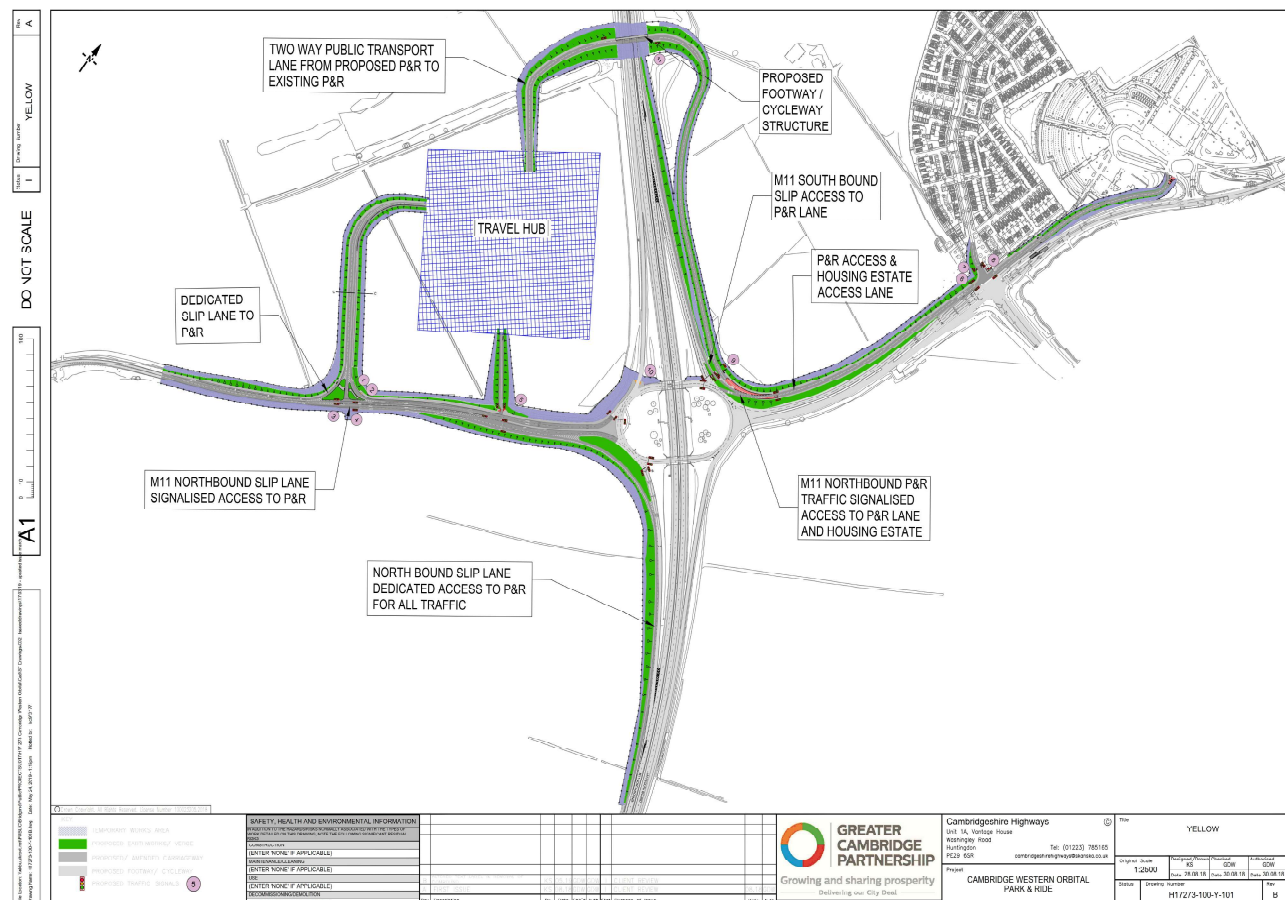
Figure 9: Updated Assessment Criteria for OBC Appraisal

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
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Potential for road accidents • Walking and cycling networks • Noise • Local air quality • Landscape • Green house gases • Historic environment • Biodiversity • Water environment • Green Belt 	<ul style="list-style-type: none"> • Construction risks • Disruption during construction • Land acquisition 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 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 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.

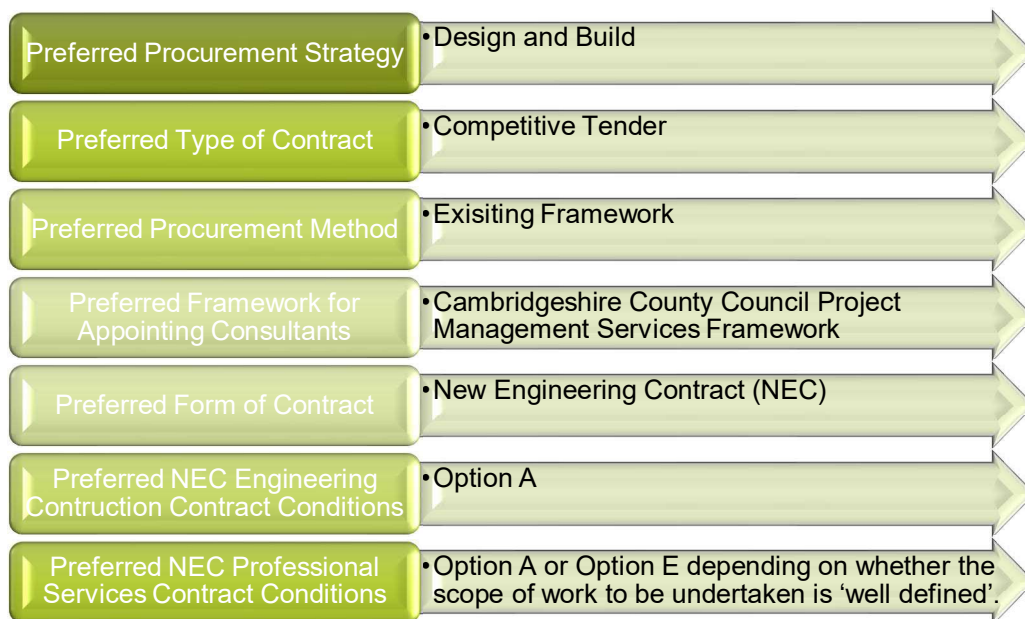
Commercial Case

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.

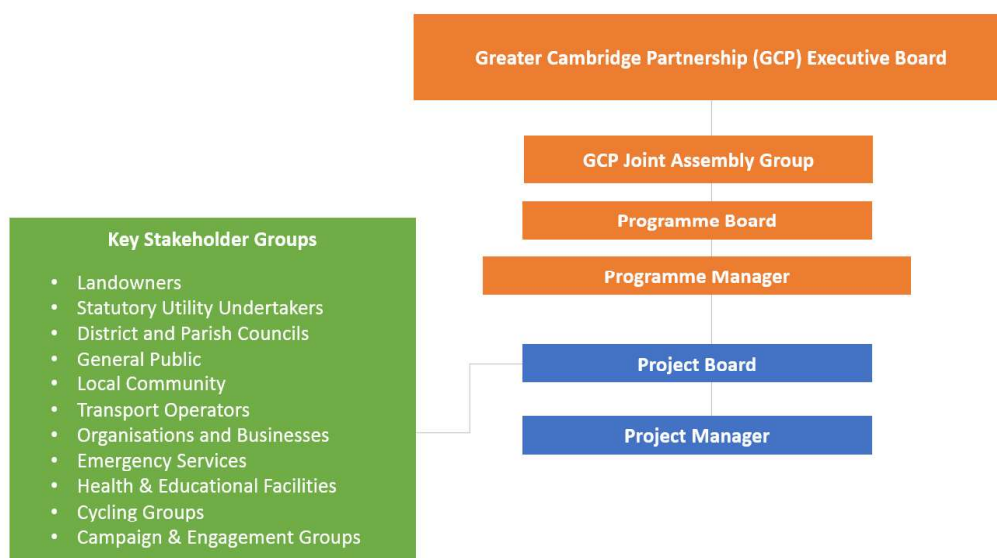
Governance and Reporting

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.

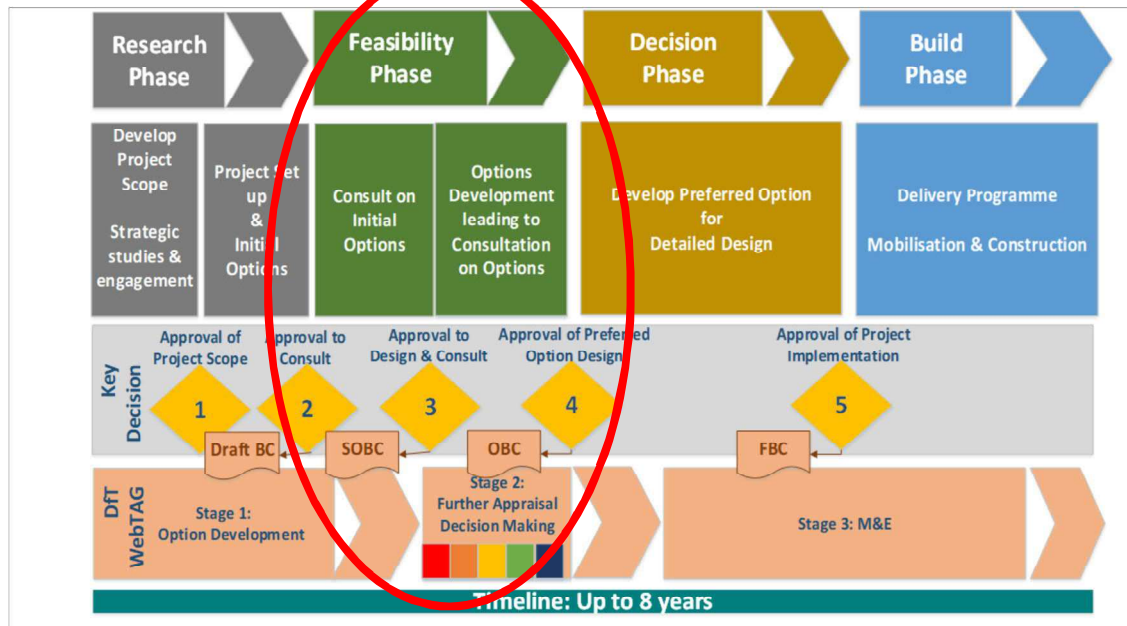
Figure 12: Project Governance



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.

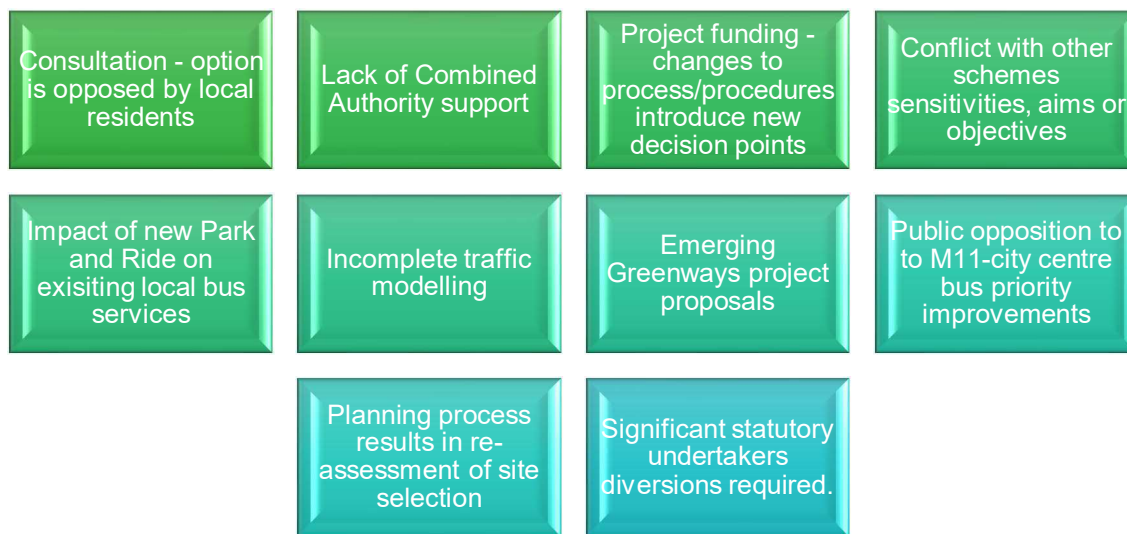
Risk Management

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 or 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 2031⁵. 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 boundary⁶.

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 originating 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

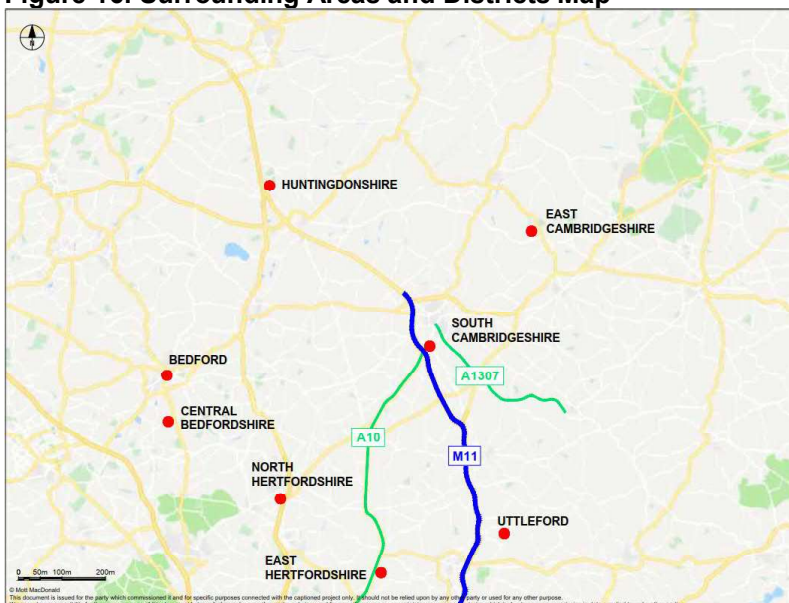
The Cambridge South West Park and Ride scheme is a component of the larger GCP West of Cambridge Package, and will include the following key measures:

- 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	<p>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.</p> <p>The NPPF promotes sustainable development and also addresses the importance of developing sustainable transport solutions to support sustainable development. It advocates:</p> <ul style="list-style-type: none"> ● 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. <p>The NPPF states that all developments that generate significant amounts of movement should take account of:</p> <ul style="list-style-type: none"> ● 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
	<p>The Cambridge South West Park and Ride scheme supports the key principles of the NPPF by:</p> <ul style="list-style-type: none"> • 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.
<p>Strategic Case Supplementary Guidance: Transport Investment Strategy</p>	<p>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:</p> <ul style="list-style-type: none"> • <i>Create a transport network that works for users, wherever they live.</i> 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. • <i>Improve productivity and rebalance growth across the UK.</i> 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. • <i>Enhance our global competitiveness by making Britain a more attractive place to invest⁷.</i> 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. • <i>Support the creation of new housing.</i> 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	
<p>Greater Cambridge Greater Peterborough SEP (Strategic Economic Plan)</p>	<p>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:</p> <ul style="list-style-type: none"> • 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.
<p>Greater Cambridge City Deal (GCCD)</p>	<p>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.</p> <p>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.</p>
<p>Cambridgeshire Local Transport Plan (LTP) 2011-2031 & Cambridgeshire Long</p>	<p>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.</p>

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)	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> ● 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. <p>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:</p> <ul style="list-style-type: none"> ● 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. <p>Other LTP goals to which enhanced Park and Ride provision will contribute are:</p> <ul style="list-style-type: none"> ● To keep Cambridge traffic at current levels while accommodating major growth. ● Dropping the transport CO2 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. <p>The LTTS considers a new Park and Ride as a necessary scheme to support major development.</p>
Local Strategy and Policy	
South Cambridgeshire Local Plan	<p>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:</p> <ul style="list-style-type: none"> ● 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. <p>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.</p> <p>Alignment between this OBC and the Local Plan is summarised by:</p> <ul style="list-style-type: none"> ● 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. <p>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</p>

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	<p>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:</p> <ul style="list-style-type: none"> ● 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	<p>The TSCSC has 21 policies, many of which Park and Ride solutions support:</p> <ul style="list-style-type: none"> ● 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. <p>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.</p>
Cambridge Biomedical Campus Strategy and Travel Plan (2017-2022) (Full Consultation Version) Draft March 2017	<p>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:</p> <ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> 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. <p>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.</p>
Cambridge City Access Strategy	<p>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:</p> <ul style="list-style-type: none"> 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) <p>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.</p>

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

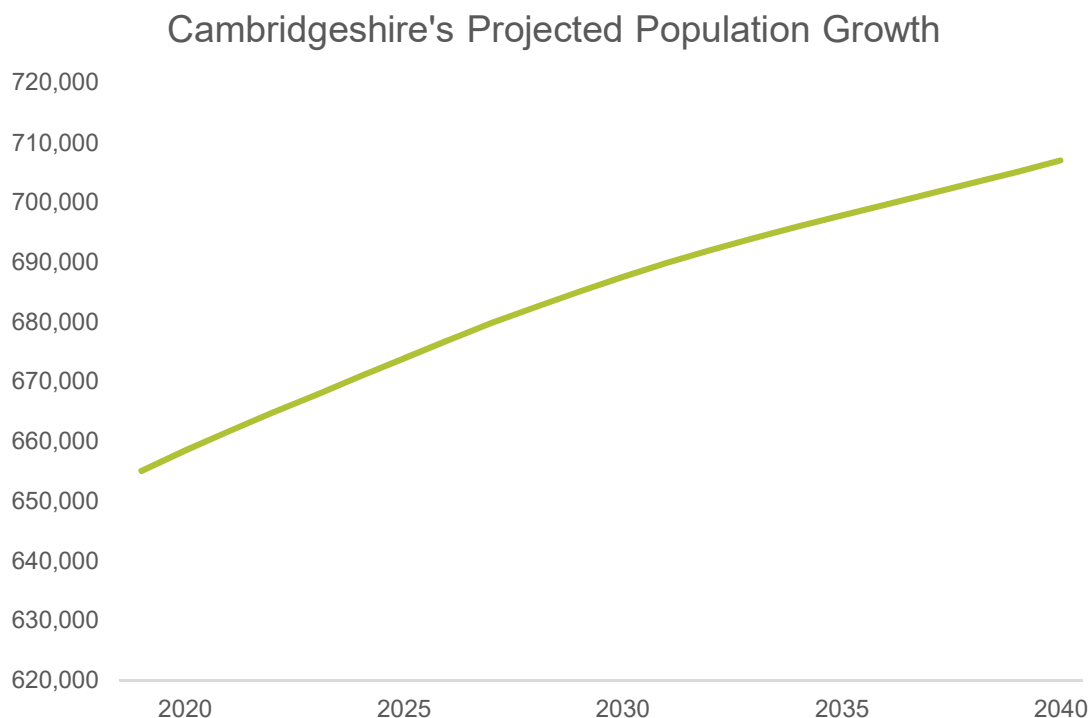
Cambridgeshire's population has grown steadily over previous decades. However, more recently the population has experienced a significantly faster rate of growth, with a total increase of 4.2% over just a five-year period. The latest count in 2017 found Cambridgeshire's total population to stand at 648,237.

It should be noted that students represent a significant proportion of the population in Cambridgeshire, meaning the population can fluctuate during term time⁸. 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
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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.

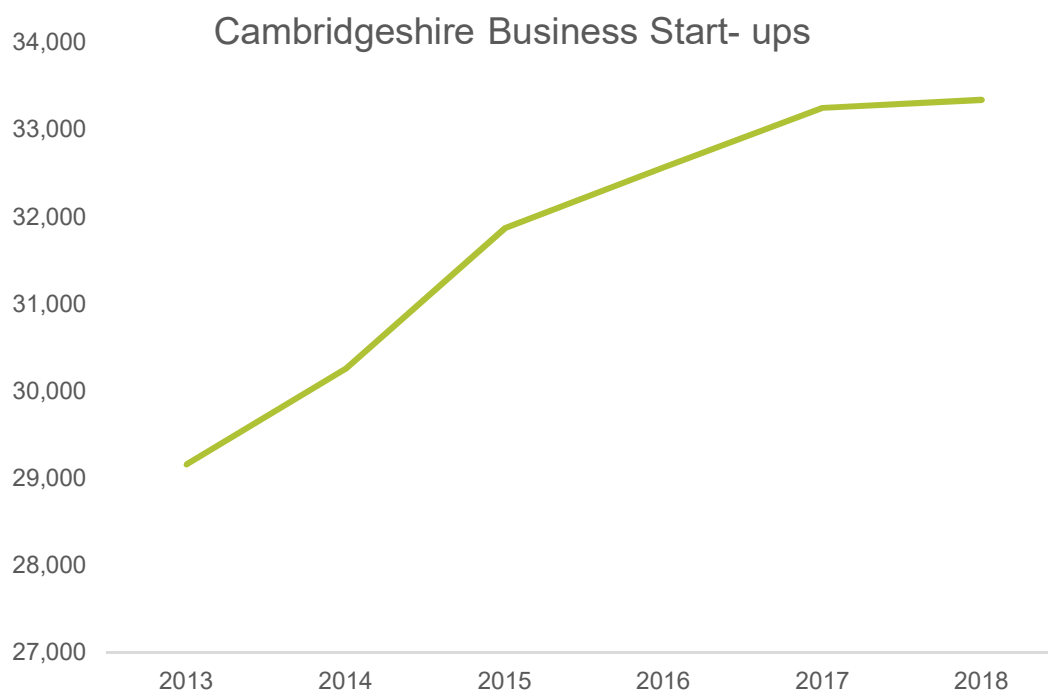
The origins of the 'Cambridge Phenomenon' date back to the 1960's. The Greater Cambridge Partnership's (GCP) vision is to now:

"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 England⁹. 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

- 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.

Opportunities

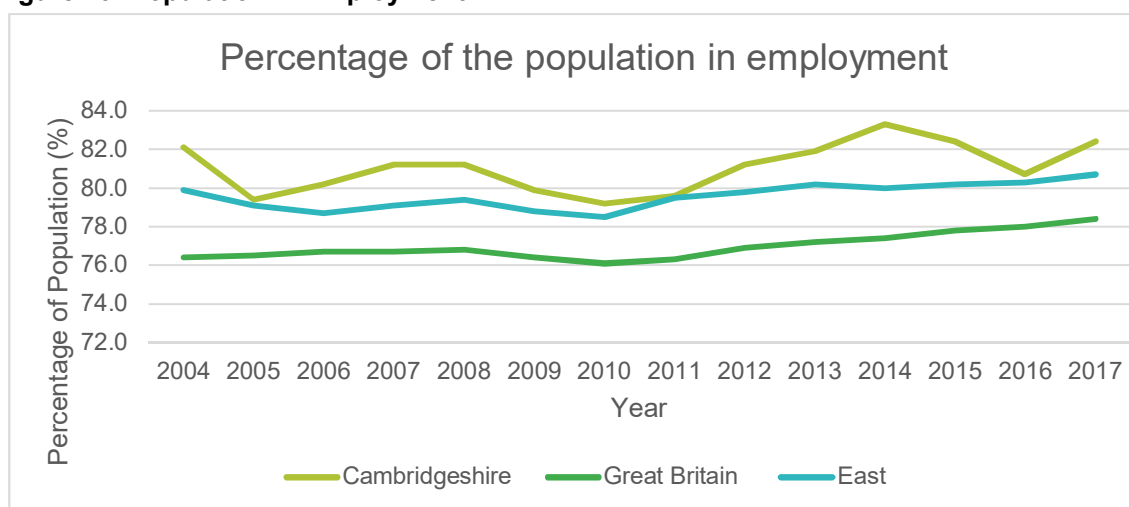
- Cambridgeshire has a strong existing economic base, and one which continues to grow. As a result, the economy is likely to benefit from any uplift in infrastructure expenditure if it equips the area to deal with expansion.
- The proposed Cambridge South West Park and Ride scheme will improve accessibility 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 facilities. In addition, the following sectors represent large proportions of Cambridgeshire's employment offer:

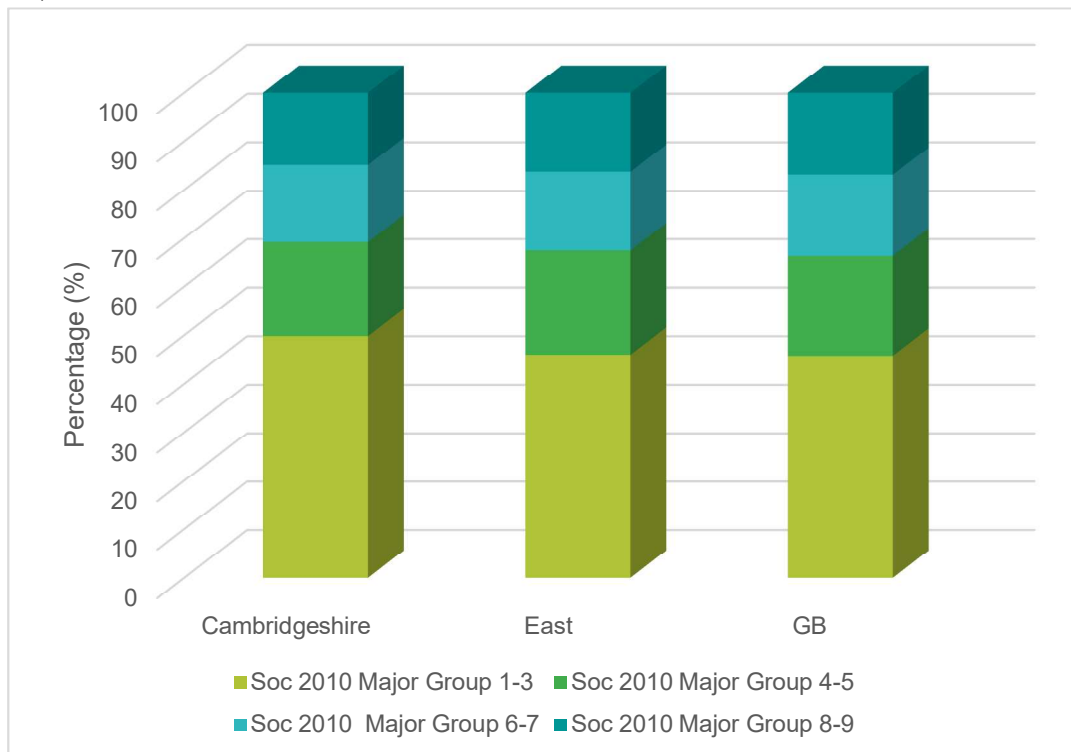
- Health;
- Manufacturing;
- Retail;
- Business Administration and Support Services;
- Accommodation and Food Services; and
- Information and Communication.

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
<ul style="list-style-type: none"> Highly skilled professionals are required to fill a large proportion of the jobs on offer in Cambridgeshire. Employers in Cambridgeshire 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. 	<ul style="list-style-type: none"> 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.

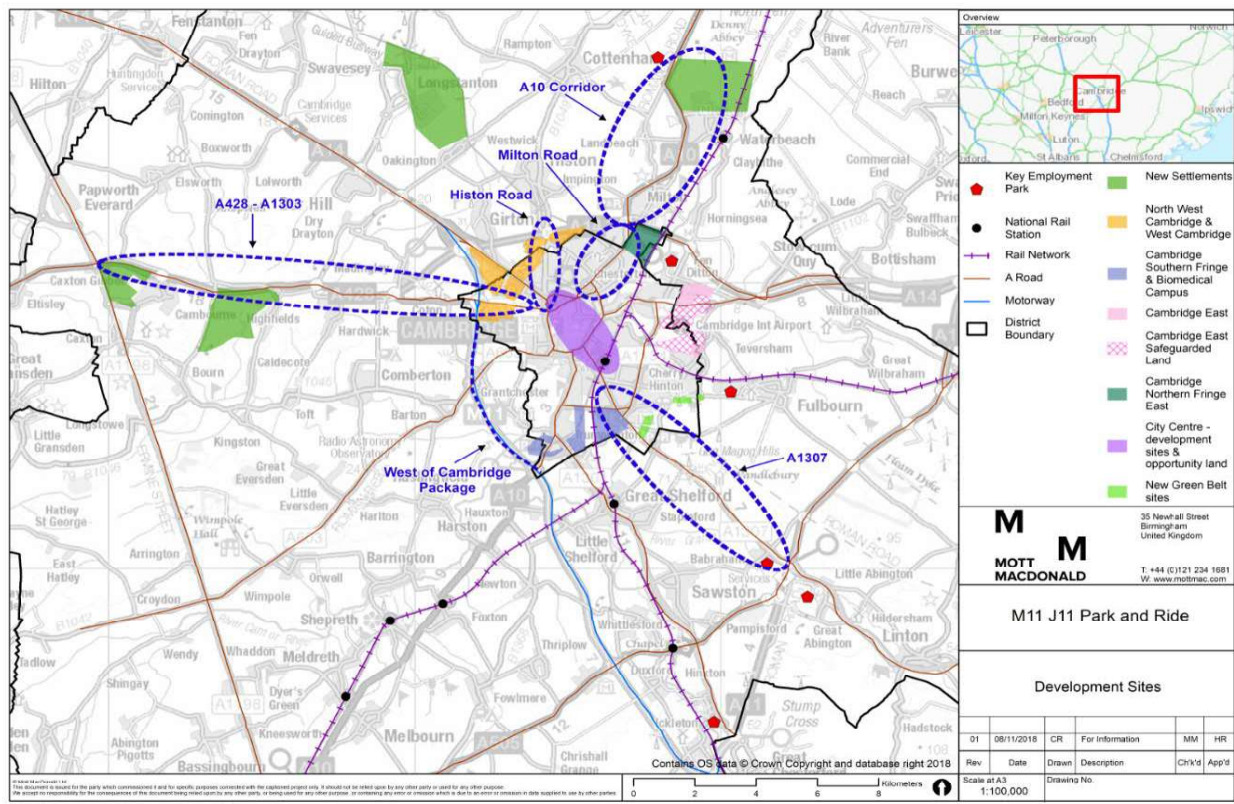
2.4.4 Planned Development

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 2031¹⁰.
- 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 Campus¹³.

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 discouraged¹⁴. 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
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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 note¹⁵ prepared.

South Cambridgeshire District Council started monitoring NO₂ 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 NO₂ concentrations have remained low.

Table 15 presents the NO₂ monitoring data, a general indicator of air quality. The national air quality objective is to have NO₂ 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/m³ between 2006 and 2017.

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

Year	NO ₂ Concentration (µg/m ³)
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	NO ₂ Concentration (µg/m ³)
2016	28.6
2017	27.3

Source: South Cambridgeshire District Council Review and Assessment Documents

Additional information has been collated on regional modelled NO₂, PM_{2.5} and PM₁₀ levels and from site specific monitoring locations in the Cambridge area for the same parameters¹⁶. This data is presented in Figures 10, 11, 12.

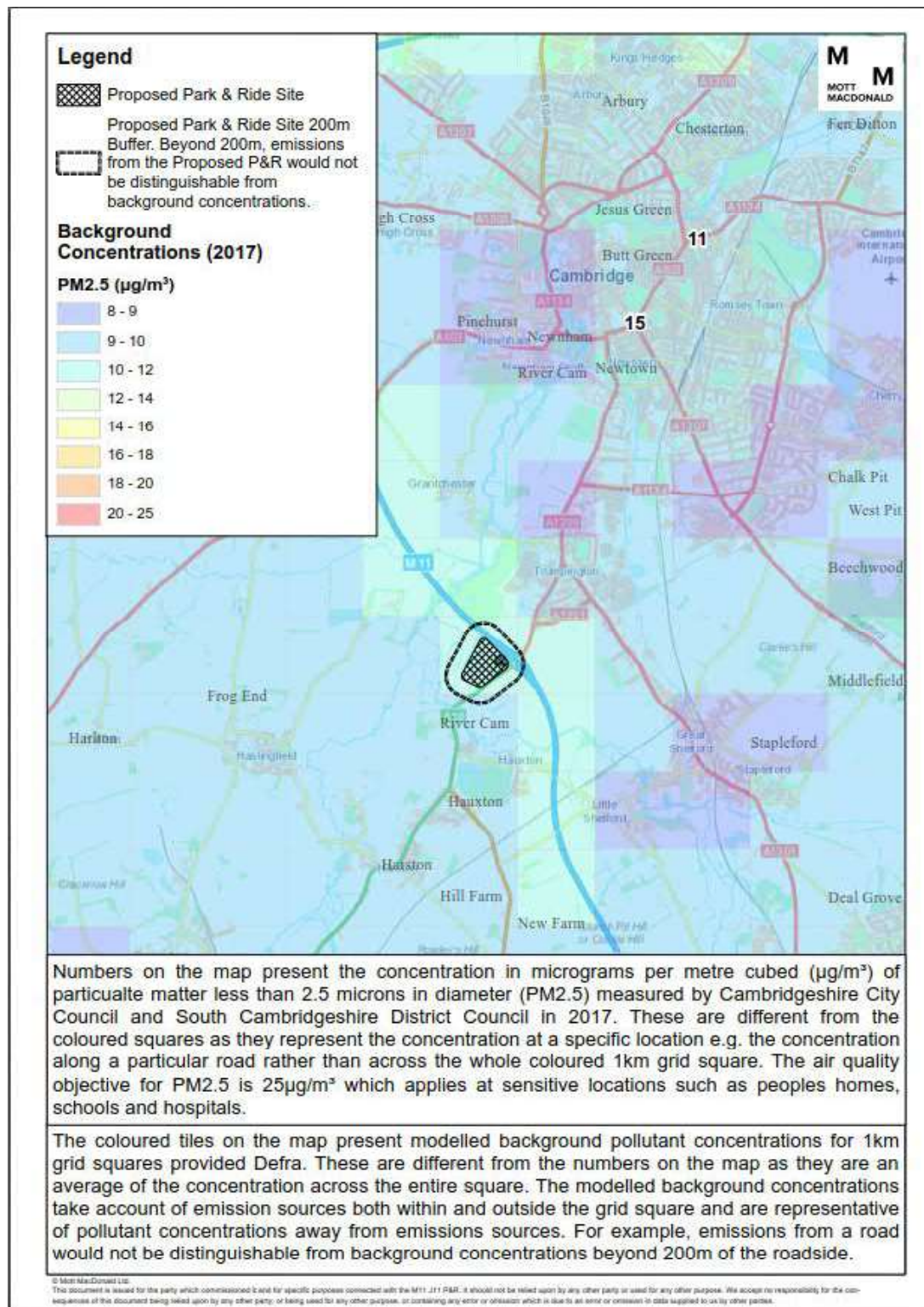
- NO₂ is the main pollutant of concern from road traffic. The highest pollutant concentrations associated with road traffic are found in busy urban areas. This is shown on the NO₂ map where NO₂ concentrations on busy roads in Cambridge are generally higher than surrounding areas.
- A diffusion tube on the High Street in Harston measured a roadside annual mean nitrogen dioxide (NO₂) concentrations of approximately 28µg/m³ for the past 4 years. This is relatively low in comparison to the annual mean NO₂ air quality objective of 40µg/m³ and would suggest air quality is reasonably good in Harston.
- In general, local authorities do not monitor PM₁₀/PM_{2.5} in as many locations as NO₂. Where concentrations of NO₂ are low and road traffic is the primary source of emissions, for example in Harston, the concentration of PM₁₀/PM_{2.5} would not exceed the relevant Defra, UK and EU air quality objectives for PM₁₀/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, Hauxton 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.

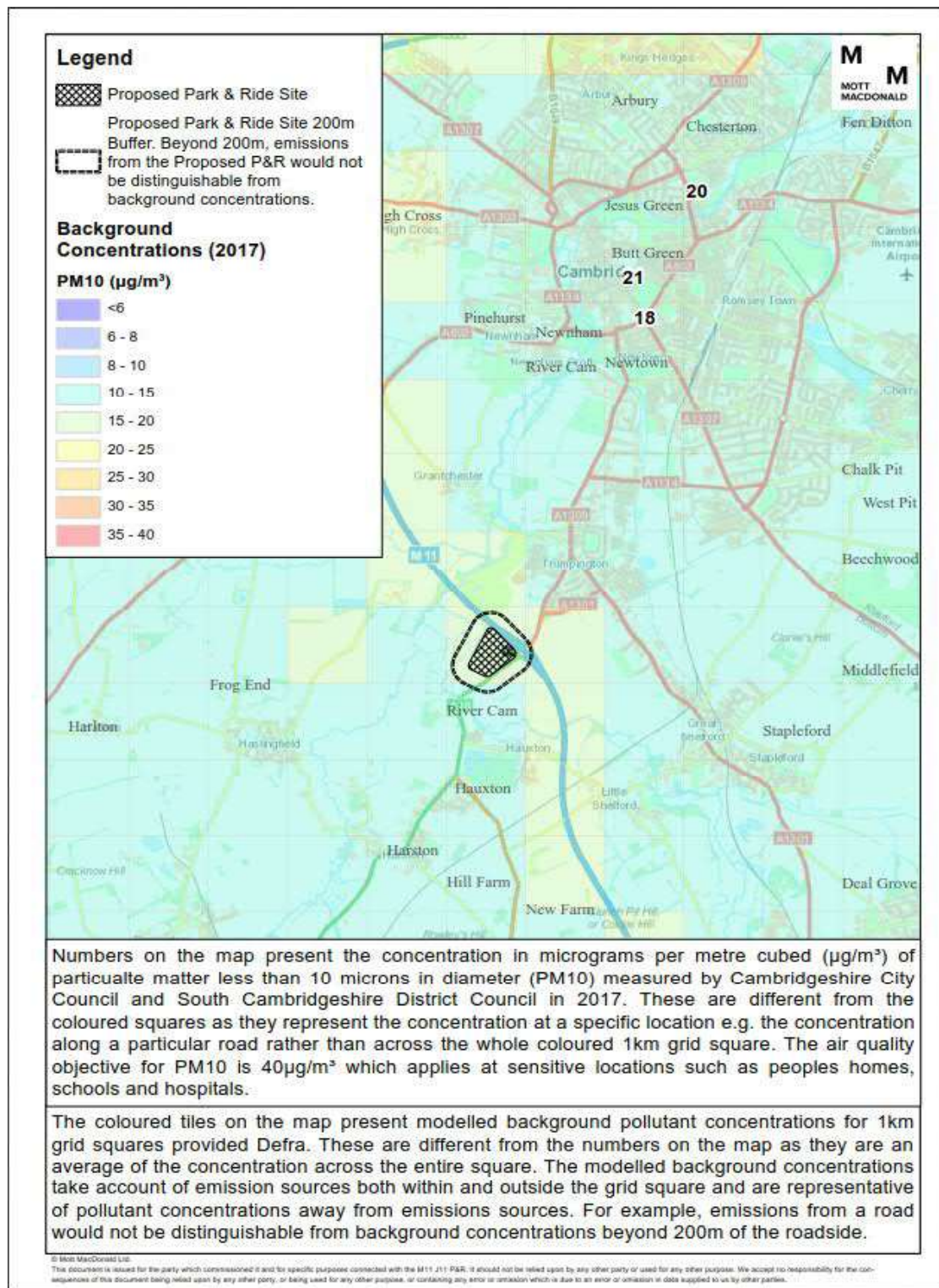
¹⁶ PM = particulate matter, 2.5 and 10 refer to the size of the particulates in micrometers.

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

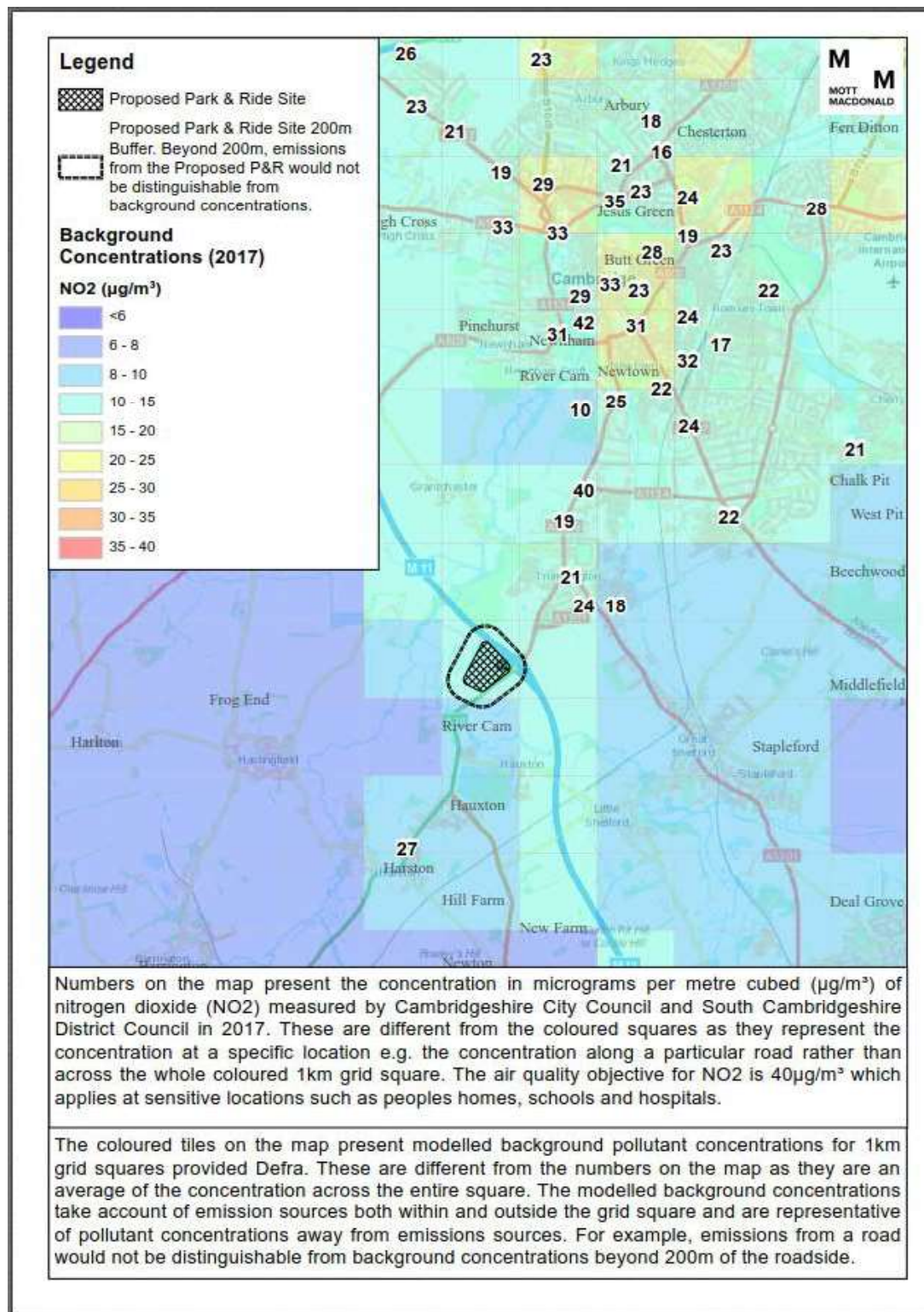
Source: Mott MacDonald

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



Source: Mott MacDonald

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



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 site¹⁹. 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 interest²⁰. 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
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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

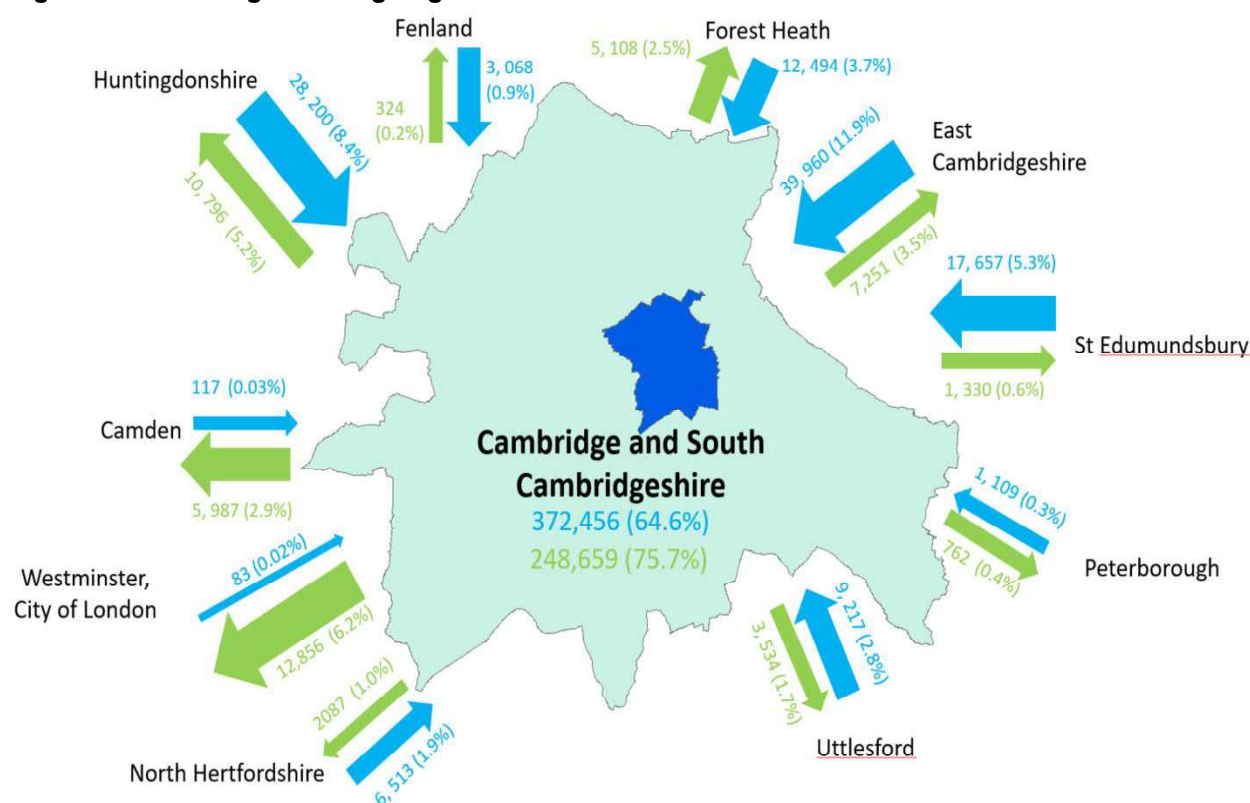
This sub-section explores the travel behaviour of those living/and or working within Cambridge and South Cambridgeshire. Data in this section has been primarily sourced from the Office of National Statistics.

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.

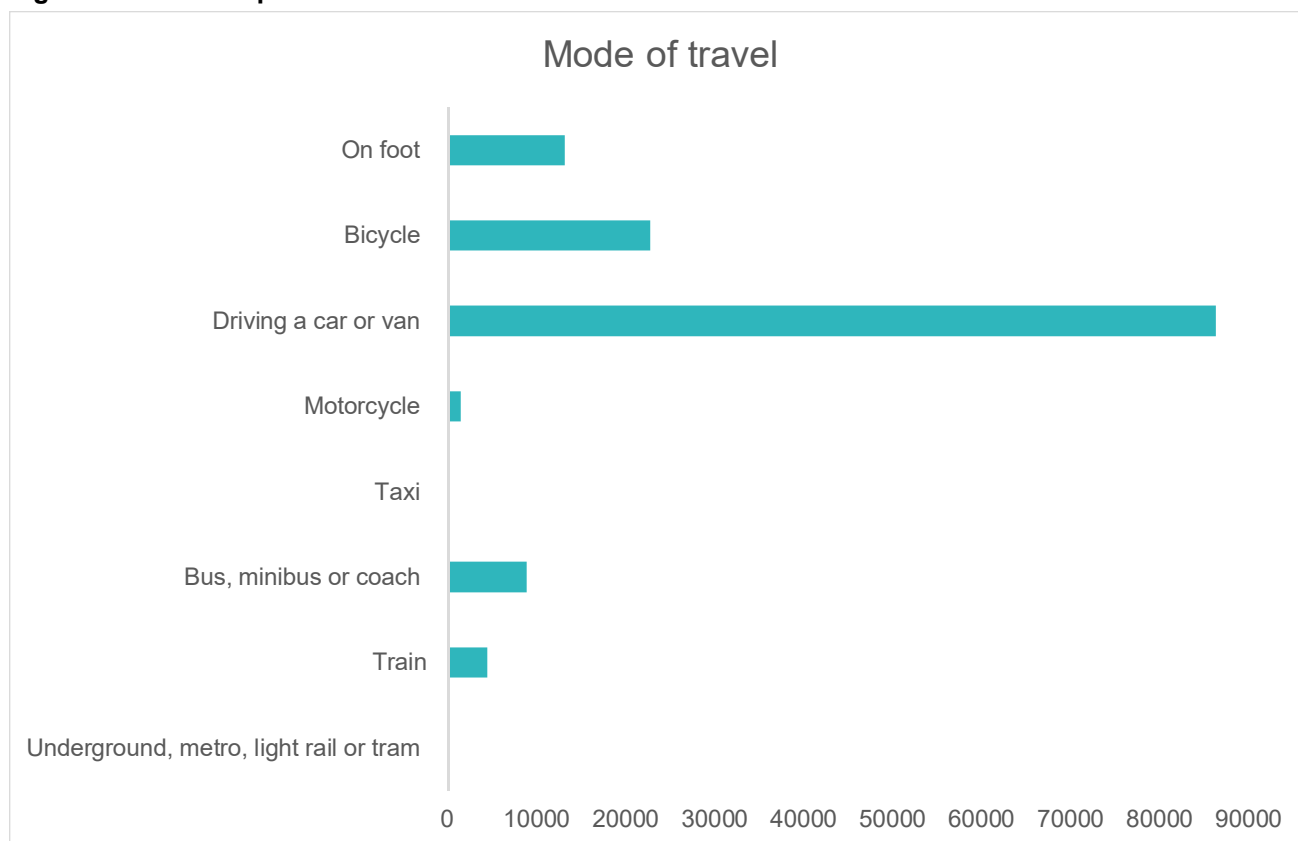
Figure 26: Incoming and Outgoing Commuter Flows



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

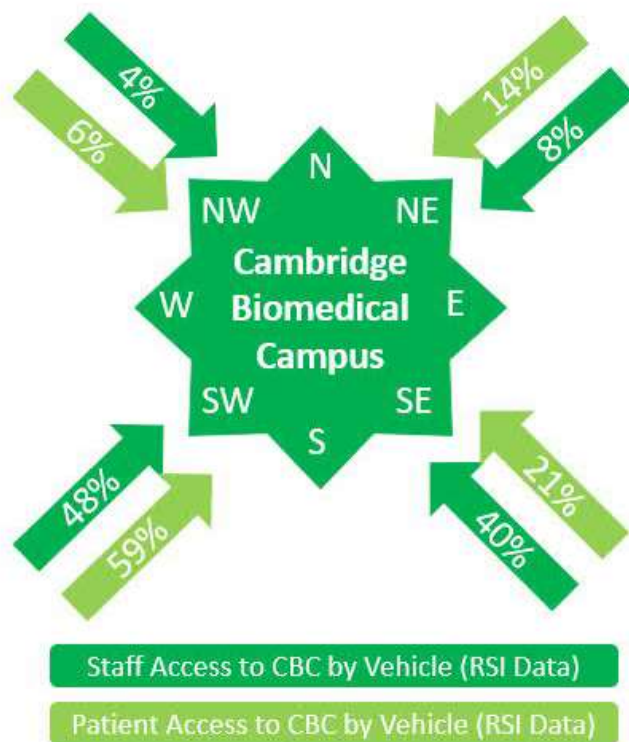
A large proportion of Cambridge and South Cambridgeshire's workforce live outside of the area and commute inbound making the connectivity of employment sites crucial to sustaining the necessary workforce. Figure 27 displays the modal split of Cambridge and South Cambridgeshire workforce.

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 area²⁴.

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
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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 period²². 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 areas²³ 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.

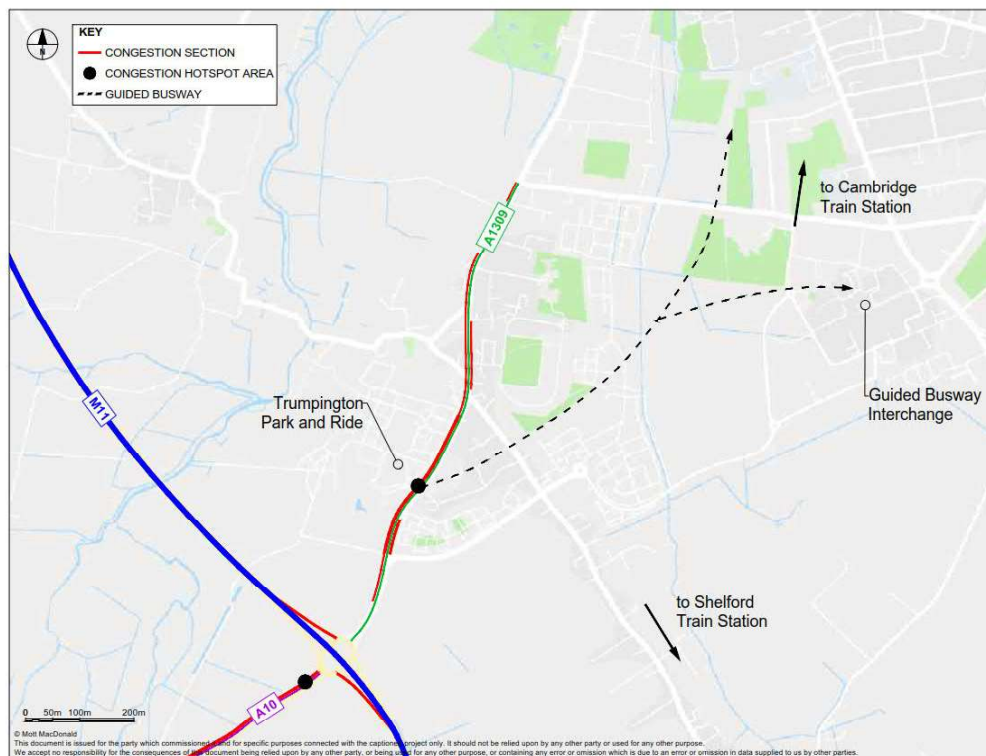
The congestion issues that already exist around M11 Junction 11 and north-east to the Cambridge Biomedical Campus are concerning, as this will almost certainly be exacerbated by continued employment growth. The sustainable transport offer will need to be increased considerably to mitigate this issue 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 Hauxton²⁴. 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 2030.²⁵²⁶

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
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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

- 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.

Opportunities

- 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 demand²⁷. 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 trajectory²⁸. 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.

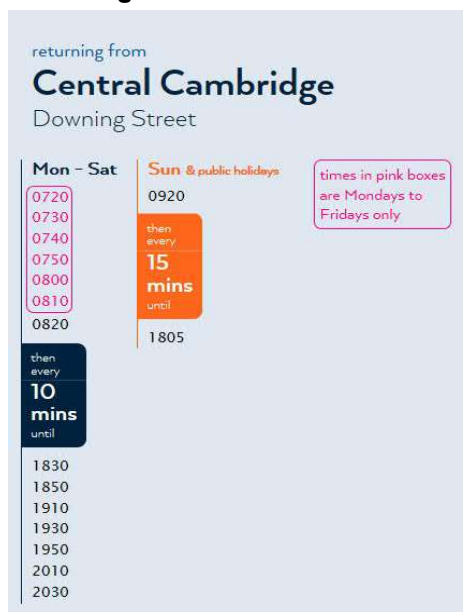
Bus timetables to and from Trumpington Park and Ride to the city centre are provided in Figure 32 and Figure 33.

Figure 32: Departures from Trumpington Park and Ride



Source: cambridgепarkandride.info

Figure 33: Return Journeys from Central Cambridge



Source: cambridgепarkandride.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 the 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
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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

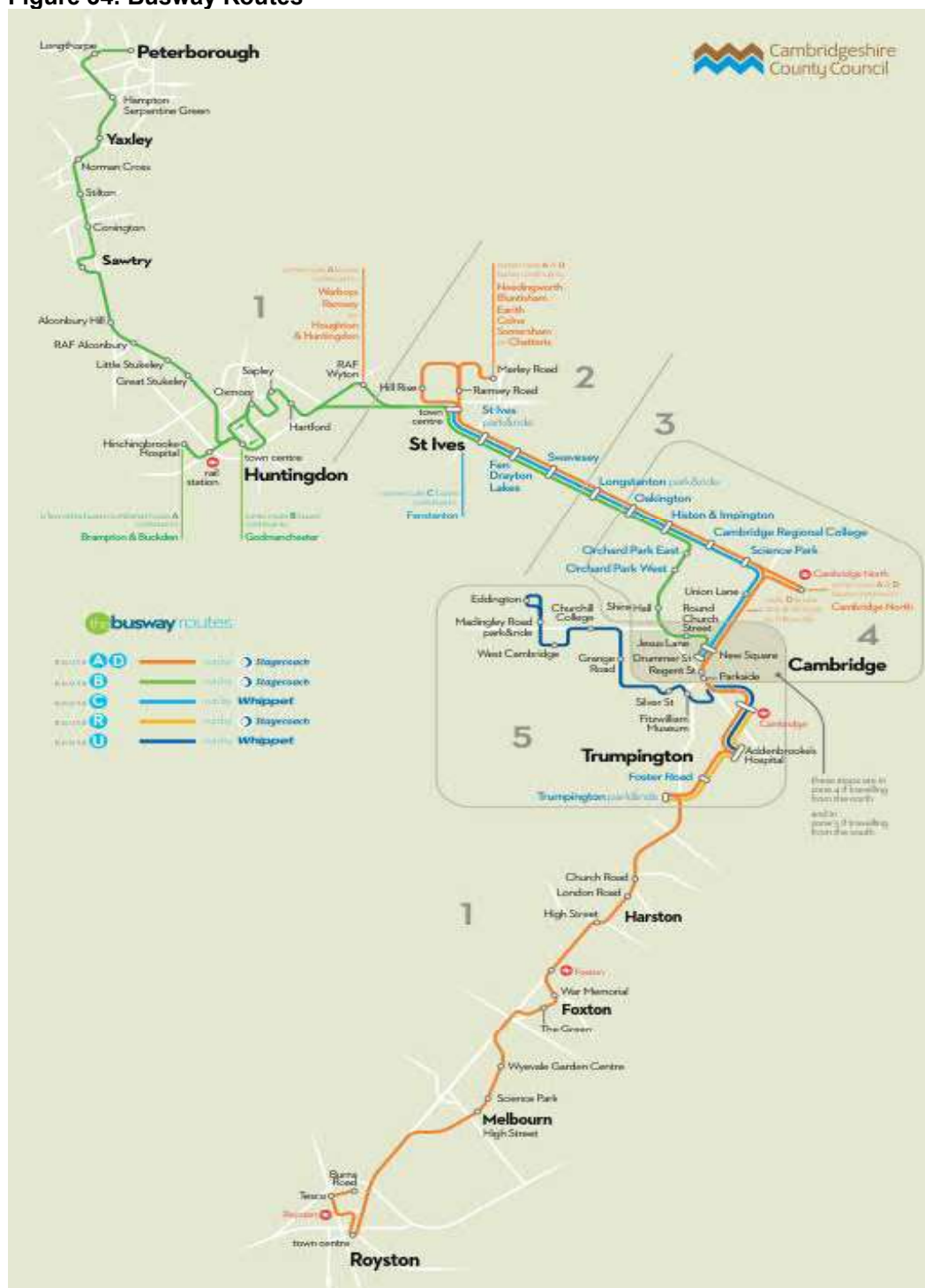
Whilst the scheme to expand Park and Ride provision is primarily focused on supporting growth in the southern fringe and particularly around the Cambridge Biomedical Campus, it is also worth noting that there are existing and potential users of the Park and Ride facilities who live further afield that 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:

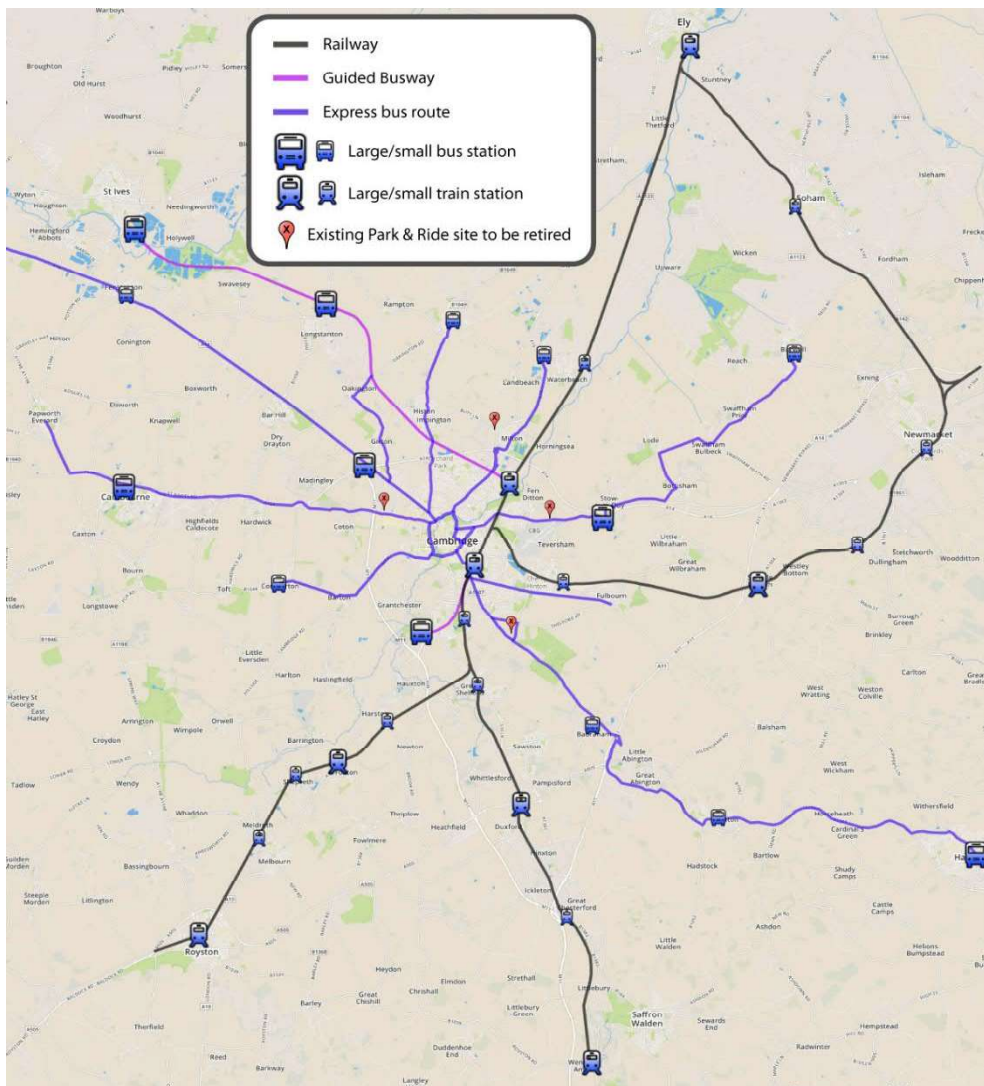
- 15 Royston, Bassingbourne, Haslingfield (one journey each way on Wednesdays only – operated by CG Myall & Son) could be extended;
- 26 Royston to Cambridge (Mondays to Saturdays – Stagecoach); and
- 31 Fowlmere, Hauxton to Addenbrooke's (four journeys per day Mondays to Saturdays and one to Drummer 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
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.

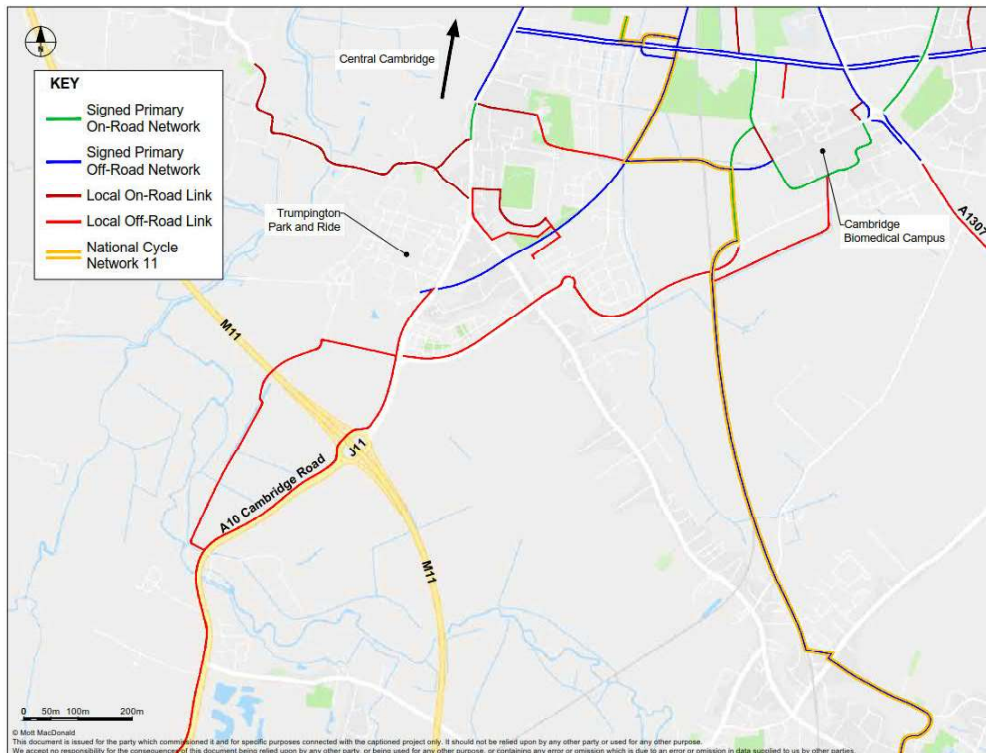
Issues	Opportunities
<ul style="list-style-type: none"> Journeys undertaken by public transport are significantly longer than the same journeys undertaken by car. Cambridgeshire's Southern Fringe is detached from the rail network, making strategic journeys timely and inconvenient for those wishing to use public transport for journeys from southern Cambridge further afield. 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> • 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 un conducive 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. 	<ul style="list-style-type: none"> • 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 originating 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
<ul style="list-style-type: none"> ● 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.
<ul style="list-style-type: none"> ● 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.
<ul style="list-style-type: none"> ● 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
<ul style="list-style-type: none"> ● 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.
<ul style="list-style-type: none"> ● 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.
<ul style="list-style-type: none"> ● 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)

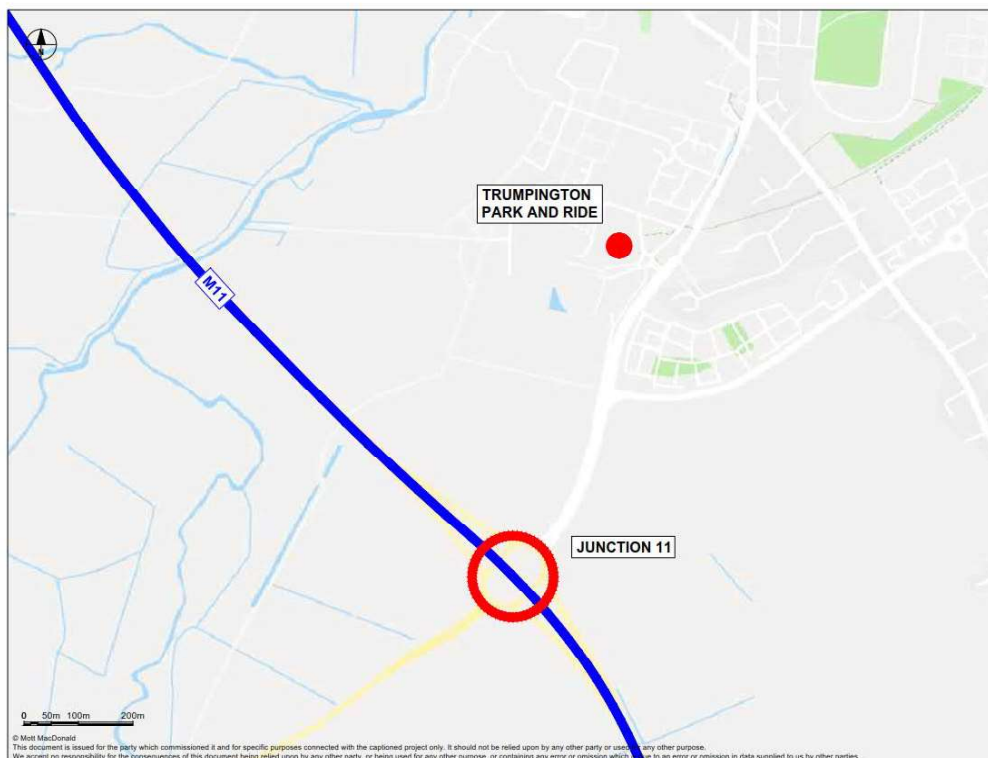
Proposed Indicator	Relating to Objective
Reduced traffic flow on A1309 Hauxton Road	1.i – reduction in traffic north east of M11 J11
Reduced traffic flow on A1309 High Street	1.i – reduction in traffic north east of M11 J11
Reduced traffic flow on J11 circulatory	1.ii – reduction in traffic flow and 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, 2012³¹) 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.

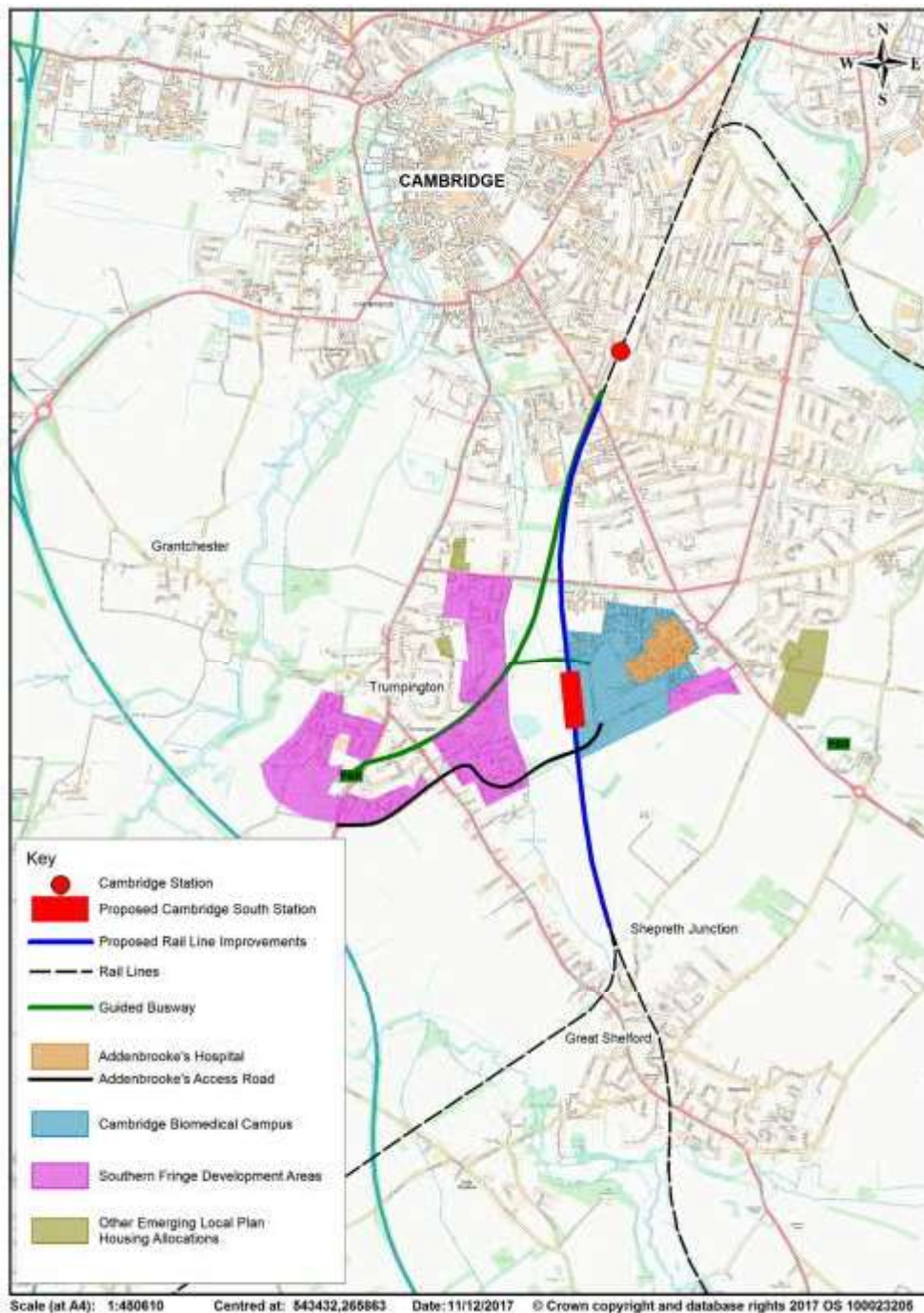
Figure 41: Whittlesford Location Plan



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.

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 2027³².

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.

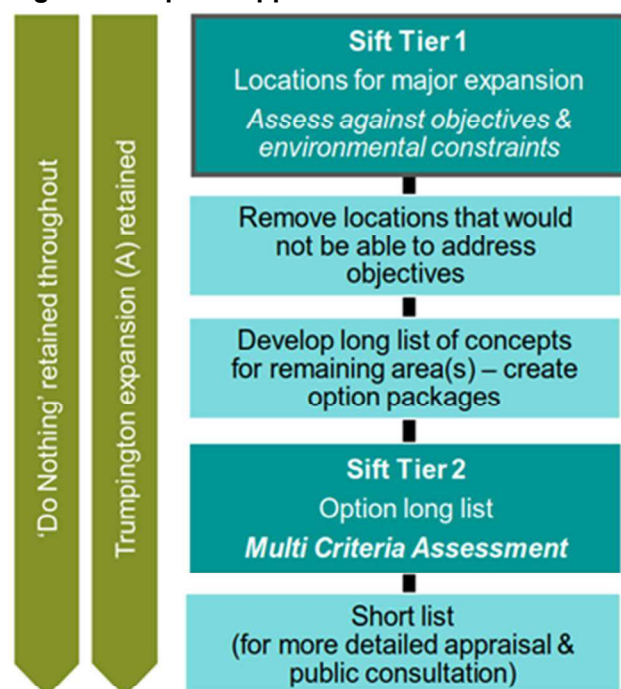
This section should be considered as a condensed substitute for a separate Options Appraisal Report (OAR), as it is considered proportionate in the case of this scheme to integrate the options development and selection process within the OBC.

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).

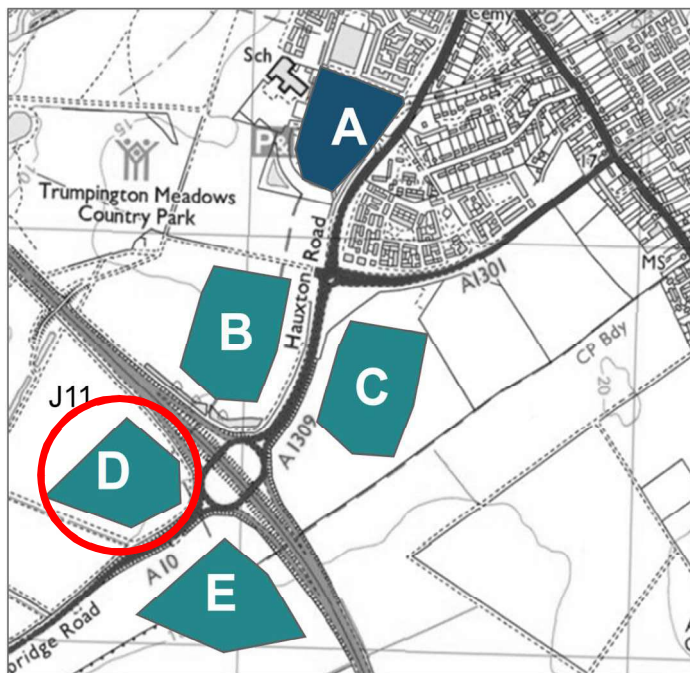
The five locations were assessed on the extent to which they would be able to meet the six scheme objectives and against the number and complexity of environmental constraints. Scoring was based on the seven-point scale recommended in WebTAG, from -3 (large adverse) to +3 (large beneficial) and where 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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.
<p>All options set out above include the following:</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Major rail-based Park and Ride site at both Foxton and Whittlesford Parkway stations. • Safe, direct and short pedestrian route between the car park and station platforms.
I	<ul style="list-style-type: none"> • 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

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
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Time to access the Park and Ride site from A10 Time to access the Park and Ride site from M11 northbound Park and Ride bus journey time Potential to link with existing public transport Potential to link with future public transport proposals 	<ul style="list-style-type: none"> Potential for road accidents Walking and cycling networks Noise Local air quality Landscape Green house gases Historic environment Biodiversity Water environment 	<ul style="list-style-type: none"> Construction risks Disruption during construction Land acquisition requirements Infrastructure maintenance/renewals complexity Ongoing cost implications - site Ongoing cost implications - bus

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.

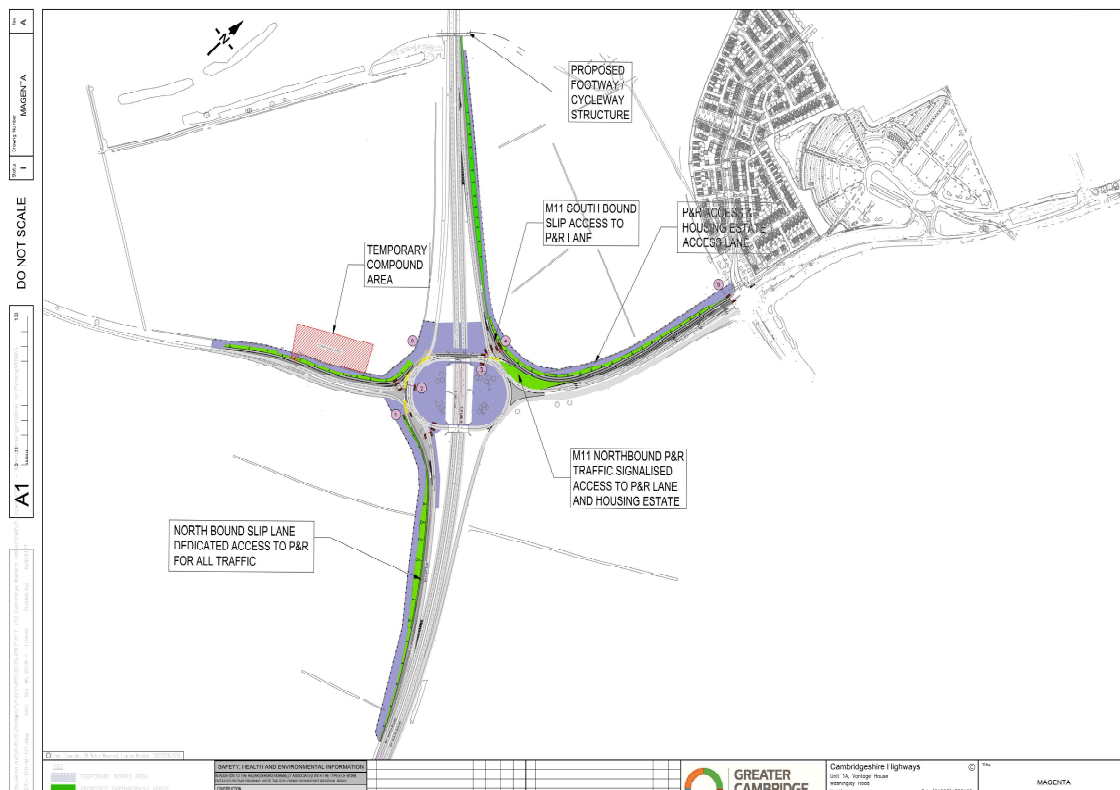
3.4.1 Do Minimum (baseline comparator)

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

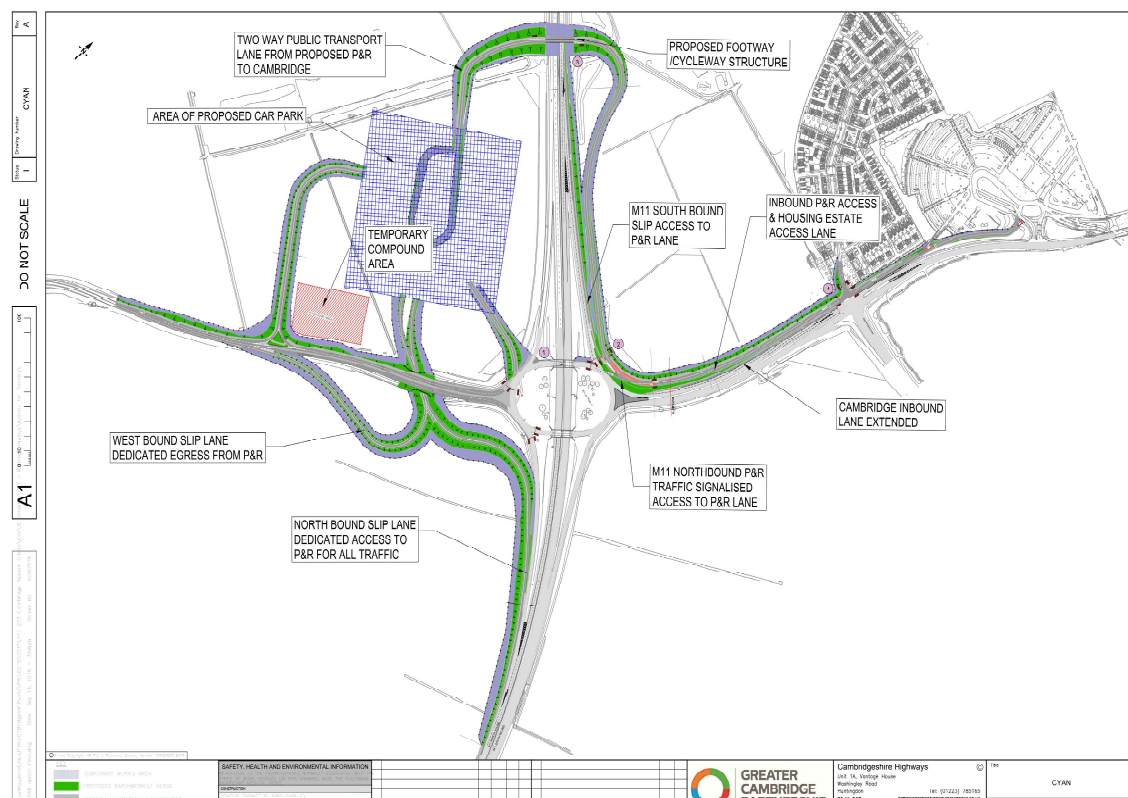


Source: Skanska

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

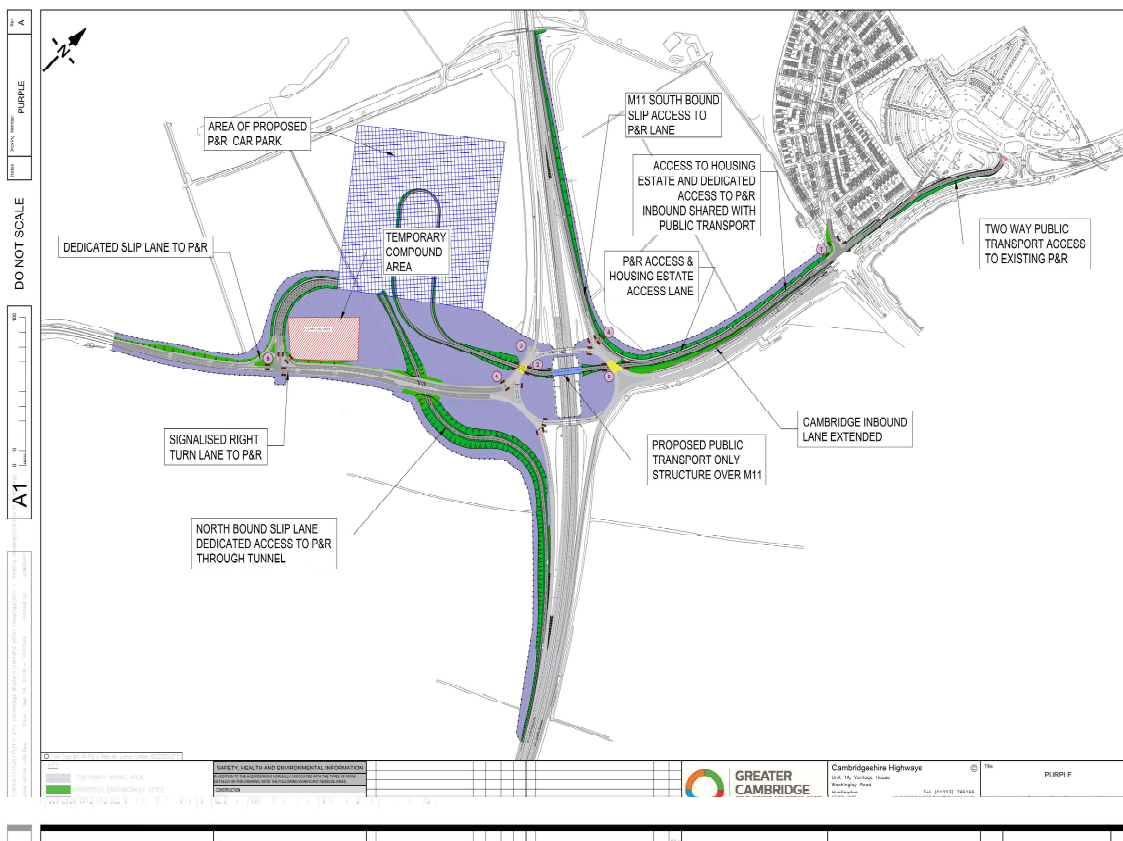


Source: Skanska

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.

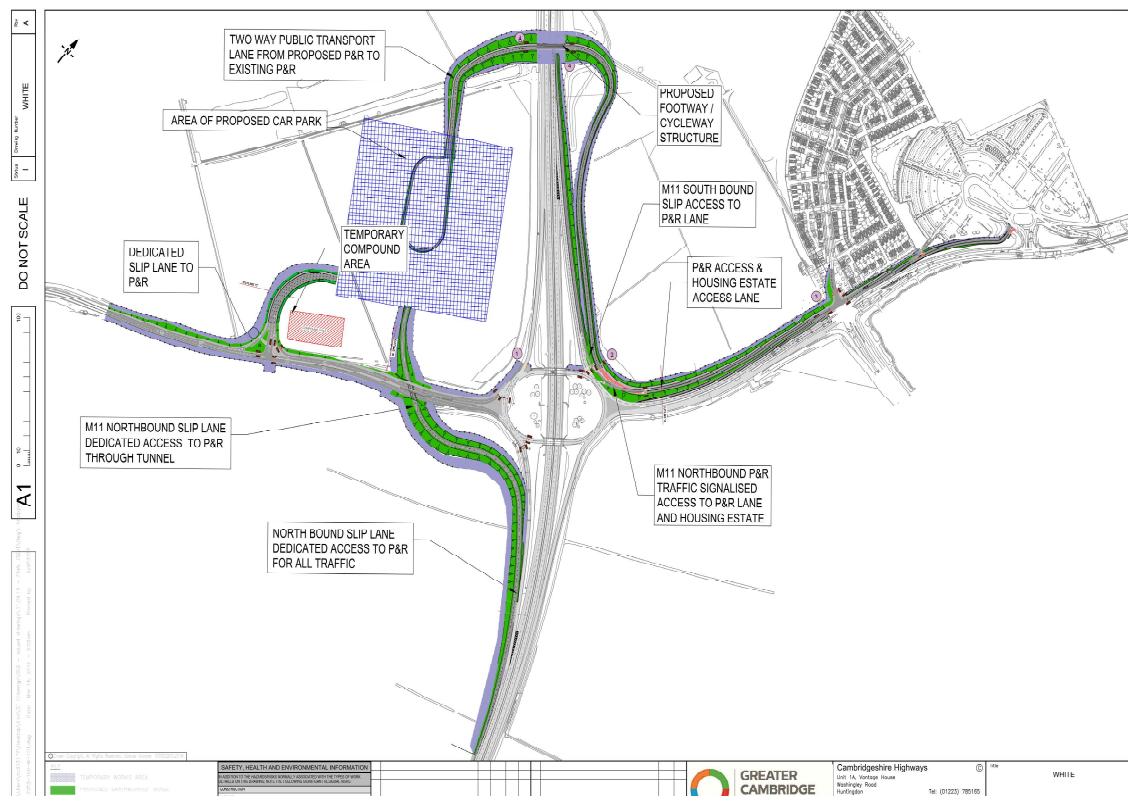
Figure 49: Purple Option



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

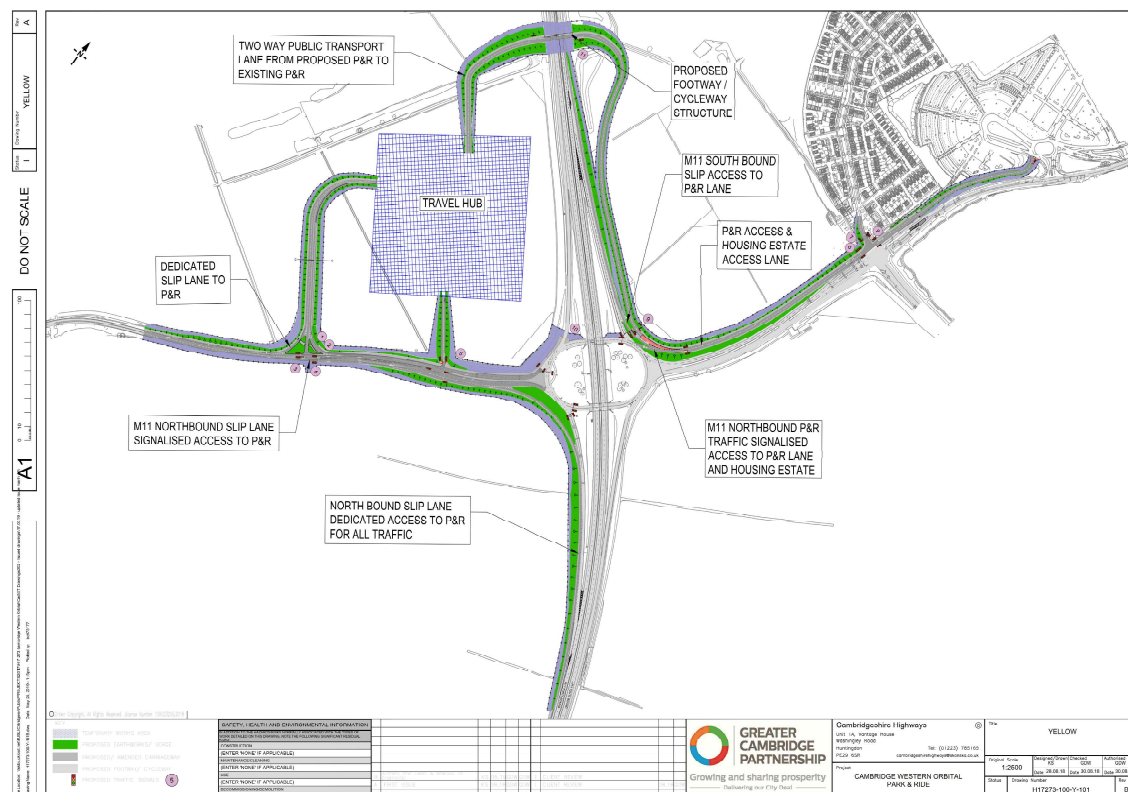


Source: Skanska

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
<ul style="list-style-type: none">• 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
<ul style="list-style-type: none"> Two signalised junctions on the A10 	<ul style="list-style-type: none"> One signalised junction on the A10 at the entrance to the Park and Ride site 	<ul style="list-style-type: none"> Dedicated slip roads to the Park and Ride site so vehicles do not need to turn right across the A10
<ul style="list-style-type: none"> New left turn filter lane on to the A10 for traffic from the M11 northbound 	<ul style="list-style-type: none"> New dedicated northbound slip exiting the M11 at J11, passing under the A10 directly into the Park and Ride site. 	<ul style="list-style-type: none"> Junction entrance to the site on the A10 for left in and left out turns only
<ul style="list-style-type: none"> Medium construction impact 	<ul style="list-style-type: none"> High construction impact 	<ul style="list-style-type: none"> High construction impact
<ul style="list-style-type: none"> Approximate construction cost £4m 	<ul style="list-style-type: none"> Approximate construction cost £12m 	<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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 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 Approximate construction cost £4.5m 	<ul style="list-style-type: none"> 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. There is also likely to be some reduction in capacity at Junction 11 Approximate construction cost £11.5m

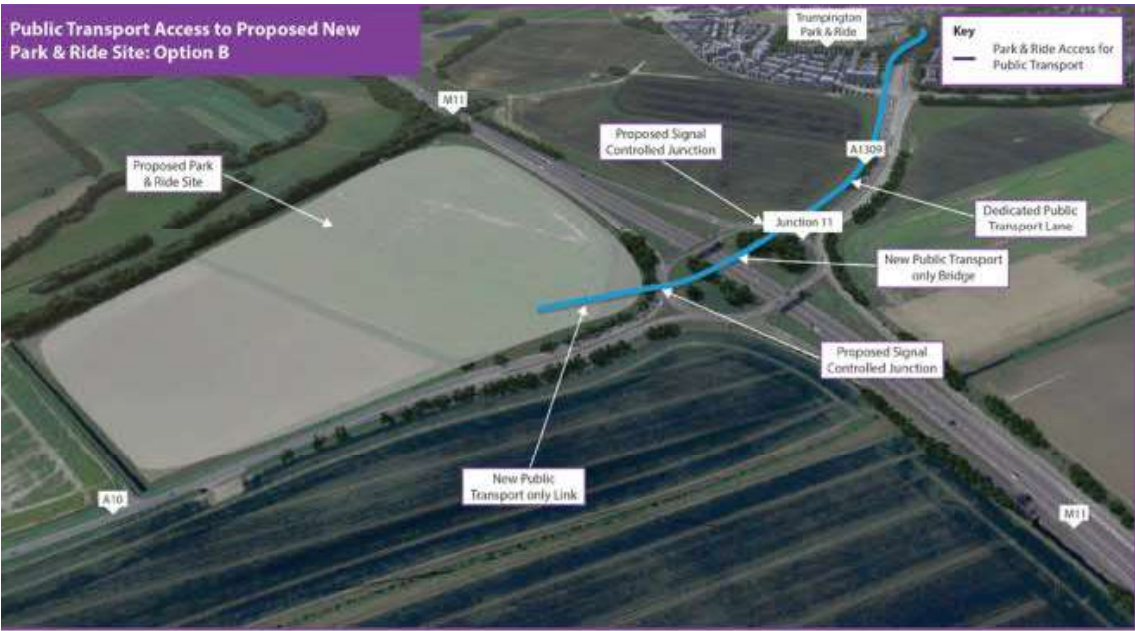
The construction costs noted for each public transport access option variant in Table 25 are in addition to the approximated £11m required to build the new site and the costs associated with private vehicular access noted in Table 24.

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

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
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Potential for road accidents • Walking and cycling networks • Noise • Local air quality • Landscape • Green house gases • Historic environment • Biodiversity • Water environment • Green Belt 	<ul style="list-style-type: none"> • Construction risks • Disruption during construction • Land acquisition requirements • Infrastructure maintenance/renewals complexity • Ongoing cost implications - site • Ongoing cost implications - bus • Likelihood of public support

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:

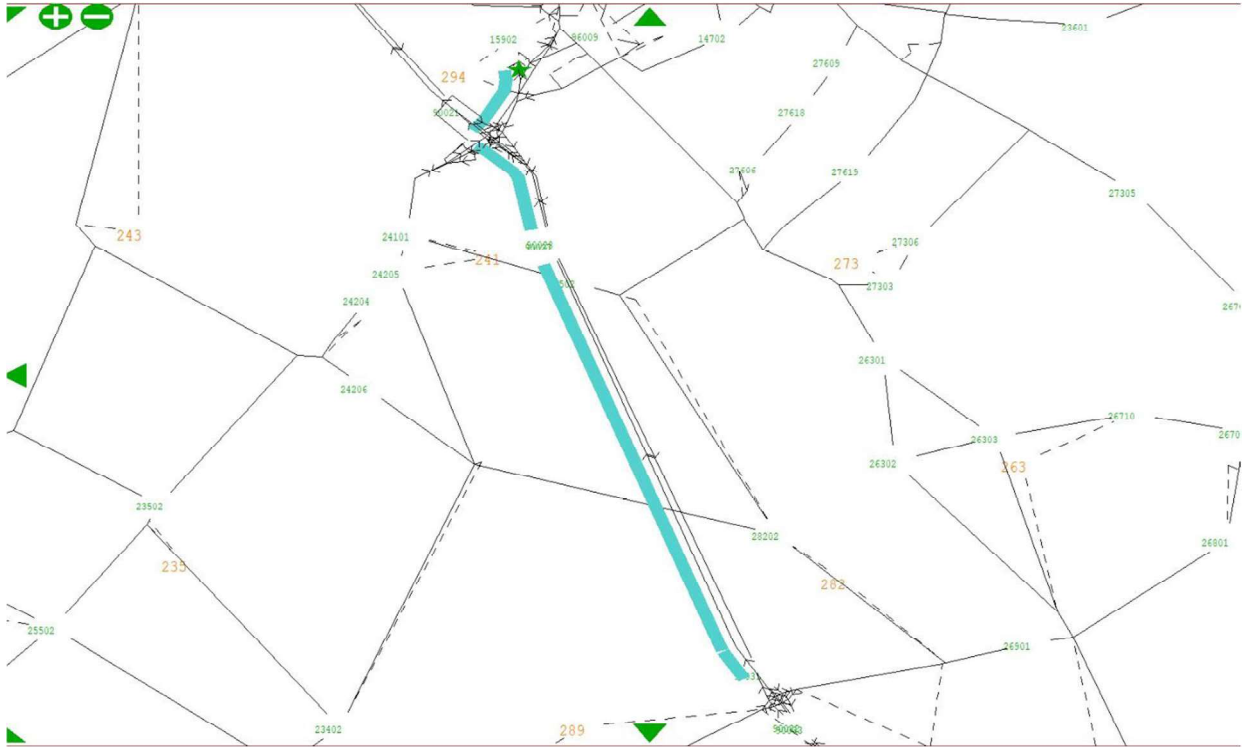
- Time to access both the proposed, new and existing Trumpington Park and Ride site from A10
- Time to access both the proposed, new and existing Trumpington Park and Ride site from the M11 northbound
- Time to access both the proposed, new and existing Trumpington Park and Ride site from the M11 southbound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

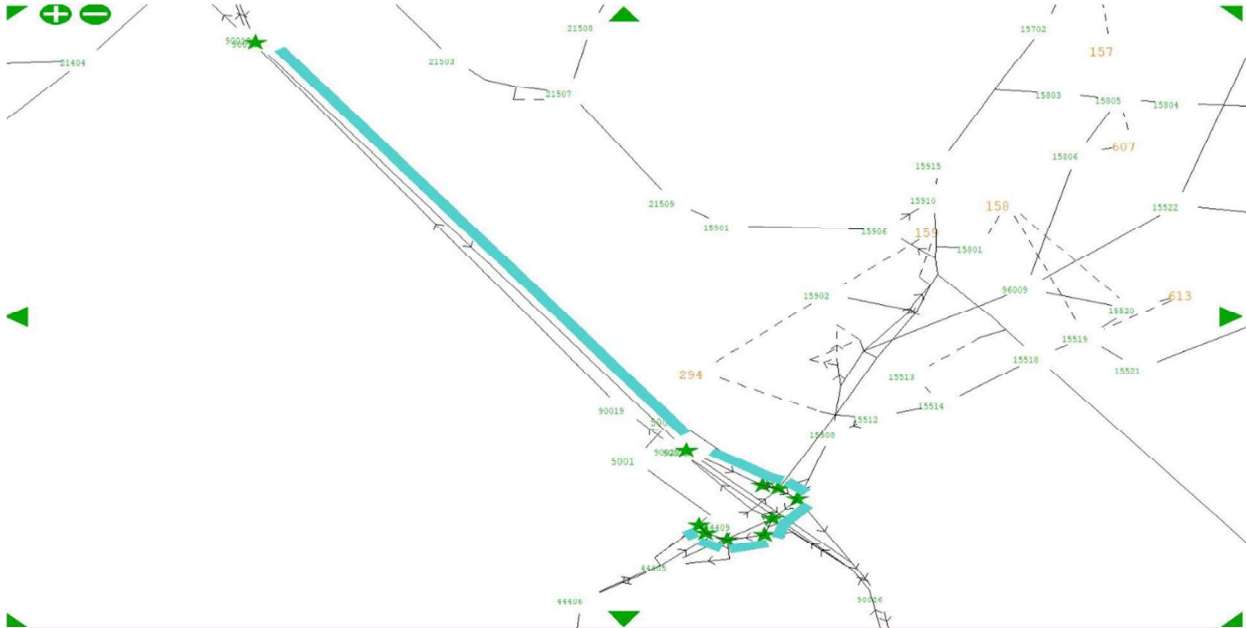
Following a brief overview of the general modelling process initially noted in section 3.6.1 and further elaborated on in section 3.6.1.1, the process and results of the options appraisal against the first three criteria for both the AM and PM peaks are shown in section 3.6.2.1 in Table 29, Table 30 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:

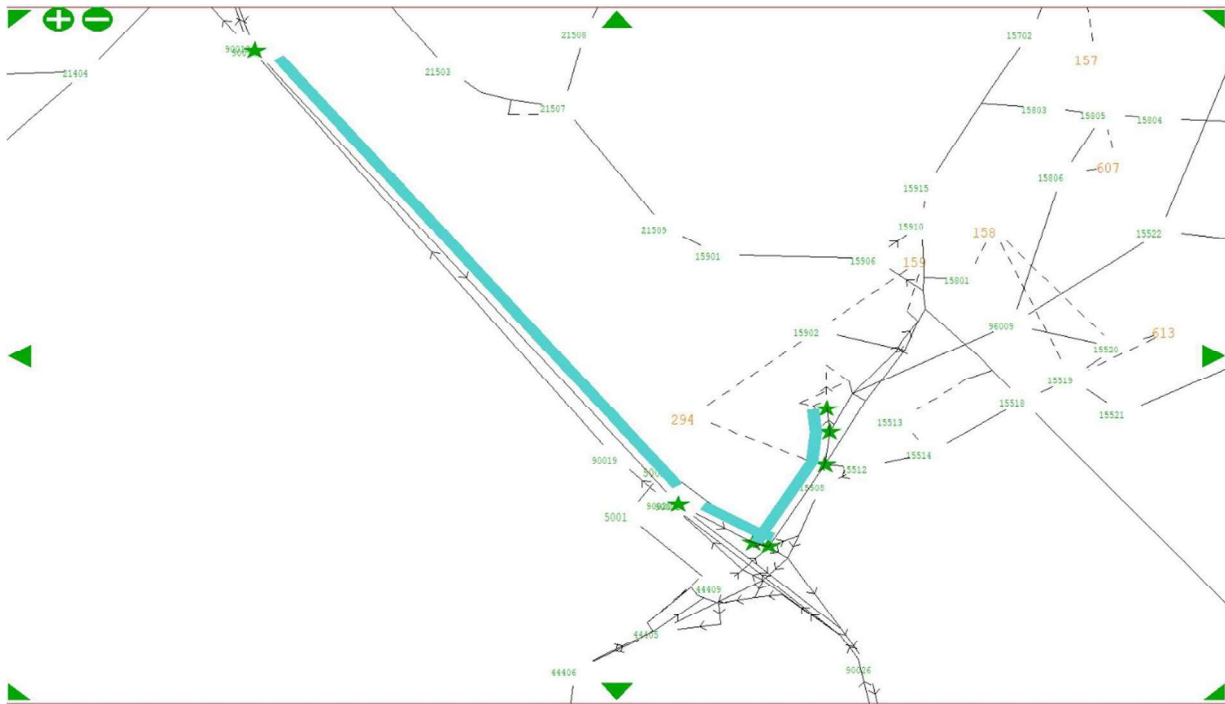
- Potential to link with existing public transport; and
- Potential to link with future public transport proposals.

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 31 indicate 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 Section 3.6.2.2 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 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	<p>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.</p> <p>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.</p>

Option	Impact	Assessment Score	Rationale for Assessment
Cyan	Moderate adverse	-2	<p>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.</p> <p>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.</p> <p>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.</p>
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	<p>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.</p> <p>Grade 1 Listed Buildings: There are no Grade 1 Listed Buildings within 500m of the site. Neutral.</p> <p>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.</p> <p>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.</p> <p>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.</p>
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
			<p>otherwise neutral.</p> <p>Grade 1 Listed Buildings: There are no Grade 1 Listed Buildings within 500m of the site. Neutral.</p> <p>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.</p> <p>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.</p> <p>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.</p>
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	<p>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.</p> <p>Potential impact on floodplain: The proposed scheme is unlikely to result in a loss of floodplain. Neutral.</p> <p>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.</p> <p>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.</p> <p>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</p>

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	<p>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.</p> <p>Potential impact on floodplain: The proposed scheme is unlikely to result in a loss of floodplain. Neutral.</p> <p>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.</p> <p>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.</p> <p>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.</p>
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	<p>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'.</p> <p>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.</p> <p>There is an increase in vehicle movements along Church Road through Hauxton and on the M11 (between Junction 11 and Junction 10).</p> <p>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). Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site.</p> <p>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.</p>

Option	Impact	Assessment Score	Rationale for Assessment
Cyan	Neutral	0	<p>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'.</p> <p>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.</p> <p>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.</p> <p>There is a decrease in vehicle movements on the A1134 Trumpington Road from southern tip of the Cambridge AQMA to Long Road.</p> <p>Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site.</p> <p>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).</p> <p>Overall: The proposed option has a relatively small affected road network and causes more improvements in air quality than deteriorations.</p>
Purple	Neutral	0	<p>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'.</p> <p>There are no AQMAs within the schemes Affected Road Network (ARN).</p> <p>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.</p> <p>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.</p> <p>Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site.</p> <p>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).</p> <p>Overall: The proposed option has a relatively large affected road network and causes more improvements in air quality than deteriorations.</p>
White	Neutral	0	<p>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'.</p> <p>There are no AQMAs within the schemes Affected Road Network (ARN).</p> <p>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.</p> <p>There is an increase in vehicle movements on Church Road through Hauxton.</p>

Option	Impact	Assessment Score	Rationale for Assessment
			<p>Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site.</p> <p>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).</p> <p>Overall: The proposed option has a relatively small affected road network and causes more improvements than deteriorations.</p>
Yellow	Neutral	0	<p>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'.</p> <p>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.</p> <p>There is an increase in vehicle movements on the M11 (between Junction 11 and Junction 12).</p> <p>Expected additional changes in vehicle movements around J11 of the M11, however there are no receptors within 200m of the proposed site.</p> <p>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 = 24.8µg/m³).</p> <p>Overall: The proposed option has a relatively small affected road network and causes more improvements in air quality than deteriorations.</p>
Purple with CAP	Neutral	0	<p>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'.</p> <p>There are no AQMAs within the schemes Affected Road Network (ARN).</p> <p>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.</p> <p>There is a decrease in vehicle movements on the west of the proposed development heading towards Hauxton along the A10.</p> <p>There are additional changes in vehicle movements around the M11 junction. However, there are no receptors within 200m of this location.</p> <p>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.</p> <p>Overall: The proposed option has a relatively large affected road network and causes more deteriorations than improvements. "</p>

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	<p>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.</p> <p>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.</p> <p>Decreases are noted for sections of Hauxton Road where new bus routes alter traffic flow.</p> <p>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.</p>
Cyan	Slightly adverse	-1	<p>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.</p> <p>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.</p> <p>Decreases are noted at for sections of Hauxton Road where new bus routes alter traffic flow.</p> <p>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.</p>
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	<p>All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed.</p> <p>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.</p>

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	<p>All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed.</p> <p>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.</p> <p>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.</p>
Purple	Neutral	0	<p>All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed.</p> <p>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.</p> <p>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.</p>
White	Neutral	0	<p>All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed.</p> <p>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.</p> <p>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.</p>
Yellow	Neutral	0	<p>All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed.</p> <p>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.</p> <p>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.</p>
Purple with CAP	Slightly adverse	-1	<p>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.</p> <p>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.</p> <p>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.</p>

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	<p>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.</p> <p>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.</p>
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 A10 traffic 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

Option	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	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 Table 59.

Table 59: Overall Delay at J11: Option MCAF Scores

Option	AM Peak (08:00-09:00)			PM Peak (17:00-18:00)		
	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

Option	Northbound AM Peak (08:00-09:00)			Southbound PM Peak (17:00-18:00)		
	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 scoring 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

Option	Inbound Access AM Peak (08:00-09:00)			Inbound Access PM Peak (17:00-18:00)			Outbound Egress PM Peak (17:00-18:00)		
	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

Option	Inbound Access AM Peak (08:00-09:00)			Inbound Access PM Peak (17:00-18:00)			Outbound Egress PM Peak (17:00-18:00)		
	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

Option	Inbound Access AM Peak (08:00-09:00)			Inbound Access PM Peak (17:00-18:00)			Outbound Egress PM Peak (17:00-18:00)		
	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

Option	AM Peak (08:00-09:00)			InterPeak			PM Peak (17:00-18:00)		
	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 or 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 or 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 or 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 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: Likelihood 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								Apply Weighting							
Normalised scores (unweighted)								Total weightings must equal 100%							
Max score = 10	PURPLE	PURPLE (CAP)	WHITE	YELLOW	CYAN	D0 MINIMUM	Major Trumpington expansion (MAGENTA)	Central Case	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	25%	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	25%	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	25%	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	25%	2.4	2.4	2.6	3.6	1.9	4.0	3.3
Weighting test 1								100%							
Normalised score (max.10)	5.00	5.14	5.15	5.36	4.84	4.72	4.31		5.00	5.14	5.15	5.36	4.84	4.72	4.31
Rank	3		2	1	4	5	6		3		2	1	4	5	6
Weighting test 2								Selection							
Normalised score (max.10)	5.84	6.11	6.11	6.35	5.82	4.89	4.55	Version	PURPLE	PURPLE (CAP)	WHITE	YELLOW	CYAN	D0 MINIMUM	Major
Rank	3		2	1	4	5	6	1	40%	8.7	10.0	9.8	10.4	8.9	8.0
								2	40%	11.8	11.6	11.8	12.0	11.8	8.0
								3	10%	1.9	1.9	1.8	1.5	1.8	1.9
								4	10%	1.0	1.0	1.0	1.4	0.6	1.6
								100%							
										5.84	6.11	6.11	6.35	5.82	4.89
										3		2	1	4	5

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.

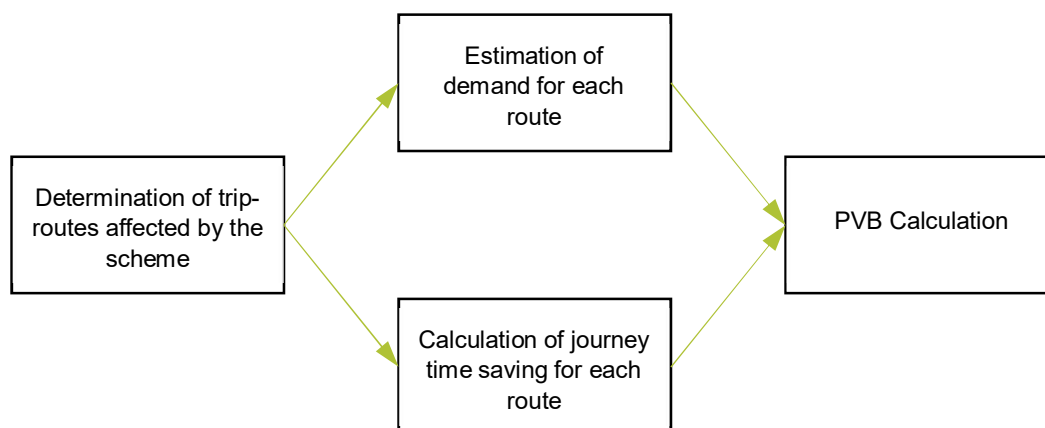
Standard annualisation factors of 759 for the AM peak, 1518 for the interpeak and 759 for the PM peak were used. These assume that the benefits in the modelled AM peak hour of 0800-0900 will be the same for 0700-0800 and 0900-1000. Similarly, they assume that the benefits in the modelled PM peak hour 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.

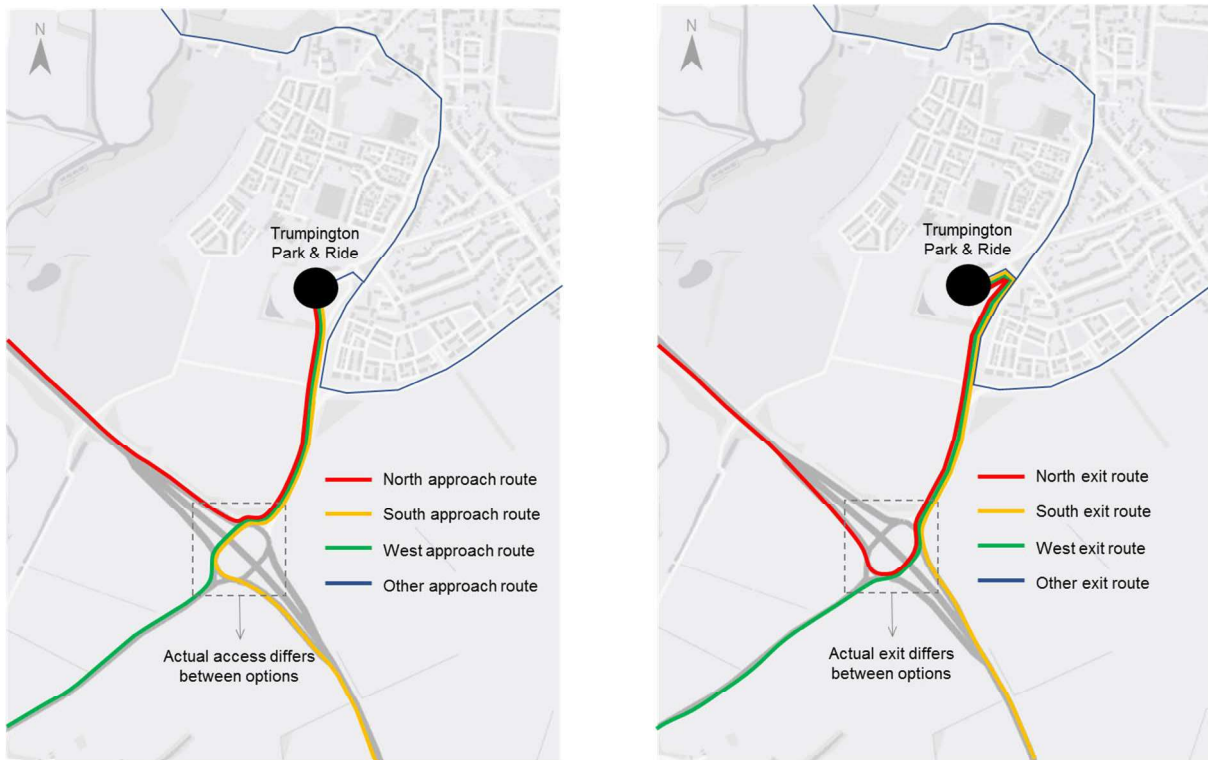
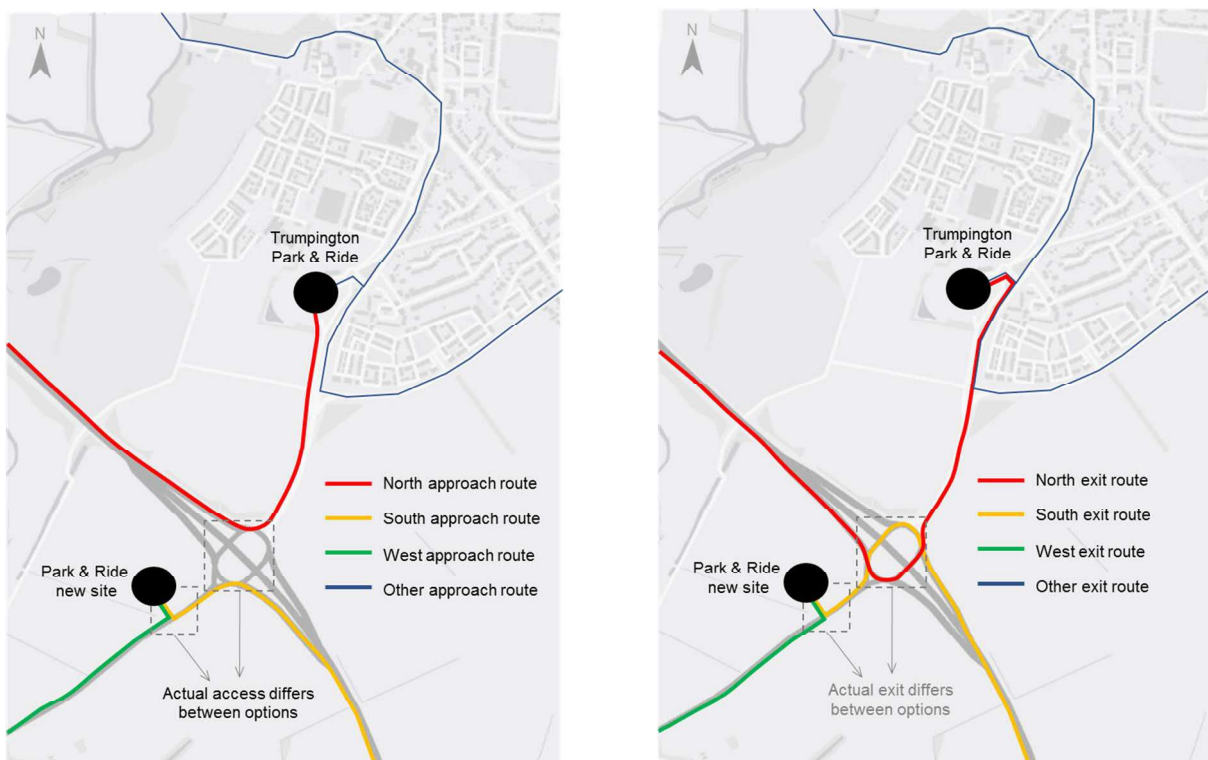
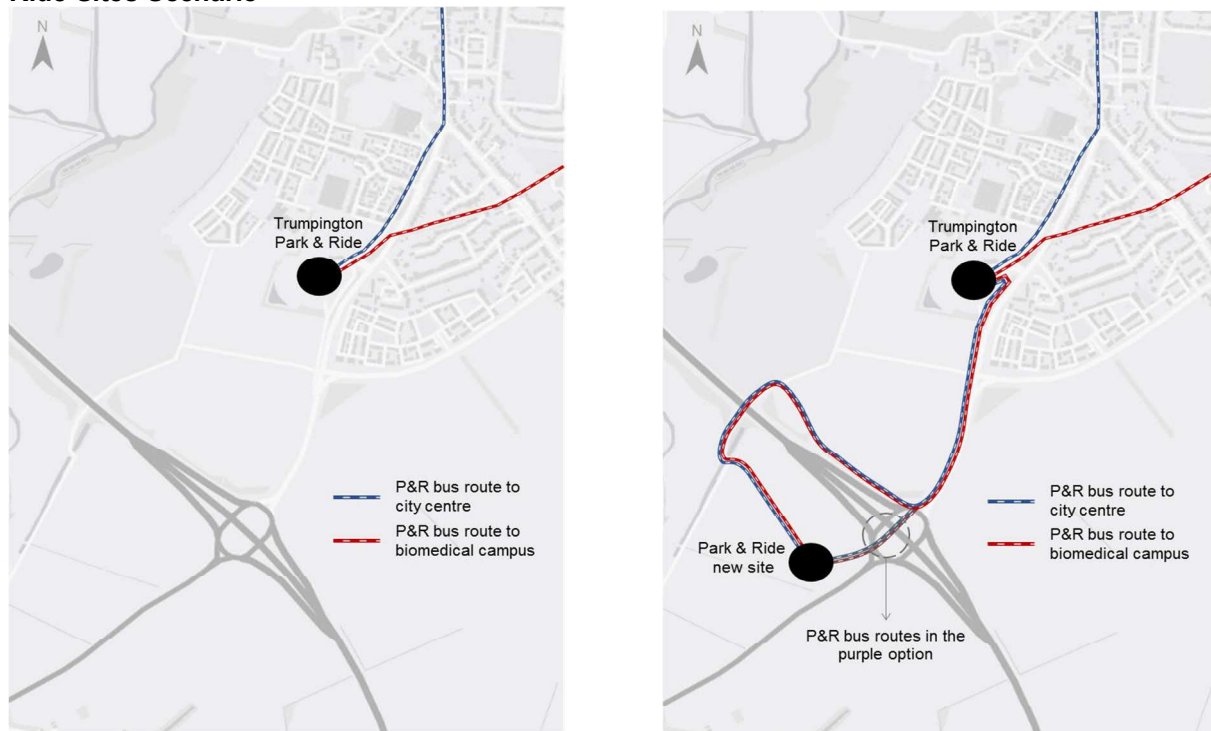
Figure 73: Entry and Exit Car Routes for the expanded existing Park and Ride Site Scenario**Figure 74: Entry and Exit Car Routes for the existing Park and Ride plus new Park and Ride Site Scenario**

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), Phase 1 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, greenhouse gases and greenbelt. Against all criteria the Yellow option scored equally as poorly as the worst performing 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:	5.2 Scheme Costs
	<ul style="list-style-type: none"> Expected whole life costs When they will occur Breakdown and profile of costs by those parties on whom they fall Any risk allowance that maybe needed (in the event of things going wrong) 	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 contractor input to risk management and appraisals, including mitigation measures, to capitalise at an early stage on opportunities to reduce construction risk and improve outturn certainty thereby reducing risks to a level that is as low as reasonably practicable.
- **Deliverability-** Engagement with contractors and stakeholders, throughout planning to scheme delivery, to support development of 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	<ul style="list-style-type: none"> Established form of contract Single stage tender process may reduce overall programme compared with other options 	<ul style="list-style-type: none"> High tender cost for Contractors given design required to support tender submission
Appointment of a Contractor	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Established form of contract Option of either stage 1 Design becoming 'GCP's Design', or transfer risk by novating stage 1 Consultant to the stage 2 Contractor 	<ul style="list-style-type: none"> 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
Appointment of a Consultant in stage 1 with a requirement to obtain ECI advice from a Contractor	<ul style="list-style-type: none"> Maintains competitive tension in both the stage 1 (design) and stage 2 (construction) tenders thereby offering excellent value for money 	<ul style="list-style-type: none"> If a different works contractor is procured compared to the ECI contractor, approach to build may vary and ECI input may be discarded/ abortive.
Appointment of a Contractor in stage 2.		<ul style="list-style-type: none"> Liabilities for construction methodology/ phasing may become blurred between the main works contractor and the ECI contractor/ client

Strategy	Advantages	Disadvantages
<p>Developed Design then D&B (akin to Ely Bypass)</p> <p>Appointment of a Contractor</p> <p>Single stage tender process with a 'Developed Design' stage to develop/ agree a Target Cost prior to proceeding to 'D&B' stage</p> <p>GCP has the option of terminating the contract on completion of Developed Design (i.e. 'break point')</p>	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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
<p>Detailed Design then Build (akin to Kings Dyke)</p> <p>Appointment of a Contractor</p> <p>Single stage tender process with a 'Design' stage to develop/ agree a Target Cost price prior to proceeding to 'Build' stage.</p> <p>GCP has the option of terminating the contract on completion of Design (i.e. 'break point')</p>	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> GCP appoints the Contractor to manage the specialists through separate sub-contracts 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The open tender procedure is fair and transparent • The open tender procedure can be a shorter tendering programme than other procurement methods 	<ul style="list-style-type: none"> • GCP may have multiple tender submissions to evaluate. The evaluation process can be time consuming. Longer evaluation process than 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.	<ul style="list-style-type: none"> 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 	<p>viewed as both an opportunity or a threat depending on the scope of works and the risks associated with the scheme construction methods</p> <ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> The closed tender procedure is a restricted process. Only shortlisted tenderers will submit a tender for the scheme 	<ul style="list-style-type: none"> All tender documents must be made available to all candidates at the start of the pre-qualification process
Pre-qualification process with only short-listed candidates being invited to tender	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Cambridgeshire County Council is a member of the EHA Framework is tried and tested in Cambridgeshire The Framework has been designed to meet the requirements of current and potential future Alliance members for project delivery specifically in terms of cost, quality, and timescales 	<ul style="list-style-type: none"> Framework Contract due to expire on 31/03/20 though we have been advised that it will be re-tendered to extend beyond this date Framework is designed to deliver construction projects costing between £2m and £20m. Estimated construction cost of the Yellow options is circa £25m. However, schemes above £20m might be

Framework	Advantages	Disadvantages
		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Framework based on a single source direct appointment (Balfour Beatty), i.e. no competitive tender. (The framework includes rates for 'preliminaries' costs with construction rates 'market tested').

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	<ul style="list-style-type: none"> • The ESPO framework is compliant with UK/EU procurement legislation • The framework is not due to expire until 18/04/21 • GCP does not need to run a full EU procurement process • The Service Providers on the framework have been assessed during the procurement process for their financial stability, track record, experience and technical & professional ability • GCP and the Service Providers have pre-agreed terms & 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 	<ul style="list-style-type: none"> • GCP is restricted in the value of any direct award by their own financial standing orders when using the direct award approach • 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	<ul style="list-style-type: none"> • GCP can award a professional services contract direct to a member of the Homes England framework up to the value of £15k • The Framework is not due to expire until February 2022 • Framework free to Employers • 20 multi-disciplinary consultants on the approved supplier list. A prequalification process could be used to reduce the number of tenderers for mini-competitions. • GCP can create a mini-competition between suitable Framework service providers • The day rates for a Professional Services supplier are pre-agreed between GCP and the Services Provider • GCP and the Service Provider are able to collaboratively negotiate project specific terms and conditions by the inclusion of replacement clauses 	<ul style="list-style-type: none"> • GCP is restricted to £15k fee limit when using the direct award approach • Challenging terms and conditions for Consultants • Lack of competitive tension if direct award
Cambridgeshire County Council Framework	<ul style="list-style-type: none"> • Bespoke Cambridgeshire County Council Framework 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The Framework is the recommended route for all central government departments and is available to local authorities and other public sector bodies • The Framework is not due to expire until 02/05/21 • Framework free to GCP 	<ul style="list-style-type: none"> • Challenging terms and conditions for Consultants • Lack of competitive tension if direct award

Framework	Advantages	Disadvantages
	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • Encourages co-operation between parties • Contractor takes full responsibility for nominated sub-contractors 	<ul style="list-style-type: none"> • Lump sum terms can result in Contractors allowing for costs for risks that do not arise • No Early Warnings - retrospective approach to risk mitigation
JCT	<ul style="list-style-type: none"> • Potentially more familiar to Local Authority officers • Ground risk rests with the Contractor • Clear payment section • Comprehensive detail regarding insurances 	<ul style="list-style-type: none"> • Emphasis on the obligations of the parties under the contract • Programme – not a contractual document and updates of the initial programme are not mandatory • Time and financial aspects of claims are dealt with separately • No Early Warnings – retrospective approach to risk mitigation • Contractor only obliged to make a claim after the risk event has occurred • No obligation to notify regarding defects • Contractors may include costs for risks that do not arise due to risk transfer • Tends to be used for building contracts rather than civil engineering and highways contracts
NEC	<ul style="list-style-type: none"> • Clarity and simplicity – written in plain English • Flexibility – adaptable to various forms of construction • Stimulus to proactive management • Encourages co-operation between parties • The programme – a key contractual document which must be regularly updated • Early Warnings – promotes proactive approach to problem resolution • Obligation on both parties to notify each other regarding defects 	<ul style="list-style-type: none"> • Requires substantial administration with higher administration costs as a consequence • Processes are prescriptive • Significantly less case law to provide guidance in dispute resolution compared with other forms of contract • Employer has a wider ownership of risk

Source: 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 ECC Conditions of Contract are set out in Table 102.

Table 102: NEC ECC Conditions of Contract - Incentives and Risks for GCP

NEC Option	Incentives	Financial Risk	Other Risks
Option A Priced Contract with Activity Schedule	Payment on completion of activities encourages progress. Contractor motivated to keep within his tendered price. Option suitable for 100% Contractor design	Contractor under pressure to complete within the tendered price.	Completeness & accuracy of activity schedule is the Contractor's risk. GCP would pay a premium for Contractor's risk
Option B Priced Contract with BoQ	GCP would have responsibility for design and re-measuring the works for payment	Contractor bears the risk on undertaking the works within the tendered priced rates. GCP would bear the risk if the BoQ is inaccurate. No incentive for the Contractor to produce an economic design	Completeness & 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 or 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

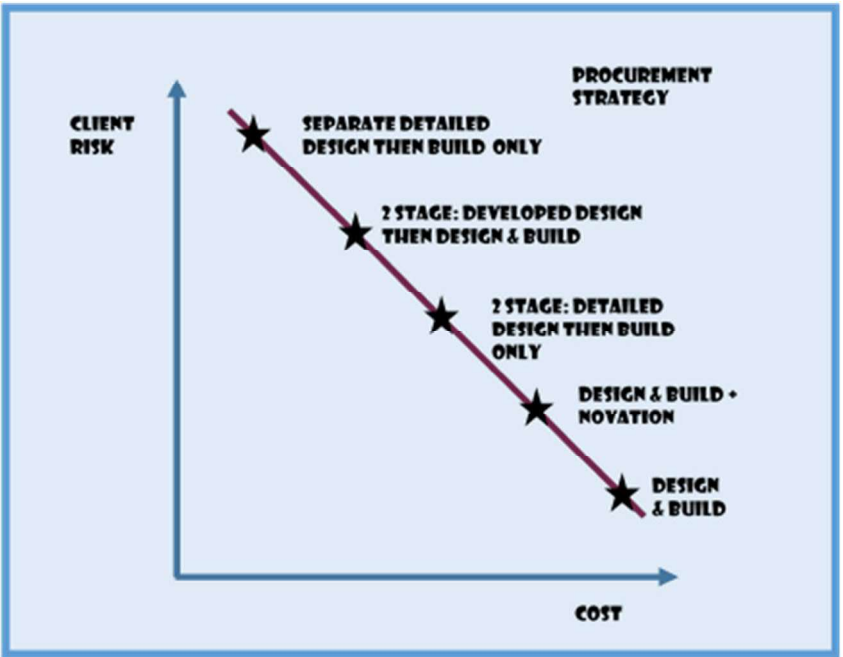
At this stage in the development of the project, prior to any procurement process, all liabilities and risks rest with GCP.

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.

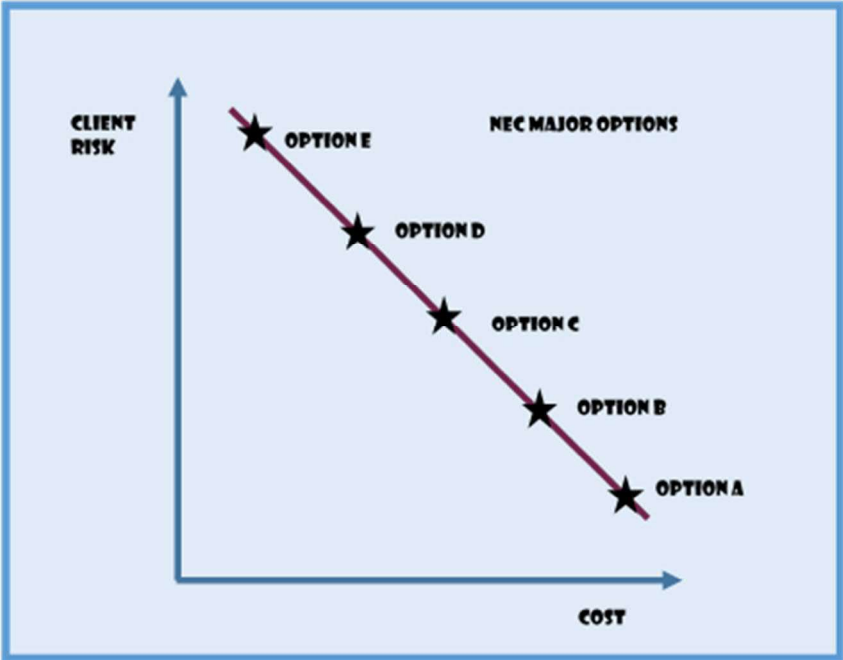
Figure 77: Risk vs Cost Profile- Procurement Strategy



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	<p>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.</p> <p>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.</p> <p>The above timescale was for a 531-space car park and building. Due to the success of the scheme, the scale of the site has increased beyond its first built capacity and now provides 792 car parking spaces to cater for the high level of continued demand.</p>	£3.1m
Longstanton and St Ives Park and Ride	<p>A further two Park and Ride sites were constructed in 2011 alongside the Cambridgeshire Guided Busway providing connectivity to Cambridge and Huntingdon. These sites have been a success in intercepting traffic and have both also increased beyond their first built capacity.</p> <p>The Longstanton Park and Ride Site now provides 350 parking spaces. St Ives Park and Ride has capacity for 1000 vehicles. Both sites are also provided with covered cycle parking.</p> <p>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.</p>	Estimated at £9m for both sites ³³ .
The Cambridge Core Traffic Scheme	<p>This scheme delivered improved access to public transport through traffic management and priority measures in the area bounded by the inner ring road.</p> <p>Delivery of this project demonstrates an ability of the promoters to consider the full impacts of a public transport scheme.</p> <p>The measures were implemented in phases from 1997, promoting sustainable travel modes to improve the city centre environment. Between 1993 and 2003 the number of private vehicles in the city centre fell by 15%. Public transport patronage on routes into Cambridge also increased.</p>	£6.9m ³⁴
The Addenbrooke's Access Road	<p>This access road is a single carriageway route, with a number of junctions and structures, that connects Hauxton Road in Trumpington on the south side of the city to Addenbrooke's Hospital.</p> <p>The route provides access to the expanding hospital and Biomedical Campus, together with development on the Cambridge Southern Fringe, and reduces traffic in the Trumpington area and on Long Road. The scheme was completed in October 2010.</p>	£24m

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	<p>This busway provides a high-quality public transport connection between Huntingdon and St Ives, to the north west of Cambridge, and Addenbrooke's Hospital and Trumpington Park and Ride to the south of Cambridge.</p> <p>Access to Cambridge City Centre is provided via on-street running. The overall route is 42km long with 25km of that being guided busway and 17km of on-street provision including bus priority measures.</p> <p>Construction began in July 2006 with the busway opened in August 2011.</p> <p>Although there were challenges during the delivery of the scheme, learning from this can benefit the delivery of future significant transport measures in the County.</p>	£150m ³⁵
The Ely Southern Bypass	<p>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.</p>	£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

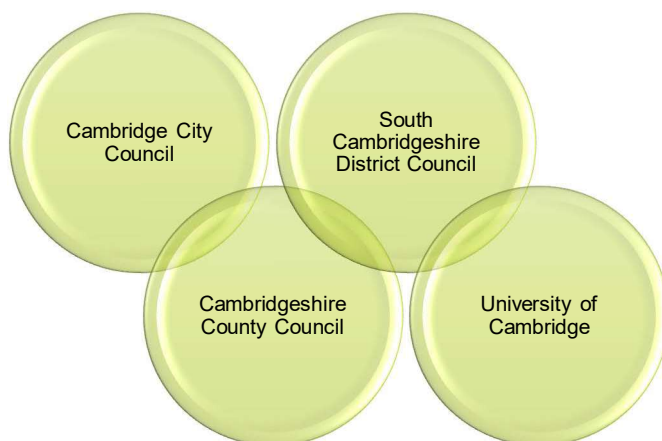
The governance of this project operates at several levels; strategically by the Greater Cambridge Partnership executive board and at a lower level by the project team, which will be influenced by key stakeholders and external partners. This section sets out how this project will be governed and managed 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 apprenticeships³⁶. 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

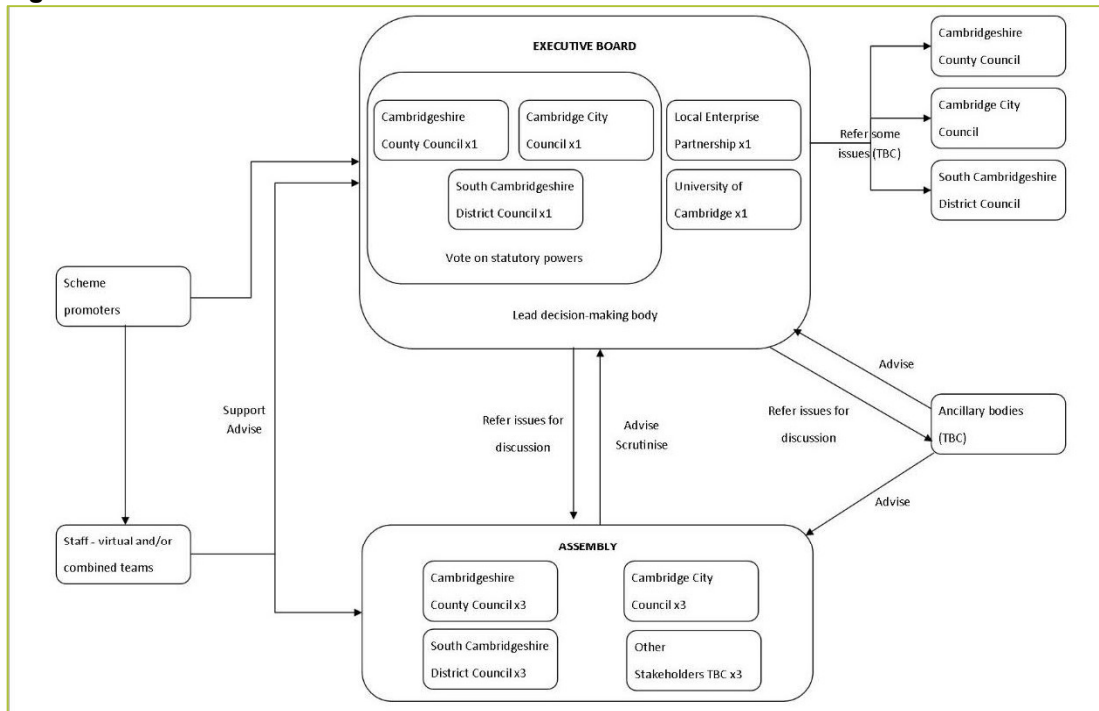


Source: <https://www.greatercambridge.org.uk/>

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.

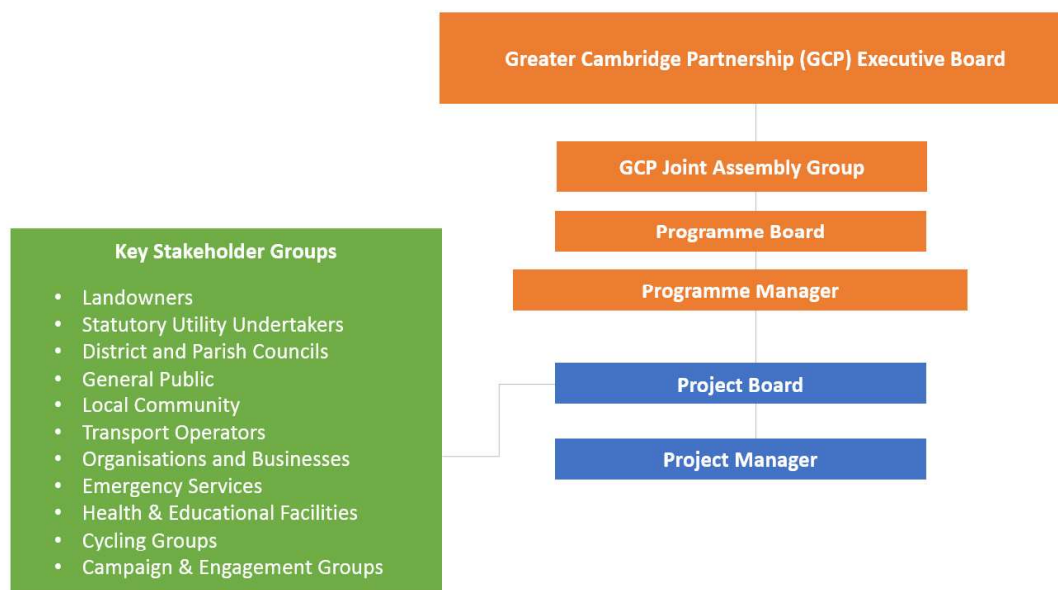
Figure 80: GCP Governance Structure



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.

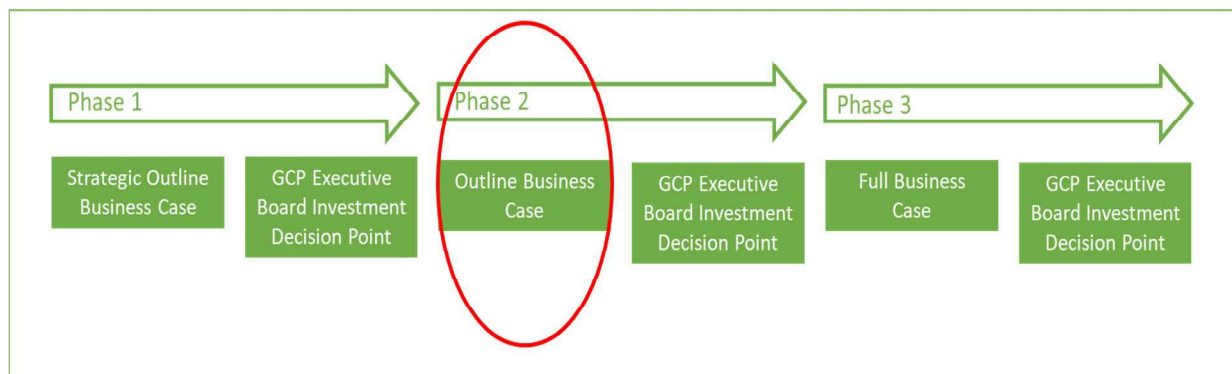
7.5 Assurance Frameworks

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	26 th April 2019
GCP Executive Board Decision/approval of OBC	27 th June 2019
Submit planning application	13 th December 2019
FBC Submission (draft)	1 st May 2020
GCP Executive Board Investment Decision on preferred option	27 th July 2020
Amend FBC following feedback from planning application	14 th August 2020
FBC Submission (final)	17 th August 2020

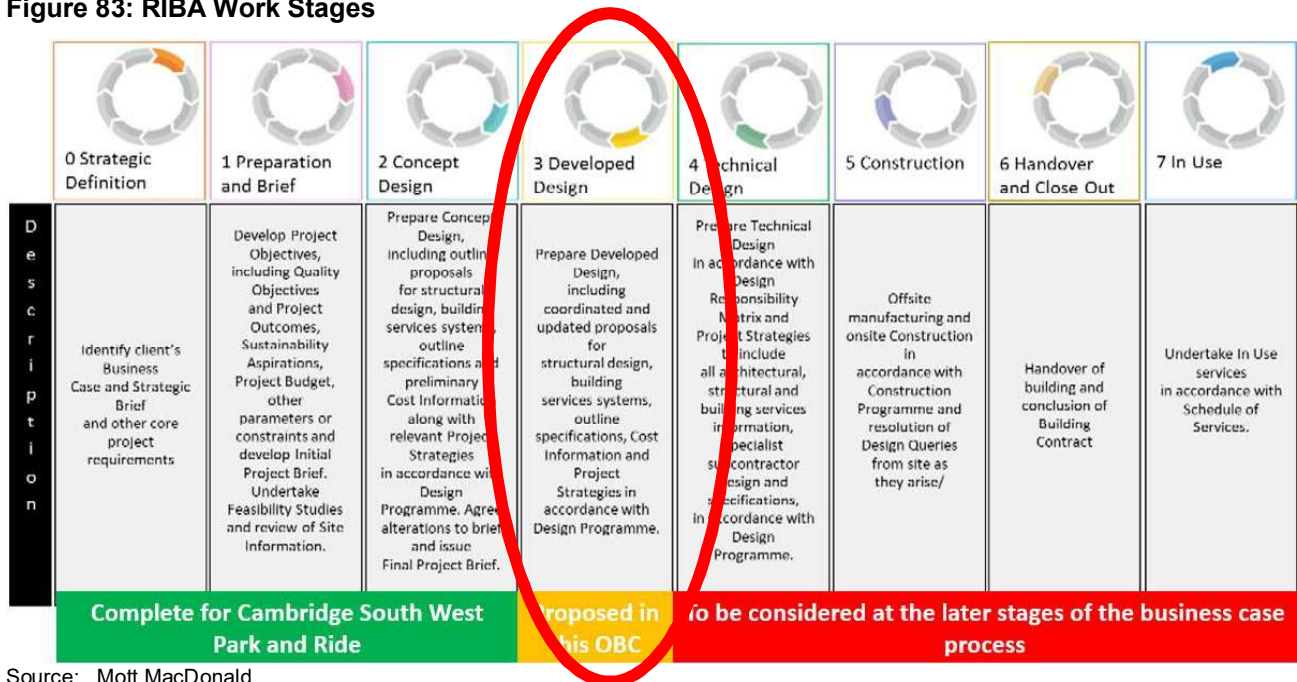
Source: GCP/Mott MacDonald

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

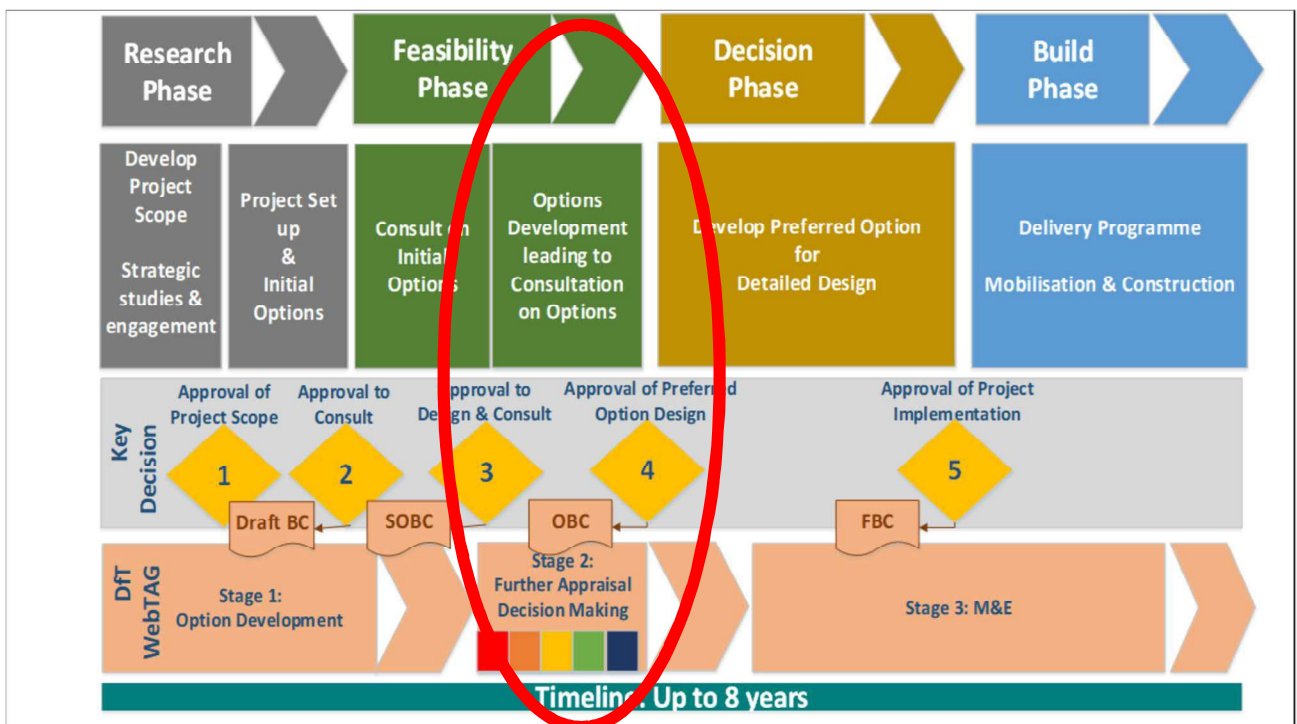
Figure 83: RIBA Work Stages



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

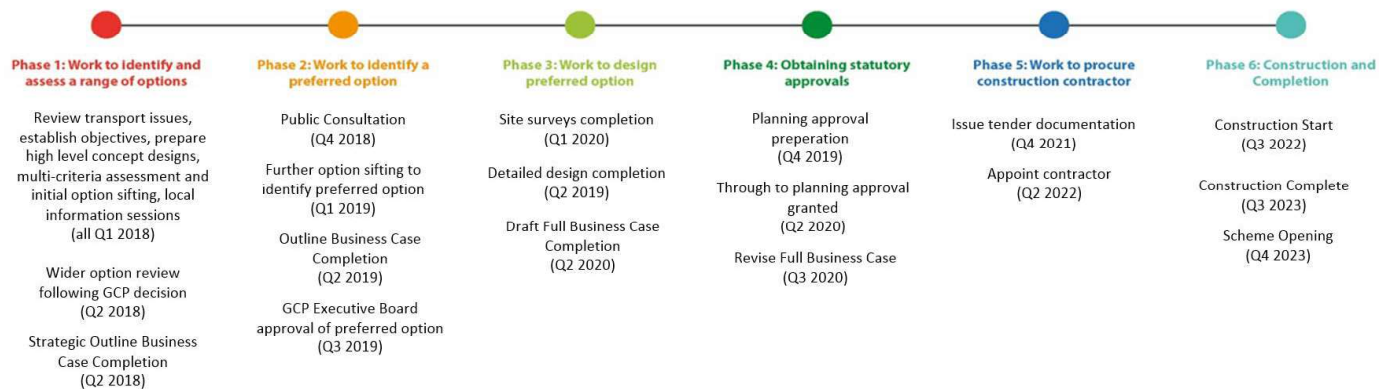


Source: Greater Cambridge Partnership

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

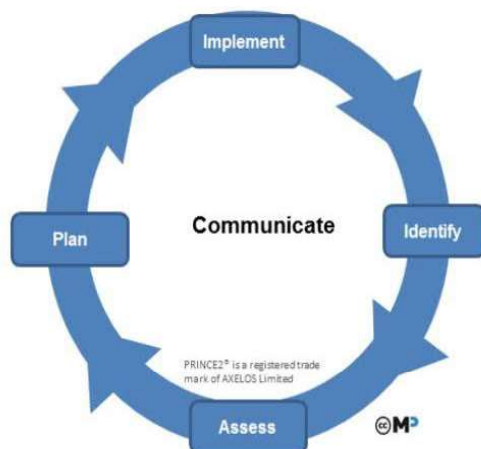
The GCP has adopted a robust strategy to ensure effective management of risks in order to enable the successful delivery of all City Deal funded projects, including the Cambridge South West Park and Ride scheme.

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 or 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
<ul style="list-style-type: none"> ● 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
<ul style="list-style-type: none"> Low financial loss (proportionate to budget involved) 		
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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			
			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
Internal Stakeholders	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
	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			
			Likelihood	Impact		Score	Likelihood	Impact	Score
Project Funding	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	2	3	6	Medium Risk
	Emerging recommended scheme not supported by the Board	Greater Cambridge Partnership	2	5	10	2	5	10	Medium Risk
	Development of processes and procedures related to GCP funding introduces new decision points and reporting requirements.	Greater Cambridge Partnership	3	4	12	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	2	4	8	Medium Risk
	Access to land denied	Environmental Impact Assessment Lead	3	3	9	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	2	5	10	High Risk
	Impact of new P&R on existing local bus services	Project Manager	3	4	12	3	4	12	High Risk
	Incomplete traffic modelling	Project Team	3	4	12	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
	New LTP does not support Park & Ride	Greater Cambridge Partnership	3	2	6	Escalation of issues via political process. Engagement with COC policy team	3	2	6	Medium Risk
Statutory Process	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. <ul style="list-style-type: none"> Platform to complete questionnaire online 	<ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Social advertising will be used to extend the reach of selected posts and target younger age groups 	<ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Record comments in writing through formal questionnaires available on site and ad hoc feedback at events 	<ul style="list-style-type: none"> Residents Local businesses General public 	November 20 th - 6 th December 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Residents Local businesses General public 	Autumn 2018 ongoing for 6 weeks
Questionnaire	Invite comments on proposals and importance of tackling congestion. <ul style="list-style-type: none"> Seek profile and travel information about the individual or business responding 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Links to the Consult Cambs website and the project webpage which cover 	<ul style="list-style-type: none"> 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.

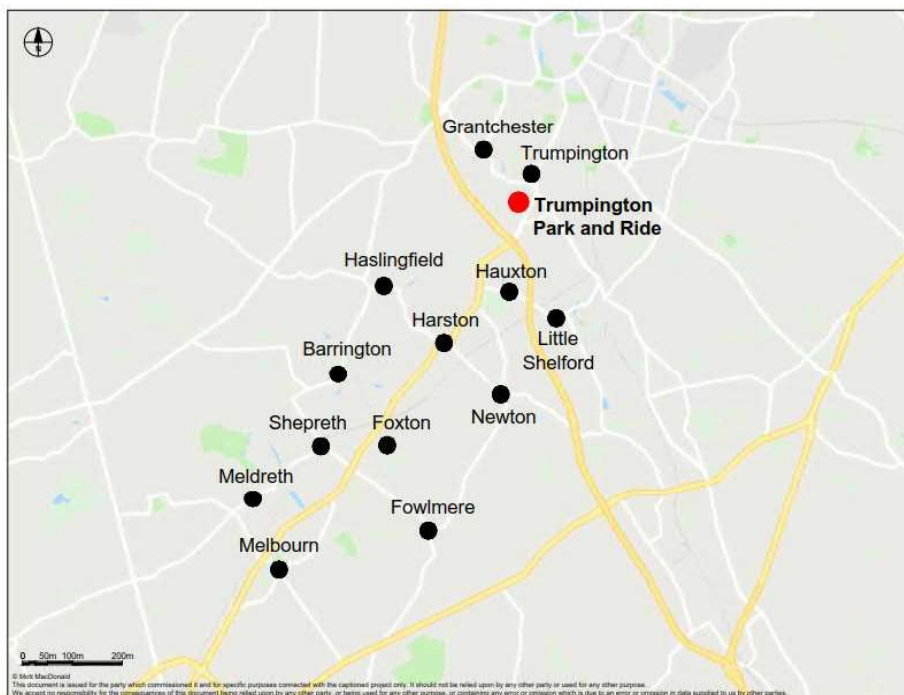
Public consultation was carried out between 5th November and 21st December 2018. This stage of the consultation presented details of the option short list to all stakeholders and the general public via a range of communication channels. The public consultation materials set out the case for change, explaining 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

HAVE YOUR SAY

Have your say by 21 December 2018

There are a number of ways to respond to the consultation:

- Fill out the questionnaire at www.greatercambridge.org.uk/parkandride
- Complete the paper questionnaire and return by freepost or drop it in to a local event
- consultations@greatercambridge.org.uk
- 01223 699906
- Greater Cambridge Partnership, SH1317, Shire Hall, Cambridge CB3 0AP
- @greatercams #GCPP&RConsult
- facebook.com/GreaterCam

More information including frequently asked questions is available online at www.greatercambridge.org.uk/parkandride

If you would like a copy of this leaflet in large print, Braille, audio tape or in another language please call 01223 699906.

Join us to find out more at a public exhibition:

LOCATION	DATE	TIME	ADDRESS
Trumpington Park & Ride	Tuesday 20 November 2018	7.30-9.00	43 Hauxton Road, Cambridge, CB2 9FT
Hauxton Primary School	Wednesday 21 November 2018	18.00-20.00	Jostling Way, Hauxton, Cambridge, CB22 5HY
Trumpington Village Hall	Thursday 29 November 2018	17.30-20.00	75 High Street, Trumpington, Cambridge CB2 9HZ
Addenbrooke's Treatment Centre	Wednesday 5 December 2018	12.00-14.00	Addenbrooke's Treatment Centre, Keith Day Road, Cambridge, CB2 0SL
Harston Village Hall	Thursday 6 December 2018	18.00-20.00	20 High Street, Harston, Cambridge, CB22 7PX

Check out our website for further event details: www.greatercambridge.org.uk

Timeline:

- EARLY 2019:** Analysis of consultation responses
- SUMMER 2019:** Final option recommendation to GCP Executive Board
- 2020:** Detailed design
- 2021:** Seek relevant powers to construct
- 2021:** Start construction

Please note, timescales are indicative, subject to change and dependent on approvals.

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Stakeholder Education establishments i.e. UoC Businesses i.e. Biomedical Campus 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of 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 	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	<ul style="list-style-type: none"> Employees Visitors Businesses 	<ul style="list-style-type: none"> Cambridge Biomedical Campus 	<ul style="list-style-type: none"> Completion of 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 	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	<ul style="list-style-type: none"> Commuters Visitors Residents of Trumpington and Hauxton Road 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride Implementation of City Access Measures Completion of other transport schemes e.g. A1307, Cambourne to Cambridge 	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	<ul style="list-style-type: none"> Local stakeholders Businesses Commuters 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride Implementation of City Access Measures Completion of other transport schemes e.g. A1307, Cambourne to Cambridge 	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	<ul style="list-style-type: none"> Local stakeholders Businesses Visitors 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride Implementation of City Access Measures Completion of other transport schemes e.g. A1307, Cambourne to Cambridge 	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	<ul style="list-style-type: none"> Commuters Visitors Residents within the surrounding area 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of 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	<ul style="list-style-type: none"> Residents Public transport operators Commuters 	<ul style="list-style-type: none"> Park and Ride service operators 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride Implementation of City Access Measures Completion of other transport schemes e.g. A1307, Cambourne to Cambridge 	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	<ul style="list-style-type: none"> Local stakeholders Businesses 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride Implementation of City Access Measures Completion of other transport schemes e.g. A1307, Cambourne to Cambridge 	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	<ul style="list-style-type: none"> Local stakeholders Commuters Visitors Businesses 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of 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 	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	<ul style="list-style-type: none"> Businesses Stakeholder CCC / CaCC / SCDC 	<ul style="list-style-type: none"> Local businesses UoC 	<ul style="list-style-type: none"> 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 	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	<ul style="list-style-type: none"> Businesses Tourist attractions Visitors 	<ul style="list-style-type: none"> Retail and leisure businesses 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride 	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		<ul style="list-style-type: none"> Local stakeholders 	<ul style="list-style-type: none"> CCC / CaCC / SCDC - tourism/visitor support department 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Businesses Stakeholder CCC / CaCC / SCDC 	<ul style="list-style-type: none"> Local Businesses 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride Marketing of Cambridge South West Park and Ride to potential users 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Local stakeholders Housing developers 	<ul style="list-style-type: none"> GCP - scheme promoter Housing developers 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Local stakeholders Visitors Commuters 	<ul style="list-style-type: none"> GCP - scheme promoter CCC Highways department 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride Effective Integration of Cambridge South West Park and Ride with existing highways network. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Cyclists Local stakeholders Visitors 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Cyclists Local stakeholders Visitors 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Local stakeholders Commuters Visitors 	<ul style="list-style-type: none"> GCP - scheme promoter 	<ul style="list-style-type: none"> Completion of Cambridge South West Park and Ride Implementation of City Access Measures 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> ● Programme / project plan assessment ● Stakeholder management approaches ● A review of the risk register and assessment of the impacts ● Assessment to determine whether the scheme is on track to deliver anticipated benefits 	During delivery	Knowledge
Delivered scheme	Output	<ul style="list-style-type: none"> ● Full description of scheme outputs ● Identification of any changes to the scheme since funding approval ● Identification of any changes to assumptions ● Assessment of whether the scheme has reached the intended beneficiaries ● Identification of changes to mitigation measures 	During delivery / post opening	Accountability
Costs	Input	<ul style="list-style-type: none"> ● Outturn investment costs ● Analysis of risk in the elements of investment costs ● Identification of cost elements with savings ● Analysis for cost elements with overruns ● Outturn operating costs ● Outturn maintenance or other capital costs 	During delivery / post opening	Accountability

Item	Stage	Type of Information Provided	Data Collection Timing	Rationale
Scheme Objectives	Output/ Outcome/ Impact	<ul style="list-style-type: none"> Identification of the main objectives 	Pre or during delivery / post opening (up to 5 years)	Accountability
Travel demand	Outcome	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Travel times / accountability changes to businesses Employment levels and Rental values 	Pre or during delivery / post opening (up to 5 years)	Knowledge / Accountability
Carbon	Impact	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • Programme / project plan assessment • Review of risk register and assessment of impacts • Project review during scheme design and build • Site inspections 	Ongoing throughout delivery and construction	Greater Cambridge Partnership
Disruption during construction	<ul style="list-style-type: none"> • Programme / project plan assessment • Review of risk register and assessment of impacts • Project review during scheme design and build • Site inspections 	Ongoing throughout delivery and construction	Greater Cambridge Partnership
Land acquisition requirements	<ul style="list-style-type: none"> • Programme / project plan assessment • Ongoing engagement and negotiation with landowners 	Ongoing throughout delivery and construction	Greater Cambridge Partnership
Infrastructure maintenance / renewals complexity	<ul style="list-style-type: none"> • Programme / project plan assessment • Review of risk register and assessment of impacts • Project review during scheme design and build • Site inspections 	Ongoing throughout delivery and construction	Greater Cambridge Partnership
Changing cost implications	<ul style="list-style-type: none"> • Programme / project plan assessment • Identification of any changes to assumptions • Analysis of risk in the elements of costs • Project review during scheme design and build • Site inspections 	Ongoing throughout delivery and construction	Greater Cambridge Partnership
Likelihood of public support	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> Traffic flows on A1309 Hauxton Road Traffic flows on A1309 High Street 	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Traffic flows on J11 circulatory Overall delay at J11 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Journey times on the A10 Harston to J11 	<ul style="list-style-type: none"> Traffic master data analysis ATC counters 	Prior to or during delivery to assess baseline data and one and four 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)	<ul style="list-style-type: none"> P&R bus patronage from Trumpington / J11 area to city centre / Cambridge Biomedical Campus 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Number of Park and Ride spaces in Trumpington / J11 area Increase in business start-ups at Cambridge Biomedical Campus 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> P&R bus journey times Trumpington to city centre 	<ul style="list-style-type: none"> 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
Quality of Life and Environment	Time to access both the new P&R site and existing Trumpington site from the A10	<ul style="list-style-type: none"> Journey time to access Trumpington site from the A10 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Journey time to access Trumpington site from the M11 Northbound 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Journey time to access Trumpington site from the M11 Southbound 	<ul style="list-style-type: none"> 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
	Potential for road accidents	<ul style="list-style-type: none"> Number of accidents at the M11 J11, along the A10 and Hauxton Road 	<ul style="list-style-type: none"> Analysis of highways incidents 	Prior to or during delivery to assess baseline data and one and four years post completion
	Walking and cycling networks	<ul style="list-style-type: none"> Increase in people walking and cycling 	<ul style="list-style-type: none"> 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





Cambridge M11, Junction 11

VISSIM Model Assessment Report

21st February 2019

Cambridge M11, Junction 11

VISSIM Model Assessment Report

21st February 2019

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
A	Nov'18	Michael Brodrick	Matt Hall	Heather Clarke	Initial Draft
B	Feb'19	Michael Brodrick	Matt Hall	Heather Clarke	Additional Scenario Testing

Document reference: 393699-MMD-TMO-XX-RP-TA-0038

Information class: Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Contents

1	Introduction	1
2	Data Inputs	3
2.1	Manual Classified Counts (MCC)	3
2.2	Highways England WebTRIS	3
2.3	Journey Time Data	3
2.4	Public Transport Inputs	4
3	Base Model Development	5
3.1	Network Coding	5
3.2	Traffic control systems	6
3.2.1	PC MOVA	6
3.2.2	UTC-SCOOT	7
3.2.3	Vehicle Actuated Signals	7
3.2.4	Priority/Give Way Junctions	7
3.3	Vehicle Routes and Inputs	7
3.4	Vehicle Composition	8
4	Validation	9
4.1	Calibration	9
4.1.1	Static Assignment	9
4.1.2	Signal Timings	12
4.1.3	Pedestrian Demand	12
4.1.4	Priority Rules	12
4.2	Journey Time Validation Results	12
4.2.1	AM Validation	12
4.2.2	PM Validation	12
4.3	Validation Summary	13
5	Proposed Scheme Assessment	16
5.1	Forecast Scenarios	16
5.2	CSRM SATURN Model	16
5.3	Network Changes	17
5.3.1	Core Changes	18
5.3.2	Magenta	18
5.3.3	Cyan	19
5.3.4	White	20
5.3.5	Yellow	21

5.3.6	Purple	22
5.4	Traffic Signal Coding	23
5.4.1	LinSig/VisVAP	23
5.4.2	PC MOVA	23
6	VISSIM Results	24
6.1	Network Performance	24
6.1.1	AM Summary	24
6.1.2	PM Summary	25
6.1.3	Summary	25
6.2	Junction Performance	31
6.2.1	AM Summary	31
6.2.2	PM Summary	32
6.3	Journey Time	35
6.3.1	AM Summary	35
6.3.2	PM Summary	36
6.4	CAP Sensitivity Test	40
6.4.1	Network Performance Summary	40
6.4.2	Junction Performance Summary	41
6.4.3	Journey Time Results	45
7	Additional Options Testing	49
7.1	Proposed Infrastructure Changes	49
7.1.1	P&R Roundabout	49
7.1.2	M11 Westbound Signals	50
7.1.3	M11 NB On-slip Merge	50
7.2	VISSIM results	51
7.2.1	AM Summary – ‘P&R Roundabout’	51
7.2.2	PM Peak – ‘M11 Westbound Signals’ and ‘M11 Northbound On-slip Merge’	56
8	Summary	60
	Appendices	64
A.	Base Flow Diagrams	65
B.	DS Scenario Drawings	78
C.	ASTRID Data Calibration Changes	84
D.	AM Modelled Vs. Observed Flow Comparison	87

E.	PM Modelled Vs. Observed Flow Comparison	94
F.	AM Junction Performance Comparison	101
G.	PM Junction Performance Comparison	120

1 Introduction

Mott MacDonald has been commissioned by the Greater Cambridge Partnership (GCP) to test the impact of various public transport improvement options along the Trumpington Road corridor to the south west of the city which forms part of the West of Cambridge Package of schemes. Microsimulation software PTV VISSIM 10.00-10 has been used as an assessment tool for this study.

The corridor included in the study stretches from south west of Junction 11 of the M11, including sections of the M11 to the north and south, and to the north up to the Fen Causeway on the outskirts of the city centre.

A validated base network based on 2016/18 observed data has been developed for the AM and PM peak periods. Forecasted traffic flows based on strategic modelled flows have been applied to the models to create future year assessments.

This report details the Base model development and validation which acts as the Local Model Validation Report (LMVR), and the future year model assessment.

The location of the study can be seen within Figure 1.1; with the dashed red outline indicating the extent of the modelled area. More detailed images can be found in later sections of this report.

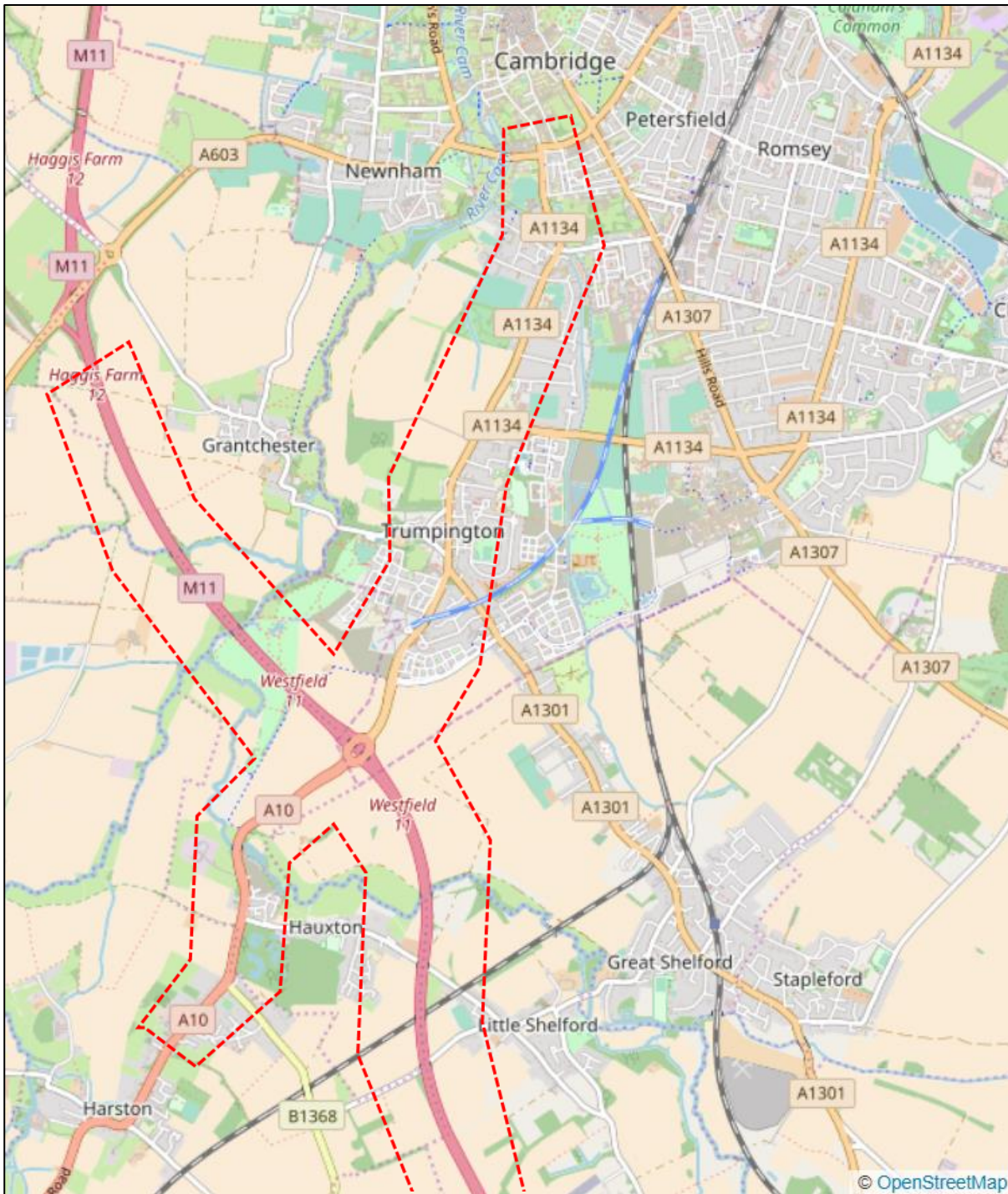


Figure 1.1 - Location and model extents

2 Data Inputs

A series of Manual Classified Count traffic surveys were conducted as part of this study at key junctions along the corridor, with supplementary ATC surveys at several points along the A1309/A1134.

2.1 Manual Classified Counts (MCC)

Turning counts by vehicle class were recorded at 20 junctions between the hours of 07:00-19:00 on a single Tuesday (20th) in March 2018, by 15-minute period.

A process of balancing was carried out on all MCC data to remove any discrepancies in flow between upstream and downstream junctions, taking consideration to ensure the full level demand was captured. Appendix A contains a summary of the three-hour flow fed into the Base VISSIM models. Video footage provided covering the MCCs were used to assist the model building process and during validation.

2.2 Highways England WebTRIS

The M11 Junction 11 MCC survey site recorded movements at each arm of the roundabout. However, the M11 mainline through movement was not recorded. Therefore, freely available WebTRIS data recorded and provided by Highways England was used to provide traffic flow data for these movements in both directions. To maintain consistency with the MCC data, the same Tuesday in March 2018 WebTRIS data was used.

2.3 Journey Time Data

Journey time data was provided by Cambridgeshire County Council (CCC) in the form of 2016 TrafficMaster data. The data provided was filtered to provide Monday-Thursday weighted average journey time data for all vehicles, by 15-minute period for the month of March. This data has been used to validate the model.

TrafficMaster data was extracted for eight journey time sections: two in each direction on the M11 and two in each direction on the corridor between Harston and Cambridge. Figure 2.1 illustrates the journey time routes used. Please note, the start and end sections of the journey time routes are partly determined by ITN network link endpoints.

Journey time data for the eight journey sections is contained within Tables 4.3 and 4.4 within the Validation section of this report.

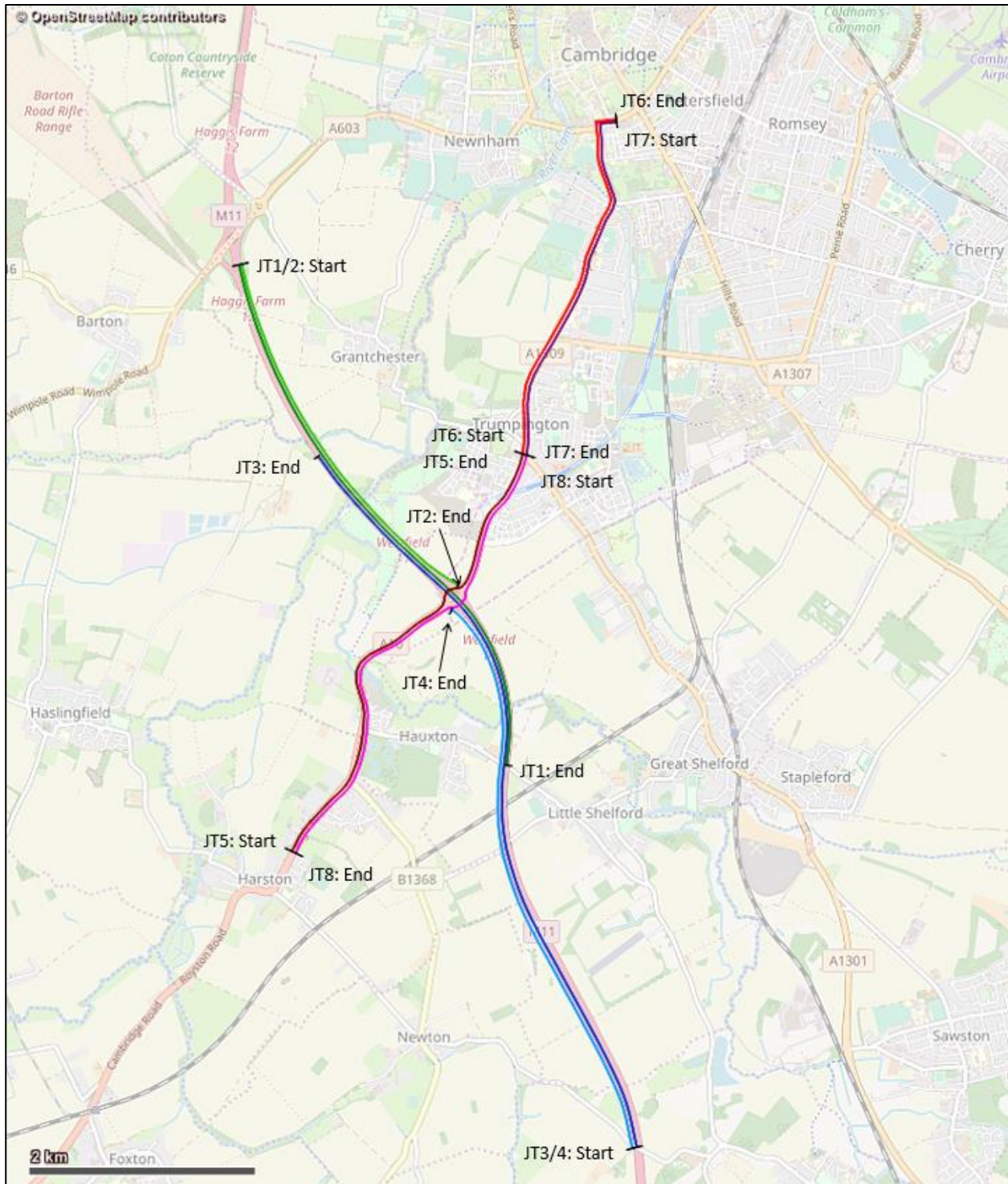


Figure 2.1 - Journey Time Route Plan

2.4 Public Transport Inputs

Publicly available bus timetables have been used to input bus routes and timetables. Only timetabled bus services have been considered, however, data input from the MCCs include the vehicle category Public Service Vehicles (PSV) to account for privately chartered and non-timetabled services captured by the survey.

3 Base Model Development

The model has been developed in PTV VISSIM 10.00-10, the latest version at the time of model development. VISSIM comprises five main components:

- Highway network (links and connectors);
- Traffic control systems (signal, stop and give-way control);
- Traffic inputs;
- Vehicle routes; and,
- Vehicle type and compositions.

Peak periods lasting three hours in duration have been modelled for the AM and PM peaks, with an additional 30-minute warm up period prior to the start of evaluation to populate the model, morning peak 07:00-10:00 and evening peak 16:00-19:00. Each model has been run 16 times with random seeds to replicate day-to-day variance – the average of these runs has been used to summarise in hourly intervals within each peak with outliers removed where appropriate.

3.1 Network Coding

An existing model built in VISSIM 8 was provided by CCC as a starting point for the network used in this study; the model covered Trumpington Road up to, but excluding Consort Avenue to the north, approximately 1.2km of Cambridge Road to the south of Junction 11 and approximately 3km and 2.5km of the M11 to the north and south respectively.

To accommodate evaluation of impacts of the proposed Park and Ride south of the M11 and the proposed infrastructure changes along Trumpington Road, the model has been expanded. The network has been extended to include the double mini-roundabouts and approaches at Fen Causeway to the north, the High Street/London Road junction (Harston) and its approaches to the south, and a further 0.2km and 2.5km of the M11 to the north and south respectively.

All major sideroads have been coded into the network with no route choice available, the approaches have been extended sufficiently to capture the level of queuing back in the base model and limit the amount of latent demand.

Figure 3.1 illustrates the network coverage and layout with the key locations identified for information.

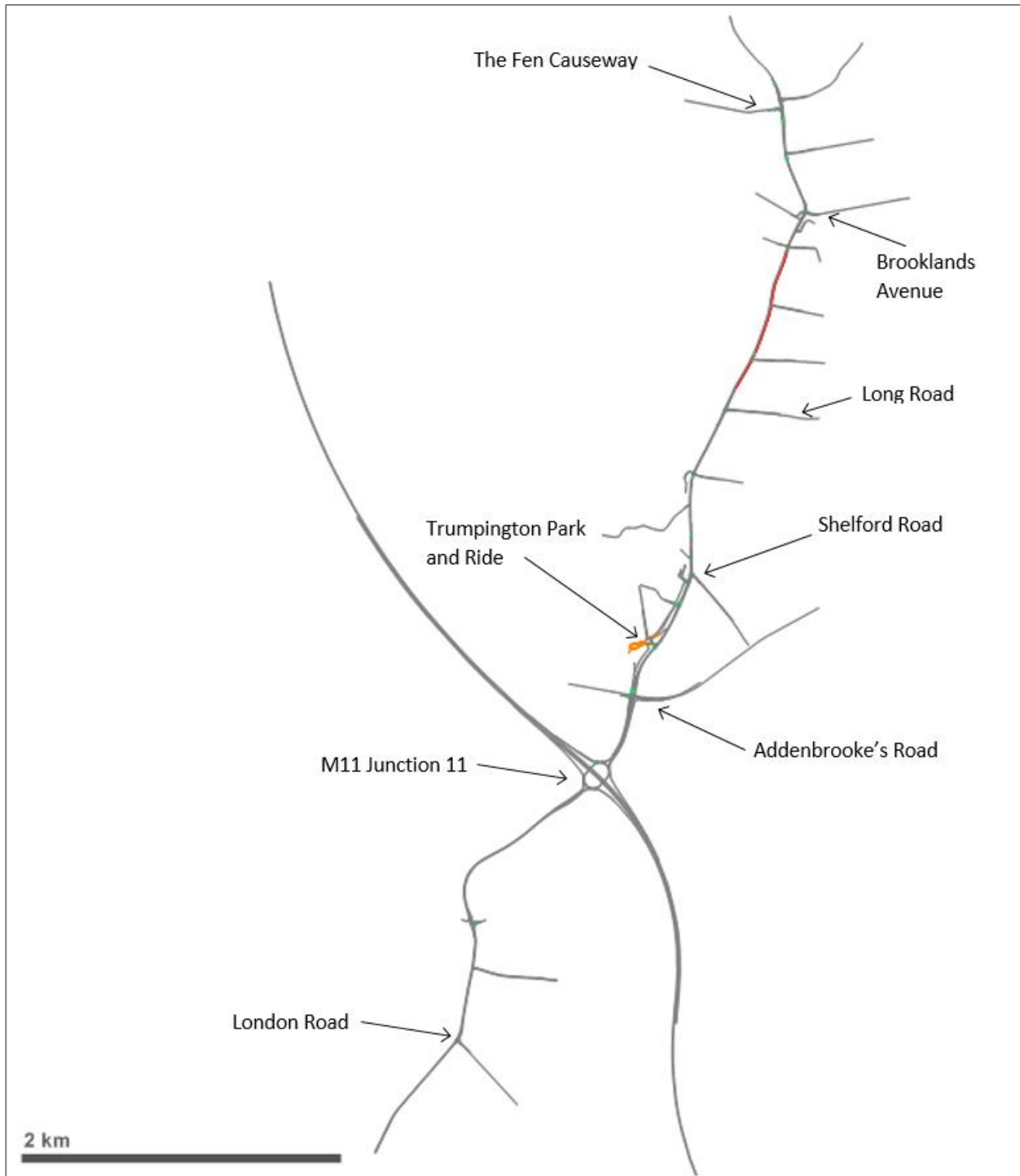


Figure 3.1 - VISSIM Base Layout

3.2 Traffic control systems

3.2.1 PC MOVA

MOVA is a dynamic traffic control system which uses vehicle detection data to optimise traffic flows throughout a junction. The software package PC MOVA can be used to control traffic signals within PTV VISSIM to replicate on-street conditions. Five junctions within the Trumpington Road corridor currently

operate on MOVA control: the northbound, eastbound and southbound entries to M11 Junction 11, Consort Avenue and Hauxton Meadows. Datasets were provided by CCC for the existing junctions and coded into VISSIM accordingly.

3.2.2 UTC-SCOOT

Similar to MOVA, SCOOT is a traffic control system which attempts to optimise performance of signal-controlled junctions based on live traffic information. The following junctions are currently under SCOOT control:

- A1309 Hauxton Road / Trumpington Park & Ride
- A1309 Hauxton Road / A1301 Shelford Road
- A1134 Trumpington Road / Church Lane
- A1134 Trumpington Road / Brooklands Avenue / Chaucer Road (Exit)

ASTRID reports giving stage change times for the above junctions were provided by CCC. Three days of ASTRID data from January 2018 was averaged out by junction to provide average green and cycle time by 15-minute period. This information has been used to build stage demand dependent fixed-time signal plans split by 15-minute periods, using VISSIM's VisVAP input. The suitability of January as a representative month to provide the ASTRID data was agreed with the client prior to its use.

Please note; as SCOOT changes green times dynamically, based on live traffic information, the ASTRID data should be viewed as a guide to signal timings. Seed variance in VISSIM and differences between surveyed traffic flows and traffic on the day of the exported ASTRID reports can result in inefficient signal performance when applied to VISSIM. Therefore, manual adjustments have been applied during the calibration stage to account for this.

3.2.3 Vehicle Actuated Signals

Both the Addenbrooke's Road / A1309 Hauxton Road and A1309 Trumpington Road / A1134 Long Road junctions currently operate under Vehicle Actuated (VA) signal control. Signal plans have been provided by CCC for both junctions; the former junction had been coded within the existing VISSIM model.

3.2.4 Priority/Give Way Junctions

The existing give-way operations at all priority junctions have been modelled using priority rules in VISSIM. This allows for the accepted gap time and headway to be set for each vehicle class. Reduced speed areas have been modelled around curves within the model to reflect the slowing down of vehicles throughout the network, both aforementioned settings have been used during the calibration stage.

3.3 Vehicle Routes and Inputs

As the purpose of the VISSIM model is to test operational performance of options with route choice and wider reassignment being captured by the CSRM SATURN Model (please see Section 5.2), it was agreed static assignment would be used for flow inputs. This method uses the balanced traffic survey data at each junction to direct traffic around the network. As such, the MCC data is used for calibration of the model and cannot be used as a measure of validation. However, a comparison is carried out to ensure the correct amount of traffic is being put through the network as illustrated in Tables 4.1 and 4.2 and detailed in Section 4.1.1.

Neither the Hauxton Meadows development, nor entries into Chaucer Road were captured by the March surveys. The proportion of trips from the CSRM was applied to the observed flows at the Brooklands Ave junction to derive flows into Chaucer Road. Flow imbalances between Church Road (Hauxton) and the M11 have been used to derive the turning flow for the Hauxton Meadows junction.

Where two junctions are in close proximity to each other with a multiple lane section between, the turns have been combined proportionally to create localised OD routes between the two junctions. This ensures vehicles choose an appropriate lane on the approach to the first junction and eliminates unrealistic lane changing.

A 30-minute warm-up period is run to ensure the network is populated at the start of the evaluation period. The surveyed flow from 07:00-07:15 has been used to create inputs between 06:30-07:00. The PM peak was able to use the surveyed MCC data for the period 15:30-16:00.

3.4 Vehicle Composition

Within VISSIM, a vehicle composition specifying the vehicle type split at each input is defined. The vehicle composition has been based on the MCC survey data which recorded vehicle type at each extent of the model by 15-minute period. The following vehicle types have been used within the model with an assumed large car/small car split of 75/25:

- Small Car
- Large Car
- LGV
- OGV1
- OGV2
- PSV
- Motorbike

4 Validation

The model has been validated against observed TrafficMaster journey time data provided by Cambridge County Council. Following DfT's WebTag guidance, a modelled journey time of within 15% of the observed passes validation criteria. As this model uses static vehicle inputs and routes, a GEH statistic on flow has been used for checking purposes only. Tables 4.1 and 4.2 illustrate the flow comparison between modelled and observed. The GEH statistic is used to remove bias when comparing different magnitudes of flows. The below formula has been used to calculate the GEH statistic; where GEH is the GEH statistic, M is the modelled flow and C is the observed flow.

$$GEH = \sqrt{\frac{(M - C)^2}{(M + C)/2}}$$

4.1 Calibration

4.1.1 Static Assignment

As discussed in Section 3.3 and above, as the model uses static assignment, the flow through each junction is defined within the model to match the count data. While comparing the modelled flow against observed cannot be used as a measure for validation, it is important to ensure that the correct flow is being assigned through the network, as doing so provides an indication as to whether the model is processing a sensible amount, as well as being a check on VISSIM inputs.

A flow comparison against each turn within the model can be found within the Appendices. The comparison shows the modelled flow is within 5 GEH of the balanced observed in at least 98% of turns by hour within the morning peak, and at least 96% of turns by hour within the evening peak. Please note, as Chaucer Road and the Hauxton Meadows junction were not captured within the survey, these have not been included within the overall match percentage.

Tables 4.1 and 4.2 detail the overall junction flow comparison between modelled and observed for the AM and PM peak respectively. Whilst it gives an effective high-level overview, viewing flow at an overall junction level can hide discrepancies in turn differences, therefore the full turn comparison within Appendix D gives a more comprehensive and reliable view.

Table 4.1 - AM Peak Modelled Vs. Observed Junction Flow

Time	Junction	Modelled Flow	Observed Flow	Difference	GEH	GEH < 5
07:00 - 08:00	Cambridge Rd / Church Road T-Junction	1843	1872	-29	0.7	✓
	Cambridge Rd / London Road T-Junction	1737	1758	-21	0.5	✓
	M11 Junction 11 Intersection	7571	7599	-28	0.3	✓
	Addenbrooke's Rd / Hauxton Rd Junction	2959	2988	-29	0.5	✓
	Trumpington Park & Ride T-Junction	1298	1363	-65	1.8	✓
	Consort Ave T-Junction	1301	1393	-92	2.5	✓
	Waitrose T-Junction	1316	1286	30	0.8	✓
	High St/ Hauxton Rd/A1301 Shelford Rd T-Junction	1659	1726	-67	1.6	✓
	High St/ Maris Lane	1587	1699	-112	2.8	✓
	High St/ Church Lane	1713	1849	-136	3.2	✓
	High St/ Winchmore Dr / Alpha Terrace Crossroads	1675	1820	-145	3.5	✓
	High St/ A1134 T-Junction	2001	2179	-178	3.9	✓
	A1134 / Parson Rd T-Junction	1192	1309	-117	3.3	✓
	A1134 / Bentley Rd T-Junction	1131	1309	-178	5.1	✗
	A1134 / Latham Rd / Newton Rd Crossroads	1082	1220	-138	4.1	✓
	A1134 / Queensway T-Junction	1035	1180	-146	4.4	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	1633	1833	-200	4.8	✓
	A1134 / Bateman St T-Junction	1392	1497	-105	2.8	✓
	A1134 / Fen Causeway T-Junction	1959	2062	-103	2.3	✓
	A1134 / Lensfield Rd T-Junction	1285	1325	-40	1.1	✓
Turns within GEH 5						99%
Time	Junction	Modelled Flow	Observed Flow	Difference	GEH	GEH<5
08:00 - 09:00	Cambridge Rd / Church Road T-Junction	1808	1784	24	0.6	✓
	Cambridge Rd / London Road T-Junction	1684	1674	10	0.3	✓
	M11 Junction 11 Intersection	7137	7036	101	1.2	✓
	Addenbrooke's Rd / Hauxton Rd Junction	2579	2514	65	1.3	✓
	Trumpington Park & Ride T-Junction	1231	1180	51	1.5	✓
	Consort Ave T-Junction	1360	1298	62	1.7	✓
	Waitrose T-Junction	1477	1251	226	6.1	✗
	High St/ Hauxton Rd/A1301 Shelford Rd T-Junction	1840	1683	157	3.7	✓
	High St/ Maris Lane	1766	1707	59	1.4	✓
	High St/ Church Lane	1846	1789	57	1.3	✓
	High St/ Winchmore Dr / Alpha Terrace Crossroads	1855	1796	59	1.4	✓
	High St/ A1134 T-Junction	2333	2265	68	1.4	✓
	A1134 / Parson Rd T-Junction	1574	1524	50	1.3	✓
	A1134 / Bentley Rd T-Junction	1417	1524	-107	2.8	✓
	A1134 / Latham Rd / Newton Rd Crossroads	1432	1368	64	1.7	✓
	A1134 / Queensway T-Junction	1351	1279	72	2.0	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	2053	2025	28	0.6	✓
	A1134 / Bateman St T-Junction	1644	1628	16	0.4	✓
	A1134 / Fen Causeway T-Junction	2060	2078	-18	0.4	✓
	A1134 / Lensfield Rd T-Junction	1462	1489	-27	0.7	✓
Turns within GEH 5						98%
Time	Junction	Modelled Flow	Observed Flow	Difference	GEH	GEH<5
09:00 - 10:00	Cambridge Rd / Church Road T-Junction	1344	1291	53	1.5	✓
	Cambridge Rd / London Road T-Junction	1319	1264	55	1.5	✓
	M11 Junction 11 Intersection	6214	6138	76	1.0	✓
	Addenbrooke's Rd / Hauxton Rd Junction	2377	2270	107	2.2	✓
	Trumpington Park & Ride T-Junction	1239	1214	25	0.7	✓
	Consort Ave T-Junction	1270	1245	25	0.7	✓
	Waitrose T-Junction	1459	1296	163	4.4	✓
	High St/ Hauxton Rd/A1301 Shelford Rd T-Junction	1746	1592	154	3.8	✓
	High St/ Maris Lane	1694	1661	33	0.8	✓
	High St/ Church Lane	1810	1779	31	0.7	✓
	High St/ Winchmore Dr / Alpha Terrace Crossroads	1778	1729	49	1.2	✓
	High St/ A1134 T-Junction	2054	1990	64	1.4	✓
	A1134 / Parson Rd T-Junction	1269	1204	65	1.8	✓
	A1134 / Bentley Rd T-Junction	1258	1204	54	1.5	✓
	A1134 / Latham Rd / Newton Rd Crossroads	1251	1188	63	1.8	✓
	A1134 / Queensway T-Junction	1237	1177	60	1.7	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	1864	1737	127	3.0	✓
	A1134 / Bateman St T-Junction	1546	1442	104	2.7	✓
	A1134 / Fen Causeway T-Junction	2135	2017	118	2.6	✓
	A1134 / Lensfield Rd T-Junction	1659	1578	81	2.0	✓
Turns within GEH 5						99%

Table 4.2 - PM Peak Modelled Vs. Observed Junction Flow

Time	Junction	Modelled Flow	Observed Flow	Difference	GEH	GEH < 5
16:00 - 17:00	Cambridge Rd / Church Road T-Junction	1642	1680	-38	0.9	✓
	Cambridge Rd / London Road T-Junction	1630	1666	-36	0.9	✓
	M11 Junction 11 Intersection	7593	7647	-54	0.6	✓
	Addenbrooke's Rd / Hauxton Rd Junction	2908	2911	-3	0.1	✓
	Trumpington Park & Ride T-Junction	1627	1649	-22	0.5	✓
	Consort Ave T-Junction	1432	1460	-28	0.7	✓
	Waitrose T-Junction	1673	1533	140	3.5	✓
	High St/ Hauxton Rd/A1301 Shelford Rd T-Junction	1866	1784	82	1.9	✓
	High St/ Maris Lane	1832	1897	-65	1.5	✓
	High St/ Church Lane	1793	1861	-68	1.6	✓
	High St/ Winchmore Dr / Alpha Terrace Crossroads	1723	1792	-69	1.6	✓
	High St/ A1134 T-Junction	1990	2066	-76	1.7	✓
	A1134 / Parson Rd T-Junction	1223	1270	-47	1.3	✓
	A1134 / Bentley Rd T-Junction	1114	1270	-157	4.5	✓
	A1134 / Latham Rd / Newton Rd Crossroads	1139	1147	-8	0.2	✓
	A1134 / Queensway T-Junction	1130	1134	-4	0.1	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	1679	1685	-6	0.1	✓
	A1134 / Bateman St T-Junction	1492	1484	8	0.2	✓
	A1134 / Fen Causeway T-Junction	2181	2162	19	0.4	✓
	A1134 / Lensfield Rd T-Junction	1660	1639	21	0.5	✓
Turns within GEH 5						98%
Time	Junction	Modelled Flow	Observed Flow	Difference	GEH	GEH<5
17:00 - 18:00	Cambridge Rd / Church Road T-Junction	1808	1773	35	0.8	✓
	Cambridge Rd / London Road T-Junction	1810	1770	40	0.9	✓
	M11 Junction 11 Intersection	7787	7687	100	1.1	✓
	Addenbrooke's Rd / Hauxton Rd Junction	3250	3202	48	0.8	✓
	Trumpington Park & Ride T-Junction	1861	1857	4	0.1	✓
	Consort Ave T-Junction	1608	1613	-5	0.1	✓
	Waitrose T-Junction	1850	1652	198	4.7	✓
	High St/ Hauxton Rd/A1301 Shelford Rd T-Junction	2050	1905	145	3.3	✓
	High St/ Maris Lane	2039	2018	21	0.5	✓
	High St/ Church Lane	1983	1980	3	0.1	✓
	High St/ Winchmore Dr / Alpha Terrace Crossroads	1930	1929	1	0.0	✓
	High St/ A1134 T-Junction	2219	2216	3	0.1	✓
	A1134 / Parson Rd T-Junction	1339	1332	7	0.2	✓
	A1134 / Bentley Rd T-Junction	1227	1332	-105	2.9	✓
	A1134 / Latham Rd / Newton Rd Crossroads	1198	1266	-68	1.9	✓
	A1134 / Queensway T-Junction	1150	1229	-79	2.3	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	1646	1787	-141	3.4	✓
	A1134 / Bateman St T-Junction	1351	1492	-141	3.7	✓
	A1134 / Fen Causeway T-Junction	2020	2170	-150	3.3	✓
	A1134 / Lensfield Rd T-Junction	1476	1521	-45	1.2	✓
Turns within GEH 5						96%
Time	Junction	Modelled Flow	Observed Flow	Difference	GEH	GEH<5
18:00 - 19:00	Cambridge Rd / Church Road T-Junction	1469	1414	55	1.4	✓
	Cambridge Rd / London Road T-Junction	1434	1383	51	1.4	✓
	M11 Junction 11 Intersection	6256	6099	157	2.0	✓
	Addenbrooke's Rd / Hauxton Rd Junction	2717	2618	99	1.9	✓
	Trumpington Park & Ride T-Junction	1644	1610	34	0.9	✓
	Consort Ave T-Junction	1525	1498	27	0.7	✓
	Waitrose T-Junction	1821	1595	226	5.5	✗
	High St/ Hauxton Rd/A1301 Shelford Rd T-Junction	2013	1815	198	4.5	✓
	High St/ Maris Lane	1943	1911	32	0.7	✓
	High St/ Church Lane	1945	1899	46	1.0	✓
	High St/ Winchmore Dr / Alpha Terrace Crossroads	1876	1849	27	0.6	✓
	High St/ A1134 T-Junction	2080	2059	21	0.5	✓
	A1134 / Parson Rd T-Junction	1220	1193	27	0.8	✓
	A1134 / Bentley Rd T-Junction	1227	1193	34	1.0	✓
	A1134 / Latham Rd / Newton Rd Crossroads	1240	1187	53	1.5	✓
	A1134 / Queensway T-Junction	1247	1193	54	1.6	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	1820	1763	57	1.3	✓
	A1134 / Bateman St T-Junction	1646	1550	96	2.4	✓
	A1134 / Fen Causeway T-Junction	2435	2317	118	2.4	✓
	A1134 / Lensfield Rd T-Junction	1743	1702	41	1.0	✓
Turns within GEH 5						99%

4.1.2 Signal Timings

ASTRID data provided by CCC has been adjusted manually to better replicate throughput and delay at key junctions on a 15-minute by 15-minute basis. The following junctions were changed during the calibration process:

- Hauxton Road/Shelford Road: Changes to stage green time up to 15 seconds in the AM peak and up to eight seconds in the PM peak.
- High Street/Church Lane: Changes to stage green time of seven seconds in the AM peak and up to four seconds in the PM peak.
- Trumpington Road/Brooklands Ave: Changes to stage green time of up to 10 seconds in the AM peak and up to three seconds in the PM peak.

Changes to individual green times for each of the above three junctions can be found within Appendix C of this report.

4.1.3 Pedestrian Demand

The traffic surveys did not include pedestrian counts at junctions and pedestrian crossings. An initial 20 pedestrians per hour was applied to all pedestrian crossings in either directions in both peaks. This level of demand was adjusted incrementally at individual junctions/crossings, with pedestrian demand dependent stages to improve journey time validation results.

4.1.4 Priority Rules

Whilst the majority of the junctions along the Trumpington Road corridor are signal controlled, or have non-conflicting mainline movements, changes in priority rules for calibration purposes are mostly limited to the double mini-roundabouts at Fen Causeway and Lensfield Road. For all priority rules, default VISSIM values for headway and gap-acceptance as advised within the VISSIM user manual have been used.

Accepted gap-times have been adjusted to alter the throughput on all arms of the junction as required, whilst ensuring realistic interaction between vehicles. Minimum and maximum gap-times of 1.8 seconds and 4.0 seconds respectively have been used within the model for traffic priority rules.

4.2 Journey Time Validation Results

Following DfT WebTAG guidance, a modelled journey time is deemed acceptable if within 15% of observed. The guidance also suggests that within 1 minute is deemed acceptable if the length of the route exceeds 3km. Given the relatively local nature of the model and to ensure robustness within this study, the latter criteria has only been applied to journey time routes above 3km in length (following WebTAG guidance on acceptable validation route lengths).

4.2.1 AM Validation

Table 4.3 details the modelled vs. observed journey time results for the eight journey time sections, by individual hours for the morning peak (as detailed in Figure 2.1). The modelled results are an average of 16 seeds with no outliers removed.

The results show in all three hours, a minimum of 85% of the modelled routes have achieved the accepted criteria, with the middle hour achieving 100% of routes within range. Within the first hour one journey time route is indicated to be faster than the observed whereas in the third hour a different journey time is indicated to be slower.

4.2.2 PM Validation

Table 4.4 details the modelled vs. observed journey time results for the evening peak. The modelled results are an average of 16 seeds with no outliers removed.

The results show in all three hours, a minimum of 85% of the modelled routes have achieved the accepted criteria, with all three hours achieving 88% of routes within range. Unlike the AM peak, each hour has a different journey time route failing validation criteria.

4.3 Validation Summary

Overall, both peaks achieve the minimum standard specified by WebTAG with regards to journey time validation. While turn or link flows cannot be used as a standard for validation in this model (as it is a statically assigned model), a check on the throughput has ensured that the surveyed flows and demand are replicated closely. Therefore, the models are considered a suitable tool to assess the proposed schemes.

Table 4.3 - AM Journey Time Validation Results

Time	Ref	Full Description	Direction	Distance (km)	Weighted Average Journey Times (secs)						
					Model Average	Observed Average	Average Limits +/-	15%	Observed Vs. Modelled		
							Lower	Upper	Difference	% Diff	Accept
07:00 - 08:00	1	M11 N to M11 S	SB	5.03	196	204	173	234	-7.6	-3.7%	✓
	2	M11 N to M11 J11 Roundabout	SB	3.35	168	185	157	213	-17.5	-9.4%	✓
	3	M11 S to M11 N	NB	7.03	263	253	215	291	10.1	4.0%	✓
	4	M11 S to M11 J11 Roundabout	NB	5.24	219	209	177	240	10.1	4.8%	✓
	5	Harston to A1137	NB	4.39	538	685	582	788	-147.2	-21.5%	✗
	6	A1134 to Trumpington Street	NB	3.31	464	412	350	474	51.8	12.6%	✓
	7	Trumpington Street to A1136	SB	3.37	426	394	335	454	31.5	8.0%	✓
	8	A1134 to Harston	SB	4.40	361	357	303	410	4.5	1.3%	✓
% Pass											88%
08:00 - 09:00	1	M11 N to M11 S	SB	5.03	192	205	174	235	-12.8	-6.2%	✓
	2	M11 N to M11 J11 Roundabout	SB	3.35	167	185	157	213	-18.6	-10.0%	✓
	3	M11 S to M11 N	NB	7.03	263	244	208	281	18.8	7.7%	✓
	4	M11 S to M11 J11 Roundabout	NB	5.24	219	205	174	235	14.1	6.9%	✓
	5	Harston to A1137	NB	4.39	852	854	726	982	-1.7	-0.2%	✓
	6	A1134 to Trumpington Street	NB	2.42	589	569	484	655	19.6	3.4%	✓
	7	Trumpington Street to A1136	SB	2.23	759	670	570	771	88.3	13.2%	✓
	8	A1134 to Harston	SB	4.40	372	377	321	434	-5.3	-1.4%	✓
% Pass											100%
09:00 - 10:00	1	M11 N to M11 S	SB	5.03	188	187	159	215	1.1	0.6%	✓
	2	M11 N to M11 J11 Roundabout	SB	3.35	165	185	157	213	-20.2	-10.9%	✓
	3	M11 S to M11 N	NB	7.03	259	248	211	286	11.0	4.4%	✓
	4	M11 S to M11 J11 Roundabout	NB	5.24	212	200	170	231	11.1	5.5%	✓
	5	Harston to A1137	NB	4.39	498	547	465	629	-48.6	-8.9%	✓
	6	A1134 to Trumpington Street	NB	2.42	447	440	374	506	6.8	1.6%	✓
	7	Trumpington Street to A1136	SB	2.23	509	425	361	489	83.3	19.6%	✗
	8	A1134 to Harston	SB	4.40	355	357	304	411	-2.7	-0.8%	✓
% Pass											88%

Table 4.4 - PM Journey Time Validation Results

Time	Ref	Full Description	Direction	Distance (km)	Weighted Average Journey Times (secs)						
					Model Average	Observed Average	Average Limits +/-	15%	Observed Vs. Modelled		
							Lower	Upper	Difference	% Diff	Accept
16:00 - 17:00	1	M11 N to M11 S	SB	5.03	196	186	158	214	9.8	5.3%	✓
	2	M11 N to M11 J11 Roundabout	SB	3.35	156	185	157	213	-29.1	-15.7%	✓
	3	M11 S to M11 N	NB	7.03	261	276	234	317	-14.7	-5.3%	✓
	4	M11 S to M11 J11 Roundabout	NB	5.24	224	210	179	242	13.8	6.6%	✓
	5	Harston to A1137	NB	4.39	426	388	330	446	37.6	9.7%	✓
	6	A1134 to Trumpington Street	NB	3.31	572	619	526	712	-46.8	-7.6%	✓
	7	Trumpington Street to A1136	SB	3.37	890	1114	947	1281	-224.3	-20.1%	✗
	8	A1134 to Harston	SB	4.40	379	405	344	466	-25.9	-6.4%	✓
% Pass											88%
17:00 - 18:00	1	M11 N to M11 S	SB	5.03	193	184	156	211	9.8	5.3%	✓
	2	M11 N to M11 J11 Roundabout	SB	3.35	156	185	157	213	-28.7	-15.5%	✓
	3	M11 S to M11 N	NB	7.03	257	315	268	362	-57.6	-18.3%	✓
	4	M11 S to M11 J11 Roundabout	NB	5.24	234	238	202	274	-4.3	-1.8%	✓
	5	Harston to A1137	NB	4.39	446	398	338	458	47.8	12.0%	✓
	6	A1134 to Trumpington Street	NB	2.42	628	777	661	894	-149.5	-19.2%	✗
	7	Trumpington Street to A1136	SB	2.23	795	926	787	1065	-130.9	-14.1%	✓
	8	A1134 to Harston	SB	4.40	397	394	335	453	2.6	0.7%	✓
% Pass											88%
18:00 - 19:00	1	M11 N to M11 S	SB	5.03	187	173	147	198	14.9	8.6%	✓
	2	M11 N to M11 J11 Roundabout	SB	3.35	156	185	157	213	-29.3	-15.8%	✓
	3	M11 S to M11 N	NB	7.03	254	259	221	298	-5.8	-2.2%	✓
	4	M11 S to M11 J11 Roundabout	NB	5.24	216	197	167	226	18.6	9.5%	✓
	5	Harston to A1137	NB	4.39	640	396	337	455	244.2	61.7%	✗
	6	A1134 to Trumpington Street	NB	2.42	521	568	483	653	-47.0	-8.3%	✓
	7	Trumpington Street to A1136	SB	2.23	538	543	461	624	-5.0	-0.9%	✓
	8	A1134 to Harston	SB	4.40	364	362	308	416	2.3	0.6%	✓
% Pass											88%

5 Proposed Scheme Assessment

5.1 Forecast Scenarios

A total of six future-year design scenarios including a Do Minimum (DM) scenario have been modelled within VISSIM, all pivoting off the validated base model. The future year assessments combine outputs from the CSRM SATURN highway model and the base inputs to derive future year demand. This section details the demand transfer process from SATURN to VISSIM, and the network and signal changes associated with the proposed designs.

The Do Minimum scenario includes only demand changes provided by the CSRM SATURN model (as detailed in Section 5.2), no infrastructure changes have been made to the VISSIM network.

Table 5.1 briefly summarises the models that were run as part of this assessment. More detailed information on the individual schemes can be found within sub-sections of this section.

Table 5.1 - Scheme Tests

Option	Demand Year	Trumpington Road Core Changes	New P&R Site
Base	2018	×	×
Do Minimum	2031	×	×
Magenta	2031	✓	×
Cyan	2031	✓	✓
White	2031	✓	✓
Yellow	2031	✓	✓
Purple	2031	✓	✓

5.2 CSRM SATURN Model

The CSRM SATURN model covers an area covering the entirety of Cambridge, to allow for strategic re-routing to be captured. The lack of route choice and local nature of the VISSIM model, means there is a reliance on the CSRM model to account for wider reassignment outside of the VISSIM network. A process was set-up to apply differences between the SATURN future year and base year scenario to the VISSIM base year demand.

Differences in turning flows between the SATURN Base and SATURN Forecast year are calculated and added to the VISSIM Base flow. If the resulting VISSIM flow is a negative value, then the percentage decrease between the SATURN Base and SATURN Forecast is applied to the Base VISSIM flow. When a percentage difference is applied, this can result in an imbalance between upstream and downstream flows, therefore a process of manual balancing is applied. Figure 5.1 below summarises the process described.

As the SATURN model period is for a single hour, the difference applied to the VISSIM model is proportionally profiled by 15-minute period, based on the 3.5-hour period VISSIM Base flows.

It has been assumed that the vehicle composition would not change from the VISSIM Base model, therefore differences have been applied on an all-vehicle basis, with the vehicle type split being determined by the March 2018 surveys.

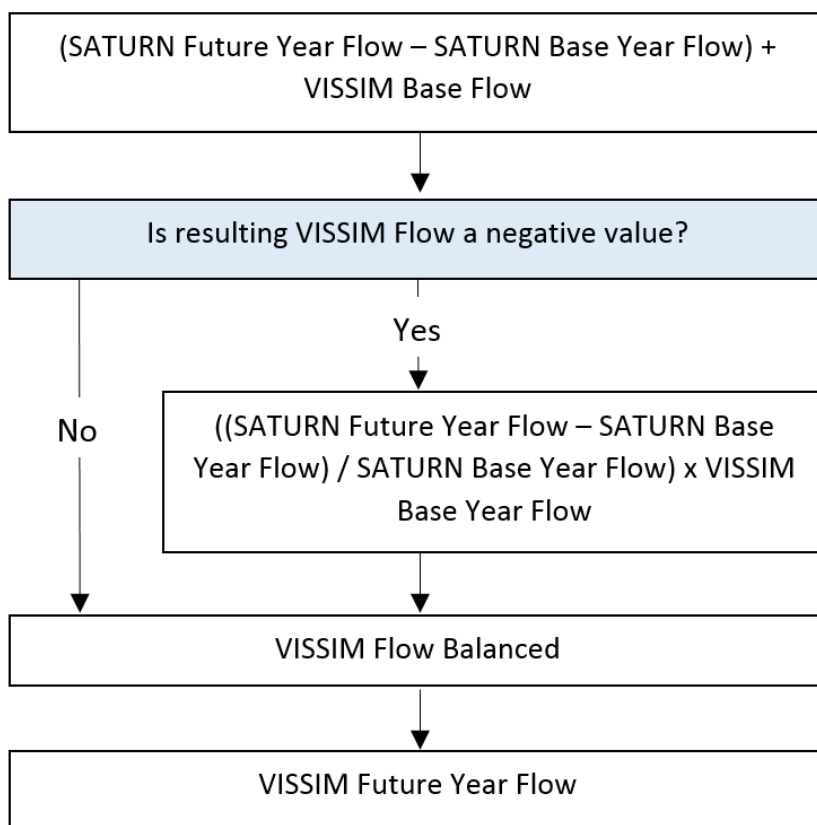


Figure 5.1 – SATURN to VISSIM Flow Transfer Process

Table 5.2 shows the level of growth in VISSIM traffic demand between the Base and future year scenarios because of the flow transfer process from SATURN. All future year scenarios show a significant increase of at least 17% and 13% in the AM and PM respectively. Table 5.2 illustrates that there is a difference in demand between the DS Scenarios. Please note, this level of growth is limited to the extent of the VISSIM model and may not equal the overall level of growth forecast by the CSRM.

Table 5.2 - 3.5-hour VISSIM traffic demand

Scenario	AM	% Increase over Base	PM	% Increase over Base
Base	36,710	-	37,885	-
DM	42,817	17%	42,713	13%
Magenta	43,285	18%	43,792	16%
Cyan	43,683	19%	43,310	14%
White	43,728	19%	43,255	14%
Yellow	44,072	20%	44,032	16%
Purple	43,467	18%	43,048	14%

5.3 Network Changes

Design proposals were provided by Skanska as part of this study for five distinct Do Something (DS) models. The changes include a series of core changes along the Trumpington Road corridor (which apply to all DS scenarios), and scheme specific design changes relating to both the access to the existing P&R site and a proposed new P&R site to the south-west of M11 Junction 11.

Designs for all the DS scenarios can be found within Appendix B of this report. The below sub-sections outline the key principles of each design. Please note, the operation within the proposed Park and Ride has not been modelled, however, a loop with a two minute dwell time has been included within the network coding to replicate services traversing the Park and Ride site.

5.3.1 Core Changes

A series of changes are proposed along the Trumpington Road corridor which relate to improved bus access between the P&R and the city centre. The designs can be found within Appendix B of this report and are summarised briefly below:

- Utilisation of existing segregated lane for Park and Ride buses from Trumpington Park and Ride to the Waitrose access in the north-eastbound direction;
- 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, extending approximately 230m, starting from Brooklands Ave; and,
- Creation of dedicated southbound bus lane on Trumpington Road, extending approximately 270m, starting from approximately 65m south of the Trumpington Road / A1134 Fen Causeway mini-roundabout.

Please note, 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 in either SATURN or VISSIM.

5.3.2 Magenta

The Magenta design option includes improvements to access to the existing Trumpington Park and Ride site from the M11 in both directions. Magenta is the only DS option not to include provision of a new park and ride site. The proposed changes include:

- Segregated P&R off-slip lane from the M11 South, extending approximately 400m from M11 Junction 11;
- Segregated P&R eastbound off-slip lane from the A10, extending approximately 320m from M11 Junction 11;
- Three lane M11 southbound off-slip section, extended an additional approximately 270m north from M11 Junction 11;
- Segregated P&R access lane running from M11 Junction 11 to Trumpington P&R and Trumpington Meadows, extended to M11 Junction 11, with existing link from Trumpington Road removed;
- Segregated P&R off-slip lane from M11 North extending approximately 65m from M11 Junction 11 to P&R access lane; and,
- Additional and dedicated P&R access lane on M11 Junction 11 roundabout between northbound entry arm to new segregated access lane, accessed also from west entry arm.

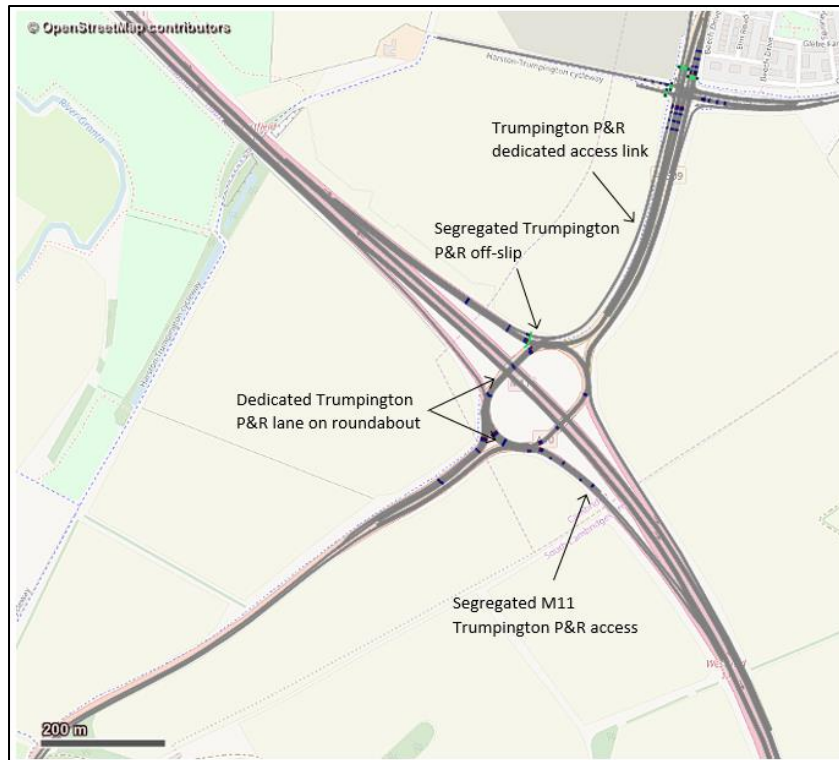


Figure 5.2 - Magenta M11 Junction 11 layout

5.3.3 Cyan

The Cyan design option includes access improvements to the existing Trumpington Park and Ride site from the M11 in both directions and a proposed new Park and Ride site to the west of M11 Junction 11. The proposed changes include:

- Three lane M11 northbound off-slip section, extended an additional 30m south, before increasing to four lanes 400m south of the M11, for a distance of 85m;
- Minimum of two lanes running entirety of northbound M11 Junction 11 off-slip;
- Three lane M11 southbound off-slip section, extending approximately 270m north from M11 Junction 11;
- Segregated Trumpington P&R access link, running from M11 Junction 11 to Trumpington P&R and Trumpington Meadows extended to M11 Junction 11, with existing link from Trumpington Road removed;
- Segregated new P&R off-slip from M11 south;
- Left-in, left-out access and egress to the new P&R, from/to the eastbound A10 Cambridge Road approximately 370m west of M11 Junction 11;
- Egress P&R exit lane merging with A10 Cambridge Road eastbound approximately 370m west of M11 Junction 11;
- Outbound bus-only link from existing P&R to new P&R, through Addenbrooke's junction and via bridge over M11 north of Junction 11; and,
- Inbound bus-only link from new P&R to segregated Trumpington P&R access link, via bridge over M11 north of Junction 11.



Figure 5.3 - Cyan M11 Junction 11 layout

5.3.4 White

The White design option is as Cyan, with the below difference relating to access to the new P&R site:

- Single all-movement signalised junction for access and egress to/from A10 Cambridge Road (access to new P&R site via M11 northbound off-slip as Cyan).



Figure 5.4 - White M11 Junction 11 layout

5.3.5 Yellow

The Yellow design option is as Cyan, with the below differences relating to access to the new P&R site:

- Left-in, left-out and right-in signalised access and egress to/from A10 Cambridge Road;
- Right-out egress via signalised junction approximately 200m west of M11 Junction 11; and,
- Segregated off-slip lane from M11 south to A10 Cambridge Road for all vehicles.

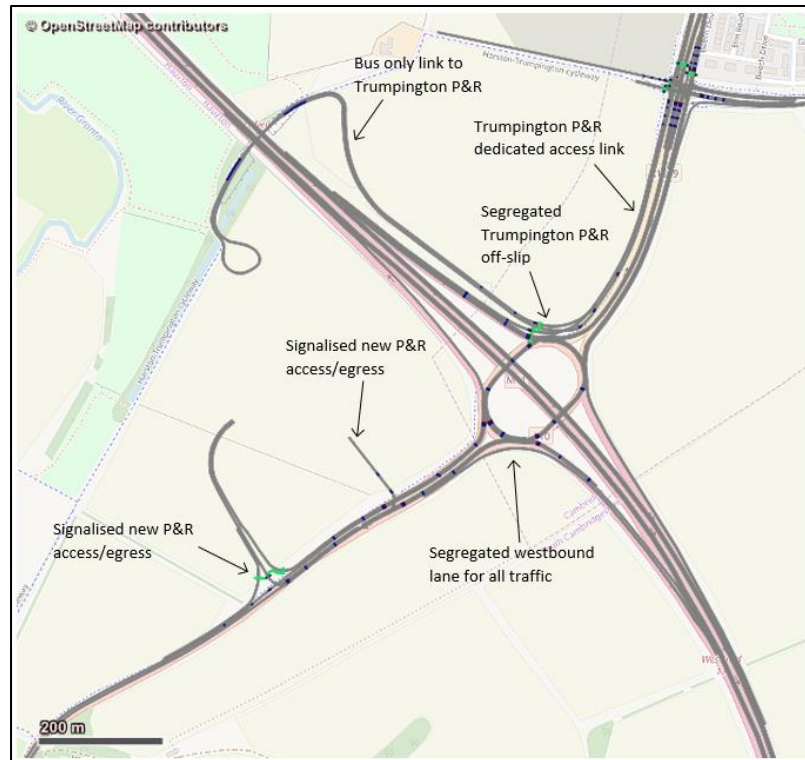


Figure 5.5 - Yellow M11 Junction 11 layout

5.3.6 Purple

The Purple design is as Cyan with the below differences relating to access to the new P&R site:

- Single all-movement signalised junction for access and egress to/from A10 Cambridge Road (access to new P&R site via M11 northbound off-slip as Cyan); and,
- Dedicated bus-only inbound/outbound new P&R access via signalised 'hamburger' arrangement at M11 Junction 11.

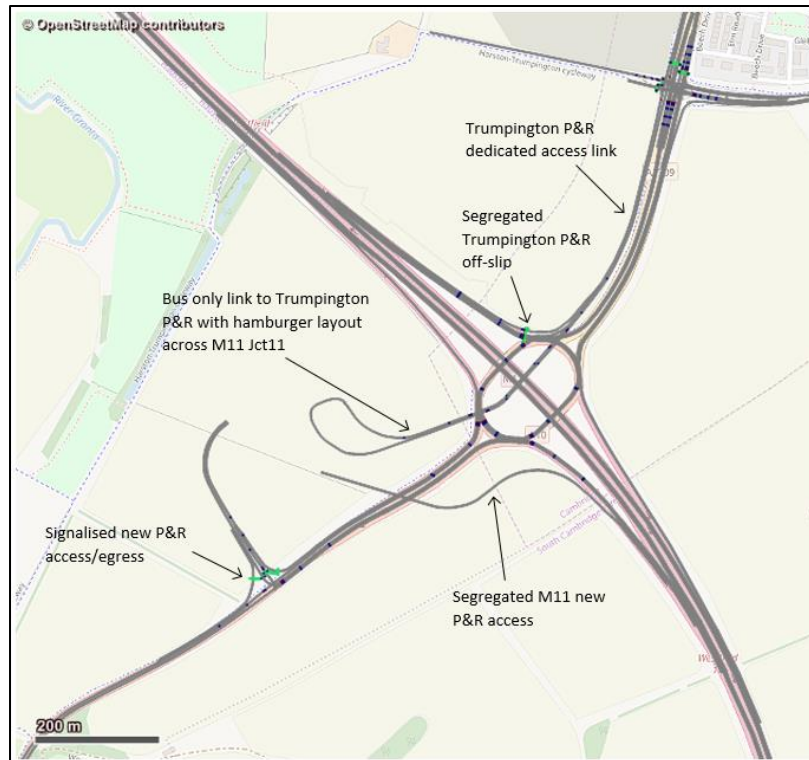


Figure 5.6 - Purple M11 Junction 11 layout

5.4 Traffic Signal Coding

5.4.1 LinSig/VisVAP

While high level of congestion is reported in the future year scenario, there did not appear to be junctions where one arm displayed spare capacity (and thus warranted signal optimisation). Therefore, notwithstanding the above, no signalised junction on VAP control has been changed. Further specific signal optimisation may be possible at certain junctions to improve the overall performance.

5.4.2 PC MOVA

PC MOVA has been used additionally to the Base/DM scenarios to write new MOVA datasets in the following capacities:

- PC MOVA control has been utilised for the proposed new P&R junctions to allow for dynamic signal change based on demand;
- Existing PC MOVA controllers on M11 Junction 11 have been updated to incorporate additional lanes where required. The dedicated bus lanes in all DS options excluding Magenta, have been coded with demand-dependent signals;
- Within Purple, an extra stage has been added to both the east and north arm controllers, for buses to cross the hamburger arrangement on demand. Figure 5.6 shows the signal layout for Purple, with blue boxes and red lines indicating detectors and signal stop lines respectively; and,
- The max allowed green time for exiting onto Trumpington Road from the Trumpington Park and Ride site has been reduced to reflect demand and congestion along Trumpington Road.

6 VISSIM Results

All six VISSIM models have been run with 16 different random seeds to replicate day-to-day variance. The modelled periods are between 07:00-10:00 for the AM Peak and 16:00-19:00 for the PM peak. The first 30-minutes of the simulation are a warm up period to populate the network, and therefore are not reported. Overall network performance, journey times, and node (junction) performance, have been extracted from the models and averaged across all the seeds, with outliers removed where appropriate.

Node evaluation includes volume, average and maximum queue length in metres, delay in seconds and the Level of Service (LOS). LOS is an American concept derived from their Highway Capacity Manual (2000) and rates junction performance based upon delay thresholds on an A to F grading as follows:

- LOS A - 0 to 10 seconds;
- LOS B - 10 to 20 seconds (10 to 15 seconds for unsignalised);
- LOS C - 20 to 35 seconds (15 to 25 seconds for unsignalised);
- LOS D - 35 to 55 seconds (25 to 35 seconds for unsignalised);
- LOS E - 55 to 80 seconds (35 to 50 seconds for unsignalised); and,
- LOS F - Over 80 seconds (over 50 seconds for unsignalised).

A LOS of A-D indicates the junction is within capacity, E indicates at capacity and F indicates the junction is over capacity.

6.1 Network Performance

VISSIM records vehicle statistics for the network as a whole, split by hour and for all vehicles. It should be noted when considering these results, that the performance of key junctions can have a large impact on the overall network. The performance of individual junctions is discussed in Section 6.2 of this report.

6.1.1 AM Summary

Tables 6.1 and 6.2 show the overall network performance statistics for the AM Peak, for all vehicle types by hour and for the period as a whole. Blue shading indicates the optimal performing future year options.

The results show that, as would be expected with the growth, all the future year options have higher levels of congestion than the Base model, indicated by a slower average speed and higher network delay. This congestion increase is likely caused by the growth in demand, with all future year scenarios reporting a significant increase in both processed vehicles and latent demand over the base.

When comparing the future year options, Magenta appears the optimal performer across all metrics, when considering the three hours as a whole; although it should be noted that Magenta has the lowest demand of all future year scenarios.

While all of the future year options show congestion, the difference between the DM and DS scenarios in terms of average network speed is relatively low, with the exception of Magenta which is over 10kmph higher than the next best performing option.

All the future year options, including DM, report high levels of latent demand, indicating that the network cannot sufficiently process demand. In reality, this would cause greater levels of congestion outside of the modelled network.

In terms of future year options which facilitate the proposed new park and ride site, both White and Cyan similarly outperform Yellow and Purple in both delay and average network speed, although Yellow does process the second highest number of vehicles after Magenta.

6.1.2 PM Summary

Tables 6.3 and 6.4 show the overall network performance statistics for the PM Peak for all vehicle types by hour and for the period as a whole.

The results show that all the future year options have significantly higher levels of congestion than both the Base and DM models, indicated by a slower average speed and higher network delay. Unlike the AM peak, the Base processes more vehicles overall throughout the three hours, although less than the DM within the first two. A build-up of severe congestion within the first two hours could explain the resulting difference in the third hour and overall total.

When comparing future year scenarios, the DM outperforms all DS scenarios with both higher average network speed and lower network delay, while still processing more vehicles in each hour.

All the future year options report high levels of latent demand, with the DS options recording at least double the latent demand than the DM and significantly higher than the AM peak for all options.

Of the DS scenarios, Magenta is again the optimal performer across the majority of measures with the exception of latent demand and delay, in which Purple is shown as optimal.

Of the DS scenarios with the proposed new Park and Ride site, Purple is the optimal performer in all but two measures where White is optimal. The results show Yellow clearly as the worse performing option with a lower network average speed and higher latent demand.

6.1.3 Summary

On a whole, the level of congestion in the PM peak far outweighs the AM peak, with average network vehicle speeds almost half in some instances. This is likely the result of an increase in processed vehicles of at least 10% in all scenarios, including the base.

The PM peak shows a more severe drop in average network speed throughout the three-hour period, which indicates the network reaches a level of congestion from which it cannot recover. It should be noted that within microsimulation software including VISSIM, when a network reaches saturation point its performance can deteriorate sharply. Within a number of the DS scenarios, random seeds have been removed as outliers, where the average network speed dropped below 7kmph in the final hour and were deemed to have reached a level of congestion where the network had failed.

Table 6.5 shows the combined weighted results from the AM and the PM, which shows that except for processed vehicles (in which both the DM and Magenta are better), all future year scenarios show inferior results than the Base. Surprisingly, the Base still processes more vehicles than all the DS scenarios with the proposed new Park and Ride site. This is likely due to the worsening of performance of key junctions relating to the proposed designs.

Of the DS scenarios, Magenta is the optimal performer and has a higher average network speed and reduced number of stops than the DM scenario.

Of the DS scenarios, including the proposed new park and ride site, the results indicate Cyan, White and Purple share the optimal performance results across the measures. Between the three options, there is only 0.9kmph difference in average network vehicle speed and only a 0.4 minute difference between average vehicle delay. In terms of vehicles processed Purple is the optimal performer.

Table 6.1 - 07:00-09:00 Network Performance Comparison

Time	Measure	Base	DM	Magenta	Cyan	White	Yellow	Purple
07:00 - 08:00	Number of Seeds	16	16	16	16	16	16	16
	Remaining Vehicles in Network	1,197	2,139	1,617	2,101	2,014	2,092	2,218
	Processed Vehicles	11,600	12,456	13,193	12,650	12,739	12,719	12,508
	Total Distance Travelled (km)	51,365	53,322	56,037	53,875	53,893	53,750	53,186
	Total Travel Time (h)	961	1,646	1,264	1,602	1,534	1,607	1,582
	Total Network Delay (h)	321	976	561	930	857	933	912
	Average Travel Time (mins)	4.5	6.8	5.1	6.5	6.2	6.5	6.4
	Average Delay Time (mins)	1.5	4.0	2.3	3.8	3.5	3.8	3.7
	Total Stopped Delay (h)	124	322	259	372	335	347	342
	Average Stopped Delay (s)	35	79	63	91	82	84	84
	Number of Stops	22,949	97,474	37,812	73,565	69,313	80,755	92,882
	Average Number of Stops	1.8	6.7	2.6	5.0	4.7	5.5	6.3
	Average Network Speed (kmph)	53.5	32.6	44.4	33.7	35.2	33.7	33.9
	Latent Demand (vehs)	18	425	237	523	450	609	356
	Latent Delay (h)	4	185	83	202	172	248	111
08:00 - 09:00	Remaining Vehicles in Network	1,036	2,098	1,529	2,076	2,198	2,243	2,437
	Processed Vehicles	12,349	13,088	13,582	13,047	12,711	12,896	12,408
	Total Distance Travelled (km)	50,190	52,428	54,244	51,465	50,472	51,334	49,082
	Total Travel Time (h)	1,184	2,320	1,677	2,229	2,312	2,300	2,596
	Total Network Delay (h)	540	1,654	983	1,569	1,663	1,643	1,962
	Average Travel Time (mins)	5.3	9.2	6.7	8.9	9.3	9.1	10.5
	Average Delay Time (mins)	2.4	6.5	3.9	6.2	6.7	6.5	7.9
	Total Stopped Delay (h)	250	738	506	707	783	733	869
	Average Stopped Delay (s)	67	175	121	169	190	174	211
	Number of Stops	37,564	140,710	67,558	131,357	138,485	139,444	193,544
	Average Number of Stops	2.8	9.3	4.5	8.7	9.3	9.2	13.1
	Average Network Speed (kmph)	42.5	23.0	32.6	23.5	22.2	22.8	19.2
	Latent Demand (vehs)	107	1,458	990	1,739	1,825	1,896	1,890
	Latent Delay (h)	77	980	616	1,126	1,136	1,247	1,086

 Best forecast year scenario

 Best forecast year DS scenario

Table 6.2 - 09:00-10:00 and 3-hour AM total Network Performance Comparison

Time	Measure	Base	DM	Magenta	Cyan	White	Yellow	Purple
09:00 - 10:00	Remaining Vehicles in Network	796	1,563	1,113	1,858	1,810	1,865	1,842
	Processed Vehicles	10,884	12,648	12,439	12,167	12,530	12,462	12,389
	Total Distance Travelled (km)	44,336	50,235	48,663	47,759	49,138	48,698	47,804
	Total Travel Time (h)	900	1,764	1,297	1,921	1,956	2,031	2,085
	Total Network Delay (h)	332	1,121	675	1,300	1,320	1,399	1,464
	Average Travel Time (mins)	4.6	7.4	5.7	8.2	8.2	8.5	8.8
	Average Delay Time (mins)	1.7	4.7	3.0	5.6	5.5	5.8	6.2
	Total Stopped Delay (h)	139	382	294	456	460	490	482
	Average Stopped Delay (s)	43	96	78	117	115	123	122
	Number of Stops	23,757	103,682	50,601	130,201	131,931	144,035	171,153
	Average Number of Stops	2.0	7.3	3.7	9.3	9.2	10.0	12.0
	Average Network Speed (kmph)	49.7	28.9	37.9	25.4	25.4	24.5	23.1
	Latent Demand (vehs)	37	1,506	1,251	2,271	2,238	2,378	2,600
	Latent Delay (h)	75	1,627	1,172	2,136	2,172	2,311	2,430
AM Peak (3 hour total)	Remaining Vehicles in Network	3,028	5,800	4,259	6,034	6,023	6,200	6,497
	Processed Vehicles	34,833	38,192	39,215	37,864	37,980	38,077	37,305
	Total Distance Travelled (km)	145,891	155,985	158,944	153,098	153,503	153,782	150,072
	Total Travel Time (h)	3,044	5,730	4,238	5,752	5,803	5,938	6,264
	Total Network Delay (h)	1,194	3,750	2,219	3,798	3,840	3,975	4,338
	Average Travel Time (mins)	4.8	7.8	5.8	7.9	7.9	8.0	8.6
	Average Delay Time (mins)	1.9	5.1	3.1	5.2	5.2	5.4	5.9
	Total Stopped Delay (h)	513	1,442	1,059	1,535	1,579	1,569	1,693
	Average Stopped Delay (s)	49	118	88	126	129	128	139
	Number of Stops	84,270	341,867	155,970	335,124	339,730	364,233	457,579
	Average Number of Stops	2.2	7.8	3.6	7.6	7.7	8.2	10.5
	Average Network Speed (kmph)	48.5	28.1	38.3	27.6	27.6	27.0	25.4
	Latent Demand (vehs)	162	3,388	2,478	4,534	4,512	4,883	4,846
	Latent Delay (h)	156	2,792	1,870	3,463	3,480	3,807	3,627

Table 6.3 - 16:00-18:00 Network Performance Comparison

Time	Measure	Base	DM	Magenta	Cyan	White	Yellow	Purple
16:00 - 17:00	Number of Seeds	16	16	16	16	16	9	12
	Remaining Vehicles in Network	1,063	1,581	2,358	2,717	2,605	2,960	2,404
	Processed Vehicles	13,920	14,729	13,757	13,206	13,358	12,898	13,676
	Total Distance Travelled (km)	50,923	55,421	50,796	49,361	50,010	48,550	50,920
	Total Travel Time (h)	1,081	1,463	1,847	2,040	1,945	2,148	1,823
	Total Network Delay (h)	433	756	1,215	1,427	1,328	1,551	1,190
	Average Travel Time (mins)	4.3	5.4	6.9	7.7	7.3	8.1	6.8
	Average Delay Time (mins)	1.7	2.8	4.5	5.4	5.0	5.9	4.4
	Total Stopped Delay (h)	177	329	730	858	818	983	707
	Average Stopped Delay (s)	43	73	164	194	185	223	159
	Number of Stops	36,099	58,267	76,931	94,734	82,339	95,678	78,386
	Average Number of Stops	2.4	3.6	4.8	6.0	5.2	6.0	4.9
	Average Network Speed (kmph)	47.3	38.0	27.8	24.4	25.8	22.8	28.0
	Latent Demand (vehs)	11	450	976	1,018	1,004	1,290	755
	Latent Delay (h)	10	284	323	338	318	432	240
17:00 - 18:00	Remaining Vehicles in Network	1,165	2,425	3,057	3,614	3,701	4,153	3,303
	Processed Vehicles	13,329	13,262	11,007	10,154	9,778	9,079	11,040
	Total Distance Travelled (km)	51,848	53,202	46,324	44,071	43,617	40,104	46,822
	Total Travel Time (h)	1,129	1,965	2,857	3,357	3,364	3,819	2,987
	Total Network Delay (h)	465	1,293	2,310	2,842	2,864	3,354	2,435
	Average Travel Time (mins)	4.7	7.6	12.2	14.7	15.0	17.4	12.5
	Average Delay Time (mins)	1.9	5.0	9.9	12.4	12.8	15.3	10.2
	Total Stopped Delay (h)	193	677	1,564	1,891	2,107	2,288	1,641
	Average Stopped Delay (s)	48	157	403	497	564	627	414
	Number of Stops	37,218	86,891	126,816	172,710	140,763	207,880	141,995
	Average Number of Stops	2.6	5.6	9.0	12.6	10.5	15.8	9.9
	Average Network Speed (kmph)	46.2	27.8	16.4	13.3	13.1	10.8	15.8
	Latent Demand (vehs)	61	1,275	4,529	5,212	5,323	6,363	3,972
	Latent Delay (h)	17	715	2,511	2,838	2,882	3,548	2,130

 Best forecast year scenario

 Best forecast year DS scenario

Table 6.4 - 18:00-19:00 and 3-hour PM Network Performance Comparison

Time	Measure	Base	DM	Magenta	Cyan	White	Yellow	Purple
18:00 - 19:00	Remaining Vehicles in Network	782	3,059	3,025	3,801	3,955	4,379	3,516
	Processed Vehicles	11,537	9,689	9,645	8,944	8,757	8,902	9,359
	Total Distance Travelled (km)	43,025	39,806	39,011	36,926	35,071	36,725	36,815
	Total Travel Time (h)	945	2,771	3,087	3,728	3,859	4,239	3,471
	Total Network Delay (h)	379	2,275	2,614	3,279	3,429	3,797	3,015
	Average Travel Time (mins)	4.6	13.2	14.6	17.5	18.2	19.1	16.2
	Average Delay Time (mins)	1.8	10.9	12.4	15.4	16.2	17.1	14.1
	Total Stopped Delay (h)	165	1,444	1,685	2,016	2,176	2,235	1,876
	Average Stopped Delay (s)	48	420	479	569	617	605	527
	Number of Stops	28,720	134,314	167,162	240,889	257,548	312,187	225,437
	Average Number of Stops	2.3	10.6	13.2	18.8	20.1	23.4	17.5
	Average Network Speed (kmph)	45.7	14.9	12.7	10.0	9.3	8.8	10.8
	Latent Demand (vehs)	80	3,338	7,590	8,530	8,757	10,059	6,750
	Latent Delay (h)	78	2,298	6,147	6,948	7,142	8,411	5,399
PM Peak (3 Hour total)	Remaining Vehicles in Network	3,010	7,065	8,440	10,132	10,261	11,492	9,223
	Processed Vehicles	38,786	37,680	34,410	32,305	31,893	30,879	34,075
	Total Distance Travelled (km)	145,797	148,429	136,130	130,358	128,698	125,379	134,557
	Total Travel Time (h)	3,155	6,198	7,791	9,125	9,168	10,206	8,282
	Total Network Delay (h)	1,278	4,323	6,139	7,547	7,621	8,703	6,641
	Average Travel Time (mins)	4.5	8.4	10.9	12.9	13.1	14.5	11.5
	Average Delay Time (mins)	1.8	5.9	8.6	10.7	10.8	12.3	9.2
	Total Stopped Delay (h)	535	2,451	3,979	4,765	5,101	5,506	4,225
	Average Stopped Delay (s)	46	201	336	405	436	469	353
	Number of Stops	102,037	279,473	370,910	508,333	480,650	615,745	445,819
	Average Number of Stops	2.4	6.3	8.6	12.0	11.4	14.5	10.3
	Average Network Speed (kmph)	46.4	27.8	19.6	16.5	16.8	14.6	18.9
	Latent Demand (vehs)	152	5,062	13,096	14,761	15,084	17,712	11,477
	Latent Delay (h)	106	3,298	8,981	10,124	10,342	12,391	7,769

Table 6.5 - AM and PM Combined Network Performance Comparison and Ranking

Time	Measure	Base	DM	Magenta	Cyan	White	Yellow	Purple
AM & PM (6 hour total)	Remaining Vehicles in Network	6,038	12,865	12,699	16,166	16,284	17,691	15,720
	Processed Vehicles	73,619	75,872	73,624	70,168	69,873	68,956	71,379
	Total Distance Travelled (km)	291,688	304,414	295,074	283,456	282,201	279,161	284,629
	Total Travel Time (h)	6,199	11,929	12,028	14,877	14,971	16,144	14,545
	Total Network Delay (h)	2,471	8,073	8,358	11,345	11,461	12,677	10,978
	Average Travel Time (mins)	4.7	8.1	8.4	10.3	10.4	11.2	10.0
	Average Delay Time (mins)	1.9	5.5	5.8	7.9	8.0	8.8	7.6
	Total Stopped Delay (h)	1,047	3,893	5,038	6,300	6,680	7,075	5,918
	Average Stopped Delay (s)	47	160	211	263	280	295	245
	Number of Stops	186,307	621,340	526,880	843,456	820,380	979,978	903,398
	Average Number of Stops	2.3	7.0	6.1	9.8	9.5	11.3	10.4
	Average Network Speed (kmph)	47.4	28.0	29.0	22.1	22.3	20.9	22.1
	Latent Demand (vehs)	313	8,450	15,573	19,295	19,596	22,594	16,323
	Latent Delay (h)	262	6,090	10,851	13,588	13,822	16,198	11,396

 Best forecast year scenario

 Best forecast year DS scenario

Rank (1=Best, 7=Worse)	Remaining Vehicles in Network	1	3	2	5	6	7	4
	Processed Vehicles	3	1	2	5	6	7	4
	Total Distance Travelled (km)	3	1	2	5	6	7	4
	Total Travel Time (h)	1	2	3	5	6	7	4
	Total Network Delay (h)	1	2	3	5	6	7	4
	Average Travel Time (mins)	1	2	3	5	6	7	4
	Average Delay Time (mins)	1	2	3	5	6	7	4
	Total Stopped Delay (h)	1	2	3	5	6	7	4
	Average Stopped Delay (s)	1	2	3	5	6	7	4
	Number of Stops	1	3	2	5	4	7	6
	Average Number of Stops	1	3	2	5	4	7	6
	Average Network Speed (kmph)	1	3	2	6	4	7	5
	Latent Demand (vehs)	1	2	3	5	6	7	4
	Latent Delay (h)	1	2	3	5	6	7	4

6.2 Junction Performance

Tables 6.6 and 6.7 show the junction performance statistics for the AM and PM peak period respectively, with blue shading indicating the optimal performer of the future year scenarios.

Please note, when considering the Peak Period All Network figures, that this includes vehicles traversing multiple junctions which results in double counting. For example, within the Yellow option, vehicles travelling along the A10 will be captured by the new P&R access and egress junctions and therefore may not be an accurate representation of vehicles processed.

It should also be noted that given the proximity of many of the junctions, congestion and delay reports at a junction may be the direct result of issues downstream and will only be reported up to the adjacent junction; therefore, the maximum queue reported may be to the next junction, whereas the queue actually transcends the adjacent junctions.

Tables displaying the same metrics by turn for each option can be found within Appendices F and G of this report and provides more comprehensive results.

6.2.1 AM Summary

The junction summary in the first hour shows a mixed message in terms of optimal performing option. Overall, Magenta shows the least amount of delay out of the future year options and is the only one which records an overall LOS lower than F in the first hour -although at LOS E it is still indicated to be at capacity. Throughout the first hour, a number of individual junctions are reported to be over capacity, with relatively high levels of delay. Except for the Magenta option the M11 Junction 11 is shown to be over capacity in all options, showing a marked increase from the Base model, which reported average delay of just 15-seconds. Recorded queue lengths show significant queueing forming on the southbound off-slip in all options except Magenta. All of DS scenarios outperform the DM with less queueing on both M11 off-slips.

Whilst the Brooklands/Chaucer Road junction also shows high levels of congestion in all future year scenarios, the proportional increase from the base is low, and even decreases within the DM scenario.

The second hour starts to see a trend towards Magenta and the DM being reported as the optimal performing scenarios, with Magenta showing significantly lower delay and queue lengths on the M11 Junction 11, and is again, the only future year option reported to be at capacity, and not over capacity.

Overall a higher number of junctions are reported to be over capacity indicating the network is reaching a highly congested level; although the Base model also reports a proportion of these junctions being over capacity.

Queueing has increased on the M11 in all options, although Magenta still reports relatively low levels of queueing, comparable with the Base. Cyan, White and Yellow outperform the DM (in that order) in terms of queueing and delay, with Purple reporting the highest of these measures, with average queue lengths of nearly 3km and delays of approximately 15 minutes for certain movements.

The final AM hour again shows Magenta as the optimal performer in terms of delay and queueing. Although it should be noted that White processes the most vehicles at the majority of junctions.

The last hour also shows the number of junctions reported as over capacity has dropped across the options indicating congestion within the network has started to clear. Magenta is still the only option to not report the M11 Junction 11 as not over capacity and is the optimal performing option at a number of other junction locations.

Although overall delay has decreased across the options there is still high levels of queueing throughout the network, particularly on the M11 where all DS options except Magenta report an average queue length of above 2km and Purple reporting at over 3.5km.

Overall, over the three-hour period, Magenta is the optimal performer in terms of delay and level of congestion, with Purple the worst performing scenario. Cyan, White and Yellow report similar results across all hours. Only Magenta outperforms the DM scenario across the majority of measures, with the other DS options relatively comparable in terms of delay, and, with the exception of Purple, slightly optimal in queue length.

6.2.2 PM Summary

The junction summary for the first PM hour shows that all of the DS options are predicted to perform inferior to the DM. All future year options report an overall LOS of F, indicating that on average, the network is over capacity. A number of key junctions report an LOS of F chiefly located between the M11 and the Consort Ave Junction in the DS scenarios, with the DM reported as at capacity at the Addenbrooke's Road junction and Consort Ave. Delay at these junctions is reported to be significantly higher than the DM and nearly six times greater in Cyan at the M11 junction.

As with the AM, the Brooklands Ave/Chaucer Road junction is reporting significant average delays of at least two minutes across all options, although again, this is relatively comparable with the delay reported in the Base.

The second hour reports a sharp increase in congestion, with all DS options being recorded as over capacity at every junction within the network. The majority of the DM junctions are reported as either at capacity or over capacity and across the network over capacity on average.

Of the DS scenarios, Purple is reported as the overall optimal performer in terms of delay and average queue length; however, all DS scenarios report significantly higher delay than the DM.

While the M11 again displays the largest of the queues, it is decreased from the morning peak. Only Cyan and Yellow report average queues of over 1km on the M11, both of which are on the southbound approach.

The final hour of the PM reports large congestion across all modelled junctions. All future year DS options are reported as over capacity, with all but one DM junction also over capacity. Average delay across all junctions has increased in all future year scenarios.

Of the DS scenarios, Magenta is reported as being the optimal performing scenario in terms of delay and queue length, with queuing only marginally worse than the DM scenario averaged across all junctions.

Queuing on the M11 shows an increase from the second hour with average queues on the northbound off-slip/mainline of over 2km in White, Purple and Yellow and 1.5km in Magenta and Cyan. The southbound M11 results in large queuing in Cyan and Yellow of approximately 3km and 1.5km in the DM. However, White and Purple report much less queuing at only 975m and 403m respectively.

Overall, over the three-hour period, with higher levels of delay and queuing across all three hours, none of the DS scenarios outperform the DM. There is also no stand-out optimal performing scenario of the DS scenarios, with Purple optimal in terms of delay in the first and second hour and Magenta marginally better in the third.

Table 6.6 – AM Junction Performance Comparison

	Junction	Volume										Max Queue Length (m)										Average Queue Length (m)										Delay (s)										LOS									
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple															
07:00 - 08:00	101	M11 J11	7,571	7,589	8,200	7,553	7,597	7,705	7,378	180	3,284	322	1,750	1,421	1,689	3,065	7	483	28	181	152	188	399	15	108	36	100	86	86	110	B	F	D	F	F	F	F	F	F												
	102	A1309 / Addenbrooke's Road	2,959	3,145	3,421	3,122	3,221	3,187	3,253	282	807	368	837	833	795	759	6	53	23	54	46	48	46	19	54	44	53	47	49	51	B	D	D	D	D	D	D	D	D												
	103	Trumpington P&R	1,298	1,174	1,203	1,200	1,227	1,220	1,266	338	367	371	367	368	366	369	44	68	94	74	78	79	91	45	51	75	58	60	68	D	D	E	E	E	E	E	E	E													
	104	Consort Ave T-junction	1,301	1,246	1,294	1,235	1,296	1,284	1,325	287	289	289	287	288	288	288	21	27	32	27	27	28	30	43	51	61	53	53	55	D	D	E	D	D	D	D	D	D													
	105	Watrose T-junction	1,316	1,340	1,382	1,351	1,433	1,416	1,412	163	163	161	161	160	160	160	18	24	21	19	20	20	19	29	34	35	33	32	33	32	C	C	C	C	C	C	C	C	C												
	106	High Street / Hauxton Rd / A1301 Shelford Rd	1,659	1,801	1,860	1,843	1,900	1,889	1,866	88	196	173	160	162	186	183	13	25	25	23	22	25	26	18	25	24	23	23	24	24	B	C	C	C	C	C	C	C	C												
	107	High Street / Maris Lane	1,587	1,788	1,873	1,830	1,830	1,825	1,802	130	170	130	132	139	134	130	5	11	8	8	7	8	7	8	11	9	9	9	9	9	9	A	B	A	A	A	A	A	A	A											
	108	High Street / Church Lane	1,713	1,867	1,905	1,887	1,922	1,909	1,887	333	648	647	648	648	648	648	46	209	208	214	217	222	208	43	124	125	130	129	134	125	D	F	F	F	F	F	F	F	F												
	109	High Street / Winchmore Dr / Alpha Terrace	1,675	1,865	1,918	1,872	1,893	1,887	1,885	211	211	205	206	205	204	201	7	7	4	3	3	3	3	15	15	11	11	11	11	11	B	C	B	B	B	B	B	B	B												
	110	High Street / A1134	2,001	2,204	2,240	2,202	2,215	2,217	2,202	436	439	325	291	302	259	304	27	24	20	19	21	21	20	42	39	33	31	33	33	32	D	D	C	C	C	C	C	C	C												
	111	A1134 / Parson Rd	1,192	1,246	1,257	1,232	1,252	1,242	1,241	126	190	205	185	240	223	230	1	4	4	4	6	5	6	9	11	12	12	13	13	13	A	B	B	B	B	B	B	B	B												
	112	A1134 / Bentley Rd	1,131	1,185	1,194	1,171	1,190	1,180	1,180	195	229	302	215	284	281	270	4	7	8	7	10	9	10	12	14	15	15	17	17	17	B	B	C	B	C	C	C	C	C												
	113	A1134 / Latham Rd / Newton Rd	1,082	1,133	1,140	1,117	1,136	1,120	1,121	333	363	333	372	353	379	363	9	11	12	12	14	14	14	20	24	25	25	28	28	28	C	C	C	C	C	D	D	D	D												
	114	A1134 / Queensway	1,035	1,086	1,085	1,067	1,081	1,065	1,070	138	139	138	139	136	137	139	7	10	11	10	11	11	12	13	16	17	17	17	18	19	B	C	C	C	C	C	C	C	C												
115	A1134 / Chaucer Rd / Brooklands Ave	1,633	1,773	1,776	1,756	1,775	1,758	1,765	600	450	610	662	590	601	633	73	61	96	101	88	79	86	109	86	133	141	122	111	119	F	F	F	F	F	F	F	F	F	F												
116	A1134 / Bateman St	1,392	1,623	1,638	1,619	1,628	1,625	1,628	122	229	169	150	183	145	141	2	7	4	3	4	3	3	10	14	11	11	11	10	11	A	B	B	B	B	B	B	B	B													
117	A1134 / Fen Causeway	1,959	2,370	2,398	2,365	2,367	2,370	2,364	129	611	611	613	612	612	612	2	74	72	79	91	107	91	13	52	48	52	57	62	57	B	F	E	F	F	F	F	F	F	F												
118	A1134 / Lensfield Rd	1,285	1,588	1,596	1,597	1,603	1,609	1,604	83	641	627	650	640	654	657	1	47	34	38	43	55	44	8	36	29	31	34	39	34	A	E	D	D	D	E	D	E	D													
201	Cambridge Rd / Church Rd	1,843	1,669	1,883	1,567	1,662	1,607	1,758	203	413	163	505	467	461	200	3	81	2	182	124	124	14	7	47	6	88	63	68	12	A	E	A	F	F	F	F	F	F													
202	Cambridge Rd / London Rd	1,737	1,645	1,807	1,503	1,628	1,569	1,710	224	670	229	876	811	792	359	16	111	17	220	185	209	30	26	78	27	151	119	141	34	D	F	D	F	F	F	F	F	F	D												
701	New P&R access / A10 Cambridge Rd				1,605	1,715	1,628	1,751				826	830	798	392							88	167	280	28																										
1001	New P&R egress / A10 Cambridge Rd						1,605																																												
08:00 - 09:00	Peak Period All Network		37,367	39,336	41,071	40,690	41,572	42,915	41,468	600	3,284	647	1,750	1,421	1,689	3,065	14	133	36	84	79	91	106	24	56	39	64	58	60	53	C	F	E	F	F	F	F	F	F	F											
	101	M11 J11	7,137	7,348	7,720	7,060	6,886	7,144	6,663	466	3,110	1,140	2,569	2,505	2,566	3,714	16	634	86	428	396	398	809	18	183	68	161	173	135	251	B	F	E	F	F	F	F	F	F	F											
	102	A1309 / Addenbrooke's Road	2,579	2,832	3,192	2,938	2,904	2,914	2,915	355	1,083	504	978	1,021	965	1,029	16	192	57	119	136	123	159	34	157	105	94	121	100	133	C	F	F	F	F	F	F	F	F	F											
	103	Trumpington P&R	1,231	1,193	1,191	1,267	1,243	1,238	1,282	352	369	371	368	371	369	370	72	162	170	136	165	163	167	95	163	160	124	155	155	150	F	F	F	F	F	F	F	F	F	F											
	104	Consort Ave T-junction	1,360	1,404	1,402	1,393	1,418	1,413	1,447	288	291	289	290	289	290	289	32	53	45	45	48	58	48	62	83	78	77	80	86	77	E	F	E	E	F	F	F	F	F	E											
	105	Watrose T-junction	1,477	1,584	1,577	1,592	1,630	1,616	1,613	162	166	162	161	161	162	161	21	29	24	24	25	25	23	31	36	35	36	37	36	34	C	D	D	D	D	D	D	D	C												
	106	High Street / Hauxton Rd / A1301 Shelford Rd	1,840	2,022	2,023	2,062	2,087	2,070	2,046	158	515	527	511	468	524	537	22	177	175	161	149	168	179	23	78	76	72	68	74	77	C	E	E	E	E	E	E	E	E												
	107	High Street / Maris Lane	1,766	2,002	2,036	2,038	2,013	2,000	1,976	190	237	194	199	220	210	149	15	23	16	18	20	21	14	14	17	13	14	15	14	12	B	C	B	B	B	B	B	B	B												
	108	High Street / Church Lane	1,846	1,983	1,966	1,980	2,002	1,980	1,957	441	650	650	650	650	650	650	112	237	225	228	232	230	229	86	160	150	151	152	150	154	F	F	F	F	F	F	F	F	F	F											
	109	High Street / Winchmore Dr / Alpha Terrace	1,855	2,033	2,030	2,015	2,027	2,012	2,005	241	227	205	214	210	218	207	14	11	5	6	7	6	22	18	13	13	14	13	14	13	A	C	C	B	B	B	B	B	B												
	110	High Street / A1134	2,333	2,500	2,499	2,496	2,494	2,479	2,462	463	454	376	401	412	372	437	50	37	42	43	49	48	51	55	45	44	45	50	47	51	E	D	D	D	D	D	D	D	D												
	111	A1134 / Parson Rd	1,574	1,601	1,588	1,577	1,585	1,570	1,570	242	268	306	304	329	312	336	13	10	17	13	26	21	21	22	18	24	21	32	26	28	C	C	C	C	D	D	D	D	D												
	112	A1134 / Bentley Rd	1,417	1,464	1,452	1,435	1,441	1,426	1,428	267	315	325	333	345	350	339	8	12	19	20	32	25	26	17	19	25	25	30	32	C	C	D	D	C	D	D	D	D													
	113	A1134 / Latham Rd / Newton Rd	1,432	1,471	1,462	1,450	1,446	1,435	1,437	348	371	362	390	384	395	389	14	21	27	26	40	35	39	27	34	40	40	54	50	56	D	D	E	E	F	F	F	F	D												
114	A1134 / Queensway	1,351	1,379	1,369	1,360	1,347	1,347	1,344	137	138	140	139	142	141	141	10																																			

Table 6.7 - PM Junction Performance Comparison

	Junction Description	Volume										Max Queue Length (m)										Average Queue Length (m)										Delay (s)										LOS									
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple															
16:00 - 17:00	M11 J11	7,593	7,997	6,918	6,461	6,787	6,445	6,855	158	489	1,182	1,618	639	1,632	567	6	36	143	184	122	148	114	14	36	145	196	154	174	142	B	D	F	F	F	F	F	F														
	A1309 / Addenbrooke's Road	2,908	3,097	2,255	1,941	2,089	1,828	2,178	52	684	1,232	1,230	1,154	1,108	1,128	1	51	217	248	226	238	187	10	66	294	276	246	279	209	A	E	F	F	F	F	F	F														
	Trumpington P&R	1,627	1,688	1,310	1,155	1,171	1,076	1,222	197	369	371	370	350	333	342	24	164	204	206	198	196	185	24	100	174	194	179	195	162	C	F	F	F	F	F	F	F														
	Consort Ave T-junction	1,432	1,551	1,192	1,156	1,139	1,071	1,210	165	280	285	284	266	256	260	4	35	88	93	96	109	81	14	59	95	97	91	98	83	B	E	F	F	F	F	F	F														
	Waltrose T-junction	1,673	1,831	1,439	1,389	1,348	1,251	1,445	152	163	161	160	149	144	146	16	27	53	59	56	59	46	19	29	58	66	61	67	49	B	C	E	E	E	E	D															
	High Street / Hauxton Rd / A1301 Shelford Rd	1,866	2,023	1,603	1,547	1,485	1,377	1,575	87	119	150	170	201	225	129	17	24	30	34	38	48	27	24	26	38	41	44	51	34	C	C	D	D	D	D	C															
	High Street / Maris Lane	1,832	2,037	1,610	1,547	1,441	1,325	1,579	356	351	351	352	330	318	323	89	55	66	77	81	88	68	45	32	39	43	41	42	37	E	D	E	E	E	E	E															
	High Street / Church Lane	1,793	2,014	1,672	1,652	1,528	1,418	1,652	222	360	415	377	282	375	272	52	87	98	99	71	88	67	52	63	77	80	64	71	60	D	E	E	F	E	E	D															
	High Street / Winchmore Dr / Alpha Terrace	1,723	2,000	1,701	1,700	1,553	1,445	1,676	458	426	423	456	428	409	419	60	30	40	51	55	63	42	48	28	32	39	35	35	33	E	D	D	E	E	E	D															
	High Street / A1134	1,990	2,430	1,992	1,934	1,812	1,682	1,988	376	327	546	586	549	528	516	76	33	89	109	122	148	90	58	36	43	45	40	45	42	E	D	D	D	D	D	D	D														
	A1134 / Parson Rd	1,223	1,550	1,115	1,070	979	907	1,097	305	138	323	364	348	341	287	31	5	26	37	47	62	26	42	15	18	25	21	30	21	E	B	C	D	D	C	D	C														
	A1134 / Bentley Rd	1,114	1,425	1,051	1,021	949	871	1,039	250	69	280	334	312	343	256	22	1	13	18	15	31	9	32	10	16	20	13	18	13	D	A	C	C	B	C	B															
	A1134 / Latham Rd / Newton Rd	1,139	1,431	1,103	1,069	1,019	954	1,096	206	180	215	283	223	226	229	10	4	12	15	10	12	10	25	14	28	32	24	27	25	D	B	D	D	C	D	C															
	A1134 / Queensway	1,130	1,400	1,082	1,057	1,021	954	1,097	130	134	122	128	120	116	115	11	4	11	12	11	11	11	16	9	17	18	18	16	17	C	A	C	C	C	C	C															
	A1134 / Chaucer Rd / Brooklands Ave	1,679	2,023	1,780	1,766	1,714	1,638	1,798	608	658	666	666	624	600	611	123	203	133	129	121	117	118	153	184	186	182	174	170	165	F	F	F	F	F	F	F															
A1134 / Bateman St	1,492	1,721	1,633	1,604	1,594	1,544	1,630	432	381	430	431	410	378	406	67	96	54	54	50	44	45	62	72	48	47	43	40	40	F	F	E	E	E	E	E																
A1134 / Fen Causeway	2,181	2,165	2,277	2,220	2,224	2,202	2,255	355	615	529	500	445	461	446	71	177	87	85	76	77	76	48	114	58	57	52	52	50	E	F	F	F	F	F	F																
A1134 / Lensfield Rd	1,660	1,573	1,705	1,660	1,665	1,647	1,677	390	662	461	410	352	300	357	21	252	36	31	23	20	25	23	214	32	30	25	22	25	C	F	D	D	C	C	D																
Cambridge Rd / Church Rd	1,642	1,791	1,322	1,210	1,333	1,309	1,378	91	100	386	490	432	345	289	1	1	46	84	58	43	21	5	5	32	65	41	33	17	A	A	D	F	E	D	C																
Cambridge Rd / London Rd	1,630	1,731	1,345	1,273	1,378	1,355	1,407	159	163	358	815	543	451	250	8	8	18	82	37	27	12	17	17	23	65	35	27	19	C	C	C	F	E	D	C																
New P&R access / A10 Cambridge Rd				1,328	1,186	1,173	1,239				825	778	738	730				73	135	207	95						159	135			F	F	F	F	F																
New P&R egress / A10 Cambridge Rd						1,147																																													
Peak Period All Network	39,327	43,476	36,105	35,760	35,412	34,618	37,092	608	684	1,232	1,618	1,154	1,632	1,128	32	62	89	103	89	98	76	33	55	90	103	89	95	78	D	F	F	F	F	F	F	F															
17:00 - 18:00	M11 J11	7,787	7,546	6,678	6,327	6,321	5,772	6,733	220	1,181	1,638	2,908	1,635	3,345	1,539	12	197	259	445	248	428	236	20	122	238	296	268	307	237	B	F	F	F	F	F	F	F														
	A1309 / Addenbrooke's Road	3,250	2,810	2,157	2,049	1,946	1,876	2,223	58	1,181	1,231	1,231	1,153	1,107	1,129	1	212	358	341	312	292	297	12	181	432	426	422	447	349	B	F	F	F	F	F	F	F														
	Trumpington P&R	1,861	1,630	1,189	1,112	1,023	1,004	1,163	234	366	367	369	346	327	337	31	190	238	238	226	217	218	26	130	261	293	300	302	248	C	F	F	F	F	F	F	F														
	Consort Ave T-junction	1,608	1,509	1,114	1,028	949	950	1,072	242	283	286	286	267	255	260	8	58	190	197	184	177	178	19	69	146	162	157	150	131	B	E	F	F	F	F	F	F														
	Waltrose T-junction	1,850	1,768	1,239	1,125	1,028	1,024	1,166	156	160	159	159	151	142	144	18	37	77	82	79	74	75	19	36	119	138	124	118	112	B	D	F	F	F	F	F	F														
	High Street / Hauxton Rd / A1301 Shelford Rd	2,050	1,906	1,395	1,262	1,129	1,109	1,289	106	364	469	529	523	510	436	21	101	153	188	210	217	131	23	61	122	161	200	215	117	C	E	F	F	F	F	F	F														
	High Street / Maris Lane	2,039	1,915	1,371	1,195	1,022	998	1,228	353	352	354	354	332	319	326	65	64	137	154	155	150	140	32	34	107	141	166	185	121	D	D	F	F	F	F	F	F														
	High Street / Church Lane	1,983	1,854	1,361	1,206	1,027	1,016	1,215	301	647	647	647	606	582	593	49	209	249	255	241	248	208	41	123	221	255	271	311	199	D	F	F	F	F	F	F	F														
	High Street / Winchmore Dr / Alpha Terrace	1,930	1,864	1,368	1,213	1,032	1,014	1,216	423	384	458	458	430	412	421	35	35	118	134	134	132	122	31	32	143	191	230	259	160	D	D	F	F	F	F	F	F														
	High Street / A1134	2,219	2,281	1,515	1,286	1,097	1,080	1,360	391	420	589	589	552	530	540	75	80	340	373	361	353	339	54	59	302	402	452	486	314	D	E	F	F	F	F	F	F														
	A1134 / Parson Rd	1,339	1,429	847	735	649	634	820	316	328	372	384	380	395	342	38	35	141	190	219	246	155	40	38	287	429	500	589	294	E	E	F	F	F	F	F	F														
	A1134 / Bentley Rd	1,227	1,348	762	633	564	556	737	304	346	389	391	365	351	356	31	41	120	160	160	189	126	38	43	252	354	319	417	229	E	E	F	F	F	F	F	F														
	A1134 / Latham Rd / Newton Rd	1,198	1,350	770	629	551	542	757	321	354	299	364	326	334	279	14	29	31	50	55	71	32	30	48	109	170	185	232	97	D	E	F	F	F	F	F	F														
	A1134 / Queensway	1,150	1,301	732	583	508	493	729	133</																																										

6.3 Journey Time

Journey time results have been extracted for all vehicles and buses separately. The All Vehicle routes maintain the same route and distance between the different options, whereas the Buses routes incorporate the different changes between options. Both journey time and delay have been extracted from the model with approximate speed calculated.

Table 6.8 and 6.9 summarise the AM and PM results respectively with the two peaks split by one-hour periods.

6.3.1 AM Summary

In terms of all vehicles, as indicated by both the node and the Network Performance Summary, congestion has led to overall increases in journey times from the Base in all hours of the AM peak.

The first hour shows the largest increases in journey times over the base in the already heavily delayed routes. The outer inbound route (Harston to Shelford Road) results in journey times doubling in all options except Magenta and Purple. The inner inbound (Shelford Road to Lensfield Road) and both the outbound routes (Lensfield Road to Shelford Road and Shelford Road to Harston) show a far less increase, with Magenta and Cyan actually recording a shorter journey time than the base on the second inbound route.

On the M11 and its Junction 11 off-slips, the greatest of increases in journey time are recorded for vehicles using the southbound off-slip, with many options showing multiple minute increases over the Base. Only Magenta reports a journey time only marginally higher than the Base. Of the future year options, Magenta, Cyan, White and Yellow all outperform the DM for the M11 southbound movements. The M11 northbound results in much less impact on journey times.

The bus only results show that outbound trips from the city centre to the P&R increase in journey time length over the base, and all DS options, except Magenta also show increases over the DM scenario. However, in the inbound direction, the DS changes result in improved journey times over the DM and the Base, with savings of over two minutes when compared to the DM scenario. Bus route 25 outbound also results in an improvement over the Base and DM in the DS scenarios. Journey times for buses going to and from the proposed new park and ride, show little variance, with Yellow and Purple marginally the optimal performing scenarios.

The second hour results in a similar trend to the first with the largest increases and standalone all-vehicle journey times reported on the outer inbound route. All options except for Magenta, report significantly higher journey times and increases of up to 30 minutes. Magenta reports an increase in the region of 20 minutes. The three other Trumpington Road journey times also report increases although much less and comparable with the DM scenario. Magenta is the optimal performing scenario in three out of four of the Trumpington Road corridor journey times.

On the M11 southbound there is a significant increase in journey time for the off-slip and through journey times indicating that queuing from Junction 11 is having a detrimental effect on the main M11 carriageway. Whilst all future year options result in worse journey times than the Base, only Purple of the DS options compares unfavourably with the DM. As the first hour, the northbound M11 journey times show much less increase in journey time and delay. All of the DS options, except Purple have favourable journey times when compared to the DM scenario.

The bus only results show that both the inbound and outbound trips between the city centre and P&R are reported to be faster in all the DS scenarios, except White, than the DM and faster than the base for the inbound movements. The 26 outbound also shows improvements in the DS over the DM and relatively comparable results for the 25 outbound. Services to the new park and ride from the town centre vary by approximately one and a half minutes over a total journey time of approximately 20 minutes, with Cyan reporting the fastest journey time and Purple the slowest. The new inbound services show a similar level of variance, with Cyan the fastest at just over 15 minutes and White the slowest at 90 seconds longer.

The last hour sees the Harston to Shelford Road journey time decrease in all options including the DM and the Base scenarios - as do the other three Trumpington Road journey times across all scenarios. Magenta outperforms the DM in the outer inbound with Magenta also optimal in the inner inbound journey time. All of the DS scenarios, except Yellow, report quicker journey times than the DM for the two outbound journey times.

The M11 journey times increase heavily across many of the DS scenarios in the southbound direction. Only Magenta of the DS scenarios mirrors the Base/DM, with a decrease in journey time over the second hour, with journey times only marginally higher than the Base, and much reduced than the DM for both the off-slip and through movements. The highest of the journey times is reported to be in the Purple scenario, at nearly 30 minutes to the end of the southbound off-slip. Cyan, White and Yellow report times of between 18 and 21 minutes, in that order. As with the previous hours the northbound journey times report only small amounts of delay. The highest of these is Purple, which is reported to be 120 seconds slower than the DM on the northbound off-slip roundabout approach.

Bus journey times reflect Trumpington Road journey times and are reduced from the previous hour. The park and ride outbound journey times show all DS options except Purple are faster than the DM, and for the inbound, all DS options are faster than the DM and the Base. Journey times to the new park and ride site show Cyan and Purple to be the fastest for the inbound and outbound directions respectively, although the variance between the best and worst performing options is relatively low.

6.3.2 PM Summary

As with the AM period, the largest increase in the first hour of the PM peak is from Harston to Shelford Road, with journey times more than doubling in the DM and more than quadrupling in some DS scenarios. The best performing of these is reported to be Purple with an average journey time of over 26 minutes – 10 minutes higher than the DM and 20 higher than the Base. North of Shelford Road sees less impact, with the DM reported to be marginally quicker than the Base, and the DS scenarios similar. For outbound movements, the DS scenarios are all reported to be quicker than both the Base and the DM up to Shelford Road. However, south of this point sees large increases in delay, leading to journey times of at least 14 minutes greater than the DM.

The M11 southbound to the roundabout also shows increased delays in the DM and DS scenarios, the highest of which are reported in Cyan and Yellow, at approximately five minutes higher than the DM. In the northbound direction, similar levels of increases are observed in all DS scenarios with Magenta the optimal performer, although still four minutes slower than the DM for off-slip movements.

The DS scenarios do show a much-improved situation for bus only trips. Park and ride outbound trips are reportedly lower in all DS scenarios than the Base and DM scenarios, with savings of over 14 minutes over the DM reported in Purple and similar levels in all other DS scenarios. While inbound park and ride journey times report less stark benefits over the Base and DM, all options are reported to be quicker than the DM and all are quicker than the Base, except for Purple. Journey times to the proposed new park and ride are quickest in Purple for the outbound movement and in White for the inbound.

The second hour again results in large increases over the Base and DM in the outer inbound journey times with journey times of over 50 minutes reported in all DS options except Purple which is still over 44 minutes. For comparison, the DM is reported to be 22 minutes for the same section.

Both the outbound journey time sections report significant levels of delay in all DS scenarios. The only DS option reported to be close to one hour for the first of these section is Magenta, at just over 62 minutes with Yellow reported as the worse at over two hours, both scenarios are significantly higher than the Base and the DM. Although less so, the outer outbound journey time shows severe increases in journey times in all DS scenarios. Please note; within microsimulation software, including VISSIM, when a network reaches a certain level of saturation the level of congestion can increase rapidly and may be an over-estimation (as traffic is unable to reroute to avoid the congestion); effectively, the network fails and cannot recover.

The M11 southbound reports mixed results in terms of DS scenario performance, with Magenta over a minute and a half quicker than the DM for off-slip movements and White and Purple recording similar journey times. However, both White and Yellow report journey times over 8 minutes slower. Northbound results in all DS scenarios reporting significant increases in journey time over the DM, with the least of these reported in Magenta at nearly nine minutes slower for the off-slip movements.

The bus only journey times show reduced delays over the all vehicles, indicating the infrastructure improvements may be alleviating congestion for buses, however, there is still reported significant increases over the DM across all Trumpington Road bus routes. Yellow sees the worst of both the inbound and outbound park and ride journey times, at over 48 and 47 minutes slower than the DM respectively. The best performing DS option for the two journey times still reports additional delays of over 17 and 13 minutes over the DM. Journey times to the new park and ride site are impacted by congestion throughout the network, with the quicker of these, Purple, reporting journey times of over 32 and 48 minutes for inbound and outbound trips respectively.

The third hour sees a very similar pattern to the second, with increases in journey times across nearly all DS routes. Inbound, all vehicle journey times are now reported to be at least over an hour in all DS scenarios up to Shelford Road, over an hour slower than the DM. Again, the southbound movements show the largest of increases. Magenta is the optimal performing DS scenario in both outbound journey times but still reports significant increases over the DM. The level of delay suggests that all of the DS options cannot cope with the level of demand and the network has failed.

The M11 southbound again shows large delays in Cyan and Yellow compared to the DM for off-slip movements, which impact the through movement journey times, but quicker journey times are reported in Magenta, White and Purple. The M11 northbound reports large delays on the off-slip in all DS options, with at least 17 minutes more delay than the DM in the best performing DS option (Cyan). This level of congestion on the off-slip impacts journey times for the through movements, with all DS options reporting increased delays when compared to the DM.

The bus journey times are heavily impacted by the levels of congestion within the network, and as such, the journey times have increased further from the second hour for all routes. Trips to and from the city centre from the park and ride are reported to take at least an hour for outbound movements and at least 38 minutes for inbound, with Magenta reporting the quickest in both directions.

Trips to and from the new park and ride are also reported with significant delays. Purple is reported as the quickest for outbound movements and records a journey time 13 minutes quicker than Cyan, the next fastest. Cyan reports the optimal inbound new park and ride journey time with Purple marginally slower and White and Yellow significantly slower.

Table 6.8 - AM Journey Time Comparison

JT	Full Description	Direction	Model Distance (km)	Weighted Average Journey Times (secs)							Weighted Average Delay (secs)							Modelled Average Speed (mph)						
				Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
0700-0800	All Traffic																							
	1 M11 N to M11 S	SB	5.3	196	430	198	227	233	256	337	24	258	26	54	61	84	165	60	27	59	52	51	46	35
	2 M11 N to M11 J11 Roundabout	SB	3.6	168	734	171	421	413	464	784	42	608	45	295	287	337	658	48	11	47	19	19	17	10
	3 M11 S to M11 N	NB	7.1	263	267	268	266	266	267	267	21	25	27	25	25	25	25	60	59	59	59	59	59	59
	4 M11 S to M11 J11 Roundabout	NB	5.3	219	235	262	269	244	261	242	32	48	75	82	57	74	55	54	50	45	44	48	45	49
	5 Harston to A1137	NB	4.4	538	1,002	733	1,662	1,346	1,440	831	268	733	464	1,393	1,076	1,170	561	18	10	13	6	7	7	12
	6 A1134 to Trumpington Street	NB	3.3	464	498	464	459	477	473	473	178	201	169	164	179	177	178	16	15	16	16	15	16	16
	7 Trumpington Street to A1136	SB	3.3	426	491	475	474	479	482	474	120	179	165	168	171	173	165	17	15	15	15	15	15	15
	8 A1134 to Harston	SB	4.4	361	380	404	387	383	387	376	92	112	135	118	114	118	107	27	26	24	25	25	25	26
	Buses																							
	91 P&R Outbound	SB	4.4	546	612	591	621	635	637	622	269	335	319	348	362	364	349	18	16	17	16	15	15	16
	92 P&R Inbound	NB	3.9	650	674	532	536	546	550	546	316	342	279	284	295	299	295	13	13	16	16	16	16	16
	94 26 Outbound	SB	8.2																					
	95 25 Outbound	SB	2.0	240	246	245	245	239	240	241	116	122	121	121	115	116	117	19	18	18	18	19	19	19
	96 Busway Outbound	SB	1.4	187	214	215	215	220	212	218	95	122	124	124	129	121	127	17	15	14	14	14	15	14
	97 Busway Inbound	NB	1.5	582	404	704	769	647	579	646	481	303	602	667	545	477	544	6	8	5	4	5	6	5
	98 Fen Causeway Eastbound	EB	0.8	107	187	188	206	203	210	208	49	129	131	149	145	152	150	17	10	9	9	9	9	9
	99 Fen Causeway Westbound	WB	0.8	111	149	142	145	161	152	138	52	90	83	86	103	94	80	16	12	13	12	11	12	13
	100 New P&R Outbound	EB	6.1					784	787	769				394	397	379	412				17	17	18	18
	101 New P&R Inbound	WB	5.6					726	741	719				346	362	339	381				17	17	17	17
0800-0900	All Traffic																							
	1 M11 N to M11 S	SB	5.3	192	479	194	381	398	422	771	20	306	22	209	225	250	598	61	25	61	31	30	28	15
	2 M11 N to M11 J11 Roundabout	SB	3.6	167	826	185	779	874	842	1,504	40	701	58	651	747	715	1,377	48	10	43	10	9	9	5
	3 M11 S to M11 N	NB	7.1	263	272	302	271	267	283	308	21	31	60	29	26	41	66	60	58	52	58	59	56	51
	4 M11 S to M11 J11 Roundabout	NB	5.3	219	397	320	353	339	324	598	33	210	134	167	153	137	412	54	30	37	33	35	36	20
	5 Harston to A1137	NB	4.4	852	2,652	1,662	2,805	2,783	2,706	2,401	582	2,382	1,392	2,536	2,513	2,437	2,131	11	4	6	3	4	4	4
	6 A1134 to Trumpington Street	NB	3.3	589	629	603	624	698	663	701	276	271	267	265	325	296	320	13	12	12	12	11	11	11
	7 Trumpington Street to A1136	SB	3.3	759	823	857	839	941	922	952	448	501	547	525	625	605	646	10	9	9	9	8	8	8
	8 A1134 to Harston	SB	4.4	372	713	452	504	576	499	615	103	445	184	235	307	229	347	26	14	22	19	17	20	16
	Buses																							
	91 P&R Outbound	SB	4.4	930	1,378	1,272	1,208	1,382	1,351	1,347	655	1,103	1,002	937	1,112	1,081	1,075	11	7	8	8	7	7	7
	92 P&R Inbound	NB	3.9	866	963	663	682	773	727	754	540	631	411	431	523	476	502	10	9	13	13	11	12	11
	94 26 Outbound	SB	8.2	1,469	2,290	1,889	1,818	2,102	2,071	2,167	944	1,767	1,367	1,296	1,583	1,548	1,649	12	8	10	10	9	9	8
	95 25 Outbound	SB	2.0	290	286	290	296	306	315	295	166	162	166	172	182	191	171	15	16	15	15	15	14	15
	96 Busway Outbound	SB	1.4	447	548	540	497	665	603	656	355	456	448	404	573	511	564	7	6	6	6	5	5	5
	97 Busway Inbound	NB	1.5	742	473	688	722	693	726	752	641	371	587	620	592	625	651	5	7	5	5	5	5	4
	98 Fen Causeway Eastbound	EB	0.8																					
	99 Fen Causeway Westbound	WB	0.8	274	648	716	601	686	749	690	216	591	658	543	627	691	632	6	3	2	3	3	2	3
	100 New P&R Outbound	EB	6.1				1,122	1,216	1,167	1,255				734	828	781	902				12	11	12	11
	101 New P&R Inbound	WB	5.6				893	980	908	954				510	599	528	610				14	13	14	13
0900-1000	All Traffic																							
	1 M11 N to M11 S	SB	5.3	188	485	190	651	599	686	965	15	312	17	478	426	514	792	63	24	62	18	20	17	12
	2 M11 N to M11 J11 Roundabout	SB	3.6	165	866	197	1,079	1,111	1,217	1,701	39	740	69	951	984	1,090	1,573	48	9	41	7	7	7	5
	3 M11 S to M11 N	NB	7.1	259	263	310	262	262	263	265	18	22	69	21	21	21	23	61	60	51	60	60	60	60
	4 M11 S to M11 J11 Roundabout	NB	5.3	212	227	297	222	226	227	347	26	40	111	36	39	41	161	56	52	40	53	52	52	34
	5 Harston to A1137	NB	4.4	498	1,232	975	1,506	1,538	1,415	1,236	228	963	706	1,237	1,269	1,146	967	20	8	10	6	6	7	8
	6 A1134 to Trumpington Street	NB	3.3	447	455	436	454	465	470	465	149	134	120	127	138	145	134	16	16	17	16	16	16	16
	7 Trumpington Street to A1136	SB	3.3	509	500	480	494	499	600	475	202	193	176	187	185	250	174	14	15	15	15	15	12	15
	8 A1134 to Harston	SB	4.4	355	458	394	378	407	461	381	85	189	125	108	138	191	112	28	21	25	26	24	21	26
	Buses																							
	91 P&R Outbound	SB	4.4	850	881	894	961	969	1,118	1,000	578	608	626	694	700	849	732	12	11	11	10	10	9	10
	92 P&R Inbound	NB	3.9	625	664	510	520	533	539	528	302	341	264	270	281	289	279	14	13	17	17	16	16	16
	94 26 Outbound	SB	8.2		3,304	2,934	3,420		3,321	2,963		2,741	2,461	2,947		2,830	2,434			6	5		6	6
	95 25 Outbound	SB	2.0	266	258	256	259	256	367	256	142	134	132	135	131	242	132	17	17	18	17	18	12	18
	96 Busway Outbound	SB	1.4	280	291	292	359	391	427	354	188	199	201	267	300	335	263	11	11	11	9	8	7	9
	97 Busway Inbound	NB	1.5	862	338	709	767	672	769	776	760	237	608	666	570	667	674	4	10	5	4	5	4	4
	98 Fen Causeway Eastbound	EB	0.8																					
	99 Fen Causeway Westbound	WB	0.8	119	237	217	232	224	223	228	62	180	160	175	167	166	171	15	7	8	8	8	8	8
	100 New P&R Outbound	EB	6.1				949	1,058	1,121	1,019				557	666	729	662				14	13	12	13
	101 New P&R Inbound	WB	5.6				722	725	722	697				338	339	336	348				17	17	17	18

Table 6.9 - PM Journey Time Comparison

JT	Full Description	Direction	Model Distance (km)	Weighted Average Journey Times (secs)							Weighted Average Delay (secs)							Modelled Average Speed (mph)						
				Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
1600-1700	All Traffic																							
	1 M11 N to M11 S	SB	5.3	196	198	198	227	200	217	199	24	26	26	55	28	44	27	60	59	59	52	59	54	59
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	198	247	495	285	488	326	30	72	120	368	158	360	199	51	40	32	16	28	16	24
	3 M11 S to M11 N	NB	7.1	261	266	267	264	265	279	267	20	24	25	23	23	38	26	61	60	59	60	60	57	59
	4 M11 S to M11 J11 Roundabout	NB	5.3	224	237	478	609	519	674	557	37	52	292	422	333	488	370	53	50	25	19	23	17	21
	5 Hartson to A1137	NB	4.4	426	1,043	1,866	2,065	1,735	1,800	1,591	156	773	1,597	1,795	1,465	1,531	1,321	23	9	5	5	6	5	6
	6 A1134 to Trumpington Street	NB	3.3	572	494	596	621	600	647	591	191	148	217	243	218	265	217	13	15	12	12	12	11	12
	7 Trumpington Street to A1136	SB	3.3	890	1,032	639	667	640	659	660	409	627	223	222	214	224	214	8	7	11	11	11	11	11
	8 A1134 to Harston	SB	4.4	379	423	1,186	1,712	1,558	2,118	1,290	110	153	915	1,442	1,287	1,848	1,021	26	23	8	6	6	5	8
	Buses																							
	91 P&R Outbound	SB	4.4	943	1,661	801	808	808	848	779	668	1,386	530	537	538	583	508	10	6	12	12	12	12	13
	92 P&R Inbound	NB	3.9	690	734	674	705	681	698	677	359	401	422	456	432	457	428	13	12	13	12	13	12	13
	94 26 Outbound	SB	8.2																					
	95 25 Outbound	SB	2.0	473	386	438	382	268	279	373	349	261	313	257	142	152	246	10	12	10	12	17	16	12
	96 Busway Outbound	SB	1.4	280	602	218	210	206	207	217	190	512	127	119	115	116	125	11	5	14	15	15	15	14
	97 Busway Inbound	NB	1.5	603	615	802	783	791	792	795	503	515	701	682	691	692	694	6	5	4	4	4	4	4
	98 Fen Causeway Eastbound	EB	0.8	119	301	159	150	151	154	149	60	242	100	91	92	95	91	15	6	11	12	12	12	12
	99 Fen Causeway Westbound	WB	0.8	156	858	175	170	160	145	153	97	800	117	112	102	86	94	11	2	10	10	11	12	12
	100 New P&R Outbound	EB	6.1				906	947	905	861				516	558	521	507				15	14	15	16
	101 New P&R Inbound	WB	5.6				913	887	890	888				537	512	525	548				14	14	14	14
1700-1800	All Traffic																							
	1 M11 N to M11 S	SB	5.3	193	198	196	423	253	589	206	22	27	25	252	81	417	35	61	60	60	28	47	20	57
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	318	220	831	488	1,054	430	31	192	94	704	362	927	303	51	25	36	10	16	8	19
	3 M11 S to M11 N	NB	7.1	257	261	300	270	300	404	294	17	21	60	30	60	164	54	62	61	53	59	53	39	54
	4 M11 S to M11 J11 Roundabout	NB	5.3	234	310	835	843	1,289	1,000	1,106	48	124	650	657	1,103	814	920	51	38	14	14	9	12	11
	5 Hartson to A1137	NB	4.4	446	1,314	3,098	3,550	3,349	3,024	2,623	176	1,043	2,830	3,281	3,080	2,755	2,354	22	7	3	3	3	3	4
	6 A1134 to Trumpington Street	NB	3.3	628	747	847	876	1,172	1,395	908	200	312	197	309	451	642	272	12	10	9	8	6	5	8
	7 Trumpington Street to A1136	SB	3.3	795	904	3,721	5,647	6,486	9,774	4,261	380	504	2,345	3,561	3,493	6,458	2,498	9	8	2	1	1	1	2
	8 A1134 to Harston	SB	4.4	397	807	3,220	4,066	4,773	5,371	3,520	127	536	2,950	3,796	4,503	5,100	3,250	25	12	3	2	2	2	3
	Buses																							
	91 P&R Outbound	SB	4.4	822	1,394	2,414	3,427	3,729	4,284	2,770	548	1,122	2,142	3,154	3,455	4,006	2,496	12	7	4	3	3	2	4
	92 P&R Inbound	NB	3.9	730	830	1,616	2,201	1,834	3,662	1,733	402	501	1,366	1,946	1,587	3,409	1,481	12	10	5	4	5	2	5
	94 26 Outbound	SB	8.2	1,061														17						
	95 25 Outbound	SB	2.0	354	366	1,824	2,446	2,839	3,315	2,265	230	241	1,701	2,323	2,714	3,186	2,142	13	12	2	2	2	1	2
	96 Busway Outbound	SB	1.4	242	489	844	643	537	3,358	826	150	397	752	551	444	3,273	734	13	6	4	5	6	1	4
	97 Busway Inbound	NB	1.5	590	865	1,041	1,351	1,188		1,522	488	763	939	1,251	1,090		1,420	6	4	3	2	3		2
	98 Fen Causeway Eastbound	EB	0.8	156	327	671	361	213	109	453	99	270	614	303	155	53	396	11	5	3	5	8	16	4
	99 Fen Causeway Westbound	WB	0.8	150	497	467	431	484		657	91	439	409	370	427		599	12	4	4	4	4		3
	100 New P&R Outbound	EB	6.1				3,468	3,800	4,029	2,853				3,083	3,412	3,644	2,502				4	4	3	5
	101 New P&R Inbound	WB	5.6				2,706	2,135	3,937	1,903				2,313	1,776	3,551	1,549				5	6	3	7
1800-1900	All Traffic																							
	1 M11 N to M11 S	SB	5.3	187	325	190	661	326	728	204	16	154	18	489	154	556	32	63	36	62	18	36	16	58
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	800	209	1,094	655	1,235	458	30	675	82	968	529	1,109	332	51	10	38	7	12	6	17
	3 M11 S to M11 N	NB	7.1	254	260	498	465	830	964	813	13	19	257	224	590	723	572	62	61	32	34	19	16	19
	4 M11 S to M11 J11 Roundabout	NB	5.3	216	481	1,581	1,696	2,255	1,953	2,252	29	295	1,395	1,510	2,069	1,767	2,067	55	25	7	7	5	6	5
	5 Hartson to A1137	NB	4.4	640	2,415	4,463	4,434	4,447	4,179	4,128	371	2,146	4,195	4,165	4,178	3,910	3,859	15	4	2	2	2	2	2
	6 A1134 to Trumpington Street	NB	3.3	521	888	772	1,261	1,615	1,809	907	197	449	185	297	474	530	190	14	8	10	6	5	4	8
	7 Trumpington Street to A1136	SB	3.3	538	2,077	4,724	6,901	8,151	8,954	4,760	220	1,233	3,426	5,438	6,140	6,741	3,151	14	4	2	1	1	1	2
	8 A1134 to Harston	SB	4.4	364	1,858	3,708	4,321	4,824	5,964	3,892	95	1,588	3,438	4,052	4,554	5,693	3,621	27	5	3	2	2	2	3
	Buses																							
	91 P&R Outbound	SB	4.4	678	2,570	4,367	5,141	5,447	5,904	4,308	403	2,293	4,101	4,873	5,178	5,637	4,042	14	4	2	2	2	2	2
	92 P&R Inbound	NB	3.9	790	1,144	2,309	2,862	3,740	4,637	2,806	464	823	2,058	2,607	3,484	4,376	2,550	11	8	4	3	2	2	3
	94 26 Outbound	SB	8.2		2,885																			
	95 25 Outbound	SB	2.0	247	1,293	1,914	2,196	3,466	3,797	2,348	123	1,169	1,790	2,071	3,342	3,674	2,224	18	3	2	2	1	1	2
	96 Busway Outbound	SB	1.4	272	858	2,167	2,684	3,178	3,215	1,723	180	766	2,076	2,592	3,086	3,123	1,631	11	4	1	1	1	1	2
	97 Busway Inbound	NB	1.5	857	934	1,324	1,615	1,973	1,779	1,346	755	832	1,222	1,512	1,671	1,678	1,245	4	4	3	2	2	2	2
	98 Fen Causeway Eastbound	EB	0.8	106	362	1,359	3,478	2,968	2,187	1,094	48	304	1,301	3,420	2,910	2,129	1,036	17	5	1	1	1	1	2
	99 Fen Causeway Westbound	WB	0.8		1,891	1,865	2,502	2,021	2,335	2,102		1,832	1,807	2,444	1,963	2,278	2,044		1	1	1	1	1	1
	100 New P&R Outbound	EB	6.1				5,190	5,449	5,984	4,359				4,797	5,062	5,595	4,007				3	2	2	3
	101 New P&R Inbound	WB	5.6				3,096	4,300	5,108	3,182				2,716	3,908	4,708	2,836				4	3	2	4

6.4 CAP Sensitivity Test

Further tests have been carried out assuming the proposed City Access Scheme has been implemented based upon SATURN model CAP scenarios. The CAP applies a 30-minute proxy penalty for vehicles accessing the city centre using private vehicles, which results in a greater mode shift to public transport and therefore increased park and ride use. Table 6.10 summarises the overall period demand in comparison to the Base, DM and without-CAP Purple and White scenarios.

Table 6.10 - 3.5-hour VISSIM traffic Demand (Inc. CAP scenarios)

Scenario	AM	% Increase over Base	PM	% Increase over Base
Base	36,710	-	37,885	-
DM	42,817	17%	42,713	13%
Purple	43,467	18%	43,048	14%
PurpleCAP	40,578	11%	40,924	8%
White	43,728	19%	43,255	14%
WhiteCAP	40,866	11%	40,959	8%

It was proposed that the best performing DS scenario for each new park and ride layout (bus bridge/hamburger) was to be tested. Magenta appeared optimal in many of the metrics, however, as the only DS option to utilise the existing Trumpington Park and Ride, and therefore with limited scope for increased capacity, the CAP test cannot be applied. Therefore, Purple and White were chosen for the test as the optimal performing DS scenarios with the proposed new park and ride site for the bus bridge and hamburger layouts respectively, based on total AM and PM combined processed vehicles.

The sensitivity tests ('PurpleCAP' and WhiteCAP) utilise the networks of Purple and White respectively, with the only difference being demand and turning proportions. The same method has been applied as described in Section 5.1 of this report.

This section summarises the results in comparison to the Base, DM, Magenta and non-CAP Purple and White scenarios.

6.4.1 Network Performance Summary

The CAP demand changes show a stark improvement in performance for both the Purple and White scenarios across all metrics, as detailed in Table 6.11. The results show much less congestion within the network as indicated by the average speed, which, within the AM peak is higher than and equal to the Base model for PurpleCAP and WhiteCAP respectively, and both significantly higher than the DM, Magenta and Purple and White scenarios; although Magenta does process a higher number of vehicles during the AM peak. Lower network delay and latent demand further show PurpleCAP and WhiteCAP as the optimal future year scenarios, with PurpleCAP the optimal out of the two.

The PM peak shows a similar pattern with PurpleCAP having the highest average network speed and lowest network delay and latent demand of the future year scenarios, whilst processing the most vehicles of the DS scenarios. Whilst WhiteCAP outperforms its non-cap counterpart, it records more congestion than both the DM and Magenta as indicated by a slower average network speed and higher delay.

Overall, throughout the AM and PM, PurpleCAP is the optimal future year performer in terms of average network speed, network delay and latent demand, followed by WhiteCAP. Over the six hour period the DM and Magenta options process more vehicles than the two CAP scenarios.

Table 6.11 - Network Performance Summary

Time	Measure	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP
AM Peak (3 hour total)	Remaining Vehicles in Network	3,028	5,800	4,259	6,497	3,006	6,023	3,102
	Processed Vehicles	34,833	38,192	39,215	37,305	37,650	37,980	37,947
	Total Distance Travelled (km)	145,891	155,985	158,944	150,072	153,284	153,503	153,116
	Total Travel Time (h)	3,044	5,730	4,238	6,264	3,026	5,803	3,181
	Total Network Delay (h)	1,194	3,750	2,219	4,338	1,104	3,840	1,253
	Average Travel Time (mins)	4.8	7.8	5.8	8.6	4.5	7.9	4.6
	Average Delay Time (mins)	1.9	5.1	3.1	5.9	1.6	5.2	1.8
	Total Stopped Delay (h)	513	1,442	1,059	1,693	464	1,579	514
	Average Stopped Delay (s)	49	118	88	139	41	129	45
	Number of Stops	84,270	341,867	155,970	457,579	81,644	339,730	93,277
	Average Number of Stops	2.2	7.8	3.6	10.5	2.0	7.7	2.3
	Average Network Speed (kmph)	48.5	28.1	38.3	25.4	51.0	27.6	48.5
	Latent Demand (vehs)	162	3,388	2,478	4,846	1,094	4,512	1,105
	Latent Delay (h)	156	2,792	1,870	3,627	810	3,480	812
PM Peak (3 Hour total)	Remaining Vehicles in Network	3,010	7,065	8,440	9,223	5,132	10,261	8,869
	Processed Vehicles	38,786	37,680	34,410	34,075	35,976	31,893	32,468
	Total Distance Travelled (km)	145,797	148,429	136,130	134,557	132,739	128,698	130,354
	Total Travel Time (h)	3,155	6,198	7,791	8,282	4,611	9,168	7,951
	Total Network Delay (h)	1,278	4,323	6,139	6,641	2,939	7,621	6,394
	Average Travel Time (mins)	4.5	8.4	10.9	11.5	6.7	13.1	11.6
	Average Delay Time (mins)	1.8	5.9	8.6	9.2	4.3	10.8	9.3
	Total Stopped Delay (h)	535	2,451	3,979	4,225	1,645	5,101	4,421
	Average Stopped Delay (s)	46	201	336	353	145	436	387
	Number of Stops	102,037	279,473	370,910	445,819	204,540	480,650	358,003
	Average Number of Stops	2.4	6.3	8.6	10.3	5.0	11.4	8.7
	Average Network Speed (kmph)	46.4	27.8	19.6	18.9	31.6	16.8	19.1
	Latent Demand (vehs)	152	5,062	13,096	11,477	2,786	15,084	10,709
	Latent Delay (h)	106	3,298	8,981	7,769	1,836	10,342	7,046
AM & PM (6 hour total)	Remaining Vehicles in Network	6,038	12,865	12,699	15,720	8,138	16,284	11,971
	Processed Vehicles	73,619	75,872	73,624	71,379	73,626	69,873	70,416
	Total Distance Travelled (km)	291,688	304,414	295,074	284,629	286,022	282,201	283,470
	Total Travel Time (h)	6,199	11,929	12,028	14,545	7,637	14,971	11,132
	Total Network Delay (h)	2,471	8,073	8,358	10,978	4,043	11,461	7,647
	Average Travel Time (mins)	4.7	8.1	8.4	10.0	5.6	10.4	8.1
	Average Delay Time (mins)	1.9	5.5	5.8	7.6	3.0	8.0	5.6
	Total Stopped Delay (h)	1,047	3,893	5,038	5,918	2,109	6,680	4,934
	Average Stopped Delay (s)	47	160	211	245	93	280	216
	Number of Stops	186,307	621,340	526,880	903,398	286,184	820,380	451,279
	Average Number of Stops	2.3	7.0	6.1	10.4	3.5	9.5	5.5
	Average Network Speed (kmph)	47.4	28.0	29.0	22.1	41.2	22.3	33.7
	Latent Demand (vehs)	313	8,450	15,573	16,323	3,880	19,596	11,814
	Latent Delay (h)	262	6,090	10,851	11,396	2,647	13,822	7,858

Best forecast year scenario Best forecast year DS scenario

6.4.2 Junction Performance Summary

The junction results as shown in Tables 6.12 and 6.13 support the network performance summary by showing PurpleCAP as the optimal performing future year scenario.

Within the AM peak across the vast majority of junctions, delay and levels of queuing are lower in PurpleCAP and WhiteCAP than the DM, Magenta and Purple and White scenarios. The result of this reduction is that all junctions, except for High Street/Church Lane, and Lensfield Road in the second hour,

are predicted to be operating either within or at capacity, with several junctions shown to have an improved performance when compared against the Base model and demand. By the third hour of the AM Peak, only the two CAP scenarios and the Base are indicated to be within capacity with PurpleCAP marginally better than WhiteCAP.

The PM peak shows less improvements when compared against the Base, and overall, a more congested network. Within the first hour, the optimal performing junctions are split between DM, WhiteCAP and PurpleCAP, with PurpleCAP showing the overall lowest averaged delay of the future year options. The second hour however, shows PurpleCAP as the optimal performing scenario in the majority of junctions in terms of delay and levels of queuing. Six junctions are reported to be over capacity in PurpleCAP compared to all in Purple, White and Magenta, ten in the DM and all but one in WhiteCAP.

The third hour reports increased congestion in PurpleCAP, with 16 out of 22 junctions shown to be over capacity, this again compares to all junctions in Magenta, Purple, White and WhiteCAP and all but one in the DM. In terms of delay and queuing, PurpleCAP is the optimal performing future year scenario averaged across all junctions.

Table 6.12 - AM Junction Performance Summary

Junction	Volume										Max Queue Length (m)										Average Queue Length (m)										Delay (s)										LOS									
	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP															
101 M11 J11	7,575	7,604	8,193	7,378	7,868	7,597	7,858	153	3,090	328	3,065	268	1,421	675	7	446	29	399	18	152	65	15	112	36	110	26	86	58	B	F	D	F	C	F	E	B	F	D	F	C	F	E								
102 A1309 / Addenbrooke's Road	2,959	3,143	3,412	3,253	3,258	3,221	3,284	311	805	379	759	477	833	658	6	51	24	46	14	46	26	18	55	45	51	29	47	37	B	D	D	D	C	D	F	E	D	F	E	D										
103 Trumpington P&R	1,295	1,175	1,201	1,266	1,242	1,227	1,206	335	365	370	369	358	368	356	43	66	95	91	79	78	72	45	51	74	68	62	60	58	D	D	E	D	E	E	E	E	E	E	E	E										
104 Consort Ave T-junction	1,302	1,248	1,294	1,325	1,328	1,296	1,326	286	289	287	288	287	288	287	21	25	33	30	27	27	26	42	49	61	55	53	53	50	D	D	E	D	D	D	D	D	D	D	D	D										
105 Waitrose T-junction	1,316	1,342	1,383	1,412	1,378	1,433	1,387	162	163	162	160	162	160	161	18	24	21	19	15	20	15	29	34	35	32	28	32	28	C	C	D	C	C	C	C	C	C	C	C	C										
106 High Street / Hauxton Rd / A1301 Shelford Rd	1,658	1,805	1,859	1,866	1,782	1,900	1,759	92	177	173	183	99	162	91	13	25	24	26	15	22	14	19	25	23	24	18	23	18	B	C	C	C	C	B	C	C	B	C	B											
107 High Street / Maris Lane	1,586	1,792	1,871	1,802	1,783	1,830	1,757	126	162	139	130	134	139	131	6	10	8	7	6	7	6	9	11	9	9	9	9	9	A	B	A	A	A	A	A	A	A	A	A	A										
108 High Street / Church Lane	1,709	1,874	1,900	1,887	1,808	1,922	1,810	348	647	648	648	647	648	648	51	207	208	208	181	217	182	46	122	125	125	112	129	112	D	F	F	F	F	F	F	F	F	F	F											
109 High Street / Winchmore Dr / Alpha Terrace	1,676	1,871	1,914	1,885	1,725	1,893	1,733	210	210	203	201	191	205	190	7	7	3	3	2	3	2	15	15	11	11	9	11	9	C	B	B	B	B	A	B	A	B	A	B											
110 High Street / A1134	2,004	2,204	2,237	2,202	1,959	2,215	1,968	431	444	254	304	211	302	181	26	24	19	20	13	21	12	42	39	31	32	27	33	26	D	D	C	C	C	C	C	C	C	C	C											
111 A1134 / Parson Rd	1,195	1,250	1,254	1,241	1,027	1,252	1,025	144	173	203	230	78	240	81	1	3	4	6	0	6	1	9	10	12	13	8	13	8	A	A	B	B	B	A	B	A	B	A	B											
112 A1134 / Bentley Rd	1,133	1,188	1,190	1,180	976	1,190	968	228	241	288	270	99	284	124	3	6	8	10	1	10	2	11	13	15	17	9	17	10	B	B	C	C	C	A	C	A	C	A	C											
113 A1134 / Latham Rd / Newton Rd	1,081	1,133	1,136	1,121	920	1,136	912	323	346	365	363	299	353	260	8	11	12	14	5	14	5	19	23	25	28	14	28	15	C	C	D	D	B	D	B	D	B	D												
114 A1134 / Quakersway	1,033	1,085	1,080	1,070	878	1,081	873	139	138	136	139	127	136	137	7	10	11	12	6	11	7	12	15	17	19	12	17	14	B	C	C	C	C	B	C	B	C	B												
115 A1134 / Chaucer Rd / Brooklands Ave	1,632	1,772	1,770	1,765	1,423	1,775	1,417	597	462	612	633	306	590	269	73	61	94	86	22	88	18	109	86	131	119	44	122	40	F	F	F	F	F	D	F	D	F	D	F											
116 A1134 / Bateman St	1,386	1,625	1,632	1,628	1,322	1,628	1,319	138	201	179	141	136	183	105	2	7	4	3	3	4	2	10	15	11	11	10	11	10	A	B	B	B	B	B	B	B	B	B	B											
117 A1134 / Fen Causeway	1,956	2,372	2,389	2,364	1,944	2,367	1,933	122	611	611	612	131	612	121	2	74	67	91	4	91	3	13	51	47	57	13	57	13	B	F	E	F	B	B	F	B	F	B	F											
118 A1134 / Lensfield Rd	1,285	1,593	1,592	1,604	1,318	1,603	1,308	92	648	617	657	243	640	211	1	36	31	44	5	43	5	9	31	27	34	14	34	14	A	D	D	D	B	D	B	D	B	D												
201 Cambridge Rd / Church Rd	1,840	1,817	1,877	1,758	1,873	1,862	1,883	190	442	126	200	107	467	347	2	113	1	14	2	124	43	6	59	6	12	6	63	26	A	F	A	B	A	F	D	F	D	F	D											
202 Cambridge Rd / London Rd	1,734	1,584	1,797	1,710	1,769	1,628	1,799	169	645	253	359	260	811	432	15	177	27	30	18	185	54	20	66	25	34	28	119	44	C	F	D	D	D	F	D	F	D	F	D											
201 New P&R access / A10 Cambridge Rd	701																																																	
Peak Period All Network	37,354	39,276	40,981	41,468	39,533	41,572	39,528	597	3,090	648	3,065	2,688	1,421	675	14	129	36	106	21	79	38	24	56	39	53	26	58	37	C	F	E	F	F	C	F	D	F	E	F	D										
101 M11 J11	7,142	7,315	7,780	6,663	7,305	6,886	7,346	393	3,071	989	3,714	323	2,505	361	20	612	74	809	20	396	32	21	166	60	251	28	173	39	C	F	E	F	F	C	F	D	F	E	F	D										
102 A1309 / Addenbrooke's Road	2,595	2,834	3,226	2,915	2,985	2,904	2,992	363	1,012	642	1,029	394	1,021	499	19	175	48	159	17	136	10	33	166	93	133	35	121	29	C	F	F	F	F	C	F	D	F	E	F	D										
103 Trumpington P&R	1,253	1,179	1,192	1,282	1,235	1,243	1,153	329	372	371	370	342	371	331	65	164	167	167	77	165	39	82	164	160	150	78	155	50	F	F	F	F	F	E	F	D	F	E	D											
104 Consort Ave T-junction	1,383	1,384	1,402	1,447	1,444	1,418	1,423	287	291	290	289	288	289	286	29	53	48	48	29	48	34	56	83	80	77	55	80	56	E	F	F	F	E	D	F	E	D	F	E											
105 Waitrose T-junction	1,498	1,561	1,576	1,613	1,565	1,630	1,570	160	163	162	161	161	160	161	21	29	24	23	16	25	15	29	36	35	34	25	37	23	C	D	D	C	C	C	D	C	D	C	D											
106 High Street / Hauxton Rd / A1301 Shelford Rd	1,867	1,989	2,022	2,048	1,987	2,087	1,967	117	525	517	537	110	468	108	19	181	178	179	18	149	17	22	81	77	77	20	68	20	C	F	E	E	E	C	E	B	C	E	B											
107 High Street / Maris Lane	1,790	1,965	2,035	1,976	1,970	2,013	1,955	166	228	197	149	161	220	215	12	23	16	14	10	20	12	12	16	13	12	12	15	12	B	C	B	B	B	B	B	B	B	B												
108 High Street / Church Lane	1,874	1,949	1,965	1,957	1,876	2,002	1,898	423	649	649	650	651	650	651	113	238	226	229	219	232	220	88	162	151	154	145	152	144	F	F	F	F	F	F	F	F	F	F	F											
109 High Street / Winchmore Dr / Alpha Terrace	1,881	2,000	2,026	2,005	1,856	2,027	1,880	211	229	205	207	189	210	185	11	12	6	6	3	7	3	19	17	13	14	10	14	11	C	C	C	B	B	B	B	B	B	B												
110 High Street / A1134	2,361	2,466	2,494	2,462	2,239	2,494	2,264	445	446	387	437	248	412	289	36	35	44	51	19	49	23	47	44	47	51	31	50	33	D	D	D	D	C	D	D	C	D	C												
111 A1134 / Parson Rd	1,588	1,567	1,587	1,570	1,357	1,585	1,362	240	278	303	336	135	329	141	5	10	20	21	2	26	3	14	17	26	28	11	32	12	B	C	D	D	D	B	D	B	D	B	D											
112 A1134 / Bentley Rd	1,427	1,432	1,449	1,428	1,201	1,441	1,203	258	337	319	339	214	345	143	7	15	21	26	4	32	3	15	22	26	32	13	35	11	B	C	D	D	B	D	B	D	B	D												
113 A1134 / Latham Rd / Newton Rd	1,440	1,440	1,461	1,437	1,218	1,446	1,216	363	375	363	389	326	384	307	12	23	28	39	9	40	9	25	38	41	56	22	54	22	C	E	E	E	F	C	C	F	C	F	C											
114 A1134 / Quakersway	1,361	1,351	1,368	1,344	1,142	1,347	1,146	139	139	139	141	133	142	137	9	13	15	19	5	17	6	15	18	20	24	11	23	12	B	C	C	C	C	B	C	B	C	B												
115 A1134 / Chaucer Rd / Brooklands Ave	2,062	2,060	2,117	2,047	1,788	2,048	1,778	653	551	649	657	370	647	365	199	158	19																																	

Table 6.13 - PM Junction Performance Summary

Node	Junction	Volume												Max Queue Length (m)												Average Queue Length (m)												Delay (s)												LOS											
		Base	DM	Magenta	Purple	PurpleCAF	White	WhiteCAF	Base	DM	Magenta	Purple	PurpleCAF	White	WhiteCAF	Base	DM	Magenta	Purple	PurpleCAF	White	WhiteCAF	Base	DM	Magenta	Purple	PurpleCAF	White	WhiteCAF	Base	DM	Magenta	Purple	PurpleCAF	White	WhiteCAF																									
101	M11 J11	7,593	8,014	6,969	6,855	6,967	6,787	6,818	144	474	1,239	567	519	639	908	5	34	139	114	46	122	119	13	35	136	142	57	154	145	B	C	F	F	F	E	F	F	F	F	F																					
102	A1309 / Addenbrooke's Road	2,909	3,095	2,318	2,178	2,595	2,089	2,002	57	716	1,230	1,128	1,109	1,154	1,153	1	51	213	187	61	226	201	10	66	274	209	74	246	252	A	E	F	F	F	E	F	F	F	F	F																					
103	Trumpington P&R	1,627	1,680	1,340	1,222	1,519	1,171	1,272	205	368	368	342	334	350	347	24	163	203	185	130	198	197	24	100	167	162	90	179	182	C	F	F	F	F	F	F	F	F	F	F	F																				
104	Consort Ave T-junction	1,431	1,539	1,218	1,210	1,536	1,139	1,267	168	284	285	262	272	266	271	4	35	86	81	33	96	92	14	60	91	83	55	91	90	B	E	F	F	F	D	F	F	F	F	F																					
105	Waltrose T-junction	1,673	1,820	1,478	1,445	1,738	1,348	1,422	155	163	161	146	151	149	149	16	27	52	46	28	56	42	19	29	58	49	33	61	46	B	C	E	D	C	E	D	C	E	D	C	E																				
106	High Street / Hauxton Rd / A1301 Shelford Rd	1,865	2,009	1,643	1,575	1,926	1,485	1,653	87	116	141	129	84	201	208	17	24	28	27	17	38	38	24	26	35	34	22	44	41	C	C	D	E	D	C	C	D	C	D	C	D																				
107	High Street / Maris Lane	1,831	2,019	1,664	1,579	1,850	1,441	1,526	356	352	352	323	301	330	332	88	63	63	68	30	81	97	45	34	37	37	23	41	51	E	D	E	E	C	E	C	E	C	E	F	F																				
108	High Street / Church Lane	1,791	2,003	1,726	1,652	1,787	1,528	1,494	235	345	396	272	158	282	606	53	84	93	67	13	71	187	52	62	73	60	21	64	108	D	E	E	E	E	C	E	F	F	F	F	F																				
109	High Street / Winchmore Dr / Alpha Terrace	1,718	1,988	1,756	1,676	1,752	1,553	1,471	453	456	439	419	194	428	427	62	36	37	42	5	55	62	49	30	31	13	35	49	E	D	D	D	D	B	E	F	F	F	F	F	F																				
110	High Street / A1134	1,981	2,418	2,057	1,988	1,936	1,812	1,627	384	350	539	516	151	549	549	79	45	78	90	11	122	118	60	41	43	42	23	40	49	E	D	D	D	C	D	C	D	C	D	C	D																				
111	A1134 / Parson Rd	1,214	1,537	1,154	1,097	981	979	803	325	320	287	43	348	335	34	10	20	26	0	47	33	44	19	20	21	8	21	22	E	C	C	C	C	A	C	C	C	C	A	C	C																				
112	A1134 / Bentley Rd	1,108	1,421	1,084	1,039	863	949	763	300	139	239	256	37	312	171	22	3	8	9	0	15	5	32	11	14	13	8	13	10	D	B	B	B	B	A	B	A	B	A	B	A																				
113	A1134 / Latham Rd / Newton Rd	1,138	1,430	1,126	1,096	868	1,019	799	212	177	240	229	173	223	105	11	5	11	10	6	10	2	26	15	26	25	21	24	11	D	B	D	D	C	C	C	C	C	C	B	C	B																			
114	A1134 / Queensway	1,133	1,400	1,100	1,097	864	1,021	795	128	133	121	115	109	102	92	11	5	10	11	8	11	2	17	9	16	17	16	18	8	C	A	A	C	C	C	C	C	C	C	A	C	C																			
115	A1134 / Chaucer Rd / Brooklands Ave	1,681	2,023	1,797	1,798	1,456	1,714	1,394	617	658	665	611	624	624	372	118	203	131	118	108	121	46	149	184	163	165	180	174	96	F	F	F	F	F	F	F	F	F	F	F	F																				
116	A1134 / Bateman St	1,493	1,722	1,641	1,630	1,425	1,594	1,345	427	382	425	406	408	410	320	64	97	51	45	65	50	25	59	72	45	40	62	43	30	F	F	E	E	E	F	F	E	F	E	D	F	D																			
117	A1134 / Fen Causeway	2,182	2,155	2,282	2,255	2,152	2,224	1,956	371	615	528	446	332	445	274	70	176	88	76	75	76	38	48	114	58	50	51	52	34	E	F	F	F	F	F	F	F	F	F	F	D	B																			
118	A1134 / Lensfield Rd	1,661	1,568	1,708	1,677	1,635	1,665	1,456	393	663	420	357	507	352	180	22	254	31	25	60	23	5	23	213	29	25	47	25	12	C	F	D	D	E	E	C	B	E	C	B	E	C																			
201	Cambridge Rd / Church Rd	1,646	1,795	1,350	1,378	1,249	1,333	1,359	97	104	387	289	65	432	156	1	46	21	0	58	5	5	5	30	17	4	41	7	A	A	D	C	A	C	A	E	A	E	A	E	A																				
202	Cambridge Rd / London Rd	1,634	1,737	1,370	1,407	1,251	1,378	1,396	33	39	218	250	86	543	124	1	1	11	12	6	37	6	8	8	12	19	15	35	14	A	A	B	C	C	C	E	B	E	B	E	B																				
701	New P&R access / A10 Cambridge Rd	39,308	43,373	36,779	37,092	37,570	35,412	33,861	617	716	1,239	730	32	778	699	32	63	86	76	38	89	81	33	55	85	78	45	89	22	D	F	F	F	F	F	F	F	F	F	F	F	F																			
Peak Period All Network		7,782	7,521	6,704	6,733	6,884	6,521	6,587	244	1,406	1,553	1,539	518	1,635	1,630	11	218	263	236	75	248	212	20	117	239	237	102	268	270	B	F	F	F	F	F	F	F	F	F	F	F	F	F																		
101	M11 J11	7,593	8,014	6,969	6,855	6,967	6,787	6,818	144	474	1,239	567	519	639	908	5	34	139	114	46	122	119	13	35	136	142	57	154	145	B	C	F	F	F	E	F	F	F	F	F	F	F																			
102	A1309 / Addenbrooke's Road	2,909	3,095	2,318	2,178	2,595	2,089	2,002	57	716	1,230	1,128	1,109	1,154	1,153	1	51	213	187	61	226	201	10	66	274	209	74	246	252	A	E	F	F	F	E	F	F	F	F	F	F	F																			
103	Trumpington P&R	1,627	1,680	1,340	1,222	1,519	1,171	1,272	205	368	368	342	334	350	347	24	163	203	185	130	198	197	24	100	167	162	90	179	182	C	F	F	F	F	F	F	F	F	F	F	F	F																			
104	Consort Ave T-junction	1,431	1,539	1,218	1,210	1,536	1,139	1,267	168	284	285	262	272	266	271	4	35	86	81	33	96	92	14	60	91	83	55	91	90	B	E	F	F	F	D	F	F	F	F	F	F																				
105	Waltrose T-junction	1,673	1,820	1,478	1,445	1,738	1,348	1,422	155	163	161	146	151	149	149	16	27	52	46	28	56	42	19	29	58	49	33	61	46	B	C	E	D	C	E	D	C	E	D	C	E																				
106	High Street / Hauxton Rd / A1301 Shelford Rd	1,865	2,009	1,643	1,575	1,926	1,485	1,653	87	116	141	129	84	201	208	17	24	28	27	17	38	38	24	26	35	34	22	44	41	C	C	D	E	D	C	C	D	C	D	C	D																				
107	High Street / Maris Lane	1,831	2,019	1,664	1,579	1,850	1,441	1,526	356	352	352	323	301	330	332	88	63	63	68	30	81	97	45	34	37	37	23	41	51	E	D	E	E	C	E	C	E	C	E	F	F																				
108	High Street / Church Lane	1,791	2,003	1,726	1,652	1,787	1,528	1,494	235	345	396	272	158	282	606	53	84	93	67	13	71	187	52	62	73	60	21	64	108	D	E	E	E	E	C	E	F	F	F	F	F																				
109	High Street / Winchmore Dr / Alpha Terrace	1,718	1,988	1,756	1,676	1,752	1,553	1,471	453	456	439	419	194	428	427	62	36	37	42	5	55	62	49	30	31	13	35	49	E	D	D	D	D	B	E	F	F	F	F	F	F																				
110	High Street / A1134	1,981	2,418	2,057	1,988	1,936	1,812	1,627	384	350	539	516	151	549	549	79	45	78	90	11	122	118	60	41	43	42	23	40	49	E	D	D	D	C	D	C	D	C	D	C	D																				
111	A1134 / Parson Rd	1,214	1,537	1,154	1,097	981	979	803	325	320	287	43	348	335	34	10	20	26	0	47	33	44	19	20	21	8	21	22	E	C	C	C	C	A	C	C	C	A	C	C																					
112	A1134 / Bentley Rd	1,108	1,421	1,084	1,039	863	949	763	300	139	239	256	37	312	171	22	3	8	9	0	15	5	32	11	14	13	8	1																																	

6.4.3 Journey Time Results

Tables 6.14 and 6.15 report the journey time results including PurpleCAP and WhiteCAP for the AM and PM peaks respectively.

Within the first hour of the AM peak, the PurpleCAP is the optimal performing future year scenario in the majority of routes with WhiteCAP also optimal in two. When compared to the other future year scenarios, PurpleCAP is over six minutes quicker than the DM scenario and one and a half minutes faster than Magenta for the Harston to A1134 route.

Of the bus only journey times, PurpleCAP is shown as the quickest in all routes bar one (WhiteCAP) and indicated to be nearly one minute faster than Purple from the new park and ride to the city centre.

Within the second hour of the AM peak period, WhiteCAP is indicated to be the optimal scenario in the majority of routes with Magenta and PurpleCAP optimal in one route each. As the journey times increase in the other future year options, the variance between the CAP and other scenarios increase for the most congested of routes and actually improves on the Base for a number of routes. Harston to Shelford Road is indicated to be 11 and 15 seconds faster than the Base in PurpleCAP and WhiteCAP respectively but over 30 minutes faster than the DM for this section. On the M11, PurpleCAP is marginally slower than Base for off-slip movements, but at least 10 minutes faster than the DM and Purple for the same movement. WhiteCAP reports the same journey time as the base and marginally quicker than PurpleCAP and Magenta for M11 north to south and the optimal time for the future year scenarios in the south to north direction, marginally slower than the Base.

Bus only times reflect the above, with WhiteCAP shown as the optimal performing future year scenario and quicker than the Base for a number of routes, including a five minute saving for park and ride inbound trips and nearly three minutes for outbound. Both PurpleCAP and WhiteCAP report a journey time of over 15 minutes less than the DM for the 26-outbound service and large negative differences compared to Magenta, Purple and White.

The final hour results in less variance between the options, although PurpleCAP and WhiteCAP are optimal in all Trumpington Road and northbound M11 routes, again faring better than the Base in a number of these routes. The largest differences are reported from Harston to Shelford Road where both PurpleCAP and WhiteCAP save at least nine minutes on the next fastest future year scenario (Magenta) and over 13 minutes compared to the DM.

Bus only travel times for the second hour show similar results, with PurpleCAP indicated as the optimal future year performing scenario closely followed by WhiteCAP.

The PM peak results indicate PurpleCAP as the optimal performing future year scenario in the majority of routes across the three hours.

The large increases in journey times within the future year scenarios along Trumpington Road are not reported in PurpleCAP. Within the first hour, PurpleCAP is three minutes quicker than the DM for the outer inbound trips and nearly 13 and 17 minutes faster than Purple and Magenta. The WhiteCAP option does not report the same saving and is actually significantly slower than the DM. In the outbound direction, PurpleCAP is reported to be over two minutes slower than the DM but less than half the journey time of Magenta and Purple. Again, WhiteCAP does not fare as well with journey times significantly higher than the DM and PurpleCAP for the outer-outbound section. The M11 reports less variances in journey time between the future year options in both directions, although the WhiteCAP performs worse than PurpleCAP and the DM.

The bus only routes indicate the largest time saving is for WhiteCAP and PurpleCAP when compared to the DM in the first hour, although it should be noted both Magenta and Purple produce similar magnitudes of difference.

The second hour starts to show much larger differences in journey times reported in the Trumpington Road outbound sections in particular. At only 511 seconds for the inner outbound section in PurpleCAP, this represents a saving nearly seven minutes over the DM and over 53 minutes when compared to Magenta. South of Shelford Road, the DM is the optimal performing future year scenario with PurpleCAP as the best DS scenario and significantly faster than Magenta and Purple. WhiteCAP does not produce the same savings as PurpleCAP and records significantly higher journey times than the DM and PurpleCAP, although does improve on its non-CAP counterpart.

The bus only routes report similar results with PurpleCAP reported as significantly faster than all other future year scenarios to both park and ride sites.

The final hour follows the trend of the previous hour with PurpleCAP indicated to be the optimal performing scenario in the majority of routes and all but one when considering only DS options. Despite being the optimal future year scenario, PurpleCAP still results in significant delay between Harston and Shelford Road compared to the Base, but results in a journey time over 40 minute faster than Magenta. The outbound direction also results in significant increases in journey time for PurpleCAP over the Base, but nearly 12 minutes faster than the next best future year scenario, the DM. By the third hour WhiteCAP indicates very high journey times along the corridor in both directions.

The bus only journey times reflect the all-vehicle times with congestion affecting all future year scenarios while PurpleCAP is the optimal future year scenarios for all routes but one, where Magenta is indicated to be optimal.

Table 6.14 - AM Journey Time Results

JT	Full Description	Dir	Model Distance (km)	Weighted Average Journey Times (secs)							Weighted Average Delay (secs)							Modelled Average Speed (mph)						
				Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP
0700-0800	All Traffic																							
	1 M11 N to M11 S	SB	5.3	196	430	198	337	198	233	200	24	258	26	165	26	61	28	60	27	59	35	60	51	59
	2 M11 N to M11 J11 Roundabout	SB	3.6	168	734	171	784	223	413	288	42	608	45	658	95	287	161	48	11	47	10	36	19	28
	3 M11 S to M11 N	NB	7.1	263	267	268	267	266	266	265	21	25	27	25	25	25	24	60	59	59	59	59	59	60
	4 M11 S to M11 J11 Roundabout	NB	5.3	219	235	262	242	222	244	229	32	48	75	55	35	57	42	54	50	45	49	53	48	51
	5 Hartson to A1137	NB	4.4	538	1,002	733	831	626	1,346	898	268	733	464	561	356	1,076	628	18	10	13	12	16	7	11
	6 A1134 to Trumpington Street	NB	3.3	464	498	464	473	408	477	412	178	201	169	178	122	179	127	16	15	16	16	18	15	18
	7 Trumpington Street to A1136	SB	3.3	426	491	475	474	446	479	436	120	179	165	165	135	171	126	17	15	15	15	16	15	17
	8 A1134 to Harston	SB	4.4	361	380	404	376	369	383	377	92	112	135	107	101	114	108	27	26	24	26	26	25	26
	Buses																							
	91 P&R Outbound	SB	4.4	546	612	591	622	585	635	586	269	335	319	349	313	362	314	18	16	17	16	17	15	17
	92 P&R Inbound	NB	3.9	650	674	532	546	484	546	491	316	342	279	295	233	295	239	13	13	16	16	18	16	18
	94 26 Outbound	SB	8.2																					
	95 25 Outbound	SB	2.0	240	246	245	241	239	239	241	116	122	121	117	115	115	117	19	18	18	19	19	19	19
	96 Busway Outbound	SB	1.4	187	214	215	218	195	220	198	95	122	124	127	104	129	107	17	15	14	14	16	14	16
	97 Busway Inbound	NB	1.5	582	404	704	646	208	647	213	481	303	602	544	107	545	113	6	8	5	5	16	5	16
	98 Fen Causeway Eastbound	EB	0.8	107	187	188	208	102	203	102	49	129	131	150	44	145	44	17	10	9	9	18	9	18
	99 Fen Causeway Westbound	WB	0.8	111	149	142	138	113	161	107	52	90	83	80	54	103	48	16	12	13	13	16	11	17
	100 New P&R Outbound	EB	6.1					767	734	787					412	379	397				18	19	17	18
	101 New P&R Inbound	WB	5.6					725	655	741					381	312	362				17	19	17	18
0800-0900	All Traffic																							
	1 M11 N to M11 S	SB	5.3	192	479	194	771	193	398	192	20	306	22	598	20	225	20	61	25	61	15	61	30	61
	2 M11 N to M11 J11 Roundabout	SB	3.6	167	826	185	1,504	223	874	253	40	701	58	1,377	96	747	126	48	10	43	5	36	9	32
	3 M11 S to M11 N	NB	7.1	263	272	302	308	266	267	265	21	31	60	66	25	26	24	60	58	52	51	59	59	60
	4 M11 S to M11 J11 Roundabout	NB	5.3	219	397	320	598	226	339	223	33	210	134	412	40	153	36	54	30	37	20	52	35	53
	5 Hartson to A1137	NB	4.4	852	2,652	1,662	2,401	841	2,783	837	582	2,382	1,392	2,131	570	2,513	567	11	4	6	4	12	4	12
	6 A1134 to Trumpington Street	NB	3.3	589	629	603	701	476	698	465	276	271	267	320	166	325	166	13	12	12	11	15	11	16
	7 Trumpington Street to A1136	SB	3.3	759	823	857	952	584	941	578	448	501	547	646	274	625	265	10	9	9	8	13	8	13
	8 A1134 to Harston	SB	4.4	372	713	452	615	382	576	390	103	445	184	347	113	307	121	26	14	22	16	26	17	25
	Buses																							
	91 P&R Outbound	SB	4.4	930	1,378	1,272	1,347	802	1,382	781	655	1,103	1,002	1,075	532	1,112	510	11	7	8	7	12	7	13
	92 P&R Inbound	NB	3.9	866	963	663	754	536	773	540	540	631	411	502	285	523	289	10	9	13	11	16	11	16
	94 26 Outbound	SB	8.2	1,469	2,290	1,889	2,167	1,271	2,102	1,233	944	1,767	1,367	1,649	752	1,583	714	12	8	10	8	14	9	15
	95 25 Outbound	SB	2.0	290	286	290	295	254	306	266	166	162	166	171	129	182	141	15	16	15	15	18	15	17
	96 Busway Outbound	SB	1.4	447	548	540	656	302	665	271	355	456	448	564	210	573	178	7	6	6	5	10	5	11
	97 Busway Inbound	NB	1.5	742	473	688	752	225	693	220	641	371	587	651	123	592	117	5	7	5	4	15	5	15
	98 Fen Causeway Eastbound	EB	0.8																					
	99 Fen Causeway Westbound	WB	0.8	274	648	716	690	280	686	222	216	591	658	632	222	627	164	6	3	2	3	6	3	8
	100 New P&R Outbound	EB	6.1					1,255	911	1,216					902	558	828				11	15	11	15
	101 New P&R Inbound	WB	5.6					954	717	980					610	371	599				13	17	13	17
0900-1000	All Traffic																							
	1 M11 N to M11 S	SB	5.3	188	485	190	965	192	599	192	15	312	17	792	19	426	19	63	24	62	12	61	20	61
	2 M11 N to M11 J11 Roundabout	SB	3.6	165	866	197	1,701	190	1,111	206	39	740	69	1,573	62	984	79	48	9	41	5	42	7	39
	3 M11 S to M11 N	NB	7.1	259	263	310	265	262	262	262	18	22	69	23	21	21	20	61	60	51	60	60	60	61
	4 M11 S to M11 J11 Roundabout	NB	5.3	212	227	297	347	214	226	214	26	40	111	161	27	39	28	56	52	40	34	55	52	55
	5 Hartson to A1137	NB	4.4	498	1,232	975	1,236	430	1,538	443	228	963	706	967	160	1,269	173	20	8	10	8	23	6	22
	6 A1134 to Trumpington Street	NB	3.3	447	455	436	465	400	465	396	149	134	120	134	105	138	104	16	16	17	16	18	16	19
	7 Trumpington Street to A1136	SB	3.3	509	500	480	475	418	499	418	202	193	176	174	116	185	112	14	15	15	15	18	15	18
	8 A1134 to Harston	SB	4.4	355	458	394	381	359	407	365	85	189	125	112	90	138	96	28	21	25	26	27	24	27
	Buses																							
	91 P&R Outbound	SB	4.4	850	881	894	1,000	597	969	601	578	608	626	732	329	700	333	12	11	11	10	16	10	16
	92 P&R Inbound	NB	3.9	625	664	510	528	477	533	470	302	341	264	279	226	281	219	14	13	17	16	18	16	18
	94 26 Outbound	SB	8.2		3,304	2,934	2,963					2,741	2,461	2,434					6	6	6			
	95 25 Outbound	SB	2.0	260	258	256	256	260	256	254	142	134	132	132	136	131	130	17	17	18	18	17	18	18
	96 Busway Outbound	SB	1.4	286	291	292	354	201	391	202	188	199	201	263	110	300	110	11	11	11	9	15	8	15
	97 Busway Inbound	NB	1.5	862	338	709	776	209	672	212	760	237	608	674	108	570	110	4	10	5	4	16	5	16
	98 Fen Causeway Eastbound	EB	0.8																					
	99 Fen Causeway Westbound	WB	0.8	119	237	217	228	115	224	114	62	180	160	171	58	167	56	15	7	8	8	15	8	16
	100 New P&R Outbound	EB	6.1					1,019	723	1,058					662	366	666				13	19	13	18
	101 New P&R Inbound	WB	5.6					697	647	725					348	299	339				18	19	17	19

Table 6.15 - PM Journey Time Results

JT	Full Description	Dir	Model Distance (km)	Weighted Average Journey Times (secs)							Weighted Average Delay (secs)							Modelled Average Speed (mph)						
				Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP	Base	DM	Magenta	Purple	PurpleCAP	White	WhiteCAP
1600-1700	All Traffic																							
	1 M11 N to M11 S	SB	5.3	196	198	198	199	195	200	207	24	26	26	27	23	28	35	60	59	59	59	60	59	57
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	198	247	326	167	285	366	30	72	120	199	40	158	239	51	40	32	24	48	28	22
	3 M11 S to M11 N	NB	7.1	261	266	267	267	260	265	263	20	24	25	26	18	23	22	61	60	59	59	61	60	60
	4 M11 S to M11 J11 Roundabout	NB	5.3	224	237	478	557	246	519	399	37	52	292	370	59	333	213	53	50	25	21	48	23	30
	5 Harton to A1137	NB	4.4	426	1,043	1,866	1,591	837	1,735	1,813	156	773	1,597	1,321	567	1,465	1,544	23	9	5	6	12	6	5
	6 A1134 to Trumpington Street	NB	3.3	572	494	596	591	591	600	486	191	148	217	217	175	218	143	13	15	12	12	12	12	15
	7 Trumpington Street to A1136	SB	3.3	890	1,032	639	660	528	640	732	409	627	223	214	174	214	206	8	7	11	11	14	11	10
	8 A1134 to Harston	SB	4.4	379	423	1,186	1,290	578	1,558	1,429	110	153	915	1,021	309	1,287	1,160	26	23	8	8	17	6	7
	Buses																							
	91 P&R Outbound	SB	4.4	943	1,661	801	779	758	808	901	668	1,386	530	508	487	538	631	10	6	12	13	13	12	11
	92 P&R Inbound	NB	3.9	690	734	674	677	650	681	586	359	401	422	428	399	432	338	13	12	13	13	13	13	15
	94 26 Outbound	SB	8.2																					
	95 25 Outbound	SB	2.0	473	386	438	373	314	268	444	349	261	313	246	190	142	319	10	12	10	12	14	17	10
	96 Busway Outbound	SB	1.4	280	602	218	215	206	196	190	512	127	125	124	115	105	11	5	14	14	14	14	15	16
	97 Busway Inbound	NB	1.5	603	615	802	795	939	791	464	503	515	701	694	839	691	364	6	5	4	4	4	4	7
	98 Fen Causeway Eastbound	EB	0.8	119	301	159	149	123	151	112	60	242	100	91	64	92	53	15	6	11	12	15	12	16
	99 Fen Causeway Westbound	WB	0.8	156	858	175	153	214	160	123	97	800	117	94	156	102	65	11	2	10	12	8	11	14
	100 New P&R Outbound	EB	6.1					861	824	947					507	470	558				16	16	14	14
	101 New P&R Inbound	WB	5.6					888	839	887					548	496	512				14	15	14	16
1700-1800	All Traffic																							
	1 M11 N to M11 S	SB	5.3	193	198	196	206	193	253	246	22	27	25	35	22	81	74	61	60	60	57	61	47	48
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	318	220	430	214	488	550	31	192	94	303	88	362	423	51	25	36	19	37	16	15
	3 M11 S to M11 N	NB	7.1	257	261	300	294	256	300	261	17	21	60	54	16	60	21	62	61	53	54	62	53	61
	4 M11 S to M11 J11 Roundabout	NB	5.3	234	310	835	1,106	291	1,289	482	48	124	650	920	105	1,103	296	51	38	14	11	41	9	24
	5 Harton to A1137	NB	4.4	446	1,314	3,098	2,623	1,106	3,349	2,897	176	1,043	2,830	2,354	836	3,080	2,628	22	7	3	4	9	3	3
	6 A1134 to Trumpington Street	NB	3.3	628	747	847	908	646	1,172	847	200	312	197	272	191	451	388	12	10	9	8	11	6	9
	7 Trumpington Street to A1136	SB	3.3	795	904	3,721	4,261	511	6,486	4,082	380	504	2,345	2,498	152	3,493	2,259	9	8	2	2	14	1	2
	8 A1134 to Harston	SB	4.4	397	807	3,220	3,520	934	4,773	3,152	127	536	2,950	3,250	665	4,503	2,882	25	12	3	3	10	2	3
	Buses																							
	91 P&R Outbound	SB	4.4	822	1,394	2,414	2,770	693	3,729	2,630	548	1,122	2,142	2,496	423	3,455	2,358	12	7	4	4	14	3	4
	92 P&R Inbound	NB	3.9	730	830	1,616	1,733	703	1,834	1,655	402	501	1,366	1,481	452	1,587	1,400	12	10	5	5	12	5	5
	94 26 Outbound	SB	8.2	1,061				1,276							744			17				14		
	95 25 Outbound	SB	2.0	354	366	1,824	2,265	320	2,839	2,459	230	241	1,701	2,142	195	2,714	2,335	13	12	2	2	14	2	2
	96 Busway Outbound	SB	1.4	242	489	844	826	201	537	429	150	397	752	734	109	444	338	13	6	4	4	15	6	7
	97 Busway Inbound	NB	1.5	590	865	1,041	1,522	1,195	1,188	469	488	763	939	1,420	1,093	1,090	367	6	4	3	2	3	3	7
	98 Fen Causeway Eastbound	EB	0.8	156	327	671	453	141	213	116	99	270	614	396	84	155	59	11	5	3	4	13	8	15
	99 Fen Causeway Westbound	WB	0.8	150	497	467	657	146	484	229	91	439	409	599	87	427	171	12	4	4	3	12	4	8
	100 New P&R Outbound	EB	6.1					2,853	827	3,800					2,502	473	3,412				5	16	4	5
	101 New P&R Inbound	WB	5.6					1,903	878	2,135					1,549	533	1,776				7	14	6	6
1800-1900	All Traffic																							
	1 M11 N to M11 S	SB	5.3	187	325	190	204	192	326	441	16	154	18	32	20	154	269	63	36	62	58	61	36	27
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	800	209	458	396	655	829	30	675	82	332	270	529	702	51	10	38	17	20	12	10
	3 M11 S to M11 N	NB	7.1	254	260	498	813	257	830	260	13	19	257	572	16	590	19	62	61	32	19	62	19	61
	4 M11 S to M11 J11 Roundabout	NB	5.3	216	481	1,581	2,252	681	2,255	801	29	295	1,395	2,067	495	2,069	615	55	25	7	5	17	5	15
	5 Harton to A1137	NB	4.4	640	2,415	4,463	4,128	1,845	4,447	4,571	371	2,146	4,195	3,859	1,576	4,178	4,302	15	4	2	2	5	2	2
	6 A1134 to Trumpington Street	NB	3.3	521	888	772	907	575	1,615	1,657	197	449	185	190	221	474	530	14	8	10	8	13	5	4
	7 Trumpington Street to A1136	SB	3.3	538	2,077	4,724	4,760	1,363	8,151	9,894	220	1,233	3,426	3,151	523	6,140	7,291	14	4	2	2	5	1	1
	8 A1134 to Harston	SB	4.4	364	1,858	3,708	3,892	2,400	4,824	4,432	95	1,588	3,438	3,621	2,130	4,554	4,161	27	5	3	3	4	2	2
	Buses																							
	91 P&R Outbound	SB	4.4	678	2,570	4,367	4,308	1,379	5,447	4,845	403	2,293	4,101	4,042	1,108	5,178	4,575	14	4	2	2	7	2	2
	92 P&R Inbound	NB	3.9	790	1,144	2,309	2,806	1,008	3,740	3,142	464	823	2,058	2,550	757	3,484	2,896	11	8	4	3	9	2	3
	94 26 Outbound	SB	8.2		2,885			3,226					2,372		2,712							6		
	95 25 Outbound	SB	2.0	247	1,293	1,914	2,348	815	3,466	3,633	123	1,169	1,790	2,224	691	3,342	3,508	18	3	2	2	6	1	1
	96 Busway Outbound	SB	1.4	272	858	2,167	1,723	202	3,178	2,971	180	766	2,076	1,631	111	3,086	2,880	11	4	1	2	15	1	1
	97 Busway Inbound	NB	1.5	857	934	1,324	1,346	1,097	1,973	1,642	755	832	1,222	1,245	995	1,871	1,540	4	4	3	2	3	2	2
	98 Fen Causeway Eastbound	EB	0.8	106	362	1,359	1,094	110	2,968	1,760	48	304	1,301	1,036	52	2,910	1,699	17	5	1	2	16	1	1
	99 Fen Causeway Westbound	WB	0.8		1,891	1,865	2,102	2,021	2,332			1,832	1,807	2,044		1,963	2,274		1	1	1	1	1	1
	100 New P&R Outbound	EB	6.1					4,359	1,466	5,449					4,007	1,108	5,062				3	9	2	3
	101 New P&R Inbound	WB	5.6					3,182	1,241	4,300					2,836	891	3,908				4	10	3	4

7 Additional Options Testing

Following initial results, further sensitivity testing was completed to assess whether the existing designs could be improved upon with relatively small-scale changes to the designs. It was decided to make the changes to Yellow as this was the worst performing option out of the new park and ride scenarios. The additional tests are as below:

- 'P&R Roundabout' - New park and ride roundabout (AM Peak)
- 'M11 Westbound (WB) Signals' - M11 Junction 11 westbound entry signalisation (PM Peak)
- 'M11 Northbound (NB) On-slip Merge' - M11 Junction 11 northbound on-slip two lane merge (PM Peak)

This section details the proposed infrastructure changes from the original Yellow layout and how this is reflected in the VISSIM coding. The results of the changes are summarised in this section using the metrics as previous.

7.1 Proposed Infrastructure Changes

The infrastructure changes detailed in this section relate only to the additional changes for these sensitivity tests, above the proposed changes associated with Yellow as described in Section 5.3.5 of this report. The proposed changes use an identical demand to the Yellow option and are therefore directly comparable.

7.1.1 P&R Roundabout

The proposed changes include removing the westbound only exit from the proposed new park and ride site and changing the entry/eastbound exit junction into an all-movements three arm-roundabout, with two lanes running along the circulatory and on all entries and the eastbound exit, and single lane exits to the west and north. Figure 7.1 illustrates the layout within VISSIM.

This option has only been modelled in the AM peak.



Figure 7.1 – P&R Roundabout VISSIM Layout

7.1.2 M11 Westbound Signals

The proposed changes include signalling the south-westbound entry to the M11 Junction 11 roundabout, with associated signals on the circulatory. The signals control has been set to MOVA as with the other arms of the junction. Figure 7.2 illustrates the layout within VISSIM.

This option has only been modelled in the PM Peak.

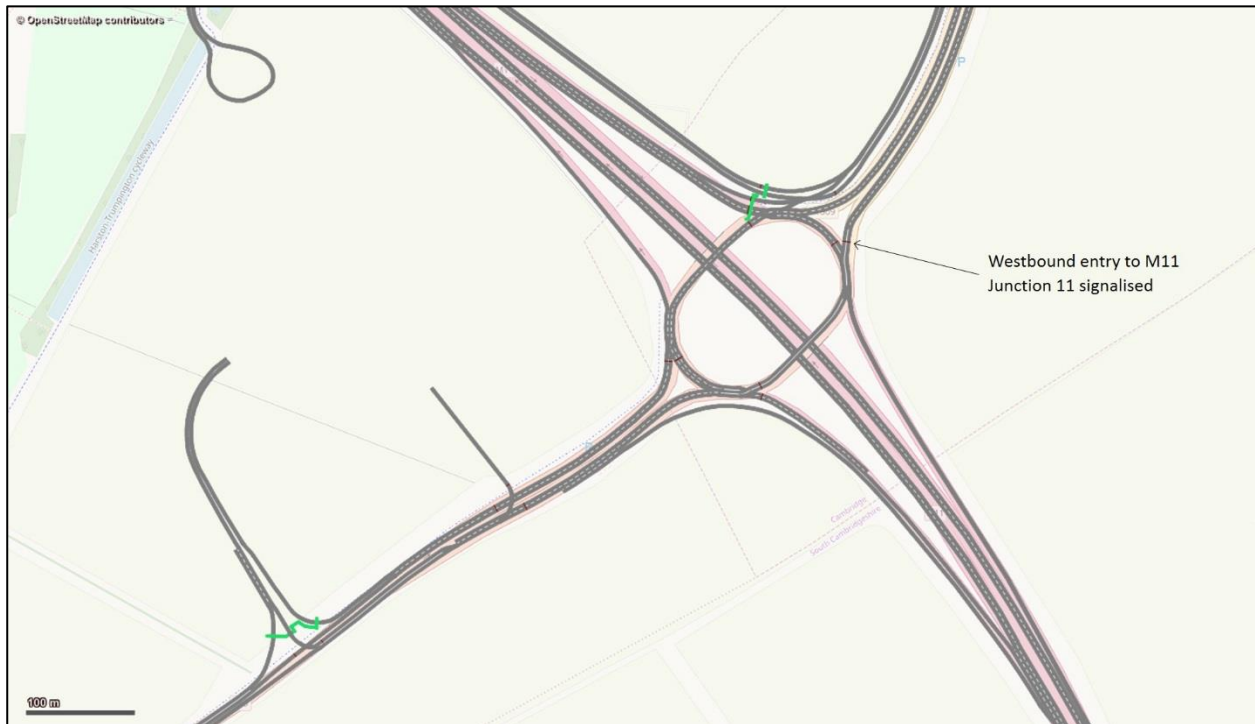


Figure 7.2 – M11 Westbound Signals VISSIM Layout

7.1.3 M11 NB On-slip Merge

The proposed changes include an additional lane on the northbound M11 exit from Junction 11. The two lane on-slip merges down to a single lane before meeting the M11 mainline. Lane allocation is also changed to allow two lanes to turn right (north-westbound) from the south-westbound entry to the roundabout with left (south-eastbound) and straight-ahead (westbound) allocated to only the left lane. The two lanes for right turners are maintained around the roundabout until the proposed two-lane exit. Figure 7.3 illustrates the layout within VISSIM.

This option has only been modelled in the PM Peak.

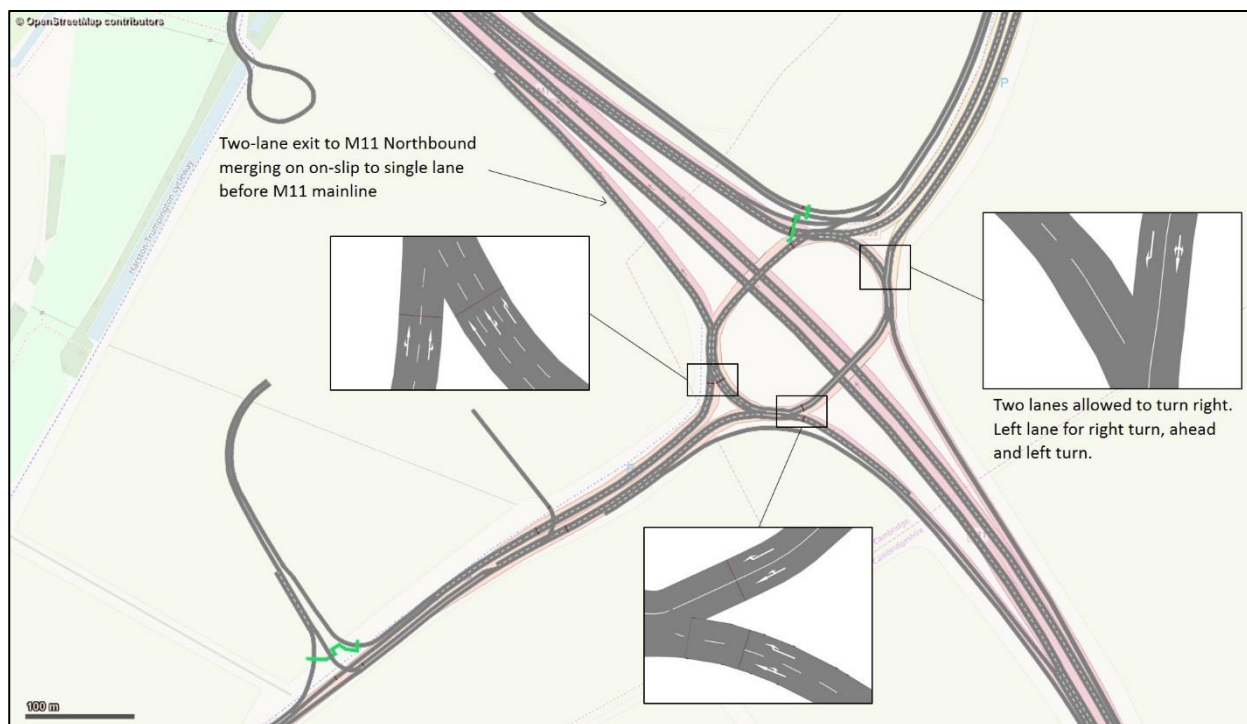


Figure 7.3 - M11 Northbound On-slip Merge VISSIM Layout

7.2 VISSIM results

This section details the performance of the additional option testing, using the same metrics as with the main options – network and junction performance and journey time results. For comparison purposes the DM and the main Yellow option results are also recorded.

7.2.1 AM Summary – ‘P&R Roundabout’

7.2.1.1 Network Performance

Table 7.1 details the Network Performance Summary for the AM Peak.

Overall the inclusion of a roundabout at the exit of the proposed park and ride in scenario ‘P&R Roundabout’ results in higher delay and a marginally slower average speed over the three hours when compared to Yellow. The change does however results in less latent demand and delay when compared to Yellow but still significantly higher than the DM scenario.

7.2.1.2 Junction Performance

Table 7.2 details the Junction Performance Summary for the AM Peak.

The change to a roundabout in scenario *P&R Roundabout* results in marginal differences from the Yellow scenario overall across the network. Comparing the proposed park and ride access junction is not a complete like for like comparison as Yellow has two egresses whereas the roundabout option only has one. Delay at the roundabout junction is higher in all three hours of the AM peak, as could be expected with the additional movements at this junction. If delay at the access and egress are considered within the Yellow scenario the delay is relatively comparable and marginally worse in the third hour, i.e. locally the roundabout does result in a marginal improvement overall. Figure 7.4 illustrates the level of congestion at the roundabout is a result of downstream congestion from M11 Junction 11.

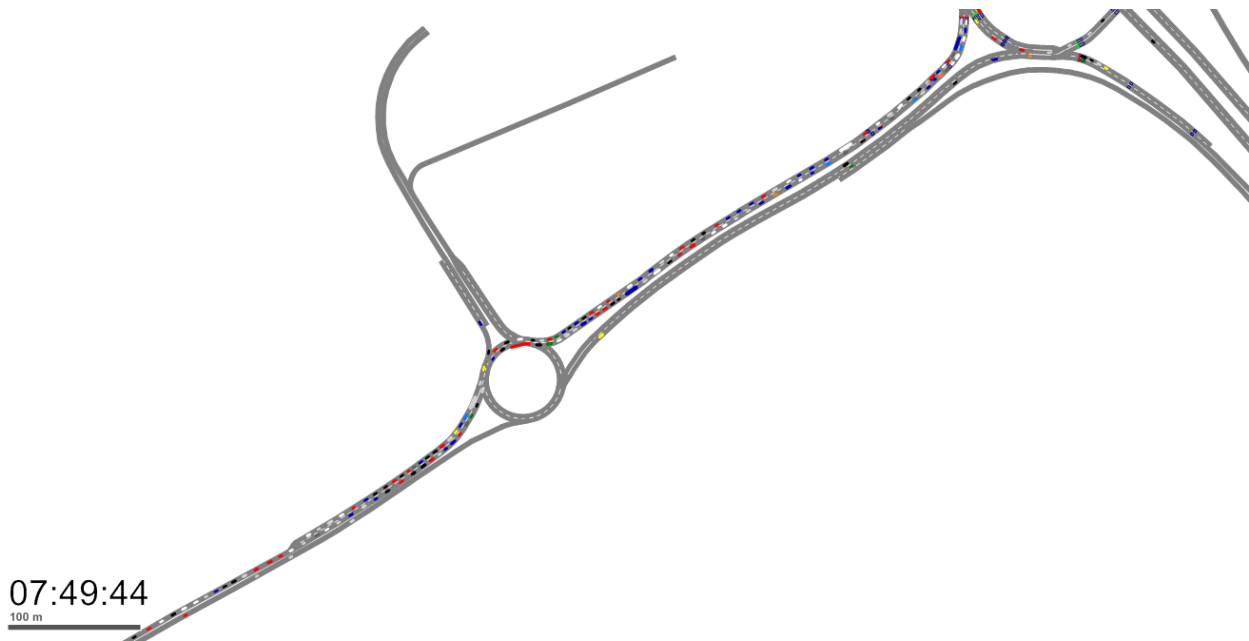


Figure 7.4 - P&R Roundabout Congestion

In terms of LOS both the roundabout and the main access junction in Yellow are both indicated to be over capacity in all three hours.

Please note, the processed vehicles are not comparable as through traffic may be double counted in the Yellow option.

7.2.1.3 Journey Times

Table 7.3 details the Junction Performance Summary for the AM Peak.

The results show the largest of differences in journey times are from the M11 North to South and on the southbound off-slip, where Yellow is optimal when compared to the P&R Roundabout scenario, and between Harston and the A1134 where the P&R Roundabout scenario is optimal. There is a potential conflict between these two journey time routes as higher number of vehicles being processed from west to east along the A10 will directly impact traffic entering the M11 roundabout from the north.

For the majority of journey time routes, the DM either outperforms or is only marginally worse than both the Yellow and P&R Roundabout scenarios.

Table 7.1 - Additional Options – AM Peak Network Performance Comparison

Time	Measure	Base	DM	Yellow	P&R Roundabout
07:00 - 08:00	Number of Seeds	16	16	16	16
	Remaining Vehicles in Network	1,197	2,139	2,092	2,267
	Processed Vehicles	11,600	12,456	12,719	12,599
	Total Distance Travelled (km)	51,365	53,322	53,750	53,586
	Total Travel Time (h)	961	1,646	1,607	1,701
	Total Network Delay (h)	321	976	933	1,025
	Average Travel Time (mins)	4.5	6.8	6.5	6.9
	Average Delay Time (mins)	1.5	4.0	3.8	4.1
	Total Stopped Delay (h)	124	322	347	360
	Average Stopped Delay (s)	35	79	84	87
	Number of Stops	22,949	97,474	80,755	94,126
	Average Number of Stops	1.8	6.7	5.5	6.3
	Average Network Speed (kmph)	53.5	32.6	33.7	31.8
	Latent Demand (vehs)	18	425	609	556
	Latent Delay (h)	4	185	248	226
08:00 - 09:00	Remaining Vehicles in Network	1,036	2,098	2,243	2,277
	Processed Vehicles	12,349	13,088	12,896	12,999
	Total Distance Travelled (km)	50,190	52,428	51,334	51,315
	Total Travel Time (h)	1,184	2,320	2,300	2,471
	Total Network Delay (h)	540	1,654	1,643	1,810
	Average Travel Time (mins)	5.3	9.2	9.1	9.7
	Average Delay Time (mins)	2.4	6.5	6.5	7.1
	Total Stopped Delay (h)	250	738	733	801
	Average Stopped Delay (s)	67	175	174	189
	Number of Stops	37,564	140,710	139,444	157,640
	Average Number of Stops	2.8	9.3	9.2	10.3
	Average Network Speed (kmph)	42.5	23.0	22.8	21.4
	Latent Demand (vehs)	107	1,458	1,896	1,881
	Latent Delay (h)	77	980	1,247	1,211
09:00 - 10:00	Remaining Vehicles in Network	796	1,563	1,865	1,975
	Processed Vehicles	10,884	12,648	12,462	12,511
	Total Distance Travelled (km)	44,336	50,235	48,698	49,085
	Total Travel Time (h)	900	1,764	2,031	2,075
	Total Network Delay (h)	332	1,121	1,399	1,435
	Average Travel Time (mins)	4.6	7.4	8.5	8.6
	Average Delay Time (mins)	1.7	4.7	5.8	5.9
	Total Stopped Delay (h)	139	382	490	480
	Average Stopped Delay (s)	43	96	123	119
	Number of Stops	23,757	103,682	144,035	146,949
	Average Number of Stops	2.0	7.3	10.0	10.1
	Average Network Speed (kmph)	49.7	28.9	24.5	23.9
	Latent Demand (vehs)	37	1,506	2,378	2,238
	Latent Delay (h)	75	1,627	2,311	2,232
AM Peak (3 hour total)	Remaining Vehicles in Network	3,028	5,800	6,200	6,520
	Processed Vehicles	34,833	38,192	38,077	38,108
	Total Distance Travelled (km)	145,891	155,985	153,782	153,986
	Total Travel Time (h)	3,044	5,730	5,938	6,246
	Total Network Delay (h)	1,194	3,750	3,975	4,269
	Average Travel Time (mins)	4.8	7.8	8.0	8.4
	Average Delay Time (mins)	1.9	5.1	5.4	5.7
	Total Stopped Delay (h)	513	1,442	1,569	1,641
	Average Stopped Delay (s)	49	118	128	133
	Number of Stops	84,270	341,867	364,233	398,715
	Average Number of Stops	2.2	7.8	8.2	8.9
	Average Network Speed (kmph)	48.5	28.1	27.0	25.7
	Latent Demand (vehs)	162	3,388	4,883	4,676
	Latent Delay (h)	156	2,792	3,807	3,670

Best forecast year scenario

Best forecast year DS scenario

Table 7.2 – Additional Options – AM Peak Junction Performance Comparison

	Junction	Volume				Max Queue Length (m)				Average Queue Length (m)				Delay (s)				LOS				
		Description	Base	DM	Yellow	P&R Roundabout	Base	DM	Yellow	P&R Roundabout	Base	DM	Yellow	P&R Roundabout	Base	DM	Yellow	P&R Roundabout	Base	DM	Yellow	P&R Roundabout
07:00 - 08:00	M11 J11		7,571	7,589	7,705	7,592	180	3,284	1,689	2,623	7	483	188	357	15	108	86	108	B	F	F	F
	A1309 / Addenbrooke's Road		2,959	3,145	3,187	3,181	282	807	795	800	6	53	48	47	19	54	49	49	B	D	D	D
	Trumpington P&R		1,298	1,174	1,220	1,215	338	367	366	366	44	68	79	77	45	51	60	57	D	D	E	E
	Consort Ave T-junction		1,301	1,246	1,284	1,283	287	289	288	287	21	27	28	28	43	51	53	52	D	D	D	D
	Walrose T-junction		1,316	1,340	1,416	1,410	163	163	160	160	18	24	20	20	29	34	33	32	C	C	C	C
	High Street / Hauxton Rd / A1301 Shelford Rd		1,659	1,801	1,889	1,880	88	196	186	174	13	25	25	24	18	25	24	23	B	C	C	C
	High Street / Maris Lane		1,587	1,788	1,825	1,819	130	170	134	129	5	11	8	7	8	11	9	9	A	B	A	A
	High Street / Church Lane		1,713	1,867	1,909	1,909	333	648	648	648	46	209	222	222	43	124	134	135	D	F	F	F
	High Street / Winchmore Dr / Alpha Terrace		1,675	1,865	1,887	1,885	211	211	204	203	7	7	3	3	15	15	11	11	B	C	B	B
	High Street / A1134		2,001	2,204	2,217	2,212	436	439	259	266	27	24	21	20	42	39	33	32	D	D	C	C
	A1134 / Parson Rd		1,192	1,246	1,242	1,234	126	190	223	251	1	4	5	6	9	11	13	13	A	B	B	B
	A1134 / Bentley Rd		1,131	1,185	1,180	1,174	195	229	281	302	4	7	9	10	12	14	17	17	B	B	C	C
	A1134 / Latham Rd / Newton Rd		1,082	1,133	1,120	1,114	333	363	379	378	9	11	14	15	20	24	28	31	C	C	D	D
	A1134 / Queensway		1,035	1,086	1,065	1,060	138	139	137	140	7	10	11	13	13	16	18	20	B	C	C	C
	A1134 / Chaucer Rd / Brooklands Ave		1,633	1,773	1,758	1,748	600	450	601	605	73	61	79	83	109	86	111	115	F	F	F	F
	A1134 / Bateman St		1,392	1,623	1,625	1,611	122	229	145	173	2	7	3	4	10	14	10	11	A	B	B	B
	A1134 / Fen Causeway		1,959	2,370	2,370	2,356	129	611	612	613	2	74	107	101	13	52	62	61	B	F	F	F
	A1134 / Lensfield Rd		1,285	1,588	1,609	1,597	83	641	654	655	1	47	55	54	8	36	39	42	A	E	E	E
	Cambridge Rd / Church Rd		1,843	1,669	1,607	1,718	203	413	461	441	3	81	124	93	7	47	68	48	A	E	F	E
	Cambridge Rd / London Rd		1,737	1,645	1,569	1,676	224	670	792	669	16	111	209	159	26	78	141	104	D	F	F	F
	New P&R access / A10 Cambridge Rd				1,628	1,707			798	772				280			128	146			F	F
	New P&R egress / A10 Cambridge Rd				1,605				240				45				71				E	
	Peak Period All Network		37,367	39,336	42,915	41,380	600	3,284	1,689	2,623	14	133	91	113	24	56	60	63	C	F	F	F
08:00 - 09:00	M11 J11		7,137	7,348	7,144	7,117	466	3,110	2,566	2,903	16	634	398	540	18	183	135	181	B	F	F	F
	A1309 / Addenbrooke's Road		2,579	2,832	2,914	2,883	355	1,083	965	1,031	16	192	123	154	34	157	100	128	C	F	F	F
	Trumpington P&R		1,231	1,193	1,238	1,252	362	369	369	369	72	162	163	163	95	163	155	157	F	F	F	F
	Consort Ave T-junction		1,360	1,404	1,413	1,422	288	291	290	289	32	53	58	60	62	83	86	89	E	F	F	F
	Walrose T-junction		1,477	1,584	1,616	1,628	162	166	162	161	21	29	25	25	31	36	36	36	C	D	D	D
	High Street / Hauxton Rd / A1301 Shelford Rd		1,840	2,022	2,070	2,085	158	515	524	533	22	177	168	175	23	78	74	76	C	E	E	E
	High Street / Maris Lane		1,766	2,002	2,000	2,019	190	237	210	242	15	23	21	23	14	17	14	16	B	C	B	C
	High Street / Church Lane		1,846	1,983	1,980	2,000	411	650	650	650	112	237	230	231	86	160	160	151	F	F	F	F
	High Street / Winchmore Dr / Alpha Terrace		1,855	2,033	2,012	2,030	241	227	218	223	14	11	7	8	22	18	13	15	C	C	B	B
	High Street / A1134		2,333	2,500	2,479	2,513	463	454	372	426	50	37	48	48	55	45	47	50	E	D	D	D
	A1134 / Parson Rd		1,574	1,601	1,570	1,603	242	268	312	330	13	10	21	25	22	18	26	29	C	C	D	D
	A1134 / Bentley Rd		1,417	1,464	1,426	1,458	267	315	350	362	8	12	25	29	17	19	30	33	C	C	D	D
	A1134 / Latham Rd / Newton Rd		1,432	1,471	1,435	1,466	348	371	395	395	14	21	35	40	27	34	50	54	D	D	F	F
	A1134 / Queensway		1,351	1,379	1,347	1,375	137	138	141	140	10	13	17	18	15	18	22	23	C	C	C	C
	A1134 / Chaucer Rd / Brooklands Ave		2,053	2,110	2,044	2,115	653	549	648	631	195	150	202	193	195	149	211	194	F	F	F	F
	A1134 / Bateman St		1,644	1,729	1,665	1,738	312	340	350	325	56	68	76	61	51	59	69	55	F	F	F	F
	A1134 / Fen Causeway		2,060	2,220	2,118	2,234	434	615	618	616	50	149	169	158	49	111	129	111	E	F	F	F
	A1134 / Lensfield Rd		1,462	1,587	1,549	1,642	475	663	663	664	87	237	274	253	85	186	211	181	F	F	F	F
	Cambridge Rd / Church Rd		1,808	1,391	1,489	1,472	153	521	535	528	2	285	328	317	7	179	158	157	A	F	F	F
	Cambridge Rd / London Rd		1,684	1,369	1,461	1,423	190	877	876	877	13	333	378	378	23	279	287	303	C	F	F	F
	New P&R access / A10 Cambridge Rd				1,656	1,655			842	817			343	205			158	241			F	F
	New P&R egress / A10 Cambridge Rd				1,634				244				52				79				E	
	Peak Period All Network		39,908	41,220	44,260	43,128	653	3,110	2,566	2,903	39	208	173	195	44	110	104	116	E	F	F	F
09:00 - 10:00	M11 J11		6,214	7,358	6,982	7,017	104	3,022	3,128	3,416	4	482	548	628	13	121	128	140	B	F	F	F
	A1309 / Addenbrooke's Road		2,377	3,068	3,033	3,052	168	819	726	790	9	49	47	35	21	53	57	48	C	D	E	D
	Trumpington P&R		1,239	1,232	1,276	1,279	222	331	356	351	28	64	107	89	35	51	86	70	C	D	F	E
	Consort Ave T-junction		1,270	1,326	1,348	1,354	242	282	284	285	10	23	35	29	25	44	64	54	C	D	E	D
	Walrose T-junction		1,459	1,563	1,616	1,621	159	160	161	163	17	24	26	24	24	29	37	33	C	C	D	C
	High Street / Hauxton Rd / A1301 Shelford Rd		1,746	1,853	1,945	1,950	131	568	567	567	21	271	271	271	21	115	113	112	C	F	F	F
	High Street / Maris Lane		1,694	1,851	1,902	1,906	159	155	168	167	9	10	18	12	10	10	15	11	A	B	C	B
	High Street / Church Lane		1,810	1,874	1,924	1,925	370	648	649	648	92	224	225	223	82	166	166	163	F	F	F	F
	High Street / Winchmore Dr / Alpha Terrace		1,778	1,889	1,926	1,925	200	204	217	200	5	4	9	3	13	11	16	11	B	B	C	B
	High Street / A1134		2,054	2,141	2,198	2,196	402	396	191	217	22	22	34	14	37	32	39	27	D	C	D	C
	A1134 / Parson Rd		1,269	1,237	1,275	1,271	117	84	105	89	5	6	7	1	14	8	16	9	B	A	C	A
	A1134 / Bentley Rd		1,258	1,233	1,265	1,264	82	78	103	93	1	3	5	1	10	9	14	10	A	A	B	A
	A1134 / Latham Rd / Newton Rd		1,251	1,220	1,250	1,248	167	147	200	192	3	2	4	3	12	10	14	13	B	B	B	B
	A1134 / Queensway		1,237	1,199	1,226	1,226	128	127	131	134	3	3	4	3	8	7	10	9	A	A	A	A
	A1134 / Chaucer Rd / Brooklands Ave		1,864	1,854	1,927	1,921	652	364	597	562	135	39	115	97	169	59	149	135	F	E	F	F
	A1134 / Bateman St		1,546	1,634	1,684	1,682	198	177	237	159	9	5	7	3	15	13	15	11	C	B	B	B
	A1134 / Fen Causeway		2,135	2,417	2,435	2,436	348	615	616	616	22	131	144	144	25	78	85	81	D	F	F	F
	A1134 / Lensfield Rd		1,659	1,986	2,049	2,058	352	664	664	665	16											

Table 7.3 - Additional Options - AM Peak Journey Time Comparison

JT	Full Description	Direction	Model Distance (km)	Weighted Average Journey Times (secs)				Weighted Average Delay (secs)				Modelled Average Speed (mph)			
				Base	DM	Yellow	P&R Roundabout	Base	DM	Yellow	P&R Roundabout	Base	DM	Yellow	P&R Roundabout
0700-0800	All Traffic														
	1 M11 N to M11 S	SB	5.3	196	430	256	351	24	258	84	179	60	27	46	34
	2 M11 N to M11 J11 Roundabout	SB	3.6	168	734	464	658	42	608	337	531	48	11	17	12
	3 M11 S to M11 N	NB	7.1	263	267	267	267	21	25	25	25	60	59	59	59
	4 M11 S to M11 J11 Roundabout	NB	5.3	219	235	261	242	32	48	74	56	54	50	45	49
	5 Hartson to A1137	NB	4.4	538	1,002	1,440	1,330	268	733	1,170	1,052	18	10	7	7
	6 A1134 to Trumpington Street	NB	3.3	464	498	473	482	178	201	177	186	16	15	16	15
	7 Trumpington Street to A1136	SB	3.3	426	491	482	496	120	179	173	188	17	15	15	15
	8 A1134 to Harston	SB	4.4	361	380	387	393	92	112	118	117	27	26	25	25
	Buses														
	91 P&R Outbound	SB	4.4	546	612	637	646	269	335	364	373	18	16	15	15
	92 P&R Inbound	NB	3.9	650	674	550	550	316	342	299	298	13	13	16	16
	94 26 Outbound	SB	8.2												
	95 25 Outbound	SB	2.0	240	246	240	238	116	122	116	114	19	18	19	19
	96 Busway Outbound	SB	1.4	187	214	212	224	95	122	121	133	17	15	15	14
	97 Busway Inbound	NB	1.5	582	404	579	591	481	303	477	490	6	8	6	6
	98 Fen Causeway Eastbound	EB	0.8	107	187	210	206	49	129	152	148	17	10	9	9
	99 Fen Causeway Westbound	WB	0.8	111	149	152	166	52	90	94	107	16	12	12	11
	100 New P&R Outbound	EB	6.1			769	772			379	383			18	18
	101 New P&R Inbound	WB	5.6			719	724			339	344			17	17
0800-0900	All Traffic														
	1 M11 N to M11 S	SB	5.3	192	479	422	539	20	306	250	367	61	25	28	22
	2 M11 N to M11 J11 Roundabout	SB	3.6	167	826	842	995	40	701	715	868	48	10	9	8
	3 M11 S to M11 N	NB	7.1	263	272	283	289	21	31	41	47	60	58	56	55
	4 M11 S to M11 J11 Roundabout	NB	5.3	219	397	324	371	33	210	137	184	54	30	36	32
	5 Hartson to A1137	NB	4.4	852	2,652	2,706	2,932	582	2,382	2,437	2,654	11	4	4	3
	6 A1134 to Trumpington Street	NB	3.3	589	629	663	664	276	271	296	324	13	12	11	11
	7 Trumpington Street to A1136	SB	3.3	759	823	922	873	448	501	605	545	10	9	8	8
	8 A1134 to Harston	SB	4.4	372	713	499	644	103	445	229	369	26	14	20	15
	Buses														
	91 P&R Outbound	SB	4.4	930	1,378	1,351	1,283	655	1,103	1,081	1,013	11	7	7	8
	92 P&R Inbound	NB	3.9	866	963	727	748	540	631	476	498	10	9	12	12
	94 26 Outbound	SB	8.2	1,469	2,290	2,071	1,908	944	1,767	1,548	1,376	12	8	9	10
	95 25 Outbound	SB	2.0	290	286	315	304	166	162	191	179	15	16	14	15
	96 Busway Outbound	SB	1.4	447	548	603	505	355	456	511	412	7	6	5	6
	97 Busway Inbound	NB	1.5	742	473	726	679	641	371	625	578	5	7	5	5
	98 Fen Causeway Eastbound	EB	0.8												
	99 Fen Causeway Westbound	WB	0.8	274	648	749	665	216	591	691	607	6	3	2	3
	100 New P&R Outbound	EB	6.1			1,167	1,106			781	718			12	12
	101 New P&R Inbound	WB	5.6			908	932			528	551			14	13
0900-1000	All Traffic														
	1 M11 N to M11 S	SB	5.3	188	485	686	718	15	312	514	545	63	24	17	16
	2 M11 N to M11 J11 Roundabout	SB	3.6	165	866	1,217	1,236	39	740	1,090	1,109	48	9	7	6
	3 M11 S to M11 N	NB	7.1	259	263	263	263	18	22	21	21	61	60	60	60
	4 M11 S to M11 J11 Roundabout	NB	5.3	212	227	227	222	26	40	41	36	56	52	52	53
	5 Hartson to A1137	NB	4.4	498	1,232	1,415	1,517	228	963	1,146	1,238	20	8	7	6
	6 A1134 to Trumpington Street	NB	3.3	447	455	470	457	149	134	145	135	16	16	16	16
	7 Trumpington Street to A1136	SB	3.3	509	500	600	486	202	193	250	174	14	15	12	15
	8 A1134 to Harston	SB	4.4	355	458	461	422	85	189	191	147	28	21	21	23
	Buses														
	91 P&R Outbound	SB	4.4	850	881	1,118	888	578	608	849	619	12	11	9	11
	92 P&R Inbound	NB	3.9	625	664	539	531	302	341	289	280	14	13	16	16
	94 26 Outbound	SB	8.2		3,304	3,321	3,137		2,741	2,830	2,627		6	6	6
	95 25 Outbound	SB	2.0	266	258	367	252	142	134	242	127	17	17	12	18
	96 Busway Outbound	SB	1.4	280	291	427	304	188	199	335	213	11	11	7	10
	97 Busway Inbound	NB	1.5	862	338	769	732	760	237	667	630	4	10	4	5
	98 Fen Causeway Eastbound	EB	0.8												
	99 Fen Causeway Westbound	WB	0.8	119	237	223	223	62	180	166	165	15	7	8	8
	100 New P&R Outbound	EB	6.1			1,121	963			729	571			12	14
	101 New P&R Inbound	WB	5.6			722	706			336	320			17	18

7.2.2 PM Peak – ‘M11 Westbound Signals’ and ‘M11 Northbound On-slip Merge’

7.2.2.1 Network Performance

Table 7.4 details the Network Performance Summary for the PM Peak.

The introduction of signals at the westbound entry to the M11 roundabout, in scenario ‘M11 Westbound Signals’ results in marginal improvements over Yellow across the majority of metrics including average vehicle speed and network delay; the scenario is still indicated to perform worse than the DM scenario across all metrics.

Allowing two lanes to exit to the north in scenario ‘M11 Northbound On-slip Merge’ results in a better performance than the Yellow and ‘M11 Westbound Signals’ scenarios across most metrics, however, still worse than the DM scenario.

It should also be noted that the ‘M11 Westbound Signals’ results in lower travel time and delay across all hours except the first compared to Yellow.

7.2.2.2 Junction Performance

Table 7.5 details the Junction Performance Summary for the PM Peak.

At the M11 both the proposed changes in the ‘M11 Northbound On-slip Merge’ option result in an improved performance when compared to Yellow in terms of overall delay whereas the ‘M11 Westbound Signals’ is indicated to be worse in the first hour but better in the 2nd and 3rd hours; all three options are indicated to be over capacity with an overall LOS of F and perform worse than the DM scenario. Out of the two additional options the on-slip merge outperforms the signals and Yellow options at the M11 in terms of delay.

At the proposed new park and ride junctions in the first hour the Yellow option records less delay than both the on-slip merge and the westbound signals options. However, by the second hour this advantage has diminished and the westbound signal option is reported to be the optimal design closely followed by Yellow. In all three hours Yellow, the on-slip merge and the westbound signal design are reported to be over capacity with an overall LOS of F.

The results for processed vehicles between Yellow and the two additional options are similar.

7.2.2.3 Journey Times

Table 7.6 details the Journey Time Summary for the PM Peak.

Within the first hour the largest of differences between the Yellow and the two additional options are recorded on section 5 between Harston and the A1134 and in the opposite direction between the A1134 and Harston where the On-slip Merge scenario saves over six minutes on Yellow and over five minutes when compared to the westbound signal option.

The second and third hour indicate neither of the changes modelled result in better journey times than the DM however, both the additional test options do improve upon Yellow for the majority of routes, some of which are significant.

Both the additional tests have a large impact on the outbound journey times when compared to the Yellow option. Within the second hour the difference is over an hour for the inner outbound route (Route 7) with M11 Westbound Signals and M11 Northbound On-slip options saving 75 and 80 minutes over Yellow respectively.

Both the M11 Westbound Signals and Northbound On-slip options result in benefits to P&R bus journey times in both directions, particularly in the last hour where the inbound route is nearly an hour quicker than the Yellow option.

Table 7.4 - Additional Options – PM Peak Network Performance Comparison

Time	Measure	Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge
16:00 - 17:00	Number of Seeds	16	16	9	12	3
	Remaining Vehicles in Network	1,063	1,581	2,960	3,026	2,798
	Processed Vehicles	13,920	14,729	12,898	12,787	13,161
	Total Distance Travelled (km)	50,923	55,421	48,550	47,489	49,179
	Total Travel Time (h)	1,081	1,463	2,148	2,264	2,097
	Total Network Delay (h)	433	756	1,551	1,674	1,490
	Average Travel Time (mins)	4.3	5.4	8.1	8.6	7.9
	Average Delay Time (mins)	1.7	2.8	5.9	6.4	5.6
	Total Stopped Delay (h)	177	329	983	945	928
	Average Stopped Delay (s)	43	73	223	216	210
	Number of Stops	36,099	58,267	95,678	130,983	93,468
	Average Number of Stops	2.4	3.6	6.0	8.3	5.9
	Average Network Speed (kmph)	47.3	38.0	22.8	21.2	23.7
	Latent Demand (vehs)	11	450	1,290	1,375	1,134
	Latent Delay (h)	10	284	432	454	354
17:00 - 18:00	Remaining Vehicles in Network	1,165	2,425	4,153	3,683	3,707
	Processed Vehicles	13,329	13,262	9,079	10,272	10,399
	Total Distance Travelled (km)	51,848	53,202	40,104	42,542	44,056
	Total Travel Time (h)	1,129	1,965	3,819	3,541	3,422
	Total Network Delay (h)	465	1,293	3,354	3,029	2,905
	Average Travel Time (mins)	4.7	7.6	17.4	15.3	14.6
	Average Delay Time (mins)	1.9	5.0	15.3	13.1	12.4
	Total Stopped Delay (h)	193	677	2,288	1,764	1,917
	Average Stopped Delay (s)	48	157	627	460	492
	Number of Stops	37,218	86,891	207,880	237,864	179,120
	Average Number of Stops	2.6	5.6	15.8	17.1	12.7
	Average Network Speed (kmph)	46.2	27.8	10.8	12.1	13.0
	Latent Demand (vehs)	61	1,275	6,363	5,798	5,190
	Latent Delay (h)	17	715	3,548	3,401	2,948
18:00 - 19:00	Remaining Vehicles in Network	782	3,059	4,379	3,804	3,797
	Processed Vehicles	11,537	9,689	8,902	9,006	8,776
	Total Distance Travelled (km)	43,025	39,806	36,725	36,290	37,140
	Total Travel Time (h)	945	2,771	4,239	3,698	3,774
	Total Network Delay (h)	379	2,275	3,797	3,254	3,337
	Average Travel Time (mins)	4.6	13.2	19.1	17.4	18.0
	Average Delay Time (mins)	1.8	10.9	17.1	15.3	16.0
	Total Stopped Delay (h)	165	1,444	2,235	1,921	2,253
	Average Stopped Delay (s)	48	420	605	542	647
	Number of Stops	28,720	134,314	312,187	258,348	209,494
	Average Number of Stops	2.3	10.6	23.4	20.2	16.7
	Average Network Speed (kmph)	45.7	14.9	8.8	9.9	9.9
	Latent Demand (vehs)	80	3,338	10,059	9,469	9,124
	Latent Delay (h)	78	2,298	8,411	7,725	7,237
PM Peak (3 Hour total)	Remaining Vehicles in Network	3,010	7,065	11,492	10,512	10,301
	Processed Vehicles	38,786	37,680	30,879	32,065	32,336
	Total Distance Travelled (km)	145,797	148,429	125,379	126,322	130,375
	Total Travel Time (h)	3,155	6,198	10,206	9,503	9,293
	Total Network Delay (h)	1,278	4,323	8,703	7,957	7,732
	Average Travel Time (mins)	4.5	8.4	14.5	13.4	13.1
	Average Delay Time (mins)	1.8	5.9	12.3	11.3	10.9
	Total Stopped Delay (h)	535	2,451	5,506	4,630	5,098
	Average Stopped Delay (s)	46	201	469	394	432
	Number of Stops	102,037	279,473	615,745	627,195	482,082
	Average Number of Stops	2.4	6.3	14.5	14.8	11.3
	Average Network Speed (kmph)	46.4	27.8	14.6	14.8	16.1
	Latent Demand (vehs)	152	5,062	17,712	16,642	15,448
	Latent Delay (h)	106	3,298	12,391	11,581	10,540

Best forecast year scenario

Best forecast year DS scenario

Table 7.5 – Additional Options - PM Peak Junction Performance Comparison

	Junction	Volume					Max Queue Length (m)					Average Queue Length (m)					Delay (s)					LOS					
		Description	Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge	Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge	Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge	Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge	Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge
16:00 - 17:00	M11 J11		7,593	7,997	6,445	6,263	6,532	158	489	1,632	3,265	1,726	6	36	148	259	141	14	36	174	205	163	B	D	F	F	F
	A1309 / Addenbrooke's Road		2,908	3,097	1,828	1,914	1,968	52	684	1,108	1,137	1,135	1	51	238	249	218	10	66	279	319	238	A	E	F	F	F
	Trumpington P&R		1,627	1,688	1,076	1,115	1,160	197	369	333	340	342	24	164	196	202	193	24	100	195	207	177	C	F	F	F	F
	Consort Ave T-junction		1,432	1,551	1,071	1,085	1,141	165	280	256	263	263	4	35	109	110	93	14	59	98	101	95	B	E	F	F	F
	Walrose T-junction		1,673	1,831	1,251	1,275	1,351	152	163	144	147	148	16	27	59	59	54	19	29	67	67	61	B	C	E	E	E
	High Street / Hauxton Rd / A1301 Shelford Rd		1,866	2,023	1,377	1,423	1,471	87	119	225	189	259	17	24	48	39	41	24	26	51	49	42	C	C	D	D	D
	High Street / Maris Lane		1,832	2,037	1,325	1,377	1,444	356	351	318	326	325	89	55	88	88	78	45	32	42	57	45	E	D	E	F	E
	High Street / Church Lane		1,793	2,014	1,418	1,479	1,545	222	360	375	387	399	52	87	88	98	96	52	63	71	87	76	D	E	E	F	E
	High Street / Winchmore Dr / Alpha Terrace		1,723	2,000	1,445	1,507	1,577	458	426	409	421	418	60	30	63	62	53	48	28	35	51	42	E	D	D	F	E
	High Street / A1134		1,990	2,430	1,682	1,755	1,859	376	327	528	542	540	76	33	148	142	114	58	36	45	56	49	E	D	D	E	D
	A1134 / Parson Rd		1,223	1,550	907	946	1,020	305	138	341	354	334	31	5	62	55	37	42	15	30	29	27	E	B	D	D	D
	A1134 / Bentley Rd		1,114	1,425	871	906	975	250	69	343	349	315	22	1	31	30	16	32	10	18	23	16	D	A	C	C	C
	A1134 / Latham Rd / Newton Rd		1,139	1,431	954	988	1,042	206	180	226	220	246	10	4	12	11	12	25	14	27	25	27	D	B	D	D	D
	A1134 / Queensway		1,130	1,400	954	983	1,036	130	134	116	116	123	11	4	11	11	11	16	9	16	15	17	C	A	C	C	C
	A1134 / Chaucer Rd / Brooklands Ave		1,679	2,023	1,638	1,666	1,729	608	658	609	614	614	123	203	117	119	118	153	184	170	168	168	F	F	F	F	F
	A1134 / Bateman St		1,492	1,721	1,544	1,554	1,585	432	381	378	407	411	67	96	44	44	47	62	72	40	40	42	F	F	E	E	E
	A1134 / Fen Causeway		2,181	2,165	2,202	2,211	2,229	355	615	461	428	503	71	177	77	71	85	48	114	52	51	55	E	F	F	F	F
A1134 / Lensfield Rd		1,660	1,573	1,647	1,664	1,671	390	662	300	395	426	21	252	20	31	36	23	214	22	30	33	C	F	C	D	D	
Cambridge Rd / Church Rd		1,642	1,791	1,309	1,270	1,203	91	100	345	414	454	1	1	43	53	87	5	5	33	40	68	A	A	D	E	F	
Cambridge Rd / London Rd		1,630	1,731	1,355	1,324	1,256	159	163	451	505	756	8	8	27	32	86	17	17	27	31	65	C	C	D	D	F	
New P&R access / A10 Cambridge Rd					1,173	1,139	1,061			738	775	775			207	226	249			133	151	181			F	F	F
New P&R egress / A10 Cambridge Rd					1,147	1,116	1,037			220	225	225			51	54	59			93	101	115			F	F	F
Peak Period All Network		39,327	43,476	34,618	34,959	35,891	608	684	1,632	3,265	1,726	32	62	98	120	98	33	55	95	107	96	D	F	F	F	F	F
17:00 - 18:00	M11 J11		7,787	7,546	5,772	6,063	6,268	220	1,181	3,345	3,458	3,217	12	197	428	552	353	20	122	307	245	252	B	F	F	F	F
	A1309 / Addenbrooke's Road		3,250	2,810	1,876	2,185	1,962	58	1,181	1,107	1,135	1,135	1	212	292	300	316	12	181	447	321	396	B	F	F	F	F
	Trumpington P&R		1,861	1,630	1,004	1,204	1,137	234	366	327	340	339	31	190	217	218	221	26	130	302	237	256	C	F	F	F	F
	Consort Ave T-junction		1,608	1,509	950	1,119	1,084	242	283	255	263	261	8	58	177	178	177	19	69	150	138	147	B	E	F	F	F
	Walrose T-junction		1,850	1,768	1,024	1,231	1,189	156	160	142	147	145	18	37	74	74	74	19	36	118	124	124	B	D	F	F	F
	High Street / Hauxton Rd / A1301 Shelford Rd		2,050	1,906	1,109	1,357	1,291	106	364	510	493	511	21	101	217	170	214	23	61	215	135	177	C	E	F	F	F
	High Street / Maris Lane		2,039	1,915	998	1,306	1,222	353	352	319	326	327	65	64	150	137	141	32	34	185	113	126	D	D	F	F	F
	High Street / Church Lane		1,983	1,854	1,016	1,326	1,234	301	647	582	598	597	49	209	248	239	247	41	123	311	231	250	D	F	F	F	F
	High Street / Winchmore Dr / Alpha Terrace		1,930	1,864	1,014	1,340	1,239	423	384	412	424	423	35	35	132	120	125	31	32	259	160	172	D	D	F	F	F
	High Street / A1134		2,219	2,281	1,080	1,509	1,374	391	420	530	544	544	75	80	353	344	344	54	59	486	356	340	D	E	F	F	F
	A1134 / Parson Rd		1,339	1,429	634	866	782	316	328	395	377	372	38	35	246	203	188	40	38	589	412	373	E	E	F	F	F
	A1134 / Bentley Rd		1,227	1,348	556	757	696	304	346	351	362	361	31	41	189	170	156	38	43	417	350	317	E	E	F	F	F
	A1134 / Latham Rd / Newton Rd		1,198	1,350	542	741	710	321	354	334	358	323	14	29	71	57	48	30	48	232	183	152	D	E	F	F	F
	A1134 / Queensway		1,150	1,301	493	694	667	133	140	164	160	161	13	24	88	78	66	19	28	121	129	95	C	D	F	F	F
	A1134 / Chaucer Rd / Brooklands Ave		1,646	1,853	543	900	922	610	666	596	612	614	98	217	249	238	228	136	219	279	450	411	F	F	F	F	F
	A1134 / Bateman St		1,351	1,531	421	728	797	429	441	492	463	441	86	138	177	172	129	80	109	105	207	132	F	F	F	F	F
	A1134 / Fen Causeway		2,020	2,035	432	877	990	419	614	550	564	565	109	225	189	188	172	74	138	150	283	181	F	F	F	F	F
A1134 / Lensfield Rd		1,476	1,511	222	583	643	228	642	592	609	606	13	200	295	271	224	20	148	100	416	180	C	F	F	F	F	
Cambridge Rd / Church Rd		1,808	1,733	1,091	1,194	1,019	137	366	459	472	490	2	26	249	250	300	6	20	209	191	247	A	C	F	F	F	
Cambridge Rd / London Rd		1,810	1,733	1,095	1,196	992	178	392	785	804	805	11	29	262	275	348	20	32	275	254	392	C	D	F	F	F	
New P&R access / A10 Cambridge Rd					1,108	1,198	1,056			755	775	775			352	358	365			268	241	298			F	F	F
New P&R egress / A10 Cambridge Rd					1,117	1,204	1,067			218	223	223			66	66	70			123	111	138			F	F	F
Peak Period All Network		41,600	40,905	24,099	29,578	28,341	610	1,181	3,345	3,458	3,217	33	126	264	276	240	34	93	280	237	243	D	F	F	F	F	
18:00 - 19:00	M11 J11		6,256	5,581	5,270	5,120	5,374	98	2,614	3,995	3,459	3,481	3	529	706	648	490	12	284	351	345	317	B	F	F	F	F
	A1309 / Addenbrooke's Road		2,717	2,074	1,888	1,872	1,744	265	1,232	1,109	1,136	1,134	9	359	296	321	333	25	417	388	399	409	C	F	F	F	F
	Trumpington P&R		1,644	1,195	1,052	1,031	1,005	319	372	334	343	343	75	229	216	221	224	66	251	259	265	263	E	F	F	F	F
	Consort Ave T-junction		1,525	1,104	986	974	950	275	289	254	259	261	26	161	174	180	180	48	171	128	141	159	D	F	F	F	F
	Walrose T-junction		1,821	1,286	1,060	1,055	1,023	161	161	144	148	147	24	82	80	80	77	26	110	114	117	116	C	F	F	F	F
	High Street / Hauxton Rd / A1301 Shelford Rd		2,013	1,382	1,174	1,160	1,116	247	566	510	522	522	49	269	266	271	273	34	191	2							

Table 7.6 - Additional Options - PM Peak Journey Time Comparison

JT	Full Description	Direction	Model Distance (km)	Weighted Average Journey Times (secs)					Weighted Average Delay (secs)					Modelled Average Speed (mph)				
				Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge	Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge	Base	DM	Yellow	M11 WB Signals	M11 NB On-slip Merge
1600-1700	All Traffic																	
	1 M11 N to M11 S	SB	5.3	196	198	217	354	236	24	26	44	182	64	60	59	54	33	50
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	198	488	790	481	30	72	360	663	354	51	40	16	10	17
	3 M11 S to M11 N	NB	7.1	261	266	279	265	264	20	24	38	23	22	61	60	57	60	60
	4 M11 S to M11 J11 Roundabout	NB	5.3	224	237	674	438	386	37	52	488	251	200	53	50	17	27	31
	5 Hartson to A1137	NB	4.4	426	1,043	1,800	1,883	2,181	156	773	1,531	1,613	1,912	23	9	5	5	4
	6 A1134 to Trumpington Street	NB	3.3	572	494	647	595	628	191	148	265	216	243	13	15	11	12	12
	7 Trumpington Street to A1136	SB	3.3	890	1,032	659	823	716	409	627	224	282	246	8	7	11	9	10
	8 A1134 to Harston	SB	4.4	379	423	2,118	2,193	1,748	110	153	1,848	1,924	1,478	26	23	5	4	6
	Buses																	
	91 P&R Outbound	SB	4.4	943	1,661	848	961	913	668	1,386	583	692	643	10	6	12	10	11
	92 P&R Inbound	NB	3.9	690	734	698	678	688	359	401	457	429	437	13	12	12	13	13
	94 26 Outbound	SB	8.2															
	95 25 Outbound	SB	2.0	473	386	279	278	326	349	261	152	151	199	10	12	16	16	14
	96 Busway Outbound	SB	1.4	280	602	207	214	218	190	512	116	122	127	11	5	15	15	14
	97 Busway Inbound	NB	1.5	603	615	792	751	771	503	515	692	651	671	6	5	4	4	4
	98 Fen Causeway Eastbound	EB	0.8	119	301	154	158	167	60	242	95	99	108	15	6	12	11	11
	99 Fen Causeway Westbound	WB	0.8	156	858	145	172	156	97	800	86	114	97	11	2	12	10	11
	100 New P&R Outbound	EB	6.1			905	959	934			521	571	545			15	14	15
	101 New P&R Inbound	WB	5.6			890	878	871			525	503	494			14	14	14
1700-1800	All Traffic																	
	1 M11 N to M11 S	SB	5.3	193	198	589	858	460	22	27	417	687	288	61	60	20	14	26
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	318	1,054	1,459	899	31	192	927	1,332	773	51	25	8	5	9
	3 M11 S to M11 N	NB	7.1	257	261	404	263	273	17	21	164	23	33	62	61	39	60	58
	4 M11 S to M11 J11 Roundabout	NB	5.3	234	310	1,000	400	503	48	124	814	215	317	51	38	12	29	23
	5 Hartson to A1137	NB	4.4	446	1,314	3,024	2,816	3,915	176	1,043	2,755	2,548	3,647	22	7	3	3	2
	6 A1134 to Trumpington Street	NB	3.3	628	747	1,395	1,487	978	200	312	642	572	398	12	10	5	5	8
	7 Trumpington Street to A1136	SB	3.3	795	904	9,774	5,258	4,928	380	504	6,458	3,590	3,123	9	8	1	1	1
	8 A1134 to Harston	SB	4.4	397	807	5,371	3,119	4,004	127	536	5,100	2,848	3,734	25	12	2	3	2
	Buses																	
	91 P&R Outbound	SB	4.4	822	1,394	4,284	3,264	3,121	548	1,122	4,006	2,990	2,847	12	7	2	3	3
	92 P&R Inbound	NB	3.9	730	830	3,662	2,318	1,868	402	501	3,409	2,062	1,610	12	10	2	4	5
	94 26 Outbound	SB	8.2	1,061					536					17				
	95 25 Outbound	SB	2.0	354	366	3,315	2,023	2,282	230	241	3,186	1,900	2,159	13	12	1	2	2
	96 Busway Outbound	SB	1.4	242	489	3,358	1,302	950	150	397	3,273	1,210	859	13	6	1	2	3
	97 Busway Inbound	NB	1.5	590	865		1,598	1,453	488	763		1,498	1,351	6	4		2	2
	98 Fen Causeway Eastbound	EB	0.8	156	327	109	691	722	99	270	53	633	664	11	5	16	3	2
	99 Fen Causeway Westbound	WB	0.8	150	497		1,097	1,063	91	439		1,040	1,004	12	4		2	2
	100 New P&R Outbound	EB	6.1			4,029	3,338	3,052			3,644	2,949	2,664			3	4	4
	101 New P&R Inbound	WB	5.6			3,937	2,661	2,262			3,551	2,273	1,869			3	5	6
1800-1900	All Traffic																	
	1 M11 N to M11 S	SB	5.3	187	325	728	1,012	669	16	154	556	840	497	63	36	16	12	18
	2 M11 N to M11 J11 Roundabout	SB	3.6	156	800	1,235	1,625	1,111	30	675	1,109	1,498	985	51	10	6	5	7
	3 M11 S to M11 N	NB	7.1	254	260	964	337	377	13	19	723	96	136	62	61	16	47	42
	4 M11 S to M11 J11 Roundabout	NB	5.3	216	481	1,953	965	966	29	295	1,767	778	780	55	25	6	12	12
	5 Hartson to A1137	NB	4.4	640	2,415	4,179	3,608	5,667	371	2,146	3,910	3,340	5,397	15	4	2	3	2
	6 A1134 to Trumpington Street	NB	3.3	521	888	1,809	1,255	1,074	197	449	530	416	396	14	8	4	6	7
	7 Trumpington Street to A1136	SB	3.3	538	2,077	8,954	5,032	6,144	220	1,233	6,741	3,174	4,176	14	4	1	1	1
	8 A1134 to Harston	SB	4.4	364	1,858	5,964	4,781	5,533	95	1,588	5,693	4,510	5,263	27	5	2	2	2
	Buses																	
	91 P&R Outbound	SB	4.4	678	2,570	5,904	4,309	5,062	403	2,293	5,637	4,039	4,795	14	4	2	2	2
	92 P&R Inbound	NB	3.9	790	1,144	4,637	2,262	1,625	464	823	4,376	2,010	1,373	11	8	2	4	5
	94 26 Outbound	SB	8.2		2,885					2,372					6			
	95 25 Outbound	SB	2.0	247	1,293	3,797	2,948	2,746	123	1,169	3,674	2,823	2,622	18	3	1	2	2
	96 Busway Outbound	SB	1.4	272	858	3,215	1,886	2,180	180	766	3,123	1,794	2,088	11	4	1	2	1
	97 Busway Inbound	NB	1.5	857	934	1,779	1,546	1,349	755	832	1,678	1,444	1,248	4	4	2	2	2
	98 Fen Causeway Eastbound	EB	0.8	106	362	2,187	1,368	578	48	304	2,129	1,311	522	17	5	1	1	3
	99 Fen Causeway Westbound	WB	0.8		1,891	2,335	1,657	1,873		1,832	2,278	1,598	1,815		1	1	1	1
	100 New P&R Outbound	EB	6.1			5,984	4,323	5,136			5,595	3,934	4,742			2	3	3
	101 New P&R Inbound	WB	5.6			5,108	2,618	1,773			4,708	2,234	1,397			2	5	7

8 Summary

Mott MacDonald has been commissioned by the Greater Cambridge Partnership to model and test the impact of five future year Do Something scenarios and a Do Minimum scenario. The Do Something options have been designed to incorporate improvements to bus access along the Trumpington Road corridor and in four of them provide a new park and ride site to the west of M11 Junction 11.

A VISSIM model for the AM and PM peak periods has been developed to facilitate the operational assessment of the different scenarios. A Base model has been built using 2018 surveyed flows, commissioned for this study and validated against TrafficMaster journey time data. A future year of 2031 has been used for the testing of scenarios under forecast demand, with the Cambridgeshire demand model CSRM used to predict demand and strategic reassignment outside the VISSIM model extents.

The model achieves WebTAG validation in all hours, based on a minimum of 85% of modelled journey time routes being within 15% of the observed - or 60 seconds where the route is at least 3km. As the model is statically assigned, a comparison between modelled and observed flow has been completed to ensure the model is processing the correct flow, but this has not been used as part of the validation.

The Base model indicates that at certain times throughout the two peaks, junctions within the modelled network are already at capacity, with delays and queuing forming. In terms of LOS, several junctions are indicated to be over capacity with significant delays reported. Any increase in demand is therefore likely to have a detrimental effect on the performance of already saturated junctions and the network as a whole.

A DM scenario has been developed to allow for a direct comparison against the DS scenarios and includes no infrastructure changes within the VISSIM modelled extent. Please note however, as changes in demand have been supplied by the SATURN model, changes throughout the strategic model may influence demand at a local level.

All DS scenarios share identical proposed infrastructure changes between Trumpington Park and Ride and Lensfield Road, chiefly designed to improve bus journey times along the corridor. The DS scenarios differ to the west of Trumpington Park and Ride, with four of the five including a proposed new park and ride site to the west of M11 Junction 11. All DS options include changes to M11 Junction 11 to improve access to the existing park and ride site and optimise the throughput at the junction from the M11. Designs for all the DS scenarios can be found within Appendix B of this report and a summary of the scenarios tested can be seen in Table 8.1 below:

Table 8.1 - Summary of Scenarios

Option	Demand Year	Trumpington Road Core Changes	New P&R Site
Base	2018	×	×
Do Minimum	2031	×	×
Magenta	2031	✓	×
Cyan	2031	✓	✓
White	2031	✓	✓
Yellow	2031	✓	✓
Purple	2031	✓	✓

Results have been extracted from the models and compared for overall network performance, individual junction performance and journey time routes. They have been split by individual hours to give an indication of how well each option is predicted to work.

The results show that all future year scenarios increase congestion throughout the network. Within the AM peak, average speed reduces significantly compared to the base in all DS and DM scenarios. Magenta is indicated to be the optimal performing forecast scenario, with an average network speed of 38.3kmph, over 10kmph lower than the Base, but more than 10kmph higher than the DM – the next best performing scenario. High levels of latent demand throughout all forecast options indicate the network cannot process the demand sufficiently and is over capacity.

The performance of the DS options in the PM peak is less positive. The average network speed in all DS scenarios drops below 20kmph over the three-hour peak and below 11kmph for all DS scenarios including the proposed new park and ride in the last hour. Unlike the AM, none of the DS scenarios outperform the DM (and Base), with higher levels of delay reported. Of the DS options, Magenta is again the optimal performer, with the highest number of processed vehicles and average speed and lowest delay. All options report significant levels of latent demand, again suggesting the network cannot cope with the level of demand supplied to the model.

Despite overall higher flow, none of the DS options process more vehicles than the DM in the morning peak and no forecast year option processes more than the Base in the PM peak. It should be noted that the growth in demand has not been applied uniformly across inputs, therefore, increases in demand at certain parts in the network may have detrimental effects elsewhere. It is likely if key junctions within the network fail, the model cannot recover as the efficiency of the model drops.

The junction performance summaries reflect the network summary, with a number of junctions throughout the AM peak estimated to be over capacity, and by the second hour, all DS junctions in the PM peak calculated as over-capacity.

The AM peak shows high levels of delay and queuing at a number of junctions in the future year scenarios, including M11 Junction 11, which predicts queues forming upstream of the M11 off-slips and impacting performance of the mainline carriageway in all options except Magenta.

Within the PM peak, the largest of the congestion and queuing is located on Trumpington Road and the northbound M11, again, impacting M11 through-movements. However, three of the DS options record lower average queue lengths than the DM for the latter in the last hour.

The journey time results show, (as could be expected by the network/junction performances), large increases in DS journey times over both the Base and DM, except for Magenta in the morning peak. While the bus only journey times show that whilst infrastructure improvements limit the effect of network congestion for buses in the DS scenarios, they are still heavily impacted by network congestion and still report high levels of delays. Very high journey times in some of the DS scenarios indicate that the network has failed and is overestimating congestion.

It should also be noted that although some wider reassignment has been captured by the CSRM, vehicles cannot change their route choice within the VISSIM model. Therefore, drivers will be assumed to choose the same route, regardless of downstream congestion, potentially causing an overestimation of demand.

Sensitivity tests have been performed on the best performing DS scenario for each new P&R layout (hamburger/bus bridge), excluding Magenta, based on processed vehicles, the Purple and White options respectively. As with all DS scenarios, the demand has been captured from the CSRM. The test assumes a penalty (CAP) has been applied for private vehicles accessing the city centre and therefore reassigns trips to public transport – increasing the number of park and ride users.

Whilst the sensitivity tests still show individual junctions over capacity in both peaks, the results, when compared to the DM and other DS scenarios are mostly positive. On a network level, the average network speed is higher than and equal to the Base model for PurpleCAP and WhiteCAP respectively in the AM periods. The PM peak shows a similar pattern with PurpleCAP having the highest average network speed and lowest network delay and latent demand of the future year scenarios, whilst processing the most vehicles of the DS scenarios. Whilst WhiteCAP outperforms its non-cap counterpart, it records more

congestion than both the DM and Magenta as indicated by a slower average network speed and higher delay.

Within the AM peak across the vast majority of junctions, delay and levels of queuing is lower in PurpleCAP and WhiteCAP than the DM, Magenta and Purple and White scenarios. The result of this reduction is that all junctions, except for High Street/Church Lane, and Lensfield Road in the second hour, are predicted to be operating either within or at capacity, with several junctions shown to have an improved performance when compared against the Base model and demand. By the third hour of the AM Peak, only the two CAP scenarios and the Base are indicated to be within capacity with PurpleCAP marginally better than WhiteCAP.

The PM peak shows less improvements when compared against the Base, and overall, a more congested network. The second hour however, shows PurpleCAP as the optimal performing scenario in the majority of junctions in terms of delay and levels of queuing.

The third hour reports increased congestion in PurpleCAP, with 16 out of 22 junctions shown to be over capacity, this again compares to all junctions in Magenta, Purple, White and WhiteCAP and all but one in the DM. In terms of delay and queuing, PurpleCAP is the optimal performing future year scenario averaged across all junctions.

The results show that the network is already at capacity, and therefore, when further demand is applied in the forecast scenarios, the network records high levels of congestion, delay and latent demand.

Without the CAP, at a network level, Magenta is indicated to be the only DS scenario to perform better than the DM. All DS scenarios perform worse than the DM in the PM peak and when the AM and PM peak results are combined.

By implementing CAP, the performance of the Purple and White schemes vastly improve, with results indicating better results than both the DM and Magenta, and in some metrics, better than the Base.

Following initial results, further sensitivity testing was completed to assess whether the existing designs could be improved upon with relatively small-scale changes to the designs. It was decided to make the changes to Yellow as this was the worst performing option out of the new park and ride scenarios. The additional tests are as below:

- 'P&R Roundabout' - New park and ride roundabout (AM Peak)
- 'M11 Westbound (WB) Signals' - M11 Junction 11 westbound entry signalisation (PM Peak)
- 'M11 Northbound (NB) On-slip Merge' - M11 Junction 11 northbound on-slip two lane merge (PM Peak)

Overall the inclusion of a roundabout at the exit of the proposed park and ride in scenario 'P&R Roundabout' results in higher delay and a marginally slower average speed over the three hours when compared to Yellow. The change does however result in less latent demand and delay when compared to Yellow but still significantly higher than the DM scenario.

If delay at the access and egress are considered within the Yellow scenario the delay is relatively comparable and marginally worse in the third hour, i.e. locally the roundabout does result in a marginal improvement overall. The level of congestion reported at the roundabout is a result of downstream congestion from M11 Junction 11.

The introduction of signals at the westbound entry to the M11 roundabout, in scenario 'M11 Westbound Signals' results in marginal improvements over Yellow across the majority of metrics including average vehicle speed and network delay; the scenario is still indicated to perform worse than the DM scenario across all metrics.

Allowing two lanes to exit to the north in scenario '*M11 Northbound On-slip Merge*' results in a better performance than the Yellow and '*M11 Westbound Signals*' scenarios across most metrics, however, still worse than the DM scenario.

At the M11 both the proposed changes in the '*M11 Northbound On-slip Merge*' option result in an improved performance when compared to Yellow in terms of overall delay whereas the '*M11 Westbound Signals*' is indicated to be worse in the first hour but better in the 2nd and 3rd hours; all three options are indicated to be over capacity with an overall LOS of F and perform worse than the DM scenario. Out of the two additional options the on-slip merge outperforms the signals and Yellow options at the M11 in terms of delay.

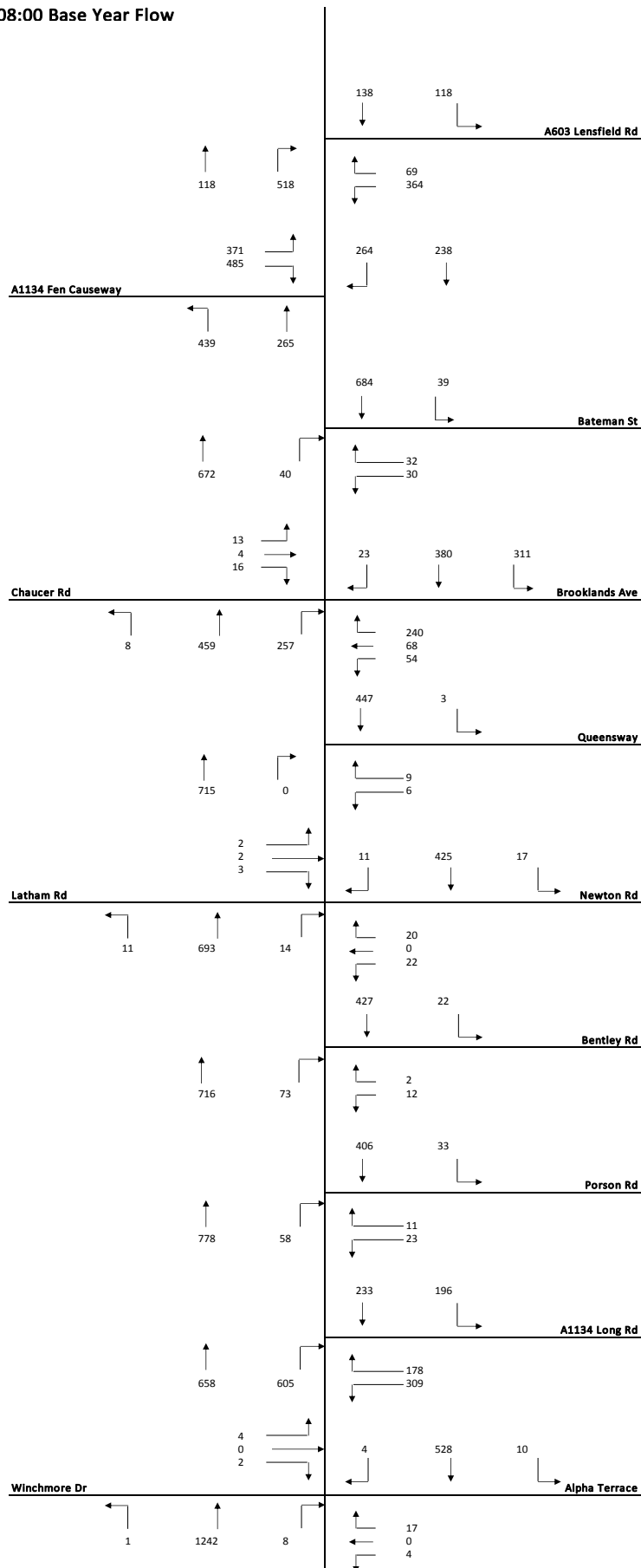
Both the M11 Westbound Signals and Northbound On-slip options result in benefits to P&R bus journey times in both directions, particularly in the last hour where the inbound route is nearly an hour quicker than the Yellow option.

In summary, the additional option testing has shown that design alterations at the M11 Junction 11 and the new park and ride access can provide benefits, although their performances are still indicated to be worse than the DM. A combination of the additional designs could yield the optimal performance.

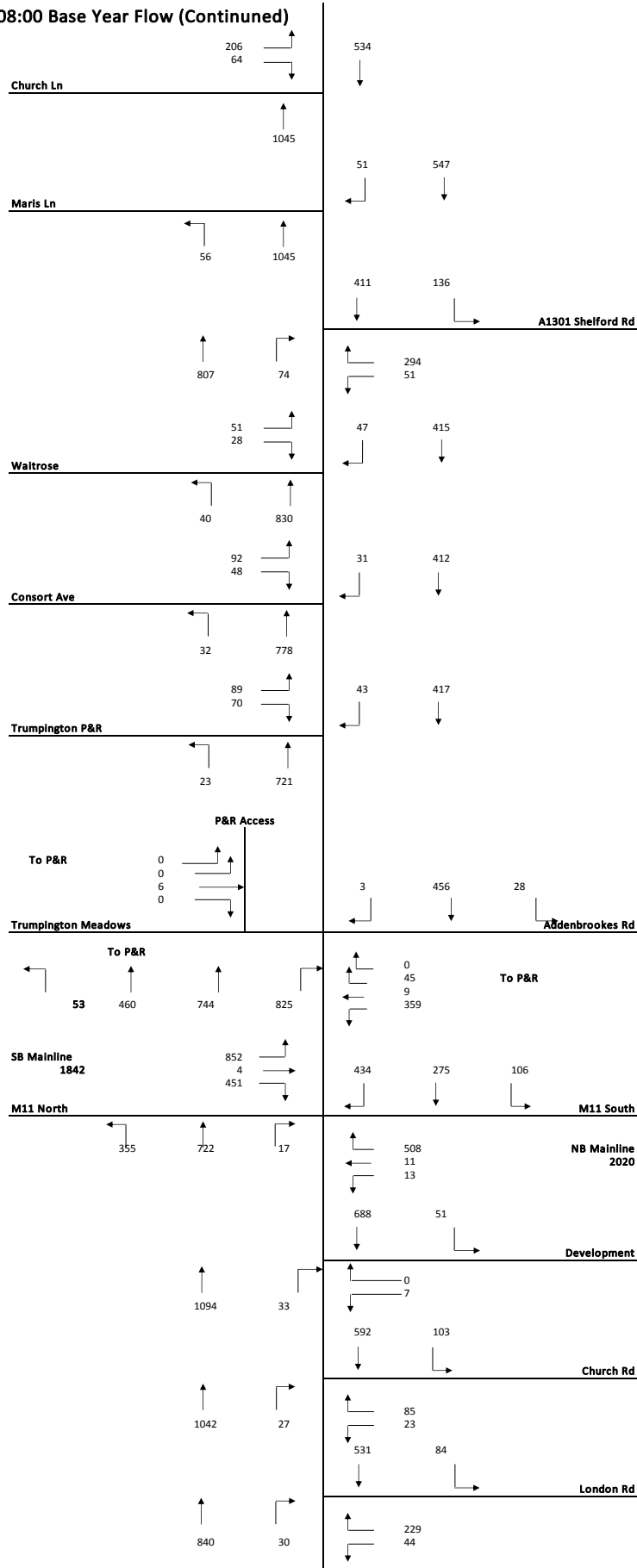
Appendices

A. Base Flow Diagrams

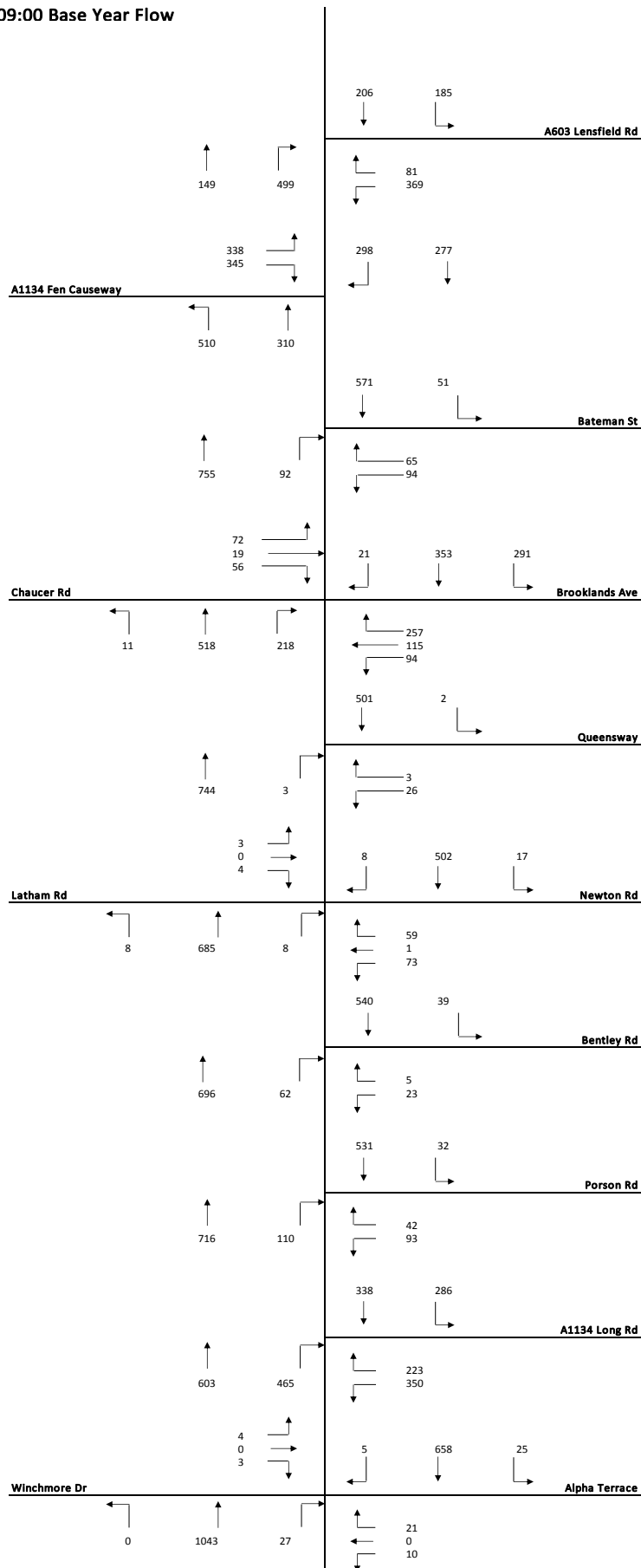
07:00 - 08:00 Base Year Flow



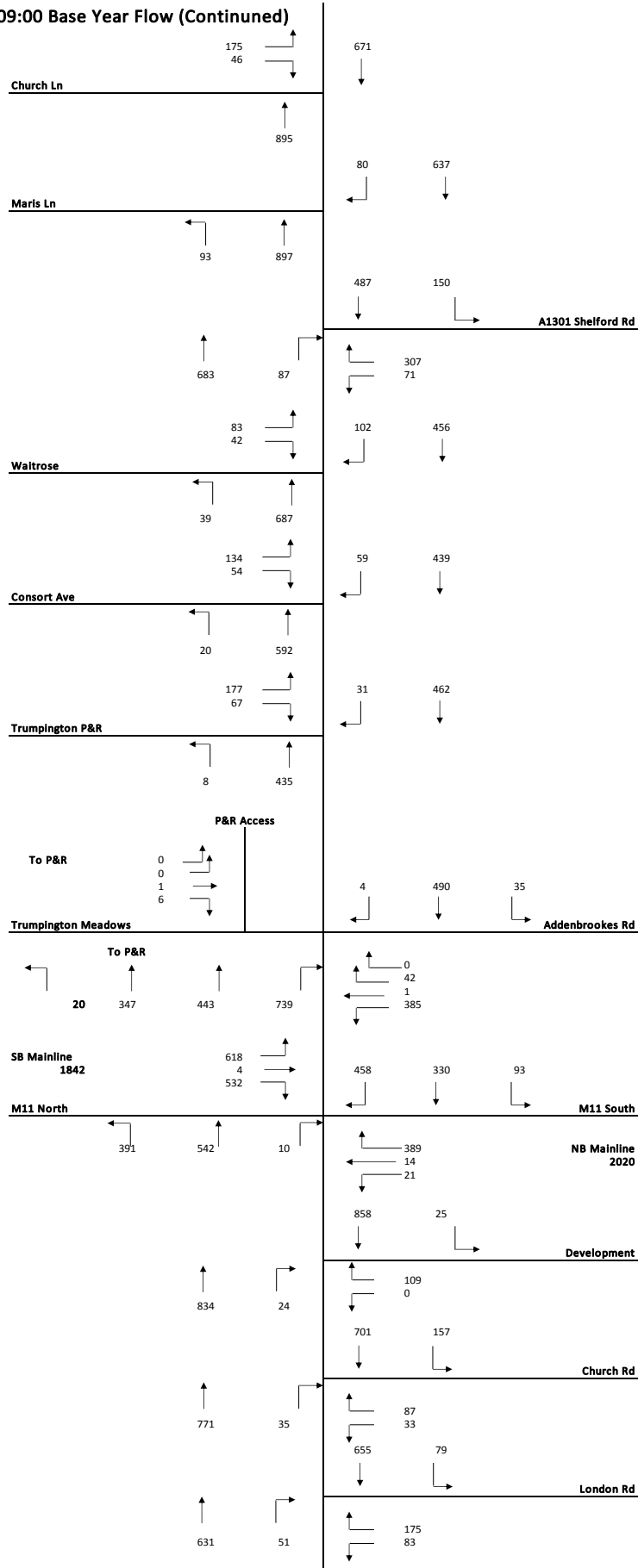
07:00 - 08:00 Base Year Flow (Continued)



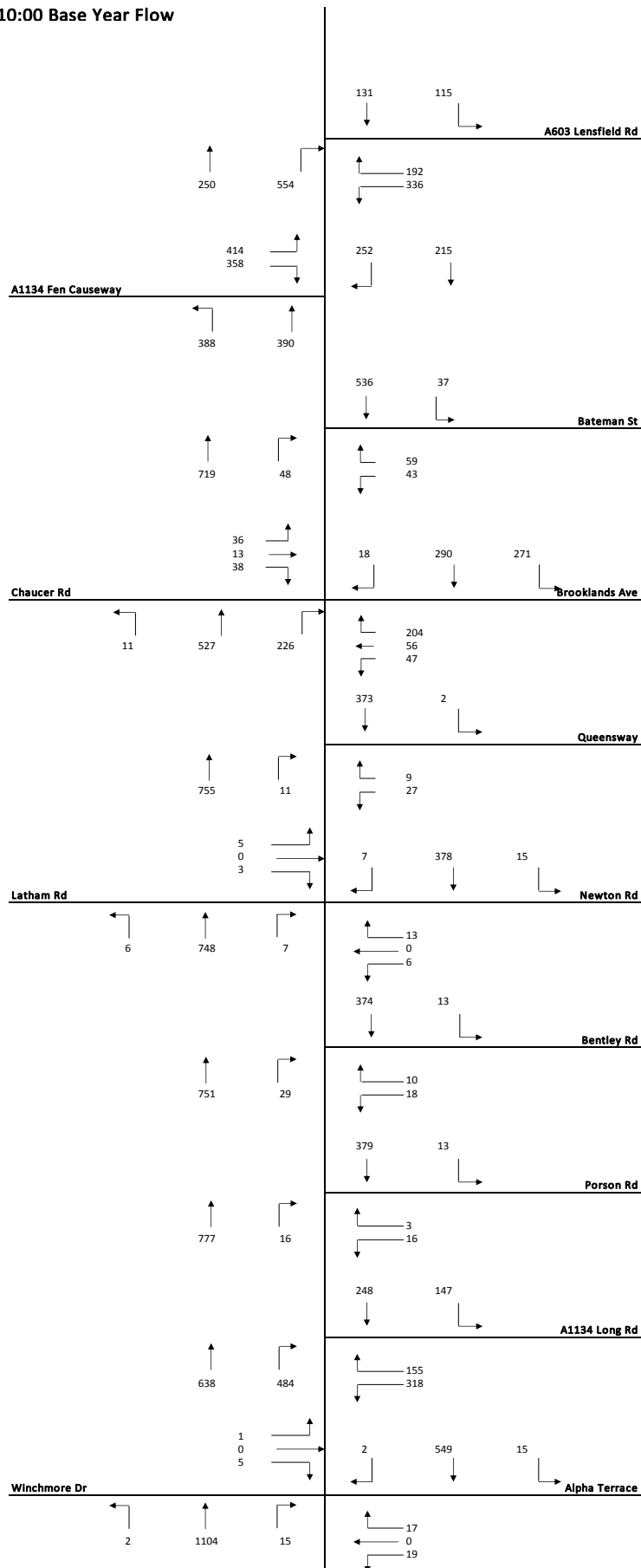
08:00 - 09:00 Base Year Flow



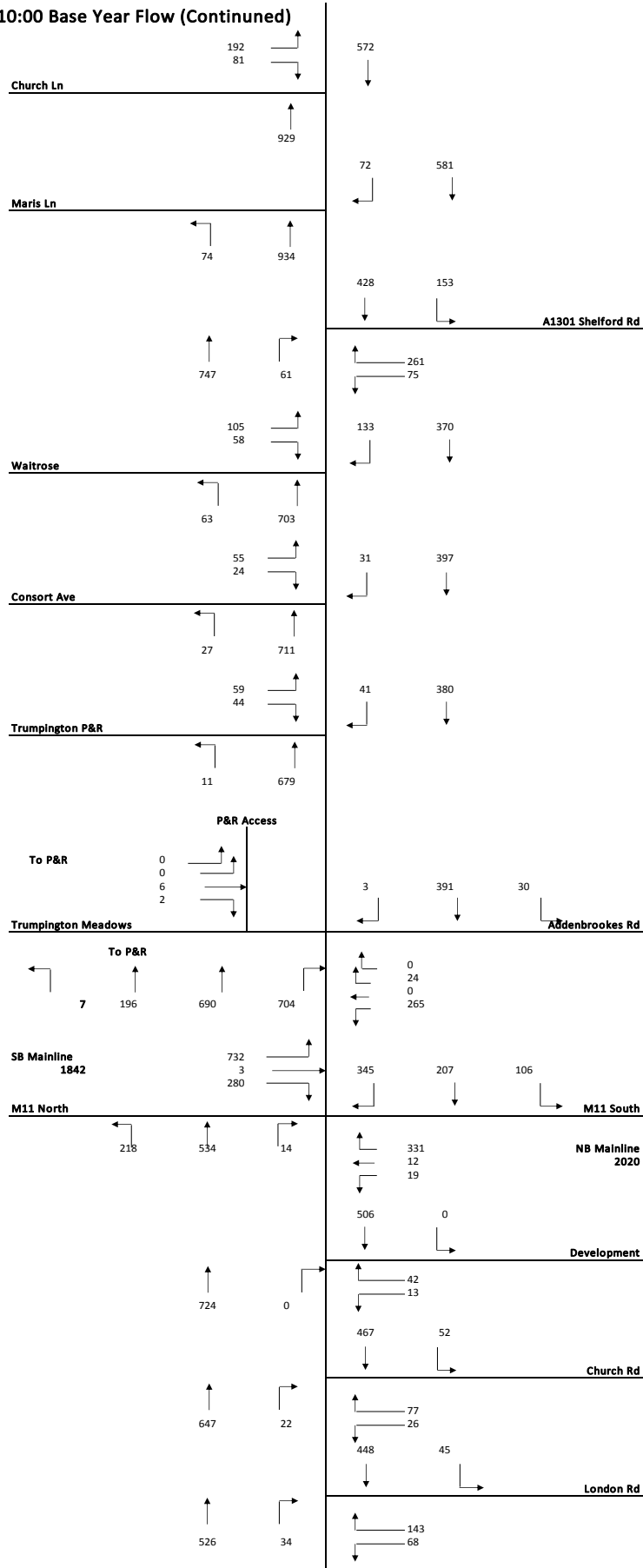
08:00 - 09:00 Base Year Flow (Continued)



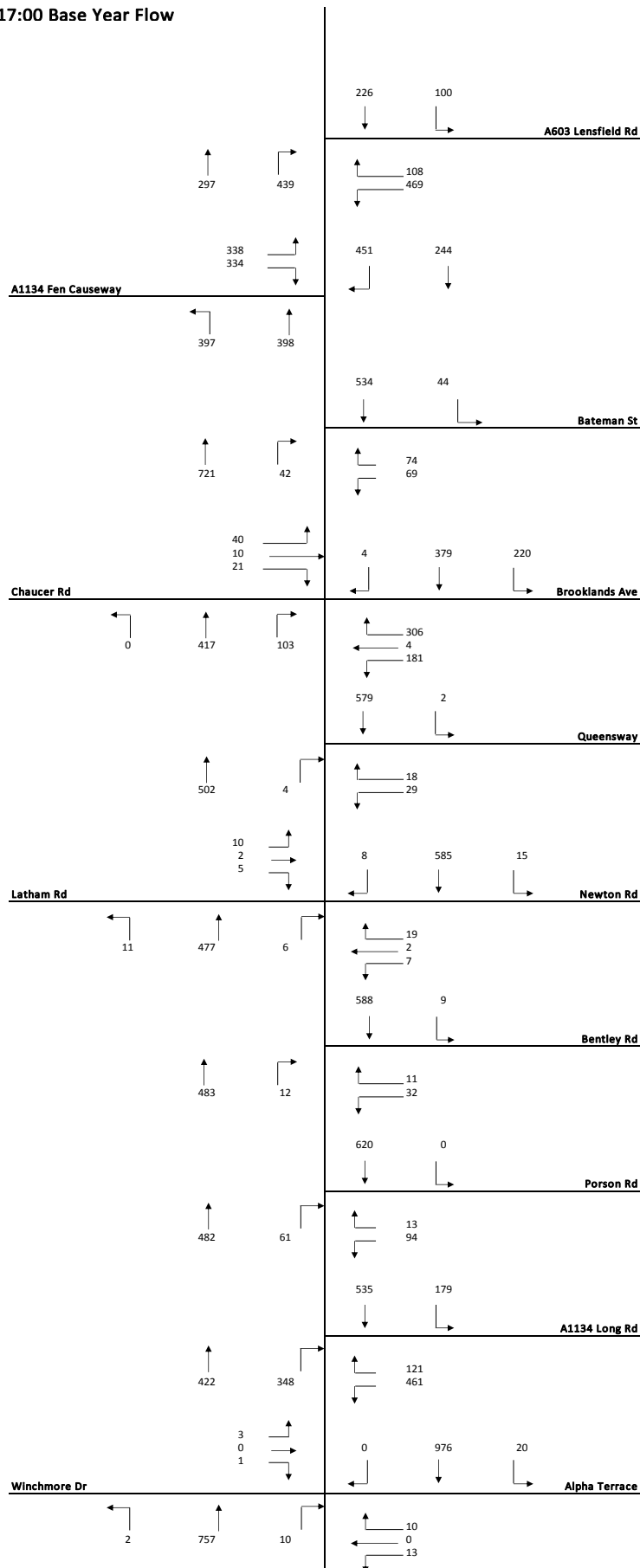
09:00 - 10:00 Base Year Flow



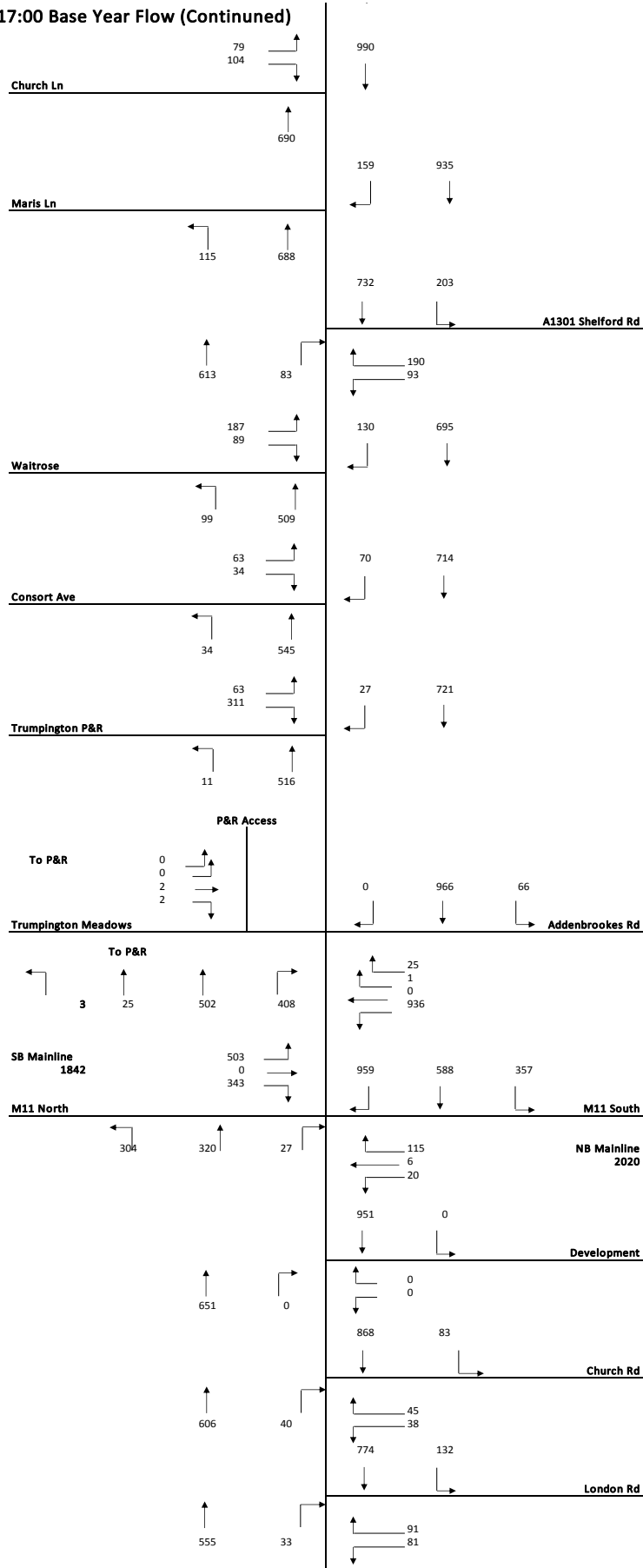
09:00 - 10:00 Base Year Flow (Continued)



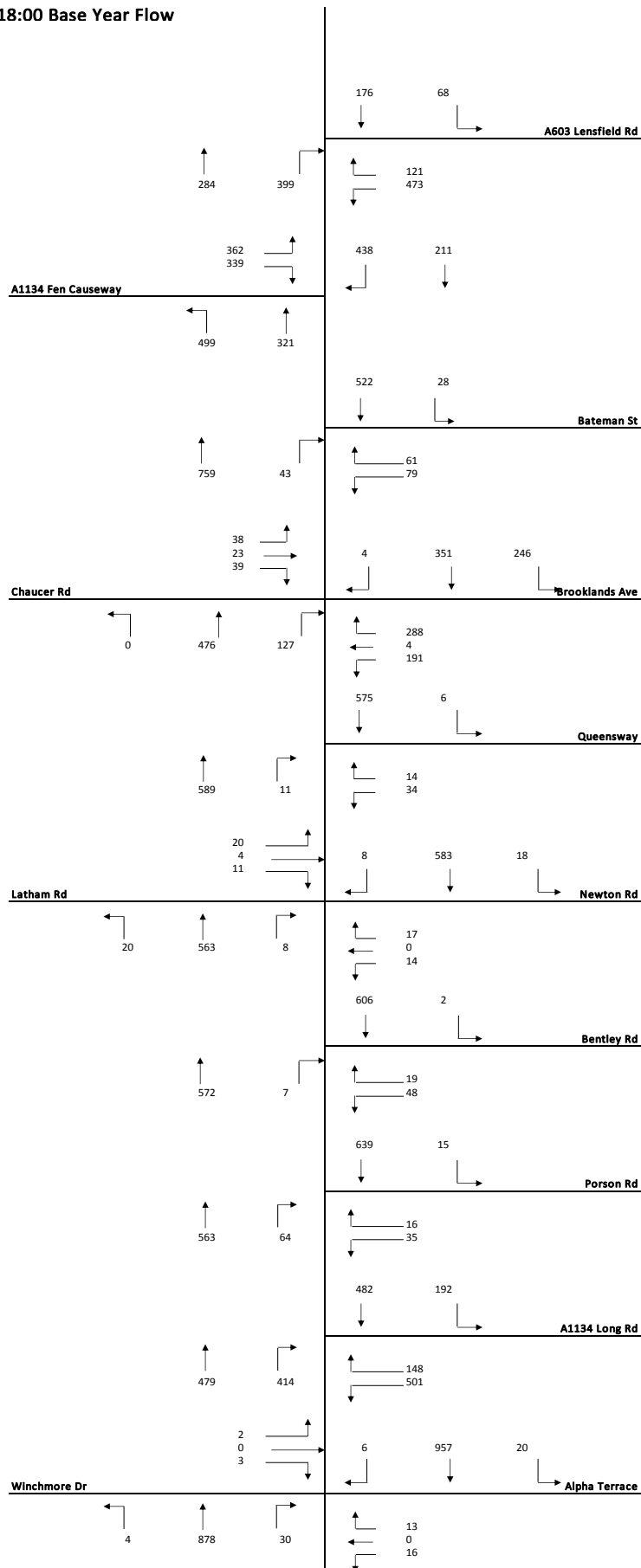
16:00 - 17:00 Base Year Flow



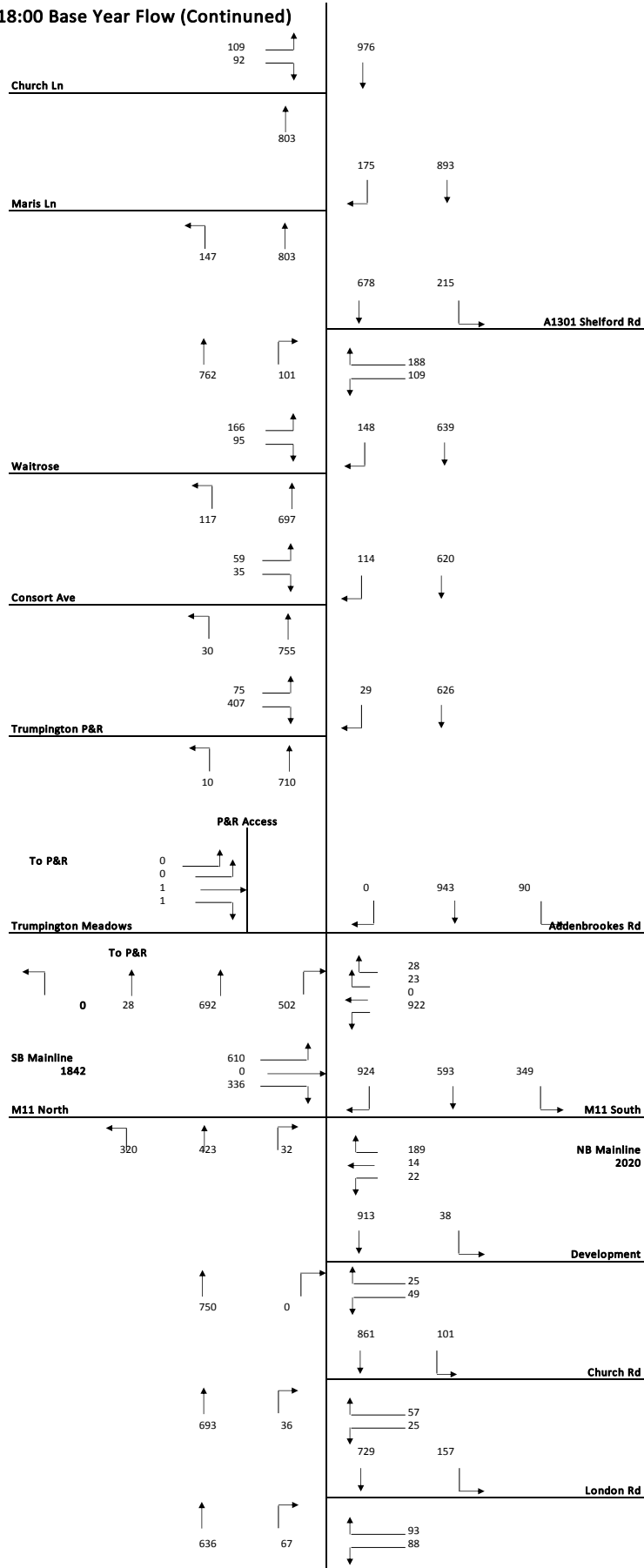
16:00 - 17:00 Base Year Flow (Continued)



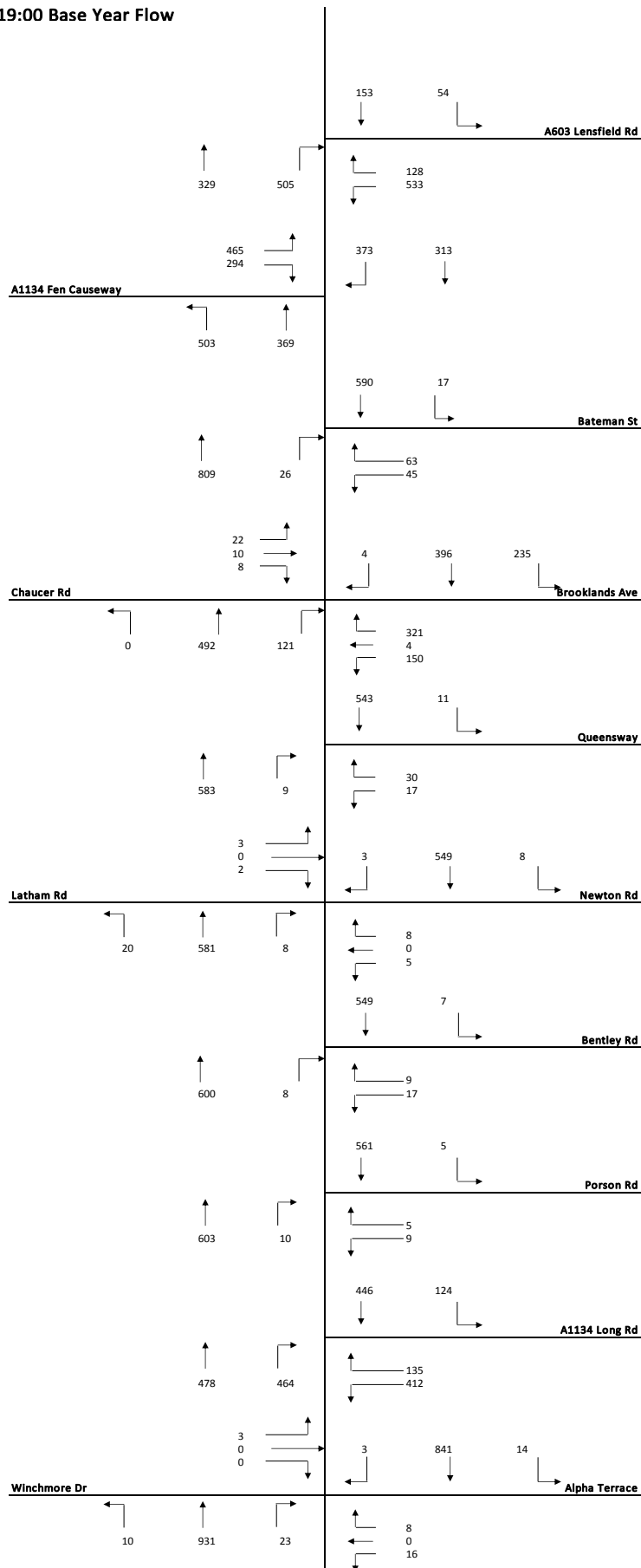
17:00 - 18:00 Base Year Flow



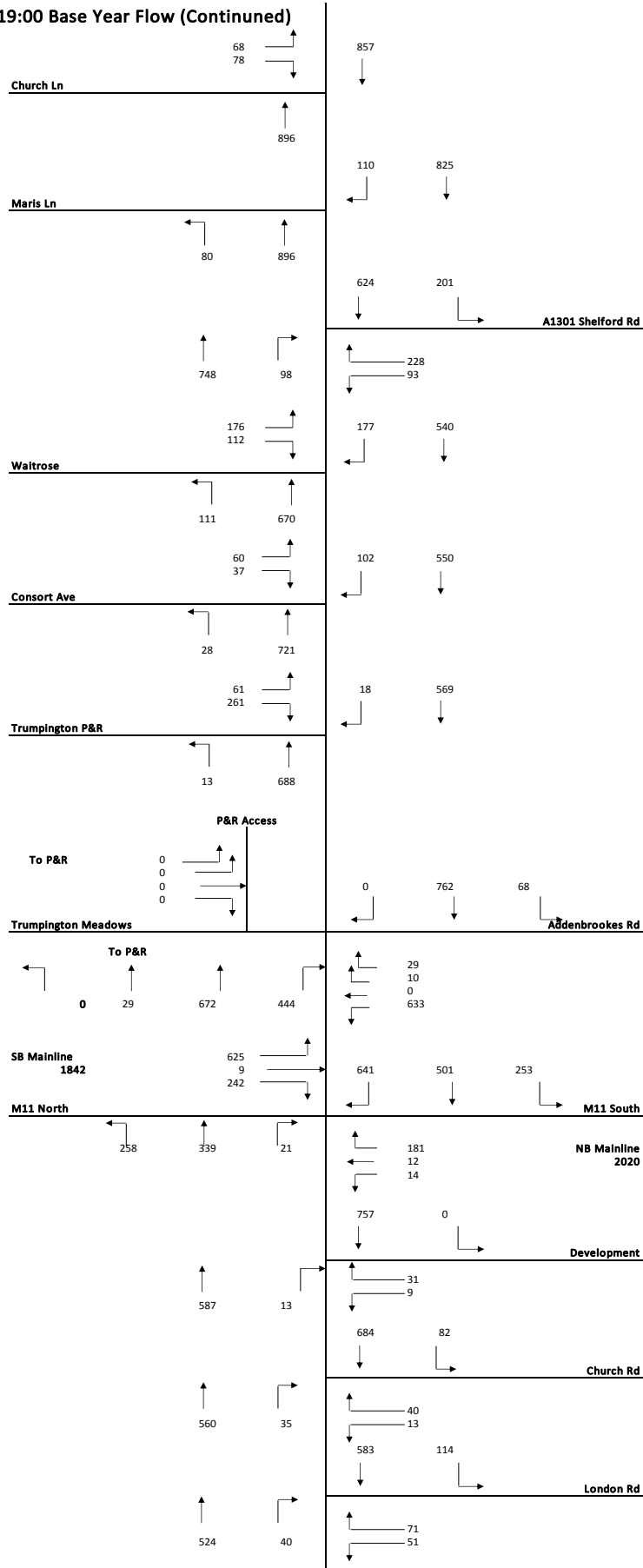
17:00 - 18:00 Base Year Flow (Continued)



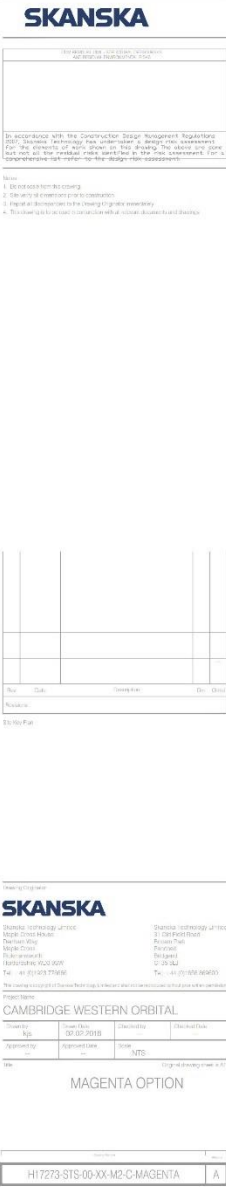
18:00 - 19:00 Base Year Flow

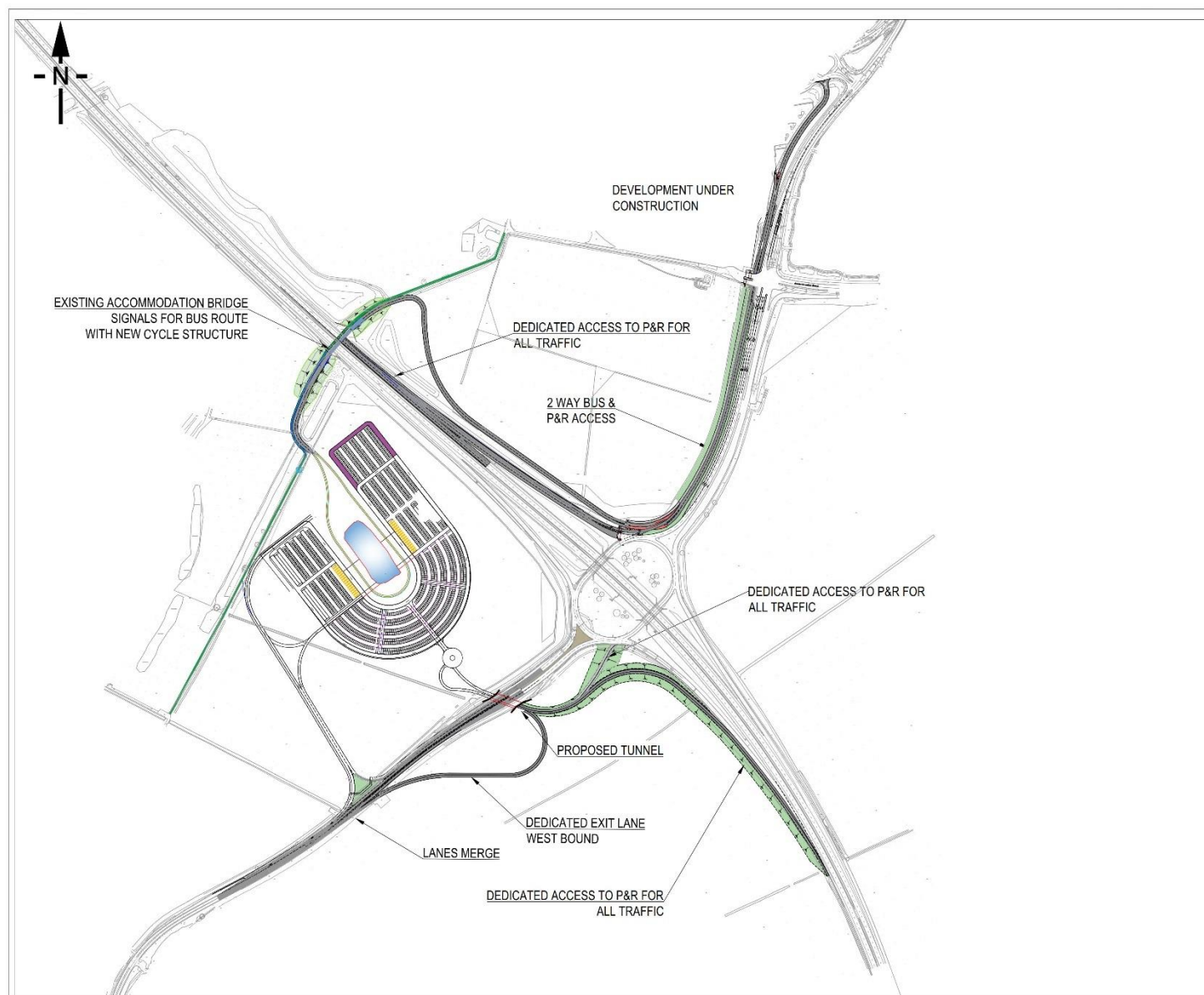


18:00 - 19:00 Base Year Flow (Continued)



B. DS Scenario Drawings





In accordance with the Construction Design Management Regulations 2015, Stantec Technology has undertaken a design risk assessment for the elements of work shown on this drawing. The above are not all the residual risks identified in the risk assessment; a comprehensive list refers to the design risk assessment.

Age	Grade	Interpretation	Doc.
Remarks			
Examiner's Name			

Glansko Technology Limited Maple Crest House Deerpark Way Maple Crest 15, Ardenmore Rd Harrogate HG2 9QR Tel: +44 (0)1430 779656	Glansko Technology Limited 31 Old Field Road Broomfield Barnet Herts AL5 1JL Tel: +44 (0)188 669600
--	--

CAMBRIDGE WESTERN ORBITAL

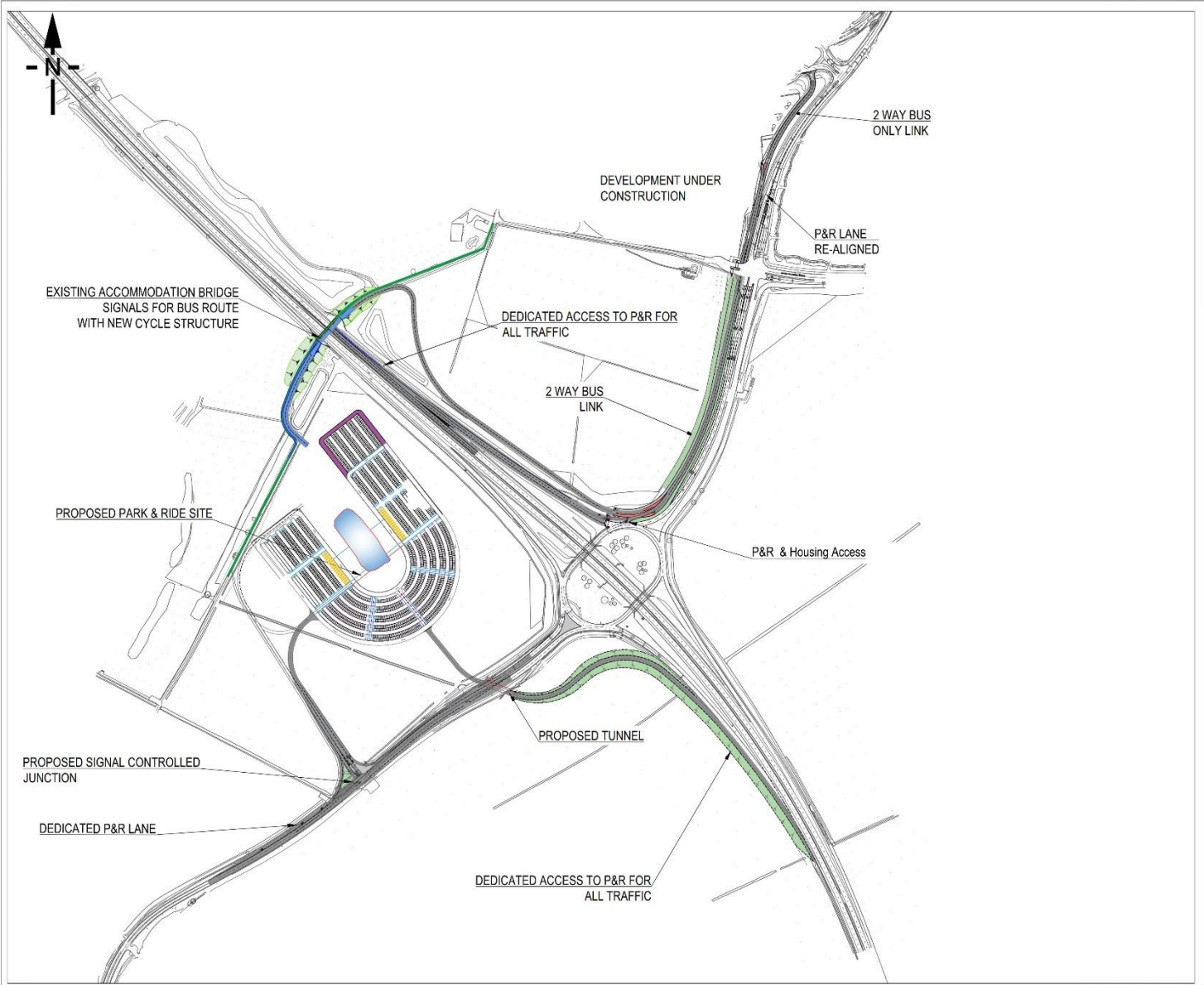
Quantity kgs	Issue Date 21.03.2018	Checked By ---	Checked Date ---
-----------------	--------------------------	-------------------	---------------------

Approved by _____ Date	Approved Date _____ Date	Score _____ / 100
------------------------------	--------------------------------	-------------------------

CYAN OPTION

Country/Region	Year
----------------	------

H17273-STS-00-XX-M2-C-CYAN	A
----------------------------	---



SKANSKA

Technical drawing for the project

Project name: CAMBRIDGE WESTERN ORBITAL

Project number: H17273-SIS-00-XX-M2-C-WHITE

Version: 1.0

Author: [Name]

Reviewer: [Name]

Approval: [Name]

Issue date: 01-01-2018

Issue number: 1

Issue description: [Description]

Issue status: [Status]

Issue type: [Type]

Issue category: [Category]

Issue priority: [Priority]

Issue severity: [Severity]

Issue impact: [Impact]

Issue effort: [Effort]

Issue cost: [Cost]

Issue risk: [Risk]

Issue status: [Status]

Issue type: [Type]

Issue category: [Category]

Issue priority: [Priority]

Issue severity: [Severity]

Issue impact: [Impact]

Issue effort: [Effort]

Issue cost: [Cost]

Issue risk: [Risk]

SKANSKA

Technical drawing for the project

Project name: CAMBRIDGE WESTERN ORBITAL

Project number: H17273-SIS-00-XX-M2-C-WHITE

Version: 1.0

Author: [Name]

Reviewer: [Name]

Approval: [Name]

Issue date: 01-01-2018

Issue number: 1

Issue description: [Description]

Issue status: [Status]

Issue type: [Type]

Issue category: [Category]

Issue priority: [Priority]

Issue severity: [Severity]

Issue impact: [Impact]

Issue effort: [Effort]

Issue cost: [Cost]

Issue risk: [Risk]

SKANSKA

Technical drawing for the project

Project name: CAMBRIDGE WESTERN ORBITAL

Project number: H17273-SIS-00-XX-M2-C-WHITE

Version: 1.0

Author: [Name]

Reviewer: [Name]

Approval: [Name]

Issue date: 01-01-2018

Issue number: 1

Issue description: [Description]

Issue status: [Status]

Issue type: [Type]

Issue category: [Category]

Issue priority: [Priority]

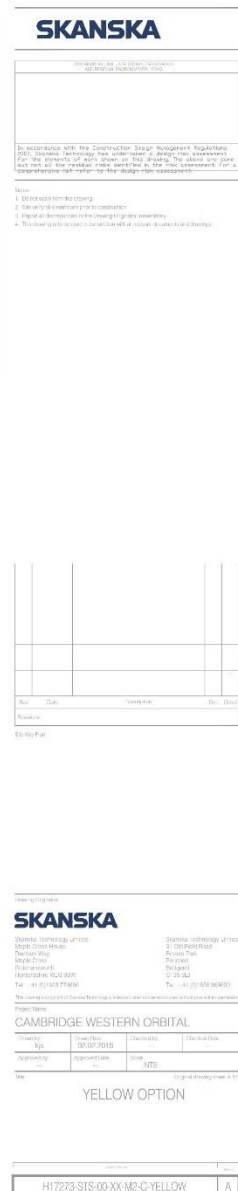
Issue severity: [Severity]

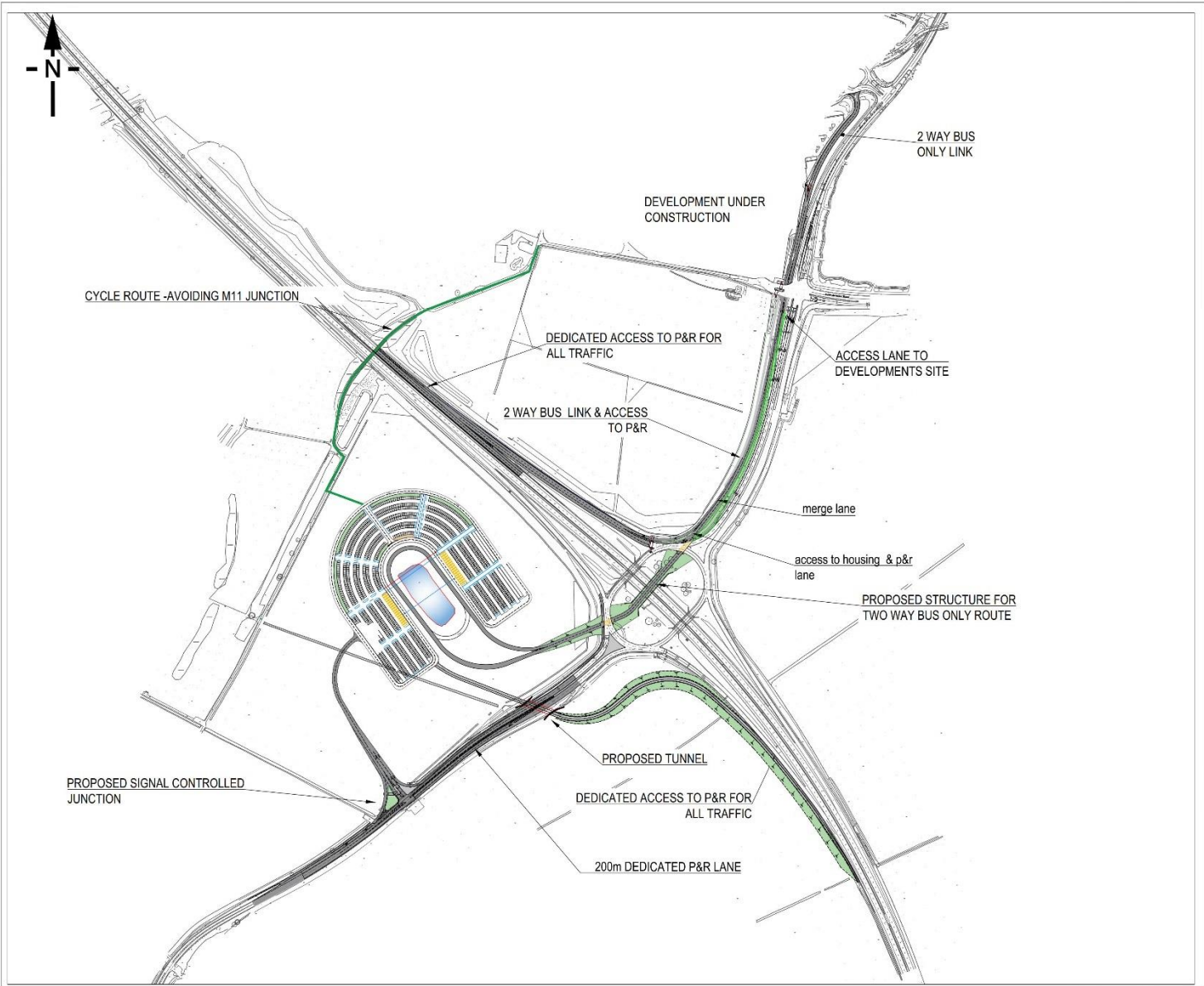
Issue impact: [Impact]

Issue effort: [Effort]

Issue cost: [Cost]

Issue risk: [Risk]





SKANSKA

Cambridge Western Orbital

100% SKANSKA

By agreement with the Construction Design Management Regulations (CDMR) the design of the proposed development is subject to a design statement. The design statement will be submitted to the relevant authorities for approval. The design statement will also be submitted to the relevant authorities for approval. The design statement will also be submitted to the relevant authorities for approval.

Notes:

- 1. The design statement will be submitted to the relevant authorities for approval.
- 2. The design statement will be submitted to the relevant authorities for approval.
- 3. The design statement will be submitted to the relevant authorities for approval.
- 4. The design statement will be submitted to the relevant authorities for approval.

Rev	Date	Description	By	Check
1	10/10/2018	Initial design	SKANSKA	SKANSKA

SKANSKA

Cambridge Western Orbital

100% SKANSKA

By agreement with the Construction Design Management Regulations (CDMR) the design of the proposed development is subject to a design statement. The design statement will be submitted to the relevant authorities for approval. The design statement will also be submitted to the relevant authorities for approval. The design statement will also be submitted to the relevant authorities for approval.

Notes:

- 1. The design statement will be submitted to the relevant authorities for approval.
- 2. The design statement will be submitted to the relevant authorities for approval.
- 3. The design statement will be submitted to the relevant authorities for approval.
- 4. The design statement will be submitted to the relevant authorities for approval.

Project Name: CAMBRIDGE WESTERN ORBITAL

Client: SKANSKA

Project Manager: SKANSKA

Project Engineer: SKANSKA

Project Designer: SKANSKA

Project Checker: SKANSKA

Project Approver: SKANSKA

Project Status: IN PROGRESS

Project Date: 10/10/2018

Project Version: 1.0

Project Location: Cambridge

Project Reference: H17273-S1S-00-XX-M2-C-PURPLE

Project File: A

C. ASTRID Data Calibration Changes

Starting 15 minute period	Stage 1*		Stage 2*		Stage 3		Stage 4		Cycle time
	Trumpington Road Outbound including left to Shelford, Hauxton Road Inbound		Trumpington Road Outbound, Hauxton Road Inbound, Peds across Shelford Road		Hauxton Road Inbound, Shelford Road, Peds across Trumpington Road Outbound		Shelford Road, Peds across Hauxton Road Inbound, Peds across Trumpington Road Outbound		
	Green Time	Adjustment	Green Time	Adjustment	Green Time	Adjustment	Green Time	Adjustment	
07:00:00	36	-11	0	-11	7	-12	20	+11	84
07:15:00	32	-11	25	-11	7	-10	23	+11	82
07:30:00	27	-11	27	-11	7	-9	25	+11	80
07:45:00	35	-11	30	-11	7	-15	25	+11	82
08:00:00	36		26		7	-7	18	+3	86
08:15:00	33		32		7	10	17	+3	85
08:30:00	31		30		7	-7	17	+3	84
08:45:00	24		26		7	-6	16	+3	76
09:00:00	38		35		7	-3	12		81
09:15:00	34		30		7	-10	12		77
09:30:00	36		23		7	-6	11		78
09:45:00	39		30		7	-1	10		81
16:00:00	33	-2	13	-2	13	+8	14	+8	87
16:15:00	22	-2	21	-2	18	+8	14	+8	86
16:30:00	27	-3	26	-3	18	+8	14	+8	90
16:45:00	32	-2	29	-2	11		7		72
17:00:00	39	-2	33	-2	19	+6	7	+1	83
17:15:00	38	-2	34	-2	17	+6	7	+1	80
17:30:00	41	-2	27	-2	16	+6	7	+1	80
17:45:00	42	-2	30	-2	17	+6	7	+1	83
18:00:00	35	-2	33	-2	16	+7	7		83
18:15:00	32	-2	24	-2	16	+7	7		79
18:30:00	35	-2	24	-2	16	+7	7	+1	82
18:45:00	30	-2	25	-2	15	+7	7	+1	77

*Note: Depending on pedestrian demand across Shelford Road either Stage 1 or 2 will be called.

Starting 15 minute period	Stage 1		Stage 2		Cycle time
	High Street		Church Lane		
	Green Time	Adjustment	Green Time	Adjustment	
07:00:00	59	-7	17	+7	90
07:15:00	57	-7	18	+7	88
07:30:00	69	-7	18	+7	100
07:45:00	81	-7	18	+7	112
08:00:00	82	-7	18	+7	112
08:15:00	82	-7	17	+7	112
08:30:00	81	-7	18	+7	112
08:45:00	84	-7	15	+7	112
09:00:00	81	-7	18	+7	112
09:15:00	82	-7	17	+7	112
09:30:00	78	-7	16	+7	107
09:45:00	71	-7	17	+7	102
16:00:00	67	-4	12	+4	91
16:15:00	83	-4	12	+4	108
16:30:00	85	-4	12	+4	110
16:45:00	87	-4	12	+4	112
17:00:00	91		8		112
17:15:00	86		8		106
17:30:00	78		8		99
17:45:00	78		8		99
18:00:00	75	-2	7		96
18:15:00	83		8		104
18:30:00	77		8		97
18:45:00	74		8		94

Starting 15 minute period	Stage 1		Stage 2		Stage 3		Stage 4		Stage 4		Cycle time
	Trumpington Road northbound, Trumpington Road southbound		Trumpington Road northbound, Trumpington Road northbound right- turn		Pedestrian		Brooklands Ave, Trumpington Road southbound left-turn		Chaucer Road		
	Green Time	Adjustment	Green Time	Adjustment	Green Time	Adjustment	Green Time	Adjustment	Green Time	Adjustment	
07:00:00	25	+8	7	-4	8		7	-2	7		94
07:15:00	30	+8	7	-7	8		11	-2	7		104
07:30:00	37	+10	7	-7	8		14	-2	7		114
07:45:00	32	+4	7	-8	8		14	-2	7	+1	108
08:00:00	31	+4	10	-4	8		16		7	+1	113
08:15:00	32	+5	12	-5	8		19		7	+2	119
08:30:00	28	+5	11	-5	8		17		7		111
08:45:00	27	+5	12	-5	8		15		8		110
09:00:00	26	+5	11	-4	8		15		7		108
09:15:00	24	+5	12	-3	8		13		7		105
09:30:00	20	+5	11	-3	8		13		7		100
09:45:00	20	+5	10	-2	8		14		7		100
16:00:00	27	+2	7	-2	8		23		7		113
16:15:00	24	+2	8	-2	8		24		7		113
16:30:00	27	+2	8	-2	8		23		7		114
16:45:00	26	+2	7	-2	8		24		7		114
17:00:00	30	+3	7	-4	8		25	-3	7		117
17:15:00	25	+3	7	-2	8		18	-3	7		106
17:30:00	26	+3	7	-2	8		22	-3	7		110
17:45:00	24	+3	7	-2	8		17	-3	7		105
18:00:00	24	+1	8	-2	8		26		7		114
18:15:00	21	+1	7	-2	8		21		7		105
18:30:00	18	+1	7	-2	8		17		7		98
18:45:00	18	+1	7	-2	8		17		7		97

D. AM Modelled Vs. Observed Flow Comparison

	Junction	Turn: From X to Y	Modelled					Observed	Diff	GEH	Pass GEH
			07:00	07:15	07:30	07:45					
07:00 - 08:00	Cambridge Rd / Church Road T-Junction	A10 Cambridge Road (North) to A10 Cambridge Road (South)	578	114.0	145.0	168.0	165.0	592	-14	0.6	✓
		A10 Cambridge Road (North) to Church Road	99	9.0	20.0	34.0	40.0	103	-5	0.4	✓
		A10 Cambridge Road (South) to Church Road	29	5.0	4.0	7.0	11.0	27	2	0.3	✓
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	1,030	235.0	265.0	273.0	269.0	1042	-12	0.4	✓
		Church Road to A10 Cambridge Road (North)	83	22.0	15.0	21.0	27.0	85	-2	0.2	✓
		Church Road to A10 Cambridge Road (South)	25	5.0	9.0	9.0	0.0	23	2	0.3	✓
			1,843					1872	-29	0.7	✓
	Cambridge Rd / London Road T-Junction	A10 Cambridge Road (North) to High St	516	105.0	138.0	155.0	133.0	531	-15	0.7	✓
		A10 Cambridge Road (North) to London Road	82	14.0	16.0	22.0	32.0	84	-2	0.2	✓
		High St to London Road	31	7.0	6.0	8.0	9.0	30	1	0.2	✓
		High St to A10 Cambridge Road (North)	840	208.0	210.0	202.0	220.0	840	0	0.0	✓
		London Road to A10 Cambridge Road (North)	223	32.0	59.0	78.0	60.0	229	-6	0.4	✓
		London Road to High St	44	9.0	10.0	14.0	11.0	44	0	0.0	✓
			1,737					1758	-21	0.5	✓
	M11 Junction 11 Intersection	A10 Cambridge Road to M11 Northbound On-Slip	339	55.0	85.0	102.0	113.0	355	-17	0.9	✓
		A10 Cambridge Road to Hauxton Road	715	190.0	188.0	184.0	160.0	722	-7	0.3	✓
		A10 Cambridge Road to M11 Southbound On-Slip	16	3.0	4.0	5.0	5.0	17	-1	0.2	✓
		A10 Cambridge Road to A10 Cambridge Road	-					0			
		M11 Southbound Mainline through	1,856	417.0	490.0	475.0	460.0	1842	14	0.3	✓
		M11 Southbound Off-Slip to Hauxton Road	861	249.0	218.0	224.0	161.0	852	9	0.3	✓
		M11 Southbound Off-Slip to M11 Northbound On-Slip	-					0			
		M11 Southbound Off-Slip to A10 Cambridge Road	448	95.0	116.0	128.0	112.0	451	-3	0.1	✓
		M11 Southbound Off-Slip to M11 Southbound On-Slip	4	4.0	0.0	0.0	0.0	4	0	0.2	✓
		Hauxton Road to M11 Southbound Slip	104	19.0	27.0	30.0	30.0	106	-2	0.2	✓
		Hauxton Road to A10 Cambridge Road	263	46.0	65.0	78.0	86.0	275	-13	0.8	✓
		Hauxton Road to M11 Northbound Slip	425	93.0	106.0	125.0	110.0	434	-9	0.4	✓
		Hauxton Road to Hauxton Road	-					0			
		M11 Northbound Mainline through	2,005	496.0	465.0	527.0	532.0	2020	-15	0.3	✓
		M11 Northbound Off-Slip to A10 Cambridge Road	15	5.0	4.0	4.0	0.0	13	2	0.6	✓
		M11 Northbound Off-Slip to M11 Southbound On-Slip	-					0			
		M11 Northbound Off-Slip to Hauxton Road	507	138.0	114.0	126.0	130.0	508	-1	0.0	✓
		M11 Northbound Off-Slip to M11 Northbound On-Slip	11	0.0	4.0	7.0	0.0	11	0	0.1	✓
			7,571					7599	-28	0.3	✓
	Addenbrooke's Rd / Hauxton Rd Junction	Dedicated P&R Link Northbound to Access Road	51	8.0	25.0	14.0	6.0	53	-2	0.2	✓
		Dedicated P&R Link Northbound Through	441	117.0	116.0	172.0	179.0	584	-143	6.3	✗
		Hauxton Road Northbound Through	723	186.0	193.0	148.0	93.0	620	103	4.0	✓
		Hauxton Road Northbound to Addenbrookes Road	853	266.0	186.0	200.0	173.0	825	28	1.0	✓
		Hauxton Road Southbound Through	438	91.0	115.0	126.0	124.0	456	-18	0.9	✓
		Hauxton Road Southbound to Addenbrookes Road	27	7.0	5.0	5.0	11.0	28	-1	0.1	✓
		Hauxton Road Southbound to Access Road	3	0.0	2.0	1.0	0.0	3	-1	0.3	✓
		Access Road to P&R Access	-	0.0	0.0	0.0	0.0	0	0		
		Access Road to Hauxton Road N	5	0.0	1.0	3.0	2.0	6	-1	0.3	✓
		Access Road to Addenbrookes Road	-	0.0	0.0	0.0	0.0	0	0		
		Access Road to Hauxton Road S	-	0.0	0.0	0.0	0.0	0	0		
		Addenbrookes Road to Hauxton Road Southbound Slip	359	67.0	83.0	107.0	102.0	359	-1	0.0	✓
		Addenbrookes Road to Access Road	12	4.0	2.0	2.0	1.0	9	3	0.8	✓
		Addenbrookes Road to P&R Access	47	14.0	8.0	10.0	13.0	45	2	0.3	✓
		Addenbrookes Road to Hauxton Road Northbound	-	0.0	0.0	0.0	0.0	0	0		
			2,959					2988	-29	0.5	✓
	Trumpington Park & Ride T-Junction	Hauxton Road Southbound Through	402	90.0	114.0	123.0	90.0	417	-15	0.7	✓
		Hauxton Road Southbound to P&R	48	17.0	10.0	6.0	10.0	43	5	0.7	✓
		Hauxton Road Northbound to P&R	24	11.0	5.0	4.0	3.0	23	1	0.2	✓
		Hauxton Road Northbound Through	670	175.0	198.0	214.0	134.0	721	-51	1.9	✓
		P&R to Hauxton Road Northbound	85	8.0	14.0	7.0	60.0	89	-4	0.4	✓
		P&R to Hauxton Road Southbound	69	8.0	8.0	9.0	45.0	70	-1	0.1	✓
			1,298					1363	-65	1.8	✓
	Consort Ave T-Junction	Hauxton Rd Northbound to Hauxton Rd Southbound	402	93.0	119.0	110.0	90.0	412	-10	0.5	✓
		Hauxton Rd Northbound to Consort Ave	30	3.0	5.0	8.0	15.0	31	-1	0.2	✓
		Hauxton Rd Southbound to Consort Ave	29	8.0	6.0	6.0	12.0	32	-3	0.5	✓
		Hauxton Rd Southbound to Hauxton Rd Northbound	709	175.0	206.0	215.0	182.0	778	-69	2.5	✓
		Consort Ave to Hauxton Rd Northbound	84	17.0	21.0	17.0	37.0	92	-8	0.9	✓
		Consort Ave to Hauxton Rd Southbound	47	14.0	5.0	19.0	10.0	48	-1	0.1	✓
			1,301					1393	-92	2.5	✓
	Waitrose T-Junction	Hauxton Rd Northbound to Hauxton Rd Southbound	404	80.2	101.5	97.1	90.2	369	35	1.8	✓
		Hauxton Rd Northbound to Waitrose	46	13.8	9.5	7.9	10.8	42	4	0.6	✓
		Hauxton Rd Southbound to Waitrose	35	13.0	8.0	9.0	10.0	40	-5	0.9	✓
		Hauxton Rd Southbound to Hauxton Rd Northbound	751	163.1	199.2	202.4	195.7	760	-9	0.3	✓
		Waitrose to Hauxton Rd North	51	10.9	11.8	13.6	10.3	47	4	0.6	✓
		Waitrose to Hauxton Rd South	30	9.0	7.0	7.0	5.0	28	2	0.3	✓
			1,316					1286	30	0.8	✓
	High St/ Hauxton Rd/A1301 Shefford Rd T-Junction	High St to Hauxton Rd	401	80.2	101.5	97.1	90.2	369	32	1.6	✓
		High St to A1301 Shefford Rd	128	20.0	35.0	44.0	37.0	136	-8	0.7	✓
		Hauxton Rd to A1301 Shefford Rd	67	17.0	21.0	22.0	14.0	74	-7	0.9	✓
		Hauxton Rd to High St	734	174.0	211.0	216.0	206.0	807	-73	2.6	✓
		A1301 Shefford Rd to High St	281	50.0	64.0	91.0	89.0	294	-13	0.8	✓
		A1301 Shefford Rd to Hauxton Rd	49	6.8	15.5	13.9	9.8	46	3	0.4	✓
			1,659					1726	-67	1.6	✓
	High St/ Maris Lane	High St North to High St South	530	114.0	146.0	149.0	138.0	547	-17	0.7	✓
		High St North to Maris Lane	45	10.0	10.0	14.0	17.0	51	-7	0.9	✓
		High St South to Maris Lane	48	7.0	13.0	18.0	18.0	56	-8	1.1	✓
		High St South to High St North	964	217.0	262.0	289.0	277.0	1045	-81	2.5	✓
			1,587					1699	-112	2.8	✓
	High St/ Church Lane	High St North to High St South	512	108.0	131.0	148.0	147.0	534	-22	1.0	✓
		High St South to High St North	954	217.0	262.0	289.0	277.0	1045	-91	2.9	✓
		Church Lane to High St North	185	29.0	69.0	55.0	53.0	206	-21	1.5	✓
		Church Lane to High St South	63	16.0	25.0	15.0	8.0	64	-1	0.2	✓
			1,713					1849	-136	3.2	✓

Junction		Turn: From X to Y	Modelled	07:00	07:15	07:30	07:45	Observed	Diff	GEH	Pass GEH
07:00 - 08:00	High St/ Winchmore Dr / Alpha Terrace Crossroads	High St North to Alpha Terrace	9	2.0	2.0	3.0	3.0	10	-1	0.3	✓
		High St North to High St South	510	106.0	129.0	147.0	146.0	528	-19	0.8	✓
		High St North to Winchmore Dr	4	2.0	1.0	1.0	0.0	4	-1	0.3	✓
		Alpha Terrace to High St South	4	1.0	2.0	0.0	1.0	4	0	0.1	✓
		Alpha Terrace to Winchmore Dr	-	0.0	0.0	0.0	0.0	0	0		
		Alpha Terrace to High St North	17	0.0	4.0	2.0	11.0	17	0	0.0	✓
		High St South to Winchmore Dr	1	1.0	0.0	0.0	0.0	1	0	0.1	✓
		High St South to High St North	1,124	242.0	329.0	343.0	328.0	1242	-118	3.4	✓
		High St South to Alpha Terrace	8	3.0	2.0	1.0	2.0	8	0	0.1	✓
		Winchmore Dr to High St North	-	2.0	1.0	1.0	0.0	4	-4	2.8	✓
		Winchmore Dr to Alpha Terrace	-	0.0	0.0	0.0	0.0	0	0		
		Winchmore Dr to High St South	-	1.0	0.0	1.0	0.0	2	-2	2.0	✓
			1,675					1820	-145	3.5	✓
	High St/ A1134 T-Junction	A1134 Trumpington Road (North) to High St (South)	223	53.0	44.0	68.0	68.0	233	-10	0.7	✓
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	182	26.0	46.0	38.0	86.0	196	-14	1.0	✓
		High St (South) to A1134 Long Rd (East)	543	128.0	178.0	165.0	134.0	605	-62	2.6	✓
		High St (South) to A1134 Trumpington Road (North)	582	116.0	156.0	181.0	205.0	658	-76	3.1	✓
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	173	29.0	30.0	47.0	72.0	178	-5	0.4	✓
		A1134 Long Rd (East) to High St (South)	298	57.0	88.0	83.0	81.0	309	-11	0.6	✓
			2,001					2179	-178	3.9	✓
	A1134 / Parson Rd T-Junction	A1134 North to A1134 South	388	77.0	90.0	104.0	135.0	406	-18	0.9	✓
		A1134 North to Parson Road	29	2.0	10.0	5.0	16.0	33	-5	0.8	✓
		A1134 South to Parson Road	50	2.0	5.0	14.0	37.0	58	-8	1.1	✓
		A1134 South to A1134 North	695	143.0	181.0	214.0	240.0	778	-83	3.1	✓
		Parson Road to A1134 North	10	0.0	0.0	1.0	10.0	11	-1	0.3	✓
		Parson Road to A1134 South	21	2.0	0.0	2.0	19.0	23	-2	0.5	✓
			1,192					1309	-117	3.3	✓
	A1134 / Bentley Rd T-Junction	A1134 North to A1134 South	408	77.0	90.0	104.0	135.0	406	2	0.1	✓
		A1134 North to Bentley Rd	18	2.0	10.0	5.0	16.0	33	-15	3.1	✓
		A1134 South to Bentley Rd	63	2.0	5.0	14.0	37.0	58	5	0.6	✓
		A1134 South to A1134 North	630	143.0	181.0	214.0	240.0	778	-148	5.6	✗
		Bentley Rd to A1134 North	2	0.0	0.0	1.0	10.0	11	-9	3.6	✓
		Bentley Rd to A1134 South	11	2.0	0.0	2.0	19.0	23	-12	2.8	✓
			1,131					1309	-178	5.1	✗
	A1134 / Latham Rd / Newton Rd Crossroads	A1134 North to Newton Rd	14	2.0	7.0	2.0	6.0	17	-3	0.8	✓
		A1134 North to A1134 South	405	78.0	98.0	99.0	150.0	425	-20	1.0	✓
		A1134 North to Latham Rd	9	4.0	2.0	1.0	4.0	11	-2	0.5	✓
		Newton Rd to A1134 South	21	1.0	4.0	8.0	9.0	22	-1	0.1	✓
		Newton Rd to Latham Rd	-	0.0	0.0	0.0	0.0	0	0		
		Newton Rd to A1134 North	18	1.0	2.0	3.0	14.0	20	-2	0.4	✓
		A1134 South to Latham Rd	10	5.0	3.0	2.0	1.0	11	-1	0.2	✓
		A1134 South to A1134 North	587	135.0	157.0	187.0	214.0	693	-106	4.2	✓
		A1134 South to Newton Rd	11	2.0	2.0	9.0	1.0	14	-3	1.0	✓
		Latham Rd to A1134 North	2	0.0	2.0	0.0	0.0	2	0	0.0	✓
		Latham Rd to Newton Rd	2	1.0	0.0	0.0	1.0	2	0	0.2	✓
		Latham Rd to A1134 South	3	1.0	1.0	0.0	1.0	3	0	0.0	✓
			1,082					1220	-138	4.1	✓
	A1134 / Queensway T-Junction	A1134 North to A1134 South	422	83.0	107.0	100.0	157.0	447	-25	1.2	✓
		A1134 North to Queensway	3	2.0	0.0	0.0	1.0	3	0	0.2	✓
		A1134 South to Queensway	-	0.0	0.0	0.0	0.0	0	0		
		A1134 South to A1134 North	595	136.0	161.0	190.0	228.0	715	-120	4.7	✓
		Queensway to A1134 North	8	3.0	2.0	1.0	3.0	9	-1	0.5	✓
		Queensway to A1134 South	7	1.0	0.0	2.0	3.0	6	1	0.4	✓
			1,035					1180	-146	4.4	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	A1134 North to Brooklands Ave	309	80.0	91.0	64.0	76.0	311	-2	0.1	✓
		A1134 North to A1134 South	369	81.0	96.0	73.0	130.0	380	-11	0.6	✓
		Brooklands Ave to A1134 South	40	4.0	7.0	19.0	24.0	54	-14	2.0	✓
		Brooklands Ave to A1134 North	209	53.0	47.0	75.0	65.0	240	-31	2.1	✓
		A1134 South to A1134 North	381	84.0	105.0	124.0	146.0	459	-78	3.8	✓
		A1134 South to Brooklands Ave	207	53.0	56.0	65.0	83.0	257	-50	3.3	✓
		Chaucer Rd to A1134 North	11	2.0	0.0	6.0	5.0	13	-2	0.4	✓
		Chaucer Rd to Brooklands Ave	4	1.0	0.0	2.0	1.0	4	0	0.1	✓
		Chaucer Rd to A1134 South	16	0.0	4.0	8.0	4.0	16	0	0.0	✓
		A1134 North to Chaucer Rd	22	5.0	6.0	6.0	6.0	23	-1	0.2	✓
		Brooklands Ave to Chaucer Rd	57	14.0	13.0	18.0	23.0	68	-11	1.4	✓
		A1134 South to Chaucer Rd	7	2.0	2.0	2.0	2.0	8	-1	0.5	✓
			1,633					1833	-200	4.8	✓
	A1134 / Bateman St T-Junction	A1134 North to A1134 South	689	163.0	189.0	129.0	203.0	684	5	0.2	✓
		A1134 North to Bateman St	42	5.0	5.0	9.0	20.0	39	3	0.4	✓
		A1134 South to Bateman St	30	2.0	5.0	11.0	22.0	40	-10	1.6	✓
		A1134 South to A1134 North	570	137.0	147.0	194.0	194.0	672	-102	4.1	✓
		Bateman St to A1134 North	32	3.0	3.0	12.0	14.0	32	0	0.1	✓
		Bateman St to A1134 South	29	3.0	4.0	14.0	9.0	30	-1	0.1	✓
			1,392					1497	-105	2.8	✓
	A1134 / Fen Causeway T-Junction	A1134 North to A1134 South	242	34.0	53.0	61.0	90.0	238	4	0.2	✓
		A1134 North to Fen Causeway	259	50.0	64.0	53.0	97.0	264	-5	0.3	✓
		A1134 South to Fen Causeway	366	89.0	85.0	131.0	134.0	439	-73	3.7	✓
		A1134 South to A1134 North	233	51.0	65.0	75.0	74.0	265	-32	2.0	✓
		Fen Causeway to A1134 North	366	91.0	107.0	94.0	79.0	371	-5	0.3	✓
		Fen Causeway to A1134 South	493	134.0	141.0	77.0	133.0	485	8	0.4	✓
			1,959					2062	-103	2.3	✓
	A1134 / Lensfield Rd T-Junction	A1134 North to A1134 South	136	18.0	30.0	32.0	58.0	138	-2	0.2	✓
		A1134 North to Lensfield Rd	119	30.0	22.0	25.0	41.0	118	1	0.1	✓
		A1134 South to Lensfield Rd	480	116.0	136.0	141.0	125.0	518	-38	1.7	✓
		A1134 South to A1134 North	118	26.0	36.0	28.0	28.0	118	0	0.0	✓
		Lensfield Rd to A1134 North	67	11.0	19.0	24.0	15.0	69	-2	0.2	✓
		Lensfield Rd to A1134 South	364	66.0	87.0	82.0	129.0	364	0	0.0	✓
			1,285					1325	-40	1.1	✓
07:00-08:00 Turns within GEH 5									99%		

	Junction	Turn: From X to Y	Modelled					Observed	Diff	GEH	Pass GEH
			08:00	08:15	08:30	08:45					
08:00 - 09:00	Cambridge Rd / Church Road T-Junction	A10 Cambridge Road (North) to A10 Cambridge Road (South)	691	147.0	180.0	181.0	193.0	701	-10	0.4	✓
		A10 Cambridge Road (North) to Church Road	153	35.0	43.0	41.0	38.0	157	-4	0.3	✓
		A10 Cambridge Road (South) to Church Road	36	8.0	6.0	14.0	7.0	35	1	0.1	✓
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	810	246.0	166.0	222.0	137.0	771	39	1.4	✓
		Church Road to A10 Cambridge Road (North)	85	23.0	28.0	8.0	28.0	87	-2	0.3	✓
		Church Road to A10 Cambridge Road (South)	33	7.0	8.0	7.0	11.0	33	0	0.0	✓
			1,808					1784	24	0.6	✓
	Cambridge Rd / London Road T-Junction	A10 Cambridge Road (North) to High St	647	139.0	166.0	167.0	183.0	655	-8	0.3	✓
		A10 Cambridge Road (North) to London Road	76	15.0	22.0	21.0	21.0	79	-3	0.3	✓
		High St to London Road	46	4.0	9.0	21.0	17.0	51	-5	0.7	✓
		High St to A10 Cambridge Road (North)	659	202.0	123.0	202.0	104.0	631	28	1.1	✓
		London Road to A10 Cambridge Road (North)	177	52.0	49.0	34.0	40.0	175	2	0.1	✓
		London Road to High St	79	20.0	22.0	21.0	20.0	83	-4	0.5	✓
			1,684					1674	10	0.3	✓
	M11 Junction 11 Intersection	A10 Cambridge Road to M11 Northbound On-Slip	416	112.0	108.0	77.0	94.0	391	25	1.2	✓
		A10 Cambridge Road to Hauxton Road	571	130.0	100.0	174.0	138.0	542	29	1.2	✓
		A10 Cambridge Road to M11 Southbound On-Slip	11	3.0	4.0	1.0	2.0	10	1	0.4	✓
		A10 Cambridge Road to A10 Cambridge Road	-								
		M11 Southbound Mainline through	1,665	438.0	411.0	400.0	394.0	1643	22	0.5	✓
		M11 Southbound Off-Slip to Hauxton Road	623	134.0	139.0	176.0	169.0	618	5	0.2	✓
		M11 Southbound Off-Slip to M11 Northbound On-Slip	-	0.0	2.0	0.0	2.0	4	-4	2.8	✓
		M11 Southbound Off-Slip to A10 Cambridge Road	528	117.0	140.0	126.0	149.0	532	-5	0.2	✓
		M11 Southbound Off-Slip to M11 Southbound On-Slip	3	0.0	2.0	0.0	2.0	4	-1	0.3	✓
		Hauxton Road to M11 Southbound Slip	94	26.0	23.0	21.0	23.0	93	1	0.1	✓
		Hauxton Road to A10 Cambridge Road	325	84.0	77.0	92.0	77.0	330	-5	0.3	✓
		Hauxton Road to M11 Northbound Slip	459	142.0	118.0	109.0	89.0	458	1	0.0	✓
		Hauxton Road to Hauxton Road	-								
		M11 Northbound Mainline through	2,006	599.0	465.0	463.0	474.0	2001	5	0.1	✓
		M11 Northbound Off-Slip to A10 Cambridge Road	21	6.0	6.0	4.0	5.0	21	0	0.0	✓
		M11 Northbound Off-Slip to M11 Southbound On-Slip	-					0	0		
		M11 Northbound Off-Slip to Hauxton Road	401	88.0	114.0	104.0	83.0	389	12	0.6	✓
		M11 Northbound Off-Slip to M11 Northbound On-Slip	14	4.0	3.0	5.0	2.0	14	0	0.0	✓
			7,137					7036	101	1.2	✓
	Addenbrooke's Rd / Hauxton Rd Junction	Dedicated P&R Link Northbound to Access Road	20	5.0	6.0	1.0	8.0	20	0	0.0	✓
		Dedicated P&R Link Northbound Through	377	96.0	81.0	135.0	53.0	365	12	0.6	✓
		Hauxton Road Northbound Through	469	96.0	97.0	111.0	121.0	425	44	2.1	✓
		Hauxton Road Northbound to Addenbrookes Road	748	155.0	169.0	207.0	208.0	739	9	0.3	✓
		Hauxton Road Southbound Through	477	130.0	112.0	137.0	111.0	490	-13	0.6	✓
		Hauxton Road Southbound to Addenbrookes Road	35	13.0	6.0	9.0	7.0	35	0	0.0	✓
		Hauxton Road Southbound to Access Road	4	0.0	4.0	0.0	0.0	4	0	0.0	✓
		Access Road to P&R Access	-	0.0	0.0	0.0	0.0	0	0		
		Access Road to Hauxton Road N	1	1.0	0.0	0.0	0.0	1	0	0.3	✓
		Access Road to Addenbrookes Road	8	1.0	3.0	1.0	1.0	6	2	0.6	✓
		Access Road to Hauxton Road S	4	0.1	0.3	0.1	0.1	1	4	2.3	✓
		Addenbrookes Road to Hauxton Road Southbound Slip	394	121.0	103.0	84.0	77.0	385	9	0.5	✓
		Addenbrookes Road to Access Road	1	0.0	0.0	1.0	0.0	1	0	0.1	✓
		Addenbrookes Road to P&R Access	41	14.0	4.0	13.0	11.0	42	-1	0.2	✓
		Addenbrookes Road to Hauxton Road Northbound	-	0.0	0.0	0.0	0.0	0	0		
			2,579					2514	65	1.3	✓
	Trumpington Park & Ride T-Junction	Hauxton Road Southbound Through	444	112.0	108.0	135.0	107.0	462	-19	0.9	✓
		Hauxton Road Southbound to P&R	36	9.0	5.0	9.0	8.0	31	5	0.9	✓
		Hauxton Road Northbound to P&R	8	1.0	4.0	2.0	1.0	8	0	0.1	✓
		Hauxton Road Northbound Through	490	99.0	89.0	127.0	120.0	435	55	2.6	✓
		P&R to Hauxton Road Northbound	182	45.0	48.0	48.0	36.0	177	5	0.4	✓
		P&R to Hauxton Road Southbound	71	31.0	14.0	11.0	11.0	67	4	0.5	✓
			1,231					1180	51	1.5	✓
	Consort Ave T-Junction	Hauxton Rd Northbound to Hauxton Rd Southbound	425	107.0	93.0	131.0	108.0	439	-14	0.7	✓
		Hauxton Rd Northbound to Consort Ave	60	12.0	14.0	14.0	19.0	59	1	0.1	✓
		Hauxton Rd Southbound to Consort Ave	20	1.0	1.0	14.0	4.0	20	0	0.1	✓
		Hauxton Rd Southbound to Hauxton Rd Northbound	666	143.0	136.0	161.0	152.0	592	74	3.0	✓
		Consort Ave to Hauxton Rd Northbound	136	43.0	43.0	32.0	16.0	134	2	0.1	✓
		Consort Ave to Hauxton Rd Southbound	53	14.0	20.0	13.0	7.0	54	-1	0.2	✓
			1,360					1298	62	1.7	✓
	Waitrose T-Junction	Hauxton Rd Northbound to Hauxton Rd Southbound	448	96.5	91.3	114.7	94.8	397	50	2.4	✓
		Hauxton Rd Northbound to Waitrose	97	25.5	24.7	26.3	13.2	90	7	0.8	✓
		Hauxton Rd Southbound to Waitrose	41	11.0	8.0	13.0	7.0	39	2	0.3	✓
		Hauxton Rd Southbound to Hauxton Rd Northbound	767	153.0	153.5	155.7	147.1	609	158	6.0	✗
		Waitrose to Hauxton Rd North	84	21.0	13.5	17.3	21.9	74	10	1.1	✓
		Waitrose to Hauxton Rd South	41	9.0	7.0	14.0	12.0	42	-1	0.2	✓
			1,477					1251	226	6.1	✗
	High St/ Hauxton Rd/A1301 Shelford Rd T-Junction	High St to Hauxton Rd	477	96.5	91.3	114.7	94.8	397	79	3.8	✓
		High St to A1301 Shelford Rd	149	29.0	41.0	48.0	32.0	150	-1	0.1	✓
		Hauxton Rd to A1301 Shelford Rd	90	25.0	19.0	27.0	16.0	87	3	0.3	✓
		Hauxton Rd to High St	761	174.0	167.0	173.0	169.0	683	78	2.9	✓
		A1301 Shelford Rd to High St	295	79.0	75.0	76.0	77.0	307	-12	0.7	✓
		A1301 Shelford Rd to Hauxton Rd	68	13.5	8.7	16.3	20.2	59	10	1.2	✓
			1,840					1683	157	3.7	✓
	High St/ Maris Lane	High St North to High St South	625	151.0	157.0	189.0	140.0	637	-12	0.5	✓
		High St North to Maris Lane	80	15.0	15.0	27.0	23.0	80	0	0.0	✓
		High St South to Maris Lane	101	17.0	26.0	23.0	27.0	93	8	0.8	✓
		High St South to High St North	960	236.0	216.0	228.0	219.0	897	63	2.1	✓
			1,766					1707	59	1.4	✓
	High St/ Church Lane	High St North to High St South	662	154.0	159.0	205.0	153.0	671	-9	0.4	✓
		High St South to High St North	971	236.0	216.0	226.0	219.0	897	74	2.4	✓
		Church Lane to High St North	167	50.0	49.0	33.0	43.0	175	-8	0.6	✓
		Church Lane to High St South	45	12.0	13.0	11.0	10.0	46	-1	0.1	✓
			1,846					1789	57	1.3	✓

Junction		Turn: From X to Y	Modelled	08:00	08:15	08:30	08:45	Observed	Diff	GEH	Pass GEH
08:00 - 09:00	High St/ Winchmore Dr / Alpha Terrace Crossroads	High St North to Alpha Terrace	24	2.0	9.0	9.0	5.0	25	-1	0.2	✓
		High St North to High St South	652	152.0	158.0	201.0	147.0	658	-6	0.2	✓
		High St North to Winchmore Dr	5	1.0	1.0	1.0	2.0	5	0	0.2	✓
		Alpha Terrace to High St South	10	2.0	1.0	3.0	4.0	10	0	0.1	✓
		Alpha Terrace to Winchmore Dr	-	0.0	0.0	0.0	0.0	0	0		
		Alpha Terrace to High St North	20	4.0	4.0	4.0	9.0	21	-1	0.2	✓
		High St South to Winchmore Dr	-	0.0	0.0	0.0	0.0	0	0		
		High St South to High St North	1,117	283.0	259.0	246.0	255.0	1043	74	2.3	✓
		High St South to Alpha Terrace	27	3.0	6.0	11.0	7.0	27	0	0.0	✓
		Winchmore Dr to High St North	-	3.0	0.0	0.0	1.0	4	-4	2.8	✓
		Winchmore Dr to Alpha Terrace	-	0.0	0.0	0.0	0.0	0	0		
		Winchmore Dr to High St South	-	0.0	0.0	1.0	2.0	3	-3	2.4	✓
			1,855					1796	59	1.4	✓
	High St/ A1134 T-Junction	A1134 Trumpington Road (North) to High St (South)	336	90.0	104.0	84.0	60.0	338	-2	0.1	✓
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	277	92.0	91.0	67.0	36.0	286	-9	0.5	✓
		High St (South) to A1134 Long Rd (East)	495	109.0	126.0	116.0	114.0	465	30	1.3	✓
		High St (South) to A1134 Trumpington Road (North)	655	181.0	137.0	134.0	151.0	603	52	2.1	✓
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	226	78.0	55.0	51.0	39.0	223	3	0.2	✓
		A1134 Long Rd (East) to High St (South)	345	65.0	64.0	127.0	94.0	350	-5	0.3	✓
			2,333					2265	68	1.4	✓
	A1134 / Parson Rd T-Junction	A1134 North to A1134 South	522	149.0	159.0	129.0	94.0	531	-9	0.4	✓
		A1134 North to Parson Road	31	9.0	18.0	3.0	2.0	32	-1	0.2	✓
		A1134 South to Parson Road	119	50.0	37.0	12.0	11.0	110	9	0.8	✓
		A1134 South to A1134 North	769	209.0	155.0	173.0	179.0	716	53	1.9	✓
		Parson Road to A1134 North	43	14.0	17.0	6.0	5.0	42	1	0.1	✓
		Parson Road to A1134 South	90	33.0	36.0	22.0	2.0	93	-3	0.3	✓
			1,574					1524	50	1.3	✓
	A1134 / Bentley Rd T-Junction	A1134 North to A1134 South	532	149.0	159.0	129.0	94.0	531	1	0.1	✓
		A1134 North to Bentley Rd	36	9.0	18.0	3.0	2.0	32	4	0.7	✓
		A1134 South to Bentley Rd	66	50.0	37.0	12.0	11.0	110	-44	4.7	✓
		A1134 South to A1134 North	755	209.0	155.0	173.0	179.0	716	39	1.4	✓
		Bentley Rd to A1134 North	4	14.0	17.0	6.0	5.0	42	-38	7.8	✗
		Bentley Rd to A1134 South	23	33.0	36.0	22.0	2.0	93	-70	9.2	✗
			1,417					1524	-107	2.8	✓
	A1134 / Latham Rd / Newton Rd Crossroads	A1134 North to Newton Rd	15	7.0	3.0	3.0	4.0	17	-2	0.4	✓
		A1134 North to A1134 South	490	147.0	142.0	124.0	89.0	502	-12	0.5	✓
		A1134 North to Latham Rd	8	2.0	2.0	1.0	3.0	8	0	0.0	✓
		Newton Rd to A1134 South	73	29.0	32.0	8.0	4.0	73	-1	0.1	✓
		Newton Rd to Latham Rd	-	0.0	0.0	0.0	1.0	1	-1	1.4	✓
		Newton Rd to A1134 North	60	22.0	20.0	13.0	4.0	59	1	0.1	✓
		A1134 South to Latham Rd	10	3.0	1.0	1.0	3.0	8	2	0.5	✓
		A1134 South to A1134 North	760	186.0	153.0	171.0	175.0	685	75	2.8	✓
		A1134 South to Newton Rd	10	0.0	5.0	1.0	2.0	8	2	0.5	✓
		Latham Rd to A1134 North	2	0.0	1.0	0.0	2.0	3	-1	0.3	✓
		Latham Rd to Newton Rd	-	0.0	0.0	0.0	0.0	0	0		
		Latham Rd to A1134 South	4	0.0	2.0	1.0	1.0	4	0	0.0	✓
			1,432					1368	64	1.7	✓
	A1134 / Queensway T-Junction	A1134 North to A1134 South	488	148.0	139.0	123.0	91.0	501	-13	0.6	✓
		A1134 North to Queensway	1	2.0	0.0	0.0	0.0	2	-1	0.5	✓
		A1134 South to Queensway	4	0.0	0.0	1.0	2.0	3	1	0.3	✓
		A1134 South to A1134 North	829	208.0	174.0	183.0	179.0	744	85	3.0	✓
		Queensway to A1134 North	4	0.0	1.0	1.0	1.0	3	1	0.6	✓
		Queensway to A1134 South	26	8.0	8.0	5.0	5.0	26	0	0.1	✓
			1,351					1279	72	2.0	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	A1134 North to Brooklands Ave	282	74.0	70.0	75.0	72.0	291	-9	0.5	✓
		A1134 North to A1134 South	346	99.0	105.0	93.0	56.0	353	-7	0.4	✓
		Brooklands Ave to A1134 South	88	33.0	21.0	20.0	20.0	94	-6	0.7	✓
		Brooklands Ave to A1134 North	233	75.0	64.0	51.0	67.0	257	-24	1.5	✓
		A1134 South to A1134 North	581	158.0	117.0	116.0	127.0	518	63	2.7	✓
		A1134 South to Brooklands Ave	243	48.0	55.0	65.0	50.0	218	25	1.7	✓
		Chaucer Rd to A1134 North	71	18.0	14.0	24.0	16.0	72	-1	0.1	✓
		Chaucer Rd to Brooklands Ave	19	8.0	6.0	4.0	1.0	19	0	0.0	✓
		Chaucer Rd to A1134 South	54	18.0	13.0	10.0	15.0	56	-2	0.3	✓
		A1134 North to Chaucer Rd	20	5.0	6.0	5.0	5.0	21	-1	0.2	
		Brooklands Ave to Chaucer Rd	103	40.0	30.0	25.0	20.0	115	-12	1.2	✓
		A1134 South to Chaucer Rd	13	2.0	3.0	3.0	3.0	11	2	0.6	✓
			2,053					2025	28	0.6	✓
	A1134 / Bateman St T-Junction	A1134 North to A1134 South	551	151.0	140.0	157.0	123.0	571	-20	0.8	✓
		A1134 North to Bateman St	47	21.0	6.0	13.0	11.0	51	-4	0.6	✓
		A1134 South to Bateman St	98	20.0	26.0	27.0	19.0	92	6	0.6	✓
		A1134 South to A1134 North	786	231.0	169.0	164.0	191.0	755	31	1.1	✓
		Bateman St to A1134 North	67	16.0	17.0	19.0	13.0	65	2	0.2	✓
		Bateman St to A1134 South	95	27.0	41.0	16.0	10.0	94	1	0.1	✓
			1,644					1628	16	0.4	✓
	A1134 / Fen Causeway T-Junction	A1134 North to A1134 South	274	75.0	66.0	78.0	58.0	277	-4	0.2	✓
		A1134 North to Fen Causeway	278	70.0	87.0	73.0	68.0	298	-20	1.2	✓
		A1134 South to Fen Causeway	519	164.0	121.0	104.0	121.0	510	9	0.4	✓
		A1134 South to A1134 North	334	83.0	65.0	79.0	83.0	310	24	1.3	✓
		Fen Causeway to A1134 North	327	70.0	68.0	103.0	97.0	338	-11	0.6	✓
		Fen Causeway to A1134 South	328	97.0	80.0	92.0	76.0	345	-17	0.9	✓
			2,060					2078	-18	0.4	✓
	A1134 / Lensfield Rd T-Junction	A1134 North to A1134 South	211	59.0	50.0	55.0	42.0	206	5	0.4	✓
		A1134 North to Lensfield Rd	180	45.0	53.0	54.0	33.0	185	-5	0.4	✓
		A1134 South to Lensfield Rd	503	125.0	110.0	134.0	130.0	499	4	0.2	✓
		A1134 South to A1134 North	157	28.0	23.0	48.0	50.0	149	8	0.7	✓
		Lensfield Rd to A1134 North	72	15.0	22.0	24.0	20.0	81	-9	1.0	✓
		Lensfield Rd to A1134 South	339	86.0	103.0	96.0	84.0	369	-30	1.6	✓
			1,462					1489	-27	0.7	✓
										Turns within GEH 5	98%

Junction	Turn: From X to Y	Modelled	09:00	09:15	09:30	09:45	Observed	Diff	GEH	Pass GEH
09:00 - 10:00	A10 Cambridge Road (North) to A10 Cambridge Road (South)	506	130.0	111.0	125.0	101.0	467	39	1.8	✓
	A10 Cambridge Road (North) to Church Road	53	26.0	12.0	6.0	8.0	52	1	0.2	✓
	A10 Cambridge Road (South) to Church Road	23	10.0	4.0	3.0	5.0	22	1	0.2	✓
	A10 Cambridge Road (South) to A10 Cambridge Road (North)	660	193.0	170.0	138.0	146.0	647	13	0.5	✓
	Church Road to A10 Cambridge Road (North)	77	24.0	20.0	19.0	14.0	77	0	0.0	✓
	Church Road to A10 Cambridge Road (South)	25	7.0	7.0	6.0	6.0	26	-1	0.2	✓
		1,344					1291	53	1.5	✓
	A10 Cambridge Road (North) to High St	489	125.0	106.0	121.0	96.0	448	41	1.9	✓
	A10 Cambridge Road (North) to London Road	47	12.0	12.0	10.0	11.0	45	2	0.3	✓
	High St to London Road	35	17.0	9.0	2.0	6.0	34	1	0.1	✓
	High St to A10 Cambridge Road (North)	537	159.0	135.0	110.0	122.0	526	11	0.5	✓
	London Road to A10 Cambridge Road (North)	146	44.0	39.0	31.0	29.0	143	3	0.3	✓
	London Road to High St	66	9.0	29.0	14.0	16.0	68	-2	0.2	✓
		1,319					1264	55	1.5	✓
	A10 Cambridge Road to M11 Northbound On-Slip	225	62.0	56.0	47.0	53.0	218	7	0.5	✓
	A10 Cambridge Road to Hauxton Road	546	150.0	145.0	111.0	128.0	534	12	0.5	✓
	A10 Cambridge Road to M11 Southbound On-Slip	14	5.0	1.0	6.0	2.0	14	0	0.1	✓
	A10 Cambridge Road to A10 Cambridge Road	-								
	M11 Southbound Mainline through	1,448	368.0	365.0	352.0	357.0	1442	6	0.1	✓
	M11 Southbound Off-Slip to Hauxton Road	754	221.0	188.0	181.0	142.0	732	22	0.8	✓
	M11 Southbound Off-Slip to M11 Northbound On-Slip	-	1.0	1.0	1.0	0.0	3	-3	2.4	✓
	M11 Southbound Off-Slip to A10 Cambridge Road	295	92.0	62.0	67.0	59.0	280	15	0.9	✓
	M11 Southbound Off-Slip to M11 Southbound On-Slip	3	1.0	1.0	1.0	0.0	3	0	0.2	✓
	Hauxton Road to M11 Southbound Slip	107	25.0	31.0	23.0	27.0	106	1	0.1	✓
	Hauxton Road to A10 Cambridge Road	217	51.0	56.0	59.0	41.0	207	10	0.7	✓
	Hauxton Road to M11 Northbound Slip	355	104.0	85.0	80.0	76.0	345	10	0.5	✓
	Hauxton Road to Hauxton Road	-								
	M11 Northbound Mainline through	1,888	515.0	500.0	412.0	465.0	1892	-4	0.1	✓
	M11 Northbound Off-Slip to A10 Cambridge Road	18	3.0	5.0	5.0	6.0	19	-1	0.1	✓
	M11 Northbound Off-Slip to M11 Southbound On-Slip	-	2.0	4.0	3.0	3.0	12	-12	4.9	✓
	M11 Northbound Off-Slip to Hauxton Road	331	112.0	67.0	70.0	82.0	331	0	0.0	✓
	M11 Northbound Off-Slip to M11 Northbound On-Slip	13	2.0	4.0	3.0	3.0	12	1	0.2	✓
		6,214					6138	76	1.0	✓
	Dedicated P&R Link Northbound to Access Road	9	3.0	1.0	1.0	2.0	7	2	0.6	✓
	Dedicated P&R Link Northbound Through	210	59.0	27.0	27.0	33.0	146	64	4.8	✓
	Hauxton Road Northbound Through	677	180.0	175.0	166.0	171.0	692	-15	0.6	✓
	Hauxton Road Northbound to Addenbrookes Road	741	193.0	197.0	168.0	146.0	704	37	1.4	✓
	Hauxton Road Southbound Through	405	107.0	107.0	92.0	85.0	391	14	0.7	✓
	Hauxton Road Southbound to Addenbrookes Road	31	17.0	2.0	5.0	6.0	30	1	0.2	✓
	Hauxton Road Southbound to Access Road	3	0.0	1.0	1.0	1.0	3	0	0.1	✓
	Access Road to P&R Access	-	0.0	0.0	0.0	0.0	0	0		
	Access Road to Hauxton Road N	6	0.0	1.0	0.0	5.0	6	0	0.1	✓
	Access Road to Addenbrookes Road	2	2.0	0.0	0.0	0.0	2	0	0.1	✓
	Access Road to Hauxton Road S	2	0.3	0.0	0.0	0.0	0	2	1.7	✓
	Addenbrookes Road to Hauxton Road Southbound Slip	268	71.0	65.0	70.0	59.0	265	3	0.2	✓
	Addenbrookes Road to Access Road	-	0.0	0.0	0.0	0.0	0	0		
	Addenbrookes Road to P&R Access	23	10.0	7.0	3.0	4.0	24	-1	0.2	✓
	Addenbrookes Road to Hauxton Road Northbound	-	0.0	0.0	0.0	0.0	0	0		
		2,377					2270	107	2.2	✓
	Hauxton Road Southbound Through	391	106.0	99.0	87.0	88.0	380	11	0.5	✓
	Hauxton Road Southbound to P&R	46	6.0	16.0	8.0	11.0	41	5	0.7	✓
	Hauxton Road Northbound to P&R	9	1.0	5.0	4.0	1.0	11	-2	0.5	✓
	Hauxton Road Northbound Through	679	177.0	170.0	162.0	170.0	679	0	0.0	✓
	P&R to Hauxton Road Northbound	68	17.0	20.0	13.0	9.0	59	9	1.1	✓
	P&R to Hauxton Road Southbound	46	18.0	11.0	11.0	4.0	44	2	0.3	✓
		1,239					1214	25	0.7	✓
	Hauxton Rd Northbound to Hauxton Rd Southbound	411	107.0	110.0	86.0	94.0	397	14	0.7	✓
	Hauxton Rd Northbound to Consort Ave	33	9.0	8.0	9.0	5.0	31	2	0.3	✓
	Hauxton Rd Southbound to Consort Ave	26	10.0	2.0	9.0	6.0	27	-1	0.2	✓
	Hauxton Rd Southbound to Hauxton Rd Northbound	722	184.0	188.0	166.0	173.0	711	11	0.4	✓
	Consort Ave to Hauxton Rd Northbound	54	25.0	12.0	13.0	5.0	55	-1	0.1	✓
	Consort Ave to Hauxton Rd Southbound	25	5.0	5.0	9.0	5.0	24	1	0.1	✓
		1,270					1245	25	0.7	✓
	Hauxton Rd Northbound to Hauxton Rd Southbound	380	92.2	93.9	61.8	67.0	315	65	3.5	✓
	Hauxton Rd Northbound to Waitrose	139	29.8	29.1	32.2	22.0	113	25	2.3	✓
	Hauxton Rd Southbound to Waitrose	62	16.0	23.0	16.0	8.0	63	-1	0.2	✓
	Hauxton Rd Southbound to Hauxton Rd Northbound	714	171.5	161.1	154.6	162.2	649	65	2.5	✓
	Waitrose to Hauxton Rd North	106	19.5	21.9	30.4	25.8	98	8	0.8	✓
	Waitrose to Hauxton Rd South	59	11.0	5.0	22.0	20.0	58	1	0.1	✓
		1,459					1296	163	4.4	✓
	High St to Hauxton Rd	443	92.2	93.9	61.8	67.0	315	128	6.6	✗
	High St to A1301 Shelford Rd	152	48.0	33.0	31.0	41.0	153	-1	0.1	✓
	Hauxton Rd to A1301 Shelford Rd	61	24.0	18.0	10.0	9.0	61	0	0.0	✓
	Hauxton Rd to High St	759	191.0	183.0	185.0	188.0	747	12	0.5	✓
	A1301 Shelford Rd to High St	257	67.0	73.0	58.0	63.0	261	-4	0.3	✓
	A1301 Shelford Rd to Hauxton Rd	74	12.8	19.1	11.2	12.0	55	19	2.3	✓
		1,746					1592	154	3.8	✓
	High St North to High St South	594	170.0	156.0	125.0	130.0	581	13	0.5	✓
	High St North to Maris Lane	80	22.0	21.0	20.0	9.0	72	8	0.9	✓
	High St South to Maris Lane	72	25.0	20.0	16.0	13.0	74	-2	0.2	✓
	High St South to High St North	949	233.0	236.0	227.0	238.0	934	15	0.5	✓
		1,694					1661	33	0.8	✓
	High St North to High St South	595	172.0	154.0	130.0	116.0	572	23	0.9	✓
	High St South to High St North	944	233.0	236.0	227.0	238.0	934	10	0.3	✓
	Church Lane to High St North	195	52.0	52.0	47.0	41.0	192	3	0.2	✓
	Church Lane to High St South	76	20.0	23.0	15.0	23.0	81	-5	0.6	✓
		1,810					1779	31	0.7	✓

Junction		Turn: From X to Y	Modelled	09:00	09:15	09:30	09:45	Observed	Diff	GEH	Pass GEH
09:00 - 10:00	High St/ Winchmore Dr / Alpha Terrace Crossroads	High St North to Alpha Terrace	16	3.0	1.0	8.0	3.0	15	1	0.3	✓
		High St North to High St South	578	163.0	148.0	127.0	111.0	549	29	1.2	✓
		High St North to Winchmore Dr	3	1.0	1.0	0.0	0.0	2	1	0.5	✓
		Alpha Terrace to High St South	17	7.0	5.0	2.0	5.0	19	-2	0.4	✓
		Alpha Terrace to Winchmore Dr	-	0.0	0.0	0.0	0.0	0	0		
		Alpha Terrace to High St North	19	10.0	5.0	1.0	1.0	17	2	0.4	✓
		High St South to Winchmore Dr	2	0.0	0.0	1.0	1.0	2	0	0.1	✓
		High St South to Alpha Terrace	1,129	282.0	281.0	265.0	276.0	1104	25	0.7	✓
		Winchmore Dr to High St North	14	3.0	2.0	8.0	2.0	15	-1	0.2	✓
		Winchmore Dr to Alpha Terrace	-	0.0	0.0	0.0	1.0	1	-1	1.4	✓
		Winchmore Dr to High St South	-	0.0	0.0	0.0	0.0	0	0		
			-	2.0	1.0	1.0	1.0	5	-5	3.2	✓
			1,778					1729	49	1.2	✓
	High St/ A1134 T-Junction	A1134 Trumpington Road (North) to High St (South)	275	70.0	61.0	62.0	55.0	248	27	1.7	✓
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	163	44.0	43.0	25.0	35.0	147	16	1.3	✓
		High St (South) to A1134 Long Rd (East)	486	132.0	107.0	128.0	117.0	484	2	0.1	✓
		High St (South) to A1134 Trumpington Road (North)	661	160.0	179.0	138.0	161.0	638	23	0.9	✓
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	154	40.0	37.0	33.0	45.0	155	-1	0.1	✓
		A1134 Long Rd (East) to High St (South)	315	97.0	89.0	73.0	59.0	318	-3	0.2	✓
			2,054					1990	64	1.4	✓
	A1134 / Parson Rd T-Junction	A1134 North to A1134 South	418	110.0	100.0	86.0	83.0	379	39	1.9	✓
		A1134 North to Parson Road	14	1.0	3.0	4.0	5.0	13	1	0.3	✓
		A1134 South to Parson Road	17	4.0	2.0	6.0	4.0	16	1	0.4	✓
		A1134 South to A1134 North	801	196.0	214.0	165.0	202.0	777	24	0.8	✓
		Parson Road to A1134 North	4	0.0	1.0	1.0	1.0	3	1	0.3	✓
		Parson Road to A1134 South	15	4.0	4.0	1.0	7.0	16	-1	0.2	✓
			1,269					1204	65	1.8	✓
	A1134 / Bentley Rd T-Junction	A1134 North to A1134 South	412	110.0	100.0	86.0	83.0	379	33	1.6	✓
		A1134 North to Bentley Rd	13	1.0	3.0	4.0	5.0	13	0	0.1	✓
		A1134 South to Bentley Rd	29	4.0	2.0	6.0	4.0	16	13	2.8	✓
		A1134 South to A1134 North	776	196.0	214.0	165.0	202.0	777	-1	0.0	✓
		Bentley Rd to A1134 North	10	0.0	1.0	1.0	1.0	3	7	2.9	✓
		Bentley Rd to A1134 South	17	4.0	4.0	1.0	7.0	16	1	0.2	✓
			1,258					1204	54	1.5	✓
	A1134 / Latham Rd / Newton Rd Crossroads	A1134 North to Newton Rd	16	6.0	2.0	4.0	3.0	15	1	0.3	✓
		A1134 North to A1134 South	413	106.0	101.0	86.0	85.0	378	35	1.8	✓
		A1134 North to Latham Rd	7	1.0	1.0	4.0	1.0	7	0	0.0	✓
		Newton Rd to A1134 South	6	1.0	1.0	2.0	2.0	6	0	0.1	✓
		Newton Rd to Latham Rd	-	0.0	0.0	0.0	0.0	0	0		
		Newton Rd to A1134 North	12	5.0	3.0	4.0	1.0	13	-1	0.3	✓
		A1134 South to Latham Rd	6	0.0	1.0	3.0	2.0	6	0	0.0	✓
		A1134 South to A1134 North	774	190.0	211.0	157.0	190.0	748	26	1.0	✓
		A1134 South to Newton Rd	8	0.0	2.0	2.0	3.0	7	1	0.3	✓
		Latham Rd to A1134 North	4	2.0	2.0	1.0	0.0	5	-1	0.4	✓
		Latham Rd to Newton Rd	0	0.0	0.0	0.0	0.0	0	0	0.4	✓
		Latham Rd to A1134 South	3	1.0	1.0	1.0	0.0	3	0	0.1	✓
			1,251					1188	63	1.8	✓
	A1134 / Queensway T-Junction	A1134 North to A1134 South	408	108.0	101.0	87.0	77.0	373	35	1.8	✓
		A1134 North to Queensway	2	0.0	2.0	0.0	0.0	2	0	0.2	✓
		A1134 South to Queensway	11	0.0	9.0	0.0	2.0	11	0	0.0	✓
		A1134 South to A1134 North	780	197.0	207.0	162.0	189.0	755	25	0.9	✓
		Queensway to A1134 North	8	2.0	2.0	1.0	4.0	9	-1	0.3	✓
		Queensway to A1134 South	27	5.0	3.0	7.0	12.0	27	0	0.0	✓
			1,237					1177	60	1.7	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	A1134 North to Brooklands Ave	303	71.0	67.0	79.0	54.0	271	32	1.9	✓
		A1134 North to A1134 South	320	87.0	76.0	64.0	63.0	290	30	1.7	✓
		Brooklands Ave to A1134 South	52	12.0	15.0	12.0	8.0	47	5	0.7	✓
		Brooklands Ave to A1134 North	227	56.0	52.0	55.0	41.0	204	23	1.6	✓
		A1134 South to A1134 North	548	135.0	141.0	114.0	137.0	527	21	0.9	✓
		A1134 South to Brooklands Ave	231	61.0	65.0	47.0	53.0	226	5	0.3	✓
		Chaucer Rd to A1134 North	37	9.0	8.0	11.0	8.0	36	1	0.2	✓
		Chaucer Rd to Brooklands Ave	13	2.0	4.0	5.0	2.0	13	0	0.1	✓
		Chaucer Rd to A1134 South	37	9.0	12.0	11.0	6.0	38	-1	0.2	✓
		A1134 North to Chaucer Rd	20	5.0	5.0	4.0	4.0	18	2	0.4	✓
		Brooklands Ave to Chaucer Rd	66	12.0	17.0	16.0	11.0	56	10	1.2	✓
		A1134 South to Chaucer Rd	11	3.0	3.0	2.0	3.0	11	0	0.0	✓
			1,864					1737	127	3.0	✓
	A1134 / Bateman St T-Junction	A1134 North to A1134 South	588	145.0	138.0	139.0	114.0	536	52	2.2	✓
		A1134 North to Bateman St	38	11.0	6.0	6.0	14.0	37	1	0.1	✓
		A1134 South to Bateman St	51	18.0	10.0	9.0	11.0	48	3	0.5	✓
		A1134 South to A1134 North	763	182.0	191.0	171.0	175.0	719	44	1.6	✓
		Bateman St to A1134 North	62	14.0	14.0	7.0	24.0	59	3	0.4	✓
		Bateman St to A1134 South	44	18.0	10.0	8.0	7.0	43	1	0.1	✓
			1,546					1442	104	2.7	✓
	A1134 / Fen Causeway T-Junction	A1134 North to A1134 South	238	57.0	57.0	54.0	47.0	215	23	1.5	✓
		A1134 North to Fen Causeway	266	62.0	63.0	72.0	55.0	252	14	0.9	✓
		A1134 South to Fen Causeway	412	113.0	100.0	92.0	83.0	388	24	1.2	✓
		A1134 South to A1134 North	415	83.0	105.0	86.0	116.0	390	25	1.2	✓
		Fen Causeway to A1134 North	426	109.0	110.0	100.0	95.0	414	12	0.6	✓
		Fen Causeway to A1134 South	378	99.0	87.0	91.0	81.0	358	20	1.1	✓
			2,135					2017	118	2.6	✓
	A1134 / Lensfield Rd T-Junction	A1134 North to A1134 South	137	32.0	31.0	40.0	28.0	131	6	0.5	✓
		A1134 North to Lensfield Rd	115	32.0	25.0	27.0	31.0	115	0	0.0	✓
		A1134 South to Lensfield Rd	565	146.0	136.0	116.0	156.0	554	11	0.5	✓
		A1134 South to A1134 North	274	46.0	79.0	70.0	55.0	250	24	1.5	✓
		Lensfield Rd to A1134 North	209	89.0	34.0	20.0	49.0	192	17	1.2	✓
		Lensfield Rd to A1134 South	361	87.0	89.0	86.0	74.0	336	25	1.3	✓
			1,659					1578	81	2.0	✓
Turns within GEH 5										99%	

E. PM Modelled Vs. Observed Flow Comparison

	Junction	Turn: From X to Y	Modelled					Observed	Difference	GEH	PassGEH
			16:00	16:15	16:30	16:45					
16:00 - 17:00	Cambridge Rd / Church Road T-Junction	A10 Cambridge Road (North) to A10 Cambridge Road (South)	838	189.0	241.0	216.0	222.0	868	-30	1.0	✓
		A10 Cambridge Road (North) to Church Road	75	17.0	22.0	20.0	24.0	83	-8	0.8	✓
		A10 Cambridge Road (South) to Church Road	39	9.0	13.0	11.0	7.0	40	-1	0.2	✓
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	604	156.0	150.0	139.0	161.0	606	-2	0.1	✓
		Church Road to A10 Cambridge Road (North)	44	7.0	12.0	11.0	15.0	45	-1	0.1	✓
		Church Road to A10 Cambridge Road (South)	41	5.0	10.0	16.0	7.0	38	3	0.4	✓
			1,642					1680	-38	0.9	✓
	Cambridge Rd / London Road T-Junction	A10 Cambridge Road (North) to High St	750	164.0	215.0	198.0	197.0	774	-25	0.9	✓
		A10 Cambridge Road (North) to London Road	125	30.0	36.0	34.0	32.0	132	-7	0.7	✓
		High St to London Road	34	11.0	9.0	5.0	8.0	33	1	0.1	✓
		High St to A10 Cambridge Road (North)	553	136.0	143.0	125.0	151.0	555	-2	0.1	✓
		London Road to A10 Cambridge Road (North)	91	29.0	20.0	25.0	17.0	91	0	0.0	✓
		London Road to High St	78	9.0	24.0	18.0	30.0	81	-3	0.4	✓
			1,630					1666	-36	0.9	✓
	M11 Junction 11 Intersection	A10 Cambridge Road to M11 Northbound On-Slip	300	70.0	84.0	74.0	76.0	304	-4	0.2	✓
		A10 Cambridge Road to Hauxton Road	318	85.0	70.0	71.0	94.0	320	-2	0.1	✓
		A10 Cambridge Road to M11 Southbound On-Slip	27	8.0	8.0	5.0	6.0	27	0	0.0	✓
		A10 Cambridge Road to A10 Cambridge Road	-					0			
		M11 Southbound Mainline through	2,069	480.0	544.0	556.0	486.0	2066	3	0.1	✓
		M11 Southbound Off-Slip to Hauxton Road	510	115.0	121.0	130.0	137.0	503	7	0.3	✓
		M11 Southbound Off-Slip to M11 Northbound On-Slip	-	0.0	0.0	0.0	0.0	0	0		
		M11 Southbound Off-Slip to A10 Cambridge Road	337	87.0	102.0	71.0	83.0	343	-6	0.3	✓
		M11 Southbound Off-Slip to M11 Southbound On-Slip	-	0.0	0.0	0.0	0.0	0			
		Hauxton Road to M11 Southbound Slip	355	93.0	81.0	84.0	99.0	357	-2	0.1	✓
		Hauxton Road to A10 Cambridge Road	563	113.0	155.0	162.0	158.0	588	-25	1.0	✓
		Hauxton Road to M11 Northbound Slip	943	228.0	239.0	257.0	235.0	959	-16	0.5	✓
		Hauxton Road to Hauxton Road	-					0			
		M11 Northbound Mainline through	2,039	555.0	507.0	483.0	500.0	2045	-6	0.1	✓
		M11 Northbound Off-Slip to A10 Cambridge Road	20	6.0	6.0	3.0	5.0	20	0	0.1	✓
		M11 Northbound Off-Slip to M11 Southbound On-Slip	-					0			
		M11 Northbound Off-Slip to Hauxton Road	106	21.0	35.0	29.0	30.0	115	-9	0.8	✓
		M11 Northbound Off-Slip to M11 Northbound On-Slip	6	2.0	2.0	0.0	2.0	6	0	0.1	✓
			7,593					7647	-54	0.6	✓
	Addenbrooke's Rd / Hauxton Rd Junction	Dedicated P&R Link Northbound to Access Road	3	1.0	1.0	0.0	1.0	3	0	0.0	✓
		Dedicated P&R Link Northbound Through	28	7.0	2.0	8.0	8.0	25	3	0.6	✓
		Hauxton Road Northbound Through	503	113.0	131.0	116.0	142.0	502	1	0.1	✓
		Hauxton Road Northbound to Addenbrookes Road	398	100.0	92.0	106.0	110.0	408	-10	0.5	✓
		Hauxton Road Southbound Through	926	212.0	249.0	259.0	246.0	966	-40	1.3	✓
		Hauxton Road Southbound to Addenbrookes Road	67	18.0	18.0	19.0	11.0	66	1	0.1	✓
		Hauxton Road Southbound to Access Road	-	0.0	0.0	0.0	0.0	0	0		
		Access Road to P&R Access	-	0.0	0.0	0.0	0.0	0	0		
		Access Road to Hauxton Road N	3	0.0	1.0	0.0	1.0	2	1	0.7	✓
		Access Road to Addenbrookes Road	2	0.0	0.0	1.0	1.0	2	0	0.0	✓
		Access Road to Hauxton Road S	1	0.0	0.0	0.2	0.2	0	0	0.4	✓
		Addenbrookes Road to Hauxton Road Southbound Slip	950	222.0	226.0	243.0	245.0	936	14	0.5	✓
		Addenbrookes Road to Access Road	0	0.0	0.0	0.0	0.0	0	0	0.4	✓
		Addenbrookes Road to P&R Access	3	1.0	0.0	0.0	0.0	1	2	1.5	✓
		Addenbrookes Road to Hauxton Road Northbound	24	0.0	0.0	0.0	0.0	0	24	6.9	✗
			2,908					2911	-3	0.1	✓
	Trumpington Park & Ride T-Junction	Hauxton Road Southbound Through	679	162.0	186.0	204.0	169.0	721	-42	1.6	✓
		Hauxton Road Southbound to P&R	33	9.0	7.0	9.0	2.0	27	6	1.0	✓
		Hauxton Road Northbound to P&R	12	2.0	3.0	2.0	4.0	11	1	0.2	✓
		Hauxton Road Northbound Through	520	118.0	130.0	122.0	146.0	516	4	0.2	✓
		P&R to Hauxton Road Northbound	68	17.0	18.0	14.0	14.0	63	5	0.6	✓
		P&R to Hauxton Road Southbound	316	68.0	81.0	74.0	88.0	311	5	0.3	✓
			1,627					1649	-22	0.5	✓
	Consort Ave T-Junction	Hauxton Rd Northbound to Hauxton Rd Southbound	680	161.0	185.0	203.0	165.0	714	-34	1.3	✓
		Hauxton Rd Northbound to Consort Ave	70	18.0	11.0	20.0	21.0	70	0	0.0	✓
		Hauxton Rd Southbound to Consort Ave	34	11.0	7.0	4.0	12.0	34	0	0.0	✓
		Hauxton Rd Southbound to Hauxton Rd Northbound	555	124.0	141.0	132.0	148.0	545	10	0.4	✓
		Consort Ave to Hauxton Rd Northbound	61	6.0	20.0	18.0	19.0	63	-2	0.2	✓
		Consort Ave to Hauxton Rd Southbound	33	10.0	8.0	10.0	6.0	34	-1	0.1	✓
			1,432					1460	-28	0.7	✓
	Waitrose T-Junction	Hauxton Rd Northbound to Hauxton Rd Southbound	662	139.7	148.1	175.5	153.3	617	45	1.8	✓
		Hauxton Rd Northbound to Waitrose	123	24.3	39.9	26.5	24.7	115	8	0.7	✓
		Hauxton Rd Southbound to Waitrose	100	23.0	22.0	31.0	23.0	99	1	0.1	✓
		Hauxton Rd Southbound to Hauxton Rd Northbound	516	92.4	128.6	100.7	127.6	449	67	3.0	✓
		Waitrose to Hauxton Rd North	184	46.6	31.4	42.3	43.4	164	20	1.5	✓
		Waitrose to Hauxton Rd South	89	24.0	29.0	24.0	12.0	89	0	0.0	✓
			1,673					1533	140	3.5	✓
	High St/ Hauxton Rd/A1301 Shelford Rd T-Junction	High St to Hauxton Rd	696	139.7	148.1	175.5	153.3	617	80	3.1	✓
		High St to A1301 Shelford Rd	195	61.0	49.0	45.0	48.0	203	-8	0.6	✓
		Hauxton Rd to A1301 Shelford Rd	85	22.0	13.0	26.0	22.0	83	2	0.2	✓
		Hauxton Rd to High St	615	139.0	160.0	143.0	171.0	613	2	0.1	✓
		A1301 Shelford Rd to High St	185	63.0	42.0	47.0	38.0	190	-5	0.3	✓
		A1301 Shelford Rd to Hauxton Rd	90	15.3	18.9	23.5	20.7	78	12	1.3	✓
			1,866					1784	82	1.9	✓
	High St/ Maris Lane	High St North to High St South	887	225.0	237.0	247.0	226.0	935	-48	1.6	✓
		High St North to Maris Lane	146	31.0	36.0	42.0	50.0	159	-13	1.1	✓
		High St South to Maris Lane	116	35.0	18.0	29.0	33.0	115	1	0.1	✓
		High St South to High St North	684	167.0	184.0	161.0	176.0	688	-4	0.2	✓
			1,832					1897	-65	1.5	✓
	High St/ Church Lane	High St North to High St South	923	226.0	246.0	258.0	260.0	990	-67	2.2	✓
		High St South to High St North	685	167.0	184.0	161.0	176.0	688	-3	0.1	✓
		Church Lane to High St North	78	23.0	18.0	20.0	18.0	79	-1	0.2	✓
		Church Lane to High St South	107	30.0	27.0	31.0	16.0	104	3	0.3	✓
			1,793					1861	-68	1.6	✓

	Junction	Turn: From X to Y	Modelled					Observed	Diff	GEH	Pass GEH
			16:00	16:15	16:30	16:45					
16:00 - 17:00	High St/ Winchmore Dr / Alpha Terrace Crossroads	High St North to Alpha Terrace	18	5.0	6.0	6.0	3.0	20	-2	0.4	✓
		High St North to High St South	914	222.0	241.0	254.0	259.0	976	-62	2.0	✓
		High St North to Winchmore Dr	-	0.0	0.0	0.0	0.0	0	0		
		Alpha Terrace to High St South	13	4.0	4.0	4.0	1.0	13	0	0.1	✓
		Alpha Terrace to Winchmore Dr	-	0.0	0.0	0.0	0.0	0	0		
		Alpha Terrace to High St North	11	1.0	5.0	1.0	3.0	10	1	0.2	✓
		High St South to Winchmore Dr	2	0.0	1.0	1.0	0.0	2	0	0.0	✓
		High St South to High St North	755	190.0	200.0	176.0	191.0	757	-2	0.1	✓
		High St South to Alpha Terrace	11	2.0	1.0	4.0	3.0	10	1	0.3	✓
		Winchmore Dr to High St North	-	3.0	0.0	0.0	0.0	3	-3	2.4	✓
		Winchmore Dr to Alpha Terrace	-	0.0	0.0	0.0	0.0	0	0		
		Winchmore Dr to High St South	-	0.0	1.0	0.0	0.0	1	-1	1.4	✓
			1,723					1792	-69	1.6	✓
	High St/ A1134 T-Junction	A1134 Trumpington Road (North) to High St (South)	484	124.0	123.0	146.0	142.0	535	-51	2.3	✓
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	169	51.0	53.0	28.0	47.0	179	-10	0.7	✓
		High St (South) to A1134 Long Rd (East)	348	89.0	92.0	83.0	84.0	348	-1	0.0	✓
		High St (South) to A1134 Trumpington Road (North)	418	105.0	113.0	94.0	110.0	422	-5	0.2	✓
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	124	26.0	37.0	27.0	31.0	121	3	0.2	✓
		A1134 Long Rd (East) to High St (South)	448	103.0	124.0	114.0	120.0	461	-13	0.6	✓
			1,990					2066	-76	1.7	✓
	A1134 / Parson Rd T-Junction	A1134 North to A1134 South	580	165.0	155.0	151.0	149.0	620	-40	1.6	✓
		A1134 North to Parson Road	0	0.0	0.0	0.0	0.0	0	0	0.4	✓
		A1134 South to Parson Road	61	11.0	16.0	16.0	18.0	61	0	0.0	✓
		A1134 South to A1134 North	481	120.0	134.0	105.0	123.0	482	-2	0.1	✓
		Parson Road to A1134 North	13	1.0	1.0	6.0	5.0	13	0	0.0	✓
		Parson Road to A1134 South	89	10.0	21.0	23.0	40.0	94	-5	0.6	✓
			1,223					1270	-47	1.3	✓
	A1134 / Bentley Rd T-Junction	A1134 North to A1134 South	567	165.0	155.0	151.0	149.0	620	-53	2.2	✓
		A1134 North to Bentley Rd	9	0.0	0.0	0.0	0.0	0	9	4.1	✓
		A1134 South to Bentley Rd	13	11.0	16.0	16.0	18.0	61	-48	8.0	✗
		A1134 South to A1134 North	482	120.0	134.0	105.0	123.0	482	0	0.0	✓
		Bentley Rd to A1134 North	12	1.0	1.0	6.0	5.0	13	-1	0.4	✓
		Bentley Rd to A1134 South	32	10.0	21.0	23.0	40.0	94	-62	7.9	✗
			1,114					1270	-157	4.5	✓
	A1134 / Latham Rd / Newton Rd Crossroads	A1134 North to Newton Rd	14	4.0	5.0	3.0	3.0	15	-2	0.4	✓
		A1134 North to A1134 South	579	147.0	153.0	140.0	145.0	585	-6	0.2	✓
		A1134 North to Latham Rd	7	4.0	1.0	1.0	2.0	8	-1	0.4	✓
		Newton Rd to A1134 South	8	2.0	1.0	2.0	2.0	7	1	0.3	✓
		Newton Rd to Latham Rd	-	2.0	0.0	0.0	0.0	2	-2	2.0	✓
		Newton Rd to A1134 North	20	12.0	6.0	0.0	1.0	19	1	0.2	✓
		A1134 South to Latham Rd	11	6.0	2.0	1.0	2.0	11	0	0.1	✓
		A1134 South to A1134 North	477	114.0	129.0	108.0	126.0	477	0	0.0	✓
		A1134 South to Newton Rd	7	1.0	1.0	4.0	0.0	6	1	0.2	✓
		Latham Rd to A1134 North	10	4.0	2.0	1.0	3.0	10	0	0.1	✓
		Latham Rd to Newton Rd	2	2.0	0.0	0.0	0.0	2	0	0.1	✓
		Latham Rd to A1134 South	5	2.0	0.0	1.0	2.0	5	0	0.1	✓
			1,139					1147	-8	0.2	✓
	A1134 / Queensway T-Junction	A1134 North to A1134 South	572	145.0	154.0	138.0	142.0	579	-7	0.3	✓
		A1134 North to Queensway	2	1.0	0.0	0.0	1.0	2	0	0.2	✓
		A1134 South to Queensway	4	0.0	0.0	1.0	3.0	4	0	0.1	✓
		A1134 South to A1134 North	504	130.0	137.0	108.0	127.0	502	2	0.1	✓
		Queensway to A1134 North	18	2.0	6.0	6.0	4.0	18	0	0.1	✓
		Queensway to A1134 South	30	10.0	5.0	6.0	8.0	29	1	0.1	✓
			1,130					1134	-4	0.1	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	A1134 North to Brooklands Ave	234	60.0	59.0	57.0	44.0	220	14	0.9	✓
		A1134 North to A1134 South	397	99.0	101.0	93.0	86.0	379	18	0.9	✓
		Brooklands Ave to A1134 South	160	42.0	50.0	41.0	48.0	181	-21	1.6	✓
		Brooklands Ave to A1134 North	282	82.0	86.0	72.0	66.0	306	-24	1.4	✓
		A1134 South to A1134 North	418	103.0	123.0	91.0	100.0	417	1	0.0	✓
		A1134 South to Brooklands Ave	104	29.0	20.0	23.0	31.0	103	1	0.0	✓
		Chaucer Rd to A1134 North	43	14.0	7.0	8.0	11.0	40	3	0.5	✓
		Chaucer Rd to Brooklands Ave	10	2.0	1.0	4.0	3.0	10	0	0.0	✓
		Chaucer Rd to A1134 South	20	5.0	3.0	4.0	9.0	21	-1	0.2	✓
		A1134 North to Chaucer Rd	5	1.0	1.0	1.0	1.0	4	1	0.3	✓
		Brooklands Ave to Chaucer Rd	3	1.0	1.0	1.0	1.0	4	-1	0.4	✓
		A1134 South to Chaucer Rd	4	0.0	0.0	0.0	0.0	0	4	2.9	✓
			1,679					1685	-6	0.1	✓
	A1134 / Bateman St T-Junction	A1134 North to A1134 South	548	144.0	145.0	135.0	110.0	534	14	0.6	✓
		A1134 North to Bateman St	46	16.0	8.0	11.0	9.0	44	2	0.3	✓
		A1134 South to Bateman St	36	25.0	4.0	7.0	6.0	42	-6	1.0	✓
		A1134 South to A1134 North	715	174.0	212.0	164.0	171.0	721	-6	0.2	✓
		Bateman St to A1134 North	75	20.0	19.0	19.0	16.0	74	1	0.1	✓
		Bateman St to A1134 South	72	16.0	16.0	16.0	21.0	69	3	0.4	✓
			1,492					1484	8	0.2	✓
	A1134 / Fen Causeway T-Junction	A1134 North to A1134 South	253	60.0	73.0	66.0	45.0	244	9	0.6	✓
		A1134 North to Fen Causeway	459	149.0	139.0	82.0	81.0	451	8	0.4	✓
		A1134 South to Fen Causeway	390	112.0	126.0	82.0	77.0	397	-7	0.4	✓
		A1134 South to A1134 North	408	82.0	105.0	101.0	110.0	398	10	0.5	✓
		Fen Causeway to A1134 North	334	72.0	79.0	77.0	110.0	338	-4	0.2	✓
		Fen Causeway to A1134 South	337	100.0	80.0	80.0	74.0	334	3	0.2	✓
			2,181					2162	19	0.4	✓
	A1134 / Lensfield Rd T-Junction	A1134 North to A1134 South	229	69.0	59.0	55.0	43.0	226	3	0.2	✓
		A1134 North to Lensfield Rd	100	28.0	24.0	24.0	24.0	100	0	0.0	✓
		A1134 South to Lensfield Rd	442	94.0	103.0	110.0	132.0	439	3	0.2	✓
		A1134 South to A1134 North	299	60.0	81.0	68.0	88.0	297	2	0.1	✓
		Lensfield Rd to A1134 North	109	31.0	32.0	23.0	22.0	108	1	0.1	✓
		Lensfield Rd to A1134 South	481	140.0	153.0	93.0	83.0	469	12	0.5	✓
			1,660					1639	21	0.5	✓
Turns within GEH 5										98%	

Junction	Turn: From X to Y	Modelled	17:00	17:15	17:30	17:45	Observed	Difference	PassGEH
17:00 - 18:00	A10 Cambridge Road (North) to A10 Cambridge Road (South)	900	215.0	210.0	214.0	222.0	861	39	1.3 ✓
	A10 Cambridge Road (North) to Church Road	100	21.0	26.0	24.0	30.0	101	-1	0.1 ✓
	A10 Cambridge Road (South) to Church Road	38	5.0	7.0	20.0	4.0	36	2	0.4 ✓
	A10 Cambridge Road (South) to A10 Cambridge Road (North)	691	166.0	150.0	189.0	188.0	693	-2	0.1 ✓
	Church Road to A10 Cambridge Road (North)	54	11.0	15.0	15.0	16.0	57	-3	0.4 ✓
	Church Road to A10 Cambridge Road (South)	24	10.0	10.0	1.0	4.0	25	-1	0.2 ✓
		1,808					1773	35	0.8 ✓
	A10 Cambridge Road (North) to High St	763	179.0	184.0	173.0	193.0	729	34	1.2 ✓
	A10 Cambridge Road (North) to London Road	165	46.0	36.0	42.0	33.0	157	8	0.6 ✓
	High St to London Road	67	22.0	7.0	23.0	15.0	67	-1	0.1 ✓
	High St to A10 Cambridge Road (North)	635	139.0	135.0	189.0	173.0	636	-1	0.0 ✓
	London Road to A10 Cambridge Road (North)	94	32.0	22.0	20.0	19.0	93	1	0.1 ✓
	London Road to High St	87	25.0	21.0	23.0	19.0	88	-1	0.2 ✓
		1,810					1770	40	0.9 ✓
	A10 Cambridge Road to M11 Northbound On-Slip	319	95.0	73.0	90.0	62.0	320	-1	0.1 ✓
	A10 Cambridge Road to Hauxton Road	413	76.0	100.0	103.0	144.0	423	-10	0.5 ✓
	A10 Cambridge Road to M11 Southbound On-Slip	32	6.0	6.0	11.0	9.0	32	-1	0.1 ✓
	A10 Cambridge Road to A10 Cambridge Road						0		
	M11 Southbound Mainline through	1,976	482.0	532.0	487.0	461.0	1962	14	0.3 ✓
	M11 Southbound Off-Slip to Hauxton Road	609	151.0	153.0	155.0	151.0	610	-1	0.0 ✓
	M11 Southbound Off-Slip to M11 Northbound On-Slip	-	0.0	0.0	0.0	0.0	0	0	
	M11 Southbound Off-Slip to A10 Cambridge Road	346	77.0	94.0	86.0	79.0	336	10	0.6 ✓
	M11 Southbound Off-Slip to M11 Southbound On-Slip	-	0.0	0.0	0.0	0.0	0	0	
	Hauxton Road to M11 Southbound Slip	354	75.0	101.0	86.0	87.0	349	5	0.3 ✓
	Hauxton Road to A10 Cambridge Road	619	154.0	173.0	118.0	148.0	583	26	1.1 ✓
	Hauxton Road to M11 Northbound Slip	956	248.0	250.0	215.0	211.0	924	32	1.0 ✓
	Hauxton Road to Hauxton Road						0		
	M11 Northbound Mainline through	1,946	524.0	513.0	481.0	409.0	1927	19	0.4 ✓
	M11 Northbound Off-Slip to A10 Cambridge Road	24	5.0	6.0	8.0	3.0	22	2	0.4 ✓
	M11 Northbound Off-Slip to M11 Southbound On-Slip	-					0	0	
	M11 Northbound Off-Slip to Hauxton Road	179	50.0	40.0	48.0	51.0	189	-10	0.7 ✓
	M11 Northbound Off-Slip to M11 Northbound On-Slip	14	3.0	5.0	2.0	4.0	14	0	0.0 ✓
		7,787					7687	100	1.1 ✓
	Dedicated P&R Link Northbound to Access Road	0	0.0	0.0	0.0	0.0	0	0	0.8 ✓
	Dedicated P&R Link Northbound Through	26	8.0	2.0	4.0	14.0	28	-2	0.4 ✓
	Hauxton Road Northbound Through	673	155.0	164.0	171.0	202.0	692	-19	0.7 ✓
	Hauxton Road Northbound to Addenbrookes Road	501	114.0	127.0	131.0	130.0	502	-1	0.1 ✓
	Hauxton Road Southbound Through	973	253.0	263.0	222.0	205.0	943	30	1.0 ✓
	Hauxton Road Southbound to Addenbrookes Road	89	22.0	17.0	22.0	29.0	90	-1	0.1 ✓
	Hauxton Road Southbound to Access Road	-	0.0	0.0	0.0	0.0	0	0	
	Access Road to P&R Access	0	0.0	0.0	0.0	0.0	0	0	0.4 ✓
	Access Road to Hauxton Road N	1	0.0	1.0	0.0	0.0	1	0	0.1 ✓
	Access Road to Addenbrookes Road	1	0.0	0.0	1.0	0.0	1	0	0.2 ✓
	Access Road to Hauxton Road S	1	0.0	0.0	0.2	0.0	0	1	1.2 ✓
	Addenbrookes Road to Hauxton Road Southbound Slip	938	224.0	261.0	196.0	241.0	922	16	0.5 ✓
	Addenbrookes Road to Access Road	-	0.0	0.0	0.0	0.0	0	0	
	Addenbrookes Road to P&R Access	21	0.0	11.0	12.0	0.0	23	-3	0.5 ✓
	Addenbrookes Road to Hauxton Road Northbound	26	0.0	0.0	0.0	0.0	0	26	7.3 ✗
		3,250					3202	48	0.8 ✓
	Hauxton Road Southbound Through	658	165.0	163.0	163.0	135.0	626	32	1.3 ✓
	Hauxton Road Southbound to P&R	34	3.0	8.0	8.0	10.0	29	5	0.8 ✓
	Hauxton Road Northbound to P&R	8	2.0	2.0	3.0	3.0	10	-2	0.6 ✓
	Hauxton Road Northbound Through	677	161.0	164.0	172.0	213.0	710	-33	1.2 ✓
	P&R to Hauxton Road Northbound	79	15.0	12.0	28.0	20.0	75	4	0.5 ✓
	P&R to Hauxton Road Southbound	405	110.0	117.0	81.0	99.0	407	-2	0.1 ✓
		1,861					1857	4	0.1 ✓
	Hauxton Rd Northbound to Hauxton Rd Southbound	654	159.0	164.0	158.0	139.0	620	34	1.3 ✓
	Hauxton Rd Northbound to Consort Ave	113	32.0	29.0	25.0	28.0	114	-1	0.1 ✓
	Hauxton Rd Southbound to Consort Ave	26	7.0	7.0	7.0	9.0	30	-4	0.7 ✓
	Hauxton Rd Southbound to Hauxton Rd Northbound	724	169.0	169.0	193.0	224.0	755	-31	1.2 ✓
	Consort Ave to Hauxton Rd Northbound	56	9.0	16.0	19.0	15.0	59	-3	0.4 ✓
	Consort Ave to Hauxton Rd Southbound	34	9.0	7.0	13.0	6.0	35	-1	0.1 ✓
		1,608					1613	-5	0.1 ✓
	Hauxton Rd Northbound to Hauxton Rd Southbound	668	143.0	149.7	132.9	124.9	550	118	4.8 ✓
	Hauxton Rd Northbound to Waitrose	146	32.0	31.3	26.1	38.1	128	19	1.6 ✓
	Hauxton Rd Southbound to Waitrose	109	19.0	32.0	30.0	36.0	117	-8	0.7 ✓
	Hauxton Rd Southbound to Hauxton Rd Northbound	667	138.7	128.2	163.6	185.1	616	51	2.0 ✓
	Waitrose to Hauxton Rd North	164	32.3	31.8	50.4	31.9	146	17	1.4 ✓
	Waitrose to Hauxton Rd South	95	21.0	21.0	30.0	23.0	95	0	0.0 ✓
		1,850					1652	198	4.7 ✓
	High St to Hauxton Rd	712	143.0	149.7	132.9	124.9	550	161	6.4 ✗
	High St to A1301 Shelford Rd	227	58.0	40.0	60.0	57.0	215	12	0.8 ✓
	Hauxton Rd to A1301 Shelford Rd	96	25.0	31.0	24.0	21.0	101	-5	0.5 ✓
	Hauxton Rd to High St	734	171.0	160.0	214.0	217.0	762	-28	1.0 ✓
	A1301 Shelford Rd to High St	181	50.0	41.0	50.0	47.0	188	-7	0.5 ✓
	A1301 Shelford Rd to Hauxton Rd	102	27.0	22.3	20.1	19.1	89	13	1.3 ✓
		2,050					1905	145	3.3 ✓
	High St North to High St South	939	233.0	221.0	219.0	220.0	893	46	1.5 ✓
	High St North to Maris Lane	185	55.0	36.0	37.0	47.0	175	10	0.7 ✓
	High St South to Maris Lane	140	32.0	23.0	44.0	48.0	147	-7	0.6 ✓
	High St South to High St North	776	189.0	178.0	220.0	216.0	803	-27	1.0 ✓
		2,039					2018	21	0.5 ✓
	High St North to High St South	1,041	269.0	236.0	243.0	228.0	976	65	2.0 ✓
	High St South to High St North	774	189.0	178.0	220.0	216.0	803	-29	1.0 ✓
	Church Lane to High St North	93	22.0	23.0	31.0	33.0	109	-16	1.6 ✓
	Church Lane to High St South	75	19.0	21.0	13.0	39.0	92	-17	1.9 ✓
		1,983					1980	3	0.1 ✓

	Junction	Turn: From X to Y	Modelled	17:00	17:15	17:30	17:45	Observed	Diff	GEH	Pass GEH
17:00 – 18:00	High St/ Winchmore Dr / Alpha Terrace Crossroads	High St North to Alpha Terrace	19	3.0	1.0	5.0	11.0	20	-1	0.3	✓
		High St North to High St South	1,015	264.0	231.0	239.0	223.0	957	58	1.9	✓
		High St North to Winchmore Dr	7	0.0	3.0	2.0	1.0	6	1	0.5	✓
		Alpha Terrace to High St South	14	4.0	3.0	4.0	5.0	16	-2	0.5	✓
		Alpha Terrace to Winchmore Dr	-	0.0	0.0	0.0	0.0	0	0		
		Alpha Terrace to High St North	13	3.0	1.0	1.0	8.0	13	0	0.1	✓
		High St South to Winchmore Dr	4	0.0	0.0	1.0	3.0	4	0	0.1	✓
		High St South to High St North	832	202.0	197.0	243.0	236.0	878	-46	1.6	✓
		High St South to Alpha Terrace	26	9.0	4.0	7.0	10.0	30	-4	0.7	✓
		Winchmore Dr to High St North	-	0.0	0.0	0.0	2.0	2	-2	2.0	✓
		Winchmore Dr to Alpha Terrace	-	0.0	0.0	0.0	0.0	0	0		
		Winchmore Dr to High St South	-	1.0	2.0	0.0	0.0	3	-3	2.4	✓
			1,930					1929	1	0.0	✓
	High St/ A1134 T-Junction	A1134 Trumpington Road (North) to High St (South)	529	137.0	114.0	114.0	117.0	482	47	2.1	✓
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	203	31.0	57.0	49.0	55.0	192	11	0.8	✓
		High St (South) to A1134 Long Rd (East)	386	89.0	89.0	120.0	116.0	414	-28	1.4	✓
		High St (South) to A1134 Trumpington Road (North)	455	116.0	109.0	124.0	130.0	479	-24	1.1	✓
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	146	37.0	37.0	38.0	36.0	148	-2	0.2	✓
		A1134 Long Rd (East) to High St (South)	499	130.0	121.0	132.0	118.0	501	-2	0.1	✓
			2,219					2216	3	0.1	✓
	A1134 / Parson Rd T-Junction	A1134 North to A1134 South	671	158.0	163.0	152.0	166.0	639	32	1.3	✓
		A1134 North to Parson Road	14	2.0	0.0	7.0	6.0	15	-1	0.3	✓
		A1134 South to Parson Road	61	18.0	10.0	25.0	11.0	64	-3	0.3	✓
		A1134 South to A1134 North	537	135.0	136.0	137.0	155.0	563	-26	1.1	✓
		Parson Road to A1134 North	17	4.0	5.0	6.0	1.0	16	1	0.2	✓
		Parson Road to A1134 South	39	10.0	8.0	11.0	6.0	35	4	0.7	✓
			1,339					1332	7	0.2	✓
	A1134 / Bentley Rd T-Junction	A1134 North to A1134 South	616	158.0	163.0	152.0	166.0	639	-23	0.9	✓
		A1134 North to Bentley Rd	2	2.0	0.0	7.0	6.0	15	-13	4.3	✓
		A1134 South to Bentley Rd	7	18.0	10.0	25.0	11.0	64	-57	9.7	✗
		A1134 South to A1134 North	536	135.0	136.0	137.0	155.0	563	-27	1.2	✓
		Bentley Rd to A1134 North	18	4.0	5.0	6.0	1.0	16	2	0.5	✓
		Bentley Rd to A1134 South	48	10.0	8.0	11.0	6.0	35	13	2.0	✓
			1,227					1332	-105	2.9	✓
	A1134 / Latham Rd / Newton Rd Crossroads	A1134 North to Newton Rd	18	5.0	6.0	3.0	4.0	18	0	0.1	✓
		A1134 North to A1134 South	575	141.0	134.0	147.0	161.0	583	-8	0.3	✓
		A1134 North to Latham Rd	8	7.0	1.0	0.0	0.0	8	0	0.1	✓
		Newton Rd to A1134 South	14	2.0	8.0	3.0	1.0	14	0	0.0	✓
		Newton Rd to Latham Rd	-	0.0	0.0	0.0	0.0	0	0		
		Newton Rd to A1134 North	17	6.0	6.0	3.0	2.0	17	0	0.1	✓
		A1134 South to Latham Rd	18	5.0	5.0	5.0	5.0	20	-3	0.6	✓
		A1134 South to A1134 North	505	138.0	138.0	138.0	149.0	563	-58	2.5	✓
		A1134 South to Newton Rd	7	2.0	2.0	2.0	2.0	8	-1	0.2	✓
		Latham Rd to A1134 North	20	11.0	7.0	0.0	2.0	20	0	0.0	✓
		Latham Rd to Newton Rd	3	4.0	0.0	0.0	0.0	4	-1	0.4	✓
		Latham Rd to A1134 South	12	5.0	3.0	3.0	0.0	11	1	0.3	✓
			1,198					1266	-68	1.9	✓
	A1134 / Queensway T-Junction	A1134 North to A1134 South	566	143.0	134.0	143.0	155.0	575	-10	0.4	✓
A1134 North to Queensway		6	1.0	0.0	3.0	2.0	6	0	0.1	✓	
A1134 South to Queensway		11	0.0	11.0	0.0	0.0	11	0	0.0	✓	
A1134 South to A1134 North		522	155.0	140.0	141.0	153.0	589	-67	2.9	✓	
Queensway to A1134 North		13	5.0	5.0	1.0	3.0	14	-1	0.2	✓	
Queensway to A1134 South		32	10.0	7.0	7.0	10.0	34	-2	0.3	✓	
		1,150					1229	-79	2.3	✓	
A1134 / Chaucer Rd / Brooklands Ave Crossroads	A1134 North to Brooklands Ave	249	67.0	66.0	54.0	59.0	246	3	0.2	✓	
	A1134 North to A1134 South	357	90.0	74.0	82.0	105.0	351	6	0.3	✓	
	Brooklands Ave to A1134 South	175	42.0	55.0	56.0	38.0	191	-16	1.2	✓	
	Brooklands Ave to A1134 North	231	58.0	80.0	60.0	90.0	288	-57	3.6	✓	
	A1134 South to A1134 North	415	133.0	110.0	114.0	119.0	476	-61	2.9	✓	
	A1134 South to Brooklands Ave	110	27.0	35.0	28.0	37.0	127	-17	1.6	✓	
	Chaucer Rd to A1134 North	39	13.0	11.0	7.0	7.0	38	1	0.2	✓	
	Chaucer Rd to Brooklands Ave	25	13.0	3.0	3.0	4.0	23	2	0.3	✓	
	Chaucer Rd to A1134 South	34	12.0	5.0	8.0	14.0	39	-5	0.8	✓	
	A1134 North to Chaucer Rd	5	1.0	1.0	1.0	1.0	4	1	0.3		
	Brooklands Ave to Chaucer Rd	4	1.0	1.0	1.0	1.0	4	0	0.2		
	A1134 South to Chaucer Rd	4	0.0	0.0	0.0	0.0	0	4	2.8		
		1,646					1787	-141	3.4	✓	
A1134 / Bateman St T-Junction	A1134 North to A1134 South	542	145.0	121.0	119.0	137.0	522	20	0.9	✓	
	A1134 North to Bateman St	29	3.0	8.0	7.0	10.0	28	1	0.1	✓	
	A1134 South to Bateman St	34	11.0	12.0	14.0	6.0	43	-9	1.5	✓	
	A1134 South to A1134 North	625	193.0	189.0	167.0	210.0	759	-134	5.1	✗	
	Bateman St to A1134 North	53	16.0	17.0	17.0	11.0	61	-8	1.1	✓	
	Bateman St to A1134 South	69	13.0	20.0	18.0	28.0	79	-10	1.1	✓	
		1,351					1492	-141	3.7	✓	
A1134 / Fen Causeway T-Junction	A1134 North to A1134 South	219	55.0	42.0	59.0	55.0	211	8	0.6	✓	
	A1134 North to Fen Causeway	432	101.0	90.0	128.0	119.0	438	-6	0.3	✓	
	A1134 South to Fen Causeway	384	129.0	120.0	126.0	124.0	499	-115	5.5	✗	
	A1134 South to A1134 North	273	80.0	86.0	58.0	97.0	321	-48	2.8	✓	
	Fen Causeway to A1134 North	363	82.0	87.0	102.0	91.0	362	1	0.1	✓	
	Fen Causeway to A1134 South	348	93.0	87.0	67.0	92.0	339	9	0.5	✓	
		2,020					2170	-150	3.3	✓	
A1134 / Lensfield Rd T-Junction	A1134 North to A1134 South	175	44.0	51.0	37.0	44.0	176	-1	0.1	✓	
	A1134 North to Lensfield Rd	70	20.0	12.0	18.0	18.0	68	2	0.2	✓	
	A1134 South to Lensfield Rd	366	94.0	97.0	99.0	109.0	399	-33	1.7	✓	
	A1134 South to A1134 North	271	68.0	76.0	61.0	79.0	284	-13	0.8	✓	
	Lensfield Rd to A1134 North	121	24.0	35.0	41.0	21.0	121	-1	0.0	✓	
	Lensfield Rd to A1134 South	474	112.0	81.0	150.0	130.0	473	1	0.0	✓	
		1,476					1521	-45	1.2	✓	
Turns within GEH 5										96%	

Junction	Turn: From X to Y	Modelled	18:00	18:15	18:30	18:45	Observed	Diff	GEH	Pass GEH
18:00 - 19:00	A10 Cambridge Road (North) to A10 Cambridge Road (South)	714	225.0	189.0	160.0	110.0	684	30	1.1	✓
	A10 Cambridge Road (North) to Church Road	86	22.0	28.0	18.0	14.0	82	4	0.5	✓
	A10 Cambridge Road (South) to Church Road	34	11.0	8.0	6.0	10.0	35	-1	0.1	✓
	A10 Cambridge Road (South) to A10 Cambridge Road (North)	583	121.0	151.0	140.0	148.0	560	23	1.0	✓
	Church Road to A10 Cambridge Road (North)	39	8.0	14.0	9.0	9.0	40	-1	0.1	✓
	Church Road to A10 Cambridge Road (South)	12	2.0	5.0	2.0	4.0	13	-1	0.3	✓
		1,469					1414	55	1.4	✓
	A10 Cambridge Road (North) to High St	610	187.0	162.0	138.0	96.0	583	27	1.1	✓
	A10 Cambridge Road (North) to London Road	120	40.0	32.0	24.0	18.0	114	6	0.6	✓
	High St to London Road	38	17.0	7.0	8.0	8.0	40	-2	0.3	✓
	High St to A10 Cambridge Road (North)	545	116.0	144.0	128.0	136.0	524	21	0.9	✓
	London Road to A10 Cambridge Road (North)	71	16.0	15.0	18.0	22.0	71	0	0.0	✓
	London Road to High St	50	4.0	14.0	16.0	17.0	51	-1	0.1	✓
		1,434					1383	51	1.4	✓
	A10 Cambridge Road to M11 Northbound On-Slip	269	63.0	71.0	74.0	50.0	258	11	0.7	✓
	A10 Cambridge Road to Hauxton Road	361	76.0	79.0	86.0	98.0	339	22	1.1	✓
	A10 Cambridge Road to M11 Southbound On-Slip	23	8.0	2.0	2.0	9.0	21	2	0.3	✓
	A10 Cambridge Road to A10 Cambridge Road						0			
	M11 Southbound Mainline through	1,545	471.0	402.0	349.0	305.0	1527	18	0.5	✓
	M11 Southbound Off-Slip to Hauxton Road	642	168.0	165.0	154.0	138.0	625	17	0.7	✓
	M11 Southbound Off-Slip to M11 Northbound On-Slip	-	0.0	2.0	2.0	5.0	9	-9	4.2	✓
	M11 Southbound Off-Slip to A10 Cambridge Road	250	80.0	66.0	55.0	41.0	242	8	0.5	✓
	M11 Southbound Off-Slip to M11 Southbound On-Slip	8	0.0	2.0	2.0	5.0	9	-1	0.2	✓
	Hauxton Road to M11 Southbound Slip	250	80.0	70.0	60.0	43.0	253	-3	0.2	✓
	Hauxton Road to A10 Cambridge Road	514	153.0	148.0	119.0	81.0	501	13	0.6	✓
	Hauxton Road to M11 Northbound Slip	667	181.0	196.0	137.0	127.0	641	26	1.0	✓
	Hauxton Road to Hauxton Road						0			
	M11 Northbound Mainline through	1,507	488.0	403.0	320.0	256.0	1467	40	1.0	✓
	M11 Northbound Off-Slip to A10 Cambridge Road	14	5.0	3.0	4.0	2.0	14	0	0.1	✓
	M11 Northbound Off-Slip to M11 Southbound On-Slip	-	5.0	2.0	3.0	2.0	12	-12	4.9	✓
	M11 Northbound Off-Slip to Hauxton Road	194	75.0	37.0	39.0	30.0	181	13	1.0	✓
	M11 Northbound Off-Slip to M11 Northbound On-Slip	13	5.0	2.0	3.0	2.0	12	1	0.3	✓
		6,256					6099	157	2.0	✓
	Dedicated P&R Link Northbound to Access Road	-	0.0	0.0	0.0	0.0	0	0		
	Dedicated P&R Link Northbound Through	32	3.0	13.0	4.0	9.0	29	3	0.6	✓
	Hauxton Road Northbound Through	693	201.0	148.0	162.0	161.0	672	21	0.8	✓
	Hauxton Road Northbound to Addenbrookes Road	469	115.0	120.0	113.0	96.0	444	25	1.1	✓
	Hauxton Road Southbound Through	767	200.0	212.0	193.0	157.0	762	5	0.2	✓
	Hauxton Road Southbound to Addenbrookes Road	70	25.0	11.0	16.0	16.0	68	2	0.2	✓
	Hauxton Road Southbound to Access Road	-	0.0	0.0	0.0	0.0	0	0		
	Access Road to P&R Access	-	0.0	0.0	0.0	0.0	0	0		
	Access Road to Hauxton Road N	-	0.0	0.0	0.0	0.0	0	0		
	Access Road to Addenbrookes Road	-	0.0	0.0	0.0	0.0	0	0		
	Access Road to Hauxton Road S	-	0.0	0.0	0.0	0.0	0	0		
	Addenbrookes Road to Hauxton Road Southbound Slip	648	214.0	202.0	123.0	94.0	633	15	0.6	✓
	Addenbrookes Road to Access Road	-	0.0	0.0	0.0	0.0	0	0		
	Addenbrookes Road to P&R Access	9	10.0	0.0	0.0	0.0	10	-1	0.5	✓
	Addenbrookes Road to Hauxton Road Northbound	29	0.0	0.0	0.0	0.0	0	29	7.6	✗
		2,717					2618	99	1.9	✓
	Hauxton Road Southbound Through	566	149.0	131.0	147.0	142.0	569	-3	0.1	✓
	Hauxton Road Southbound to P&R	22	2.0	7.0	6.0	3.0	18	4	0.8	✓
	Hauxton Road Northbound to P&R	12	3.0	5.0	0.0	5.0	13	-1	0.4	✓
	Hauxton Road Northbound Through	711	201.0	156.0	166.0	165.0	688	23	0.9	✓
	P&R to Hauxton Road Northbound	69	20.0	20.0	10.0	11.0	61	8	1.0	✓
	P&R to Hauxton Road Southbound	264	76.0	92.0	62.0	31.0	261	3	0.2	✓
		1,644					1610	34	0.9	✓
	Hauxton Rd Northbound to Hauxton Rd Southbound	551	133.0	136.0	145.0	136.0	550	1	0.0	✓
	Hauxton Rd Northbound to Consort Ave	104	29.0	20.0	24.0	29.0	102	2	0.2	✓
	Hauxton Rd Southbound to Consort Ave	27	7.0	7.0	7.0	7.0	28	-2	0.3	✓
	Hauxton Rd Southbound to Hauxton Rd Northbound	749	214.0	169.0	169.0	169.0	721	28	1.0	✓
	Consort Ave to Hauxton Rd Northbound	60	12.0	17.0	10.0	21.0	60	0	0.0	✓
	Consort Ave to Hauxton Rd Southbound	36	18.0	2.0	8.0	9.0	37	-1	0.2	✓
		1,525					1498	27	0.7	✓
	Hauxton Rd Northbound to Hauxton Rd Southbound	545	116.6	119.9	119.2	114.4	470	75	3.3	✓
	Hauxton Rd Northbound to Waitrose	182	34.4	36.1	45.8	37.6	154	28	2.2	✓
	Hauxton Rd Southbound to Waitrose	115	34.0	34.0	19.0	24.0	111	4	0.4	✓
	Hauxton Rd Southbound to Hauxton Rd Northbound	691	177.0	137.2	129.9	148.9	593	98	3.9	✓
	Waitrose to Hauxton Rd North	178	35.0	38.8	38.1	43.1	155	23	1.8	✓
	Waitrose to Hauxton Rd South	110	33.0	20.0	31.0	28.0	112	-2	0.2	✓
		1,821					1595	226	5.5	✗
	High St to Hauxton Rd	636	116.6	119.9	119.2	114.4	470	166	7.1	✗
	High St to A1301 Shelford Rd	214	47.0	56.0	51.0	47.0	201	13	0.9	✓
	Hauxton Rd to A1301 Shelford Rd	98	18.0	19.0	39.0	22.0	98	0	0.0	✓
	Hauxton Rd to High St	771	212.0	176.0	168.0	192.0	748	23	0.8	✓
	A1301 Shelford Rd to High St	206	59.0	46.0	63.0	60.0	228	-22	1.5	✓
	A1301 Shelford Rd to Hauxton Rd	88	12.4	16.1	18.8	22.6	70	19	2.1	✓
		2,013					1815	198	4.5	✓
	High St North to High St South	848	198.0	212.0	216.0	199.0	825	23	0.8	✓
	High St North to Maris Lane	117	30.0	22.0	28.0	30.0	110	7	0.7	✓
	High St South to Maris Lane	75	38.0	11.0	14.0	17.0	80	-5	0.6	✓
	High St South to High St North	903	233.0	211.0	217.0	235.0	896	7	0.2	✓
		1,943					1911	32	0.7	✓
	High St North to High St South	860	202.0	216.0	224.0	215.0	857	3	0.1	✓
	High St South to High St North	902	233.0	211.0	217.0	235.0	896	6	0.2	✓
	Church Lane to High St North	86	22.0	17.0	16.0	13.0	68	18	2.0	✓
	Church Lane to High St South	97	26.0	18.0	20.0	14.0	78	19	2.0	✓
		1,945					1899	46	1.0	✓

Junction		Turn: From X to Y	Modelled	18:00	18:15	18:30	18:45	Observed	Diff	GEH	Pass GEH
18:00 – 19:00	High St/ Winchmore Dr / Alpha Terrace Crossroads	High St North to Alpha Terrace	14	4.0	5.0	2.0	3.0	14	0	0.0	✓
		High St North to High St South	846	198.0	215.0	219.0	209.0	841	5	0.2	✓
		High St North to Winchmore Dr	3	2.0	1.0	0.0	0.0	3	0	0.0	✓
		Alpha Terrace to High St South	14	4.0	1.0	5.0	6.0	16	-2	0.4	✓
		Alpha Terrace to Winchmore Dr	-	0.0	0.0	0.0	0.0	0	0		
		Alpha Terrace to High St North	10	2.0	2.0	2.0	2.0	8	2	0.7	✓
		High St South to Winchmore Dr	10	1.0	1.0	3.0	5.0	10	0	0.1	✓
		High St South to High St North	957	246.0	224.0	223.0	238.0	931	26	0.9	✓
		High St South to Alpha Terrace	21	8.0	3.0	7.0	5.0	23	-2	0.3	✓
		Winchmore Dr to High St North	-	0.0	0.0	2.0	1.0	3	-3	2.4	✓
		Winchmore Dr to Alpha Terrace	-	0.0	0.0	0.0	0.0	0	0		
		Winchmore Dr to High St South	-	0.0	0.0	0.0	0.0	0	0		
			1,876					1849	27	0.6	✓
	High St/ A1134 T-Junction	A1134 Trumpington Road (North) to High St (South)	451	103.0	118.0	104.0	121.0	446	5	0.2	✓
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	125	30.0	34.0	33.0	27.0	124	1	0.1	✓
		High St (South) to A1134 Long Rd (East)	470	131.0	107.0	116.0	110.0	464	6	0.3	✓
		High St (South) to A1134 Trumpington Road (North)	499	117.0	119.0	111.0	131.0	478	21	0.9	✓
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	131	29.0	29.0	31.0	46.0	135	-4	0.3	✓
		A1134 Long Rd (East) to High St (South)	404	101.0	103.0	117.0	91.0	412	-8	0.4	✓
			2,080					2059	21	0.5	✓
	A1134 / Parson Rd T-Junction	A1134 North to A1134 South	565	131.0	149.0	136.0	145.0	561	4	0.2	✓
		A1134 North to Parson Road	6	3.0	2.0	0.0	0.0	5	1	0.3	✓
		A1134 South to Parson Road	11	4.0	3.0	2.0	1.0	10	1	0.4	✓
		A1134 South to A1134 North	623	142.0	145.0	140.0	176.0	603	20	0.8	✓
		Parson Road to A1134 North	6	2.0	1.0	2.0	0.0	5	1	0.3	✓
		Parson Road to A1134 South	9	2.0	3.0	1.0	3.0	9	0	0.0	✓
			1,220					1193	27	0.8	✓
	A1134 / Bentley Rd T-Junction	A1134 North to A1134 South	557	131.0	149.0	136.0	145.0	561	-4	0.2	✓
		A1134 North to Bentley Rd	7	3.0	2.0	0.0	0.0	5	2	0.6	✓
		A1134 South to Bentley Rd	9	4.0	3.0	2.0	1.0	10	-1	0.3	✓
		A1134 South to A1134 North	629	142.0	145.0	140.0	176.0	603	26	1.0	✓
		Bentley Rd to A1134 North	9	2.0	1.0	2.0	0.0	5	4	1.7	✓
		Bentley Rd to A1134 South	17	2.0	3.0	1.0	3.0	9	8	2.1	✓
			1,227					1193	34	1.0	✓
	A1134 / Latham Rd / Newton Rd Crossroads	A1134 North to Newton Rd	8	3.0	2.0	1.0	2.0	8	0	0.0	✓
		A1134 North to A1134 South	554	129.0	145.0	135.0	140.0	549	5	0.2	✓
		A1134 North to Latham Rd	2	1.0	0.0	1.0	1.0	3	-1	0.5	✓
		Newton Rd to A1134 South	4	2.0	1.0	1.0	1.0	5	-1	0.3	✓
		Newton Rd to Latham Rd	-	0.0	0.0	0.0	0.0	0	0		
		Newton Rd to A1134 North	8	2.0	1.0	2.0	3.0	8	0	0.0	✓
		A1134 South to Latham Rd	23	5.0	5.0	5.0	5.0	20	3	0.7	✓
		A1134 South to A1134 North	626	138.0	138.0	138.0	167.0	581	45	1.8	✓
		A1134 South to Newton Rd	10	2.0	2.0	2.0	2.0	8	2	0.6	✓
		Latham Rd to A1134 North	3	0.0	1.0	1.0	1.0	3	0	0.0	✓
		Latham Rd to Newton Rd	-	0.0	0.0	0.0	0.0	0	0		
		Latham Rd to A1134 South	2	0.0	0.0	1.0	1.0	2	0	0.1	✓
			1,240					1187	53	1.5	✓
	A1134 / Queensway T-Junction	A1134 North to A1134 South	546	128.0	141.0	133.0	141.0	543	3	0.1	✓
		A1134 North to Queensway	10	1.0	9.0	1.0	0.0	11	-2	0.5	✓
		A1134 South to Queensway	9	0.0	0.0	0.0	9.0	9	0	0.1	✓
		A1134 South to A1134 North	634	140.0	140.0	141.0	162.0	583	51	2.1	✓
		Queensway to A1134 North	31	7.0	7.0	4.0	12.0	30	1	0.1	✓
		Queensway to A1134 South	19	5.0	6.0	4.0	2.0	17	2	0.4	✓
			1,247					1193	54	1.6	✓
	A1134 / Chaucer Rd / Brooklands Ave Crossroads	A1134 North to Brooklands Ave	248	67.0	67.0	43.0	58.0	235	13	0.8	✓
		A1134 North to A1134 South	401	82.0	115.0	90.0	109.0	396	5	0.3	✓
		Brooklands Ave to A1134 South	143	44.0	34.0	41.0	31.0	150	-7	0.6	✓
		Brooklands Ave to A1134 North	310	78.0	81.0	92.0	70.0	321	-11	0.6	✓
		A1134 South to A1134 North	535	115.0	126.0	109.0	142.0	492	43	1.9	✓
		A1134 South to Brooklands Ave	130	32.0	21.0	36.0	32.0	121	9	0.8	✓
		Chaucer Rd to A1134 North	21	9.0	7.0	4.0	2.0	22	-1	0.2	✓
		Chaucer Rd to Brooklands Ave	10	9.0	1.0	0.0	0.0	10	0	0.1	✓
		Chaucer Rd to A1134 South	9	3.0	1.0	3.0	1.0	8	1	0.4	✓
		A1134 North to Chaucer Rd	4	1.0	1.0	1.0	1.0	4	0	0.1	✓
		Brooklands Ave to Chaucer Rd	4	1.0	1.0	1.0	1.0	4	0	0.0	✓
		A1134 South to Chaucer Rd	5	0.0	0.0	0.0	0.0	0	5	3.0	✓
			1,820					1763	57	1.3	✓
	A1134 / Bateman St T-Junction	A1134 North to A1134 South	599	140.0	161.0	126.0	163.0	590	9	0.4	✓
		A1134 North to Bateman St	16	6.0	5.0	5.0	1.0	17	-1	0.2	✓
		A1134 South to Bateman St	26	8.0	6.0	4.0	8.0	26	0	0.1	✓
		A1134 South to A1134 North	870	194.0	208.0	201.0	206.0	809	61	2.1	✓
		Bateman St to A1134 North	76	14.0	13.0	19.0	17.0	63	13	1.6	✓
		Bateman St to A1134 South	58	10.0	22.0	8.0	5.0	45	13	1.9	✓
			1,646					1550	96	2.4	✓
	A1134 / Fen Causeway T-Junction	A1134 North to A1134 South	320	69.0	94.0	63.0	87.0	313	7	0.4	✓
		A1134 North to Fen Causeway	374	108.0	103.0	79.0	83.0	373	1	0.1	✓
		A1134 South to Fen Causeway	562	113.0	131.0	127.0	132.0	503	59	2.6	✓
		A1134 South to A1134 North	409	95.0	90.0	93.0	91.0	369	40	2.0	✓
		Fen Causeway to A1134 North	471	123.0	128.0	105.0	109.0	465	6	0.3	✓
		Fen Causeway to A1134 South	299	77.0	72.0	68.0	77.0	294	5	0.3	✓
			2,435					2317	118	2.4	✓
	A1134 / Lensfield Rd T-Junction	A1134 North to A1134 South	153	35.0	43.0	32.0	43.0	153	0	0.0	✓
		A1134 North to Lensfield Rd	53	15.0	13.0	11.0	15.0	54	-1	0.2	✓
		A1134 South to Lensfield Rd	525	134.0	130.0	109.0	132.0	505	20	0.9	✓
		A1134 South to A1134 North	354	84.0	88.0	89.0	68.0	329	25	1.4	✓
		Lensfield Rd to A1134 North	127	29.0	37.0	35.0	27.0	128	-1	0.1	✓
		Lensfield Rd to A1134 South	530	142.0	154.0	110.0	127.0	533	-3	0.1	✓
			1,743					1702	41	1.0	✓
Turns within GEH 5										99%	

F. AM Junction Performance Comparison

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
07:00 - 08:00	M11 J11	Hauxton Road to M11 Southbound Slip	104	150	160	140	136	130	157
		Hauxton Road to A10 Cambridge Road	263	347	341	354	328	339	325
		Hauxton Road to M11 Northbound Slip	425	503	435	501	565	566	526
		Hauxton Road to Hauxton Road	0	0	0	0	0	0	0
		M11 Southbound Off-Slip to A10 Cambridge Road	448	278	358	361	330	349	230
		M11 Southbound Off-Slip to M11 Northbound On-Slip	0	0	0	0	0	0	0
		M11 Southbound Off-Slip to Hauxton Road	861	800	693	538	532	546	591
		M11 Southbound Off-Slip to M11 Southbound On-Slip	4	6	5	6	5	6	6
		M11 Southbound Mainline through	1856	1789	2012	1981	1917	1920	1703
		A10 Cambridge Road to M11 Northbound On-Slip	339	273	225	84	108	97	138
		A10 Cambridge Road to Hauxton Road	715	648	660	527	610	597	648
		A10 Cambridge Road to M11 Southbound On-Slip	16	5	0	6	7	7	15
		A10 Cambridge Road to A10 Cambridge Road	0	0	0	0	0	0	0
		M11 Northbound Off-Slip to Hauxton Road	507	587	405	475	481	468	458
		M11 Northbound Off-Slip to M11 Southbound On-Slip	0	0	0	0	0	0	0
		M11 Northbound Off-Slip to A10 Cambridge Road	15	16	15	15	3	113	12
		M11 Northbound Off-Slip to M11 Northbound On-Slip	11	11	10	12	12	12	11
		M11 Northbound Mainline through	2005	2176	2237	2121	2110	2121	2124
		M11 Northbound to P&R access			0	121	124		114
		A10 Cambridge Road to P&R access			0	85	110		139
		M11 Southbound to P&R access			225	202	197		158
		M11 Northbound to P&R access South of M11J11				0	12		
		Trumpington P&R exit to new P&R access				12	12		
		All	7571	7589	8200	7553	7597	7705	7378
	A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	27	31	54	35	31	31	27
		Hauxton Road Southbound Through	438	432	400	417	439	435	452
		Hauxton Road Southbound to Access Road	3	3	3	3	2	3	3
		Addenbrookes Road to Hauxton Road Southbound Slip	359	534	520	550	562	564	545
		Addenbrookes Road to Access Road	12	11	9	10	10	9	10
		Addenbrookes Road to P&R Access	47	29	0	7	7	5	7
		Addenbrookes Road to Hauxton Road Northbound	0	0	16	45	0	9	0
		Dedicated P&R Link Northbound to Access Road	51	49	55	50	49	48	53
		Dedicated P&R Link Northbound Through	441	378	574	368	395	373	370
		Hauxton Road Northbound Through	723	548	544	534	551	549	589
		Hauxton Road Northbound to Addenbrookes Road	853	1011	1151	973	1031	1016	1062
		Access Road to P&R Access	0	0	2	1	11	11	0
		Access Road to Hauxton Road N	5	25	31	28	30	31	28
		Access Road to Addenbrookes Road	0	47	32	44	46	45	49
		Access Road to Hauxton Road S	0	48	31	45	45	47	48
		Dedicated P&R Link Southbound Through				12	12	12	12
		All	2959	3145	3421	3122	3221	3187	3253
	Trumpington P&R	Hauxton Road Southbound Through	402	419	413	405	399	398	412
		Hauxton Road Southbound to P&R	48	61	42	49	93	94	94
		Hauxton Road Northbound to P&R	24	20	34	65	22	22	22
		Hauxton Road Northbound Through	670	511	514	499	518	517	554
		P&R to Hauxton Road Northbound	85	114	156	131	121	116	116
		P&R to Hauxton Road Southbound	69	50	44	51	74	72	69
		All	1298	1174	1203	1200	1227	1220	1266
	Consort Ave T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	402	429	408	403	443	445	456
		Hauxton Rd Northbound to Consort Ave	30	32	35	41	39	37	38
		Hauxton Rd Southbound to Consort Ave	29	24	27	27	26	26	27
		Hauxton Rd Southbound to Hauxton Rd Northbound	709	578	629	584	594	587	626
		Consort Ave to Hauxton Rd Northbound	84	136	149	134	145	142	131
		Consort Ave to Hauxton Rd Southbound	47	47	47	47	48	47	47
		All	1301	1246	1294	1235	1296	1284	1325
	Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	404	403	382	383	420	419	434
		Hauxton Rd Northbound to Waitrose	46	75	64	90	107	102	63
		Hauxton Rd Southbound to Waitrose	35	23	34	8	21	20	33
		Hauxton Rd Southbound to Hauxton Rd Northbound	751	686	738	703	716	705	718
		Waitrose to Hauxton Rd North	51	93	95	91	95	92	89
		Waitrose to Hauxton Rd South	30	60	62	64	64	65	62
		All	1316	1340	1382	1351	1433	1416	1412
	High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	401	435	424	438	440	433	414
		High St to A1301 Shelford Rd	128	86	97	102	103	101	90
		Hauxton Rd to A1301 Shelford Rd	67	74	74	73	80	78	84
		Hauxton Rd to High St	734	702	766	732	742	731	733
		A1301 Shelford Rd to High St	281	460	477	462	448	457	462
		A1301 Shelford Rd to Hauxton Rd	49	44	22	35	87	88	83
		All	1659	1801	1860	1843	1900	1889	1866
	High Street / Maris Lane	High St North to High St South	530	522	522	539	543	534	505
		High St North to Maris Lane	45	106	108	96	98	103	102
		High St South to Maris Lane	48	146	214	182	138	150	157
		High St South to High St North	964	1015	1030	1013	1051	1038	1038
		All	1587	1788	1873	1830	1830	1825	1802
	High Street / Church Lane	High St North to High St South	512	599	605	589	582	582	578
		High St South to High St North	954	1004	1028	1008	1045	1034	1033
		Church Lane to High St North	185	233	247	243	236	239	248
		Church Lane to High St South	63	29	25	47	60	55	29
		All	1713	1867	1905	1887	1922	1909	1887
	High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	9	9	9	9	9	9	9
		High St North to High St South	510	600	604	587	581	583	578
		High St North to Winchmore Dr	4	3	3	3	3	3	3
		Alpha Terrace to High St South	4	1	1	1	1	1	1
		Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0
		Alpha Terrace to High St North	17	16	26	21	21	20	17
		High St South to Winchmore Dr	1	1	1	1	1	1	1
		High St South to High St North	1124	1228	1267	1243	1271	1264	1271
		High St South to Alpha Terrace	8	7	7	7	7	7	7
		Winchmore Dr to High St North	0	0	0	0	0	0	0
		Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0
		Winchmore Dr to High St South	0	0	0	0	0	0	0
		All	1675	1865	1918	1872	1893	1887	1885
	High Street / A1134	A1134 Trumpington Road (North) to High St (South)	223	202	194	185	182	174	185
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	182	224	220	223	228	222	221
		High St (South) to A1134 Long Rd (East)	543	570	586	584	577	582	578
		High St (South) to A1134 Trumpington Road (North)	582	663	690	663	693	689	687
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	173	134	128	135	127	132	128
		A1134 Long Rd (East) to High St (South)	298	411	422	413	409	419	403
		All	2001	2204	2240	2202	2215	2217	2202

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
07:00 - 08:00	A1134 / Parson Rd	A1134 North to A1134 South	388	406	398	392	393	380	387
		A1134 North to Parson Road	29	27	27	27	26	27	27
		A1134 South to Parson Road	50	45	45	45	44	44	45
		A1134 South to A1134 North	695	738	759	739	761	762	754
		Parson Road to A1134 North	10	9	9	9	9	9	9
		Parson Road to A1134 South	21	20	20	20	20	20	20
		All	1192	1246	1257	1232	1252	1242	1241
	A1134 / Bentley Rd	A1134 North to A1134 South	408	416	409	402	403	388	396
		A1134 North to Bentley Rd	18	17	16	16	16	17	18
		A1134 South to Bentley Rd	63	54	55	56	54	54	54
		A1134 South to A1134 North	630	675	692	674	695	695	688
		Bentley Rd to A1134 North	2	5	3	5	4	3	6
		Bentley Rd to A1134 South	11	19	19	19	19	23	19
		All	1131	1185	1194	1171	1190	1180	1180
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	14	10	8	7	7	8	7
		A1134 North to A1134 South	405	404	396	393	388	376	383
		A1134 North to Latham Rd	9	9	9	9	8	12	9
		Newton Rd to A1134 South	21	29	30	28	30	29	31
		Newton Rd to Latham Rd	0	0	0	0	0	0	0
		Newton Rd to A1134 North	18	21	22	28	24	21	24
		A1134 South to Latham Rd	10	10	10	10	11	9	11
		A1134 South to A1134 North	587	629	646	623	647	645	636
		A1134 South to Newton Rd	11	15	15	15	16	15	15
		Latham Rd to A1134 North	2	1	1	1	1	1	2
		Latham Rd to Newton Rd	2	2	2	2	2	2	2
		Latham Rd to A1134 South	3	3	1	1	3	2	3
		All	1082	1133	1140	1117	1136	1120	1121
	A1134 / Queensway	A1134 North to A1134 South	422	410	399	394	391	383	385
		A1134 North to Queensway	3	9	3	3	3	3	6
		A1134 South to Queensway	0	1	3	5	0	3	0
		A1134 South to A1134 North	595	640	655	636	661	652	661
		Queensway to A1134 North	8	12	10	14	13	11	14
		Queensway to A1134 South	7	13	15	16	14	14	14
		All	1035	1086	1085	1067	1081	1065	1070
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	309	361	366	364	356	360	356
		A1134 North to A1134 South	369	351	342	338	335	329	336
		Brooklands Ave to A1134 South	40	40	34	32	33	31	31
		Brooklands Ave to A1134 North	209	189	198	199	197	195	196
		A1134 South to Brooklands Ave	381	389	397	387	410	400	400
		A1134 South to A1134 North	207	212	217	212	213	214	214
		Chaucer Rd to A1134 North	11	35	28	33	38	43	43
		Chaucer Rd to Brooklands Ave	4	12	12	13	12	12	11
		Chaucer Rd to A1134 South	16	29	26	26	26	26	25
		A1134 North to Chaucer Rd	22	29	32	32	32	32	32
		Brooklands Ave to Chaucer Rd	57	82	80	78	81	76	77
		A1134 South to Chaucer Rd	7	43	44	42	43	41	44
		All	1633	1773	1776	1756	1775	1758	1765
	A1134 / Bateman St	A1134 North to A1134 South	689	716	723	718	709	708	708
		A1134 North to Bateman St	42	198	202	199	197	199	198
		A1134 South to Bateman St	30	17	13	14	10	19	19
		A1134 South to A1134 North	570	593	611	605	636	619	620
		Bateman St to A1134 North	32	58	57	51	45	53	48
		Bateman St to A1134 South	29	41	33	34	32	26	36
		All	1392	1623	1638	1619	1628	1625	1628
	A1134 / Fen Causeway	A1134 North to A1134 South	242	274	279	269	262	258	265
		A1134 North to Fen Causeway	259	399	396	412	424	430	415
		A1134 South to Fen Causeway	366	315	338	295	295	285	290
		A1134 South to A1134 North	233	337	328	360	381	386	378
		Fen Causeway to A1134 North	366	396	404	375	355	356	368
		Fen Causeway to A1134 South	493	649	653	654	650	654	647
		All	1959	2370	2398	2365	2367	2370	2364
	A1134 / Lensfield Rd	A1134 North to A1134 South	136	187	188	190	185	192	188
		A1134 North to Lensfield Rd	119	36	41	32	33	29	35
		A1134 South to Lensfield Rd	480	606	608	606	605	613	618
		A1134 South to A1134 North	118	126	123	129	130	129	127
		Lensfield Rd to A1134 North	67	145	148	148	147	149	144
		Lensfield Rd to A1134 South	364	487	488	492	502	497	493
		All	1285	1588	1596	1597	1603	1609	1604
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	578	546	589	581	558	546	498
		A10 Cambridge Road (North) to Church Road	99	54	81	103	71	69	53
		A10 Cambridge Road (South) to Church Road	29	25	20	12	13	14	23
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	1030	965	1101	814	956	912	1089
		Church Road to A10 Cambridge Road (North)	83	59	68	52	50	47	73
		Church Road to A10 Cambridge Road (South)	25	20	24	5	13	20	22
		All	1843	1669	1883	1567	1662	1607	1758
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	516	532	552	528	522	516	481
		A10 Cambridge Road (North) to London Road	82	29	60	57	48	45	36
		High St to London Road	31	27	30	22	26	23	30
		High St to A10 Cambridge Road (North)	840	817	894	673	773	727	890
		London Road to A10 Cambridge Road (North)	223	199	229	181	218	218	229
		London Road to High St	44	43	44	42	41	40	43
		All	1737	1645	1807	1503	1628	1569	1710
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				710	836	807	977
		Cambridge Rd S to P&R				65	92	79	118
		Cambridge Rd N to Cambridge Rd S				731	657	658	567
		Cambridge Rd N to P&R					0	83	0
		P&R to Cambridge Rd S				0	0	1628	0
		P&R to Cambridge Rd N				0	24	0	0
		All					1715	1628	1751
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						803	
		Cambridge Rd N to Cambridge Rd S						802	
		P&R exit to Cambridge Rd S						0	
		All						1605	

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
08:00 - 09:00	M11 J11	Hauxton Road to M11 Southbound Slip	94	127	146	132	124	113	150
		Hauxton Road to A10 Cambridge Road	325	366	411	426	390	387	393
		Hauxton Road to M11 Northbound Slip	459	506	460	561	607	584	584
		Hauxton Road to Hauxton Road	0	0	0	0	0	0	0
		M11 Southbound Slip to A10 Cambridge Road	528	385	424	445	382	414	274
		M11 Southbound Slip to M11 Northbound Slip	0	0	0	0	0	0	0
		M11 Southbound Slip to Hauxton Road	623	676	503	342	324	336	427
		M11 Southbound Slip to M11 Southbound Slip	3	3	3	3	2	3	2
		M11 Southbound Mainline through	1665	1838	1824	1643	1549	1664	1350
		A10 Cambridge Road to M11 Northbound Slip	416	288	207	62	73	68	89
		A10 Cambridge Road to Hauxton Road	571	416	606	508	533	568	487
		A10 Cambridge Road to M11 Southbound Slip	11	2	0	3	14	4	9
		A10 Cambridge Road to A10 Cambridge Road	0	0	0	0	0	0	0
		M11 Northbound Slip to Hauxton Road	401	524	311	410	394	380	376
		M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0
		M11 Northbound Slip to A10 Cambridge Road	21	18	17	19	4	122	15
		M11 Northbound Slip to M11 Northbound Slip	14	15	15	13	13	12	12
		M11 Northbound Mainline through	2006	2185	2212	2132	2119	2127	2144
		M11 Northbound to P&R access			0	114	115		107
		A10 Cambridge Road to P&R access			0	66	76		90
		M11 Southbound to P&R access			166	159	146		133
		M11 Northbound to P&R access South of M11J11				0	11		
		Trumpington P&R exit to new P&R access				11	10		
		All	7137	7348	7720	7060	6886	7144	6663
	A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	35	33	61	42	40	37	36
		Hauxton Road Southbound Through	477	443	426	462	475	458	482
		Hauxton Road Southbound to Access Road	4	4	4	4	4	4	4
		Addenbrookes Road to Hauxton Road Southbound Slip	394	534	554	590	589	576	577
		Addenbrookes Road to Access Road	1	1	1	1	1	1	1
		Addenbrookes Road to P&R Access	41	22	0	5	4	5	4
		Addenbrookes Road to Hauxton Road Northbound	0	0	12	45	0	3	0
		Dedicated P&R Link Northbound to Access Road	20	20	21	18	19	23	18
		Dedicated P&R Link Northbound Through	377	375	552	335	330	328	323
		Hauxton Road Northbound Through	469	387	363	365	366	368	415
		Hauxton Road Northbound to Addenbrookes Road	748	883	1088	928	915	953	904
		Access Road to P&R Access	0	0	0	0	13	10	0
		Access Road to Hauxton Road N	1	22	30	26	27	26	25
		Access Road to Addenbrookes Road	8	54	39	52	55	55	56
		Access Road to Hauxton Road S	4	55	40	54	56	55	59
		Dedicated P&R Link Southbound Through				12	11	11	11
		All	2579	2832	3192	2938	2904	2914	2915
	Trumpington P&R	Hauxton Road Southbound Through	444	453	456	446	435	422	445
		Hauxton Road Southbound to P&R	36	48	30	38	81	77	81
		Hauxton Road Northbound to P&R	8	11	24	78	11	13	10
		Hauxton Road Northbound Through	490	421	385	391	392	406	442
		P&R to Hauxton Road Northbound	182	222	260	254	239	239	228
		P&R to Hauxton Road Southbound	71	38	37	60	85	80	76
		All	1231	1193	1191	1267	1243	1238	1282
	Consort Ave T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	425	451	431	431	463	448	472
		Hauxton Rd Northbound to Consort Ave	60	63	66	70	69	67	69
		Hauxton Rd Southbound to Consort Ave	20	22	21	22	21	22	24
		Hauxton Rd Southbound to Hauxton Rd Northbound	666	627	626	629	613	632	646
		Consort Ave to Hauxton Rd Northbound	136	188	203	187	197	191	182
		Consort Ave to Hauxton Rd Southbound	53	53	54	54	54	54	55
		All	1360	1404	1402	1393	1418	1413	1447
	Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	448	441	424	425	457	444	465
		Hauxton Rd Northbound to Waitrose	97	125	115	138	150	143	111
		Hauxton Rd Southbound to Waitrose	41	32	41	16	24	28	43
		Hauxton Rd Southbound to Hauxton Rd Northbound	767	786	792	804	787	797	789
		Waitrose to Hauxton Rd North	84	125	125	123	126	121	122
		Waitrose to Hauxton Rd South	41	75	75	76	78	75	75
		All	1477	1584	1577	1592	1630	1616	1613
	High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	477	512	505	512	508	491	482
		High St to A1301 Shelford Rd	149	104	113	119	121	117	109
		Hauxton Rd to A1301 Shelford Rd	90	109	97	108	110	110	117
		Hauxton Rd to High St	761	802	824	827	812	816	804
		A1301 Shelford Rd to High St	295	439	449	444	439	440	442
		A1301 Shelford Rd to Hauxton Rd	68	56	35	52	98	95	94
		All	1840	2022	2023	2062	2087	2070	2046
	High Street / Maris Lane	High St North to High St South	625	615	617	630	629	608	589
		High St North to Maris Lane	80	139	142	131	128	131	135
		High St South to Maris Lane	101	212	273	252	202	211	220
		High St South to High St North	960	1035	1004	1025	1054	1050	1032
		All	1766	2002	2036	2038	2013	2000	1976
	High Street / Church Lane	High St North to High St South	662	746	752	735	719	707	716
		High St South to High St North	971	1044	1008	1029	1060	1054	1037
		Church Lane to High St North	167	183	199	190	185	186	193
		Church Lane to High St South	45	11	8	26	38	33	12
		All	1846	1983	1966	1980	2002	1980	1957
	High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	24	26	25	25	24	24	24
		High St North to High St South	652	738	745	729	712	702	709
		High St North to Winchmore Dr	5	5	5	5	4	5	5
		Alpha Terrace to High St South	10	6	6	6	6	6	7
		Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0
		Alpha Terrace to High St North	20	20	31	24	24	24	20
		High St South to Winchmore Dr	0	3	1	0	1	0	0
		High St South to High St North	1117	1214	1195	1205	1233	1229	1217
		High St South to Alpha Terrace	27	23	23	22	23	23	24
		Winchmore Dr to High St North	0	0	0	0	0	0	0
		Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0
		Winchmore Dr to High St South	0	0	0	0	0	0	0
		All	1855	2033	2030	2015	2027	2012	2005
	High Street / A1134	A1134 Trumpington Road (North) to High St (South)	336	296	292	283	267	259	270
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	277	310	310	315	303	301	292
		High St (South) to A1134 Long Rd (East)	495	519	514	529	524	521	518
		High St (South) to A1134 Trumpington Road (North)	655	726	726	715	750	746	738
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	226	182	177	182	179	182	178
		A1134 Long Rd (East) to High St (South)	345	468	480	474	472	471	466
		All	2333	2500	2499	2496	2494	2479	2462

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
08:00 - 09:00	A1134 / Parson Rd	A1134 North to A1134 South	522	513	508	503	478	468	472
		A1134 North to Parson Road	31	28	28	28	26	26	27
		A1134 South to Parson Road	119	101	104	104	104	105	105
		A1134 South to A1134 North	769	823	814	807	843	836	831
		Parson Road to A1134 North	43	45	45	45	44	44	45
		Parson Road to A1134 South	90	91	91	91	91	91	91
		All	1574	1601	1588	1577	1585	1570	1570
	A1134 / Bentley Rd	A1134 North to A1134 South	532	509	505	499	473	459	467
		A1134 North to Bentley Rd	36	32	33	32	30	29	30
		A1134 South to Bentley Rd	66	59	59	60	59	59	60
		A1134 South to A1134 North	755	823	816	807	841	837	834
		Bentley Rd to A1134 North	4	8	7	6	7	6	7
		Bentley Rd to A1134 South	23	32	31	32	31	36	32
		All	1417	1464	1452	1435	1441	1426	1428
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	15	5	8	7	7	9	7
		A1134 North to A1134 South	490	453	452	445	416	405	410
		A1134 North to Latham Rd	8	7	7	7	6	10	6
		Newton Rd to A1134 South	73	81	82	79	82	79	82
		Newton Rd to Latham Rd	0	0	0	0	0	0	0
		Newton Rd to A1134 North	60	62	62	69	65	62	65
		A1134 South to Latham Rd	10	10	8	8	10	8	10
		A1134 South to A1134 North	760	831	825	815	839	843	834
		A1134 South to Newton Rd	10	16	16	16	17	16	17
		Latham Rd to A1134 North	2	1	1	1	1	1	2
		Latham Rd to Newton Rd	0	0	0	0	0	0	0
		Latham Rd to A1134 South	4	4	3	3	4	3	4
		All	1432	1471	1462	1450	1446	1435	1437
	A1134 / Queensway	A1134 North to A1134 South	488	431	427	424	394	388	389
		A1134 North to Queensway	1	3	1	2	1	1	5
		A1134 South to Queensway	4	7	7	10	3	5	4
		A1134 South to A1134 North	829	895	891	883	909	912	906
		Queensway to A1134 North	4	8	5	7	5	6	6
		Queensway to A1134 South	26	35	37	35	35	34	35
		All	1351	1379	1369	1360	1347	1347	1344
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	282	291	293	285	249	251	249
		A1134 North to A1134 South	346	282	284	278	248	245	251
		Brooklands Ave to A1134 South	88	86	79	81	81	79	79
		Brooklands Ave to A1134 North	233	208	222	224	211	213	212
		A1134 South to A1134 North	581	588	583	580	604	604	598
		A1134 South to Brooklands Ave	243	254	252	251	253	257	254
		Chaucer Rd to A1134 North	71	79	81	80	86	84	90
		Chaucer Rd to Brooklands Ave	19	26	26	26	27	27	28
		Chaucer Rd to A1134 South	54	65	64	65	64	64	63
		A1134 North to Chaucer Rd	20	24	25	26	24	25	23
		Brooklands Ave to Chaucer Rd	103	141	138	142	140	133	135
		A1134 South to Chaucer Rd	13	65	65	61	61	62	65
		All	2053	2110	2112	2099	2048	2044	2047
	A1134 / Bateman St	A1134 North to A1134 South	551	494	492	484	420	435	416
		A1134 North to Bateman St	47	170	174	165	144	153	143
		A1134 South to Bateman St	98	47	50	30	28	37	38
		A1134 South to A1134 North	786	831	836	855	872	864	859
		Bateman St to A1134 North	67	91	93	82	83	89	80
		Bateman St to A1134 South	95	96	96	96	92	88	96
		All	1644	1729	1741	1711	1639	1665	1632
	A1134 / Fen Causeway	A1134 North to A1134 South	274	280	274	272	245	252	251
		A1134 North to Fen Causeway	278	386	367	390	365	376	357
		A1134 South to Fen Causeway	519	450	474	433	430	423	419
		A1134 South to A1134 North	334	463	449	495	519	524	509
		Fen Causeway to A1134 North	327	264	267	238	192	204	197
		Fen Causeway to A1134 South	328	378	387	372	316	340	305
		All	2060	2220	2218	2201	2066	2118	2036
	A1134 / Lensfield Rd	A1134 North to A1134 South	211	264	258	256	236	245	240
		A1134 North to Lensfield Rd	180	79	81	90	89	87	80
		A1134 South to Lensfield Rd	503	576	570	581	562	582	565
		A1134 South to A1134 North	157	150	144	150	145	144	138
		Lensfield Rd to A1134 North	72	121	120	122	110	111	106
		Lensfield Rd to A1134 South	339	397	379	403	370	380	365
		All	1462	1587	1551	1603	1514	1549	1494
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	691	647	723	703	655	645	600
		A10 Cambridge Road (North) to Church Road	153	88	117	157	116	115	81
		A10 Cambridge Road (South) to Church Road	36	23	24	12	14	8	24
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	810	574	879	569	634	679	676
		Church Road to A10 Cambridge Road (North)	85	43	62	40	37	35	49
		Church Road to A10 Cambridge Road (South)	33	16	31	4	10	8	21
		All	1808	1391	1835	1486	1465	1489	1451
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	647	633	700	652	616	613	586
		A10 Cambridge Road (North) to London Road	76	25	48	52	43	42	30
		High St to London Road	46	31	48	32	32	33	38
		High St to A10 Cambridge Road (North)	659	454	710	446	483	510	553
		London Road to A10 Cambridge Road (North)	177	152	185	145	178	189	166
		London Road to High St	79	74	81	82	75	74	74
		All	1684	1369	1772	1408	1427	1461	1446
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				637	664	710	678
		Cambridge Rd S to P&R				73	89	90	101
		Cambridge Rd N to Cambridge Rd S				888	776	775	680
		Cambridge Rd N to P&R					0	80	0
		P&R to Cambridge Rd S				0	0	1656	0
		P&R to Cambridge Rd N				0	24	0	0
		All					1671	1656	1557
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						712	
		Cambridge Rd N to Cambridge Rd S						922	
		P&R exit to Cambridge Rd S						0	
		All						1634	

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
09:00 - 10:00	M11 J11	Hauxton Road to M11 Southbound Slip	107	154	156	138	137	137	155
		Hauxton Road to A10 Cambridge Road	217	318	298	293	288	291	287
		Hauxton Road to M11 Northbound Slip	355	462	364	417	493	492	466
		Hauxton Road to Hauxton Road	0	0		0	0	0	0
		M11 Southbound Slip to A10 Cambridge Road	295	243	222	301	291	310	246
		M11 Southbound Slip to M11 Northbound Slip	0	0	0	0	0	0	0
		M11 Southbound Slip to Hauxton Road	754	816	683	483	527	520	592
		M11 Southbound Slip to M11 Southbound Slip	3	5		3	4	4	4
		M11 Southbound Mainline through	1448	1692		1451	1621	1542	1430
		A10 Cambridge Road to M11 Northbound Slip	225	334	109	40	48	47	50
		A10 Cambridge Road to Hauxton Road	546	818	597	890	897	935	874
		A10 Cambridge Road to M11 Southbound Slip	14	11	0	13	13	14	19
		A10 Cambridge Road to A10 Cambridge Road	0	0	0	0	0	0	0
		M11 Northbound Slip to Hauxton Road	331	432	312	371	371	352	402
		M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0
		M11 Northbound Slip to A10 Cambridge Road	18	19	19	18	4	105	15
		M11 Northbound Slip to M11 Northbound Slip	13	12		11	12	12	14
		M11 Northbound Mainline through	1888	2042		2003	1990	1993	2013
		M11 Northbound to P&R access			0	51	53		55
		A10 Cambridge Road to P&R access			0	42	50		58
		M11 Southbound to P&R access			112	110	108		95
		M11 Northbound to P&R access South of M11J11				0	10		
		Trumpington P&R exit to new P&R access				10	11		
		All	6214	7358	6925	6656	6929	6982	6795
	A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	31	33	46	35	31	32	28
		Hauxton Road Southbound Through	405	380	347	366	394	397	398
		Hauxton Road Southbound to Access Road	3	4	3	3	2	3	3
		Addenbrookes Road to Hauxton Road Southbound Slip	268	457	412	432	458	460	432
		Addenbrookes Road to Access Road	0	0	0	0	0	0	0
		Addenbrookes Road to P&R Access	23	14	0	0	0	0	0
		Addenbrookes Road to Hauxton Road Northbound	0	0	9	37	0	2	0
		Dedicated P&R Link Northbound to Access Road	9	9	9	20	26	13	18
		Dedicated P&R Link Northbound Through	210	239	386	195	196	204	200
		Hauxton Road Northbound Through	677	660	566	633	642	647	672
		Hauxton Road Northbound to Addenbrookes Road	741	1154	1048	1100	1131	1143	1186
		Access Road to P&R Access	0	0	7	0	5	6	0
		Access Road to Hauxton Road N	6	23	28	28	26	27	27
		Access Road to Addenbrookes Road	2	47	33	43	43	44	46
		Access Road to Hauxton Road S	2	47	33	41	45	46	47
		Dedicated P&R Link Southbound Through				9	10	10	10
		All	2377	3068	2928	2942	3009	3033	3067
	Trumpington P&R	Hauxton Road Southbound Through	391	384	380	372	374	375	378
		Hauxton Road Southbound to P&R	46	53	39	43	78	80	78
		Hauxton Road Northbound to P&R	9	12	21	61	12	12	12
		Hauxton Road Northbound Through	679	659	594	619	653	657	688
		P&R to Hauxton Road Northbound	68	105	176	121	100	101	101
		P&R to Hauxton Road Southbound	46	20	14	33	53	52	48
		All	1239	1232	1224	1248	1270	1276	1306
	Consort Ave T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	411	410	395	391	426	426	432
		Hauxton Rd Northbound to Consort Ave	33	34	36	40	40	40	41
		Hauxton Rd Southbound to Consort Ave	26	28	28	27	28	28	29
		Hauxton Rd Southbound to Hauxton Rd Northbound	722	731	745	712	727	729	764
		Consort Ave to Hauxton Rd Northbound	54	101	110	99	99	100	95
		Consort Ave to Hauxton Rd Southbound	25	23	24	23	24	25	23
		All	1270	1326	1338	1292	1344	1348	1383
	Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	380	353	339	339	374	372	385
		Hauxton Rd Northbound to Waitrose	139	153	146	165	178	170	142
		Hauxton Rd Southbound to Waitrose	62	57	69	39	31	35	67
		Hauxton Rd Southbound to Hauxton Rd Northbound	714	775	786	772	796	794	790
		Waitrose to Hauxton Rd North	106	140	146	141	146	143	140
		Waitrose to Hauxton Rd South	59	87	88	89	88	89	87
		All	1459	1563	1579	1557	1626	1616	1623
	High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	443	448	444	454	459	448	437
		High St to A1301 Shelford Rd	152	109	116	122	123	124	113
		Hauxton Rd to A1301 Shelford Rd	61	77	72	75	84	83	88
		Hauxton Rd to High St	759	838	867	851	873	870	856
		A1301 Shelford Rd to High St	257	327	332	329	331	330	334
		A1301 Shelford Rd to Hauxton Rd	74	54	38	48	90	90	88
		All	1746	1853	1869	1878	1960	1945	1915
	High Street / Maris Lane	High St North to High St South	594	556	560	576	582	573	550
		High St North to Maris Lane	80	125	129	121	120	124	121
		High St South to Maris Lane	72	165	222	196	159	169	173
		High St South to High St North	949	1005	984	989	1048	1036	1021
		All	1694	1851	1896	1881	1910	1902	1865
	High Street / Church Lane	High St North to High St South	595	642	658	645	640	639	633
		High St South to High St North	944	998	980	986	1042	1031	1015
		Church Lane to High St North	195	203	213	207	205	203	211
		Church Lane to High St South	76	30	26	45	56	51	30
		All	1810	1874	1877	1882	1943	1924	1889
	High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	16	15	15	14	14	15	15
		High St North to High St South	578	629	647	633	629	626	621
		High St North to Winchmore Dr	3	3	3	3	3	2	3
		Alpha Terrace to High St South	17	14	14	13	13	13	15
		Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0
		Alpha Terrace to High St North	19	18	26	23	23	23	19
		High St South to Winchmore Dr	2	3	3	1	2	1	2
		High St South to High St North	1129	1194	1188	1195	1244	1233	1225
		High St South to Alpha Terrace	14	14	15	12	12	12	13
		Winchmore Dr to High St North	0	0	0	0	0	0	0
		Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0
		Winchmore Dr to High St South	0	0	0	0	0	0	0
		All	1778	1889	1909	1894	1940	1926	1912
	High Street / A1134	A1134 Trumpington Road (North) to High St (South)	275	226	233	221	220	211	219
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	163	186	197	199	206	198	194
		High St (South) to A1134 Long Rd (East)	486	503	503	513	520	517	511
		High St (South) to A1134 Trumpington Road (North)	661	702	712	705	750	736	735
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	154	111	109	116	109	116	110
		A1134 Long Rd (East) to High St (South)	315	412	423	417	417	420	409
		All	2054	2141	2175	2170	2222	2198	2179

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
09:00 - 10:00	A1134 / Parson Rd	A1134 North to A1134 South	418	397	411	402	405	387	396
		A1134 North to Parson Road	14	12	13	13	13	13	14
		A1134 South to Parson Road	17	15	15	15	16	16	15
		A1134 South to A1134 North	801	796	808	809	843	840	830
		Parson Road to A1134 North	4	2	3	3	4	3	3
		Parson Road to A1134 South	15	15	15	15	15	16	15
		All	1269	1237	1265	1257	1296	1275	1273
	A1134 / Bentley Rd	A1134 North to A1134 South	412	384	397	387	389	370	383
		A1134 North to Bentley Rd	13	13	12	13	13	12	12
		A1134 South to Bentley Rd	29	23	24	24	25	25	25
		A1134 South to A1134 North	776	778	790	789	826	820	809
		Bentley Rd to A1134 North	10	9	10	9	10	10	10
		Bentley Rd to A1134 South	17	26	26	26	26	28	26
		All	1258	1233	1258	1249	1289	1265	1265
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	16	8	6	6	6	9	8
		A1134 North to A1134 South	413	385	390	383	384	364	373
		A1134 North to Latham Rd	7	7	8	8	7	12	8
		Newton Rd to A1134 South	6	13	13	14	14	13	15
		Newton Rd to Latham Rd	0	0	0	0	0	0	0
		Newton Rd to A1134 North	12	14	14	19	17	14	16
		A1134 South to Latham Rd	6	5	5	6	6	6	6
		A1134 South to A1134 North	774	771	782	784	827	817	810
		A1134 South to Newton Rd	8	12	11	11	11	11	12
		Latham Rd to A1134 North	4	3	2	2	2	2	4
		Latham Rd to Newton Rd	0	0	0	0	0	0	0
		Latham Rd to A1134 South	3	3	3	3	3	3	3
		All	1251	1220	1234	1235	1277	1250	1256
	A1134 / Queensway	A1134 North to A1134 South	408	366	369	363	362	349	355
		A1134 North to Queensway	2	3	2	2	2	2	6
		A1134 South to Queensway	11	10	9	13	9	10	10
		A1134 South to A1134 North	780	778	789	793	838	821	822
		Queensway to A1134 North	8	9	9	13	9	10	9
		Queensway to A1134 South	27	34	34	34	34	34	35
		All	1237	1199	1212	1217	1254	1226	1235
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	303	340	342	331	326	334	331
		A1134 North to A1134 South	320	279	280	273	274	262	270
		Brooklands Ave to A1134 South	52	44	43	44	41	43	44
		Brooklands Ave to A1134 North	227	169	219	219	219	219	222
		A1134 South to A1134 North	548	519	524	532	566	551	549
		A1134 South to Brooklands Ave	231	221	223	229	232	230	229
		Chaucer Rd to A1134 North	37	56	44	57	58	56	62
		Chaucer Rd to Brooklands Ave	13	18	19	18	19	19	19
		Chaucer Rd to A1134 South	37	46	46	46	47	46	46
		A1134 North to Chaucer Rd	20	26	26	25	28	29	26
		Brooklands Ave to Chaucer Rd	66	86	101	91	93	88	92
		A1134 South to Chaucer Rd	11	51	51	50	52	50	53
		All	1864	1854	1918	1914	1954	1927	1944
	A1134 / Bateman St	A1134 North to A1134 South	588	581	590	569	567	562	565
		A1134 North to Bateman St	38	174	177	171	173	170	173
		A1134 South to Bateman St	51	23	13	26	33	31	32
		A1134 South to A1134 North	763	723	777	784	811	797	806
		Bateman St to A1134 North	62	82	83	77	73	79	78
		Bateman St to A1134 South	44	50	49	49	45	44	51
		All	1546	1634	1690	1676	1702	1684	1704
	A1134 / Fen Causeway	A1134 North to A1134 South	238	309	326	314	308	302	315
		A1134 North to Fen Causeway	266	476	480	492	507	514	512
		A1134 South to Fen Causeway	412	322	360	321	320	310	320
		A1134 South to A1134 North	415	489	499	541	564	563	565
		Fen Causeway to A1134 North	426	375	372	339	328	326	330
		Fen Causeway to A1134 South	378	447	438	423	428	419	418
		All	2135	2417	2475	2430	2454	2435	2459
	A1134 / Lensfield Rd	A1134 North to A1134 South	137	180	191	198	211	208	209
		A1134 North to Lensfield Rd	115	25	31	45	50	47	39
		A1134 South to Lensfield Rd	565	613	615	621	630	628	633
		A1134 South to A1134 North	274	250	255	257	261	260	261
		Lensfield Rd to A1134 North	209	319	328	318	311	306	315
		Lensfield Rd to A1134 South	361	600	608	601	597	601	612
		All	1659	1986	2029	2041	2060	2049	2069
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	506	601	548	571	588	548	559
		A10 Cambridge Road (North) to Church Road	53	31	36	69	38	39	35
		A10 Cambridge Road (South) to Church Road	23	31	12	16	11	18	23
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	660	990	727	983	994	1070	939
		Church Road to A10 Cambridge Road (North)	77	65	59	44	63	61	76
		Church Road to A10 Cambridge Road (South)	25	34	25	5	17	13	26
		All	1344	1751	1408	1688	1712	1749	1657
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	489	627	559	554	588	548	577
		A10 Cambridge Road (North) to London Road	47	19	21	29	23	16	12
		High St to London Road	35	41	34	35	37	37	38
		High St to A10 Cambridge Road (North)	537	839	584	850	795	866	761
		London Road to A10 Cambridge Road (North)	146	156	154	132	191	210	176
		London Road to High St	66	76	66	67	78	76	75
		All	1319	1758	1418	1667	1712	1754	1638
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				984	976	1042	962
		Cambridge Rd S to P&R				108	151	151	161
		Cambridge Rd N to Cambridge Rd S				616	586	554	550
		Cambridge Rd N to P&R				0	0	103	0
		P&R to Cambridge Rd S				0	0	1848	0
		P&R to Cambridge Rd N				0	25	0	0
		All					1838	1848	1758
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						1045	
		Cambridge Rd N to Cambridge Rd S						707	
		P&R exit to Cambridge Rd S						0	
		All						1752	

	Junction	Movement	Max Q Length (m)							Avg Q Length (m)							
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	
M11 J11		Hauxton Road to M11 Southbound Slip	50	81	148	106	111	110	133	1	3	15	7	5	8	10	
		Hauxton Road to A10 Cambridge Road	50	81	148	106	111	110	133	1	3	15	7	5	8	10	
		Hauxton Road to M11 Northbound Slip	50	81	148	106	111	110	133	1	3	15	7	5	8	10	
		Hauxton Road to Hauxton Road	50	81	148	106	111	110	133	1	3	15	7	5	8	10	
		M11 Southbound Off-Slip to A10 Cambridge Road	101	3120	106	1695	1383	1671	3057	14	2126	14	645	628	886	1710	
		M11 Southbound Off-Slip to M11 Northbound On-Slip	101	3120	106	1695	1383	1671	3057	14	2126	14	645	628	886	1710	
		M11 Southbound Off-Slip to Hauxton Road	101	3120	106	1695	1383	1671	3057	14	2126	14	645	628	886	1710	
		M11 Southbound Off-Slip to M11 Southbound On-Slip	101	3120	106	1695	1383	1671	3057	14	2126	14	645	628	886	1710	
		M11 Southbound Mainline through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		A10 Cambridge Road to M11 Northbound On-Slip	178	1255	137	476	460	233	380	22	749	38	403	333	206	159	
		A10 Cambridge Road to Hauxton Road	178	1255	137	476	460	233	380	22	749	38	403	333	206	159	
		A10 Cambridge Road to M11 Southbound On-Slip	178	1255	137	476	460	233	380	22	749	38	403	333	206	159	
		A10 Cambridge Road to A10 Cambridge Road	178	1255	137	476	460	233	380	22	749	38	403	333	206	159	
		M11 Northbound Off-Slip to Hauxton Road	59	108	113	192	117	202	189	7	19	23	45	25	38	29	
		M11 Northbound Off-Slip to M11 Southbound On-Slip	59	108	113	192	117	202	189	7	19	23	45	25	38	29	
		M11 Northbound Off-Slip to A10 Cambridge Road	59	108	113	192	117	0	189	7	19	23	45	25	0	29	
		M11 Northbound Off-Slip to M11 Northbound On-Slip	59	108	113	192	117	202	189	7	19	23	45	25	38	29	
		M11 Northbound Mainline through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		M11 Northbound to P&R access			113	192	117		189			23	45	25		29	
		A10 Cambridge Road to P&R access			137	476	460		380			38	403	333		159	
		M11 Southbound to P&R access			61	1523	986		3038			3	523	372		1680	
		M11 Northbound to P&R access South of M11J11				192	28						45	1			
		Trumpington P&R exit to new P&R access				29	29						1	1			
		All	180	3284	322	1750	1421	1689	3065	7	483	28	181	152	188	399	
	A1309 / Addenbrooke's Road		Hauxton Road Southbound to Addenbrookes Road	29	24	29	39	27	40	34	0	0	0	0	0	0	0
			Hauxton Road Southbound Through	33	26	35	38	28	46	34	0	0	0	0	0	0	0
			Hauxton Road Southbound to Access Road	17	18	17	17	16	17	17	0	1	0	1	1	1	0
			Addenbrookes Road to Hauxton Road Southbound Slip	0	0	3	0	0	0	0	0	0	0	0	0	0	0
			Addenbrookes Road to Access Road	30	27	18	27	17	19	19	3	3	2	4	1	2	1
			Addenbrookes Road to P&R Access	30	27	18	28	17	19	19	3	3	2	4	1	2	1
			Addenbrookes Road to Hauxton Road Northbound	30	27	18	28	17	19	19	3	3	2	4	1	2	1
			Dedicated P&R Link Northbound to Access Road	57	89	97	93	81	88	79	2	5	6	5	4	4	3
		Dedicated P&R Link Northbound Through	57	89	97	93	81	88	79	2	5	6	5	4	4	3	
		Hauxton Road Northbound Through	203	750	345	637	666	493	746	22	106	72	102	103	77	149	
		Hauxton Road Northbound to Addenbrookes Road	264	807	368	837	833	795	759	28	346	118	414	342	383	290	
		Access Road to P&R Access	14	81	68	90	91	90	77	0	12	10	13	13	14	12	
		Access Road to Hauxton Road N	14	81	68	90	91	90	77	0	12	10	13	13	14	12	
		Access Road to Addenbrookes Road	14	81	68	90	91	90	77	0	12	10	13	13	14	12	
		Access Road to Hauxton Road S	14	81	68	90	91	90	77	0	12	10	13	13	14	12	
		Dedicated P&R Link Southbound Through				26	25	26	23				1	1	1	1	
		All	282	807	368	837	833	795	759	6	53	23	54	46	48	46	
Trumpington P&R			Hauxton Road Southbound Through	91	89	81	91	101	97	102	7	8	7	7	10	11	11
			Hauxton Road Southbound to P&R	91	89	81	91	101	97	102	7	8	7	7	10	11	11
			Hauxton Road Northbound to P&R	338	357	361	356	357	356	359	115	124	174	135	142	144	167
			Hauxton Road Northbound Through	338	367	371	367	368	366	369	115	131	182	142	149	151	175
			P&R to Hauxton Road Northbound	51	51	53	54	53	55	54	10	11	14	12	12	12	12
			P&R to Hauxton Road Southbound	51	51	53	54	53	55	54	10	11	14	12	12	12	12
			All	338	367	371	367	368	366	369	44	68	94	74	78	79	91
	Consort Ave T-junction		Hauxton Rd Northbound to Hauxton Rd Southbound	61	67	58	70	72	65	67	0	0	0	0	1	1	1
			Hauxton Rd Northbound to Consort Ave	17	12	18	21	13	18	16	0	0	0	0	0	0	0
			Hauxton Rd Southbound to Consort Ave	287	289	289	287	288	288	288	101	117	151	121	124	125	134
			Hauxton Rd Southbound to Hauxton Rd Northbound	287	289	289	287	288	288	288	101	117	151	121	124	125	134
			Consort Ave to Hauxton Rd Northbound	54	95	91	95	90	102	97	2	8	5	6	5	7	7
		Consort Ave to Hauxton Rd Southbound	55	95	91	95	90	103	97	2	8	5	6	5	7	7	
Waitrose T-junction		All	287	289	289	287	288	288	288	21	27	32	27	27	28	30	
		Hauxton Rd Northbound to Hauxton Rd Southbound	53	56	53	53	56	56	56	3	5	4	6	7	7	5	
		Hauxton Rd Northbound to Waitrose	53	56	53	53	56	56	56	3	5	4	6	7	7	5	
		Hauxton Rd Southbound to Waitrose	163	163	161	161	160	160	160	61	65	67	59	57	60	61	
		Hauxton Rd Southbound to Hauxton Rd Northbound	163	163	161	161	160	160	160	61	65	67	59	57	60	61	
		Waitrose to Hauxton Rd North	37	57	61	54	61	59	52	8	14	17	15	17	17	15	
		Waitrose to Hauxton Rd South	42	63	66	59	66	64	58	11	19	21	20	22	22	20	
		All	163	163	161	161	160	160	160	18	24	21	19	20	20	19	
	High Street / Hauxton Rd / A1301 Shellford Rd		High St to Hauxton Rd	82	83	81	83	83	82	81	16	18	18	19	20	19	18
			High St to A1301 Shellford Rd	82	83	81	83	83	82	81	16	18	18	19	20	19	18
		Hauxton Rd to A1301 Shellford Rd	56	61	65	65	67	68	68	17	19	19	19	19	19	19	
		Hauxton Rd to High St	56	61	65	65	67	68	68	17	19	19	19	19	19	19	
		A1301 Shellford Rd to High St	80	196	173	160	162	186	183	11	34	33	28	27	32	34	
		A1301 Shellford Rd to Hauxton Rd	76	192	169	156	158	182	180	8	31	30	25	24	28	31	
High Street / Maris Lane		All	88	196	173	160	162	186	183	13	25	25	23	22	25	26	
		High St North to High St South	89	144	89	103	119	106	96	3	7	4	4	5	5	4	
		High St North to Maris Lane	74	143	76	88	104	91	83	2	9	6	5	6	6	5	
		High St South to Maris Lane	111	113	112	113	112	113	112	8	12	10	9	8	9	9	
		High St South to High St North	122	124	123	124	123	124	123	10	14	12	11	10	11	11	
		All	130	170	130	132	139	134	130	5	11	8	8	7	8	7	
High Street / Church Lane		High St North to High St South	97	123	113	110	112	124	123	6	7	7	7	7	7	7	
		High St South to High St North	310	321	288	289	299	301	309	51	63	38	33	42	38	39	
		Church Lane to High St North	241	648	647	648	648	648	648	80	558	580	603	601	620	577	
		Church Lane to High St South	241	648	647	648	648	648	648	80	558	580	603	601	620	577	
		All	333	648	647	648	648	648	648	46	209	208	214	217	222	208	
		High St North to Alpha Terrace	49	53	51	49	52	54	63	0	1	1	1	1	1	1	
High Street / Winchmore Dr / Alpha Terrace		High St North to High St South	62	66	62	60	63	65	74	1	1	1	1	1	1	1	
		High St North to Winchmore Dr	60	64	62	61	64	66	74	1	1	1	1	1	1	1	
		Alpha Terrace to High St South	13	13	15	14	15	16	14	0	0	0	0	0	0	0	
		Alpha Terrace to Winchmore Dr	13	14	15	14	16	16	15	0	0	0	1	1	1	0	
		Alpha Terrace to High St North	13	14	15	14	16	16	15	0	0	0	1	1	1	0	
		High St South to Winchmore Dr	203	204	201	203	202	200	198	30	35	23	20	23	22	21	
		High St South to High St North	192	209	161	120	153	144	126	16	18	5	3	4	4	3	
		High St South to Alpha Terrace	196	208	167	136	164	157	134	15	16	5	3	4	4	3	
		Winchmore Dr to High St North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Winchmore Dr to High St South	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	All	211	211	205	206	205	204	2010									

	Junction	Movement	Max Q Length (m)							Avg Q Length (m)						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
07:00 - 08:00	A1134 / Parson Rd	A1134 North to A1134 South	5	5	5	1	4	6	2	0	0	0	0	0	0	0
		A1134 North to Parson Road	1	2	1	0	0	0	0	0	0	0	0	0	0	0
		A1134 South to Parson Road	126	190	205	185	240	223	230	4	10	13	13	19	16	19
		A1134 South to A1134 North	114	173	193	173	228	211	218	3	9	11	12	17	15	17
		Parson Road to A1134 North	17	23	30	24	30	27	32	0	1	1	1	1	1	1
		Parson Road to A1134 South	17	24	30	24	31	27	32	0	1	1	1	1	1	1
		All	126	190	205	185	240	223	230	1	4	4	4	6	5	6
	A1134 / Bentley Rd	A1134 North to A1134 South	1	1	1	2	3	1	4	0	0	0	0	0	0	0
		A1134 North to Bentley Rd	0	0	1	1	2	0	3	0	0	0	0	0	0	0
		A1134 South to Bentley Rd	195	229	302	215	284	281	270	11	21	24	22	31	28	32
		A1134 South to A1134 North	186	220	293	206	275	272	261	10	20	23	21	30	26	30
		Bentley Rd to A1134 North	6	12	13	10	10	8	15	0	0	0	0	0	0	0
		Bentley Rd to A1134 South	7	13	16	13	13	9	17	0	0	0	0	0	0	0
		All	195	229	302	215	284	281	270	4	7	8	7	10	9	10
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	53	48	54	54	58	54	51	1	1	1	1	1	1	1
		A1134 North to A1134 South	61	55	60	60	64	60	57	1	1	1	1	1	1	1
		A1134 North to Latham Rd	61	55	60	60	64	60	57	1	1	1	1	1	1	1
		Newton Rd to A1134 South	20	22	23	21	22	19	23	0	1	1	0	1	0	1
		Newton Rd to Latham Rd	19	21	22	21	21	18	23	0	0	0	0	0	0	1
		Newton Rd to A1134 North	18	20	21	20	20	18	22	0	1	1	1	1	1	1
		A1134 South to Latham Rd	330	359	330	369	350	375	360	42	55	59	57	66	66	68
		A1134 South to A1134 North	333	363	333	372	353	379	363	43	56	60	58	67	67	69
		A1134 South to Newton Rd	333	363	333	372	353	379	363	43	56	60	58	67	67	69
		Latham Rd to A1134 North	5	3	3	2	2	2	3	0	0	0	0	0	0	0
		Latham Rd to Newton Rd	4	4	4	3	6	4	4	0	0	0	0	0	0	0
		Latham Rd to A1134 South	7	7	3	3	6	4	6	0	0	0	0	0	0	0
		All	333	363	333	372	353	379	363	9	11	12	12	14	14	14
	A1134 / Queensway	A1134 North to A1134 South	42	31	36	43	52	44	42	0	0	0	0	0	0	0
		A1134 North to Queensway	23	11	17	22	28	22	22	0	0	0	0	0	0	0
		A1134 South to Queensway	125	126	125	127	123	125	127	16	21	23	22	22	24	25
		A1134 South to A1134 North	138	139	138	139	136	137	139	17	22	24	23	24	25	26
		Queensway to A1134 North	16	29	32	31	29	26	28	1	3	3	2	2	2	3
		Queensway to A1134 South	16	29	32	30	29	25	28	1	2	2	2	2	2	2
		All	138	139	138	139	136	137	139	7	10	11	10	11	11	12
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	318	343	334	321	341	297	294	40	70	52	46	55	45	44
		A1134 North to A1134 South	318	342	334	321	341	298	294	40	70	52	46	55	45	44
		Brooklands Ave to A1134 South	600	412	610	662	590	598	633	320	164	406	456	354	316	363
		Brooklands Ave to A1134 North	600	412	610	662	590	598	633	320	164	406	456	354	316	363
		A1134 South to Brooklands Ave	87	87	88	89	87	88	88	20	28	30	27	29	30	29
		A1134 South to A1134 North	87	87	88	89	87	88	88	20	28	30	27	29	30	29
		Chaucer Rd to A1134 North	31	49	46	48	49	52	55	4	9	8	10	9	10	10
		Chaucer Rd to Brooklands Ave	31	49	46	48	49	52	55	4	9	8	10	9	10	10
		Chaucer Rd to A1134 South	31	49	46	48	49	52	55	4	9	8	10	9	10	10
		A1134 North to Chaucer Rd	318	342	334	321	341	298	294	40	70	52	46	55	45	44
		Brooklands Ave to Chaucer Rd	600	412	610	662	590	598	633	320	164	406	456	354	316	363
		A1134 South to Chaucer Rd	80	80	81	82	80	81	81	17	23	25	23	24	25	25
		All	600	450	610	662	590	601	633	73	61	96	101	88	79	86
	A1134 / Bateman St	A1134 North to A1134 South	100	216	156	143	172	133	124	3	16	8	6	9	6	6
		A1134 North to Bateman St	93	209	149	135	165	126	117	2	15	7	5	8	5	6
		A1134 South to Bateman St	78	68	68	64	58	68	84	1	1	1	1	1	1	1
		A1134 South to A1134 North	96	97	101	91	100	88	93	5	5	5	4	5	5	5
		Bateman St to A1134 North	28	38	35	33	31	35	33	1	2	1	1	1	1	1
		Bateman St to A1134 South	29	39	36	34	32	36	34	1	1	1	1	1	1	1
		All	122	229	169	150	183	145	141	2	7	4	3	4	3	3
	A1134 / Fen Causeway	A1134 North to A1134 South	61	90	87	92	91	93	91	4	24	22	22	24	25	23
		A1134 North to Fen Causeway	61	90	87	92	91	93	91	4	24	22	22	24	25	23
		A1134 South to Fen Causeway	60	80	89	74	83	74	76	1	4	5	4	5	4	4
		A1134 South to A1134 North	60	80	89	74	83	74	76	1	4	5	4	5	4	4
		Fen Causeway to A1134 North	125	611	611	613	612	612	612	2	266	257	286	329	396	332
		Fen Causeway to A1134 South	125	611	611	613	612	612	612	2	266	257	286	329	396	332
		All	129	611	611	613	612	612	612	2	74	72	79	91	107	91
	A1134 / Lensfield Rd	A1134 North to A1134 South	23	64	56	57	60	51	66	1	5	4	4	5	4	5
		A1134 North to Lensfield Rd	23	64	56	57	60	51	66	1	5	4	4	5	4	5
		A1134 South to Lensfield Rd	37	73	71	71	68	69	72	1	4	4	4	4	4	5
		A1134 South to A1134 North	37	73	71	71	68	69	72	1	4	4	4	4	4	5
		Lensfield Rd to A1134 North	83	641	627	650	640	654	657	2	132	95	106	121	156	122
		Lensfield Rd to A1134 South	83	641	627	650	640	654	657	2	132	95	106	121	156	122
		All	83	641	627	650	640	654	657	1	47	34	38	43	55	44
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A10 Cambridge Road (North) to Church Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A10 Cambridge Road (South) to Church Road	203	413	162	491	467	461	199	5	139	3	277	201	237	23
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	190	399	149	478	454	448	185	4	134	2	267	193	228	22
		Church Road to A10 Cambridge Road (North)	39	195	31	468	292	264	65	3	67	2	183	113	79	13
		Church Road to A10 Cambridge Road (South)	39	195	32	469	292	264	65	2	67	1	183	113	79	12
		All	203	413	163	505	467	461	200	3	81	2	182	124	124	14
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	115	171	129	138	154	152	136	8	12	9	11	11	11	8
		A10 Cambridge Road (North) to London Road	115	171	129	138	154	152	136	8	12	9	11	11	11	8
		High St to London Road	215	670	218	876	806	790	349	17	266	18	573	436	495	50
		High St to A10 Cambridge Road (North)	215	670	218	876	806	790	349	17	266	18	573	436	495	50
		London Road to A10 Cambridge Road (North)	112	199	113	233	302	318	136	22	56	24	78	109	120	33
		London Road to High St	112	199	113	233	302	318	136	22	56	24	78	109	120	33
		All	224	670	229	876	811	792	359	16	111	17	220	185	209	30
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N					826	830	798					615	524	583
		Cambridge Rd S to P&R					0	774	742					0	479	534
		Cambridge Rd N to Cambridge Rd S					0	15	32					0	0	3
		Cambridge Rd N to P&R					0	15	32					0	0	3
		P&R to Cambridge Rd S					0	0	798					0	0	280
		P&R to Cambridge Rd N					0	0	0					0	0	0
		All					830	798	392					167	280	28
New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N							240						134		
	Cambridge Rd N to Cambridge Rd S							0						0		
	P&R exit to Cambridge Rd S							0						0		
								240						45		

Junction	Movement	Max Q Length (m)							Avg Q Length (m)						
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
M11 J11	Huxton Road to M11 Southbound Slip	56	419	241	315	396	330	445	2	224	52	112	187	110	232
	Huxton Road to A10 Cambridge Road	56	419	241	315	396	330	445	2	224	52	112	187	110	232
	Huxton Road to M11 Northbound Slip	56	419	241	315	396	330	445	2	224	52	112	187	110	232
	Huxton Road to Huxton Road	0	419	241	315	396	330	445	0	224	52	112	187	110	232
	M11 Southbound Slip to A10 Cambridge Road	123	3043	169	2511	2474	2566	3651	16	2259	31	1629	1600	1804	3128
	M11 Southbound Slip to M11 Northbound Slip	123	3043	169	2511	2474	2566	3651	16	2259	31	1629	1600	1804	3128
	M11 Southbound Slip to Huxton Road	123	3043	169	2511	2474	2566	3651	16	2259	31	1629	1600	1804	3128
	M11 Southbound Slip to M11 Southbound Slip	123	3043	169	2511	2474	2566	3651	16	2259	31	1629	1600	1804	3128
	M11 Southbound Mainline through	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	A10 Cambridge Road to M11 Northbound Slip	463	1287	285	475	459	233	460	69	1154	79	419	380	215	365
	A10 Cambridge Road to Huxton Road	463	1287	285	475	459	233	460	69	1154	79	419	380	215	365
	A10 Cambridge Road to M11 Southbound Slip	463	1287	285	475	459	233	460	69	1154	79	419	380	215	365
	A10 Cambridge Road to A10 Cambridge Road	0	1287	285	475	459	233	460	0	1154	79	419	380	215	365
	M11 Northbound Slip to Huxton Road	55	571	94	338	260	552	847	7	166	18	111	75	146	432
	M11 Northbound Slip to M11 Southbound Slip	55	571	94	338	260	552	847	7	166	18	111	75	146	432
	M11 Northbound Slip to A10 Cambridge Road	55	571	94	338	260	0	847	7	166	18	111	75	0	432
	M11 Northbound Slip to M11 Northbound Slip	0	571	94	338	260	552	847	0	166	18	111	75	146	432
	M11 Northbound Mainline through	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	M11 Northbound to P&R access			94	338	260		847			18	111	75		432
	A10 Cambridge Road to P&R access			285	475	459		460			79	419	380		365
	M11 Southbound to P&R access			91	2445	2190		3647			10	1583	1320		3124
	M11 Northbound to P&R access South of M11J11				338	21						111	1		
	Trumpington P&R exit to new P&R access				22	22						1	1		
	All	466	3110	1140	2569	2505	2566	3714	16	634	86	428	396	398	809
A1309 / Addenbrooke's Road	Huxton Road Southbound to Addenbrookes Road	25	173	26	59	105	63	146	0	61	0	9	22	22	30
	Huxton Road Southbound Through	26	173	33	63	105	70	152	0	61	0	9	22	22	30
	Huxton Road Southbound to Access Road	21	18	20	21	20	20	20	1	1	1	1	1	1	1
	Addenbrookes Road to Huxton Road Southbound Slip	0	571	75	296	497	228	570	0	294	16	84	213	106	216
	Addenbrookes Road to Access Road	25	21	15	23	10	12	10	2	2	1	3	0	1	1
	Addenbrookes Road to P&R Access	25	21	15	23	10	12	10	2	2	1	3	0	1	1
	Addenbrookes Road to Huxton Road Northbound	25	21	15	23	10	12	10	2	2	1	3	0	1	1
	Dedicated P&R Link Northbound to Access Road	62	103	94	84	75	74	82	2	4	5	4	2	3	2
	Dedicated P&R Link Northbound Through	62	103	94	84	75	74	82	2	4	5	4	2	3	2
	Huxton Road Northbound Through	340	985	493	900	963	910	979	84	619	235	502	519	483	632
	Huxton Road Northbound to Addenbrookes Road	304	985	497	947	963	937	979	56	659	240	557	557	560	661
	Access Road to P&R Access	17	122	90	95	111	133	103	1	28	14	19	22	28	22
	Access Road to Huxton Road N	17	122	90	95	111	133	103	1	28	14	19	22	28	22
	Access Road to Addenbrookes Road	17	122	90	95	111	133	103	1	28	14	19	22	28	22
	Access Road to Huxton Road S	17	122	90	95	111	133	103	1	28	14	19	22	28	22
	Dedicated P&R Link Southbound Through				20	16	18	17			1	1	1	1	1
	All	355	1083	504	978	1021	965	1029	16	192	57	119	136	123	159
Trumpington P&R	Huxton Road Southbound Through	95	153	86	101	136	129	132	8	29	6	9	17	22	16
	Huxton Road Southbound to P&R	95	153	86	101	136	129	132	8	29	6	9	17	22	16
	Huxton Road Northbound to P&R	352	369	361	358	360	359	360	195	294	318	251	305	298	310
	Huxton Road Northbound Through	352	369	371	368	371	369	370	195	304	329	260	315	308	320
	P&R to Huxton Road Northbound	51	53	55	55	55	55	55	15	22	26	23	23	23	22
	P&R to Huxton Road Southbound	51	53	55	55	55	55	55	15	22	26	23	23	23	22
	All	352	369	371	368	371	369	370	72	162	170	136	165	163	167
08:00 - 09:00 Consort Ave T- junction	Huxton Rd Northbound to Huxton Rd Southbound	77	94	65	66	66	79	73	1	7	1	1	1	5	2
	Huxton Rd Northbound to Consort Ave	21	55	25	30	33	44	34	0	7	0	0	0	5	1
	Huxton Rd Southbound to Consort Ave	288	291	289	290	289	290	289	146	197	198	191	202	196	196
	Huxton Rd Southbound to Huxton Rd Northbound	288	291	289	290	289	290	289	146	197	198	191	202	196	196
	Consort Ave to Huxton Rd Northbound	92	164	146	132	147	181	153	8	28	13	17	18	41	20
	Consort Ave to Huxton Rd Southbound	92	165	146	133	147	181	153	8	28	13	17	18	41	20
	All	288	291	289	290	289	290	289	32	53	45	45	48	58	48
Waitrose T-junction	Huxton Rd Northbound to Huxton Rd Southbound	57	60	58	65	65	66	60	6	10	8	11	13	13	8
	Huxton Rd Northbound to Waitrose	57	60	58	65	65	66	60	6	10	8	11	13	13	8
	Huxton Rd Southbound to Waitrose	162	166	162	161	161	162	161	64	73	71	70	71	69	67
	Huxton Rd Southbound to Huxton Rd Northbound	162	166	162	161	161	162	161	64	73	71	70	71	69	67
	Waitrose to Huxton Rd North	45	70	65	67	71	66	60	11	19	19	20	21	21	18
High Street / Huxton Rd / A1301 Shelford Rd	Waitrose to Huxton Rd South	51	75	70	73	77	72	65	15	23	24	25	26	26	23
	All	162	166	162	161	161	162	161	21	29	24	24	25	25	23
	High St to Huxton Rd	81	82	82	83	83	84	83	16	19	18	20	21	21	17
	High St to A1301 Shelford Rd	81	82	82	83	83	84	83	16	19	18	20	21	21	17
	Huxton Rd to A1301 Shelford Rd	58	62	65	68	67	67	67	17	20	19	21	21	20	20
	Huxton Rd to High St	58	62	65	68	67	67	67	17	20	19	21	21	20	20
	A1301 Shelford Rd to High St	157	515	523	508	465	520	533	29	336	333	304	279	318	341
High Street / Maris Lane	A1301 Shelford Rd to Huxton Rd	154	512	523	508	465	520	533	25	332	330	300	276	314	337
	All	158	515	527	511	468	524	537	22	177	175	161	149	168	179
	High St North to High St South	182	227	181	194	213	202	139	10	23	12	17	19	22	8
	High St North to Maris Lane	168	221	176	179	198	187	124	10	25	13	17	19	22	9
	High St South to Maris Lane	111	113	113	113	112	112	112	18	20	17	18	19	18	17
High Street / Church Lane	High St South to High St North	122	123	124	124	123	123	123	21	24	21	22	22	22	21
	All	190	237	194	199	220	210	149	15	23	16	18	20	21	14
	High St North to High St South	130	155	144	140	148	148	140	9	11	8	10	10	12	8
	High St South to High St North	302	316	248	256	290	273	284	83	62	30	37	49	41	41
	Church Lane to High St North	393	650	650	650	650	650	650	246	637	637	637	636	637	637
High Street / Winchmore Dr / Alpha Terrace	Church Lane to High St South	393	650	650	650	650	650	650	246	637	637	637	636	637	637
	All	411	650	650	650	650	650	650	112	237	225	228	232	230	229
	High St North to Alpha Terrace	120	109	70	83	78	105	78	7	4	1	2	1	7	1
	High St North to High St South	134	123	81	94	89	116	89	8	5	2	3	2	8	2
	High St North to Winchmore Dr	132	121	81	95	89	117	89	8	5	2	3	2	8	2
	Alpha Terrace to High St South	16	17	20	17	18	20	16	0	0	1	0	0	1	0
	Alpha Terrace to Winchmore Dr	16	17	20	17	18	20	16	1	1	1	1	1	1	1
	Alpha Terrace to High St North	16	17	20	17	18	20	16	1	1	1	1	1	1	1
	High St South to Winchmore Dr	203	204	199	201	203	198	201	51	44	23	27	31	26	29
	High St South to High St North	208	212	192	206	206	162	206	36	25	10	12	15	11	13
	High St South to Alpha Terrace	208	211	199	205	206	172	205	35	25	10	11	14	11	13
	Winchmore Dr to High St North	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Winchmore Dr to High St South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
High Street / A1134	All	241	227	205	214	210	218	207	14	11	5	6	7	7	6
	A1134 Trumpington Road (North) to High St (South)	60	1	0	0	0									

	Junction	Movement	Max Q Length (m)							Avg Q Length (m)																																					
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple																															
	A1134 / Parson Rd	A1134 North to A1134 South	58	10	12	34	31	30	27	11	0	0	0	0	0	1																															
		A1134 North to Parson Road	50	5	5	27	24	25	16	11	0	0	0	1	0	0	1																														
		A1134 South to Parson Road	242	268	306	304	322	312	336	22	24	40	30	54	41	46	46																														
		A1134 South to A1134 North	230	256	293	292	317	300	324	20	22	37	28	50	38	42	42																														
		Parson Road to A1134 North	68	75	97	88	125	110	111	8	9	13	9	26	22	18	19																														
		Parson Road to A1134 South	68	75	98	88	126	111	111	8	8	13	9	25	22	18	18																														
		All	242	268	306	304	322	312	336	13	10	17	13	26	21	21	21																														
	A1134 / Bentley Rd	A1134 North to A1134 South	49	2	3	3	1	2	4	5	0	0	0	0	0	0	0																														
		A1134 North to Bentley Rd	47	1	0	1	0	0	1	5	0	0	0	0	0	0	0																														
		A1134 South to Bentley Rd	266	315	325	333	345	350	339	19	37	58	60	98	75	80	80																														
		A1134 South to A1134 North	257	306	316	324	336	341	330	18	35	56	57	94	72	76	76																														
		Bentley Rd to A1134 North	15	17	17	19	23	19	19	0	1	1	0	1	1	1	1																														
		Bentley Rd to A1134 South	16	18	18	20	24	20	20	0	0	0	0	1	1	1	1																														
		All	267	315	325	333	345	350	339	8	12	19	20	32	25	26	26																														
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	66	57	72	66	53	60	53	2	1	1	1	1	1	1	1																														
		A1134 North to A1134 South	74	65	78	72	59	66	59	2	1	1	1	1	1	1	1																														
		A1134 North to Latham Rd	74	65	78	72	59	66	59	2	1	1	1	1	1	1	1																														
		Newton Rd to A1134 South	55	59	62	60	68	64	70	4	5	5	5	6	5	6	6																														
		Newton Rd to Latham Rd	55	59	61	60	68	63	69	4	5	5	5	5	5	5	5																														
		Newton Rd to A1134 North	54	58	60	59	67	63	69	4	5	5	5	6	5	6	6																														
		A1134 South to Latham Rd	345	367	359	387	380	392	386	64	95	125	119	188	167	185	185																														
		A1134 South to A1134 North	348	371	362	390	384	395	389	65	97	127	121	190	169	187	187																														
		A1134 South to Newton Rd	348	371	362	390	384	395	389	65	97	127	121	190	169	187	187																														
		Latham Rd to A1134 North	6	4	3	4	3	4	7	0	0	0	0	0	0	0	0																														
		Latham Rd to Newton Rd	2	2	1	1	1	1	2	0	0	0	0	0	0	0	0																														
		Latham Rd to A1134 South	7	7	5	6	7	6	7	0	0	0	0	0	0	0	0																														
		All	348	371	362	390	384	395	389	14	21	27	26	40	35	39	39																														
			A1134 / Queensway	A1134 North to A1134 South	51	38	47	57	60	47	58	1	0	0	0	1	0	0	0																												
				A1134 North to Queensway	28	16	24	33	36	25	34	0	0	0	0	1	0	0	0																												
A1134 South to Queensway	125			126	127	127	129	129	128	22	26	29	29	38	37	40	40																														
A1134 South to A1134 North	137			138	140	139	142	141	141	22	28	31	32	39	38	42	42																														
Queensway to A1134 North	19			42	31	34	31	29	36	1	3	2	2	2	2	2	3																														
Queensway to A1134 South	18			42	31	34	31	29	36	1	3	2	2	2	2	2	3																														
All	137			138	140	139	142	141	141	10	13	14	14	17	17	19	19																														
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	393	392	391	392	392	393	393	251	267	261	261	274	274	285	285																														
		A1134 North to A1134 South	393	392	391	392	392	393	393	251	267	262	261	274	274	285	285																														
		Brooklands Ave to A1134 South	653	526	655	662	646	643	657	604	289	571	604	541	573	585	585																														
		Brooklands Ave to A1134 North	653	526	655	662	646	643	657	604	289	571	604	541	573	585	585																														
		A1134 South to A1134 North	87	87	87	89	88	89	89	26	29	30	31	35	34	36	36																														
		A1134 South to Brooklands Ave	87	87	87	89	88	89	89	26	29	30	31	35	34	36	36																														
		Chaucer Rd to A1134 North	64	78	84	84	101	99	108	16	21	22	21	28	25	31	31																														
		Chaucer Rd to Brooklands Ave	64	78	84	84	101	99	108	16	21	22	21	28	25	31	31																														
		Chaucer Rd to A1134 South	64	78	84	84	101	99	108	16	21	22	21	28	25	31	31																														
		A1134 North to Chaucer Rd	393	392	391	392	392	393	393	251	267	262	261	274	274	285	285																														
		Brooklands Ave to Chaucer Rd	653	526	655	662	646	643	657	604	289	571	604	541	573	585	585																														
		A1134 South to Chaucer Rd	80	80	80	82	81	82	82	22	25	26	27	30	29	31	31																														
		All	653	549	655	662	647	648	657	195	150	195	201	197	202	209	209																														
			A1134 / Bateman St	A1134 North to A1134 South	310	321	321	322	316	323	322	146	160	160	156	151	177	182	182																												
				A1134 North to Bateman St	303	314	314	315	308	315	315	141	155	151	145	171	162	176	176																												
A1134 South to Bateman St	162			153	178	140	185	179	219	5	5	4	8	9	9	12	12																														
A1134 South to A1134 North	162			164	175	161	193	196	217	10	11	10	14	14	15	18	18																														
Bateman St to A1134 North	111			174	183	152	224	199	231	17	38	38	33	59	51	69	69																														
Bateman St to A1134 South	112			175	184	153	225	200	232	18	38	39	33	60	52	69	69																														
All	312			340	334	335	338	350	344	56	68	66	64	82	76	88	88																														
	A1134 / Fen Causeway	A1134 North to A1134 South	89	94	94	93	95	94	93	28	42	42	41	43	43	44	44																														
		A1134 North to Fen Causeway	89	94	94	93	95	94	93	28	42	42	41	43	43	44	44																														
		A1134 South to Fen Causeway	112	207	148	205	231	191	255	8	36	24	41	46	42	47	47																														
		A1134 South to A1134 North	112	207	148	205	231	191	255	8	36	24	41	46	42	47	47																														
		Fen Causeway to A1134 North	427	615	616	615	616	618	616	157	483	502	509	518	551	537	537																														
		Fen Causeway to A1134 South	427	615	616	615	616	618	616	157	483	502	509	518	551	537	537																														
		All	434	615	616	615	616	618	616	50	149	148	158	163	169	169	169																														
	A1134 / Lensfield Rd	A1134 North to A1134 South	142	306	394	328	502	441	476	32	87	132	116	216	184	194	194																														
		A1134 North to Lensfield Rd	142	306	394	328	502	441	476	32	87	132	116	216	184	194	194																														
		A1134 South to Lensfield Rd	83	91	91	90	92	93	92	13	23	21	24	30	28	31	31																														
		A1134 South to A1134 North	83	91	91	90	92	93	92	13	23	21	24	30	28	31	31																														
		Lensfield Rd to A1134 North	475	663	664	663	663	663	664	216	601	607	609	603	611	618	618																														
		Lensfield Rd to A1134 South	475	663	664	663	663	663	664	216	601	607	609	603	611	618	618																														
		All	475	663	664	663	663	663	664	87	237	253	250	283	274	281	281																														
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0																														
		A10 Cambridge Road (North) to Church Road	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0																														
		A10 Cambridge Road (South) to Church Road	153	491	162	491	491	491	476	4	388	5	406	382	381	279	279																														
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	140	478	149	478	478	478	462	3	375	4	393	370	368	269	269																														
		Church Road to A10 Cambridge Road (North)	35	462	31	538	520	529	277	2	330	2	521	425	445	137	137																														
		Church Road to A10 Cambridge Road (South)	35	462	32	538	521	530	277	1	331	1	522	425	446	137	137																														
		All	153	521	162	538	532	535	479	2	285	2	368	320	328	165	165																														
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	138	261	183	194	219	194	213	11	26	15	20	22	17	19	19																														
		A10 Cambridge Road (North) to London Road	138	261	183	194	219	194	213	11	26	15	20	22	17	19	19																														
		High St to London Road	183	877	198	877	878	876	791	13	754	14	828	801	796	477	477																														
		High St to A10 Cambridge Road (North)	183	877	198	877	878	876	791	13	754	14	828	801	796	477	477																														
		London Road to A10 Cambridge Road (North)	92	354	91	270	448	417	318	15	220	17	141	333	320	167	167																														
		London Road to High St	92	354	91	270	448	417	318	15	220	17	141	333	320	167	167																														
		All	190	877	224	877	878	876	791	13	333	15	329	385	378	221	221																														
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				826	841	842	839				701	707	712	603																															
		Cambridge Rd S to P&R				0	785	786	783				0	652	657	553																															
		Cambridge Rd N to Cambridge Rd S				0	19	32	16				0	0	0	3	0																														
		Cambridge Rd N to P&R				0	19	32	16				0	0	0	3	0																														
		P&R to Cambridge Rd S				0	0	842	0				0	0	0	343	0																														
	New P&R egress / A10 Cambridge Rd	P&R to Cambridge Rd N				0	0	0	0				0	0	0	0	0																														
		All				841	842	839				226	343	343	193	193																															
		Cambridge Rd S to Cambridge Rd N				0		244								157	0																														
		Cambridge Rd N to Cambridge Rd S				0		0								0	0																														
		P&R exit to Cambridge Rd S				0		0								0	0																														
																																															</

	Junction	Movement	Max Q Length (m)							Avg Q Length (m)							
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple	
M11 J11		Hauxton Road to M11 Southbound Slip	34	166	89	45	93	174	235	0	43	3	1	7	19	49	
		Hauxton Road to A10 Cambridge Road	34	166	89	45	93	174	235	0	43	3	1	7	19	49	
		Hauxton Road to M11 Northbound Slip	34	166	89	45	93	174	235	0	43	3	1	7	19	49	
		Hauxton Road to Hauxton Road	0	166		45	93	174	235	0	43		1	7	19	49	
		M11 Southbound Slip to A10 Cambridge Road	77	2563	102	3012	2667	3514	3749	6	1957	15	2427	2290	2945	3584	
		M11 Southbound Slip to M11 Northbound Slip	77	2563	102	3012	2667	3514	3749	6	1957	15	2427	2290	2945	3584	
		M11 Southbound Slip to Hauxton Road	77	2563	102	3012	2667	3514	3749	6	1957	15	2427	2290	2945	3584	
		M11 Southbound Slip to M11 Southbound Slip	77	2563	13	3012	2667	3514	3749	6	1957		2427	2290	2945	3584	
		M11 Southbound Mainline through	0	0		0	0	0	0	0	0		0	0	0	0	
		A10 Cambridge Road to M11 Northbound Slip	77	1214	117	475	457	233	455	5	638	23	368	269	188	214	
		A10 Cambridge Road to Hauxton Road	77	1214	117	475	457	233	455	5	638	23	368	269	188	214	
		A10 Cambridge Road to M11 Southbound Slip	77	1214	117	475	457	233	455	5	638	23	368	269	188	214	
		A10 Cambridge Road to A10 Cambridge Road	0	1214		475	457	233	455	0	638		368	269	188	214	
		M11 Northbound Slip to Hauxton Road	41	96	61	65	57	76	310	3	15	9	7	6	9	56	
		M11 Northbound Slip to M11 Southbound Slip	41	96	61	65	57	76	310	3	15	9	7	6	9	56	
		M11 Northbound Slip to A10 Cambridge Road	41	96	61	65	57	0	310	3	15	9	7	6	0	56	
		M11 Northbound Slip to M11 Northbound Slip	0	96		65	57	76	310	0	15		7	6	9	56	
		M11 Northbound Mainline through	0	0		0	0	0	0	0	0		0	0	0	0	
		M11 Northbound to P&R access			61	65	57		310			9	7	6		56	
		A10 Cambridge Road to P&R access			117	475	457		455			23	368	269		214	
		M11 Southbound to P&R access			39	2996	2553		3746			1	2134	2197		3581	
		M11 Northbound to P&R access South of M11J11				65	23						7	1			
		Trumpington P&R exit to new P&R access				28	25						1	1			
		All	89	2779	602	3027	2703	3514	3749	2	442	32	549	530	577	832	
A1309 / Addenbrooke's Road		Hauxton Road Southbound to Addenbrookes Road	24	77	26	23	17	35	51	0	9	0	0	0	1	1	
		Hauxton Road Southbound Through	26	77	26	27	20	34	51	0	9	0	0	0	1	1	
		Hauxton Road Southbound to Access Road	16	18	14	15	15	17	15	0	1	0	0	0	0	1	
		Addenbrookes Road to Hauxton Road Southbound Slip	0	209	0	0	77	222	225	0	79	0	0	9	19	42	
		Addenbrookes Road to Access Road	20	16	13	20	0	8	1	1	1	1	2	0	0	0	
		Addenbrookes Road to P&R Access	20	16	13	20	0	8	1	1	1	1	2	0	0	0	
		Addenbrookes Road to Hauxton Road Northbound	20	16	13	20	0	8	1	1	1	1	2	0	0	0	
		Dedicated P&R Link Northbound to Access Road	48	51	72	59	44	43	45	1	2	3	2	1	1	1	
		Dedicated P&R Link Northbound Through	48	51	72	59	44	43	45	1	2	3	2	1	1	1	
		Hauxton Road Northbound Through	41	614	304	280	432	613	516	2	153	129	95	47	134	100	
		Hauxton Road Northbound to Addenbrookes Road	102	736	358	756	615	783	744	10	262	140	334	180	264	269	
		Access Road to P&R Access	16	68	61	60	58	62	61	1	8	8	8	8	8	8	
		Access Road to Hauxton Road N	16	68	61	60	58	62	61	1	8	8	8	8	8	8	
		Access Road to Addenbrookes Road	16	68	61	60	58	62	61	1	8	8	8	8	8	8	
		Access Road to Hauxton Road S	16	68	61	60	58	62	61	1	8	8	8	8	8	8	
		Dedicated P&R Link Southbound Through				25	18	19	24				1	0	0	1	
		All	102	770	358	756	660	824	765	2	58	31	44	25	43	42	
	Trumpington P&R		Hauxton Road Southbound Through	85	104	79	72	85	92	91	7	9	6	6	9	9	10
			Hauxton Road Southbound to P&R	85	104	79	72	85	92	91	7	9	6	6	9	9	10
			Hauxton Road Northbound to P&R	180	320	338	333	348	340	353	34	142	260	116	180	181	223
			Hauxton Road Northbound Through	180	330	348	343	359	351	363	34	150	270	124	188	189	232
			P&R to Hauxton Road Northbound	37	47	54	49	48	47	49	6	10	20	10	11	10	10
			P&R to Hauxton Road Southbound	37	47	54	49	48	47	49	6	10	20	10	11	10	10
			All	180	330	348	343	359	351	363	16	78	139	64	97	97	119
Consort Ave T- junction			Hauxton Rd Northbound to Hauxton Rd Southbound	72	76	63	59	59	64	67	0	1	1	0	0	0	1
			Hauxton Rd Northbound to Consort Ave	3	20	18	16	14	15	15	0	0	0	0	0	0	0
			Hauxton Rd Southbound to Consort Ave	228	284	289	284	287	285	288	37	124	167	121	143	141	154
		Hauxton Rd Southbound to Hauxton Rd Northbound	228	284	289	284	287	285	288	37	124	167	121	143	141	154	
		Consort Ave to Hauxton Rd Northbound	11	63	59	31	50	68	68	0	6	3	1	2	4	5	
		Consort Ave to Hauxton Rd Southbound	9	63	60	34	50	68	68	0	6	3	1	1	4	5	
Waitrose T-junction		All	228	284	289	284	287	286	288	7	27	35	25	29	30	33	
		Hauxton Rd Northbound to Hauxton Rd Southbound	60	65	62	67	72	66	63	8	10	9	11	14	12	9	
		Hauxton Rd Northbound to Waitrose	60	65	62	67	72	66	63	8	10	9	11	14	12	9	
		Hauxton Rd Southbound to Waitrose	159	161	161	160	160	160	161	36	61	65	58	61	59	59	
		Hauxton Rd Southbound to Hauxton Rd Northbound	159	161	161	160	160	160	161	36	61	65	58	61	59	59	
		Waitrose to Hauxton Rd North	44	69	65	68	70	70	72	11	18	20	21	21	21	22	
		Waitrose to Hauxton Rd South	49	74	71	74	75	75	77	15	23	26	26	26	26	27	
		All	159	161	161	160	160	160	161	16	26	24	23	24	23	23	
	High Street / Hauxton Rd / A1301 Shelford Rd		High St to Hauxton Rd	81	82	81	82	85	83	81	13	15	14	14	19	16	13
			High St to A1301 Shelford Rd	81	82	81	82	85	83	81	13	15	14	14	19	16	13
		Hauxton Rd to A1301 Shelford Rd	56	55	63	66	67	67	67	9	12	13	13	14	13	13	
		Hauxton Rd to High St	56	55	63	66	67	67	67	9	12	13	13	14	13	13	
		A1301 Shelford Rd to High St	97	567	567	567	568	567	568	20	530	536	523	522	532	536	
		A1301 Shelford Rd to Hauxton Rd	93	563	564	563	564	564	564	16	526	532	519	518	528	532	
High Street / Maris Lane		All	98	567	567	567	568	567	568	15	271	274	267	268	273	273	
		High St North to High St South	113	162	114	117	167	144	93	4	13	5	5	13	11	4	
		High St North to Maris Lane	98	158	99	108	153	130	78	3	14	6	6	13	12	5	
		High St South to Maris Lane	108	111	110	111	111	110	110	8	12	13	13	13	13	12	
		High St South to High St North	119	121	121	121	121	121	121	10	15	16	16	16	16	15	
		All	133	177	136	138	182	165	122	6	14	10	10	14	13	9	
High Street / Church Lane		High St North to High St South	113	132	117	128	126	120	126	6	10	7	7	7	7	7	
		High St South to High St North	224	244	198	236	242	220	226	18	27	18	20	25	23	21	
		Church Lane to High St North	336	649	648	649	649	649	649	208	637	636	636	636	636	637	
		Church Lane to High St South	336	649	648	649	649	649	649	208	637	636	636	636	636	637	
		All	346	649	648	649	649	649	649	77	225	221	221	223	222	222	
		High St North to Alpha Terrace	52	96	67	54	58	66	61	1	11	1	1	1	1	1	
High Street / Winchmore Dr / Alpha Terrace		High St North to High St South	66	110	78	65	70	77	72	1	12	2	1	1	2	2	
		High St North to Winchmore Dr	64	108	79	65	70	78	72	1	12	1	1	1	2	1	
		Alpha Terrace to High St South	19	20	23	19	22	21	20	0	0	1	0	1	1	1	
		Alpha Terrace to Winchmore Dr	19	20	23	19	22	21	20	1	1	1	1	1	1	1	
		Alpha Terrace to High St North	19	20	23	19	22	21	20	0	0	1	1	1	1	1	
		High St South to Winchmore Dr	196	200	194	198	198	197	195	16	21	15	16	18	18	16	
		High St South to High St North	148	189	124	126	142	136	100	3	5	1	2	2	2	1	
		High St South to Alpha Terrace	153	188	124	132	158	145	108	3	5	2	2	2	2	1	
		Winchmore Dr to High St North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Winchmore Dr to High St South	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	All	198	219	194	200	201	199	196	3	7	2	2	3	3	2		
High Street / A1134		A1134 Trumpington Road (North) to High St (South)															

	Junction	Movement	Max Q Length (m)							Avg Q Length (m)						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
	A1134 / Parson Rd	A1134 North to A1134 South	67	27	3	1	2	31	7	7	10	0	0	0	11	0
		A1134 North to Parson Road	65	26	0	0	0	27	0	7	9	0	0	0	11	0
		A1134 South to Parson Road	101	84	61	78	74	105	85	7	9	1	1	2	9	1
		A1134 South to A1134 North	89	72	49	66	62	93	73	6	8	0	1	1	8	1
		Parson Road to A1134 North	14	8	6	5	13	15	7	1	1	0	0	0	1	0
		Parson Road to A1134 South	16	9	7	6	12	16	8	1	1	0	0	0	1	0
		All	117	84	61	78	76	105	85	5	6	0	0	1	7	0
	A1134 / Bentley Rd	A1134 North to A1134 South	29	24	1	1	1	24	1	1	6	0	0	0	6	0
		A1134 North to Bentley Rd	28	23	0	1	0	23	0	1	6	0	0	0	6	0
		A1134 South to Bentley Rd	78	58	79	82	94	102	81	2	0	1	2	3	7	1
		A1134 South to A1134 North	69	49	70	73	85	93	71	2	0	0	2	3	7	1
		Bentley Rd to A1134 North	12	19	13	12	14	18	13	0	1	0	0	0	2	0
		Bentley Rd to A1134 South	12	19	14	13	15	19	13	0	1	0	0	0	2	0
		All	82	78	79	82	95	103	81	1	3	0	1	1	5	0
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	49	51	50	49	50	51	50	1	2	1	1	1	1	1
		A1134 North to A1134 South	56	59	56	55	55	57	56	1	2	1	1	1	2	1
		A1134 North to Latham Rd	56	59	56	55	55	57	56	1	2	1	1	1	2	1
		Newton Rd to A1134 South	10	11	11	13	13	13	12	0	0	0	0	0	0	0
		Newton Rd to Latham Rd	7	9	7	11	11	11	9	0	0	0	0	0	0	0
		Newton Rd to A1134 North	10	10	10	13	11	12	11	0	0	0	0	0	0	0
		A1134 South to Latham Rd	163	144	133	153	229	197	206	14	7	7	12	19	17	17
		A1134 South to A1134 North	167	147	136	156	233	200	209	15	7	7	13	20	18	18
		A1134 South to Newton Rd	167	147	136	156	233	200	209	15	7	7	13	20	18	18
		Latham Rd to A1134 North	10	9	7	6	5	6	8	0	0	0	0	0	0	0
		Latham Rd to Newton Rd	4	2	2	2	2	2	3	0	0	0	0	0	0	0
		Latham Rd to A1134 South	10	8	9	8	9	9	9	0	0	0	0	0	0	0
		All	167	147	136	157	233	200	209	3	2	2	3	4	4	4
	A1134 / Queensway	A1134 North to A1134 South	36	35	36	38	38	51	43	0	1	0	0	0	1	0
		A1134 North to Queensway	15	13	12	18	16	27	21	0	1	0	0	0	1	0
		A1134 South to Queensway	115	114	106	115	119	118	123	6	5	3	5	8	7	7
		A1134 South to A1134 North	128	127	119	127	132	131	136	6	5	4	5	8	8	7
		Queensway to A1134 North	15	20	20	17	15	19	18	0	1	0	1	0	1	1
		Queensway to A1134 South	15	20	20	16	15	18	18	0	1	0	0	0	1	0
		All	128	127	119	127	132	131	136	3	3	2	2	4	4	3
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	325	327	300	309	340	340	294	87	74	57	58	56	79	50
		A1134 North to A1134 South	324	327	300	309	340	340	295	87	74	58	59	56	80	50
		Brooklands Ave to A1134 South	652	256	582	612	564	591	618	605	52	416	489	385	486	515
		Brooklands Ave to A1134 North	652	256	582	612	564	591	618	605	52	416	489	385	486	515
		A1134 South to A1134 North	88	88	86	86	87	89	87	14	14	12	14	17	16	15
		A1134 South to Brooklands Ave	88	88	86	86	87	89	87	14	14	12	14	17	16	15
		Chaucer Rd to A1134 North	38	51	48	51	49	59	57	8	11	10	11	11	13	13
		Chaucer Rd to Brooklands Ave	38	51	48	51	49	59	57	8	11	10	11	11	13	13
		Chaucer Rd to A1134 South	38	51	48	51	49	59	57	8	11	10	11	11	13	13
		A1134 North to Chaucer Rd	324	327	300	309	340	340	295	87	74	58	59	56	80	50
		Brooklands Ave to Chaucer Rd	652	256	582	612	564	591	618	605	52	416	489	385	486	515
		A1134 South to Chaucer Rd	81	81	79	79	81	82	81	11	11	9	11	14	13	12
		All	652	364	590	618	586	597	622	135	39	94	107	90	115	109
	A1134 / Bateman St	A1134 North to A1134 South	171	144	158	105	142	210	124	20	11	9	6	5	15	5
		A1134 North to Bateman St	164	137	150	97	135	203	116	18	10	8	5	4	14	4
		A1134 South to Bateman St	95	82	62	114	116	113	151	2	1	1	3	2	2	6
		A1134 South to A1134 North	141	123	115	141	131	145	175	8	6	6	9	8	8	12
		Bateman St to A1134 North	37	49	48	69	43	45	94	2	2	2	11	2	2	15
		Bateman St to A1134 South	38	50	49	70	44	46	95	2	2	2	10	2	2	15
		All	198	177	191	155	184	237	219	9	5	5	7	4	7	10
	A1134 / Fen Causeway	A1134 North to A1134 South	62	88	85	85	88	89	90	4	16	14	13	15	16	15
		A1134 North to Fen Causeway	62	88	85	85	88	89	90	4	16	14	13	15	16	15
		A1134 South to Fen Causeway	96	116	123	129	141	127	139	5	14	15	20	22	21	24
		A1134 South to A1134 North	96	116	123	129	141	127	139	5	14	15	20	22	21	24
		Fen Causeway to A1134 North	348	615	614	616	615	616	615	76	479	471	503	512	519	509
		Fen Causeway to A1134 South	348	615	614	616	615	616	615	76	479	471	503	512	519	509
		All	348	615	614	616	615	616	615	22	131	129	139	143	144	143
	A1134 / Lensfield Rd	A1134 North to A1134 South	47	69	143	163	305	273	307	2	6	10	19	31	29	27
		A1134 North to Lensfield Rd	47	69	143	163	305	273	307	2	6	10	19	31	29	27
		A1134 South to Lensfield Rd	73	84	85	86	84	88	88	7	19	20	21	19	20	20
		A1134 South to A1134 North	73	84	85	86	84	88	88	7	19	20	21	19	20	20
		Lensfield Rd to A1134 North	348	664	664	663	642	664	664	39	381	385	375	382	438	422
		Lensfield Rd to A1134 South	348	664	664	663	642	664	664	39	381	385	375	382	438	422
		All	352	664	664	663	642	664	664	16	135	138	138	144	163	156
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	0	55	0	0	0	0	0	0	5	0	0	0	0	0
		A10 Cambridge Road (North) to Church Road	0	55	0	0	0	0	0	0	5	0	0	0	0	0
		A10 Cambridge Road (South) to Church Road	83	470	61	491	489	489	420	1	194	1	263	226	200	130
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	70	457	47	477	476	476	407	1	187	0	253	217	192	125
		Church Road to A10 Cambridge Road (North)	28	540	30	541	541	543	398	1	466	1	531	511	519	287
		Church Road to A10 Cambridge Road (South)	28	540	30	542	541	543	398	0	466	0	532	512	520	287
		All	84	540	65	542	541	543	444	1	263	0	316	293	286	166
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	130	287	154	188	224	129	160	7	34	9	13	19	12	13
		A10 Cambridge Road (North) to London Road	130	287	154	188	224	129	160	7	34	9	13	19	12	13
		High St to London Road	99	874	121	877	877	877	712	8	620	9	722	674	693	435
		High St to A10 Cambridge Road (North)	99	874	121	877	877	877	712	8	620	9	722	674	693	435
		London Road to A10 Cambridge Road (North)	71	281	84	165	395	382	269	9	139	11	44	239	243	128
		London Road to High St	71	281	84	165	395	382	269	9	139	11	44	239	243	128
		All	144	874	168	877	877	877	714	8	264	10	260	311	316	192
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				824	837	837	800				457	480	436	295
		Cambridge Rd S to P&R				0	781	780	744				0	433	392	266
		Cambridge Rd N to Cambridge Rd S				0	14	37	12				0	0	5	0
		Cambridge Rd N to P&R				0	14	37	12				0	0	5	0
		P&R to Cambridge Rd S				0	0	837	0				0	0	208	0
		P&R to Cambridge Rd N				0	0	0	0				0	0	0	0
		All					837	837	800				152	208	286	94
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						239							92	
		Cambridge Rd N to Cambridge Rd S							0						0	
		P&R exit to Cambridge Rd S							0						0	
		All							239						31	

Junction	Movement	Delay (s)							LOS						
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
M11 J11	Huxton Road to M11 Southbound Slip	6	6	19	10	6	10	8	A	A	B	B	A	A	A
	Huxton Road to A10 Cambridge Road	17	19	49	26	19	25	20	B	B	D	C	B	C	B
	Huxton Road to M11 Northbound Slip	30	35	79	49	41	52	48	C	D	E	D	D	D	D
	Huxton Road to Huxton Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Off-Slip to A10 Cambridge Road	30	362	58	273	266	315	548	C	F	E	F	F	F	F
	M11 Southbound Off-Slip to M11 Northbound On-Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Off-Slip to Huxton Road	20	364	21	254	256	290	518	B	F	C	F	F	F	F
	M11 Southbound Off-Slip to M11 Southbound On-Slip	19	481	22	182	228	225	439	B	F	C	F	F	F	F
	M11 Southbound Mainline through	3	34	4	11	11	17	27	A	C	A	B	B	B	C
	A10 Cambridge Road to M11 Northbound On-Slip	24	234	53	288	231	163	99	C	F	D	F	F	F	F
	A10 Cambridge Road to Huxton Road	34	326	63	483	370	301	188	C	F	E	F	F	F	F
	A10 Cambridge Road to M11 Southbound On-Slip	27	390	0	479	332	292	186	C	F	A	F	F	F	F
	A10 Cambridge Road to A10 Cambridge Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Off-Slip to Huxton Road	45	132	101	230	170	205	140	D	F	F	F	F	F	F
	M11 Northbound Off-Slip to M11 Southbound On-Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Off-Slip to A10 Cambridge Road	18	24	63	53	33	7	33	B	C	E	D	C	A	C
	M11 Northbound Off-Slip to M11 Northbound On-Slip	33	42	105	56	44	55	48	C	D	F	E	D	D	D
	M11 Northbound Mainline through	2	3	3	3	3	3	3	A	A	A	A	A	A	A
	M11 Northbound to P&R access				144	102		98			A	F	F		F
	A10 Cambridge Road to P&R access				420	293		149			A	F	F		F
	M11 Southbound to P&R access			16	86	81		439			B	F	F		F
	M11 Northbound to P&R access South of M11J11				0	39						A	D		
	Trumpington P&R exit to new P&R access				38	44						D	D		
	All	15	108	36	100	86	86	110	B	F	D	F	F	F	F
A1309 / Addenbrooke's Road	Huxton Road Southbound to Addenbrookes Road	17	28	30	29	27	29	27	B	C	C	C	C	C	C
	Huxton Road Southbound Through	16	27	25	28	26	27	25	B	C	C	C	C	C	C
	Huxton Road Southbound to Access Road	44	60	48	56	60	59	46	D	E	D	E	E	E	D
	Addenbrookes Road to Huxton Road Southbound Slip	4	5	5	5	5	5	5	A	A	A	A	A	A	A
	Addenbrookes Road to Access Road	34	48	52	51	53	51	51	D	D	D	D	D	D	D
	Addenbrookes Road to P&R Access	37	52	0	48	46	55	48	D	D	A	D	D	D	D
	Addenbrookes Road to Huxton Road Northbound	0	0	59	58	0	63	0	A	A	E	E	A	E	A
	Dedicated P&R Link Northbound to Access Road	6	11	10	10	7	8	7	A	B	A	B	A	A	A
	Dedicated P&R Link Northbound Through	7	13	9	10	7	9	9	A	B	A	A	A	A	A
	Huxton Road Northbound Through	20	44	81	61	58	55	75	C	D	F	E	E	D	E
	Huxton Road Northbound to Addenbrookes Road	30	115	68	107	90	97	91	C	F	E	F	F	F	F
	Access Road to P&R Access	0	0	50	34	49	55	0	A	A	D	C	D	D	A
	Access Road to Huxton Road N	39	62	63	61	56	58	57	D	E	E	E	E	E	E
	Access Road to Addenbrookes Road	0	53	63	58	54	55	53	A	D	E	E	D	E	D
	Access Road to Huxton Road S	0	46	47	51	46	48	46	A	D	D	D	D	D	D
	Dedicated P&R Link Southbound Through				24	21	26	23				C	C	C	C
	All	19	54	44	53	47	49	51	B	D	D	D	D	D	D
Trumpington P&R	Huxton Road Southbound Through	10	11	9	9	11	11	11	B	B	A	A	B	B	B
	Huxton Road Southbound to P&R	32	30	34	29	32	34	36	C	C	C	C	C	C	D
	Huxton Road Northbound to P&R	51	72	123	103	85	97	91	D	E	F	F	F	F	F
	Huxton Road Northbound Through	70	93	145	105	114	113	129	E	F	F	F	F	F	F
	P&R to Huxton Road Northbound	28	29	32	27	27	28	28	C	C	C	C	C	C	C
	P&R to Huxton Road Southbound	32	34	36	35	31	33	34	C	C	D	C	C	C	C
	All	45	51	75	58	60	60	68	D	D	E	E	E	E	E
	All	6	7	7	7	8	8	9	C	A	A	D	A	A	A
Consort Ave T-junction	Huxton Rd Northbound to Huxton Rd Southbound	34	30	35	31	34	33	34	C	D	D	C	D	C	C
	Huxton Rd Southbound to Consort Ave	60	91	96	87	90	88	90	E	F	F	F	F	F	F
	Huxton Rd Southbound to Huxton Rd Northbound	64	86	101	87	89	89	91	E	F	F	F	F	F	F
	Consort Ave to Huxton Rd Northbound	37	46	43	42	43	47	48	D	D	D	D	D	D	D
	Consort Ave to Huxton Rd Southbound	34	43	42	41	43	42	44	C	D	D	D	D	D	D
	All	43	51	61	53	53	53	55	D	D	E	D	D	D	D
	All	2	2	2	3	3	3	2	A	A	A	A	A	A	A
	All	31	32	34	35	36	36	34	C	C	C	D	D	D	C
Waitrose T-junction	Huxton Rd Southbound to Waitrose	36	42	41	31	41	44	39	D	D	D	C	D	D	D
	Huxton Rd Southbound to Huxton Rd Northbound	41	47	44	42	40	43	42	D	D	D	D	D	D	D
	Waitrose to Huxton Rd North	42	50	63	49	56	52	49	D	E	E	D	E	D	D
	Waitrose to Huxton Rd South	71	87	89	82	89	80	85	E	E	C	F	F	F	F
	All	29	34	35	33	32	33	32	C	C	C	C	C	C	C
High Street / Huxton Rd / A1301 Shelford Rd	High St to Huxton Rd	23	25	24	26	26	26	26	C	C	C	C	C	C	C
	High St to A1301 Shelford Rd	13	13	13	13	13	12	13	B	B	B	B	B	B	B
	Huxton Rd to A1301 Shelford Rd	34	33	33	32	33	33	34	C	C	C	C	C	C	C
	Huxton Rd to High St	12	13	12	12	12	12	12	B	B	B	B	B	B	B
	A1301 Shelford Rd to High St	28	43	42	38	38	41	42	C	D	D	D	D	D	D
	A1301 Shelford Rd to Huxton Rd	14	24	23	21	23	24	26	B	C	C	C	C	C	C
High Street / Maris Lane	All	18	25	24	23	23	24	24	B	C	C	C	C	C	C
	High St North to High St South	12	16	14	14	14	14	14	B	C	B	B	B	B	B
	High St North to Maris Lane	23	38	34	29	28	31	34	C	C	D	D	D	D	D
	High St South to Maris Lane	5	5	4	4	4	4	4	A	A	A	A	A	A	A
	High St South to High St North	5	6	5	5	5	5	5	A	A	A	A	A	A	A
High Street / Church Lane	All	8	11	9	9	9	9	9	A	B	A	A	A	A	A
	High St North to High St South	10	11	11	11	11	11	11	B	B	B	B	B	B	B
	High St South to High St North	31	34	25	23	26	25	25	C	C	C	C	C	C	C
	Church Lane to High St North	169	741	763	752	735	768	743	F	F	F	F	F	F	F
	Church Lane to High St South	131	636	692	700	694	733	654	F	F	F	F	F	F	F
High Street / Winchmore Dr / Alpha Terrace	All	43	124	125	130	129	134	125	D	F	F	F	F	F	F
	High St North to Alpha Terrace	8	8	7	7	8	7	7	A	A	A	A	A	A	A
	High St North to High St South	8	9	9	9	9	9	9	A	A	A	A	A	A	A
	High St North to Winchmore Dr	15	13	16	15	12	12	17	B	B	C	B	B	B	C
	Alpha Terrace to High St South	4	5	3	3	3	3	3	A	A	A	A	A	A	A
	Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Alpha Terrace to High St North	17	21	20	19	20	23	21	C	C	C	C	C	C	C
	High St South to Winchmore Dr	7	12	8	9	6	8	6	A	B	A	A	A	A	A
	High St South to High St North	17	18	12	11	12	12	12	C	C	B	B	B	B	B
	High St South to Alpha Terrace	16	16	12	13	12	14	11	C	C	B	B	B	B	B
	Winchmore Dr to High St North	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	A	A	A	A	A	A	A
High Street / A1134	Winchmore Dr to High St South	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	All	15	15	11	11	11	11	11	B	C	B	B	B	B	B
	A1134 Trumpington Road (North) to High St (South)	28	28	32	33	33	33	32	C	C	C	C	C	C	C
	A1134 Trumpington Road (North) to A1134 Long Rd (East)	21	22	28	27	29	27	26	C	C	C	C	C	C	C
	High St (South) to A1134 Long Rd (East)	68	61	51	48	52	50	47	E	E	D	D	D	D	D
	High St (South) to A1134 Trumpington Road (North)	44	41	24	24	26	25	24	D	D	C	C	C	C	C

	Junction	Movement	Delay (s)							LOS						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
07:00 - 08:00	A1134 / Parson Rd	A1134 North to A1134 South	8	8	8	8	8	8	8	A	A	A	A	A	A	A
		A1134 North to Parson Road	9	8	8	7	8	8	7	A	A	A	A	A	A	A
		A1134 South to Parson Road	12	17	20	20	27	24	23	B	C	C	C	D	C	C
		A1134 South to A1134 North	9	11	13	13	15	14	15	A	B	B	B	C	B	C
		Parson Road to A1134 North	25	35	35	47	54	48	54	D	D	D	E	F	E	F
		Parson Road to A1134 South	7	10	9	10	11	13	13	A	A	A	A	B	B	B
		All	9	11	12	12	13	13	13	A	B	B	B	B	B	B
	A1134 / Bentley Rd	A1134 North to A1134 South	6	6	6	6	6	6	6	A	A	A	A	A	A	A
		A1134 North to Bentley Rd	6	6	6	6	6	6	6	A	A	A	A	A	A	A
		A1134 South to Bentley Rd	19	26	29	27	33	31	32	C	D	D	D	D	D	D
		A1134 South to A1134 North	15	19	20	20	23	22	23	B	C	C	C	C	C	C
		Bentley Rd to A1134 North	6	15	10	12	11	15	13	A	C	A	A	B	B	B
		Bentley Rd to A1134 South	2	4	4	3	4	3	4	A	A	A	A	A	A	A
		All	12	14	15	15	17	17	17	B	B	C	B	C	C	C
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	2	2	3	3	3	3	3	A	A	A	A	A	A	A
		A1134 North to A1134 South	5	4	5	5	5	5	5	A	A	A	A	A	A	A
		A1134 North to Latham Rd	4	2	3	3	3	4	3	A	A	A	A	A	A	A
		Newton Rd to A1134 South	7	8	8	7	8	7	7	A	A	A	A	A	A	A
		Newton Rd to Latham Rd	0	0	0	0	0	0	0	A	A	A	A	A	A	A
		Newton Rd to A1134 North	18	20	21	18	19	21	20	C	C	C	C	C	C	C
		A1134 South to Latham Rd	15	22	23	19	26	21	26	C	C	C	C	D	C	D
		A1134 South to A1134 North	33	38	39	39	44	43	44	D	E	E	E	E	E	E
		A1134 South to Newton Rd	19	41	34	33	42	38	44	C	E	D	D	E	E	E
		Latham Rd to A1134 North	4	3	3	2	3	1	4	A	A	A	A	A	A	A
		Latham Rd to Newton Rd	10	8	5	5	11	8	7	A	A	A	A	B	A	A
		Latham Rd to A1134 South	10	13	7	5	9	10	6	B	B	A	A	A	B	A
		All	20	24	25	25	28	28	28	C	C	C	C	D	D	D
	A1134 / Queensway	A1134 North to A1134 South	2	2	2	2	2	2	2	A	A	A	A	A	A	A
		A1134 North to Queensway	1	1	1	1	1	1	1	A	A	A	A	A	A	A
		A1134 South to Queensway	0	32	18	12	0	26	0	A	D	C	B	A	D	A
		A1134 South to A1134 North	20	25	26	25	25	27	27	C	C	D	D	D	D	D
		Queensway to A1134 North	53	65	76	67	68	70	70	F	F	F	F	F	F	F
		Queensway to A1134 South	16	38	26	19	25	31	25	C	E	D	C	D	D	D
		All	13	16	17	17	18	19	19	B	C	C	C	C	C	C
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	28	42	32	29	33	30	29	C	D	C	C	C	C	C
		A1134 North to A1134 South	44	65	56	52	58	53	51	D	E	E	D	E	D	D
		Brooklands Ave to A1134 South	401	218	502	583	464	427	471	F	F	F	F	F	F	F
		Brooklands Ave to A1134 North	434	268	557	614	495	446	498	F	F	F	F	F	F	F
		A1134 South to A1134 North	18	22	22	22	23	23	23	B	C	C	C	C	C	C
		A1134 South to Brooklands Ave	79	98	100	96	97	102	98	E	F	F	F	F	F	F
		Chaucer Rd to A1134 North	81	80	86	88	81	84	80	F	F	F	F	F	F	F
		Chaucer Rd to Brooklands Ave	87	79	83	90	85	77	81	F	E	F	F	F	E	F
		Chaucer Rd to A1134 South	87	81	78	85	79	76	75	F	F	E	F	E	E	E
		A1134 North to Chaucer Rd	51	71	68	64	67	68	66	D	E	E	F	E	E	E
		Brooklands Ave to Chaucer Rd	364	212	496	546	438	384	431	F	F	F	F	F	F	F
		A1134 South to Chaucer Rd	3	6	5	6	7	6	7	A	A	A	A	A	A	A
		All	109	86	133	141	122	111	119	F	F	F	F	F	F	F
	A1134 / Bateman St	A1134 North to A1134 South	11	17	13	12	13	11	12	B	C	B	B	B	B	B
		A1134 North to Bateman St	9	16	11	10	11	10	9	A	C	B	A	B	A	A
		A1134 South to Bateman St	14	17	15	16	15	15	18	B	C	B	C	C	C	C
		A1134 South to A1134 North	8	9	8	8	9	8	9	A	A	A	A	A	A	A
		Bateman St to A1134 North	16	19	18	19	17	19	18	C	C	C	C	C	C	C
		Bateman St to A1134 South	11	18	14	13	15	13	14	B	C	B	B	B	B	B
		All	10	14	11	11	11	10	13	A	B	B	B	B	B	B
	A1134 / Fen Causeway	A1134 North to A1134 South	5	14	12	13	13	13	13	A	B	B	B	B	B	B
		A1134 North to Fen Causeway	9	23	21	21	22	22	21	A	C	C	C	C	C	C
		A1134 South to Fen Causeway	12	16	18	16	18	17	17	B	C	C	C	C	C	C
		A1134 South to A1134 North	9	14	14	15	15	15	15	A	B	B	B	C	C	B
		Fen Causeway to A1134 North	17	94	87	97	108	120	108	C	F	F	F	F	F	F
		Fen Causeway to A1134 South	19	97	90	100	112	124	111	C	F	F	F	F	F	F
		All	13	52	48	52	57	62	57	B	F	E	F	F	F	F
	A1134 / Lensfield Rd	A1134 North to A1134 South	13	33	29	31	32	32	34	B	D	D	D	D	D	D
		A1134 North to Lensfield Rd	13	15	14	15	14	14	16	B	C	B	C	B	B	C
		A1134 South to Lensfield Rd	4	8	7	8	7	7	8	A	A	A	A	A	A	A
		A1134 South to A1134 North	1	3	2	2	3	2	3	A	A	A	A	A	A	A
		Lensfield Rd to A1134 North	10	65	45	51	60	71	55	A	F	E	F	F	F	F
		Lensfield Rd to A1134 South	12	74	58	62	69	82	70	B	F	F	F	F	F	F
		All	8	36	29	31	34	39	34	A	E	D	D	D	E	D
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	4	3	4	4	3	3	3	A	A	A	A	A	A	A
		A10 Cambridge Road (North) to Church Road	4	3	4	4	3	3	3	A	A	A	A	A	A	A
		A10 Cambridge Road (South) to Church Road	13	61	12	113	63	107	16	B	F	B	F	F	F	C
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	8	57	7	124	79	102	13	A	F	A	F	F	F	B
		Church Road to A10 Cambridge Road (North)	22	315	21	601	519	313	61	C	F	C	F	F	F	E
		Church Road to A10 Cambridge Road (South)	5	280	5	883	561	263	49	A	F	A	F	F	F	B
		All	7	47	6	88	63	68	12	A	E	A	F	F	F	B
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	13	16	13	15	15	15	13	B	C	B	B	C	C	B
		A10 Cambridge Road (North) to London Road	10	15	11	12	13	13	11	A	B	B	B	B	B	B
		High St to London Road	79	167	83	301	207	252	87	F	F	F	F	F	F	F
		High St to A10 Cambridge Road (North)	26	112	27	265	178	230	36	D	F	D	F	F	F	E
		London Road to A10 Cambridge Road (North)	48	112	52	177	183	205	64	E	F	F	F	F	F	F
		London Road to High St	44	99	47	158	158	179	60	E	F	E	F	F	F	F
		All	26	78	27	151	119	141	34	D	F	D	F	F	F	D
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				331	216	257	38					F	F	F
		Cambridge Rd S to P&R				174	125	150	21					F	F	C
		Cambridge Rd N to Cambridge Rd S				2	2	2	1				A	A	A	A
		Cambridge Rd N to P&R				0	0	25	0					A	C	A
		P&R to Cambridge Rd S				0	0	128	0					A	F	A
		P&R to Cambridge Rd N				0	3	0	0					A	A	A
		All				110	128	22						F	F	C
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						149								F
		Cambridge Rd N to Cambridge Rd S														A
		P&R exit to Cambridge Rd S						0								A
		All						71								E

Junction	Movement	Delay (s)							LOS						
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
M11 J11	Hauxton Road to M11 Southbound Slip	6	205	82	36	136	107	159	A	F	E	F	F	F	F
	Hauxton Road to A10 Cambridge Road	17	217	85	106	152	116	179	B	F	E	F	F	F	F
	Hauxton Road to M11 Northbound Slip	31	317	111	147	230	180	290	C	F	F	F	F	F	F
	Hauxton Road to Hauxton Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Slip to A10 Cambridge Road	32	411	83	497	586	490	860	C	F	F	F	F	F	F
	M11 Southbound Slip to M11 Northbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Slip to Hauxton Road	24	431	43	493	579	496	846	C	F	D	F	F	F	F
	M11 Southbound Slip to M11 Southbound Slip	17	404	54	424	426	375	546	B	F	D	F	F	F	F
	M11 Southbound Mainline through	3	36	3	32	34	31	71	A	D	A	C	C	C	E
	A10 Cambridge Road to M11 Northbound Slip	44	515	79	397	395	209	379	D	F	E	F	F	F	F
	A10 Cambridge Road to Hauxton Road	47	500	99	579	524	350	526	D	F	F	F	F	F	F
	A10 Cambridge Road to M11 Southbound Slip	46	425	0	594	546	365	587	D	F	A	F	F	F	F
	A10 Cambridge Road to A10 Cambridge Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Slip to Hauxton Road	52	357	161	345	308	292	563	D	F	F	F	F	F	F
	M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Slip to A10 Cambridge Road	20	187	114	119	134	14	339	B	F	F	F	F	B	F
	M11 Northbound Slip to M11 Northbound Slip	0	198	129	140	136	106	388	A	F	F	F	F	F	F
	M11 Northbound Mainline through	2	7	20	5	3	7	12	A	A	B	A	A	A	B
	M11 Northbound to P&R access				0	261	273	526			A	F	F	F	F
	A10 Cambridge Road to P&R access				0	581	490	570			A	F	F	F	F
	M11 Southbound to P&R access				27	169	191	709			C	F	F	F	F
	M11 Northbound to P&R access South of M11J11				0	38					A	D			
	Trumpington P&R exit to new P&R access				36	43					D	D			
	All	18	183	68	161	173	135	251	B	F	E	F	F	F	F
A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	17	89	27	40	50	49	62	B	F	C	D	D	D	E
	Hauxton Road Southbound Through	15	131	24	44	63	55	77	B	F	C	D	E	E	E
	Hauxton Road Southbound to Access Road	41	85	56	90	85	96	68	D	F	E	F	F	F	E
	Addenbrookes Road to Hauxton Road Southbound Slip	4	181	17	52	121	57	133	A	F	B	D	F	E	F
	Addenbrookes Road to Access Road	21	36	33	70	38	48	106	C	F	C	E	E	E	F
	Addenbrookes Road to P&R Access	37	133	0	75	98	70	133	D	F	A	E	F	E	F
	Addenbrookes Road to Hauxton Road Northbound	0	0	84	104	0	124	0	A	A	F	F	A	F	A
	Dedicated P&R Link Northbound to Access Road	8	22	9	10	7	8	6	A	C	A	B	A	A	A
	Dedicated P&R Link Northbound Through	9	24	9	9	7	8	8	A	C	A	A	A	A	A
	Hauxton Road Northbound Through	103	368	609	276	381	326	385	F	F	F	F	F	F	F
	Hauxton Road Northbound to Addenbrookes Road	31	136	74	109	100	102	103	C	F	E	F	F	F	F
	Access Road to P&R Access	0	0	0	0	68	85	0	A	A	A	A	E	F	A
	Access Road to Hauxton Road N	47	119	97	87	109	108	99	D	F	F	F	F	F	F
	Access Road to Addenbrookes Road	38	104	84	74	74	84	76	D	F	F	F	E	E	F
	Access Road to Hauxton Road S	37	126	63	73	80	92	84	D	F	F	E	E	E	F
	Dedicated P&R Link Southbound Through				23	18	20	21			C	B	C	C	C
	All	34	157	105	94	121	100	133	C	F	F	F	F	F	F
Trumpington P&R	Hauxton Road Southbound Through	10	30	8	12	16	18	16	B	C	A	B	B	B	B
	Hauxton Road Southbound to P&R	33	55	39	39	44	48	43	C	D	D	D	D	D	D
	Hauxton Road Northbound to P&R	216	400	410	314	445	430	374	F	F	F	F	F	F	F
	Hauxton Road Northbound Through	208	392	430	295	425	404	378	F	F	F	F	F	F	F
	P&R to Hauxton Road Northbound	28	39	38	34	36	36	37	C	D	D	C	D	D	D
	P&R to Hauxton Road Southbound	33	44	40	39	40	43	38	C	D	D	D	D	D	D
	All	95	163	160	124	155	155	150	F	F	F	F	F	F	F
	Hauxton Rd Northbound to Hauxton Rd Southbound	8	15	3	3	3	12	10	A	B	A	A	A	B	A
	Hauxton Rd Northbound to Consort Ave	35	41	39	39	39	48	37	D	D	D	D	D	D	D
	Hauxton Rd Southbound to Consort Ave	105	116	132	121	132	128	120	F	F	F	F	F	F	F
Consort Ave T-junction	Hauxton Rd Southbound to Hauxton Rd Northbound	101	136	137	132	141	137	130	F	F	F	F	F	F	F
	Consort Ave to Hauxton Rd Northbound	52	82	59	65	71	98	76	D	F	E	E	E	F	E
	Consort Ave to Hauxton Rd Southbound	49	79	58	65	70	97	77	D	E	E	E	E	F	E
	All	62	83	78	77	80	86	77	E	F	E	E	F	F	E
	Hauxton Rd Northbound to Hauxton Rd Southbound	2	5	3	4	4	6	3	A	A	A	A	A	A	A
	Hauxton Rd Northbound to Waitrose	30	37	37	38	41	40	37	C	D	D	D	D	D	D
	Hauxton Rd Southbound to Waitrose	43	44	41	43	46	43	41	D	D	D	D	D	D	D
	Hauxton Rd Southbound to Hauxton Rd Northbound	43	47	45	45	46	44	43	D	D	D	D	D	D	D
	Waitrose to Hauxton Rd North	44	54	63	55	58	53	52	D	D	D	D	E	D	D
	Waitrose to Hauxton Rd South	60	70	80	87	87	85	75	E	E	E	F	F	F	E
High Street / Hauxton Rd / A1301 Shelford Rd	All	31	36	35	36	37	36	34	C	D	D	D	D	D	C
	High St to Hauxton Rd	20	23	22	24	26	26	22	B	C	C	C	C	C	C
	High St to A1301 Shelford Rd	16	15	15	16	15	16	16	B	B	B	B	B	B	B
	Hauxton Rd to A1301 Shelford Rd	36	36	35	38	36	37	38	D	D	C	D	D	D	D
	Hauxton Rd to High St	13	13	12	13	13	13	12	B	B	B	B	B	B	B
	A1301 Shelford Rd to High St	53	265	263	242	215	236	248	D	F	F	F	F	F	F
	A1301 Shelford Rd to Hauxton Rd	34	249	257	227	194	219	230	C	F	F	F	F	F	F
	All	23	78	76	72	68	74	77	C	E	E	E	E	E	E
	High St North to High St South	18	26	20	22	23	23	18	C	D	C	C	C	C	C
	High St North to Maris Lane	33	47	37	38	38	39	34	D	E	A	E	E	E	D
High Street / Maris Lane	High St South to Maris Lane	9	7	6	6	6	7	6	A	A	A	A	A	A	A
	High St South to High St North	10	8	7	7	8	8	7	A	A	A	A	A	A	A
	All	14	17	13	14	15	14	12	B	C	B	B	B	B	B
	High St North to High St South	11	12	11	11	12	12	11	B	B	B	B	B	B	B
	High St South to High St North	44	34	23	25	29	26	27	D	C	C	C	C	C	C
	Church Lane to High St North	521	1408	1280	1237	1195	1203	1309	F	F	F	F	F	F	F
	Church Lane to High St South	529	1370	1270	1213	1165	1184	1293	F	F	F	F	F	F	F
	All	86	160	150	151	152	150	154	F	F	F	F	F	F	F
	High St North to Alpha Terrace	12	10	8	9	9	9	9	B	B	A	A	A	A	A
	High St North to High St South	14	12	10	11	10	11	10	B	B	B	B	B	B	B
High Street / Winchmore Dr / Alpha Terrace	High St North to Winchmore Dr	35	22	16	20	18	20	19	D	C	C	C	C	C	C
	Alpha Terrace to High St South	7	11	14	9	11	23	9	A	B	B	A	B	C	A
	Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Alpha Terrace to High St North	21	25	26	26	27	27	26	C	C	D	D	D	D	D
	High St South to Winchmore Dr	0	23	9	0	9	0	0	A	C	A	A	A	A	A
	High St South to High St North	27	21	14	14	16	15	15	D	C	B	B	C	B	C
	High St South to Alpha Terrace	30	21	15	16	16	17	15	D	C	B	C	C	C	B
	Winchmore Dr to High St North	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to High St South	0	0	0	0	0	0	0	A	A	A	A	A	A	A
High Street / A1134	All	22	18	13	13	14	13	14	C	C	B	B	B	B	B
	A1134 Trumpington Road (North) to High St (South)	42	32	42	48	46	45	45	D	C	D	D	D	D	D
	A1134 Trumpington Road (North) to A1134 Long Rd (East)	29	25	37	42	42	41	40	C	C	D	D	D	D	D
	High St (South) to A1134 Long Rd (East)	83	68	59	61	67	59	67	F	E	E	E	E	E	E
	High St (South) to A1134 Trumpington Road (North)	57	47	34	31	38	33	37	E	D	C	C	D	C	D
	A1134 Long Rd (East) to A1134 Trumpington Road (North)	63	63	77	74	87	85	94	E	E	E	E	F	F	F
	A1134 Long Rd (East) to High St (South)	40	31	39	38	43	43	47	D	C	D	D	D	D	D
	All	55	45	44	45	50	47	51	E	D	D	D	D	D	D

	Junction	Movement	Delay (s)							LOS						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
08:00 - 09:00	A1134 / Parson Rd	A1134 North to A1134 South	19	9	9	9	9	9	9	C	A	A	A	A	A	A
		A1134 North to Parson Road	12	9	9	9	9	9	9	B	A	A	A	A	A	A
		A1134 South to Parson Road	20	23	32	27	35	30	34	C	C	D	D	E	D	D
		A1134 South to A1134 North	21	19	26	23	32	26	29	C	C	D	C	D	D	D
		Parson Road to A1134 North	44	61	85	69	130	110	103	E	F	F	F	F	F	F
		Parson Road to A1134 South	38	33	48	36	91	74	66	E	D	E	E	F	F	F
		All	22	18	24	21	32	26	28	C	C	C	C	D	D	D
	A1134 / Bentley Rd	A1134 North to A1134 South	12	7	7	6	6	6	6	B	A	A	A	A	A	A
		A1134 North to Bentley Rd	10	6	6	6	6	6	7	B	A	A	A	A	A	A
		A1134 South to Bentley Rd	30	39	50	47	61	56	57	D	E	F	F	F	F	F
		A1134 South to A1134 North	20	26	36	35	51	42	45	C	D	E	E	F	E	E
		Bentley Rd to A1134 North	21	32	42	36	58	39	54	C	D	E	E	F	E	D
		Bentley Rd to A1134 South	5	6	7	6	9	7	8	A	A	A	A	A	A	A
		All	17	19	25	25	35	30	32	C	C	D	C	D	D	D
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	4	3	3	3	3	2	3	A	A	A	A	A	A	A
		A1134 North to A1134 South	5	5	5	5	5	5	5	A	A	A	A	A	A	A
		A1134 North to Latham Rd	4	3	4	3	3	3	3	A	A	A	A	A	A	A
		Newton Rd to A1134 South	19	21	22	23	23	22	23	C	C	C	C	C	C	C
		Newton Rd to Latham Rd	0	0	0	0	0	0	0	A	A	A	A	A	A	A
		Newton Rd to A1134 North	27	33	33	31	35	34	35	D	D	D	D	E	D	E
		A1134 South to Latham Rd	44	48	57	58	74	72	83	E	E	F	F	F	F	F
		A1134 South to A1134 North	43	51	61	61	83	76	85	E	F	F	F	F	F	F
		A1134 South to Newton Rd	32	35	58	58	87	77	86	E	F	F	F	F	F	F
		Latham Rd to A1134 North	4	5	3	4	6	7	8	A	A	A	A	A	A	A
		Latham Rd to Newton Rd	0	0	0	1	0	0	0	A	A	A	A	A	A	A
		Latham Rd to A1134 South	13	12	13	14	14	12	12	B	B	B	B	B	B	B
		All	27	34	40	40	54	50	56	D	D	E	E	F	F	F
	A1134 / Queensway	A1134 North to A1134 South	2	2	2	2	2	2	3	A	A	A	A	A	A	A
		A1134 North to Queensway	1	1	1	1	1	1	2	A	A	A	A	A	A	A
		A1134 South to Queensway	14	16	17	19	24	19	22	B	C	C	C	C	C	C
		A1134 South to A1134 North	22	24	26	27	31	30	32	C	C	D	D	D	D	D
		Queensway to A1134 South	124	132	149	125	144	132	163	F	F	F	F	F	F	F
08:00 - 09:00	A1134 / Chaucer Rd / Brooklands Ave	Queensway to A1134 North	13	40	29	28	23	23	32	B	E	D	C	C	C	D
		All	15	18	19	20	23	22	24	C	C	C	C	C	C	C
		A1134 North to Brooklands Ave	147	175	168	179	207	205	218	F	F	F	F	F	F	F
		A1134 North to A1134 South	191	235	248	256	304	300	312	F	F	F	F	F	F	F
		Brooklands Ave to A1134 South	546	300	526	541	531	569	572	F	F	F	F	F	F	F
		Brooklands Ave to A1134 North	592	316	547	568	525	563	576	F	F	F	F	F	F	F
		A1134 South to A1134 North	26	27	27	28	28	28	30	C	C	C	C	C	C	C
		A1134 South to Brooklands Ave	69	71	71	71	74	74	76	E	E	E	E	E	E	E
		Chaucer Rd to A1134 North	92	103	105	104	120	116	128	F	F	F	F	F	F	F
		Chaucer Rd to Brooklands Ave	98	98	108	99	123	115	134	F	F	F	F	F	F	F
		Chaucer Rd to A1134 South	99	106	112	107	132	126	143	F	F	F	F	F	F	F
		A1134 North to Chaucer Rd	222	232	276	286	318	330	334	F	F	F	F	F	F	F
	A1134 / Bateman St	Brooklands Ave to Chaucer Rd	579	343	566	583	577	616	622	F	F	F	F	F	F	F
		A1134 South to Chaucer Rd	10	10	10	10	11	11	11	B	A	B	A	B	B	B
		All	195	149	197	204	207	211	219	F	F	F	F	F	F	F
		A1134 North to A1134 South	106	115	111	119	158	138	159	F	F	F	F	F	F	F
		A1134 North to Bateman St	91	98	101	111	137	125	139	F	F	F	F	F	F	F
		A1134 South to Bateman St	15	16	16	17	18	18	18	C	C	C	C	C	C	C
		A1134 South to A1134 North	12	12	11	13	14	14	15	B	B	B	B	B	B	C
		Bateman St to A1134 North	60	99	103	92	162	148	179	F	F	F	F	F	F	F
		Bateman St to A1134 South	75	120	122	107	192	158	192	F	F	F	F	F	F	F
	A1134 / Fen Causeway	All	51	59	59	59	76	69	76	F	F	F	F	F	F	F
		A1134 North to A1134 South	29	34	34	34	38	38	40	D	D	D	D	E	E	E
		A1134 North to Fen Causeway	25	28	30	30	32	31	32	C	D	D	D	D	D	D
		A1134 South to Fen Causeway	17	33	28	36	38	37	37	C	D	D	D	E	E	E
		A1134 South to A1134 North	21	51	38	58	64	60	70	C	F	E	F	F	F	F
		Fen Causeway to A1134 North	102	305	287	329	438	410	442	F	F	F	F	F	F	F
		Fen Causeway to A1134 South	121	313	297	325	443	391	437	F	F	F	F	F	F	F
		All	49	111	106	115	134	129	137	E	F	F	F	F	F	F
	A1134 / Lensfield Rd	A1134 North to A1134 South	92	181	232	205	364	286	332	F	F	F	F	F	F	F
		A1134 North to Lensfield Rd	42	85	131	103	226	174	186	E	F	F	F	F	F	F
		A1134 South to Lensfield Rd	13	19	17	19	20	19	22	B	C	G	C	C	C	C
		A1134 South to A1134 North	25	9	6	8	8	8	10	A	A	A	A	A	A	B
		Lensfield Rd to A1134 North	243	453	443	440	492	472	508	F	F	F	F	F	F	F
		Lensfield Rd to A1134 South	228	452	459	437	498	487	520	F	F	F	F	F	F	F
08:00 - 09:00	Cambridge Rd / Church Rd	All	85	186	196	184	230	211	231	F	F	F	F	F	F	F
		A10 Cambridge Road (North) to A10 Cambridge Road (South)	5	5	5	6	5	4	4	A	A	A	A	A	A	A
		A10 Cambridge Road (North) to Church Road	4	4	4	5	4	4	4	A	A	A	A	A	A	A
		A10 Cambridge Road (South) to Church Road	14	239	14	250	224	254	154	B	F	B	F	F	F	F
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	8	266	8	268	232	201	168	A	F	A	F	F	F	F
		Church Road to A10 Cambridge Road (North)	17	1661	18	3046	2331	2191	722	C	F	C	F	F	F	F
	Cambridge Rd / London Rd	Church Road to A10 Cambridge Road (South)	6	1940	10	3469	2439	2485	721	A	F	B	F	F	F	F
		All	7	179	7	195	174	158	108	A	F	A	F	F	F	F
		A10 Cambridge Road (North) to High St	13	23	15	19	21	18	19	B	C	C	C	C	C	C
		A10 Cambridge Road (North) to London Road	10	20	11	15	17	15	17	B	C	B	B	C	C	C
		High St to London Road	75	641	70	660	624	574	412	F	F	F	F	F	F	F
		High St to A10 Cambridge Road (North)	23	592	24	627	549	490	309	C	F	C	F	F	F	F
08:00 - 09:00	New P&R access / A10 Cambridge Rd	London Road to A10 Cambridge Road (North)	40	444	42	319	603	552	324	E	F	E	F	F	F	F
		London Road to High St	38	451	40	303	617	555	339	E	F	E	F	F	F	F
		All	23	279	24	258	300	287	183	C	F	C	F	F	F	F
		Cambridge Rd S to Cambridge Rd N				460	395	341	337					F	F	F
		Cambridge Rd S to P&R				245	234	208	203					F	F	F
		Cambridge Rd N to Cambridge Rd S				3	2	3	2				A	A	A	A
	New P&R egress / A10 Cambridge Rd	Cambridge Rd N to P&R				0	0	26	0					A	A	C
		P&R to Cambridge Rd S				0	0	153	0					A	A	F
		P&R to Cambridge Rd N				0	3	0	0					A	A	A
		All				163	158	161						F	F	F
		Cambridge Rd S to Cambridge Rd N														F
		Cambridge Rd N to Cambridge Rd S														A
08:00 - 09:00	New P&R egress / A10 Cambridge Rd	P&R exit to Cambridge Rd S														A
		All														E
		Cambridge Rd S to Cambridge Rd N														F
		Cambridge Rd N to Cambridge Rd S														A
		P&R exit to Cambridge Rd S														A
		All														E

Junction	Movement	Delay (s)							LOS						
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
M11 J11	Hauxton Road to M11 Southbound Slip	3	31	14	8	20	21	12	A	C	B	A	B	C	B
	Hauxton Road to A10 Cambridge Road	13	48	40	15	34	33	25	B	D	D	B	C	C	C
	Hauxton Road to M11 Northbound Slip	25	67	62	29	51	55	57	C	E	E	C	D	E	E
	Hauxton Road to Hauxton Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Slip to A10 Cambridge Road	26	405	74	496	551	604	810	C	F	E	F	F	F	F
	M11 Southbound Slip to M11 Northbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Slip to Hauxton Road	25	394	57	484	510	563	732	C	F	E	F	F	F	F
	M11 Southbound Slip to M11 Southbound Slip	16	411	0	427	513	538	696	B	F		F	F	F	F
	M11 Southbound Mainline through	2	37	0	55	47	54	76	A	D		D	D	D	E
	A10 Cambridge Road to M11 Northbound Slip	13	206	50	198	204	121	176	B	F	D	F	F	F	F
	A10 Cambridge Road to Hauxton Road	30	287	71	325	309	206	231	C	F	E	F	F	F	F
	A10 Cambridge Road to M11 Southbound Slip	24	249	0	341	337	223	226	C	F	A	F	F	F	F
	A10 Cambridge Road to A10 Cambridge Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Slip to Hauxton Road	43	122	101	156	145	145	232	D	F	F	F	F	F	F
	M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Slip to A10 Cambridge Road	12	20	46	15	17	7	82	B	B	D	B	B	A	F
	M11 Northbound Slip to M11 Northbound Slip	0	30	0	29	29	31	132	A	C		C	C	C	F
	M11 Northbound Mainline through	2	3	0	2	2	3	3	A	A		A	A	A	A
	M11 Northbound to P&R access			0	91	80		227			A	F	E		F
	A10 Cambridge Road to P&R access			0	305	254		250			A	F	F		F
	M11 Southbound to P&R access			43	186	206		709			D	F	F		F
	M11 Northbound to P&R access South of M11J11				0	35						A	D		
	Trumpington P&R exit to new P&R access				38	37						D	D		
	All	13	121	46	130	132	128	175	B	F	D	C	F	F	F
A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	15	40	24	29	25	40	25	B	D	D	C	C	D	C
	Hauxton Road Southbound Through	13	36	20	26	24	43	22	B	D	C	C	C	D	C
	Hauxton Road Southbound to Access Road	29	47	49	44	37	52	60	C	D	D	D	D	D	D
	Addenbrookes Road to Hauxton Road Southbound Slip	3	40	10	4	30	34	6	A	D	A	A	C	C	A
	Addenbrookes Road to Access Road	0	0	0	0	0	0	0	C	A	A	A	A	A	A
	Addenbrookes Road to P&R Access	33	92	0	0	20	1	19	C	F	A	A	B	A	B
	Addenbrookes Road to Hauxton Road Northbound	0	0	70	46	0	47	0	A	A	E	D	A	D	A
	Dedicated P&R Link Northbound to Access Road	7	9	7	6	4	5	4	A	A	A	A	A	A	A
	Dedicated P&R Link Northbound Through	7	8	7	7	4	5	6	A	A	A	A	A	A	A
	Hauxton Road Northbound Through	34	20	214	32	53	42	42	C	C	F	C	D	D	D
	Hauxton Road Northbound to Addenbrookes Road	25	88	73	91	79	80	81	C	F	E	F	E	E	F
	Access Road to P&R Access	0	0	37	0	38	53	0	A	A	D	A	D	D	A
	Access Road to Hauxton Road N	29	42	54	43	44	66	41	C	D	D	D	D	D	E
	Access Road to Addenbrookes Road	36	46	55	49	48	73	46	D	D	D	D	D	D	D
	Access Road to Hauxton Road S	35	41	46	41	41	73	38	C	D	D	D	D	D	D
	Dedicated P&R Link Southbound Through	2	2	24	20	19	22					C	C	B	C
	All	21	53	74	48	52	57	47	C	D	E	D	D	E	D
Trumpington P&R	Hauxton Road Southbound Through	10	13	7	8	10	19	9	A	B	A	A	A	B	A
	Hauxton Road Southbound to P&R	27	33	38	33	36	44	38	C	C	D	C	D	D	D
	Hauxton Road Northbound to P&R	55	64	214	58	117	110	115	D	E	F	E	F	F	F
	Hauxton Road Northbound Through	52	79	231	65	149	140	124	D	E	F	E	F	F	F
	P&R to Hauxton Road Northbound	19	25	38	24	29	26	27	B	C	D	C	C	C	C
	P&R to Hauxton Road Southbound	31	37	39	33	36	44	39	C	D	D	C	D	D	D
	All	35	51	124	42	86	86	75	C	D	F	D	F	F	E
09:00 - 10:00	Hauxton Rd Northbound to Hauxton Rd Southbound	6	7	7	7	36	13	7	A	A	A	A	A	B	A
	Hauxton Rd Northbound to Consort Ave	25	33	40	33	36	38	37	C	C	D	C	D	D	D
	Hauxton Rd Southbound to Consort Ave	33	62	98	75	87	89	82	C	E	F	E	F	F	F
	Hauxton Rd Southbound to Hauxton Rd Northbound	35	63	97	74	88	88	82	C	E	F	E	F	F	F
	Consort Ave to Hauxton Rd Northbound	28	49	42	35	38	80	38	C	D	D	C	D	F	D
	Consort Ave to Hauxton Rd Southbound	26	44	42	35	37	62	38	C	D	D	C	D	E	D
	All	25	44	63	49	56	64	54	C	D	E	D	E	E	D
Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	3	4	3	4	5	6	4	A	A	A	A	A	A	A
	Hauxton Rd Northbound to Waitrose	29	31	32	33	35	34	31	C	C	C	C	C	C	C
	Hauxton Rd Southbound to Waitrose	25	30	35	29	36	33	32	C	C	C	C	D	C	C
	Hauxton Rd Southbound to Hauxton Rd Northbound	30	35	39	36	37	37	36	C	D	D	D	D	D	D
	Waitrose to Hauxton Rd North	30	35	39	36	38	65	38	C	D	D	D	D	E	D
	Waitrose to Hauxton Rd South	62	63	90	96	96	131	103	F	E	F	F	F	F	F
	All	24	29	33	32	33	37	32	C	C	C	C	C	D	C
High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	17	19	18	21	24	26	17	B	B	B	C	C	C	B
	High St to A1301 Shelford Rd	17	16	18	18	17	17	17	B	B	B	B	B	B	B
	Hauxton Rd to A1301 Shelford Rd	28	31	31	31	32	32	31	C	C	C	C	C	C	C
	Hauxton Rd to High St	8	9	9	9	9	9	9	A	A	A	A	A	A	A
	A1301 Shelford Rd to High St	62	515	543	517	452	474	477	E	F	F	F	F	F	F
	A1301 Shelford Rd to Hauxton Rd	37	473	497	473	417	437	435	D	F	F	F	F	F	F
	All	21	115	117	114	108	113	113	C	F	F	F	F	F	F
High Street / Maris Lane	High St North to High St South	15	16	15	16	21	29	15	C	C	C	C	C	D	B
	High St North to Maris Lane	22	26	30	26	31	37	26	C	D	D	C	D	E	D
	High St South to Maris Lane	5	5	5	5	6	6	5	A	A	A	A	A	A	A
	High St South to High St North	6	6	6	6	6	6	6	A	A	A	A	A	A	A
	All	10	10	10	10	12	15	10	A	B	B	B	B	C	A
High Street / Church Lane	High St North to High St South	10	10	11	10	11	17	10	A	B	B	B	B	B	B
	High St South to High St North	23	20	18	19	20	21	19	C	C	B	B	B	C	B
	Church Lane to High St North	463	1224	1205	1132	1095	1138	1194	F	F	F	F	F	F	F
	Church Lane to High St South	443	1206	1181	1106	1078	1117	1169	F	F	F	F	F	F	F
	All	82	166	166	164	160	166	165	F	F	F	F	F	F	F
High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	8	8	8	7	7	22	7	A	A	A	A	A	C	A
	High St North to High St South	10	10	9	9	9	25	9	A	A	A	A	A	C	A
	High St North to Winchmore Dr	18	17	18	15	14	55	16	C	C	C	C	B	F	C
	Alpha Terrace to High St North	9	10	11	8	10	22	10	A	B	B	A	B	C	B
	Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Alpha Terrace to High St North	21	20	25	24	28	33	27	C	C	C	C	D	D	D
	High St South to Winchmore Dr	9	8	9	6	6	7	9	A	A	A	A	A	A	A
	High St South to High St North	14	12	10	10	11	11	10	B	B	B	B	B	B	B
	High St South to Alpha Terrace	15	13	12	12	11	13	12	B	B	B	B	B	B	B
	Winchmore Dr to High St North	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to High St South	0	0	0	0	0	0	0	A	A	A	A	A	A	A
High Street / A1134	All	13	11	10	10	10	16	10	B	B	B	B	B	C	B
	A1134 Trumpington Road (North) to High St (South)	38	32	30	30	31	48	29	D	C	C	C	C	D	C
	A1134 Trumpington Road (North) to A1134 Long Rd (East)	31	26	24	23	25	38	24	C	C	C	C	C	D	C
	High St (South) to A1134 Long Rd (East)	55	47	39	42	44	44	41	E	D	D	D	D	D	D
	High St (South) to A1134 Trumpington Road (North)	34	28	19	19	20	23	20	C	C	B	B	C	C	C
	A1134 Long Rd (East) to A1134 Trumpington Road (North)	39	37	35	37	37	60	37	D	D	D	D	D	E	D
	A1134 Long Rd (East) to High St (South)	19	20	20	19	20	49	20	B	B	B	B	B	D	B
	All	37	32	26	27	28	39	27	D	C	C	C	C	D	C

	Junction	Movement	Delay (s)							LOS						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
09:00 - 10:00	A1134 / Parson Rd	A1134 North to A1134 South	18	10	8	8	7	5	22	8	C	B	A	A	A	C
		A1134 North to Parson Road	14	8	7	7	7	13	6	B	A	A	A	A	B	A
		A1134 South to Parson Road	16	8	8	8	9	15	8	C	A	A	A	A	C	A
		A1134 South to A1134 North	10	7	8	8	9	13	9	B	A	A	A	A	B	A
		Parson Road to A1134 North	54	12	21	13	52	67	11	F	B	C	B	F	F	B
		Parson Road to A1134 South	30	3	2	3	6	46	3	D	A	A	A	A	E	A
		All	14	8	8	8	9	16	8	B	A	A	A	A	C	A
	A1134 / Bentley Rd	A1134 North to A1134 South	8	6	6	6	6	15	6	A	A	A	A	A	B	A
		A1134 North to Bentley Rd	7	5	5	6	5	7	6	A	A	A	A	A	A	A
		A1134 South to Bentley Rd	11	11	11	11	12	14	12	B	B	B	B	B	B	B
		A1134 South to A1134 North	11	10	10	11	12	14	11	B	B	B	B	B	B	B
		Bentley Rd to A1134 North	11	10	9	9	12	32	9	B	A	A	A	A	D	A
		Bentley Rd to A1134 South	5	3	3	3	3	21	2	A	A	A	A	A	C	A
		All	10	9	9	9	10	14	9	A	A	A	A	A	B	A
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	2	3	2	2	3	3	2	A	A	A	A	A	A	A
		A1134 North to A1134 South	4	4	4	5	4	6	4	A	A	A	A	A	A	A
		A1134 North to Latham Rd	3	4	3	3	4	3	4	A	A	A	A	A	A	A
		Newton Rd to A1134 South	4	5	6	5	5	5	4	A	A	A	A	A	A	A
		Newton Rd to Latham Rd	0	0	0	0	0	0	0	A	A	A	A	A	A	A
		Newton Rd to A1134 North	11	10	9	10	11	9	11	B	B	A	B	B	A	B
		A1134 South to Latham Rd	15	12	13	11	17	16	16	B	B	B	B	C	C	C
		A1134 South to A1134 North	16	13	13	15	19	18	19	C	B	B	C	C	C	C
		A1134 South to Newton Rd	17	14	15	16	19	19	17	C	B	B	C	C	C	C
		Latham Rd to A1134 North	7	5	4	3	4	4	6	A	A	A	A	A	A	A
		Latham Rd to Newton Rd	1	0	0	0	0	0	3	A	A	A	A	A	A	A
		Latham Rd to A1134 South	14	16	13	11	11	13	9	B	C	B	B	B	B	A
		All	12	10	10	12	14	14	14	B	B	A	B	B	B	B
	A1134 / Queensway	A1134 North to A1134 South	2	1	2	2	2	3	2	A	A	A	A	A	A	A
		A1134 North to Queensway	1	1	1	1	1	1	1	A	A	A	A	A	A	A
		A1134 South to Queensway	11	9	7	8	8	9	9	B	A	A	A	A	A	A
		A1134 South to A1134 North	10	10	9	10	13	12	12	B	B	A	B	B	B	B
		Queensway to A1134 North	27	20	21	22	33	28	36	D	C	C	C	D	D	E
		Queensway to A1134 South	6	4	6	7	7	5	7	A	A	A	A	A	A	A
		All	8	7	8	8	9	10	9	A	A	A	A	A	A	A
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	57	55	44	46	44	60	40	E	E	D	D	D	D	D
		A1134 North to A1134 South	79	79	71	74	72	91	67	E	E	E	E	E	E	E
		Brooklands Ave to A1134 South	636	92	465	525	429	534	547	F	F	F	F	F	F	F
		Brooklands Ave to A1134 North	722	125	527	608	492	610	627	F	F	F	F	F	F	F
		A1134 South to A1134 North	21	23	22	22	23	23	23	C	C	C	C	C	C	C
		A1134 South to Brooklands Ave	48	49	48	49	51	51	49	D	D	D	D	D	D	D
		Chaucer Rd to A1134 North	70	74	75	74	74	86	78	E	E	E	E	E	E	E
		Chaucer Rd to Brooklands Ave	74	72	68	72	71	85	77	E	E	E	E	E	E	E
		Chaucer Rd to A1134 South	69	70	75	78	70	81	70	E	E	E	E	E	E	E
		A1134 North to Chaucer Rd	96	98	88	96	94	119	87	F	F	F	F	F	F	F
		Brooklands Ave to Chaucer Rd	652	102	466	547	439	555	567	F	F	F	F	F	F	F
		A1134 South to Chaucer Rd	7	7	7	7	7	8	8	A	A	A	A	A	A	A
		All	169	59	132	144	122	149	145	F	E	F	F	F	F	F
	A1134 / Bateman St	A1134 North to A1134 South	20	15	14	13	12	19	11	C	C	B	B	B	C	B
		A1134 North to Bateman St	17	14	12	10	10	18	10	C	B	B	B	A	C	B
		A1134 South to Bateman St	14	14	14	15	16	15	18	B	B	B	B	C	B	C
		A1134 South to A1134 North	11	10	9	11	11	10	13	B	A	A	B	B	B	B
		Bateman St to A1134 North	21	22	21	58	22	69	69	C	C	C	F	C	C	F
		Bateman St to A1134 South	17	20	18	51	18	20	82	C	C	C	F	C	C	F
		All	15	13	12	15	12	15	16	C	B	B	C	B	B	C
	A1134 / Fen Causeway	A1134 North to A1134 South	8	8	7	7	8	7	8	A	A	A	A	A	A	A
		A1134 North to Fen Causeway	8	14	14	13	14	14	13	A	B	B	B	B	B	B
		A1134 South to Fen Causeway	16	28	28	32	34	32	35	C	D	D	D	D	D	E
		A1134 South to A1134 North	14	27	26	31	33	33	35	B	D	D	D	D	D	D
		Fen Causeway to A1134 North	45	190	188	222	215	222	225	E	F	F	F	F	F	F
		Fen Causeway to A1134 South	49	197	199	233	225	234	233	E	F	F	F	F	F	F
		All	25	78	76	85	83	85	85	D	F	F	F	F	F	F
	A1134 / Lensfield Rd	A1134 North to A1134 South	22	35	53	73	103	110	107	C	E	F	F	F	F	F
		A1134 North to Lensfield Rd	18	26	34	62	70	78	87	C	D	D	F	F	F	F
		A1134 South to Lensfield Rd	9	14	14	14	14	14	14	A	B	B	B	B	B	B
		A1134 South to A1134 North	3	7	7	9	6	6	6	A	A	A	A	A	A	A
		Lensfield Rd to A1134 North	47	150	152	148	158	168	158	E	F	F	F	F	F	F
		Lensfield Rd to A1134 South	37	153	159	149	159	170	163	E	F	F	F	F	F	F
		All	21	79	83	82	88	94	91	C	F	F	F	F	F	F
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	3	6	3	3	3	2	2	A	A	A	A	A	A	A
		A10 Cambridge Road (North) to Church Road	3	7	3	3	3	2	3	A	A	A	A	A	A	A
		A10 Cambridge Road (South) to Church Road	9	94	9	112	149	62	62	A	F	A	F	F	F	F
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	5	82	5	107	99	80	56	A	F	A	F	F	F	F
		Church Road to A10 Cambridge Road (North)	10	2586	11	5260	3793	4292	1463	B	F	B	F	F	F	F
		Church Road to A10 Cambridge Road (South)	4	2538	5	5103	3642	4283	1392	A	F	A	F	F	F	F
		All	4	178	4	208	201	200	110	A	F	A	F	F	F	F
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	12	25	13	16	19	16	16	B	C	B	C	C	C	C
		A10 Cambridge Road (North) to London Road	9	25	10	13	15	13	13	A	D	A	B	C	B	B
		High St to London Road	72	327	80	368	366	324	252	F	F	F	F	F	F	F
		High St to A10 Cambridge Road (North)	19	226	20	265	280	237	163	C	F	C	F	F	F	F
		London Road to A10 Cambridge Road (North)	30	314	34	140	449	425	270	D	F	D	F	F	F	F
		London Road to High St	28	273	33	115	412	395	235	D	F	D	F	F	F	F
		All	19	166	21	162	209	192	128	C	F	C	F	F	F	F
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				212	193	153	119					F	F	F
		Cambridge Rd S to P&R				118	111	87	67					F	F	F
		Cambridge Rd N to Cambridge Rd S				2	1	2	1				A	A	A	A
		Cambridge Rd N to P&R				0	0	29	0					A	A	A
		P&R to Cambridge Rd S				0	0	92	0				A	A	F	A
		P&R to Cambridge Rd N				0	2	0	0				A	A	A	A
		All				108	92	72						F	F	E
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						95								F
		Cambridge Rd N to Cambridge Rd S						2								A
		P&R exit to Cambridge Rd S						0								A
		All						56								E

G. PM Junction Performance Comparison

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
	M11 J11	Hauxton Road to M11 Southbound Slip	355	188	106	14	23	13	21
		Hauxton Road to A10 Cambridge Road	563	604	165	85	96	58	126
		Hauxton Road to M11 Northbound Slip	943	935	547	358	465	321	492
		Hauxton Road to Hauxton Road	0	0	0	0	0	0	0
		M11 Southbound Slip to A10 Cambridge Road	337	383	310	311	307	309	295
		M11 Southbound Slip to M11 Northbound Slip	0	4	0	0	0	0	0
		M11 Southbound Slip to Hauxton Road	510	576	525	463	532	499	525
		M11 Southbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0
		M11 Southbound Mainline through	2069	2147	2221	2162	2248	2141	2218
		A10 Cambridge Road to M11 Northbound Slip	300	228	24	5	17	13	16
		A10 Cambridge Road to Hauxton Road	318	427	334	339	357	393	369
		A10 Cambridge Road to M11 Southbound Slip	27	26	0	92	106	112	116
		A10 Cambridge Road to A10 Cambridge Road	0	6	0	0	0	0	0
		M11 Northbound Slip to Hauxton Road	106	149	241	292	327	287	310
		M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0
		M11 Northbound Slip to A10 Cambridge Road	20	20	17	25	16	50	16
		M11 Northbound Slip to M11 Northbound Slip	6	6	5	4	5	4	6
		M11 Northbound Mainline through	2039	2300	2250	2180	2151	2116	2205
		M11 Northbound to P&R access			0	8	4		4
		A10 Cambridge Road to P&R access			0	6	16		16
		M11 Southbound to P&R access			108	97	99		99
		M11 Northbound to P&R access South of M11J11				0	10		
		Trumpington P&R exit to new P&R access				10	10		
		All	7593	7997	6918	6461	6787	6445	6855
	A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	67	66	44	37	34	25	42
		Hauxton Road Southbound Through	926	872	428	255	290	196	338
		Hauxton Road Southbound to Access Road	0	0	0	2	0	0	0
		Addenbrookes Road to Hauxton Road Southbound Slip	950	915	461	324	349	242	405
		Addenbrookes Road to Access Road	0	29	14	15	11	7	16
		Addenbrookes Road to P&R Access	3	6	0	1	1	2	1
		Addenbrookes Road to Hauxton Road Northbound	24	44	26	26	0	14	0
		Dedicated P&R Link Northbound to Access Road	3	53	52	41	54	49	52
		Dedicated P&R Link Northbound Through	28	18	100	81	76	73	79
		Hauxton Road Northbound Through	503	581	663	679	754	744	722
		Hauxton Road Northbound to Addenbrookes Road	398	463	422	415	462	425	472
		Access Road to P&R Access	0	0	0	7	0	0	0
		Access Road to Hauxton Road N	3	14	10	15	6	2	6
		Access Road to Addenbrookes Road	2	18	18	18	23	21	19
		Access Road to Hauxton Road S	1	18	18	16	20	18	17
		Dedicated P&R Link Southbound Through				10	10	9	10
		All	2908	3097	2255	1941	2089	1828	2178
		Hauxton Road Southbound Through	679	634	273	239	243	176	291
		Hauxton Road Southbound to P&R	33	31	26	24	21	19	24
		Hauxton Road Northbound to P&R	12	11	24	26	21	20	26
		Hauxton Road Northbound Through	520	628	677	693	737	741	700
	Trumpington P&R	P&R to Hauxton Road Northbound	68	70	57	49	6	7	28
		P&R to Hauxton Road Southbound	316	313	253	125	143	113	153
		All	1627	1688	1310	1155	1171	1076	1222
	Consort Ave T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	680	633	312	281	282	220	332
		Hauxton Rd Northbound to Consort Ave	70	101	80	71	63	57	78
		Hauxton Rd Southbound to Consort Ave	34	33	30	30	31	32	31
		Hauxton Rd Southbound to Hauxton Rd Northbound	555	666	706	716	712	721	707
		Consort Ave to Hauxton Rd Northbound	61	84	45	42	36	29	45
		Consort Ave to Hauxton Rd Southbound	33	34	18	17	15	12	18
		All	1432	1551	1192	1156	1139	1071	1210
	Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	662	620	325	290	294	241	348
		Hauxton Rd Northbound to Waitrose	123	122	100	96	82	72	78
		Hauxton Rd Southbound to Waitrose	100	141	120	117	121	121	139
		Hauxton Rd Southbound to Hauxton Rd Northbound	516	605	636	646	631	631	617
		Waitrose to Hauxton Rd North	184	227	162	145	135	116	168
		Waitrose to Hauxton Rd South	89	116	92	90	78	66	87
		All	1673	1831	1439	1389	1348	1251	1445
	High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	696	664	361	320	309	246	371
		High St to A1301 Shelford Rd	195	185	105	92	76	62	87
		Hauxton Rd to A1301 Shelford Rd	85	109	110	114	110	109	113
		Hauxton Rd to High St	615	723	691	682	660	638	679
		A1301 Shelford Rd to High St	185	263	266	267	256	248	264
		A1301 Shelford Rd to Hauxton Rd	90	79	70	72	73	74	62
		All	1866	2023	1603	1547	1485	1377	1575
	High Street / Maris Lane	High St North to High St South	887	846	470	420	390	315	463
		High St North to Maris Lane	146	205	185	179	139	126	175
		High St South to Maris Lane	116	171	121	93	82	69	113
		High St South to High St North	684	815	834	854	829	815	827
		All	1832	2037	1610	1547	1441	1325	1579
	High Street / Church Lane	High St North to High St South	923	996	659	627	546	454	642
		High St South to High St North	685	815	837	857	817	806	828
		Church Lane to High St North	78	153	156	162	151	143	154
		Church Lane to High St South	107	50	20	6	13	15	28
		All	1793	2014	1672	1652	1528	1418	1652
	High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	18	18	15	14	13	12	15
		High St North to High St South	914	987	665	638	554	465	652
		High St North to Winchmore Dr	0	0	0	0	0	0	0
		Alpha Terrace to High St South	13	13	12	12	12	12	11
		Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0
		Alpha Terrace to High St North	11	11	10	10	10	9	11
		High St South to Winchmore Dr	2	2	2	5	2	5	1
		High St South to High St North	755	961	989	1009	955	933	977
		High St South to Alpha Terrace	11	10	8	11	8	10	8
		Winchmore Dr to High St North	0	0	0	0	0	0	0
		Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0
		Winchmore Dr to High St South	0	0	0	0	0	0	0
		All	1723	2000	1701	1700	1553	1445	1676
	High Street / A1134	A1134 Trumpington Road (North) to High St (South)	484	471	264	233	173	144	210
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	169	325	246	199	228	211	260
		High St (South) to A1134 Long Rd (East)	348	363	453	453	422	418	421
		High St (South) to A1134 Trumpington Road (North)	418	605	548	564	525	509	565
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	124	133	30	19	28	23	32
		A1134 Long Rd (East) to High St (South)	448	533	450	465	436	378	500
		All	1990	2430	1992	1934	1812	1682	1988

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
16:00 - 17:00	A1134 / Parson Rd	A1134 North to A1134 South	580	710	460	417	381	337	429
		A1134 North to Parson Road	0	0	0	7	0	1	0
		A1134 South to Parson Road	61	57	56	52	46	50	53
		A1134 South to A1134 North	481	680	520	523	486	465	536
		Parson Road to A1134 North	13	13	10	9	9	8	10
		Parson Road to A1134 South	89	90	69	62	56	46	69
		All	1223	1550	1115	1070	979	907	1097
	A1134 / Bentley Rd	A1134 North to A1134 South	567	680	468	436	400	355	438
		A1134 North to Bentley Rd	9	8	7	7	8	7	7
		A1134 South to Bentley Rd	13	12	16	11	13	12	14
		A1134 South to A1134 North	482	682	513	523	485	455	536
		Bentley Rd to A1134 North	12	12	16	12	15	15	16
		Bentley Rd to A1134 South	32	32	31	32	28	28	29
		All	1114	1425	1051	1021	949	871	1039
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	14	13	22	14	21	23	21
		A1134 North to A1134 South	579	672	495	470	438	406	463
		A1134 North to Latham Rd	7	6	6	6	6	6	7
		Newton Rd to A1134 South	8	8	8	7	9	6	9
		Newton Rd to Latham Rd	0	0	0	0	0	0	0
		Newton Rd to A1134 North	20	21	24	20	25	27	29
		A1134 South to Latham Rd	11	10	17	9	9	12	10
		A1134 South to A1134 North	477	659	496	506	486	445	534
		A1134 South to Newton Rd	7	24	19	17	8	12	7
		Latham Rd to A1134 North	10	9	10	13	10	11	10
		Latham Rd to Newton Rd	2	2	2	2	2	2	2
		Latham Rd to A1134 South	5	9	5	5	5	5	5
		All	1139	1431	1103	1069	1019	954	1096
	A1134 / Queensway	A1134 North to A1134 South	572	660	501	468	449	420	472
		A1134 North to Queensway	2	2	2	2	2	2	6
		A1134 South to Queensway	4	4	7	3	3	5	4
		A1134 South to A1134 North	504	686	522	538	520	477	567
		Queensway to A1134 North	18	18	22	17	22	22	22
		Queensway to A1134 South	30	30	29	29	24	27	25
		All	1130	1400	1082	1057	1021	954	1097
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	234	226	313	325	302	295	315
		A1134 North to A1134 South	397	429	332	283	287	273	300
		Brooklands Ave to A1134 South	160	192	134	150	130	124	141
		Brooklands Ave to A1134 North	282	310	287	285	285	282	288
		A1134 South to A1134 North	418	548	420	421	411	371	440
		A1134 South to Brooklands Ave	104	137	120	124	134	117	142
		Chaucer Rd to A1134 North	43	74	75	78	75	77	75
		Chaucer Rd to Brooklands Ave	10	21	25	21	21	20	21
		Chaucer Rd to A1134 South	20	41	39	40	37	33	39
		A1134 North to Chaucer Rd	5	13	12	12	12	11	12
		Brooklands Ave to Chaucer Rd	3	12	17	14	16	19	16
		A1134 South to Chaucer Rd	4	20	7	13	4	15	9
		All	1679	2023	1780	1766	1714	1638	1798
	A1134 / Bateman St	A1134 North to A1134 South	548	559	607	579	577	569	589
		A1134 North to Bateman St	46	59	69	72	72	75	71
		A1134 South to Bateman St	36	103	91	106	98	87	101
		A1134 South to A1134 North	715	830	703	690	684	653	709
		Bateman St to A1134 North	75	62	119	113	131	131	127
		Bateman St to A1134 South	72	108	44	44	30	29	33
		All	1492	1721	1633	1604	1594	1544	1630
	A1134 / Fen Causeway	A1134 North to A1134 South	253	266	240	208	208	211	217
		A1134 North to Fen Causeway	459	346	425	428	423	422	425
		A1134 South to Fen Causeway	390	445	419	412	413	402	426
		A1134 South to A1134 North	408	451	413	402	413	398	417
		Fen Causeway to A1134 North	334	305	343	327	326	333	329
		Fen Causeway to A1134 South	337	351	437	443	441	437	442
		All	2181	2165	2277	2220	2224	2202	2255
	A1134 / Lensfield Rd	A1134 North to A1134 South	229	337	297	297	295	294	298
		A1134 North to Lensfield Rd	100	71	83	91	87	82	83
		A1134 South to Lensfield Rd	442	496	478	461	484	480	486
		A1134 South to A1134 North	299	259	277	268	255	249	258
		Lensfield Rd to A1134 North	109	137	204	207	211	205	211
		Lensfield Rd to A1134 South	481	274	366	337	334	337	342
		All	1660	1573	1705	1660	1665	1647	1677
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	838	887	459	543	538	496	556
		A10 Cambridge Road (North) to Church Road	75	121	50	41	58	62	58
		A10 Cambridge Road (South) to Church Road	39	20	48	19	38	39	41
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	604	673	513	543	553	582	589
		Church Road to A10 Cambridge Road (North)	44	49	71	44	48	35	52
		Church Road to A10 Cambridge Road (South)	41	40	182	19	98	95	83
		All	1642	1791	1322	1210	1333	1309	1378
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	750	741	494	458	483	448	490
		A10 Cambridge Road (North) to London Road	125	183	149	105	155	141	151
		High St to London Road	34	33	32	28	31	30	33
		High St to A10 Cambridge Road (North)	553	612	553	510	529	557	550
		London Road to A10 Cambridge Road (North)	91	83	39	98	105	101	106
		London Road to High St	78	79	79	74	75	78	77
		All	1630	1731	1345	1273	1378	1355	1407
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				411	475	495	510
		Cambridge Rd S to P&R				56	14	14	16
		Cambridge Rd N to Cambridge Rd S				419	418	562	437
		Cambridge Rd N to P&R					0	10	0
		P&R to Cambridge Rd S				172	176	1173	175
		P&R to Cambridge Rd N				87	91	92	91
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N					1186	1173	1239
		Cambridge Rd N to Cambridge Rd S						416	
		P&R exit to Cambridge Rd S						179	
		All						1147	

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
17:00 - 18:00	M11 J11	Hauxton Road to M11 Southbound Slip	354	131	68	24	19	17	29
		Hauxton Road to A10 Cambridge Road	619	479	148	119	100	86	146
		Hauxton Road to M11 Northbound Slip	956	681	381	375	328	312	425
		Hauxton Road to Hauxton Road	0	0	0		0	0	0
		M11 Southbound Slip to A10 Cambridge Road	346	378	326	330	307	298	315
		M11 Southbound Slip to M11 Northbound Slip	0	21	0	0	0	0	0
		M11 Southbound Slip to Hauxton Road	609	676	659	556	612	529	643
		M11 Southbound Slip to M11 Southbound Slip	0	0	0		0	0	0
		M11 Southbound Mainline through	1976	2028	2110		2043	1648	2104
		A10 Cambridge Road to M11 Northbound Slip	319	221	21	5	12	9	14
		A10 Cambridge Road to Hauxton Road	413	431	356	361	344	393	403
		A10 Cambridge Road to M11 Southbound Slip	32	22	0	90	90	99	108
		A10 Cambridge Road to A10 Cambridge Road	0	13	0		0	0	0
		M11 Northbound Slip to Hauxton Road	179	218	301	365	334	355	350
		M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0
		M11 Northbound Slip to A10 Cambridge Road	24	21	19	28	15	44	18
		M11 Northbound Slip to M11 Northbound Slip	14	12	11		8	10	10
		M11 Northbound Mainline through	1946	2214	2107		1977	1858	2029
		M11 Northbound to P&R access			0	9	5		6
		A10 Cambridge Road to P&R access			0	5	15		14
		M11 Southbound to P&R access			112	89	97		102
		M11 Northbound to P&R access South of M11J11				0	8		
		Trumpington P&R exit to new P&R access				9	7		
		All	7787	7546	6678	6327	6321	5772	6733
17:00 - 18:00	A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	89	61	28	31	22	17	33
		Hauxton Road Southbound Through	973	685	282	230	188	165	261
		Hauxton Road Southbound to Access Road	0	0	0	1	0	0	0
		Addenbrookes Road to Hauxton Road Southbound Slip	938	634	306	286	248	232	321
		Addenbrookes Road to Access Road	0	21	8	9	7	6	9
		Addenbrookes Road to P&R Access	21	22	0	4	2	2	4
		Addenbrookes Road to Hauxton Road Northbound	26	31	22	21	0	10	0
		Dedicated P&R Link Northbound to Access Road	0	50	57	32	53	45	55
		Dedicated P&R Link Northbound Through	26	17	95	80	71	62	76
		Hauxton Road Northbound Through	673	717	799	774	791	793	839
		Hauxton Road Northbound to Addenbrookes Road	501	524	517	503	495	485	556
		Access Road to P&R Access	0	0	0	14	0	0	3
		Access Road to Hauxton Road N	1	14	10	13	6	1	6
		Access Road to Addenbrookes Road	1	17	17	20	27	23	26
		Access Road to Hauxton Road S	1	16	18	21	28	27	26
		Dedicated P&R Link Southbound Through				9	8	8	9
		All	3250	2810	2157	2049	1946	1876	2223
	Trumpington P&R	Hauxton Road Southbound Through	658	456	166	134	108	92	157
		Hauxton Road Southbound to P&R	34	26	15	11	7	7	11
		Hauxton Road Northbound to P&R	8	7	17	21	16	14	21
		Hauxton Road Northbound Through	677	753	815	790	784	793	821
		P&R to Hauxton Road Northbound	79	67	28	32	4	11	17
		P&R to Hauxton Road Southbound	405	322	148	126	103	88	137
		All	1861	1630	1189	1112	1023	1004	1163
	Consort Ave T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	654	475	179	143	113	99	165
		Hauxton Rd Northbound to Consort Ave	113	117	80	59	44	42	67
		Hauxton Rd Southbound to Consort Ave	26	24	21	20	21	22	22
		Hauxton Rd Southbound to Hauxton Rd Northbound	724	799	826	803	771	788	815
		Consort Ave to Hauxton Rd Northbound	56	67	4	2	1	0	1
		Consort Ave to Hauxton Rd Southbound	34	27	3	1	0	0	1
		All	1608	1509	1114	1028	949	950	1072
	Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	668	498	238	190	152	139	215
		Hauxton Rd Northbound to Waitrose	146	112	83	62	45	40	56
		Hauxton Rd Southbound to Waitrose	109	143	121	113	115	113	131
		Hauxton Rd Southbound to Hauxton Rd Northbound	667	724	710	691	660	680	686
		Waitrose to Hauxton Rd North	164	188	56	44	42	39	52
		Waitrose to Hauxton Rd South	95	103	28	21	13	12	22
		All	1850	1768	1239	1125	1028	1024	1166
	High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	712	529	239	172	119	108	199
		High St to A1301 Shelford Rd	227	168	81	54	30	20	52
		Hauxton Rd to A1301 Shelford Rd	96	113	101	104	95	104	102
		Hauxton Rd to High St	734	799	673	641	611	623	646
		A1301 Shelford Rd to High St	181	214	221	213	197	184	219
		A1301 Shelford Rd to Hauxton Rd	102	83	80	78	77	69	71
		All	2050	1906	1395	1262	1129	1109	1289
	High Street / Maris Lane	High St North to High St South	939	700	321	225	147	127	249
		High St North to Maris Lane	185	202	153	111	60	59	111
		High St South to Maris Lane	140	178	125	98	91	78	115
		High St South to High St North	776	836	772	760	724	733	752
		All	2039	1915	1371	1195	1022	998	1228
	High Street / Church Lane	High St North to High St South	1041	900	469	332	191	178	343
		High St South to High St North	774	826	770	760	737	741	755
		Church Lane to High St North	93	111	113	111	85	90	103
		Church Lane to High St South	75	17	9	3	13	7	15
		All	1983	1854	1361	1206	1027	1016	1215
	High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	19	15	9	6	3	2	7
		High St North to High St South	1015	892	453	313	176	162	326
		High St North to Winchmore Dr	7	6	3	2	1	1	3
		Alpha Terrace to High St South	14	13	13	14	14	12	13
		Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0
		Alpha Terrace to High St North	13	13	12	12	12	12	11
		High St South to Winchmore Dr	4	3	4	5	4	7	3
		High St South to High St North	832	901	856	841	805	798	837
		High St South to Alpha Terrace	26	22	19	21	18	18	18
		Winchmore Dr to High St North	0	0	0	0	0	0	0
		Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0
		Winchmore Dr to High St South	0	0	0	0	0	0	0
		All	1930	1864	1368	1213	1032	1014	1216
	High Street / A1134	A1134 Trumpington Road (North) to High St (South)	529	404	161	116	68	64	112
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	203	313	176	106	87	89	172
		High St (South) to A1134 Long Rd (East)	386	348	394	375	357	372	360
		High St (South) to A1134 Trumpington Road (North)	455	551	473	475	468	451	488
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	146	141	10	16	8	6	15
		A1134 Long Rd (East) to High St (South)	499	524	301	198	108	98	214
		All	2219	2281	1515	1286	1097	1080	1360

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
17:00 - 18:00	A1134 / Parson Rd	A1134 North to A1134 South	671	688	271	158	97	101	225
		A1134 North to Parson Road	14	12	5	3	1	2	5
		A1134 South to Parson Road	61	52	42	44	45	45	45
		A1134 South to A1134 North	537	624	444	453	441	425	471
		Parson Road to A1134 North	17	17	20	18	14	12	17
		Parson Road to A1134 South	39	37	66	59	52	50	56
		All	1339	1429	847	735	649	634	820
	A1134 / Bentley Rd	A1134 North to A1134 South	616	660	225	109	63	68	188
		A1134 North to Bentley Rd	2	1	1	1	1	1	1
		A1134 South to Bentley Rd	7	5	5	5	5	7	6
		A1134 South to A1134 North	536	615	460	457	445	435	481
		Bentley Rd to A1134 North	18	20	24	19	20	16	23
		Bentley Rd to A1134 South	48	47	47	43	31	29	39
		All	1227	1348	762	633	564	556	737
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	18	15	12	4	2	2	11
		A1134 North to A1134 South	575	644	208	87	42	39	172
		A1134 North to Latham Rd	8	8	3	2	1	0	2
		Newton Rd to A1134 South	14	14	14	13	10	8	13
		Newton Rd to Latham Rd	0	0	0	0	0	0	0
		Newton Rd to A1134 North	17	17	21	16	15	15	23
		A1134 South to Latham Rd	18	16	16	14	13	16	15
		A1134 South to A1134 North	505	577	447	439	425	415	477
		A1134 South to Newton Rd	7	21	13	16	7	10	9
		Latham Rd to A1134 North	20	20	20	24	18	23	22
		Latham Rd to Newton Rd	3	4	3	3	3	2	3
		Latham Rd to A1134 South	12	15	13	12	14	13	12
		All	1198	1350	770	629	551	542	757
	A1134 / Queensway	A1134 North to A1134 South	566	638	197	77	41	30	169
		A1134 North to Queensway	6	5	2	1	0	0	2
		A1134 South to Queensway	11	8	9	7	10	9	10
		A1134 South to A1134 North	522	602	478	469	441	442	512
		Queensway to A1134 North	13	15	16	9	7	4	16
		Queensway to A1134 South	32	32	30	20	10	9	20
		All	1150	1301	732	583	508	493	729
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	249	247	114	56	35	11	116
		A1134 North to A1134 South	357	413	97	32	20	7	74
		Brooklands Ave to A1134 South	175	172	66	29	14	11	65
		Brooklands Ave to A1134 North	231	221	134	70	46	20	125
		A1134 South to A1134 North	415	478	373	357	327	319	393
		A1134 South to Brooklands Ave	110	125	113	111	109	110	128
		Chaucer Rd to A1134 North	39	66	58	45	34	28	55
		Chaucer Rd to Brooklands Ave	25	33	31	22	18	15	27
		Chaucer Rd to A1134 South	34	58	40	21	10	10	36
		A1134 North to Chaucer Rd	5	14	4	1	0	0	4
		Brooklands Ave to Chaucer Rd	4	12	8	4	2	0	7
		A1134 South to Chaucer Rd	4	15	6	10	3	12	7
		All	1646	1853	1042	756	619	543	1036
	A1134 / Bateman St	A1134 North to A1134 South	542	572	222	113	87	37	211
		A1134 North to Bateman St	29	49	18	9	7	3	17
		A1134 South to Bateman St	34	83	64	61	47	39	73
		A1134 South to A1134 North	625	676	492	392	330	298	498
		Bateman St to A1134 North	53	47	70	43	48	40	82
		Bateman St to A1134 South	69	105	29	15	6	5	23
		All	1351	1531	894	634	525	421	904
	A1134 / Fen Causeway	A1134 North to A1134 South	219	265	90	44	38	20	85
		A1134 North to Fen Causeway	432	386	173	99	78	43	173
		A1134 South to Fen Causeway	384	412	323	252	210	192	344
		A1134 South to A1134 North	273	296	218	148	116	97	218
		Fen Causeway to A1134 North	363	323	141	76	63	31	134
		Fen Causeway to A1134 South	348	353	177	113	91	50	176
		All	2020	2035	1122	732	595	432	1130
	A1134 / Lensfield Rd	A1134 North to A1134 South	175	267	128	76	61	35	135
		A1134 North to Lensfield Rd	70	37	35	28	24	16	35
		A1134 South to Lensfield Rd	366	397	218	126	96	65	218
		A1134 South to A1134 North	271	222	136	88	67	50	128
		Lensfield Rd to A1134 North	121	204	85	54	45	21	88
		Lensfield Rd to A1134 South	474	383	141	75	63	36	129
		All	1476	1511	743	446	356	222	732
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	900	793		624	550	529	604
		A10 Cambridge Road (North) to Church Road	100	122		63	69	79	76
		A10 Cambridge Road (South) to Church Road	38	26		11	20	20	26
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	691	716	366	358	319	367	399
		Church Road to A10 Cambridge Road (North)	54	53	48	40	43	44	44
		Church Road to A10 Cambridge Road (South)	24	23	111	13	57	52	42
		All	1808	1733	1066	1109	1057	1091	1192
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	763	623	416	493	434	419	466
		A10 Cambridge Road (North) to London Road	165	195	152	143	171	168	178
		High St to London Road	67	64	38	24	25	32	39
		High St to A10 Cambridge Road (North)	635	681	370	276	255	301	352
		London Road to A10 Cambridge Road (North)	94	84	42	95	89	98	97
		London Road to High St	87	86	87	81	73	78	78
		All	1810	1733	1105	1112	1047	1095	1210
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				379	374	419	452
		Cambridge Rd S to P&R				45	9	10	11
		Cambridge Rd N to Cambridge Rd S				480	423	575	480
		Cambridge Rd N to P&R					0	9	0
		P&R to Cambridge Rd S				174	172	1108	175
		P&R to Cambridge Rd N				88	90	94	89
		All					1079	1108	1219
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						512	
		Cambridge Rd N to Cambridge Rd S						428	
		P&R exit to Cambridge Rd S						178	
		All						1117	

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
	M11 J11	Hauxton Road to M11 Southbound Slip	250	77	58	14	16	12	15
		Hauxton Road to A10 Cambridge Road	514	347	133	106	93	74	132
		Hauxton Road to M11 Northbound Slip	667	418	326	345	335	269	388
		Hauxton Road to Hauxton Road	0	0	0	0	0	0	0
		M11 Southbound Slip to A10 Cambridge Road	250	238	230	294	252	286	253
		M11 Southbound Slip to M11 Northbound Slip	0	26	0	0	0	0	0
		M11 Southbound Slip to Hauxton Road	642	526	666	616	677	638	709
		M11 Southbound Slip to M11 Southbound Slip	8	3	8	4	6	3	7
		M11 Southbound Mainline through	1545	1377	1681	1454	1510	1620	1471
		A10 Cambridge Road to M11 Northbound Slip	269	161	20	7	14	9	14
		A10 Cambridge Road to Hauxton Road	361	368	318	376	369	376	361
		A10 Cambridge Road to M11 Southbound Slip	23	20	0	79	88	90	87
		A10 Cambridge Road to A10 Cambridge Road	0	20	0	0	0	0	0
		M11 Northbound Slip to Hauxton Road	194	227	300	294	298	317	295
		M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0
		M11 Northbound Slip to A10 Cambridge Road	14	14	13	15	11	23	12
		M11 Northbound Slip to M11 Northbound Slip	13	12	10	10	8	12	9
		M11 Northbound Mainline through	1507	1745	1650	1466	1179	1412	1323
		M11 Northbound to P&R access			0	8	4		4
		A10 Cambridge Road to P&R access			0	6	16		14
		M11 Southbound to P&R access			107	99	99		110
		M11 Northbound to P&R access South of M11J11				0	6		
		Trumpington P&R exit to new P&R access				5	7		
		All	6256	5581	5568	5205	4986	5270	5217
	A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	70	45	27	30	25	24	33
		Hauxton Road Southbound Through	767	436	242	187	178	140	227
		Hauxton Road Southbound to Access Road	0	0	0	2	0	0	0
		Addenbrookes Road to Hauxton Road Southbound Slip	648	402	267	247	247	203	278
		Addenbrookes Road to Access Road	0	15	9	10	7	5	9
		Addenbrookes Road to P&R Access	9	9	0	6	5	5	5
		Addenbrookes Road to Hauxton Road Northbound	29	30	23	20	0	14	0
		Dedicated P&R Link Northbound to Access Road	0	36	48	39	48	45	52
		Dedicated P&R Link Northbound Through	32	21	89	79	77	78	84
		Hauxton Road Northbound Through	693	616	818	798	851	857	848
		Hauxton Road Northbound to Addenbrookes Road	469	426	464	477	490	465	518
		Access Road to P&R Access	0	0	0	8	0	0	1
		Access Road to Hauxton Road N	0	10	9	9	5	0	4
		Access Road to Addenbrookes Road	0	14	16	25	24	25	22
		Access Road to Hauxton Road S	0	13	12	25	21	21	20
		Dedicated P&R Link Southbound Through				5	6	6	8
		All	2717	2074	2023	1968	1983	1888	2108
	Trumpington P&R	Hauxton Road Southbound Through	566	297	142	116	106	87	136
		Hauxton Road Southbound to P&R	22	12	14	10	8	9	11
		Hauxton Road Northbound to P&R	12	8	20	22	18	21	26
		Hauxton Road Northbound Through	711	637	826	807	831	845	826
		P&R to Hauxton Road Northbound	69	51	27	42	11	9	23
		P&R to Hauxton Road Southbound	264	190	129	107	101	81	126
		All	1644	1195	1158	1102	1076	1052	1148
	Consort Ave T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	551	291	156	126	116	96	147
		Hauxton Rd Northbound to Consort Ave	104	73	63	51	48	42	61
		Hauxton Rd Southbound to Consort Ave	27	20	22	23	23	23	23
		Hauxton Rd Southbound to Hauxton Rd Northbound	749	658	822	822	813	825	828
		Consort Ave to Hauxton Rd Northbound	60	44	2	1	0	0	2
		Consort Ave to Hauxton Rd Southbound	36	19	1	1	0	0	1
		All	1525	1104	1067	1023	1000	986	1062
	Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	545	279	203	167	158	138	192
		Hauxton Rd Northbound to Waitrose	182	96	98	73	70	69	71
		Hauxton Rd Southbound to Waitrose	115	116	121	116	121	117	132
		Hauxton Rd Southbound to Hauxton Rd Northbound	691	587	702	707	689	700	698
		Waitrose to Hauxton Rd North	178	128	41	31	33	25	42
		Waitrose to Hauxton Rd South	110	80	21	17	14	10	23
		All	1821	1286	1188	1113	1088	1060	1163
	High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	636	320	247	185	168	145	210
		High St to A1301 Shelford Rd	214	102	75	57	48	39	52
		Hauxton Rd to A1301 Shelford Rd	98	90	97	101	95	102	102
		Hauxton Rd to High St	771	633	653	642	633	625	649
		A1301 Shelford Rd to High St	206	184	214	209	208	203	212
		A1301 Shelford Rd to Hauxton Rd	88	54	55	54	59	60	52
		All	2013	1382	1340	1248	1211	1174	1277
	High Street / Maris Lane	High St North to High St South	848	424	323	243	218	186	265
		High St North to Maris Lane	117	89	115	93	74	76	90
		High St South to Maris Lane	75	89	70	50	46	40	65
		High St South to High St North	903	731	798	802	796	788	799
		All	1943	1333	1305	1188	1133	1090	1219
	High Street / Church Lane	High St North to High St South	860	492	427	335	277	257	338
		High St South to High St North	902	734	799	801	792	784	800
		Church Lane to High St North	86	78	116	112	95	100	108
		Church Lane to High St South	97	20	11	3	15	6	17
		All	1945	1323	1353	1251	1179	1147	1263
	High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	14	8	9	7	6	7	8
		High St North to High St South	846	482	417	325	266	249	328
		High St North to Winchmore Dr	3	3	2	2	2	2	2
		Alpha Terrace to High St South	14	13	15	14	13	12	14
		Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0
		Alpha Terrace to High St North	10	10	11	10	11	11	12
		High St South to Winchmore Dr	10	6	6	9	6	9	7
		High St South to High St North	957	797	902	892	870	861	887
		High St South to Alpha Terrace	21	15	16	17	16	20	16
		Winchmore Dr to High St North	0	0	0	0	0	0	0
		Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0
		Winchmore Dr to High St South	0	0	0	0	0	0	0
		All	1876	1334	1378	1277	1189	1171	1274
	High Street / A1134	A1134 Trumpington Road (North) to High St (South)	451	205	158	123	101	93	119
		A1134 Trumpington Road (North) to A1134 Long Rd (East)	125	145	146	110	145	145	162
		High St (South) to A1134 Long Rd (East)	470	341	432	419	413	415	410
		High St (South) to A1134 Trumpington Road (North)	459	475	481	489	481	458	494
		A1134 Long Rd (East) to A1134 Trumpington Road (North)	131	87	21	17	12	11	14
		A1134 Long Rd (East) to High St (South)	404	288	271	216	178	165	222
		All	2080	1540	1510	1374	1329	1287	1421

	Junction	Movement	Volume						
			Base	DM	Magenta	Cyan	White	Yellow	Purple
18:00 - 19:00	A1134 / Parson Rd	A1134 North to A1134 South	565	359	294	223	225	207	274
		A1134 North to Parson Road	6	3	4	4	6	6	4
		A1134 South to Parson Road	11	9	9	10	9	12	8
		A1134 South to A1134 North	623	565	496	498	487	452	496
		Parson Road to A1134 North	6	6	6	7	12	14	7
		Parson Road to A1134 South	9	8	13	14	24	33	12
		All	1220	950	822	756	763	724	801
	A1134 / Bentley Rd	A1134 North to A1134 South	557	368	286	215	211	190	270
		A1134 North to Bentley Rd	7	4	3	3	3	5	3
		A1134 South to Bentley Rd	9	7	6	7	7	8	7
		A1134 South to A1134 North	629	579	496	505	490	449	490
		Bentley Rd to A1134 North	9	8	13	11	16	17	15
		Bentley Rd to A1134 South	17	16	18	21	23	27	16
		All	1227	981	822	760	751	697	802
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	8	5	10	6	9	11	11
		A1134 North to A1134 South	554	382	287	217	206	189	271
		A1134 North to Latham Rd	2	2	1	1	1	1	1
		Newton Rd to A1134 South	4	4	5	5	9	8	5
		Newton Rd to Latham Rd	0	0	0	0	0	0	0
		Newton Rd to A1134 North	8	8	11	9	16	23	15
		A1134 South to Latham Rd	23	15	18	15	15	16	15
		A1134 South to A1134 North	626	568	479	486	482	446	479
		A1134 South to Newton Rd	10	19	14	15	10	10	9
		Latham Rd to A1134 North	3	4	3	7	4	9	4
		Latham Rd to Newton Rd	0	0	0	0	0	0	0
		Latham Rd to A1134 South	2	5	2	2	1	1	2
		All	1240	1010	831	763	762	715	811
	A1134 / Queensway	A1134 North to A1134 South	546	376	280	199	199	181	269
		A1134 North to Queensway	10	7	5	5	7	7	11
		A1134 South to Queensway	9	7	6	7	6	6	5
		A1134 South to A1134 North	634	575	490	495	510	474	496
		Queensway to A1134 North	31	23	36	33	37	31	36
		Queensway to A1134 South	19	15	18	23	16	20	14
		All	1247	1003	837	762	773	720	830
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	248	149	136	99	92	87	164
		A1134 North to A1134 South	401	246	148	85	93	88	155
		Brooklands Ave to A1134 South	143	113	104	78	66	62	88
		Brooklands Ave to A1134 North	310	225	252	163	164	150	208
		A1134 South to A1134 North	535	472	407	402	417	376	399
		A1134 South to Brooklands Ave	130	115	118	115	134	124	128
		Chaucer Rd to A1134 North	21	46	56	69	72	71	60
		Chaucer Rd to Brooklands Ave	10	17	24	21	21	18	21
		Chaucer Rd to A1134 South	9	25	34	39	44	38	37
		A1134 North to Chaucer Rd	4	7	5	4	3	3	6
		Brooklands Ave to Chaucer Rd	4	9	16	7	10	8	14
		A1134 South to Chaucer Rd	5	14	5	11	3	12	5
		All	1820	1437	1304	1092	1119	1037	1284
	A1134 / Bateman St	A1134 North to A1134 South	599	337	260	156	158	151	305
		A1134 North to Bateman St	16	18	16	9	9	9	20
		A1134 South to Bateman St	26	63	60	66	59	53	60
		A1134 South to A1134 North	870	691	669	576	621	561	604
		Bateman St to A1134 North	76	40	145	137	127	124	128
		Bateman St to A1134 South	58	73	31	32	30	27	20
		All	1646	1222	1182	976	1004	926	1136
	A1134 / Fen Causeway	A1134 North to A1134 South	320	164	137	89	88	89	160
		A1134 North to Fen Causeway	374	168	159	119	120	119	200
		A1134 South to Fen Causeway	562	422	476	413	430	394	419
		A1134 South to A1134 North	409	312	354	299	338	301	318
		Fen Causeway to A1134 North	471	268	190	97	88	91	208
		Fen Causeway to A1134 South	299	199	145	75	70	72	165
		All	2435	1534	1460	1092	1143	1067	1470
	A1134 / Lensfield Rd	A1134 North to A1134 South	153	165	168	124	128	122	194
		A1134 North to Lensfield Rd	53	19	32	23	24	20	32
		A1134 South to Lensfield Rd	525	362	336	238	262	241	327
		A1134 South to A1134 North	354	213	204	152	158	144	195
		Lensfield Rd to A1134 North	127	70	54	41	45	39	81
		Lensfield Rd to A1134 South	530	165	127	83	89	87	165
		All	1743	994	920	661	706	653	994
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	714	542		523	482	464	510
		A10 Cambridge Road (North) to Church Road	86	93		50	64	77	68
		A10 Cambridge Road (South) to Church Road	34	16		10	20	19	19
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	583	555	308	377	344	340	339
		Church Road to A10 Cambridge Road (North)	39	38	47	43	47	50	46
		Church Road to A10 Cambridge Road (South)	12	11	102	6	61	58	41
		All	1469	1255	875	1010	1018	1009	1022
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	610	431	334	421	398	375	407
		A10 Cambridge Road (North) to London Road	120	125	118	110	151	145	149
		High St to London Road	38	36	24	19	20	18	21
		High St to A10 Cambridge Road (North)	545	524	309	293	264	264	266
		London Road to A10 Cambridge Road (North)	71	60	25	94	97	93	92
		London Road to High St	50	49	50	55	56	50	50
		All	1434	1226	859	992	985	945	984
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				391	398	395	392
		Cambridge Rd S to P&R				48	12	13	13
		Cambridge Rd N to Cambridge Rd S				415	357	525	395
		Cambridge Rd N to P&R					0	11	0
		P&R to Cambridge Rd S				145	175	1037	175
		P&R to Cambridge Rd N				78	90	93	89
		All					1038	1037	1070
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						491	
		Cambridge Rd N to Cambridge Rd S						364	
		P&R exit to Cambridge Rd S						172	
		All						1046	

Junction	Movement	Max Q Length (m)								Avg Q Length (m)							
		Base	DM	Magenta	Cyan	White	Yellow	Purple		Base	DM	Magenta	Cyan	White	Yellow	Purple	
M11 J11	Huxton Road to M11 Southbound Slip	155	431	553	552	517	497	506	12	110	474	448	477	469	413		
	Huxton Road to A10 Cambridge Road	155	431	553	552	517	497	506	12	110	474	448	477	469	413		
	Huxton Road to M11 Northbound Slip	155	431	553	552	517	497	506	12	110	474	448	477	469	413		
	Huxton Road to Huxton Road	155	431	553	552	517	497	506	12	110	474	448	477	469	413		
	M11 Southbound Slip to A10 Cambridge Road	53	217	247	1590	457	1578	355	3	51	80	618	154	556	152		
	M11 Southbound Slip to M11 Northbound Slip	53	217	247	1590	457	1578	355	3	51	80	618	154	556	152		
	M11 Southbound Slip to Huxton Road	53	217	247	1590	457	1578	355	3	51	80	618	154	556	152		
	M11 Southbound Slip to M11 Southbound Slip	53	217	247	1590	457	1578	355	3	51	80	618	154	556	152		
	M11 Southbound Mainline through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	A10 Cambridge Road to M11 Northbound Slip	97	270	1152	476	430	209	419	17	51	590	387	318	177	269		
	A10 Cambridge Road to Huxton Road	97	270	1152	476	430	209	419	17	51	590	387	318	177	269		
	A10 Cambridge Road to M11 Southbound Slip	97	270	1152	476	430	209	419	17	51	590	387	318	177	269		
	A10 Cambridge Road to A10 Cambridge Road	97	270	1152	476	430	209	419	17	51	590	387	318	177	269		
	M11 Northbound Slip to Huxton Road	28	42	375	355	348	779	383	4	7	124	160	142	270	150		
	M11 Northbound Slip to M11 Southbound Slip	28	42	375	355	348	779	383	4	7	124	160	142	270	150		
	M11 Northbound Slip to A10 Cambridge Road	28	42	375	355	348	779	383	4	7	124	160	142	270	150		
	M11 Northbound Slip to M11 Northbound Slip	28	42	375	355	348	779	383	4	7	124	160	142	270	150		
	M11 Northbound Mainline through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	M11 Northbound to P&R access			375	355	348		383			124	160	142			150	
	A10 Cambridge Road to P&R access			1152	476	430		419			590	387	318			269	
	M11 Southbound to P&R access			141	237	43		255			17	39	2			38	
	M11 Northbound to P&R access South of M11J11				355	24						160	1				
	Trumpington P&R exit to new P&R access				26	24						1	1				
	All	158	489	1182	1618	639	1632	567	6	36	143	184	122	148	114		
A1309 / Addenbrooke's Road	Huxton Road Southbound to Addenbrookes Road	13	79	371	369	349	333	340	0	3	203	223	233	253	186		
	Huxton Road Southbound Through	15	80	371	369	348	333	340	0	3	203	223	233	253	186		
	Huxton Road Southbound to Access Road	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	
	Addenbrookes Road to Huxton Road Southbound Slip	0	208	1232	1230	1154	1108	1128	0	17	765	806	821	861	684		
	Addenbrookes Road to Access Road	14	27	23	24	17	18	15	1	4	2	2	1	1	1	1	
	Addenbrookes Road to P&R Access	14	27	23	24	17	18	15	1	4	2	2	1	1	1	1	
	Addenbrookes Road to Huxton Road Northbound	14	27	23	24	17	18	15	1	4	2	2	1	1	1	1	
	Dedicated P&R Link Northbound to Access Road	8	19	31	30	27	28	30	0	0	1	1	0	0	0	0	
	Dedicated P&R Link Northbound Through	8	19	31	30	27	28	30	0	0	1	1	0	0	0	0	
	Huxton Road Northbound Through	24	669	1013	1008	945	907	919	1	325	747	845	758	756	693		
	Huxton Road Northbound to Addenbrookes Road	49	442	180	630	478	576	482	8	101	26	375	206	251	116		
	Access Road to P&R Access	12	33	33	36	32	30	31	0	4	3	4	3	3	3	2	
	Access Road to Huxton Road N	12	33	33	36	32	30	31	0	4	3	4	3	3	3	2	
	Access Road to Addenbrookes Road	12	33	33	36	32	30	31	0	4	3	4	3	3	3	2	
	Access Road to Huxton Road S	12	33	33	36	32	30	31	0	4	3	4	3	3	3	2	
	Dedicated P&R Link Southbound Through				17	16	18	17				0	0	0	0	0	
	All	52	684	1232	1230	1154	1108	1128	1	51	217	248	226	238	187		
Trumpington P&R	Huxton Road Southbound Through	193	149	298	300	284	272	277	34	20	147	159	168	185	136		
	Huxton Road Southbound to P&R	193	149	298	300	284	272	277	34	20	147	159	168	185	136		
	Huxton Road Northbound to P&R	151	358	360	360	340	324	333	25	304	314	314	293	281	287		
	Huxton Road Northbound Through	151	369	371	370	350	333	342	25	314	325	324	303	290	296		
	P&R to Huxton Road Northbound	54	54	55	55	52	50	51	14	20	31	26	26	27	22		
	P&R to Huxton Road Southbound	54	54	55	55	52	50	51	14	20	31	26	26	27	22		
	All	197	369	371	370	350	333	342	24	164	204	206	198	196	185		
	Huxton Rd Northbound to Huxton Rd Southbound	88	95	156	159	149	146	144	1	62	70	74	85	59			
	Huxton Rd Northbound to Consort Ave	13	34	171	174	164	160	158	0	69	77	82	94	66			
	Huxton Rd Southbound to Consort Ave	165	280	283	283	264	256	259	18	165	149	146	126	128	134		
Consort Ave T-junction	Huxton Rd Southbound to Huxton Rd Northbound	165	280	283	283	264	256	259	18	165	149	146	126	128	134		
	Consort Ave to Huxton Rd Northbound	18	61	267	281	265	254	252	0	3	80	86	99	119	74		
	Consort Ave to Huxton Rd Southbound	18	61	268	281	265	254	252	0	3	80	86	99	119	74		
	All	165	280	285	284	266	256	260	4	35	88	93	96	109	81		
	Huxton Rd Northbound to Huxton Rd Southbound	62	59	69	71	67	62	64	6	6	22	24	25	28	20		
	Huxton Rd Northbound to Waitrose	62	59	69	71	67	62	64	6	6	22	24	25	28	20		
	Huxton Rd Southbound to Waitrose	152	163	161	160	149	144	146	36	77	73	68	64	64	64		
	Huxton Rd Southbound to Huxton Rd Northbound	152	163	161	160	149	144	146	36	77	73	68	64	64	64		
	Waitrose to Huxton Rd North	48	65	123	125	117	112	114	12	16	72	84	79	84	60		
	Waitrose to Huxton Rd South	54	70	128	131	122	117	119	16	20	78	90	85	89	65		
All	152	163	161	160	149	144	146	16	27	53	59	56	59	46			
High Street / Huxton Rd / A1301 Shelford Rd	High St to Huxton Rd	84	85	85	84	78	75	78	41	37	43	46	46	48	42		
	High St to A1301 Shelford Rd	84	85	85	84	78	75	78	41	37	43	46	46	48	42		
	Huxton Rd to A1301 Shelford Rd	53	53	58	62	60	60	58	8	11	11	13	11	14	11		
	Huxton Rd to High St	53	53	58	62	60	60	58	8	11	11	13	11	14	11		
	A1301 Shelford Rd to High St	74	119	150	170	201	225	129	11	26	35	41	49	67	28		
	A1301 Shelford Rd to Huxton Rd	70	115	146	166	198	221	125	8	22	31	37	46	64	25		
	All	87	119	150	170	201	225	129	17	24	30	34	38	48	27		
	High St North to High St South	356	351	351	352	330	318	323	175	101	122	143	152	168	128		
High Street / Maris Lane	High St North to Maris Lane	341	335	336	337	315	304	309	163	93	115	136	144	160	120		
	High St South to Maris Lane	104	108	107	109	102	98	98	8	12	12	13	12	11	10		
	High St South to High St North	115	119	118	120	113	107	108	11	15	16	16	16	14	13		
	All	356	351	351	352	330	318	323	89	55	66	77	81	88	68		
High Street / Church Lane	High St North to High St South	200	196	195	202	189	183	186	83	41	61	73	77	87	63		
	High St South to High St North	104	116	167	183	199	214	146	5	7	11	15	19	19	10		
	Church Lane to High St North	186	359	414	370	262	357	249	68	213	221	209	118	158	128		
	Church Lane to High St South	186	359	414	370	262	357	249	68	213	221	209	118	158	128		
All	222	360	415	377	282	375	272	52	87	98	99	71	88	67			
High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	445	408	401	445	417	399	408	188	89	121	150	160	185	127		
	High St North to High St South	458	421	412	456	428	409	418	199	96	126	156	166	192	132		
	High St North to Winchmore Dr	456	419	413	456	428	409	419	197	94	126	156	166	192	132		
	Alpha Terrace to High St South	13	14	15	17	19	18	16	0	0	1	1	2	2	1		
	Alpha Terrace to Winchmore Dr	13	14	15	17	19	18	16	0	0	1	1	2	2	1		
	Alpha Terrace to High St North	13	14	15	17	19	18	16	0	0	1	1	2	2	1		
	High St South to Winchmore Dr	146	178	188	195	183	172	164	12	17	21	26	28	28	19		
	High St South to High St North	126	151	164	178	158	165	158	12	9	12	12	14	14	6		
	High St South to Alpha Terrace	125	151	164	180	158	167	166	3	4	5	8	12	14	6		
	Winchmore Dr to High St North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

	Junction	Movement	Max Q Length (m)							Avg Q Length (m)						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
	A1134 / Parson Rd	A1134 North to A1134 South	300	99	319	360	338	321	278	88	11	50	63	71	93	45
		A1134 North to Parson Road	293	91	311	353	331	314	272	86	11	49	61	69	91	44
		A1134 South to Parson Road	92	93	139	262	262	250	193	4	3	7	23	38	46	17
		A1134 South to A1134 North	80	81	126	250	250	239	182	2	2	6	21	36	43	15
		Parson Road to A1134 North	54	31	196	222	255	308	167	4	1	23	28	32	48	18
		Parson Road to A1134 South	54	31	196	222	255	308	167	5	1	23	28	33	49	19
		All	305	138	323	364	348	341	287	31	5	26	37	47	62	26
	A1134 / Bentley Rd	A1134 North to A1134 South	232	26	248	302	312	342	217	52	2	23	31	39	63	20
		A1134 North to Bentley Rd	227	22	245	299	309	339	215	51	2	23	31	38	62	19
		A1134 South to Bentley Rd	112	55	134	166	88	131	103	13	0	17	23	6	25	7
		A1134 South to A1134 North	103	46	126	157	80	124	94	13	0	16	22	5	24	6
		Bentley Rd to A1134 North	20	18	20	17	21	35	19	1	0	1	1	1	5	1
		Bentley Rd to A1134 South	21	19	21	18	22	36	20	1	0	1	1	1	5	1
		All	250	69	280	334	312	343	256	22	1	13	18	15	31	9
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	90	70	84	82	81	92	77	8	2	4	4	5	10	2
		A1134 North to A1134 South	97	78	89	88	87	98	82	10	4	5	5	6	11	3
		A1134 North to Latham Rd	97	78	89	88	87	98	82	10	4	5	5	6	11	3
		Newton Rd to A1134 South	19	21	21	19	18	22	15	0	0	1	1	1	1	0
		Newton Rd to Latham Rd	18	19	19	18	17	21	14	0	0	1	1	0	1	0
		Newton Rd to A1134 North	17	19	19	18	17	21	13	1	0	1	1	1	1	0
		A1134 South to Latham Rd	200	177	209	280	218	219	225	41	16	55	67	42	49	48
		A1134 South to A1134 North	203	180	213	283	222	222	228	42	17	56	68	43	50	49
		A1134 South to Newton Rd	203	180	213	283	222	222	228	42	17	56	68	43	50	49
		Latham Rd to A1134 North	10	9	9	9	8	11	8	0	0	0	0	0	0	0
		Latham Rd to Newton Rd	8	7	7	7	5	9	7	0	0	0	0	0	0	0
		Latham Rd to A1134 South	10	9	8	9	8	10	7	0	0	0	0	0	0	0
		All	206	180	215	283	223	226	229	10	4	12	15	10	12	10
	A1134 / Queensway	A1134 North to A1134 South	94	45	55	67	87	102	43	7	0	2	3	4	9	0
		A1134 North to Queensway	71	24	33	44	65	80	23	5	0	1	2	3	7	0
		A1134 South to Queensway	108	121	107	115	108	104	103	18	8	20	23	19	17	20
		A1134 South to A1134 North	121	134	120	128	120	116	115	20	10	22	25	21	19	22
		Queensway to A1134 North	31	19	38	32	35	38	31	3	1	6	4	5	5	4
		Queensway to A1134 South	30	19	38	31	34	38	30	3	1	6	3	4	5	4
		All	130	134	122	128	120	116	115	11	4	11	12	11	11	11
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	373	393	258	209	213	233	205	151	298	44	30	32	32	29
		A1134 North to A1134 South	373	393	258	209	213	234	205	151	298	45	30	33	32	30
		Brooklands Ave to A1134 South	600	658	666	666	624	600	611	387	562	632	636	591	570	576
		Brooklands Ave to A1134 North	600	658	666	666	624	600	611	387	562	632	636	591	570	576
		A1134 South to A1134 North	87	86	87	88	82	78	81	22	20	23	26	24	20	26
		A1134 South to Brooklands Ave	87	86	87	88	82	78	81	22	20	23	26	24	20	26
		Chaucer Rd to A1134 North	48	94	119	111	96	103	96	8	20	34	30	24	27	25
		Chaucer Rd to Brooklands Ave	48	94	119	111	96	103	96	8	20	34	30	24	27	25
		Chaucer Rd to A1134 South	48	94	119	111	96	103	96	8	20	34	30	24	27	25
		A1134 North to Chaucer Rd	373	393	258	209	213	234	205	151	298	45	30	33	32	30
		Brooklands Ave to Chaucer Rd	600	658	666	666	624	600	611	387	562	632	636	591	570	576
		A1134 South to Chaucer Rd	80	79	80	81	75	72	74	19	16	19	22	20	17	22
		All	608	658	666	666	624	600	611	123	203	133	129	121	117	118
	A1134 / Bateman St	A1134 North to A1134 South	200	323	93	68	75	84	73	25	236	4	2	2	3	2
		A1134 North to Bateman St	193	315	86	61	68	77	66	23	229	3	1	1	2	1
		A1134 South to Bateman St	432	349	430	431	410	378	406	135	40	123	131	121	107	109
		A1134 South to A1134 North	419	347	417	419	399	367	395	140	54	130	137	125	112	116
		Bateman St to A1134 North	155	67	136	123	118	101	112	39	8	33	25	24	21	22
		Bateman St to A1134 South	156	68	137	124	119	102	113	39	9	33	25	24	21	22
		All	432	381	430	431	410	378	406	67	96	54	54	50	44	45
	A1134 / Fen Causeway	A1134 North to A1134 South	80	93	84	87	76	75	78	13	50	16	17	14	13	14
		A1134 North to Fen Causeway	80	93	84	87	76	75	78	13	50	16	17	14	13	14
		A1134 South to Fen Causeway	295	266	296	295	277	266	270	125	50	103	105	94	93	91
		A1134 South to A1134 North	295	266	296	295	277	266	270	125	50	103	105	94	93	91
		Fen Causeway to A1134 North	297	615	522	498	444	452	431	20	558	126	111	100	108	107
		Fen Causeway to A1134 South	297	615	522	498	444	452	431	20	558	126	111	100	108	107
		All	355	615	529	500	445	461	446	71	177	87	85	76	77	76
	A1134 / Lensfield Rd	A1134 North to A1134 South	34	343	44	45	43	34	44	2	117	4	3	3	3	4
		A1134 North to Lensfield Rd	34	343	44	45	43	34	44	2	117	4	3	3	3	4
		A1134 South to Lensfield Rd	50	92	72	69	62	60	63	1	18	4	3	3	3	3
		A1134 South to A1134 North	50	92	72	69	62	60	63	1	18	4	3	3	3	3
		Lensfield Rd to A1134 North	390	662	461	410	352	300	357	60	621	101	86	61	53	69
		Lensfield Rd to A1134 South	390	662	461	410	352	300	357	60	621	101	86	61	53	69
		All	390	662	461	410	352	300	357	21	252	36	31	23	20	25
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A10 Cambridge Road (North) to Church Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A10 Cambridge Road (South) to Church Road	91	100	377	490	432	345	289	2	2	71	186	121	96	44
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	78	87	364	476	419	333	277	1	2	68	180	116	92	41
		Church Road to A10 Cambridge Road (North)	23	30	264	128	160	98	76	1	1	45	28	26	14	9
		Church Road to A10 Cambridge Road (South)	24	30	264	128	160	99	76	0	1	45	28	26	14	9
		All	91	100	386	490	432	345	289	1	1	46	84	58	43	21
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	157	155	115	145	123	95	106	10	10	5	7	6	5	5
		A10 Cambridge Road (North) to London Road	157	155	115	145	123	95	106	10	10	5	7	6	5	5
		High St to London Road	84	96	342	815	539	442	237	6	7	43	211	89	67	22
		High St to A10 Cambridge Road (North)	84	96	342	815	539	442	237	6	7	43	211	89	67	22
		London Road to A10 Cambridge Road (North)	54	56	44	119	79	56	58	8	8	5	28	16	10	9
		London Road to High St	54	56	44	119	79	56	58	8	8	5	28	16	10	9
		All	159	163	358	815	543	451	250	8	8	18	82	37	27	12
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N					825	778	738	730			512	420	431	297
		Cambridge Rd S to P&R					0	726	688	679			0	384	395	267
		Cambridge Rd N to Cambridge Rd S					0	72	7	76			0	2	0	2
		Cambridge Rd N to P&R					0	72	7	76			0	2	0	2
		P&R to Cambridge Rd S					0	48	738	41			0	5	207	5
		P&R to Cambridge Rd N					13	0	0	0			0	0	0	0
		All						778	738	730				135	207	95
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N							220						148	
		Cambridge Rd N to Cambridge Rd S								34						4
		P&R exit to Cambridge Rd S								45						4
									220						51	

Junction	Movement	Max Q Length (m)								Avg Q Length (m)							
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple		
M11 J11	Huxton Road to M11 Southbound Slip	214	539	552	552	518	496	507	33	422	534	534	503	484	489		
	Huxton Road to A10 Cambridge Road	214	539	552	552	518	496	507	33	422	534	534	503	484	489		
	Huxton Road to M11 Northbound Slip	214	539	552	552	518	496	507	33	422	534	534	503	484	489		
	Huxton Road to Huxton Road	214	539	552	552	518	496	507	33	422	534	534	503	484	489		
	M11 Southbound Slip to A10 Cambridge Road	56	725	211	2819	1201	3085	712	4	242	65	2064	612	2437	363		
	M11 Southbound Slip to M11 Northbound Slip	56	725	211	2819	1201	3085	712	4	242	65	2064	612	2437	363		
	M11 Southbound Slip to Huxton Road	56	725	211	2819	1201	3085	712	4	242	65	2064	612	2437	363		
	M11 Southbound Slip to M11 Southbound Slip	56	725	211		1201	3085	712	4	242	65		612	2437	363		
	M11 Southbound Mainline through	0	0	0		0	0	0	0	0	0		0	0	0		
	A10 Cambridge Road to M11 Northbound Slip	118	1034	1272	475	430	207	418	25	483	1206	451	398	194	376		
	A10 Cambridge Road to Huxton Road	118	1034	1272	475	430	207	418	25	483	1206	451	398	194	376		
	A10 Cambridge Road to M11 Southbound Slip	118	1034	1272	475	430	207	418	25	483	1206	451	398	194	376		
	A10 Cambridge Road to A10 Cambridge Road	118	1034	1272		430	207	418	25	483	1206		398	194	376		
	M11 Northbound Slip to Huxton Road	47	141	1187	771	1498	2153	1260	8	33	519	367	710	1022	602		
	M11 Northbound Slip to M11 Southbound Slip	47	141	1187	771	1498	2153	1260	8	33	519	367	710	1022	602		
	M11 Northbound Slip to A10 Cambridge Road	47	141	1187	771	1498	0	1260	8	33	519	367	710	0	602		
	M11 Northbound Slip to M11 Northbound Slip	47	141	1187		1498	2153	1260	8	33	519		710	1022	602		
	M11 Northbound Mainline through	0	0	0		0	0	0	0	0	0		0	0	0		
	M11 Northbound to P&R access			1187	771	1498		1260			519	367	710		602		
	A10 Cambridge Road to P&R access			1272	475	430		418			1206	451	398		376		
	M11 Southbound to P&R access			101	827	117		645			5	588	11		290		
	M11 Northbound to P&R access South of M11J11				771	18						367	1				
	Trumpington P&R exit to new P&R access				26	17						1	1				
	All	220	1181	1638	2908	1635	3345	1539	12	197	259	445	248	428	236		
A1309 / Addenbrooke's Road	Huxton Road Southbound to Addenbrookes Road	10	313	372	370	347	336	340	0	143	351	356	337	325	324		
	Huxton Road Southbound Through	10	313	372	370	347	336	339	0	144	351	356	336	324	324		
	Huxton Road Southbound to Access Road	0	0	0	14	0	0	0	0	0	0	0	0	0	0		
	Addenbrookes Road to Huxton Road Southbound Slip	0	1093	1231	1231	1153	1107	1129	0	652	1210	1211	1138	1093	1110		
	Addenbrookes Road to Access Road	20	31	19	24	12	15	12	2	4	2	2	1	1	1		
	Addenbrookes Road to P&R Access	20	31	19	24	12	15	12	2	4	2	2	1	1	1		
	Addenbrookes Road to Huxton Road Northbound	20	31	19	24	12	15	12	2	4	2	2	1	1	1		
	Dedicated P&R Link Northbound to Access Road	8	17	30	31	25	22	25	0	0	1	1	0	0	0		
	Dedicated P&R Link Northbound Through	8	17	30	31	25	22	25	0	0	1	1	0	0	0		
	Huxton Road Northbound Through	30	948	1015	1005	943	903	921	1	606	879	875	813	787	788		
	Huxton Road Northbound to Addenbrookes Road	58	753	747	809	761	619	726	10	355	426	599	485	382	413		
	Access Road to P&R Access	7	28	26	36	52	42	37	0	3	3	5	10	8	5		
	Access Road to Huxton Road N	7	28	26	36	52	42	37	0	3	3	5	10	8	5		
	Access Road to Addenbrookes Road	7	28	26	36	52	42	37	0	3	3	5	10	8	5		
	Access Road to Huxton Road S	7	28	26	36	52	42	37	0	3	3	5	10	8	5		
	Dedicated P&R Link Southbound Through				22	15	14	15				0	0	0	0		
	All	58	1181	1231	1231	1153	1107	1129	1	212	358	341	312	292	297		
Trumpington P&R	Huxton Road Southbound Through	184	276	304	303	284	273	278	26	113	291	293	275	264	267		
	Huxton Road Southbound to P&R	184	276	304	303	284	273	278	26	113	291	293	275	264	267		
	Huxton Road Northbound to P&R	226	356	357	359	336	318	328	47	305	308	307	293	281	282		
	Huxton Road Northbound Through	226	356	367	369	346	327	337	47	315	318	317	302	290	291		
	P&R to Huxton Road Northbound	54	55	55	55	52	50	51	19	28	35	36	33	33	33		
	P&R to Huxton Road Southbound	54	55	55	55	52	50	51	19	28	35	36	33	33	33		
	All	234	366	367	369	346	327	337	31	190	238	238	226	217	218		
	Huxton Rd Northbound to Huxton Rd Southbound	73	144	161	161	151	146	148	1	39	142	147	139	134	134		
Consort Ave T-junction	Huxton Rd Northbound to Consort Ave	14	151	177	177	166	160	162	0	43	157	163	154	148	148		
	Huxton Rd Southbound to Consort Ave	242	283	282	282	261	252	257	37	135	113	118	106	102	99		
	Huxton Rd Southbound to Huxton Rd Northbound	242	283	282	282	261	252	257	37	135	113	118	106	102	99		
	Consort Ave to Huxton Rd Northbound	15	157	280	279	261	250	256	0	38	268	277	260	250	254		
	Consort Ave to Huxton Rd Southbound	15	157	281	280	261	250	256	0	38	269	278	260	250	254		
	All	242	283	286	286	267	255	260	8	58	190	197	184	177	178		
	Huxton Rd Northbound to Huxton Rd Southbound	60	68	73	73	68	64	67	8	16	40	43	44	42	38		
	Huxton Rd Northbound to Waitrose	60	68	73	73	68	64	67	8	16	40	43	44	42	38		
Waitrose T-junction	Huxton Rd Southbound to Waitrose	156	160	159	159	151	142	144	37	63	54	57	58	53	49		
	Huxton Rd Southbound to Huxton Rd Northbound	156	160	159	159	151	142	144	37	63	54	57	58	53	49		
	Waitrose to Huxton Rd North	56	96	125	125	117	112	114	13	34	115	119	112	108	109		
	Waitrose to Huxton Rd South	61	101	130	130	122	117	119	18	39	121	125	118	113	115		
	All	156	160	159	159	151	142	144	18	37	77	82	79	74	75		
	High St to Huxton Rd	85	84	87	86	81	78	79	37	40	65	70	68	66	63		
	High St to A1301 Shelford Rd	85	84	87	86	81	78	79	37	40	65	70	68	66	63		
	Huxton Rd to A1301 Shelford Rd	51	53	57	56	52	52	52	6	9	9	10	11	11	9		
High Street / Huxton Rd / A1301 Shelford Rd	Huxton Rd to High St	51	53	57	56	52	52	52	6	9	9	10	11	11	9		
	A1301 Shelford Rd to High St	102	364	469	529	523	510	436	22	178	270	338	382	394	228		
	A1301 Shelford Rd to Huxton Rd	98	360	465	526	520	506	433	18	174	267	334	378	390	225		
	All	106	364	469	529	523	510	436	21	101	153	188	210	217	131		
	High St North to High St South	353	352	354	354	332	319	326	128	120	274	304	303	290	280		
	High St North to Maris Lane	337	337	339	339	318	306	312	118	114	261	289	289	277	266		
	High St South to Maris Lane	102	106	106	107	102	100	100	6	10	7	10	13	16	7		
	High St South to High St North	113	117	117	117	112	110	110	7	12	9	12	15	19	9		
High Street / Church Lane	All	353	352	354	354	332	319	326	65	64	137	154	155	150	140		
	High St North to High St South	197	197	203	204	192	185	188	54	52	147	165	166	159	152		
	High St South to High St North	132	197	203	242	259	286	231	6	22	15	30	39	58	19		
	Church Lane to High St North	291	647	647	647	606	582	593	88	553	586	569	518	527	454		
	Church Lane to High St South	291	647	647	647	606	582	593	88	553	586	569	518	527	454		
	All	301	647	647	647	606	582	593	49	209	249	255	241	248	208		
	High St North to Alpha Terrace	407	366	446	447	419	402	410	105	88	369	408	403	386	378		
	High St North to High St South	420	379	457	458	429	412	420	112	94	379	419	413	396	388		
High Street / Winchmore Dr / Alpha Terrace	High St North to Winchmore Dr	418	377	458	458	430	412	421	111	93	380	420	414	397	388		
	Alpha Terrace to High St South	15	23	32	29	43	39	29	0	1	4	5	9	8	4		
	Alpha Terrace to Winchmore Dr	15	23	33	30	43	39	29	0	1	4	5	9	8	4		
	Alpha Terrace to High St North	15	23	33	30	43	39	29	0	1	4	5	9	8	4		
	High St South to Winchmore Dr	162	198	186	186	178	169	181	117	118	31	31	31	45	22		
	High St South to High St North	156	195	184	195	185	179	168	17	13	25	31	40	17			
	High St South to Alpha Terrace	158	195	183	195	193	179	159	6	21	13	25	31	40	17		
	Winchmore Dr to High St North	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Winchmore Dr to High St South	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	All	423	384	458	458	430	412	42									

	Junction	Movement	Max Q Length (m)								Avg Q Length (m)							
			Base	DM	Magenta	Cyan	White	Yellow	Purple		Base	DM	Magenta	Cyan	White	Yellow	Purple	
17:00 - 18:00	A1134 / Parson Rd	A1134 North to A1134 South	311	148	367	387	345	331	338		104	49	310	345	328	313	305	
		A1134 North to Parson Road	303	141	359	359	337	324	330		100	48	302	337	319	306	298	
		A1134 South to Parson Road	118	310	269	314	352	338	293		10	55	29	45	84	119	56	
		A1134 South to A1134 North	106	298	257	302	341	327	282		9	51	26	42	79	113	53	
		Parson Road to A1134 North	33	30	232	289	334	393	218		1	2	89	186	252	311	109	
	A1134 / Bentley Rd	Parson Road to A1134 South	33	31	232	289	334	394	218		2	2	90	187	252	311	109	
		All	316	328	372	384	380	395	342		38	35	141	190	219	246	155	
		A1134 North to A1134 South	236	122	389	391	365	351	356		72	44	328	370	350	339	320	
		A1134 North to Bentley Rd	232	119	386	387	362	348	353		70	43	325	366	347	336	317	
		A1134 South to Bentley Rd	183	308	158	303	249	300	176		23	77	8	37	33	75	16	
	A1134 / Latham Rd / Newton Rd	A1134 South to A1134 North	174	299	150	293	241	291	168		22	75	7	35	31	72	15	
		Bentley Rd to A1134 North	25	34	91	165	178	241	121		1	3	27	76	98	154	45	
		Bentley Rd to A1134 South	26	35	92	167	179	242	122		1	3	27	77	99	155	46	
		All	304	346	389	391	365	351	356		31	41	120	160	160	189	126	
		A1134 North to Newton Rd	77	77	112	112	103	100	103		8	9	76	91	88	87	74	
	A1134 / Queensway	A1134 North to A1134 South	85	84	118	118	109	105	109		9	10	81	96	93	92	79	
		A1134 North to Latham Rd	85	84	118	118	109	105	109		9	10	81	96	93	92	79	
		Newton Rd to A1134 South	14	18	62	87	110	136	71		0	1	18	34	53	74	22	
		Newton Rd to Latham Rd	12	17	61	86	110	135	70		0	1	18	33	53	73	22	
		Newton Rd to A1134 North	13	16	61	86	109	135	68		0	1	18	33	52	72	22	
	A1134 / Chaucer Rd / Brooklands Ave	A1134 South to Latham Rd	316	350	294	360	319	326	273		62	133	36	81	55	89	37	
		A1134 South to A1134 North	319	354	298	363	323	329	276		63	135	39	83	57	90	37	
		A1134 South to Newton Rd	319	354	298	363	323	329	276		63	135	39	83	57	90	37	
		Latham Rd to A1134 North	16	20	52	71	97	122	58		0	1	7	16	34	46	9	
		Latham Rd to Newton Rd	16	20	52	71	97	122	57		0	1	7	16	34	45	9	
	A1134 / Chaucer Rd / Brooklands Ave	Latham Rd to A1134 South	16	20	53	71	97	122	58		0	1	7	16	34	46	9	
		All	321	354	299	364	326	334	279		14	29	31	50	55	71	32	
		A1134 North to A1134 South	69	84	145	146	134	129	134		5	10	101	121	118	117	98	
		A1134 North to Queensway	52	60	121	122	111	107	112		4	7	81	96	96	95	79	
		A1134 South to Queensway	120	126	111	121	116	112	108		25	42	8	10	17	20	11	
	A1134 / Chaucer Rd / Brooklands Ave	A1134 South to A1134 North	133	139	136	166	166	164	136		26	44	31	49	61	73	36	
		Queensway to A1134 North	36	49	93	141	148	148	107		3	9	47	82	95	118	52	
		Queensway to A1134 South	35	49	92	141	148	148	107		3	8	47	81	95	118	52	
		All	133	140	154	170	166	164	146		13	24	49	70	77	88	52	
		A1134 North to Brooklands Ave	290	392	375	388	363	347	356		71	286	286	329	319	327	267	
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to A1134 South	290	392	375	388	363	347	356		71	286	286	329	319	327	267	
		Brooklands Ave to A1134 North	610	666	666	664	622	596	611		387	624	647	651	611	589	593	
		A1134 South to A1134 North	610	666	666	664	622	596	611		387	624	647	651	611	589	593	
		A1134 South to Brooklands Ave	87	89	84	86	80	78	78		27	38	12	15	17	16	14	
		Chaucer Rd to A1134 North	52	108	205	336	320	312	228		11	33	94	192	205	223	123	
	A1134 / Chaucer Rd / Brooklands Ave	Chaucer Rd to Brooklands Ave	52	108	205	336	320	312	228		11	33	94	192	205	223	123	
		Chaucer Rd to A1134 South	52	108	205	336	320	312	228		11	33	94	192	205	223	123	
		A1134 North to Chaucer Rd	290	392	375	388	363	347	356		71	286	286	329	319	327	267	
		Brooklands Ave to Chaucer Rd	610	666	666	664	622	596	611		387	624	647	651	611	589	593	
		A1134 South to Chaucer Rd	80	82	78	80	74	72	72		23	33	10	12	14	14	12	
	A1134 / Bateman St	All	610	666	666	664	622	596	611		98	217	223	255	248	249	213	
		A1134 North to A1134 South	116	321	292	320	296	287	295		14	166	210	249	242	254	193	
		A1134 North to Bateman St	109	314	284	313	291	280	288		13	160	204	242	235	248	187	
		A1134 South to Bateman St	429	429	257	274	308	299	155		180	188	32	29	62	42	23	
		A1134 South to A1134 North	416	417	252	277	305	303	177		180	189	38	34	64	44	29	
	A1134 / Fen Causeway	Bateman St to A1134 North	243	215	410	514	502	491	351		64	61	168	251	225	238	125	
		Bateman St to A1134 South	244	216	411	515	503	492	352		65	61	169	252	226	239	126	
		All	429	441	458	535	506	492	405		86	138	137	177	176	177	114	
		A1134 North to A1134 South	73	91	89	89	81	77	81		13	40	49	57	58	60	46	
		A1134 North to Fen Causeway	73	91	89	89	81	77	81		13	40	49	57	58	60	46	
	A1134 / Lensfield Rd	A1134 South to Fen Causeway	296	294	275	261	266	245	252		172	152	87	83	106	93	72	
		A1134 South to A1134 North	286	294	275	261	266	245	252		172	152	87	83	106	93	72	
		Fen Causeway to A1134 North	375	614	611	612	572	550	560		81	554	541	527	490	510	448	
		Fen Causeway to A1134 South	375	614	611	612	572	550	560		81	554	541	527	490	510	448	
		All	419	614	611	612	572	550	560		109	225	191	187	190	189	159	
	Cambridge Rd / Church Rd	A1134 North to A1134 South	34	132	529	620	582	558	489		2	31	266	351	345	382	238	
		A1134 North to Lensfield Rd	34	132	529	620	582	558	489		2	31	266	351	345	382	238	
		A1134 South to Lensfield Rd	47	89	88	86	80	75	82		2	11	32	37	41	38	35	
		A1134 South to A1134 North	47	89	88	86	80	75	82		2	11	32	37	41	38	35	
		Lensfield Rd to A1134 North	228	642	613	657	615	592	579		35	557	377	429	425	465	322	
	Cambridge Rd / London Rd	Lensfield Rd to A1134 South	228	642	613	657	615	592	579		35	557	377	429	425	465	322	
		All	228	642	613	657	615	592	579		13	200	225	272	270	295	198	
		A10 Cambridge Road (North) to A10 Cambridge Road (South)	0	0	0	0	0	0	0		0	0	0	0	0	0	0	
		A10 Cambridge Road (North) to Church Road	137	366	491	460	442	450	450		5	60	454	420	393	370	370	
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	124	352	477	478	448	430	438		3	57	376	441	408	381	359	
	New P&R access / A10 Cambridge Rd	Church Road to A10 Cambridge Road (North)	23	55	523	316	455	399	377		1	7	411	203	308	236	187	
		Church Road to A10 Cambridge Road (South)	24	55	523	317	456	400	377		0	6	412	203	308	236	187	
		All	137	366	532	494	496	459	462		2	26	317	260	289	249	221	
		A10 Cambridge Road (North) to High St	178	141	100	151	137	118	118		12	9	5	9	8	6	7	
		A10 Cambridge Road (North) to London Road	178	141	100	151	137	118	118		12	9	5	9	8	6	7	
	New P&R egress / A10 Cambridge Rd	High St to London Road	99	369	873	874	818	785	799		9	65	655	851	761	682	574	
		High St to A10 Cambridge Road (North)	99	369	873	874	818	785	799		9	65	655	851	761	682	574	

	Junction	Movement	Max Q Length (m)								Avg Q Length (m)							
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple		
M11 J11		Huxton Road to M11 Southbound Slip	69	551	552	553	519	498	507	1	508	535	536	503	485	490		
		Huxton Road to A10 Cambridge Road	69	551	552	553	519	498	507	1	508	535	536	503	485	490		
		Huxton Road to M11 Northbound Slip	69	551	552	553	519	498	507	1	508	535	536	503	485	490		
		Huxton Road to Huxton Road	69	551	552	553	519	498	507	1	508	535	536	503	485	490		
		M11 Southbound Slip to A10 Cambridge Road	67	2614	184	3057	1378	3362	889	7	1483	53	2824	975	3127	403		
		M11 Southbound Slip to M11 Northbound Slip	67	2614	184	3057	1378	3362	889	7	1483	53	2824	975	3127	403		
		M11 Southbound Slip to Huxton Road	67	2614	184	3057	1378	3362	889	7	1483	53	2824	975	3127	403		
		M11 Southbound Slip to M11 Southbound Slip	67	2614	184	3057	1378	3362	889	7	1483	53	2824	975	3127	403		
		M11 Southbound Mainline through	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		A10 Cambridge Road to M11 Northbound Slip	86	1249	1271	473	428	206	418	8	1091	1247	450	399	195	387		
		A10 Cambridge Road to Huxton Road	86	1249	1271	473	428	206	418	8	1091	1247	450	399	195	387		
		A10 Cambridge Road to M11 Southbound Slip	86	1249	1271	473	428	206	418	8	1091	1247	450	399	195	387		
		A10 Cambridge Road to A10 Cambridge Road	86	1249	1271	473	428	206	418	8	1091	1247	450	399	195	387		
		M11 Northbound Slip to Huxton Road	48	341	2130	2213	3539	3277	3290	4	95	1514	1480	2666	2693	2482		
		M11 Northbound Slip to M11 Southbound Slip	48	341	2130	2213	3539	3277	3290	4	95	1514	1480	2666	2693	2482		
		M11 Northbound Slip to A10 Cambridge Road	48	341	2130	2213	3539	3277	3290	4	95	1514	1480	2666	2693	2482		
		M11 Northbound Slip to M11 Northbound Slip	48	341	2130	2213	3539	3277	3290	4	95	1514	1480	2666	2693	2482		
		M11 Northbound Mainline through	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		M11 Northbound to P&R access			2130	2213	3539		3290			1514	1480	2666		2482		
		A10 Cambridge Road to P&R access			1271	473	428		418			1247	450	399		387		
		M11 Southbound to P&R access			57	1634	388		828			3	1328	157		360		
		M11 Northbound to P&R access South of M11J11				2213	23						1480	0				
		Trumpington P&R exit to new P&R access				16	20							0	1			
		All	98	2614	2228	3661	3539	3995	3337	3	529	373	736	522	706	458		
A1309 / Addenbrooke's Road		Huxton Road Southbound to Addenbrookes Road	12	371	371	371	372	348	335	340	0	278	353	356	337	324	325	
		Huxton Road Southbound Through	12	370	371	371	371	348	335	340	0	278	352	356	337	324	325	
		Huxton Road Southbound to Access Road	0	0	0	0	12	0	0	0	0	0	0	0	0	0		
		Addenbrookes Road to Huxton Road Southbound Slip	0	1232	1231	1231	1155	1109	1130	0	1120	1212	1212	1138	1094	1112		
		Addenbrookes Road to Access Road	16	29	18	22	16	15	1	3	2	2	2	1	1	1		
		Addenbrookes Road to P&R Access	16	29	18	22	16	15	1	3	2	2	2	1	1	1		
		Addenbrookes Road to Huxton Road Northbound	16	29	18	22	16	15	1	3	2	2	2	1	1	1		
		Dedicated P&R Link Northbound to Access Road	9	15	31	32	23	29	35	0	0	1	1	1	0	1		
		Dedicated P&R Link Northbound Through	9	15	31	32	23	29	35	0	0	1	1	1	0	1		
		Huxton Road Northbound Through	252	1005	1014	1005	941	903	923	67	863	895	894	825	818	811		
		Huxton Road Northbound to Addenbrookes Road	55	973	832	807	811	538	768	9	682	691	638	521	386	567		
		Access Road to P&R Access	0	48	36	83	77	85	59	0	7	3	18	10	16	7		
		Access Road to Huxton Road N	0	48	36	83	77	85	59	0	7	3	18	10	16	7		
		Access Road to Addenbrookes Road	0	48	36	83	77	85	59	0	7	3	18	10	16	7		
		Access Road to Huxton Road S	0	48	36	83	77	85	59	0	7	3	18	10	16	7		
		Dedicated P&R Link Southbound Through				12	15	22	20					0	0	0		
		All	265	1232	1231	1231	1155	1109	1130	9	359	390	348	317	296	315		
	18:00 - 19:00	Trumpington P&R	Huxton Road Southbound Through	129	303	304	304	284	274	279	16	238	292	293	275	265	267	
			Huxton Road Southbound to P&R	129	303	304	304	284	274	279	16	238	292	293	275	265	267	
			Huxton Road Northbound to P&R	319	362	363	363	342	325	333	193	317	306	308	289	278	281	
			Huxton Road Northbound Through	319	372	373	373	352	334	342	193	327	316	318	299	287	291	
			P&R to Huxton Road Northbound	52	54	55	55	52	50	51	16	32	36	35	33	33	32	
			P&R to Huxton Road Southbound	52	54	55	55	52	50	51	16	32	36	35	33	33	32	
		Consort Ave T-junction	All	319	372	373	373	352	334	342	75	229	237	239	224	216	218	
Huxton Rd Northbound to Huxton Rd Southbound			72	158	162	160	151	145	146	1	106	146	147	139	134	134		
Huxton Rd Northbound to Consort Ave			27	173	178	176	165	159	163	0	118	161	162	153	148	149		
Huxton Rd Southbound to Consort Ave			275	288	279	284	257	248	257	127	170	111	123	105	91	102		
Huxton Rd Southbound to Huxton Rd Northbound			275	288	279	284	257	248	257	127	170	111	123	105	91	102		
Consort Ave to Huxton Rd Northbound			44	267	280	278	260	250	256	1	205	278	277	260	250	254		
Waitrose T-junction	Consort Ave to Huxton Rd Southbound	44	268	280	279	261	250	256	1	206	278	278	260	250	254			
	All	275	289	285	286	264	254	260	26	161	195	197	184	174	179			
	Huxton Rd Northbound to Huxton Rd Southbound	58	71	72	73	70	67	68	7	32	42	44	42	42	39			
	Huxton Rd Northbound to Waitrose	58	71	72	73	70	67	68	7	32	42	44	42	42	39			
	Huxton Rd Southbound to Waitrose	161	161	159	159	150	144	148	69	81	60	63	58	57	56			
	Huxton Rd Southbound to Huxton Rd Northbound	161	161	159	159	150	144	148	69	81	60	63	58	57	56			
	Waitrose to Huxton Rd North	53	125	125	125	117	113	114	13	97	119	119	112	108	109			
	Waitrose to Huxton Rd South	59	130	130	131	122	118	119	17	102	125	125	117	113	115			
	All	161	161	159	159	150	144	148	24	82	80	85	83	80	79			
	High Street / Huxton Rd / A1301 Shelford Rd	High St to Huxton Rd	81	84	86	85	81	77	79	25	56	67	70	66	64	63		
		High St to A1301 Shelford Rd	81	84	86	85	81	77	79	25	56	67	70	66	64	63		
		Huxton Rd to A1301 Shelford Rd	53	53	56	56	53	48	54	8	13	10	10	8	8	9		
Huxton Rd to High St		53	53	56	56	53	48	54	8	13	10	10	8	8	9			
A1301 Shelford Rd to High St		247	566	567	568	532	510	520	83	505	534	546	518	498	494			
A1301 Shelford Rd to Huxton Rd		243	562	564	564	529	507	517	79	501	530	542	514	495	490			
High Street / Maris Lane	All	247	566	567	568	532	510	520	49	269	285	292	277	266	264			
	High St North to High St South	242	353	355	352	332	318	325	17	242	297	305	295	280	281			
	High St North to Maris Lane	227	337	340	337	317	304	311	14	231	282	290	281	267	267			
	High St South to Maris Lane	104	109	100	104	99	96	96	6	20	5	8	7	9	4			
	High St South to High St North	115	120	111	115	109	106	106	8	23	7	10	9	11	6			
	All	242	353	355	352	332	318	325	12	129	148	153	148	142	140			
High Street / Church Lane	High St North to High St South	134	196	204	205	192	183	188	7	128	157	164	160	152	151			
	High St South to High St North	148	259	161	234	206	249	145	12	70	10	23	26	42	8			
	Church Lane to High St North	314	648	648	647	608	583	593	137	639	639	639	599	575	585			
	Church Lane to High St South	314	648	648	647	608	583	593	137	639	639	639	599	575	585			
	All	314	648	648	647	608	583	593	52	279	269	275	262	257	248			
	High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	117	420	445	446	419	403	409	3	304	397	406	393	372	377		
High St North to High St South		131	434	456	457	429	413	419	5	316	408	417	403	382	387			
High St North to Winchmore Dr		128	432	456	458	430	414	419	4	314	408	418	404	383	388			
Alpha Terrace to High St South		14	33	26	32	37	34	28	0	5	3	4	5	5	3			
Alpha Terrace to Winchmore Dr		14	33	26	32	37	34	28	0	5	3	4	5	5	3			
Alpha Terrace to High St North		14	33	26	32	37	34	28	0	5	3	4	5	5	3			
High St South to Winchmore Dr		174	488	498	498	463	442	442	14	52	14	23	15	13	13			
High St South to High St North		132	199	159	180	177	186	144	6	47	8	17	20	32	5			
High St South to Alpha Terrace		136	198	159	180	176	186	144	6	47	8	17	20	32	6			
Winchmore Dr to High St North		0	0	0	0	0	0	0										

	Junction	Movement	Max Q Length (m)							Avg Q Length (m)						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
	A1134 / Parson Rd	A1134 North to A1134 South	1	341	370	368	345	330	339	0	216	334	339	317	305	305
		A1134 North to Parson Road	0	334	362	360	338	322	331	0	211	327	331	310	298	297
		A1134 South to Parson Road	116	304	108	236	272	267	150	13	91	9	24	60	79	13
		A1134 South to A1134 North	104	292	96	223	260	256	138	12	87	8	22	57	75	12
		Parson Road to A1134 North	12	19	19	77	181	230	49	0	3	1	7	51	77	5
		Parson Road to A1134 South	12	19	20	78	181	230	50	0	3	2	8	52	78	5
		All	116	356	371	371	366	368	339	4	102	114	122	141	152	106
	A1134 / Bentley Rd	A1134 North to A1134 South	0	354	393	391	368	352	360	0	197	365	367	342	321	322
		A1134 North to Bentley Rd	0	350	389	388	365	349	357	0	194	361	364	339	318	319
		A1134 South to Bentley Rd	155	331	148	268	335	291	161	23	67	15	39	89	88	14
		A1134 South to A1134 North	146	322	140	259	326	283	153	22	64	14	37	85	85	14
		Bentley Rd to A1134 North	13	43	31	63	118	165	58	0	15	4	12	40	74	11
		Bentley Rd to A1134 South	14	44	32	64	119	166	60	0	15	4	12	41	75	12
		All	156	379	393	391	368	352	360	7	92	127	138	156	160	115
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	60	100	114	116	107	103	107	1	42	81	86	78	74	67
		A1134 North to A1134 South	68	108	120	122	113	109	112	1	46	86	91	83	79	71
		A1134 North to Latham Rd	68	108	120	122	113	109	112	1	46	86	91	83	79	71
		Newton Rd to A1134 South	9	14	17	32	78	101	37	0	2	1	4	19	25	5
		Newton Rd to Latham Rd	6	11	16	31	77	100	36	0	1	1	3	18	24	5
		Newton Rd to A1134 North	10	14	16	31	76	100	36	0	1	1	4	19	24	5
		A1134 South to Latham Rd	298	376	271	372	370	325	258	45	88	44	90	152	135	46
		A1134 South to A1134 North	301	379	274	375	373	328	261	46	90	45	92	154	137	47
		A1134 South to Newton Rd	301	379	274	375	373	328	261	46	90	45	92	154	137	47
		Latham Rd to A1134 North	4	7	4	12	10	17	7	0	0	0	1	1	2	0
		Latham Rd to Newton Rd	0	5	2	8	8	14	5	0	0	0	1	1	2	0
		Latham Rd to A1134 South	3	10	5	10	10	15	8	0	1	0	1	1	2	1
		All	301	379	276	375	373	336	264	9	27	26	37	52	50	25
	A1134 / Queensway	A1134 North to A1134 South	37	121	146	146	137	132	134	0	52	98	112	101	99	82
		A1134 North to Queensway	15	97	121	121	114	110	112	0	42	77	90	81	79	64
		A1134 South to Queensway	113	125	107	125	118	109	105	12	18	9	17	36	33	14
		A1134 South to A1134 North	126	146	127	164	169	160	127	14	32	17	48	84	75	29
		Queensway to A1134 North	34	85	66	127	146	141	69	3	31	20	69	119	105	34
		Queensway to A1134 South	34	85	66	126	146	141	69	3	31	20	69	119	105	33
		All	126	150	150	167	170	161	143	7	34	37	65	89	82	41
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	368	392	392	390	366	351	360	160	335	348	360	337	325	311
		A1134 North to A1134 South	368	392	392	390	367	351	360	160	335	349	360	337	325	311
		Brooklands Ave to A1134 South	665	665	665	665	623	599	609	604	641	642	646	607	583	591
		Brooklands Ave to A1134 North	665	665	665	665	623	599	609	604	641	642	646	607	583	591
		A1134 South to A1134 North	87	87	85	86	83	77	78	15	20	12	18	31	28	16
		A1134 South to Brooklands Ave	87	87	85	86	83	77	78	15	20	12	18	31	28	16
		Chaucer Rd to A1134 North	40	73	184	334	323	316	210	5	26	73	241	280	271	106
		Chaucer Rd to Brooklands Ave	40	73	184	334	323	316	210	5	26	73	241	280	271	106
		Chaucer Rd to A1134 South	40	73	184	334	323	316	210	5	26	73	241	280	271	106
		A1134 North to Chaucer Rd	368	392	392	390	367	351	360	160	335	349	360	337	325	311
		Brooklands Ave to Chaucer Rd	665	665	665	665	623	599	609	604	641	642	646	607	583	591
		A1134 South to Chaucer Rd	80	80	78	79	77	70	72	13	17	10	16	27	25	14
		All	665	665	665	665	623	599	609	160	229	239	274	270	260	225
	A1134 / Bateman St	A1134 North to A1134 South	133	322	324	324	304	291	296	22	282	285	295	269	263	247
		A1134 North to Bateman St	125	315	316	316	297	284	290	20	275	277	288	262	257	240
		A1134 South to Bateman St	400	347	278	400	379	366	298	36	51	32	73	133	148	74
		A1134 South to A1134 North	394	351	298	397	373	363	294	48	61	41	79	138	149	78
		Bateman St to A1134 North	189	287	358	522	494	495	312	22	128	105	381	433	449	157
		Bateman St to A1134 South	190	288	359	523	495	496	313	22	129	106	382	434	450	157
		All	405	431	440	536	509	496	404	28	154	141	249	278	286	159
	A1134 / Fen Causeway	A1134 North to A1134 South	59	93	92	94	88	84	85	2	61	64	68	62	61	55
		A1134 North to Fen Causeway	59	93	92	94	88	84	85	2	61	64	68	62	61	55
		A1134 South to Fen Causeway	291	241	254	285	260	252	238	37	48	41	102	112	131	81
		A1134 South to A1134 North	291	241	254	285	260	252	238	37	48	41	102	112	131	81
		Fen Causeway to A1134 North	148	612	612	611	573	552	560	4	558	578	591	556	531	511
		Fen Causeway to A1134 South	148	612	612	611	573	552	560	4	558	578	591	556	531	511
		All	309	612	612	611	573	552	560	20	179	181	216	210	214	182
	A1134 / Lensfield Rd	A1134 North to A1134 South	23	411	601	626	586	563	543	1	199	534	608	570	547	444
		A1134 North to Lensfield Rd	23	411	601	626	586	563	543	1	199	534	608	570	547	444
		A1134 South to Lensfield Rd	51	92	92	92	87	81	84	2	44	49	61	56	53	48
		A1134 South to A1134 North	51	92	92	92	87	81	84	2	44	49	61	56	53	48
		Lensfield Rd to A1134 North	119	661	661	661	619	595	607	3	639	631	646	605	581	583
		Lensfield Rd to A1134 South	119	661	661	661	619	595	607	3	639	631	646	605	581	583
		All	119	661	661	661	619	595	607	2	294	405	438	410	393	359
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A10 Cambridge Road (North) to Church Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A10 Cambridge Road (South) to Church Road	88	439	476	491	460	443	450	2	312	453	428	412	416	416
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	75	426	476	477	448	431	438	1	302	433	440	416	400	404
		Church Road to A10 Cambridge Road (North)	16	110	538	388	467	459	448	0	55	527	331	444	408	396
		Church Road to A10 Cambridge Road (South)	16	111	538	389	468	460	448	0	55	527	332	445	408	396
		All	88	439	538	495	496	477	482	1	145	387	311	347	326	322
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	100	123	81	120	102	102	118	5	6	4	7	6	6	7
		A10 Cambridge Road (North) to London Road	100	123	81	120	102	102	118	5	6	4	7	6	6	7
		High St to London Road	73	685	872	873	818	785	800	5	425	848	854	802	770	782
		High St to A10 Cambridge Road (North)	73	685	872	873	818	785	800	5	425	848	854	802	770	782
		London Road to A10 Cambridge Road (North)	38	53	41	227	281	162	165	4	7	4	104	155	70	79
		London Road to High St	38	53	41	227	281	162	165	4	7	4	104	155	70	79
		All	110	686	872	873	818	785	800	5	146	285	322	321	282	289
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N					823	786	755	768			798	765	735	744
		Cambridge Rd S to P&R					0	734	704	717			0	713	685	693
		Cambridge Rd N to Cambridge Rd S					0	74	8	75			0	2	0	2
		Cambridge Rd N to P&R					0	74	8	75			0	2	0	2
		P&R to Cambridge Rd S					0	48	755	51			0	6	355	6
	New P&R egress / A10 Cambridge Rd	P&R to Cambridge Rd N					9	0	0	0					0	0
		All						786	755	768				248	355	241
		Cambridge Rd S to Cambridge Rd N														196
															33	
															45	
																217
																67

Junction	Movement	Delay (s)							LOS						
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
M11 J11	Huxton Road to M11 Southbound Slip	11	48	439	655	566	950	343	B	D	F	F	F	F	F
	Huxton Road to A10 Cambridge Road	19	56	499	702	634	866	498	B	E	F	F	F	F	F
	Huxton Road to M11 Northbound Slip	43	95	635	981	801	1105	618	D	F	F	F	F	F	F
	Huxton Road to Huxton Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Slip to A10 Cambridge Road	24	48	170	418	200	375	240	C	D	F	F	F	F	F
	M11 Southbound Slip to M11 Northbound Slip	0	79	0	0	0	0	0	A	E	A	A	A	A	A
	M11 Southbound Slip to Huxton Road	11	76	128	362	167	327	198	B	E	F	F	F	F	F
	M11 Southbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Mainline through	3	4	4	10	5	10	4	A	A	A	B	A	A	A
	A10 Cambridge Road to M11 Northbound Slip	27	65	618	730	609	488	508	C	E	F	F	F	F	F
	A10 Cambridge Road to Huxton Road	30	97	730	751	578	426	493	C	F	F	F	F	F	F
	A10 Cambridge Road to M11 Southbound Slip	29	53	0	557	426	248	361	C	D	A	F	F	F	F
	A10 Cambridge Road to A10 Cambridge Road	0	91	0	0	0	0	0	A	F	A	A	A	A	A
	M11 Northbound Slip to Huxton Road	46	135	620	702	545	661	555	D	F	F	F	F	F	F
	M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Slip to A10 Cambridge Road	27	44	285	425	353	25	384	C	D	F	F	F	C	F
	M11 Northbound Slip to M11 Northbound Slip	34	56	276	458	280	492	390	C	E	F	F	F	F	F
	M11 Northbound Mainline through	2	3	5	3	3	13	5	A	A	A	A	A	B	A
	M11 Northbound to P&R access			0	585	550		415			A	F	F	F	F
	A10 Cambridge Road to P&R access			0	595	721		419			A	F	F	F	F
	M11 Southbound to P&R access			49	97	38		121			D	F	D	F	F
	M11 Northbound to P&R access South of M11J11				0	34					A	C	C		
	Trumpington P&R exit to new P&R access				34	37					C	D			
	All	14	36	145	196	154	174	142	B	D	F	F	F	F	F
A1309 / Addenbrooke's Road	Huxton Road Southbound to Addenbrookes Road	12	21	234	345	307	559	200	B	C	F	F	F	F	F
	Huxton Road Southbound Through	11	21	324	490	465	672	309	B	C	F	F	F	F	F
	Huxton Road Southbound to Access Road	0	0	0	241	0	0	0	A	A	A	F	A	A	A
	Addenbrookes Road to Huxton Road Southbound Slip	7	11	454	615	613	835	421	A	B	F	F	F	F	F
	Addenbrookes Road to Access Road	2	42	311	438	362	64	273	A	D	F	F	F	F	F
	Addenbrookes Road to P&R Access	28	48	0	40	29	43	34	C	D	A	D	C	D	C
	Addenbrookes Road to Huxton Road Northbound	32	51	268	434	0	576	0	C	D	F	F	A	F	A
	Dedicated P&R Link Northbound to Access Road	2	27	4	5	3	3	4	A	C	A	A	A	A	A
	Dedicated P&R Link Northbound Through	3	25	5	5	3	4	6	A	C	A	A	A	A	A
	Huxton Road Northbound Through	4	231	435	226	174	178	196	A	F	F	F	F	F	F
	Huxton Road Northbound to Addenbrookes Road	21	70	43	76	61	67	58	C	E	D	E	E	E	E
	Access Road to P&R Access	0	0	0	43	0	0	0	A	A	A	D	A	A	A
	Access Road to Huxton Road N	32	52	51	49	50	43	53	C	D	D	D	D	D	D
	Access Road to Addenbrookes Road	30	44	40	42	41	41	36	C	D	D	D	D	D	D
	Access Road to Huxton Road S	17	44	174	215	224	278	183	B	D	F	F	F	F	F
	Dedicated P&R Link Southbound Through				12	10	10	10			B	B	B	B	B
	All	10	66	294	276	246	279	209	A	E	F	F	F	F	F
Trumpington P&R	Huxton Road Southbound Through	28	18	214	234	229	333	162	C	B	F	F	F	F	F
	Huxton Road Southbound to P&R	32	39	150	183	200	233	140	C	D	F	F	F	F	F
	Huxton Road Northbound to P&R	27	241	210	204	172	176	188	C	F	F	F	F	F	F
	Huxton Road Northbound Through	26	230	210	202	173	167	183	C	F	F	F	F	F	F
	P&R to Huxton Road Northbound	10	22	41	42	45	72	33	A	C	D	D	D	E	C
	P&R to Huxton Road Southbound	17	24	81	144	139	193	103	B	C	F	F	F	F	F
	All	24	100	174	194	179	195	162	C	F	F	F	F	F	F
Consort Ave T-junction	Huxton Rd Northbound to Huxton Rd Southbound	8	8	116	129	134	183	55	A	A	F	F	F	F	F
	Huxton Rd Northbound to Consort Ave	19	39	66	69	69	80	56	B	D	E	F	F	F	F
	Huxton Rd Southbound to Consort Ave	18	102	91	85	75	69	86	B	F	F	F	F	E	E
	Huxton Rd Southbound to Huxton Rd Northbound	21	111	97	92	81	79	86	C	F	F	F	F	E	F
	Consort Ave to Huxton Rd Northbound	22	46	50	61	55	39	53	C	D	D	E	E	D	D
	Consort Ave to Huxton Rd Southbound	22	44	54	58	59	53	61	C	D	D	E	E	D	E
	All	14	59	95	97	91	98	83	B	E	F	F	F	F	F
Waitrose T-junction	Huxton Rd Northbound to Huxton Rd Southbound	3	3	35	42	43	58	29	A	A	D	D	D	E	C
	Huxton Rd Northbound to Waitrose	17	18	20	20	18	17	18	B	B	B	C	B	B	B
	Huxton Rd Southbound to Waitrose	31	50	47	45	43	42	42	C	D	D	D	D	D	D
	Huxton Rd Southbound to Huxton Rd Northbound	34	51	48	46	43	43	43	C	D	D	D	D	D	D
	Waitrose to Huxton Rd North	19	22	88	134	130	170	74	B	C	F	F	F	F	F
	Waitrose to Huxton Rd South	45	47	210	264	232	242	165	D	D	F	F	F	F	F
	All	19	29	58	66	61	67	49	B	C	E	E	E	E	E
High Street / Huxton Rd / A1301 Shelford Rd	High St to Huxton Rd	30	29	71	79	84	100	62	C	C	E	E	F	F	E
	High St to A1301 Shelford Rd	39	40	33	31	29	28	29	D	D	C	C	C	C	C
	Huxton Rd to A1301 Shelford Rd	28	27	26	26	25	23	24	C	C	C	C	C	C	C
	Huxton Rd to High St	7	8	8	9	8	8	8	A	A	A	A	A	A	A
	A1301 Shelford Rd to High St	40	57	64	70	75	91	56	D	E	E	E	E	F	E
	A1301 Shelford Rd to Huxton Rd	18	25	99	103	144	188	81	B	C	F	F	F	F	F
	All	24	26	38	41	44	51	34	C	C	D	D	D	D	C
High Street / Maris Lane	High St North to High St South	78	56	92	106	108	121	86	F	F	F	F	F	F	F
	High St North to Maris Lane	63	51	77	84	83	92	74	F	F	F	F	F	F	F
	High St South to Maris Lane	6	7	7	7	6	6	6	A	A	A	A	A	A	A
	High St South to High St North	7	7	8	8	8	7	7	A	A	A	A	A	A	A
	All	45	32	39	43	41	42	37	E	D	E	E	E	E	E
High Street / Church Lane	High St North to High St South	44	24	48	53	59	65	45	D	C	D	D	E	E	D
	High St South to High St North	15	16	18	21	20	20	17	B	B	B	C	B	C	B
	Church Lane to High St North	225	448	474	489	294	336	315	F	F	F	F	F	F	F
	Church Lane to High St South	240	406	490	519	348	407	291	F	F	F	F	F	F	F
	All	52	63	77	80	64	71	60	D	E	E	F	E	E	E
High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	76	40	31	45	46	47	41	F	E	D	E	E	E	E
	High St North to High St South	79	43	60	76	70	70	63	F	E	F	F	F	F	F
	High St North to Winchmore Dr	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Alpha Terrace to High St North	15	14	41	51	53	97	39	B	B	E	F	F	F	E
	Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Alpha Terrace to High St North	20	22	38	43	58	68	35	C	C	E	E	F	F	E
	High St South to Winchmore Dr	13	10	6	19	7	19	6	B	B	A	C	A	C	A
	High St South to High St North	11	12	14	16	15	16	13	B	B	B	C	B	C	B
	High St South to Alpha Terrace	19	22	26	36	35	35	23	C	C	D	E	D	E	C
	Winchmore Dr to High St North	0	0	0	0	0	0	0	A	A	A	A	A	A	A
High Street / A1134	Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to High St South	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	All	48	28	32	39	35	35	33	E	D	D	E	E	D	D
	A1134 Trumpington Road (North) to High St (South)	121	55	77	86	79	86	81	F	E	E	F	E	F	F
	A1134 Trumpington Road (North) to A1134 Long Rd (East)	72	40	60	60	54	54	51	E	D	E	E	D	D	D
	High St (South) to A1134 Long Rd (East)	40	43	42	39	39	42	35	D	D	D	D	D	D	C
	A1134 Long Rd (East) to A1134 Trumpington Road (North)	18	23	19	20	20	30	20	B	C	B	B	B	C	B
	A1134 Long Rd (East) to A1134 Trumpington Road (North)	46	37	43	66	48	47	55	D	D	D	E	D	D	D
	A1134 Long Rd (East) to High St (South)	40	27	45	55	45	47	52	D	C	D	E	D	D	D
	All	58	36	43	45	40	45	42	E	D	D	D	D	D	D

	Junction	Movement	Delay (s)							LOS						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
	A1134 / Parson Rd	A1134 North to A1134 South	73	18	20	23	21	18	22	F	C	C	C	C	C	C
		A1134 North to Parson Road	2	4	1	17	5	5	5	A	A	A	C	C	A	A
		A1134 South to Parson Road	14	12	15	27	21	46	16	B	B	C	D	C	E	C
		A1134 South to A1134 North	10	11	13	23	19	33	20	B	B	B	C	C	D	C
		Parson Road to A1134 North	37	23	54	63	49	157	26	E	C	F	F	E	E	D
		Parson Road to A1134 South	38	14	41	50	39	43	35	E	B	E	E	E	E	D
		All	42	15	18	25	21	30	21	E	B	C	D	C	D	C
	A1134 / Bentley Rd	A1134 North to A1134 South	44	9	9	10	11	7	9	E	A	A	B	B	A	A
		A1134 North to Bentley Rd	39	7	8	7	17	4	17	E	A	A	A	C	A	C
		A1134 South to Bentley Rd	32	14	27	29	14	25	14	D	B	D	D	B	D	B
		A1134 South to A1134 North	20	11	22	28	15	25	15	C	B	C	D	B	D	C
		Bentley Rd to A1134 North	25	9	23	25	24	31	28	C	A	C	C	C	D	D
		Bentley Rd to A1134 South	11	6	8	9	9	20	11	B	A	A	A	A	C	B
		All	32	10	16	20	13	18	13	D	A	C	C	B	C	B
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	10	5	4	4	4	5	4	A	A	A	A	A	A	A
		A1134 North to A1134 South	13	7	7	7	7	7	6	B	A	A	A	A	A	A
		A1134 North to Latham Rd	9	6	5	4	5	3	4	A	A	A	A	A	A	A
		Newton Rd to A1134 South	15	16	11	11	9	11	9	B	C	B	B	A	B	A
		Newton Rd to Latham Rd	0	0	0	0	0	0	0	A	A	A	A	A	A	A
		Newton Rd to A1134 North	22	16	18	16	15	14	14	C	C	C	C	B	B	B
		A1134 South to Latham Rd	35	19	50	47	32	48	37	D	C	E	E	D	E	E
		A1134 South to A1134 North	41	20	50	56	42	48	42	E	C	E	F	E	E	E
		A1134 South to Newton Rd	70	27	51	59	53	48	52	F	D	F	F	F	E	F
		Latham Rd to A1134 North	9	5	6	7	4	7	6	A	A	A	A	A	A	A
		Latham Rd to Newton Rd	15	12	6	5	6	4	10	B	B	A	A	A	A	B
		Latham Rd to A1134 South	17	19	10	37	13	18	11	C	C	A	E	B	C	B
		All	25	14	28	32	24	27	25	D	B	D	D	C	D	C
	A1134 / Queensway	A1134 North to A1134 South	6	2	2	2	2	2	2	A	A	A	A	A	A	A
		A1134 North to Queensway	2	1	1	1	0	1	1	A	A	A	A	A	A	A
		A1134 South to Queensway	16	7	15	16	12	13	20	C	A	C	C	B	B	C
		A1134 South to A1134 North	25	14	26	30	26	25	26	D	B	D	D	D	D	D
		Queensway to A1134 North	87	32	100	88	94	73	103	F	D	F	F	F	F	F
		Queensway to A1134 South	29	9	43	26	34	28	26	D	A	E	D	D	D	D
		All	16	9	17	18	18	16	17	C	A	C	C	C	C	C
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	93	163	32	25	25	21	24	F	F	C	C	C	C	C
		A1134 North to A1134 South	121	192	60	50	51	45	49	F	F	E	D	D	D	D
		Brooklands Ave to A1134 South	332	378	532	514	504	478	471	F	F	F	F	F	F	F
		Brooklands Ave to A1134 North	378	425	605	587	564	533	533	F	F	F	F	F	F	F
		A1134 South to A1134 North	43	31	43	44	41	40	40	D	C	D	D	D	D	D
		A1134 South to Brooklands Ave	51	59	61	63	69	56	70	D	E	E	E	E	E	E
		Chaucer Rd to A1134 North	90	124	182	164	146	151	141	F	F	F	F	F	F	F
		Chaucer Rd to Brooklands Ave	95	120	167	137	123	136	131	F	F	F	F	F	F	F
		Chaucer Rd to A1134 South	80	93	118	113	99	114	101	F	F	F	F	F	F	F
		A1134 North to Chaucer Rd	127	213	69	59	64	59	63	F	F	E	E	E	E	E
		Brooklands Ave to Chaucer Rd	295	386	553	538	515	497	501	F	F	F	F	F	F	F
		A1134 South to Chaucer Rd	11	13	16	13	15	16	13	B	B	B	B	B	B	B
		All	153	184	186	182	174	170	165	F	F	F	F	F	F	F
	A1134 / Bateman St	A1134 North to A1134 South	30	144	13	12	11	10	11	D	F	B	B	B	B	B
		A1134 North to Bateman St	27	134	10	9	8	7	8	D	F	B	A	A	A	A
		A1134 South to Bateman St	67	33	62	62	59	54	52	F	D	F	F	F	F	F
		A1134 South to A1134 North	73	29	65	67	62	59	57	F	D	F	F	F	F	F
		Bateman St to A1134 North	146	41	114	97	87	82	81	F	E	F	F	F	F	F
		Bateman St to A1134 South	126	43	94	75	69	62	70	F	E	F	F	F	F	F
		All	62	72	48	47	43	40	40	F	F	E	E	E	E	E
	A1134 / Fen Causeway	A1134 North to A1134 South	7	42	8	8	7	7	7	A	E	A	A	A	A	A
		A1134 North to Fen Causeway	17	39	20	20	18	17	17	C	E	C	C	C	C	C
		A1134 South to Fen Causeway	142	61	114	116	104	105	100	F	F	F	F	F	F	F
		A1134 South to A1134 North	40	32	35	37	34	34	32	E	D	E	E	D	D	D
		Fen Causeway to A1134 North	34	266	77	69	64	65	64	D	F	F	F	F	F	F
		Fen Causeway to A1134 South	34	282	76	69	64	64	62	D	F	F	F	F	F	F
		All	48	114	58	57	52	52	50	E	F	F	F	F	F	F
	A1134 / Lensfield Rd	A1134 North to A1134 South	18	191	24	24	23	21	23	F	C	C	C	C	C	C
		A1134 North to Lensfield Rd	14	89	14	14	14	14	15	B	F	B	B	B	B	B
		A1134 South to Lensfield Rd	5	17	7	7	7	6	6	A	C	A	A	A	A	A
		A1134 South to A1134 North	1	5	2	2	2	2	2	A	A	A	A	A	A	A
		Lensfield Rd to A1134 North	46	638	70	65	51	44	52	E	F	F	F	F	E	F
		Lensfield Rd to A1134 South	52	642	75	73	56	50	58	F	F	F	F	F	E	F
		All	23	214	32	30	25	22	25	C	F	D	D	C	C	D
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	3	4	3	3	3	3	3	A	A	A	A	A	A	A
		A10 Cambridge Road (North) to Church Road	3	4	3	3	3	3	3	A	A	A	A	A	A	A
		A10 Cambridge Road (South) to Church Road	12	14	43	103	59	56	26	B	B	E	F	F	F	D
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	7	6	50	122	74	59	28	A	A	F	F	F	F	D
		Church Road to A10 Cambridge Road (North)	12	13	68	188	90	82	42	B	B	F	F	F	F	E
		Church Road to A10 Cambridge Road (South)	6	6	43	114	52	26	20	A	A	E	F	F	D	C
		All	5	5	32	65	41	33	17	A	A	D	F	E	D	C
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	12	12	10	12	11	10	10	B	B	A	B	B	A	B
		A10 Cambridge Road (North) to London Road	10	10	9	10	9	8	8	A	A	A	B	A	A	A
		High St to London Road	71	71	70	117	87	91	68	F	F	F	F	F	F	F
		High St to A10 Cambridge Road (North)	17	18	34	117	57	40	23	C	C	D	F	F	E	C
		London Road to A10 Cambridge Road (North)	33	34	27	86	52	37	32	D	D	D	F	F	E	D
		London Road to High St	30	31	26	92	55	33	29	D	D	D	F	F	D	D
		All	17	17	23	65	35	27	19	C	C	C	F	E	D	C
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				462	320	314	207					F	F	F
		Cambridge Rd S to P&R				242	178	177	91					F	F	F
		Cambridge Rd N to Cambridge Rd S				2	7	3	7					A	A	A
		Cambridge Rd N to P&R					2	7	0					A	A	A
		P&R to Cambridge Rd S				2	20	133	20					A	C	F
		P&R to Cambridge Rd N				134	5	6	6					F	A	A
		All					135	133	91					F	F	F
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						186						F		
		Cambridge Rd N to Cambridge Rd S							6					A	B	D
		P&R exit to Cambridge Rd S							17							
All							93							F		

Junction	Movement	Delay (s)							LOS						
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
M11 J11	Hauxton Road to M11 Southbound Slip	21	280	745	917	973	1080	699	C	F	F	F	F	F	F
	Hauxton Road to A10 Cambridge Road	30	280	761	910	960	1123	723	C	F	F	F	F	F	F
	Hauxton Road to M11 Northbound Slip	64	373	1091	1258	1344	1528	995	E	F	F	F	F	F	F
	Hauxton Road to Hauxton Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Slip to A10 Cambridge Road	29	159	145	543	332	590	308	C	F	F	F	F	F	F
	M11 Southbound Slip to M11 Northbound Slip	0	272	0	0	0	0	0	A	F	A	A	A	A	A
	M11 Southbound Slip to Hauxton Road	12	209	100	501	298	549	291	B	F	F	F	F	F	F
	M11 Southbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Mainline through	3	5	4	0	10	45	6	A	A	A	A	B	D	A
	A10 Cambridge Road to M11 Northbound Slip	36	343	1170	917	898	563	653	D	F	F	F	F	F	F
	A10 Cambridge Road to Hauxton Road	35	353	1371	868	823	484	670	D	F	F	F	F	F	F
	A10 Cambridge Road to M11 Southbound Slip	32	304	0	637	614	292	517	C	F	A	F	F	F	F
	A10 Cambridge Road to A10 Cambridge Road	0	300	0	0	0	0	0	A	F	A	A	A	A	A
	M11 Northbound Slip to Hauxton Road	56	335	1008	923	1222	950	1035	E	F	F	F	F	F	F
	M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Slip to A10 Cambridge Road	45	145	692	675	1049	88	833	D	F	F	F	F	F	F
	M11 Northbound Slip to M11 Northbound Slip	50	147	734	0	1123	813	1006	D	F	F	F	F	F	F
	M11 Northbound Mainline through	2	2	20	0	16	44	16	A	A	B	B	B	D	B
	M11 Northbound to P&R access			0	814	1358		970			A	F	F	F	F
	A10 Cambridge Road to P&R access			0	917	1090		690			A	F	F	F	F
	M11 Southbound to P&R access			26	185	87		234			C	F	F	F	F
	M11 Northbound to P&R access South of M11J11			0	32						A	C	C		
	Trumpington P&R exit to new P&R access			34	40						C	D			
	All	20	122	238	296	268	307	237	B	F	F	F	F	F	F
A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	14	158	635	814	978	1136	649	B	F	F	F	F	F	F
	Hauxton Road Southbound Through	14	169	845	1138	1314	1572	894	B	F	F	F	F	F	F
	Hauxton Road Southbound to Access Road	0	0	0	506	0	0	0	A	A	A	A	A	A	A
	Addenbrookes Road to Hauxton Road Southbound Slip	7	250	1122	1309	1506	1652	1038	A	F	F	F	F	F	F
	Addenbrookes Road to Access Road	24	856	992	1022	1332	908		C	F	F	F	F	F	F
	Addenbrookes Road to P&R Access	36	302	0	743	772	835	903	D	F	A	F	F	F	F
	Addenbrookes Road to Hauxton Road Northbound	33	220	848	1041	0	1285	0	C	F	F	F	A	A	A
	Dedicated P&R Link Northbound to Access Road	0	34	4	3	4	3	4	A	C	A	A	A	A	A
	Dedicated P&R Link Northbound Through	3	33	4	4	3	3	6	A	C	A	A	A	A	A
	Hauxton Road Northbound Through	5	232	367	187	170	171	164	A	F	F	F	F	F	F
	Hauxton Road Northbound to Addenbrookes Road	25	100	43	75	72	77	62	C	F	D	E	E	E	E
	Access Road to P&R Access	1	0	0	45	0	0	44	A	A	A	D	A	A	D
	Access Road to Hauxton Road N	29	53	51	69	101	117	72	C	D	D	E	F	F	E
	Access Road to Addenbrookes Road	24	45	42	51	108	86	47	C	D	D	D	F	F	D
	Access Road to Hauxton Road S	24	114	191	279	366	419	203	C	F	F	F	F	F	F
	Dedicated P&R Link Southbound Through				13	10	10	12			B	B	B	A	B
	All	12	181	432	426	422	447	349	B	F	F	F	F	F	F
Trumpington P&R	Hauxton Road Southbound Through	24	109	818	1099	1342	1543	867	C	F	F	F	F	F	F
	Hauxton Road Southbound to P&R	32	126	657	837	1032	1199	681	C	F	F	F	F	F	F
	Hauxton Road Northbound to P&R	29	190	137	167	168	152	149	C	F	F	F	F	F	F
	Hauxton Road Northbound Through	34	189	167	173	165	158	148	C	F	F	F	F	F	F
	P&R to Hauxton Road Northbound	17	36	66	72	73	123	63	B	D	E	E	E	F	E
	P&R to Hauxton Road Southbound	20	55	202	256	311	364	214	B	D	F	F	F	F	F
	All	26	130	261	293	300	302	248	C	F	F	F	F	F	F
Consort Ave T- junction	Hauxton Rd Northbound to Hauxton Rd Southbound	7	51	483	650	799	902	550	A	D	F	F	F	F	F
	Hauxton Rd Northbound to Consort Ave	25	57	122	149	191	195	121	C	E	F	F	F	F	F
	Hauxton Rd Southbound to Consort Ave	27	76	63	68	63	68	54	C	E	E	E	E	E	E
	Hauxton Rd Southbound to Hauxton Rd Northbound	28	79	65	70	69	62	57	C	E	E	E	E	E	E
	Consort Ave to Hauxton Rd Northbound	27	115	1546	1096	280	0	384	C	F	F	F	F	A	F
	Consort Ave to Hauxton Rd Southbound	26	138	1958	1285	394	0	772	C	F	F	F	F	A	F
	All	19	69	146	162	157	150	131	B	E	F	F	F	F	F
Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	3	16	98	136	169	177	112	A	B	F	F	F	F	F
	Hauxton Rd Northbound to Waitrose	23	26	24	27	32	31	23	C	C	C	C	C	C	C
	Hauxton Rd Southbound to Waitrose	27	37	34	39	40	33	32	C	D	C	D	D	C	C
	Hauxton Rd Southbound to Hauxton Rd Northbound	27	38	35	38	41	37	33	C	D	D	D	D	D	C
	Waitrose to Hauxton North	22	54	763	937	1061	1173		C	D	F	F	F	F	F
	Waitrose to Hauxton Rd South	52	110	2065	2643	2608	2352	1908	D	F	F	F	F	F	F
	All	19	36	119	138	124	118	112	B	D	F	F	F	F	F
High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	28	46	197	298	435	509	246	C	D	F	F	F	F	F
	High St to A1301 Shelford Rd	31	29	28	26	21	24	23	C	C	C	C	C	C	C
	Hauxton Rd to A1301 Shelford Rd	22	22	23	24	23	18	20	C	C	C	C	C	B	B
	Hauxton Rd to High St	5	7	6	8	10	11	6	A	A	A	A	A	B	A
	A1301 Shelford Rd to High St	70	288	394	493	603	686	343	E	F	F	F	F	F	F
	A1301 Shelford Rd to Hauxton Rd	23	218	367	509	654	768	339	C	F	F	F	F	F	F
	All	23	61	122	161	200	215	117	C	E	F	F	F	F	F
High Street / Maris Lane	High St North to High St South	56	73	363	582	932	1172	513	F	F	F	F	F	F	F
	High St North to Maris Lane	51	72	222	397	576	716	307	F	F	F	F	F	F	F
	High St South to Maris Lane	4	5	5	6	7	12	5	A	A	A	A	A	B	A
	High St South to High St North	5	6	5	8	10	12	5	A	A	A	A	B	B	A
	All	32	34	107	141	166	185	121	D	D	F	F	F	F	F
High Street / Church Lane	High St North to High St South	28	34	176	287	503	610	267	C	C	F	F	F	F	F
	High St South to High St North	11	20	18	30	39	50	21	B	B	B	C	D	D	C
	Church Lane to High St North	253	1424	1695	1694	1609	1866	1232	F	F	F	F	F	F	F
	Church Lane to High St South	265	1520	1717	1995	1905	2134	1304	F	F	F	F	F	F	F
	All	41	123	221	255	271	311	199	D	F	F	F	F	F	F
High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	34	36	333	559	726	1294	452	D	E	F	F	F	F	F
	High St North to High St South	48	50	417	696	1248	1574	604	E	E	F	F	F	F	F
	High St North to Winchmore Dr	50	63	345	449	487	402	397	F	D	F	F	F	F	F
	Alpha Terrace to High St South	11	30	104	149	200	286	90	B	D	F	F	F	F	F
	Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Alpha Terrace to High St North	19	40	85	121	217	230	154	C	E	F	F	F	F	F
	High St South to Winchmore Dr	8	11	16	14	16	33	10	A	B	C	B	C	D	A
	High St South to High St North	10	17	14	24	30	36	17	B	C	B	C	D	E	C
	High St South to Alpha Terrace	18	25	30	50	44	41	33	C	D	D	E	E	E	D
	Winchmore Dr to High St North	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to High St South	0	0	0	0	0	0	0	A	A	A	A	A	A	A
High Street / A1134	All	31	32	143	191	230	259	160	D	D	F	F	F	F	F
	A1134 Trumpington Road (North) to High St (South)	104	81	601	1022	1574	1839	782	F	F	F	F	F	F	F
	A1134 Trumpington Road (North) to A1134 Long Rd (East)	66	51	435	719	1021	1263	552	E	D	F	F	F	F	F
	High St (South) to A1134 Long Rd (East)	48	59	51	56	69	74	45	D	E	D	E	E	E	D
	High St (South) to A1134 Trumpington Road (North)	24	43	25	34	76	107	34	C	D	C	C	E	F	C
	A1134 Long Rd (East) to A1134 Trumpington Road (North)	43	81	878	1337	2135	1967	1008	D	F	F	F	F	F	F
	A1134 Long Rd (East) to High St (South)	30	69	907	1486	2374	2767	1147	C	E	F	F	F	F	F
	All	54	59	302	402	452	486	314	D	E	F	F	F	F	F

	Junction	Movement	Delay (s)							LOS						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
17:00 - 18:00	A1134 / Parson Rd	A1134 North to A1134 South	65	40	665	1250	1909	2052	814	F	E	F	F	F	F	F
		A1134 North to Parson Road	40	37	524	661	426	313	494	E	E	F	F	F	F	F
		A1134 South to Parson Road	14	43	50	75	140	144	84	B	E	E	F	F	F	F
		A1134 South to A1134 North	14	39	35	51	101	150	59	B	E	D	F	F	F	F
		Parson Road to A1134 North	20	35	516	1321	1812	2103	715	C	E	F	F	F	F	F
		Parson Road to A1134 South	23	32	645	1320	1762	2202	757	C	D	F	F	F	F	F
		All	40	38	287	429	500	589	294	E	E	F	F	F	F	F
	A1134 / Bentley Rd	A1134 North to A1134 South	52	35	907	1734	2144	2243	932	F	D	F	F	F	F	F
		A1134 North to Bentley Rd	42	25	719	528	1020	2284	580	E	D	F	F	F	F	F
		A1134 South to Bentley Rd	31	52	25	85	78	202	31	D	F	C	F	F	F	D
		A1134 South to A1134 North	25	57	18	40	39	94	22	D	F	C	F	F	F	C
		Bentley Rd to A1134 North	17	42	196	552	728	1341	299	C	E	F	F	F	F	F
		Bentley Rd to A1134 South	16	33	223	643	910	1418	367	C	D	F	F	F	F	F
		All	38	43	252	354	319	417	229	E	E	F	F	F	F	F
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	8	7	253	680	629	575	285	A	A	F	F	F	F	F
		A1134 North to A1134 South	11	12	297	742	1403	1422	288	B	B	F	F	F	F	F
		A1134 North to Latham Rd	17	6	142	427	558	1	150	C	A	F	F	F	A	F
		Newton Rd to A1134 South	12	22	344	698	1136	1325	290	B	C	F	F	F	F	F
		Newton Rd to Latham Rd	0	0	0	0	0	0	0	A	A	A	A	A	A	A
		Newton Rd to A1134 North	16	31	256	526	571	1004	207	C	D	F	F	F	F	F
		A1134 South to Latham Rd	53	92	42	75	44	83	39	F	F	E	F	F	E	F
		A1134 South to A1134 North	55	93	41	71	56	91	39	F	F	E	F	F	F	E
		A1134 South to Newton Rd	57	92	71	108	77	114	51	F	F	F	F	F	F	F
		Latham Rd to A1134 North	6	15	87	172	437	631	130	A	B	F	F	F	F	F
17:00 - 18:00	A1134 / Queensway	A1134 North to A1134 South	14	13	134	223	408	608	175	B	B	F	F	F	F	F
		A1134 North to Queensway	17	32	198	415	719	871	258	C	D	F	F	F	F	F
		A1134 South to Queensway	30	48	109	170	185	232	97	D	E	F	F	F	F	F
		A1134 North to A1134 South	5	7	279	704	1173	1320	224	A	A	F	F	F	F	F
		A1134 North to Queensway	3	7	66	96	116	4	36	A	A	F	F	F	A	E
		A1134 South to Queensway	22	33	28	26	54	49	29	C	D	D	D	F	E	D
		A1134 South to A1134 North	33	46	14	18	24	28	18	D	E	B	C	C	D	C
		Queensway to A1134 North	50	154	469	967	1102	1866	566	E	F	F	F	F	F	F
		Queensway to A1134 South	23	87	578	1196	1479	2058	462	C	F	F	F	F	F	F
		All	19	28	87	115	106	121	72	C	D	F	F	F	F	F
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	51	158	734	710	744	1523	473	D	F	F	F	F	F	F
		A1134 North to A1134 South	77	190	1094	1410	1443	1927	922	E	F	F	F	F	F	F
		Brooklands Ave to A1134 South	323	536	1667	2027	1870	2351	1472	F	F	F	F	F	F	F
		Brooklands Ave to A1134 North	403	613	1233	1061	985	1210	1010	F	F	F	F	F	F	F
		A1134 South to A1134 North	51	53	30	30	33	30	28	D	D	C	C	C	C	E
		A1134 South to Brooklands Ave	51	59	65	67	65	75	65	D	E	E	E	E	E	E
		Chaucer Rd to A1134 North	96	168	354	604	633	632	444	F	F	F	F	F	F	F
		Chaucer Rd to Brooklands Ave	93	151	274	443	470	504	343	F	F	F	F	F	F	F
		Chaucer Rd to A1134 South	73	114	868	1408	1549	1475	812	E	F	F	F	F	F	F
		A1134 North to Chaucer Rd	82	224	796	1053	268	5	679	F	F	F	F	F	A	F
17:00 - 18:00	A1134 / Bateman St	Brooklands Ave to Chaucer Rd	319	543	1180	1506	847	493	1324	F	F	F	F	F	F	F
		A1134 South to Chaucer Rd	16	21	10	12	11	12	13	B	C	A	B	B	B	B
		All	136	219	403	351	259	279	367	F	F	F	F	F	F	F
		A1134 North to A1134 South	23	121	421	440	339	556	315	C	F	F	F	F	F	F
		A1134 North to Bateman St	16	104	447	490	330	425	362	C	F	F	F	F	F	F
		A1134 South to Bateman St	101	95	27	32	47	33	30	F	F	D	D	E	D	D
		A1134 South to A1134 North	107	97	32	29	50	43	29	F	F	D	D	F	E	D
		Bateman St to A1134 North	192	170	386	503	262	222	235	F	F	F	F	F	F	F
		Bateman St to A1134 South	243	175	767	915	835	1088	517	F	F	F	F	F	F	F
		All	80	109	140	120	109	105	121	F	F	F	F	F	F	F
	A1134 / Fen Causeway	A1134 North to A1134 South	8	35	144	193	114	136	117	A	E	F	F	F	F	F
		A1134 North to Fen Causeway	22	40	77	144	107	78	72	C	E	F	F	F	F	F
		A1134 South to Fen Causeway	187	160	76	63	82	89	69	F	F	F	F	F	F	F
		A1134 South to A1134 North	57	82	164	181	216	213	148	F	F	F	F	F	F	F
		Fen Causeway to A1134 North	71	259	454	289	167	255	369	F	F	F	F	F	F	F
		Fen Causeway to A1134 South	74	270	424	321	192	249	357	F	F	F	F	F	F	F
		All	74	138	180	158	137	150	157	F	F	F	F	F	F	F
	A1134 / Lensfield Rd	A1134 North to A1134 South	22	79	433	418	302	222	434	C	F	F	F	F	F	F
		A1134 North to Lensfield Rd	13	42	252	159	102	30	223	B	E	F	F	F	D	F
		A1134 South to Lensfield Rd	5	15	51	82	73	59	58	A	B	F	F	F	F	F
		A1134 South to A1134 North	2	4	15	18	43	48	16	A	A	B	C	E	E	C
		Lensfield Rd to A1134 North	37	368	357	212	162	92	239	E	F	F	F	F	F	F
		Lensfield Rd to A1134 South	39	366	361	211	137	121	311	E	F	F	F	F	F	F
		All	20	148	201	165	130	100	189	C	F	F	F	F	F	F
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	4	5		3	3	3	3	A	A		A	A	A	A
		A10 Cambridge Road (North) to Church Road	4	4		3	3	3	3	A	A		A	A	A	A
		A10 Cambridge Road (South) to Church Road	17	41		492	511	434	329	C	E		F	F	F	F
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	8	37	413	499	509	405	333	A	E	F	F	F	F	F
		Church Road to A10 Cambridge Road (North)	15	50	1058	1243	1036	848	705	B	E	F	F	F	F	F
		Church Road to A10 Cambridge Road (South)	6	14	934	1059	915	718	557	A	B	F	F	F	F	F
		All	6	20	284	220	247	209	162	A	C	F	F	F	F	F
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	14	14	12	15	14	12	13	B	B	B	C	B	B	B
		A10 Cambridge Road (North) to London Road	11	12	10	13	12	10	11	B	B	B	B	B	B	B
		High St to London Road	63	77	555	1056	943	703	457	F	F	F	F	F	F	F
		High St to A10 Cambridge Road (North)	20	46	618	1108	1047	794	526	C	E	F	F	F	F	F
		London Road to A10 Cambridge Road (North)	44	48	88	488	507	289	237	E	E	F	F	F	F	F
		London Road to High St	42	47	49	453	471	272	210	E	E	E	F	F	F	F
		All	20	32	225	371	347	275	195	C	D	F	F	F	F	F
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				896	840	695	634				F	F	F	F
		Cambridge Rd S to P&R				475	555	427	414				F	F	F	F
		Cambridge Rd N to Cambridge Rd S				2	7	3	7			A	A	A	A	A
		Cambridge Rd N to P&R				2	0	6	0				A	A	A	A
		P&R to Cambridge Rd S				2	24	268	26				A	C	F	C
		P&R to Cambridge Rd N				146	18	19	7				F	B	B	A
		All					302	268	246					F	F	F
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						256							F	
		Cambridge Rd N to Cambridge Rd S						6							A	
		P&R exit to Cambridge Rd S						20							B	
		All						123							F	

Junction	Movement	Delay (s)							LOS						
		Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
M11 J11	Hauxton Road to M11 Southbound Slip	7	699	893	329	903	1035	801	A	F	F	F	F	F	F
	Hauxton Road to A10 Cambridge Road	15	711	909	1009	960	1124	815	B	F	F	F	F	F	F
	Hauxton Road to M11 Northbound Slip	28	917	1311	1335	1291	1530	1120	C	F	F	F	F	F	F
	Hauxton Road to Hauxton Road	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Southbound Slip to A10 Cambridge Road	22	486	149	557	370	519	324	C	F	F	F	F	F	F
	M11 Southbound Slip to M11 Northbound Slip	0	661	0	0	0	0	0	A	F	A	A	A	A	A
	M11 Southbound Slip to Hauxton Road	17	602	95	527	371	509	299	B	F	F	F	F	F	F
	M11 Southbound Slip to M11 Southbound Slip	15	556	69	428	253	395	205	B	F	E	F	F	F	F
	M11 Southbound Mainline through	2	37	3	50	16	47	5	A	D	A	D	B	D	A
	A10 Cambridge Road to M11 Northbound Slip	17	735	1400	1056	957	657	845	B	F	F	F	F	F	F
	A10 Cambridge Road to Hauxton Road	28	699	1565	849	764	512	773	C	F	F	F	F	F	F
	A10 Cambridge Road to M11 Southbound Slip	23	646	0	616	563	310	607	C	F	A	F	F	F	F
	A10 Cambridge Road to A10 Cambridge Road	0	611	0	0	0	0	0	A	F	A	A	A	A	A
	M11 Northbound Slip to Hauxton Road	48	615	1511	1646	1834	1261	1773	D	F	F	F	F	F	F
	M11 Northbound Slip to M11 Southbound Slip	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	M11 Northbound Slip to A10 Cambridge Road	18	373	1179	1345	1625	197	1528	B	F	F	F	F	F	F
	M11 Northbound Slip to M11 Northbound Slip	32	348	1203	1440	1702	1165	1653	C	F	F	F	F	F	F
	M11 Northbound Mainline through	2	3	44	46	100	87	72	A	A	D	D	F	F	E
	M11 Northbound to P&R access					1482	1866				A	F	F	F	F
	A10 Cambridge Road to P&R access					947	993				A	F	F	F	F
	M11 Southbound to P&R access			21	201	124		271			C	F	F	F	F
	M11 Northbound to P&R access South of M11J11					34						A	C		
	Trumpington P&R exit to new P&R access				32	44						C	D		
	All	12	284	323	404	393	351	359	B	F	F	F	F	F	F
A1309 / Addenbrooke's Road	Hauxton Road Southbound to Addenbrookes Road	12	470	771	867	913	994	733	B	F	F	F	F	F	F
	Hauxton Road Southbound Through	11	612	1004	1198	1196	1419	969	B	F	F	F	F	F	F
	Hauxton Road Southbound to Access Road	0	0	0	558	0	0	0	A	A	A	F	A	A	A
	Addenbrookes Road to Hauxton Road Southbound Slip	5	982	1319	1327	1355	1530	1229	A	F	F	F	F	F	F
	Addenbrookes Road to Access Road	8	14	1019	1039	1143	1143	968	D	F	F	F	F	F	F
	Addenbrookes Road to P&R Access	39	913	0	1042	1022	1199	958	D	F	A	F	F	F	F
	Addenbrookes Road to Hauxton Road Northbound	35	748	1007	974	0	1139	0	C	F	F	F	A	F	A
	Dedicated P&R Link Northbound to Access Road	0	53	4	5	3	4	4	A	D	A	A	A	A	A
	Dedicated P&R Link Northbound Through	7	51	4	5	3	4	6	A	D	A	A	A	A	A
	Hauxton Road Northbound Through	62	320	350	182	154	152	162	E	F	F	F	F	F	F
	Hauxton Road Northbound to Addenbrookes Road	24	156	44	80	68	70	62	C	F	D	E	E	E	E
	Access Road to P&R Access	0	0	0	118	0	0	52	A	A	A	F	A	A	D
	Access Road to Hauxton Road N	0	102	49	116	63	0	66	A	F	D	F	E	A	E
	Access Road to Addenbrookes Road	0	72	44	110	52	106	64	A	E	D	F	D	F	E
	Access Road to Hauxton Road S	0	277	185	352	241	376	216	F	F	F	F	F	F	F
	Dedicated P&R Link Southbound Through				14	9	14	14				B	A	B	B
	All	25	417	465	404	378	388	356	C	F	F	F	F	F	F
Trumpington P&R	Hauxton Road Southbound Through	18	525	933	1114	1159	1323	901	B	F	F	F	F	F	F
	Hauxton Road Southbound to P&R	40	397	749	873	902	1056	697	D	F	F	F	F	F	F
	Hauxton Road Northbound to P&R	132	210	143	159	142	136	146	F	F	F	F	F	F	F
	Hauxton Road Northbound Through	126	225	160	164	148	138	148	F	F	F	F	F	F	F
	P&R to Hauxton Road Northbound	21	61	67	70	94	114	63	C	E	E	E	F	F	E
	P&R to Hauxton Road Southbound	24	147	246	278	294	354	232	C	F	F	F	F	F	F
	All	66	251	264	271	262	259	245	E	F	F	F	F	F	F
Consort Ave T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	7	253	557	689	697	789	537	A	F	F	F	F	F	F
	Hauxton Rd Northbound to Consort Ave	38	122	140	169	164	166	131	D	F	F	F	F	F	F
	Hauxton Rd Southbound to Consort Ave	73	109	57	59	54	44	54	E	F	E	E	D	D	D
	Hauxton Rd Southbound to Hauxton Rd Northbound	80	108	63	67	60	53	59	E	F	E	E	E	D	E
	Consort Ave to Hauxton Rd Northbound	41	1090	1652	1612	356	0	2223	D	F	F	F	F	A	F
	Consort Ave to Hauxton Rd Southbound	40	1106	2056	2418	797	0	3051	D	F	F	F	F	A	F
	All	48	171	155	152	138	128	147	D	F	F	F	F	F	F
Waitrose T-junction	Hauxton Rd Northbound to Hauxton Rd Southbound	3	78	119	154	153	168	116	A	E	F	F	F	F	F
	Hauxton Rd Northbound to Waitrose	18	25	22	22	21	18	19	B	C	C	C	C	B	C
	Hauxton Rd Southbound to Waitrose	42	53	36	37	36	34	34	D	D	D	D	D	C	C
	Hauxton Rd Southbound to Hauxton Rd Northbound	43	56	37	40	36	35	35	D	E	D	D	D	D	C
	Waitrose to Hauxton Rd North	19	369	944	1091	1038	1206	880	B	F	F	F	F	F	F
	Waitrose to Hauxton Rd South	44	842	2829	3395	3914	4042	3028	C	F	F	F	F	F	F
	All	26	110	130	133	139	114	142	C	F	F	F	F	F	F
High Street / Hauxton Rd / A1301 Shelford Rd	High St to Hauxton Rd	21	167	185	264	272	286	207	C	F	F	F	F	F	F
	High St to A1301 Shelford Rd	31	28	28	31	24	25	21	C	C	C	C	C	C	C
	Hauxton Rd to A1301 Shelford Rd	26	26	25	25	23	23	22	C	C	C	C	C	C	C
	Hauxton Rd to High St	6	12	5	7	6	6	5	A	B	A	A	A	A	A
	A1301 Shelford Rd to High St	166	840	853	900	840	819	792	F	F	F	F	F	F	F
	A1301 Shelford Rd to Hauxton Rd	89	881	830	914	852	863	792	F	F	F	F	F	F	F
	All	34	191	209	234	228	227	201	C	F	F	F	F	F	F
High Street / Maris Lane	High St North to High St South	21	327	348	469	526	510	420	C	F	F	F	F	F	F
	High St North to Maris Lane	24	236	298	297	336	325	268	C	F	F	F	F	F	F
	High St South to Maris Lane	5	9	4	5	4	5	4	A	A	A	A	A	A	A
	High St South to High St North	5	13	4	6	5	6	4	A	B	A	A	A	A	A
	All	13	103	106	116	121	113	109	B	F	F	F	F	F	F
High Street / Church Lane	High St North to High St South	9	195	186	249	293	275	229	A	F	F	F	F	F	F
	High St South to High St North	15	52	14	23	22	30	13	B	D	B	C	C	C	B
	Church Lane to High St North	436	2750	2441	2601	2494	2576	2189	F	F	F	F	F	F	F
	Church Lane to High St South	430	2746	2582	2642	2759	2884	2394	F	F	F	F	F	F	F
	All	53	281	295	318	316	319	284	D	F	F	F	F	F	F
High Street / Winchmore Dr / Alpha Terrace	High St North to Alpha Terrace	10	395	375	417	531	469	452	B	F	F	F	F	F	F
	High St North to High St South	13	384	390	487	610	547	495	B	F	F	F	F	F	F
	High St North to Winchmore Dr	22	301	410	384	529	368	491	C	F	F	F	F	F	F
	Alpha Terrace to High St South	8	112	85	130	132	140	114	A	F	F	F	F	F	F
	Alpha Terrace to Winchmore Dr	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Alpha Terrace to High St North	15	110	88	98	146	131	109	C	F	F	F	F	F	F
	High St South to Winchmore Dr	12	58	15	35	14	30	10	B	F	B	D	B	D	A
	High St South to High St North	11	36	11	17	18	24	10	B	E	B	C	C	C	A
	High St South to Alpha Terrace	14	64	23	37	36	36	17	B	F	C	E	D	E	C
	Winchmore Dr to High St North	0	0	0	0	0	0	0	A	A	A	A	A	A	A
High Street / A1134	Winchmore Dr to Alpha Terrace	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	Winchmore Dr to High St South	0	0	0	0	0	0	0	A	A	A	A	A	A	A
	All	12	131	127	136	148	140	134	B	F	F	F	F	F	F
	A1134 Trumpington Road (North) to High St (South)	32	517	544	671	678	629	600	C	F	F	F	F	F	F
	A1134 Trumpington Road (North) to A1134 Long Rd (East)	20	281	432	511	490	451	445	B	F	F	F	F	F	F
	High St (South) to A1134 Long Rd (East)	54	94	54	52	66	80	48	D	F	D	D	E	F	D
	High St (South) to A1134 Trumpington Road (North)	29	82	21	25	42	58	20	C	F	C	C	D	E	C
	A1134 Long Rd (East) to A1134 Trumpington Road (North)	33	556	760	1026	1326	1092	995	C	F	F	F	F	F	F
	A1134 Long Rd (East) to High St (South)	18	593	840	956	1414	1318	1076	B	F	F	F	F	F	F
	All	33	231	276	282	324	320	286	C	F	F	F	F	F	F

	Junction	Movement	Delay (s)							LOS						
			Base	DM	Magenta	Cyan	White	Yellow	Purple	Base	DM	Magenta	Cyan	White	Yellow	Purple
	A1134 / Parson Rd	A1134 North to A1134 South	9	372	488	631	704	655	549	A	F	F	F	F	F	F
		A1134 North to Parson Road	8	376	486	513	673	656	524	A	F	F	F	F	F	F
		A1134 South to Parson Road	17	163	31	49	90	93	33	C	F	D	E	F	F	D
		A1134 South to A1134 North	13	75	14	32	63	82	16	B	F	B	D	F	F	C
		Parson Road to A1134 North	50	207	27	268	987	1159	223	E	F	D	F	F	F	F
		Parson Road to A1134 South	17	135	94	429	1291	1590	296	C	F	F	F	F	F	F
		All	12	151	184	225	323	368	207	B	F	F	F	F	F	F
	A1134 / Bentley Rd	A1134 North to A1134 South	7	364	576	826	1069	988	663	A	F	F	F	F	F	F
		A1134 North to Bentley Rd	6	188	454	583	752	829	424	A	F	F	F	F	F	F
		A1134 South to Bentley Rd	30	127	36	58	123	149	35	D	F	E	F	F	F	D
		A1134 South to A1134 North	22	65	22	47	84	93	19	C	F	C	E	F	F	C
		Bentley Rd to A1134 North	15	213	68	238	663	1078	194	C	F	F	F	F	F	F
		Bentley Rd to A1134 South	5	222	89	275	825	1227	259	A	F	F	F	F	F	F
		All	15	132	214	273	382	408	235	C	F	F	F	F	F	F
	A1134 / Latham Rd / Newton Rd	A1134 North to Newton Rd	3	41	140	177	228	208	138	A	E	F	F	F	F	F
		A1134 North to A1134 South	4	120	153	235	273	283	162	A	F	F	F	F	F	F
		A1134 North to Latham Rd	2	16	48	204	157	34	333	A	C	E	F	F	D	F
		Newton Rd to A1134 South	5	119	114	363	751	1054	260	A	F	F	F	F	F	F
		Newton Rd to Latham Rd	0	0	0	0	0	0	0	A	A	A	A	A	A	A
		Newton Rd to A1134 North	13	74	52	232	710	821	180	B	F	F	F	F	F	F
		A1134 South to Latham Rd	40	68	40	81	116	132	50	E	F	E	F	F	F	F
		A1134 South to A1134 North	36	71	47	90	132	134	44	E	F	E	F	F	F	E
		A1134 South to Newton Rd	37	79	75	128	188	173	76	E	F	F	F	F	F	F
		Latham Rd to A1134 North	2	15	6	32	116	132	35	A	C	A	D	F	F	D
		Latham Rd to Newton Rd	0	0	0	0	61	0	0	A	A	A	A	A	A	A
		Latham Rd to A1134 South	7	137	49	120	216	339	157	A	F	E	F	F	F	F
		All	22	71	84	134	192	212	92	C	F	F	F	F	F	F
	A1134 / Queensway	A1134 North to A1134 South	2	86	99	174	195	190	107	A	F	F	F	F	F	F
		A1134 North to Queensway	1	12	61	69	79	55	46	A	B	F	F	F	F	F
		A1134 South to Queensway	6	15	8	32	35	37	30	A	B	A	D	E	E	D
		A1134 South to A1134 North	16	26	15	26	46	48	22	C	D	C	D	E	E	C
		Queensway to A1134 North	55	304	184	783	1657	1985	645	F	F	F	F	F	F	F
		Queensway to A1134 South	45	268	241	879	2000	1982	660	E	F	F	F	F	F	F
		All	11	42	57	121	179	189	73	B	E	F	F	F	F	F
	A1134 / Chaucer Rd / Brooklands Ave	A1134 North to Brooklands Ave	100	415	616	1265	1417	1361	583	F	F	F	F	F	F	F
		A1134 North to A1134 South	124	515	953	1700	1994	2100	842	F	F	F	F	F	F	F
		Brooklands Ave to A1134 South	512	892	1214	2475	2882	2870	1476	F	F	F	F	F	F	F
		Brooklands Ave to A1134 North	581	790	918	1635	1907	2066	1123	F	F	F	F	F	F	F
		A1134 South to A1134 North	27	32	30	37	50	56	35	C	C	C	D	D	E	D
		A1134 South to Brooklands Ave	39	46	46	49	50	46	41	D	D	D	D	D	D	D
		Chaucer Rd to A1134 North	92	138	374	1103	1269	1411	559	F	F	F	F	F	F	F
		Chaucer Rd to Brooklands Ave	95	136	449	1272	1473	1627	618	F	F	F	F	F	F	F
		Chaucer Rd to A1134 South	83	241	554	1673	2023	1997	866	F	F	F	F	F	F	F
		A1134 North to Chaucer Rd	115	500	818	1629	1481	1683	677	F	F	F	F	F	F	F
		Brooklands Ave to Chaucer Rd	493	800	1178	2018	2784	3095	1383	F	F	F	F	F	F	F
		A1134 South to Chaucer Rd	14	18	7	18	65	20	17	B	B	A	B	E	B	B
		All	194	283	498	792	909	950	506	F	F	F	F	F	F	F
	A1134 / Bateman St	A1134 North to A1134 South	25	425	604	1312	1434	1383	547	C	F	F	F	F	F	F
		A1134 North to Bateman St	22	279	651	1330	1736	1536	513	C	F	F	F	F	F	F
		A1134 South to Bateman St	36	41	31	66	99	114	61	E	E	D	F	F	F	F
		A1134 South to A1134 North	30	49	30	56	88	112	56	D	E	D	F	F	F	F
		Bateman St to A1134 North	135	494	452	1434	1835	1801	604	F	F	F	F	F	F	F
		Bateman St to A1134 South	130	443	516	1801	2085	2326	750	F	F	F	F	F	F	F
		All	37	140	221	469	522	565	252	E	F	F	F	F	F	F
	A1134 / Fen Causeway	A1134 North to A1134 South	3	212	184	520	507	310	116	A	F	F	F	F	F	F
		A1134 North to Fen Causeway	6	77	103	462	378	181	66	A	F	F	F	F	F	F
		A1134 South to Fen Causeway	48	53	32	64	79	88	59	E	F	D	F	F	F	F
		A1134 South to A1134 North	19	127	113	283	361	404	208	C	F	F	F	F	F	F
		Fen Causeway to A1134 North	18	500	1116	2251	2938	2529	1316	C	F	F	F	F	F	F
		Fen Causeway to A1134 South	19	562	1306	2564	3148	2841	1444	C	F	F	F	F	F	F
		All	21	164	297	464	517	502	290	C	F	F	F	F	F	F
	A1134 / Lensfield Rd	A1134 North to A1134 South	15	481	1648	2568	2693	2703	1234	B	F	F	F	F	F	F
		A1134 North to Lensfield Rd	13	155	1317	1887	2128	2428	1005	B	F	F	F	F	F	F
		A1134 South to Lensfield Rd	5	104	52	89	99	110	70	A	F	F	F	F	F	F
		A1134 South to A1134 North	2	23	14	26	23	33	25	A	C	B	D	C	D	C
		Lensfield Rd to A1134 North	14	687	1839	2550	2660	3051	1574	B	F	F	F	F	F	F
		Lensfield Rd to A1134 South	17	931	1890	2889	2610	3067	1581	C	F	F	F	F	F	F
		All	10	302	663	978	1015	1125	655	A	F	F	F	F	F	F
	Cambridge Rd / Church Rd	A10 Cambridge Road (North) to A10 Cambridge Road (South)	3	5		3	3	3	3	A	A		A	A	A	A
		A10 Cambridge Road (North) to Church Road	3	4		3	3	3	3	A	A		A	A	A	A
		A10 Cambridge Road (South) to Church Road	11	227		445	455	456	506	B	F		F	F	F	F
		A10 Cambridge Road (South) to A10 Cambridge Road (North)	6	211	577	474	474	468	492	A	F	F	F	F	F	F
		Church Road to A10 Cambridge Road (North)	9	562	1828	2665	2107	1856	2038	A	F	F	F	F	F	F
		Church Road to A10 Cambridge Road (South)	3	417	1713	2465	1999	1768	1977	A	F	F	F	F	F	F
		All	5	120	507	311	380	352	334	A	F	F	F	F	F	F
	Cambridge Rd / London Rd	A10 Cambridge Road (North) to High St	10	12	10	14	12	12	13	A	B	B	B	B	B	B
		A10 Cambridge Road (North) to London Road	8	10	8	11	11	10	11	A	B	A	B	B	B	B
		High St to London Road	59	256	865	1072	1070	1031	1056	F	F	F	F	F	F	F
		High St to A10 Cambridge Road (North)	16	278	986	1146	1140	1115	1157	C	F	F	F	F	F	F
		London Road to A10 Cambridge Road (North)	25	54	91	456	589	295	351	C	F	F	F	F	F	F
		London Road to High St	22	39	37	379	497	217	280	C	E	E	F	F	F	F
		All	14	135	380	429	419	366	379	B	F	F	F	F	F	F
	New P&R access / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N				831	755	738	786				F	F	F	F
		Cambridge Rd S to P&R				449	475	484	498				F	F	F	F
		Cambridge Rd N to Cambridge Rd S				2	7	3	7				A	A	A	A
		Cambridge Rd N to P&R					2	0	17	0				A	A	A
		P&R to Cambridge Rd S					25	284	23				A	C	F	C
		P&R to Cambridge Rd N				174	11	9	13				F	B	A	B
		All					303	284	299				F	F	F	F
	New P&R egress / A10 Cambridge Rd	Cambridge Rd S to Cambridge Rd N						275						F	F	
		Cambridge Rd N to Cambridge Rd S						6				F	A	B	B	
		P&R exit to Cambridge Rd S						19							F	F
								133							F	



Appraisal Summary Table

Date produced:

17-Apr-19

Contact:

Name of scheme:		Cambridge South West Park and Ride scheme					Name	Tim Watkins
Description of scheme:		Provision of additional Park and Ride capacity close to M11 J11 in Cambridgeshire - Preferred Option					Organisation	GCP
							Role	Promoter/Official
Impacts		Summary of key impacts		Assessment				
				Quantitative		Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	Bus passenger benefits only		Value of journey time changes(£)			151,722	Moderate beneficial
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
	Reliability impact on Business users	Not calculated at this stage						
	Regeneration	Not assessed as it is considered unlikely that the proposals would have any impact on regeneration						
	Wider Impacts	Not assessed as it is considered unlikely that the proposals would deliver any measurable or quantifiable wider economic impact.						
Environmental	Noise					Slight adverse		Neutral
	Air Quality					Neutral		Neutral
	Greenhouse gases			Change in non-traded carbon over 60y (CO2e)		Neutral		
				Change in traded carbon over 60y (CO2e)				
	Landscape					Moderate adverse		
	Townscape	Not assessed						
	Historic Environment					Moderate adverse		
	Biodiversity					Moderate adverse		
	Water Environment					Neutral		
Social	Commuting and Other users	Bus passenger benefits only		Value of journey time changes(£)			2,538,278	Moderate beneficial
			Net journey time changes (£)					
			0 to 2min	2 to 5min	> 5min			
	Reliability impact on Commuting and Other users	Not calculated at this stage						
	Physical activity					Slight beneficial		
	Journey quality					Slight beneficial		
	Accidents					Adverse		Moderate adverse
	Security					Slight adverse		Moderate adverse
	Access to services	Not assessed						Not assessed
Affordability	Not assessed						Not asseessed	
	Severance					Adverse		Moderate adverse
	Option and non-use values	Not assessed						
Public Account	Cost to Broad Transport Budget						35,147,000	
	Indirect Tax Revenues	No decongestion benefits assumed					1,192,000	



Environmental Appraisal Report

Cambridge South West Park and Ride

26 April 2019

Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
F +44 (0)1223 461007
mottmac.com

Environmental Appraisal Report

Cambridge South West Park and Ride

26 April 2019

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
1	26 April 2019	J Beddard V Alexander H Lavelle A Winter J Montgomery J Edhouse M Hopper	C Mills I Bray J Morrison A Greenwood K Gareau S Dyne	K Gareau / J Montgomery	Draft for comments

Document reference: 393699-MMD-ENV-XX-RP-EN-0050

Information class: Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

1 Introduction

1.1 Purpose of this document

This document is the Environmental Appraisal Report (EAR) produced to support the Outline Business Case (OBC) being developed for the Cambridge South West Park and Ride (CSWPR) scheme.

The information presented here is used in developing the Economic Case of the OBC and contributes to the final Appraisal Summary Table.

The report summarises the assessments undertaken on the key environmental disciplines as required by the Department for Transport's appraisal guidance, specifically as set out in WebTAG Unit A3. This guidance focuses on the following environmental topics;

- Air quality (*)
- Biodiversity
- Greenhouse gases (*)
- Historic environment
- Landscape
- Noise (*)
- Water

Topics with an asterics (*) can be used to develop a Net Present Value of the level of impact which can feed into the Benefit Cost Ratio. However, WebTAG requires a proportionate approach and in some schemes the level of impact may not justify this fully quantified impact appraisal.

The OBC process identifies a preferred scheme using inputs from the environmental appraisal, amongst other criteria, for decisions makers to approve to be taken forward for the next stage of planning.

It is important to note that the WebTAG process is not an environmental impact assessment, the full environmental impact assess

ment (EIA) is carried out on the preferred scheme once the OBC is approved. WebTAG is an options appraisal process that seeks to identify the key environmental assets could be affected by different options in a way that contributes to identifying the best option to take forward into scheme development.

1.2 Overview of the Scheme

1.2.1 Introduction and Scheme Location

The CSWPR scheme is being delivered by the Greater Cambridge Partnership (GCP) with specific objectives to improve public transport and facilitate the economic growth in the greater Cambridge area.

The CSWPR scheme is looking at increasing Park and Ride (P&R) capacity in South West Cambridge. The existing P&R site on Trumpington Road is the busiest in the city due to its closeness to the M11, the city centre and the Cambridge Biomedical Campus. With new jobs

and services at the Cambridge Biomedical Campus, such as the Royal Papworth Hospital and AstraZeneca, more and more people will want to travel to access opportunities. GCP want to cater for this future demand sustainably, by significantly increasing the supply of P&R car parking spaces close to Junction 11 (J11) of the M11 to provide people with an alternative to driving into the Biomedical Campus and the city centre¹.

The CSWPR scheme is located on the southern periphery of Cambridge, adjacent to J11 on the M11.

1.3 Scheme Options

Five options are considered for the Outline Business Case stage. Four of the proposed options (Cyan, White, Purple, Yellow) would involve a new P&R by J11 of the M11, while one option would involve an expansion of the existing Trumpington Park and Ride (Magenta).

1.3.1 Cyan Option

The Cyan option involves establishing a new P&R site. There would be a dedicated northbound off slip for the P&R from the M11 which then passes below the A10 through a tunnel. A dedicated left-turn lane would be installed from the A10 at Hauxton into the P&R site. For traffic travelling southbound on the A10, there would be a dedicated slip road to access the P&R site. The southbound traffic would 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 P&R would be implemented. Buses would cross the motorway using the existing accommodation bridge to the north, then would continue to travel alongside the southbound off slip.

1.3.2 White Option

The White option involves establishing a new P&R site. There would be a dedicated northbound off slip for the P&R from the M11 which passes below the A10 through a tunnel. A new junction on the A10 would be created for traffic exiting the P&R and a dedicated left-turn lane would operate from the A10 at Hauxton into the P&R site. There would also be a free flow left turn lane from the southbound motorway off slip to the A1309 for Trumpington P&R. Buses would cross the motorway using the accommodation bridge to the north and would then route alongside the southbound off slip.

1.3.3 Yellow Option

The Yellow option involves the development of a new P&R site with general traffic access/egress via two new junctions on the A10. A dedicated left turn lane would operate from the A10 at Hauxton into the P&R site. There would be a dedicated P&R lane on the southbound offslip from the M11 for Trumpington P&R, with a dedicated lane for the A10 on the northbound offslip. Buses would cross the motorway using the existing accommodation bridge to the north and will then route alongside the southbound off slip.

1.3.4 Magenta Option

The Magenta option involves a major expansion of the existing Trumpington P&R. The option would likely involve the addition of a new deck above the existing site, as there is no available land, to enable expansion, immediately surrounding the site. New dedicated P&R access lanes

¹ Greater Cambridge Partnership (2018). Cambridge South West Park and Ride. Leaflet prepared for public consultation. 12 pages.

for general traffic which would extend back to the motorway off slips and the A10 would be installed. As part of this investment, the overbridge at J11 would most likely need widening.

1.3.1 Purple Option

For the Purple option involves establishing a new P&R site. There would be a dedicated northbound off slip for the P&R from the M11 which passes below the A10 via a tunnel. A new junction on the A10 would be created for traffic exiting the P&R and a dedicated left-turn lane would operate from the A10 at Hauxton into the P&R site. A free flow left turn lane from southbound motorway off slip to the A1309 for Trumpington P&R would also be implemented. Buses would pass directly through the centre of J11 using a new bridge structure that runs across the M11.

The assessment also considered the purple option with a City Access Penalty. While the shortlisted options (White, Yellow, Purple, Cyan and Magenta) 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 option (Purple – identified using early indicators) with a scenario with Local Plan levels of development plus City Access Penalty capacity restraint measures (CAP) in place (previously referred to as 'High Growth'). This is referred to as 'Purple with CAP'. As identified in the City Access Strategy, these measures could include workplace parking levies, traffic management and improved cycling provision etc. Measures which are therefore expected to increase numbers of people wanting to use Park and Ride sites.

2 Appraisal Methodology

2.1 Introduction

There are individual approaches to impact assessment that are taken through the appraisal process for each environmental topic.

The assessment for environmental topics will generally follow **TAG Unit A3** and documented in the TAG environmental impacts worksheets. However, it is important that the assessments are proportional to the stage of the process (i.e. options appraisal) and based on the availability of the data and the potential scale of the impacts.

Some topics may require a more detailed assessment (depending on the scale of change proposed from a specific development) and in such cases the assessment will follow that set out in DRMB Volume 11 (e.g. traffic related topics require output from the traffic modelling to inform the appraisal and may justify detailed modelling following the methodology set out in DRMB Volume 11 for that topic).

Each topic section in this report sets out the scale of the potential impact and the proportional approach taken to assessing the impacts for that specific topic area.

2.2 Scoping and Proportionality

A key element of the WebTAG appraisal process is that the process should not try and replicate an EIA process at all stages of options definition and selection. The level of detail and scope should be based on the stage of the options appraisals leading to a preferred scheme being identified.

Where limited data is available then it is a requirement that the limitations are noted in the appraisal process, particularly if this could affect the conclusions being drawn. Assumptions need to be clearly stated as well and if appropriate, a precautionary approach taken in the appraisal.

The impacts assessed following the WebTAG process either arise as a direct result of changes in traffic (air quality, noise and greenhouse gases) and those that arise in the surrounding area from the new development (landscape and townscape, biodiversity, heritage and the water environment).

In completing WebTAG appraisals it is not usual to require the impacts from construction to be taken into account. The construction effects are more appropriately assessed in the EIA of the preferred scheme.

2.3 General Assessment Assumptions and Limitations

The majority of the WebTAG assessment was based on publicly available data, data from surveys undertaken at an earlier stage of develop was also considered, and the purchase of Cambridgeshire & Peterborough Environmental Records Centre biological records and Cambridgeshire Historic Environment Record data. For noise, greenhouse gases and air quality, the assessments were based on limited traffic data provided by the project team. More details on the methodology followed by each of the environmental disciplines is described in the relevant sections of the report.

2.4 Mitigation and Enhancement Measures

While mitigation and enhancement measures are expected to be developed at a later stage for the preferred option only, early design concept includes the use of planting to reduce the potential impact of a new P&R on the landscape. Standard design measures that would be required to meet normal design practice (eg. drainage designed to avoid creating flood risks on or off site) are assumed to be included in all options.

As the design progresses mitigation and enhancement measures to avoid or minimise specific environmental effects will be incorporated with the design, through the detailed EIA process.

3 Air Quality

3.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the semi quantitative WebTAG assessment that has been undertaken with regards to air quality.

3.2 Legislation and Policy Context

3.2.1 National Legislation and Policy

Directive 2008/50/EC² on ambient air quality and cleaner air for Europe was adopted in May 2008. This Directive defines limit values, and dates by which they are to be achieved, for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

Directive 2008/50/EC sets out that the Limit Values apply everywhere with the exception of:

- any locations situated within areas where members of the public do not have access and there is no fixed habitation
- in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply
- on the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation

3.2.2 Legislation

The Air Quality Standards Regulations 2010 and the Air Quality Standards Regulations (Amendment) Regulations 2016 implement the EU's Directive 2008/50/EC on ambient air quality for the UK.

Part IV of the Environment Act 1995³ requires that every Local Authority shall periodically carry out a review of air quality within its area, including predictions of likely future air quality scenarios. As part of this review, the local authority must assess whether air quality objectives are being achieved, or likely to be achieved within the relevant periods. Any parts of a local authority's area where the objectives are not being achieved or are not likely to be achieved within the relevant period must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, Authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000⁴ and the Air Quality (England) (Amendment) Regulations 2002⁵. In most cases, the air quality objectives are

² European Union (April 2008) Directive on Ambient Air Quality and cleaner Air for Europe, Directive 2008/50/EC Official Journal, vol. 152, pp. 0001-0044

³ Defra (2003). Part IV of the Environment Act 1995 Local Air Quality Management.

⁴ Statutory Instrument (2000). Air Quality (England) Regulations, No. 928.

⁵ Statutory Instrument (2002). Air Quality (England) (Amendment) Regulations, No. 3043.

set at the same pollutant concentrations as the limit values specified in the EU Directives although compliance dates differ.

3.2.3 Air quality standards

Applicable air quality standards are summarised in Table 1.

Table 1: Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date	
				Air Quality Objectives	EU Limit Values
Nitrogen dioxide (NO ₂)	Annual	40 µg/m ³	-	31 December 2005 ^(a)	1 January 2010 ^(c)
	1 Hour	200 µg/m ³	18	31 December 2005 ^(a)	1 January 2010 ^(c)
Particulates (PM ₁₀)	Annual	40 µg/m ³	-	31 December 2004 ^(a)	1 January 2005 ^(c)
	24 Hour	50 µg/m ³	35	31 December 2004 ^(a)	1 January 2005 ^(c)
Fine particulates (PM _{2.5})	Annual	25 µg/m ³	-	2020 ^(b)	2015 ^(c)

Notes: ^(a) Air Quality (England) Regulations 2000 as amended in 2002

^(b) Air Quality Strategy 2007

^(c) EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe and The Air Quality Standards Regulations 2010. Derogations (time extensions) have been agreed by the EU for meeting the NO₂ limit values in some zones/agglomerations;

3.3 Assessment Methodology

A full WebTAG appraisal was not undertaken as insufficient traffic data was available at the time of assessment. In addition to this, it was not considered proportionate to undertake further traffic assessment to produce the additional traffic data required for a full WebTAG compliant assessment considering the minimal differences between the options assessed, their resulting likely effects on air quality and the subsequent effects on the overall Net Present Value for the scheme options.

The impact of each scheme option has been assessed using a stepped assessment methodology. The key pollutants looked at were nitrogen dioxide (NO₂) and particulate matter with an aerodynamic diameter of less than 10 microns (PM₁₀) as per TAG unit A3.

The first step was to identify the affected road network (ARN) this was calculated by comparing the traffic data from modelled scenarios “with the scheme” and “without the scheme”. Only the AM and PM peak flows for the “with” and “without” scheme scenarios was available. Therefore, the ARN was determined based on a combined change across the peak hours of 200 vehicle movements. Roads that met this criterion are considered within the assessment. The assessment is based on peak flows rather than annual average daily traffic (AADT) flows.

Receptors within 200m of the ARN for each of the scheme options have been determined. Receptors beyond 200m have not been considered due to the contribution of vehicle emissions not being significant beyond 200m⁶. This is consistent with TAG Unit A3 guidance.

⁶ Department for Transport (2015). TAG UNIT A3 Environmental Impact Assessment, December 2015.

The number of receptors predicted to experience a positive or negative air quality effect have been identified for each scheme option and an overall effect on air quality was determined across the study area.

3.4 Study Area

The proposed scheme options are associated with either a new P&R site located within the South Cambridgeshire Local Authority Boundary or an increase in capacity at the existing Trumpington P&R site, which is located within the Cambridge City Local Authority Boundary, as shown in Figure 1. Figure 2 below presents the ARNs for each of the scheme options (including Purple with City Access Penalty (CAP)), affecting roads in both local authorities.

Figure 1: Study Area

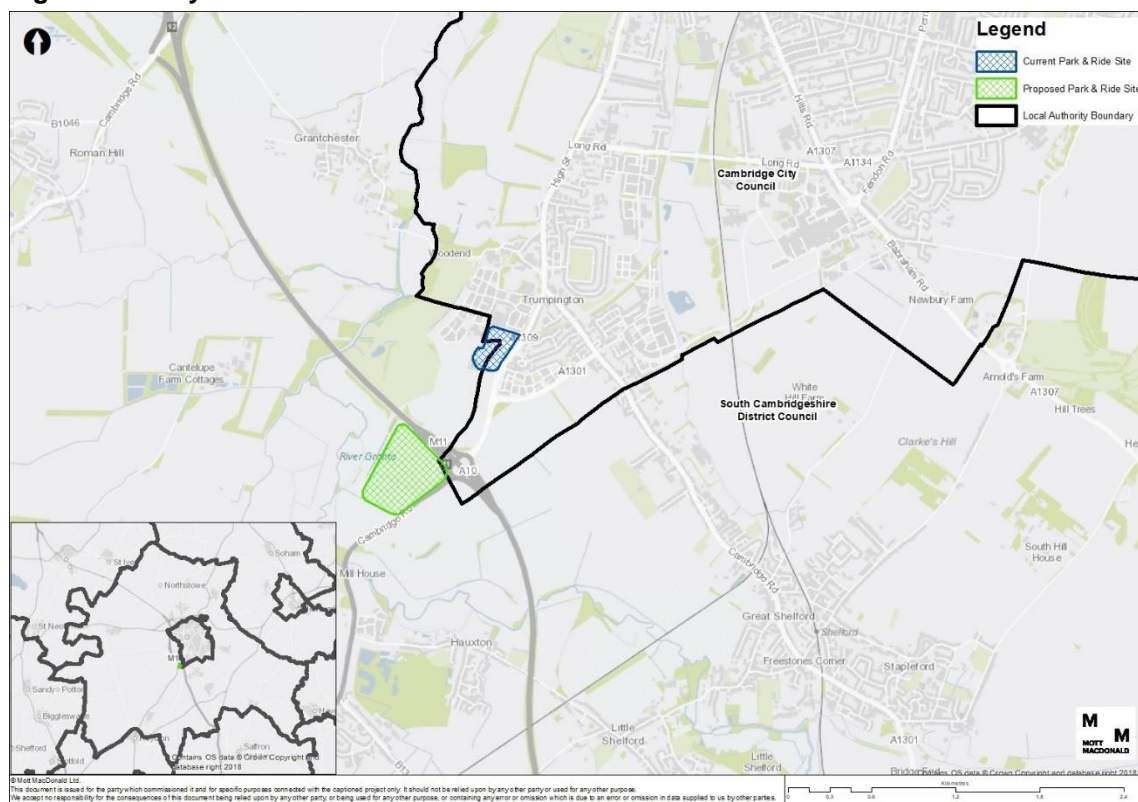
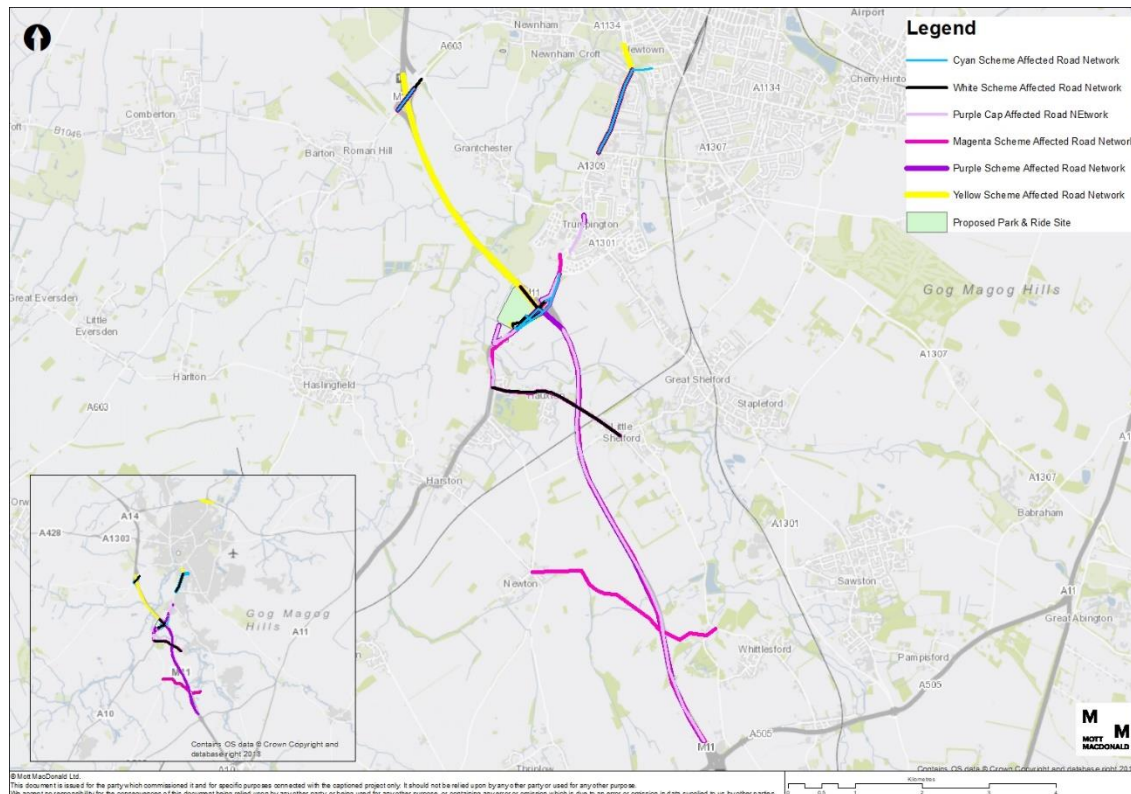


Figure 2: Study areas for Cyan, White, Magenta, Purple, Purple with CAP and Yellow



The majority of predicted traffic flow changes are located around J11 of the M11, as four of the proposed options are located in that area and require new access and egress routes.

All of the proposed options provide a reduction in traffic along Trumpington Road North of Long Road. None of the proposed options are predicted to trigger the affected road criteria through the village of Harston.

The key changes in study areas between the options is summarised below:

- The largest study area is associated with the Magenta. The ARN extends south towards Junction 10 of the M11 where an increase in traffic is predicted and west to east between the villages of Newton and Whittlesford.
- The Magenta and the White options have affected roads included in the ARN that pass through the village of Hauxton whereas the other options do not.
- The Purple option has an ARN similar to the Magenta option but does not trigger the road between the villages of Newton and Whittlesford or through Hauxton
- The study area for the Yellow option extends north along the M11 from J11 to J12 where there is predicted to be an increase in traffic flows and is the only option to trigger links on the M11 to north of J11.
- The Cyan, White and Magenta options all have roads that meet the affected road criteria at J12 of the M11 but do not trigger links in the main M11 carriageway between J12 and J11.

- The study area for the Purple with CAP is very similar to the Purple option. The main difference is the Purple option has a decrease on the A1134 to the north east of Trumpington Park and Ride whereas the Purple CAP does not.

3.5 Baseline Information

3.5.1 Overview

Baseline air quality information is obtained from a variety of sources including local authorities, national networks monitoring sites and other published sources. For the purpose of this EAR data was obtained from Defra, Air Information Resource website⁷, Cambridge City Council and South Cambridgeshire District Council. The most recent year of monitoring data available for Cambridge City Council and South Cambridgeshire District Council is for 2017. This data was available in the Cambridge City Councils Annual Status Report 2018⁸ and the South Cambridgeshire District Council Annual Status Reports 2018⁹.

3.5.2 Local Authority Review and Assessment

South Cambridgeshire District Council (SCDC)

In 2008, SCDC declared an Air Quality Management Area (AQMA) for exceeding both the annual mean objectives for NO₂ and PM₁₀. As the AQMA is located at approximately 6.5km from the scheme options, the ARNs do not overlap with the AQMA and therefore is not considered further within this EAR.

SCDC undertakes automatic NO₂ and PM₁₀ monitoring at three locations and NO₂ non-automatic (passive) monitoring at 27 sites within the District⁹. The most representative automatic monitor in relation to the proposed scheme is 'Girton', which is located at approximately 7km north of the proposed scheme options. The most representative non-automatic monitor in relation to the proposed scheme is 'DT8' (diffusion tube 8), which is located at approximately 2.3km from the proposed scheme options. The locations of the representative monitors are presented on Figure 3, Table 2 presents the NO₂ and PM₁₀ concentrations from the 'Girton' site for the 2013 – 2017 period, while Table 3 presents the annual mean concentrations of NO₂ for the 'DT8' site. The monitoring results from both locations demonstrate that the concentrations measured at these sites are below the annual mean air quality objectives of 40 µg/m³ for NO₂ and 40 µg/m³ for PM₁₀.

Table 2: Representative South Cambridgeshire District Council automatic monitoring site

Site ID	Site Name	Site Type	Pollutant	National Grid Reference		Distance to Site (Km)	Annual mean concentrations (µg/m ³)				
				X	Y		2013	2014	2015	2016	2017
GIRT	Girton	Roadside	NO ₂	542676	260667	6.98	26	25	24	23	23
			PM ₁₀				30	16	11	17	17

Source: South Cambridgeshire District Council ASR, 2018

⁷ Department for Environment Food and Rural Affairs. Air Quality Information Resource (Air) Website, available at: <http://uk-air.defra.gov.uk>

⁸ Cambridge City Council (2018). 2018 Air Quality Annual Status Report (ASR), August 2018.

⁹ South Cambridgeshire District Council (2018). 2018 Air Quality Annual Status Report (ASR), June 2018.

Table 3: Representative South Cambridgeshire District Council non-automatic monitoring site

Site Name	Site Type	National Grid Reference		Distance to Site (km)	Annual mean concentrations (µg/m³)				
		X	Y		2013	2014	2015	2016	2017
DT8	Urban Background	542554	25102	2.3	25.7	28.0	28.4	28.6	27.3*

Source: South Cambridgeshire District Council ASR, 2018

* data was annualised and has been bias adjusted

Cambridge City Council (CCC)

In 2004, CCC declared the Cambridge AQMA for exceedances of the annual mean objective for NO₂. The AQMA is located in the centre of Cambridge bounded by the inner ring road. The study areas of the Yellow and Cyan options enter the AQMA. The study area of the Yellow option heads north along the section of the A1134 located within the AQMA, while the one for the Cyan option heads east along Brooklands Avenue. The study areas for Magenta, White and Purple reach the southern boundary of the AQMA without entering it. The study area of Purple with CAP is the furthest area from the AQMA as it does not extend beyond Trumpington village.

CCC undertakes NO₂ and PM₁₀ automatic monitoring at five locations and NO₂ non-automatic (passive) monitoring at 63 sites. Three automatic monitors are considered to be representative in relation to the proposed scheme as they are located in areas where air quality would be broadly similar given their locations on the inner ring road and arterial roads leading out of the city: 'CM1', 'CM2' and 'CM3'. The locations of the representative monitors are presented on Figure 3. The monitoring results demonstrate that the monitored concentrations at these sites are below the annual mean air quality objectives of 40 µg/m³ for NO₂ and 40 µg/m³ for PM₁₀ except at 'DT6' where an exceedance of the NO₂ annual mean air quality objective was monitored.

Table 4 presents the annual mean concentrations for NO₂ and PM₁₀ measured by CCC between 2013 and 2017, while Table 5 presents the annual mean concentrations for NO₂ for the non-automatic monitoring sites. The monitoring results demonstrate that the monitored concentrations at these sites are below the annual mean air quality objectives of 40 µg/m³ for NO₂ and 40 µg/m³ for PM₁₀ except at 'DT6' where an exceedance of the NO₂ annual mean air quality objective was monitored.

Table 4: Representative Cambridge City Council automatic monitoring sites

Site ID	Site Type	Pollutant	National Grid Reference		Distance to Site (km)	Annual mean concentrations (µg/m³)				
			X	Y		2013	2014	2015	2016	2017
CM1	Roadside	NO ₂	545508	257828	4.5	35	37	35	36	31
		PM ₁₀				23	19	21	20	18
CM2	Roadside	NO ₂	546057	259487	6.3	29	24	23	27	24
		PM ₁₀				23	20	22	22	20
CM3	Roadside	NO ₂	546317	258900	5.8	28	26	25	24	26

Source: Cambridge City Council ASR, 2018

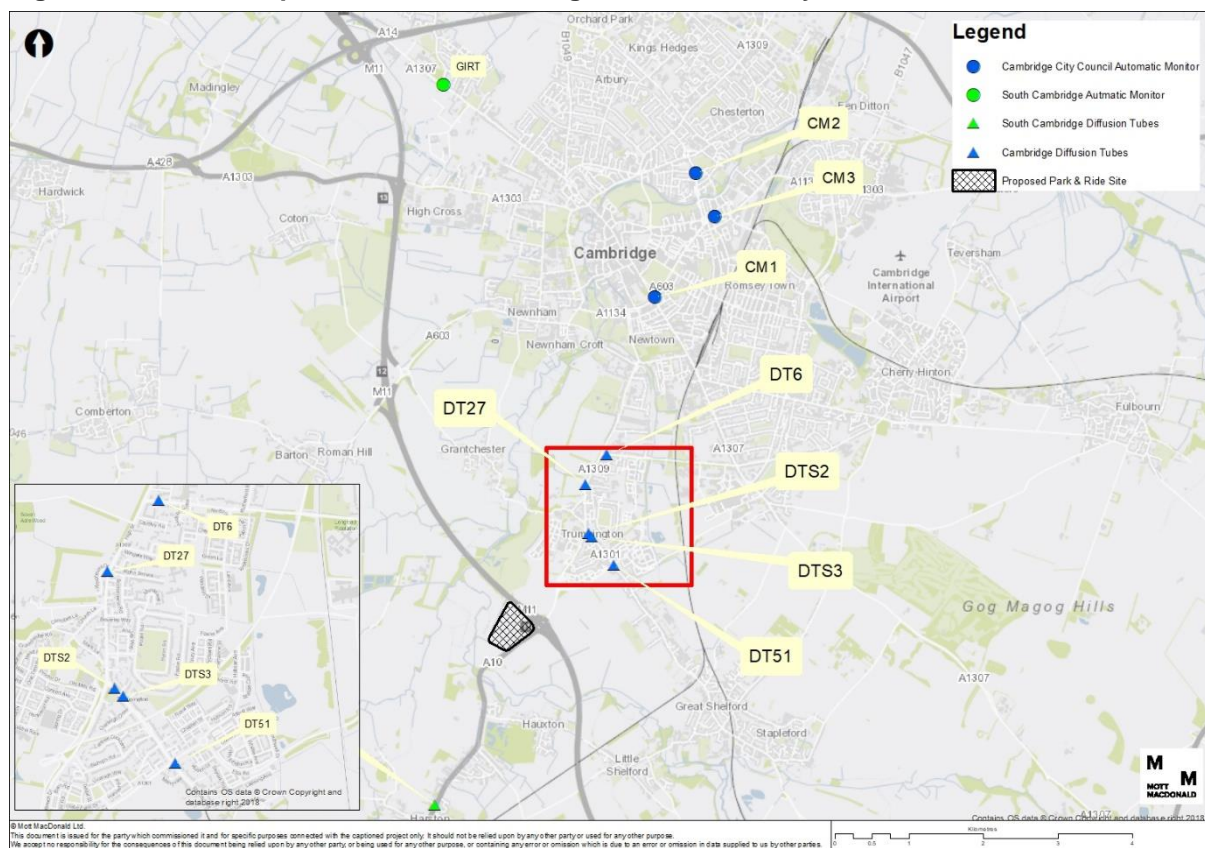
Table 5: Representative Cambridge City Council non-automatic monitoring sites

Site Name	Site Type	National Grid Reference		Distance to Site (km)	Annual mean concentrations (µg/m3)				
		X	Y		2013	2014	2015	2016	2017
DT6	Kerbside	544867	255709	2.4	41	42	45	45	40
DT27	Roadside	544575	255307	1.9	27	27	25	24	19
DT51	Roadside	544960	254220	1.3	26	26	27	27	24
DTS2	Roadside	544614	254646	1.4	0	0	0	36	32
DTS3	Kerbside	544664	254600	1.4	0	0	0	25	21

Source: Cambridge City Council ASR, 2018

Values in Bold indicate exceedances of the NO₂ Annual mean objective

Figure 3: Identified representative monitoring locations used by SCDC and CCC



3.5.3 Defra projected background concentrations

Defra provide estimates of background pollution concentrations for NO_x, NO₂, PM₁₀ and PM_{2.5} across the UK for each one-kilometre grid square for every year from 2015 to 2030. Future year projections have been developed from the base year of the background maps which is currently 2015. The data displayed in Table 6 are the 2017 (most up to date monitoring data provided), 2019 (current year) and 2023 (opening year) background concentrations for the one-kilometre

grid square containing the proposed development. The data shows background concentrations do not exceed the relevant objectives.

Table 6: Defra projected background concentrations of NO_x, NO₂ and PM₁₀ for the proposed scheme (µg/m³)

1km grid square location (OS Grid Reference)		2017			2019			2023		
X	Y	NO ₂	NO _x	PM ₁₀	NO ₂	NO _x	PM ₁₀	NO ₂	NO _x	PM ₁₀
543500	253500	13.0	17.5	15.9	9.6	15.8	15.7	9.6	12.7	15.4
543500	254500	11.7	15.7	15.5	8.8	14.2	15.2	8.8	11.5	15.0
544500	253500	12.4	16.7	16.0	9.3	15.1	15.8	9.3	12.2	15.5
544500	254500	11.0	14.7	14.1	10.1	13.4	13.9	8.4	11.1	13.7

Source: Defra Air, 2015

3.5.4 Pollution Climate Mapping (PCM) Model

Defra uses the Pollution Climate Mapping (PCM) model to report compliance with the EU Air Quality Directive (Directive 2008/50/EC). PCM model projections are available for all years from 2017 to 2030 and these are derived from the base year of 2015. In general, the model suggests NO₂ concentrations decline into the future, mainly in response to cleaner vehicles and technologies, and actions in Defra's Air Quality Action Plan. The most recent PCM model was published in August 2017.

All scheme options have roads meeting the affected roads criteria which overlay links included in the PCM model (only roads where there are sensitive receptors nearby are included in the PCM model). The overlapping PCM links with the highest concentrations are presented in Table 7. The NO₂ concentrations presented in Table 7 suggest that none of the scheme options are likely to lead to a non-compliance of the EU Directive as the predicted concentrations are well below the EU Limit Values.

Table 7: PCM max concentrations for links that overlay the model for 2023

Scheme	NO ₂ Concentration (µg/m ³)
Cyan	22.5
Magenta	22.5
Purple	22.5
Purple with CAP	20.0
White	22.5
Yellow	22.5

3.6 Sensitive Resources and Receptors

In accordance with TAG Unit 3 receptors included within the appraisal were those where the annual mean air quality objectives are applicable for the protection of human health.

The human receptors were determined from an address base which details the classification of receptors¹⁰. Receptors included residential properties, educational facilities, hospitals and prisons.

3.7 Results of Assessment

A summary of the assessment is presented here, however more details on the assessment of the potential effects of the options can be found in the Air Quality WebTAG worksheets presented in Appendix A.

For all scheme options, some receptors are expected to experience air quality improvement and some receptors an air quality deterioration (Table 8). The assessment demonstrates that the overall number of receptors which will experience a change in air quality is relatively small and similar for each of the scheme options. Based on the traffic changes predicted and the number of receptors included in the assessment, it can be concluded that the overall differences between the schemes from the perspective of an air quality impact is negligible.

In summary:

- The scheme with the highest number of receptors (1292 receptors) affected is the Magenta option, of which 44.6 % would experience an air quality deterioration while 55.4% would experience an air quality improvement;
- The option with the highest proportion of receptors (99.6%) who would likely experience an improvement in air quality is the Yellow option; and
- The option with the highest proportion of receptors (85.1%) who would likely experience a deterioration in air quality is the Purple option with CAP.

Table 8: Number and proportion of receptors likely to experience air quality deterioration or improvement for each scheme options

Categories	Scheme options					
	Cyan	White	Magenta	Purple	Yellow	Purple with CAP
Number of receptors likely to experience air quality deterioration	178	459	576	99	2	771
Proportion of receptors likely to experience air quality deterioration	23.9%	48.8%	44.6%	11.4%	0.4%	85.1%
Number of receptors likely to experience air quality improvement	567	482	716	767	563	135
Proportion of receptors likely to experience air quality improvement	76.1%	51.2%	55.4%	88.6%	99.6%	14.9%
Total number of receptors affected	745	941	1292	866	565	906

¹⁰ Ordnance Survey (2013). Address Base Products Classification Scheme. October 2013.

4 Biodiversity

4.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the qualitative WebTAG assessment that has been undertaken with regards to biodiversity.

4.2 Legislation and Policy Context

The construction and operational activities for proposed works must comply with European and UK nature conservation legislation, and with national and local biodiversity policies.

4.2.1 National Legislation and Policy

The main pieces of legislation in the UK are the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017. The biodiversity policies which are most relevant are the National Planning Policy Framework (NPPF, 2018), Biodiversity 2020 (DEFRA, 2011).

Under the Natural Environment and Rural Communities (NERC) Act 2006, all public bodies are required to have regard to biodiversity conservation when carrying out their function. Under this act a list of habitats and species that are of principal importance for the conservation of biodiversity in England are published under Section 41 (S41).

4.2.2 Local Legislation and Policy

The Cambridgeshire and Peterborough Biodiversity Group provide Biodiversity Action Plans (BAPs) for the habitats and species within Cambridgeshire. Also Cambridge City Council have produced a document Biodiversity Checklist, Developers Guidance (Cambridge City Council, 2001).

4.3 Assessment Methodology

The purpose of this appraisal is to identify the significance of the impacts of the various proposed scheme options on biodiversity interests. The appraisal study follows WebTag Unit A3 environmental impact appraisal guidance using the following sources:

- Preliminary Ecological Appraisal, including a Phase 1 Habitat Survey of the site and a desk study, of the proposed park and ride (Mott MacDonald, 2019).
- Biological records obtained from the Cambridgeshire and Peterborough Environmental Records Centre;
- Multi-Agency Geographic Information for the Countryside;
- Joint Nature Conservation Committee; and
- Cambridgeshire and Peterborough Biodiversity Group.

4.4 Study Area

The study area encompasses the footprint of the five options: Magenta, Yellow, White, Purple, and Cyan.

The current guidance on ecological assessments (CIEEM, 2018) recommends that all ecological features that occur within a 'zone of influence' (Zol) for a proposed development are investigated. The Zol includes:

- Areas directly within the land take for the proposed development and access;
- Areas which will be temporarily affected during construction;
- Areas likely to be impacted by hydrological disruption; and
- Areas where there is a risk of pollution and noise disturbance during construction and/or operation.

The Zol is variable depending on the ecological receptors affected. With respect to this report, it is considered to be all land within the site boundary unless stated otherwise.

4.5 Baseline Information and Receptors

There is one designated site for nature conservation within 2km of the site, Byron's Pool Local Nature Reserve (LNR), at approximately 652m north.

There are six non-statutory sites for nature conservation within 2km of the site. The closest is Trumpington Meadows Country Park:

- Trumpington Meadows Country Park;
- River Cam County Wildlife Site;
- Old Mill Plantation City Wildlife Site;
- River Rhee County Wildlife Site;
- Grantchester Road Plantations City Wildlife Site; and
- Eight Acre Wood and Seven Acres Wood.

The project site consists of predominantly arable fields adjacent to the M11 and A10. The following habitats have been identified within the footprint of the options:

- Arable fields;
- Semi-improved grassland field margins;
- Dense scrub;
- Scattered trees;
- Semi-natural broadleaved woodland – Priority habitat on the Cambridgeshire and Peterborough BAP;
- Four water bodies – Priority habitat on the Cambridgeshire and Peterborough BAP;
- Species-poor native hedgerows – Section 41 habitats of principal importance;
- Tall ruderal; and
- Hardstanding.

The habitats on site have the potential to support the following protected and notable animal species:

- Breeding birds listed on Section 41 or the list of Birds of Conservation Concern.
- Wintering birds listed on Section 41 or the list of Birds of Conservation Concern.
- Commuting bats along hedgerows, scrub, trees and woodland features (seven species of bat are listed on Section 41 of the NERC Act 2006).

- Foraging bats along hedgerows, scrub, trees and woodland features and over waterbodies. (seven species of bat are listed on Section 41 of the NERC Act 2006).
- Badgers including setts as well as foraging and commuting areas in hedgerows, woodland, field edges and scrub.
- Otter foraging and commuting in water bodies (Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP).
- Water vole foraging, commuting and burrows in water bodies (Section 41 of the NERC Act and a priority species in the Cambridgeshire and Peterborough BAP).
- Brown hare foraging, commuting and breeding in arable and field margins (Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP).
- Hedgehog presence (Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP).
- Great crested newts in water bodies, woodland, hedgerow, and scrub (Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP).
- Widespread reptiles in semi-improved grassland, hedgerows, scrub and tall ruderal (Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP).

4.6 Results of Assessment

A summary of the assessment is presented here, however more details on the assessment of the potential effects of the options can be found in the Biodiversity WebTAG worksheets in Appendix B.

Cyan, White, Purple, and Yellow Options

The designated sites will in the main not be impacted by these options. However, there is potential to impact Trumpington Meadows Country Park located adjacent to the works. This may also cause a slight adverse impact on its habitats and species.

There will be a slight adverse impact on the arable fields, semi-improved grassland field margins, dense scrub scattered trees, tall ruderal and semi-natural broadleaved woodland. There will be a moderate adverse impact on the three coprolite ponds located on the northern side of the site and will likely impact the field ditch crossing the fields. There will also be a moderate adverse impact on species-poor hedgerows.

The impacts on wintering and breeding birds will be slight adverse due to habitat loss as will the impacts on brown hare, hedgehog and widespread reptiles. There is the potential for moderately adverse impacts on foraging, commuting and roosting bats, badgers, great crested newts, otters and water vole. Should these be confirmed as not impacted after further surveys, the impact can be reduced.

As such the overall summary assessment score is a moderately adverse effect for these options.

Magenta Option

With the exception of semi-improved grassland field margins, scattered trees and widespread reptiles for which there will be a slight adverse impact, there will be no predicted impacts for remaining biodiversity features.

The overall summary assessment score of slight adverse for this option.

5 Greenhouse Gases

5.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the semi-quantitative WebTAG assessment that has been undertaken with regards to Greenhouse Gas (GHG)¹¹ emissions associated specifically with the operational phase of the scheme. WebTAG Unit A3 Environmental Impact Appraisal outlined the need to determine the impacts of proposed transport schemes on GHG emissions - whether emissions increase or decrease. The term of GHG emissions will also be known as carbon emissions throughout this report.

5.2 Legislation and Policy Context

5.2.1 European Union

The Commission Implementing Regulation (2014/749/EU)

Article 17 states that Member States shall report approximated greenhouse gas inventories as referred to in Article 8(1) of Regulation (EU) No 525/2013 at a level of disaggregation of source categories reflecting the activity data and methods available for the preparation of estimates for the year X-1. An explanation for the main drivers for the trends in emissions should also be reported.¹²

5.2.2 National Legislation and Policy

5.2.2.1 Legislation

National Policy Statement for National Networks

The National Policy Statement for National Networks (NPSNN)¹³ contains a section on carbon emissions, particularly paragraph 5.17, which sets out how the impact of carbon will be assessed as part of the EIA process in order to meet the overarching national carbon reduction strategy as set out in the Carbon Plan (2011). Mitigation measures in both the design and construction should be presented as part of the assessment. The NPSNN is applicable to a public transport scheme as private vehicles will be using the national network first in order to reach the park and ride.

Climate Change Act 2008

The Climate Change Act 2008 forms part of the UK government's plan to reduce GHG emissions, committing the government to a reduction of GHG by at least 80% of 1990 levels by 2050. The Climate Change Act creates a new approach to managing and responding to climate change in the UK, by:

¹¹ A greenhouse gas is a gas that absorbs and emits radiant energy within the thermal infrared range. Greenhouse gases cause the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide and ozone.

¹² Official Journal of the European Union (2014) Commission Implementing Regulation (2014/249/EU) [online] available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0749> (last accessed April 2019)

¹³ Department for Transport (2014) National Policy Statement for National Networks (NPSNN) [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf (last accessed March 2019).

- Setting ambitious, legally binding emission reduction targets;
- Taking powers to help meet those targets;
- Strengthening the institutional framework;
- Enhancing the UK's ability to adapt to the impact of climate change; and
- Establishing clear and regular accountability to the UK Parliament and to the devolved legislatures¹⁴.

Key provisions of the Act in respect of climate change mitigation include the requirement for the government to set legally binding carbon budgets capping the amount of GHG emitted in the UK over a 5-year period, as set out in Table 9.

Table 9: UK carbon reduction targets

Carbon Budget	Carbon Budget Level	Reduction Below 1990 Levels
3rd carbon budget (2018- 2022)	2,544MtCO ₂ e	37% by 2020
4th carbon budget (2023- 2027)	1,950MtCO ₂ e	51% by 2025
5th carbon budget (2028- 2032)	1,725MtCO ₂ e	57% by 2030

Key provisions of the Act in respect of climate change adaptation include:

- A requirement for the government to report, at least every 6 years, on the risks to the UK of climate change, and to publish a programme setting out how these will be addressed. This Act also introduces powers for government to require public bodies and statutory undertakers to carry out their own risk assessment and make plans to address those risks
- The Adaptation Sub-Committee of the Committee on Climate Change, will provide advice to, and scrutiny of, the government's adaptation work.

5.2.2.2 National Policy

The Carbon Plan 2011

The Carbon Plan was presented to UK Parliament pursuant to Sections 12 and 14 of the Climate Change Act 2008. The plan sets out how the UK will achieve decarbonisation within the framework of the energy policy. UK local authorities and regional level authorities must report on their carbon dioxide (CO₂) emissions. However, all emissions from the motorways sector have been removed and are not factored into the annual CO₂ emissions.

Infrastructure Carbon Review

The Infrastructure Carbon Review¹⁵ sets out carbon reduction actions required by infrastructure organisations. In terms of the scheme, this means that emission reduction actions should be taken into account when developing scheme specific mitigation measures, where relevant.

PAS2080:2016

PAS2080¹⁶ sets out a common approach and understanding of whole life carbon management in the provision of economic infrastructure as a result of the Infrastructure Carbon Review. It

¹⁴ DECC (2012) Climate Change Act 2008

¹⁵ HM Treasury (2013) Infrastructure Carbon Review [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/260710/infrastructure_carbon_review_251113.pdf (last accessed March 2019)

¹⁶ BSI (2016) PAS 2080: Carbon management in infrastructure [online] available at: <https://shop.bsigroup.com/ProductDetail?pid=000000000030323493> (last accessed March 2019)

promotes reduced carbon, reduced cost infrastructure delivery, more collaborative ways of working and a culture of challenge in the infrastructure value chain.

5.2.3 Local Policy

Cambridge Local Plan 2018

Cambridge County Council (CCC) adopted their Cambridge Local Plan¹⁷ in 2018. GHG policies within the Local Plan include Policy 28: Carbon reduction, community energy networks, sustainable design and construction, and water use which states that “all developments should take the available opportunities to integrate the principles of sustainable design and construction into the design of proposals... including carbon reduction.”

South Cambridgeshire Local Plan 2018

South Cambridgeshire District Council adopted their Local Plan in 2018¹⁸. GHG policies within the Local Plan include Policy CC/3: Mitigation and Adaptation to Climate Change, which states that proposals should “embed the principles of climate change mitigation and adaptation into the development.” Policy CC/: Renewable and Low Carbon Energy in New Developments requires developments for new dwellings or other buildings to reduce carbon emissions.

5.3 Assessment Methodology

A GHG appraisal undertaken in accordance with TAG Unit A3 Chapter 3 calculates the economic value of GHG emissions as a result of a scheme, and used to compare scheme options. The likely changes in traffic as a result of the different options are not considered likely to be significant, due to the scheme options having approximately the same car park footprint with differing access and egress routes. Additionally, the expected changes in GHG emissions as a result of the scheme (for all options assessed) are not predicted to be significant. On this basis and remaining in line with air quality and noise assessments, the quantification of economic value (positive or negative) is not considered to have a material effect on the overall economic benefit of the scheme and would not have a material effect on the schemes overall Benefit Cost Ratio (BCR). The current traffic models that are available do not adequately cover the required scenarios to fully inform the GHG WebTAG assessment; it is therefore not considered proportionate to further develop the models or generate a set of workable (but imperfect) data from the traffic models available to inform the assessment at this stage.

Limited outputs from the Cambridge Sub Regional Model (CSRM2) traffic models were provided for each of the scheme options. Data on vehicles flow, speed, and % Heavy Duty Vehicles (HGV) (HGV are a sum of Heavy Goods Vehicles and buses) were available on an Peak Hour traffic flow for the Do Minimum and Do Something scenarios for the scheme options. A percentage change between the Do Minimum and Do Something for each option was calculated to differentiate between them. These results were then ranked against each other giving an indicative option score where 1 is estimated to have the lowest impact on GHGs, and 5 the greatest impact. The results and qualitative description are then fed into the DfT Greenhouse Gases Workbook (Version May-18) for each of the options being considered.

¹⁷ Cambridge City Council (2018) Cambridge Local Plan [online] available at: <https://www.cambridge.gov.uk/media/6890/local-plan-2018.pdf> (last accessed March 2019)

¹⁸ South Cambridgeshire District Council (2018) South Cambridgeshire Local Plan [online] available at: https://www.scambs.gov.uk/media/12740/south-cambridgeshire-adopted-local-plan-270918_sml.pdf (last accessed April 2019)

5.4 Study Area

The study area to be considered for this assessment specifically analyses the operational emissions that impact the ARN for road user carbon (vehicle emissions). Road user carbon are assessed in line with the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1 Air Quality (A207/07) and the Transport Analysis Guidance (TAG) Unit A3 Environmental Impact Appraisal, Chapter 4. This study area when defined in terms of lifecycle stage, is B9 – User utilisation of infrastructure as detailed in Section 7 of PAS2080:2016.

5.5 Baseline Information

The following baseline information is based on national and county-wide data as GHG emissions do not have a local receptor, as once they are emitted they are not limited to geographic boundaries. From a UK perspective, national GHG emissions in 2017 decreased by 44% from 1990. In 2018, UK net CO₂ emissions were estimated at 364 million tonnes, a decrease of 2% in comparison to 2017 levels¹⁹. In 2017, 27% of UK GHG emissions were from the transport sector which is a 0% change in comparison to 2016²⁰.

Within South Cambridgeshire, the carbon emissions specifically from motorways in 2016 was 130.9 ktCO₂, which represents a 2% increase since 2005 and an 1% decrease in overall road transport emissions²¹. There were 37.9 million vehicles licensed for use on roads in the UK at the end of March 2018. However, in 2018 Q1 registration of ultra-low emission vehicles were up by 11% on 2017 Q1. There has also been a sharp decline in the number of diesel cars being registered for the first time in 2018 Q1, down 33% compared to 2017 Q1²².

5.6 Resources and Receptors

GHG emissions do not have a local receptor, as once they are emitted they are not limited to geographic boundaries, and therefore the global atmosphere is the receptor. All GHG emissions contribute to climate change. It is important to note that the country which has emitted the emissions is responsible for those emissions, and the UK is legally bound to cutting emissions to meet the carbon budgets set out in Table 9.

The NPSNN states that *“It is very unlikely that the impact of a road project will, in isolation, affect the ability of Government to meet its carbon reduction plan targets.”* However, the release of GHG emissions needs to be assessed and managed to minimise emissions where possible.

5.7 Results of Assessment

A summary of the assessment is presented here, however more details on the assessment of the potential effects of the options can be found in the GHG WebTAG worksheets in Appendix C.

¹⁹ Department for Business, Energy and Industrial Strategy (2019): 2018 UK Provisional Greenhouse Gas Emissions [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790086/2018-provisional-emissions-statistics-one-page-summary.pdf (last accessed March 2019).

²⁰ Department for Business, Energy and Industrial Strategy (2018): 2017 UK Greenhouse Gas Emissions [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776083/2017_Final_emissions_statistics_one_page_summary.pdf (last accessed March 2019).

²¹ Department for Business, Energy and Industrial Strategy (2018): 2005 to 2016 UK local and regional CO₂ emissions – data tables [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/720677/2005-16_UK_local_and_regional_CO2_emissions.xlsx (last accessed March 2019).

²² Department for Transport (2018): Vehicle licensing statistics: January to March 2018 report [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/729581/vehicle-licensing-statistics-january-to-march-2018.pdf (last accessed March 2019).

The semi-qualitative assessment has enabled a percentage change to be calculated for each of the scenarios against the Do Minimum. The results in Table 10 give an indication as to how the different options will impact the total vehicle flows, percentage of HGVs in the traffic and the average speed.

Table 10: Percentage change against the Do Minimum for total vehicle flows, percentage of HGVs and speed

	Total Vehicle Flows	HGV Split %	Speed	Option Score
	Percentage change against the Do Minimum (%)			
Cyan	0.27	1.47	0.18	1
Magenta	0.18	0.10	-0.03	1
Purple	0.56	1.78	0.05	3
White	0.60	1.47	-0.03	3
Yellow	0.65	1.58	-0.05	5

Note: An increase in percentage change for total vehicle flows and HGVs has a negative impact in terms of GHGs. Whereas for speed an increase in speed indicates a more constant speed is being achieved therefore having a positive impact on GHG emissions.

The results in Table 10 indicate that the Yellow option performs worst in terms of GHG.

A sensitivity assessment was carried out for the Purple Option which assessed it with the addition of the CAP. The results in Table 11 are the percentage change from a Do Minimum with the CAP to the Do Something with CAP – this shows Purple with CAP is worse than Purple without CAP. This is because CAP causes more vehicles on the ARN trying to access the park and ride as they are discouraged from accessing the city centre under CAP.

Table 11: Percentage change against the Do Minimum with CAP for total vehicle flows, percentage of HGVs and speed

	Total Vehicle Flows	HGV Split %	Speed	Option Score
	Percentage change against the Do Minimum (%)			
Purple with CAP	0.72	2.09	0.003	6

6 Historic Environment

6.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the qualitative WebTAG assessment that has been undertaken with regards to the historic environment.

6.2 Legislation and Policy Context

6.2.1 National Legislation and Policy

6.2.1.1 Legislation

The over-arching legislation in relation to the historic environment in England is provided by the Ancient Monuments and Archaeological Areas Act 1979; and Planning (Listed Buildings and Conservation Areas Act)1990.

6.2.1.2 National Policy

National planning policy is set out in the National Planning Policy Framework (NPPF) (2019). The NPPF addresses the conservation and enhancement of the historic of pertinence to the Scheme are paragraphs 184, 189, 190, 192, 193, 194, 195, 196, 197, 198 and 199, and footnote 63 (which is given equal weight to the paragraphs). These set out the local planning authority's responsibilities when dealing with planning proposals which have the potential to impact on cultural heritage assets. The policies emphasise the importance of balancing the need for the conservation of heritage assets with the desirability of new development. Although this Scheme will not be subject to the local authority planning process these policies represent best practice when dealing with the cultural heritage resource.

6.2.2 Local Policy

The current local planning policy and guidance relevant to the historic environment is contained in the adopted (2018) South Cambridgeshire and the City of Cambridge Local Plans.

The relevant policies for South Cambridgeshire are detailed below:

- Policy NH/14: Heritage Assets

1. Development proposals will be supported when:
 - a. They sustain and enhance the special character and distinctiveness of the district's historic environment including its villages and countryside and its building traditions and details;
 - b. They create new high quality environments with a strong sense of place by responding to local heritage character including in innovative ways.
2. Development proposals will be supported when they sustain and enhance the significance of heritage assets, including their settings, as appropriate to their significance and in accordance with the National Planning Policy Framework, particularly:
 - c. Designated heritage assets, i.e. listed buildings, conservation areas, scheduled monuments, registered parks and gardens;

- d. Non-designated heritage assets including those identified in conservation area appraisals, through the development process and through further supplementary planning documents;
- e. The wider historic landscape of South Cambridgeshire including landscape and settlement patterns;
- f. Designed and other landscapes including historic parks and gardens, churchyards, village greens and public parks;
- g. Historic places;
- h. Archaeological remains of all periods from the earliest human habitation to modern times.

The relevant policies for the City of Cambridge are detailed below:

- Policy 61: Conservation and enhancement of Cambridge's historic environment

To ensure the conservation and enhancement of Cambridge's historic environment, proposals should:

- a. preserve or enhance the significance of the heritage assets of the city, their setting and the wider townscape, including views into, within and out of conservation areas;
- b. retain buildings and spaces, the loss of which would cause harm to the character or appearance of the conservation area;
- c. be of an appropriate scale, form, height, massing, alignment and detailed design which will contribute to local distinctiveness, complement the built form and scale of heritage assets and respect the character, appearance and setting of the locality;
- d. demonstrate a clear understanding of the significance of the asset and of the wider context in which the heritage asset sits, alongside assessment of the potential impact of the development on the heritage asset and its context; and
- e. provide clear justification for any works that would lead to harm or substantial harm to a heritage asset yet be of substantial public benefit, through detailed analysis of the asset and the proposal.

- Policy 62: Local heritage assets

The Council will actively seek the retention of local heritage assets, including buildings, structures, features and gardens of local interest as detailed in the Council's local list and as assessed against the criteria set out in Appendix G of the plan. Where permission is required, proposals will be permitted where they retain the significance, appearance, character or setting of a local heritage asset. Where an application for any works would lead to harm or substantial harm to a non-designated heritage asset, a balanced judgement will be made having regard to the scale of any harm or loss and the significance of the heritage asset.

6.3 Assessment Methodology

The purpose of this appraisal is to identify the significance of effects of the impacts of the various proposed scheme options on the historic environment resource and highlight which if any would require further study. The appraisal study follows WebTAG environmental impact appraisal guidance. This appraisal has used the following sources:

- The National Heritage List for England (NHLE) maintained by Historic England for details of nationally designated heritage assets;
- Cambridgeshire Historic Environment Record (CHER) for information on locally listed parks and gardens and conservation areas;

- The CHER for records pertaining to all non-designated heritage assets (both below and above ground), previous archaeological events, secondary sources;
- The Archaeology Data Service has been searched for relevant archaeological fieldwork grey literature reports and publications;
- A search was undertaken on relevant planning applications (which contained historic environment information) held by the City of Cambridge Council and South Cambridge District Council; and
- A geophysical survey was undertaken over the offline P&R option areas during February 2018.

6.4 Study Area

A study area of 500m for designated heritage assets and 250m for non-designated heritage assets from the extent of the proposed options was used to develop the baseline.

6.5 Baseline Information and Receptors

Cyan, White, Purple and Yellow Options

The following designated heritage assets are within 500m of the four options considered at the potential new site:

- Two scheduled monuments;
 - A Romano-British settlement site SW of Trumpington (NHLE 1006903), 400m north east of the option;
 - A prehistoric/Roman settlement complex north of Hauxton (NHLE 1006892), 250m south east of the options.
- Trumpington Conservation Area is located 400m to the north of the options.
- There are four Grade II listed buildings within 500m of the options;
 - Milestone (Hauxton Road, Trumpington Meadows) about half of a mile south of junction with Shelford Road (NHLE 1126190), located within the (options) busway route to the south of the existing P&R;
 - Milestone, Hauxton Mill Bridge (NHLE 1127840), 350m south of the options;
 - Hauxton Watermill (NHLE 1127839), 430m south of the options; and
 - Hauxton Watermill Bridge (NHLE 1127839), 440m south of the options.

There are 47 archaeological monument and events recorded on the CHER within 250m of the options. These include the following assets identified within footprint of the options:

- The site of a World War II Prison of War Camp (Just to the north of the M11 junction (CHER reference number. MCB21193);
- Medieval ridge and furrow and evidence of post medieval activity to the north of the M11 junction (MCB20491);
- An Iron Age pit recorded in the access road to the P&R (04414);
- Fieldwalking to the north of the M11 junction recovered artefacts dating from the Lower Palaeolithic to the medieval period (MCB20490); and
- Iron Age occupation features have been identified just to the south of the P&R (MCB20489).

In addition to the assets identified by the CHER, the following heritage assets have been identified within the footprint of the options:

- Archaeological assessment/fieldwork undertaken as part of the Trumpington Meadows development²³; identified the following assets within the footprint of the options:
 - Air photo evidence of bank features in the field to the north of the M11 junction;
 - Prehistoric pot boilers were recovered, within the proposed P&R area; and
 - Metal detecting (by a local enthusiast) in the area of the proposed P&R recovered Roman material.
- The geophysical survey²⁴ of the proposed P&R site and the fields to the south and west of the M11 junction identified potential linear features that predated the known historic boundaries. Some of these anomalies are located in the area of the Roman material recovered during metal detecting.
- Ponds located on the north western edge of the proposed P&R site are related to coprolite quarrying in the 19th century.

Magenta Option

The following designated heritage assets are within 500m of the option for the existing Trumpington P&R:

- Two scheduled monuments;
 - A Romano-British settlement site SW of Trumpington (NHLE 1006903), 400m west of the option;
 - A prehistoric/Roman settlement complex north of Hauxton (NHLE 1006892), 450m south east of the option.
- Trumpington Conservation Area is located 270m to the north of the option.
- Anstey Hall, Trumpington (NHLE 1331876), is located 450m to the north of the P&R.
- There are six Grade II listed buildings with 500m of the option.
 - Milestone (Hauxton Road, Trumpington Meadows) about half of a mile south of junction with Shelford Road (NHLE 1126190), located within the (options) busway route to the south of the existing P&R;
 - Milestone, Hauxton Mill Bridge (NHLE 1127840), 450m south west of the option;
 - Hauxton Watermill (NHLE 1127839), 500m south west of the option;
 - Hauxton Watermill Bridge (NHLE 1127839), 500m south west of the option;
 - Dovecote at Anstey Hall Farm (NHL3 104224), 470m north of the option; and
 - 60 and 63 High Street, Trumpington (NHLE 1331850), 450m north of the option.

There are 38 archaeological monuments and events recorded on the CHER within 250m of the option. These include the following assets identified within footprint of the option:

- Iron Age/Roman features and artefacts were encountered during soil improvement works (CHER Ref. 09716), now located within the footprint of the P&R;
- Neolithic to Late Iron Age remains were excavated in advance of the construction of the P&R in 2000 - 2001. These included settlement remains, land division and three Iron Age mortuary enclosures (CB15749/ECB1158);
- An Iron Age pit recorded in the access road to the P&R (04414);
- The P&R was formerly crossed by the Sandy to Cambridge railway line (03344).

²³ TMC Ltd (2007). Trumpington Meadows; Environmental Statement, Technical Appendices C | Cultural Heritage

²⁴ WYAS (2018). Western Orbital Park and Ride Site, Cambridgeshire; Geophysical Survey.

6.6 Results of Assessment

A summary of the assessment is presented here, however more details on the assessment of the potential effects of the options can be found in the Historic Environment WebTAG worksheets in Appendix D.

Cyan, White, Purple and Yellow Options

The scheduled monuments 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. This may cause a slight impact on the context of the prehistoric/Roman settlement complex north of Hauxton (NHLE 1006892), which may cause slight negative effect on the asset.

The removal of the Hauxton Road, Trumpington Meadows milestone (NHLE 1126190), would result in a large adverse physical impact. However, it is proposed that the milestone where possible will remain in its current location or relocated in the near vicinity (in a similar setting), this will reduce the impact on the asset resulting in a neutral effect.

Potential for major adverse impact on archaeological remains identified by the geophysical survey and the Trumpington Meadows investigations; Remains associated with the former Prisoner War Camp, and unidentified remains in areas that have not been subject to archaeological investigation. This will result in a moderate adverse effect.

There are no other predicted impacts on the other identified heritage assets from the construction and operation of the options.

Magenta Option

The removal of the Hauxton Road, Trumpington Meadows milestone (NHLE 1126190), would result in a large adverse physical impact. However, it is proposed that the milestone where possible will remain in its current location or relocated in the near vicinity (in a similar setting), this will reduce the impact on the asset, this will reduce the impact on the asset resulting in a neutral effect.

There are no other predicted impacts on the other identified heritage assets from the construction and operation of the options.

7 Landscape

7.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the qualitative WebTAG assessment that has been undertaken with regards to landscape.

7.2 Legislation and Policy Context

7.2.1 National Legislation and Policy

National Planning Policy Framework (NPPF)

The NPPF attaches importance to the character of the environment, emphasising that developments should add to the overall quality of the area, respond to local character and history and reflect the identity of local surroundings and materials. The provisions relevant to the proposed development are included in the following sections:

- Policy 7: Requiring good design – paragraph 56 notes that good design is a key aspect of sustainable development, is indivisible from good planning, and should contribute positively to making places better for people.
- Policy 11: Conserving and Enhancing the Natural Environment - paragraph 109 notes that: the planning system should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, geological conservation interests and soils;
- Policy 12: Conserving and Enhancing the Historic Environment - paragraph 128 notes that: in determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting.
- Protecting Green Belt Land – paragraph 133 emphasizes the importance of Green Belts in reducing urban sprawl to maintain open land. Paragraph 136 states that once Green Belt boundaries have been established they should only be altered in exceptional circumstances that are fully evidenced and justified.

7.2.2 Local Policy

Cambridge Local Plan (2018)

- Policy 18: Southern Fringe Areas of Major Change – Landscape around Trumpington Meadows is prioritised to support residential development and complementary uses that benefit the community (community and education services, local shops and services, open space and recreation). Developments should aim to retain or enhance strategic green corridors and watercourse character whilst helping to create a distinctive gateway to the city and a high-quality urban fringe without compromising existing views. Schemes must also fully incorporate access for pedestrians and cyclists.

South Cambridgeshire District Council Local Plan (2018)

- Policy NH/2: Protecting and Enhancing Landscape Character – Development must respect and aim to retain or enhance the character of the local landscape and the National Character Area in which it is located.

- Policy NH/6: Green Infrastructure – Aim to reinforce, connect, protect and create new green infrastructure where possible and promote its use by society. See Cambridgeshire Green Infrastructure Strategy.
- Policy NH/7: Ancient Woodlands and Veteran Trees – Development should avoid loss or damage to veteran trees or ancient woodland else must act to mitigate adverse effects.
- Policy NH/8: Mitigating the Impact of Development in and Adjoining the Green Belt – developments must not have detrimental impact on rurality and openness of Green Belt. Development should include careful landscaping of high-quality design. Landscaping and planting must be well-maintained.
- Policy NH/13: Important Countryside Frontage – Development must not compromise land with strong countryside character that provides important break between nearby development framework areas or acts to provide connection between urban and surrounding rural area.

7.3 Assessment Methodology

The purpose of this appraisal is to identify the significance of effects of the impacts of the proposed scheme options on landscape character. The appraisal study follows WebTAG environmental impact appraisal guidance and was informed by the following publications:

- Cambridgeshire Green Infrastructure Strategy, LDA Design (2011);
- Cambridge Inner Green Belt Boundary Study, LDA Design (2015);
- National Character Area Profile: 88. Bedfordshire and Cambridgeshire Claylands, Natural England (2014); and
- Cambridge Landscape Character Assessment, Cambridge City Council (2003).

Site visits were undertaken in summer 2018 and winter 2019 to identify the landscape character and the potential visibility of scheme from the surrounding area.

7.4 Study Area

The Magenta Option is located in the existing Trumpington Park and Ride site, off Trumpington Road. Due to the presence of surrounding built development and mature trees, the study area for the Magenta Option is contained to an area approximately 1000m from the site.

The other options are located south-west of Junction 11 on the M11. A zone of theoretical visibility (ZTV) was modelled for the scheme, assuming the highest structure on the site was an 8m high lamp column, and this informed the identification of the study area. This includes the area within approximately 1500m from the option site. The ZTV shows that there are likely to be no views from Harston, Hauxton or Little Shelford.

7.5 Baseline Information and Receptors

National Character Area Assessments

The study area lies within National Character Area 88: Bedfordshire and Cambridgeshire Claylands. The key characteristics of the study area in relation to this are:

- Broad, lowland plateau dissected by shallow river valleys;
- Large-scale arable farmland; and
- Majority of landscape is sparsely populated but a “feeling of urbanisation” is induced by large settlements such as Cambridge and the network of major transport routes.

Local Landscape Character Assessment

The most up to date local landscape character assessment was carried out for the Cambridge Green Belt Study²⁵ in 2015. The Magenta Option sites lies in the urban area of Cambridge and is not covered by this assessment. The other option sites lie in the Rhee and Bourn Valleys LCA. The keys characteristics of the LCA are:

- An extensive landscape with wide, shallow valleys and a gently undulating topography;
- Willow-lined small watercourses;
- Intensive arable agriculture on higher land, rich meadow/pastureland in the lower reaches;
- Small isolated woodland belts;
- Prominent roads and transport infrastructures; and
- Rural fringe of Cambridge dominated by housing developments and Addenbrookes Hospital campus.

The Magenta Option site is an existing Park and Ride car park. The site for the other options is an arable field that slopes gently downward towards the River Cam in the west and the Granta in the south. Money Hill, immediately south of Haslingfield is a local high point in an otherwise flat landscape. The character of the study area is mainly rural, but includes the urban edge of Cambridge, transport infrastructures and small settlements including Hauxton, Harston and the Shelfords. Notable landscape features include the tree-lined river corridors and associated water meadows and the Trumpington Meadows Country Park and LNR. There are a number of public rights of way to the south and a local cycle route through the LNR. A farm access bridge over the M11 provides an off-road route between Cambridge and the landscape to the south.

7.6 Results of Assessment

A summary of the assessment is presented here, however more details on the assessment of the potential effects of the options can be found in the Landscape WebTAG worksheets in Appendix E.

Purple Option

The existing topography and woodland in the surrounding landscape will contain effects of the Purple Option to a relatively small area north and west of the car park site. Currently arable fields south-west of Junction 11 will be replaced with a car park with roads, parking areas, lighting, signage and a one-storey building. These will not be wholly uncharacteristic additions to the landscape as they will be seen in the context of the motorway and Junction 11 roundabout. Tranquillity will be reduced, but the change will not be noticeable as the A10 and M11 are already busy roads. Substantial areas of the site will be planted with new woodland or seeded with a wildflower and grass seed mix to create new wildflower meadows. Over time the car park will become more wooded in character and the woodland and meadows will integrate it into the landscape of the neighbouring nature reserve. The introduction of a new car park into the landscape will affect a small proportion of the landscape character area. The impact will be slight adverse in operation.

Cyan, White and Yellow Options

There will be a loss of trees and shrubs from fields bordering the A10 and M11 and the approaches to the farm access bridge over the M11 due to road widening. Currently arable fields south-west of Junction 11 will be replaced with a car park with roads, parking areas, lighting, signage and a one-storey building. These will not be wholly uncharacteristic additions to

²⁵ Cambridge Green Belt Study, LDA Design, 2015

the landscape as they will be seen in the context of the motorway and Junction 11 roundabout. Tranquillity will be reduced, but the change will not be noticeable as the A10 and M11 are already busy roads. Substantial areas of the site will be planted with new woodland or seeded with a wildflower and grass seed mix to create new wildflower meadows. Over time the car park will become more wooded in character and the woodland and meadows will integrate it into the landscape of the neighbouring nature reserve, but buses using the farm access will remain prominent in views. The impact will be moderate adverse in operation.

Magenta Option

There will be a loss of trees and shrubs from fields bordering the A10 and M11 due to road widening. The option will result in the replacement of a surface level car park with a substantial new building. There will be a loss of the maturing landscape framework of the car park, which currently screens views and provides a verdant character to the landscape in summer. Views from the flats on Spring Drive to the north would be particularly affected. Views from other directions would be largely screened by intervening vegetation. The decked car park would not be wholly uncharacteristic of the landscape due to the large-scale John Lewis building adjacent. The impact in will be slight adverse in operation.

8 Noise

8.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the semi-quantitative WebTAG assessment that has been undertaken with regards to noise.

This appraisal considers noise impacts due to health effects for each proposed scheme option during the operational phase of the scheme only. The impacts of noise from construction are not considered within the scope of this appraisal.

8.2 Legislation and Policy Context

8.2.1 National Legislation and Policy

The Land Compensation Act 1973 Part 1

The Land Compensation Act 1973 Part 1²⁶ includes provision for compensation for loss in property value resulting from physical agents, including noise and vibration, resulting from the use of public works, such as new or improved roads.

The Noise Insulation Regulations 1975 (amended 1988)

The Noise Insulation Regulations 1975 (amended 1988)²⁷ were made under Part 2 of the Land Compensation Act for the obligatory and discretionary provision of noise mitigation measures for dwellings adjacent to new highways. Among the criteria for a property to qualify for insulation in living rooms and bedrooms is the façade noise level is at least 68dB L_{A10,18hr}, and that noise from the new or altered highway increases by at least 1dB.

8.2.2 National Policy

The Environmental Noise (England) Regulations 2006

The Environmental Noise (England) Regulations²⁸ implement European legislation requiring noise action plans to be developed on a five-year rolling programme. Action plans have to be developed for the major noise sources and areas for which maps have been produced. The action plans seek to manage noise issues and effects including noise reduction, if necessary, based on the results obtained through the mapping process. As a result of the process, the “Noise Action Plan: Roads (Including Major Roads)”²⁹ was published, which identified ‘Important Areas’ for future mitigation.

The National Planning Policy Framework 2018

The National Planning Policy Framework (NPPF)³⁰ was revised in July 2018. Paragraph 170 of the NPPF states that: “Planning policies and decisions should contribute to and enhance the natural and local environment by:...e) preventing new and existing development from

²⁶ HMSO, (1973). “Land Compensation Act.

²⁷ HMSO, (1975). “Noise Insulation Regulations. Statutory Instruments No. 1763. Building and Buildings.

²⁸ Environmental Noise Regulations available online at http://www.legislation.gov.uk/uksi/2006/2238/pdfs/ukxi_20062238_en.pdf

²⁹ Noise Action Plan: Roads (Including Major Roads) Environmental Noise (England) Regulations 2006, as amended January 2014

³⁰ NPPF. Available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728643/Revised_NPPF_2018.pdf

contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability”.

Paragraph 180 of the NPPF states that planning policy and decisions should aim to:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The Noise Policy Statement for England 2010

The Noise Policy Statement for England (NPSE)³¹ was issued by the Department for Environment, Food and Rural Affairs (Defra) in 2010. Its purpose is to promote, “good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”. The three main aims are to:

- Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Within the aims stated above there are several key phrases that lead to additional concepts now considered in the assessment of noise impact; these and their definitions are detailed below:

- Lowest Observed Adverse Effect Level (LOAEL): this is the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL): this is the level above which significant adverse effects on health and quality of life occur.

There are no pre-defined levels for these effect levels as it is acknowledged that they will be different for different sources, different receptors and at different times.

8.2.2.1 Planning Practice Guidance

Planning Practice Guidance (PPG)³² is a Government web-based resource which provides guidance on how the policy set out in NPPF may be interpreted in practice for a wide range of issues. There is a subsection of PPG relating specifically to noise:

“Local planning authorities’ plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved.”

³¹ Defra (2010). “The Noise Policy Statement for England”

³² Department for Communities and Local Government (2014) Planning Practice Guidance.

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during construction wherever applicable) is, or would be, above or below the significant observed adverse effect level...”

Among the specific factors to consider where relevant the guidance states: “In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur”.

PPG provides a noise exposure hierarchy which describes the perception and outcomes associated with increasing effect levels as shown in Table 12.

Table 12: PPG noise exposure hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Source: Planning Practice Guidance

8.2.3 Local Policy

The current local planning policy and guidance relevant to noise and vibration is contained in the adopted (2018) South Cambridgeshire and the City of Cambridge Local Plans.

The relevant policies for South Cambridgeshire are detailed below:

- Policy SC/10: Noise Pollution

1. Planning permission will not be granted for development which:
 - a. Has an unacceptable adverse impact on the indoor and outdoor acoustic environment of existing or planned development;
 - b. Has an unacceptable adverse impact on countryside areas of tranquillity which are important for wildlife and countryside recreation;
 - c. Would be subject to unacceptable noise levels from existing noise sources, both ambient levels and having regard to noise characteristics such as impulses whether irregular or tonal.
2. Conditions may be attached to any planning permission to ensure adequate attenuation of noise emissions or to control the noise at source. Consideration will be given to the increase in road traffic that may arise due to development and conditions or Section 106 agreements may be used to minimise such noise.
3. Where a planning application for residential development is near an existing noise source, the applicant will be required to demonstrate that the proposal would not be subject to an unacceptable noise levels both internally and externally.
4. The Council will seek to ensure that noise from proposed commercial, industrial, recreational or transport use does not cause any significant increase in the background noise level at nearby existing noise sensitive premises which includes dwellings, hospitals, residential institutions, nursing homes, hotels, guesthouses, and schools and other educational establishments.

- Policy TI/2: Planning for Sustainable Travel

...3. Developers will be required to demonstrate they will make adequate provision to mitigate the likely impacts (including cumulative impacts) of their proposal including environmental impacts (such as noise and pollution) and impact on amenity and health...

- Policy SC/10 supporting text also refers to Noise Action Plans and Noise Important Areas which would be potentially impacted due to development. The policy notes that with respect to the Noise Action Plans existing management and control measures can be implemented to mitigate against increases in noise exposure due to development.

The relevant policies for the City of Cambridge are detailed below:

- Policy 35: Protection of human health and quality of life from noise and vibration

Development will be permitted where it is demonstrated that:

- a. it will not lead to significant adverse effects and impacts, including cumulative effects and construction phase impacts wherever applicable, on health and quality of life/amenity from noise and vibration; and
- b. adverse noise effects/impacts can be minimised by appropriate reduction and/or mitigation measures secured through the use of conditions or planning obligations, as appropriate (prevention through high quality acoustic design is preferable to mitigation).

This appraisal of noise does not consider mitigation measures or the significance of effects, however, compares noise level impact changes between scheme options at a preliminary stage.

8.2.4 Guidance

DMRB Volume 11, Section 3, Part 7 'Noise and Vibration 2011

The DMRB Volume 11, Section 3, Part 7, HD213/11³³ 'Noise and Vibration' describes a methodology for the assessment of road projects in the UK and best reflects Environmental Impact Assessment (EIA) methodology as applied to highways. It includes a method of the classification of magnitude of impact and assessment of both long and short-term effects.

³³ Design Manual for Roads and Bridges, HD213/11 Revision 1, 2011.

WHO Environmental Noise Guidelines for the European Region 2018

The World Health Organisation (WHO) Environmental Noise Guidelines for the European Region³⁴ provide evidence-based recommendations on the health effects of noise. The guidelines complement the expert-based recommendations of the WHO 'Night Noise Guidelines' (2009) (NNG).

The new guidelines provide source specific recommendations road traffic, railway, aircraft and wind turbine noise, and indoor as well as outdoor exposure levels for leisure noise.

Specific recommendations are made with regards to road traffic noise as follows:

- "For average noise exposure, the Guideline Development Group (GDG) strongly recommends reducing noise levels produced by road traffic below 53 decibels (dB) L_{den} , as road traffic noise above this level is associated with adverse health effects.
- For night noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic during night time below 45 dB L_{night} , as night-time road traffic noise above this level is associated with adverse effects on sleep.
- To reduce health effects, the GDG strongly recommends that policymakers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure."

The Guidelines clarify that " L_{den} and L_{night} refer to a measurement or calculation of noise exposure at the most exposed façade, outdoors, reflecting the long-term average exposure."

WHO Night Noise Guidelines for Europe

The WHO Night Noise Guidelines for Europe (NNG)³⁵ suggest on a very precautionary basis, that the population should not be exposed to a NNG value greater than 40dB of $L_{night,outside}$ (defined as the night noise level outside in free field conditions) during the part of the night when most people are sleeping. However, the precautionary nature of this target is fully appreciated by the WHO and a noise level of 55dB $L_{night,outside}$ is therefore recommended relating to the onset of heart disease.

British Standard (BS) 8233 2014

BS 8233 2014³⁶ provides guidance relating to noise levels in external amenity areas which states that it is desirable noise levels do not exceed 50 dB $L_{Aeq,T}$ with an upper guidance value of 55 dB $L_{Aeq,T}$. The upper guidance value is relevant in noisier environments.

Guidance states "however, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be

³⁴ WORLD HEALTH ORGANISATION, 2018. Environmental Noise Guidelines for the European Region. ISBN 978 92 890 5356 3. URL available: <http://www.euro.who.int/en/health-topics/environment-and-health/noise/publications/2018/environmental-noise-guidelines-for-the-european-region-2018> (Last accessed January 2019)

³⁵ World Health Organization, (2009). Night Noise Guidelines for Europe.

³⁶ BSI 2014, BS 8233, Guidance on sound insulation and noise reduction for buildings.

warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.”

Calculation of Road Traffic Noise 1988

Calculation of Road Traffic Noise (CRTN)³⁷ provides procedures for predicting noise levels for a given flow of road traffic at sensitive receptors. These methodologies are used in the determination of entitlement under the Noise Insulation Regulations and for traffic noise change assessments undertaken in accordance with the DMRB assessment methodology.

8.3 Assessment Methodology

A SATURN traffic model for each proposed scheme option has been developed to provide inputs to the economic assessment. At this stage however, traffic model outputs do not provide relevant parameters necessary to complete a WebTAG³⁸ assessment in accordance with the requirements of CRTN and DMRB HD213/11.

The noise WebTAG calculation procedure requires the day and night-time noise levels ($L_{eq,16hr}$ and $L_{night,8hr}$) to be calculated for with scheme and without scheme scenarios. AAWT (Annual Average Weekly Traffic) data or equivalent is necessary to calculate these values. At this stage AAWT values are unavailable however, AM and PM peak hour values are available and have been provided for the Cambridge area. These values have been analysed to understand noise changes based on traffic flow changes.

The Do Minimum traffic data without CAP has been considered for all options except Purple with CAP. To enable comparison the Purple CAP option has been considered against the Do Minimum traffic data with CAP implemented.

The peak hour parameters alone are not sufficient to enable calculation of daytime or night-time noise level values. It has therefore not been possible to complete a full WebTAG calculation or determine Net Present Values (NPV) for each scheme option. A modified approach has been undertaken based on the peak hour values which provides comparison between the scheme options in terms of noise.

The following methodology has been adopted for the purposes of completing a modified WebTAG assessment and appraisal of noise impact. The approach broadly follows the DMRB scoping stage assessment methodology:

- Determine the change in noise level for road links due to change in traffic flow for AM and PM peak hour periods.
- Identify receptors within 50m of links which experience a 1dB or greater change (increase or decrease) in road traffic noise level for AM and PM peak hours.
- Review baseline ambient noise levels at receptor locations where a 1dB or greater change (increase or decrease) in road traffic noise is identified to understand likely impacts.

Calculations consider only road traffic noise level changes from the nearest road link (within 50m) to each receptor property. Acoustic screening from buildings, structures or topography has not been considered within the calculations. Noise level changes are therefore considered to present a comparative assessment for receptors closest to the affected road network.

³⁷ Department of Transport (1988). “Calculation of Road Traffic Noise”.

³⁸ Department for Transport, Transport Appraisal Guidance, available at: <https://www.gov.uk/guidance/transport-analysis-guidance-webtag>

Receptor have been identified using the Ordnance Survey Address Base which defines the receptor location and classification (i.e. residential, commercial, etc.).

8.4 Study Area

For this assessment noise level changes have been considered for any road links which fall partly or fully within a 1km study area from the scheme extents (focused around the J11 roundabout).

8.5 Baseline Information

Baseline noise surveys have not been undertaken at this stage of the scheme assessment. Existing baseline conditions have therefore been reviewed through desktop study.

Where necessary existing ambient noise levels in the surrounding areas have been estimated using the Extrium³⁹ noise map.

Baseline noise levels in the immediate vicinity of the proposed scheme area are characterised by road traffic noise using the M11 and surrounding road network. As distance increases from each road, noise levels reduce but traffic remains audible within the whole study area.

8.6 Resources and Receptors

There are two noise important areas (NIA) on Hauxton Road (ID 5024 and ID 5025) and two further north on High Street (ID 11427 and ID 11428). These noise important areas are located between approximately 800m and 2000m from M11 J11 however are all within 1km of the existing P&R site.

The surrounding areas from the proposed scheme options include noise sensitive residential dwellings in Cambridge and Trumpington and villages to the south at Harston and Hauxton. Only residential dwellings have been considered within this appraisal.

8.7 Results of Assessment

A summary of the assessment is presented here, however more details on the assessment of the potential effects of the options can be found in the Noise WebTAG information in Appendix F.

The assessment suggests that more households will be subject to increases during the afternoon peak hour than in the morning peak hour for all options except Cyan and Purple with CAP which presents a similar number of increases during morning and afternoon peak hours.

The Magenta option, which comprises added capacity to the existing P&R site, shows fewer noise level increases during morning peak hours when compared against the other assessed options which all otherwise include development of a new P&R site at J11.

The Cyan option presents the lowest number of afternoon peak hour noise level increases of all options. Purple, White and Yellow options all present similar results due to similar scheme proposals with respect to noise. The majority of new road links and changes to J11 with development of a new P&R site are located in a relatively sparsely populated area which minimises potential impacts at sensitive receptors.

³⁹ Extrium Noise Map, available online at: <http://extrium.co.uk/>

The Purple CAP option presents a greater number of morning peak hour noise level increases but marginally fewer increases during the afternoon peak hour when compared against other similar scheme options (i.e. Cyan, Purple, White and Yellow).

The number of noise level decreases show minor variations between scheme options.

Overall, the six options show similar results and affected road networks. Noise level increases in the most populated areas are common to all options are focussed around the Cambridgeshire Guided Busway (north east of J11, Hauxton Road (A1309, towards Cambridge) and Hauxton (village south of J11).

The existing ambient noise levels are dominated in the Hauxton village area by noise from the M11 motorway. The above assessment and calculations consider only noise level change from the nearest road and does not consider the influence of other nearby dominant noise sources. In practice the noise level changes at the majority of receptors will likely be less significant due existing dominant road traffic noise sources in the surrounding area.

9 Water

9.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the qualitative WebTAG assessment that has been undertaken with regards to water.

9.2 Legislation and Policy Context

9.2.1 European legislation

9.2.1.1 Water Framework Directive 2000

The key EU legislation covering the water environment which has a bearing on this scheme is the Water Framework Directive (WFD), which establishes a framework for the management of water resources throughout the European Union. The WFD is translated into UK law through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

The key objectives of the WFD are to:

- Prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water and reduce pollution from discharges and emissions of hazardous substances.
- Protect, enhance and restore all bodies of groundwater, achieve good chemical and quantitative status of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between groundwater abstraction and replenishment.
- Preserve protected areas.

9.2.1.2 Groundwater Directive 2006

The Groundwater Directive 2006/118/EEC is aimed at the protection of groundwater from pollution and deterioration. The main requirements of the directive in relation to transport projects is the requirement to limit or avoid the discharge of hazardous substances to groundwater.

9.2.2 National legislation

9.2.2.1 Environmental Permitting Regulations 2010

The Environmental Permitting Regulations (EPR) 2010 aim to protect groundwater and surface waters from pollution by controlling the inputs of potentially harmful and polluting substances. The Regulations implement the WFD and the Groundwater Daughter Directive 2006. The EPR replace those parts of the Water Resources Act (WRA) 1991 that relate to the regulation of discharges to controlled waters (including groundwater).

9.2.2.2 Water Resources Act 1991

Section 93 of the WRA 1991 provides for the establishment of groundwater protection zones. The requirements of Section 93 are implemented and set out in the Environment Agency's Groundwater Protection Guides covering: requirements, permissions, risk assessments and

controls (previously covered in GP3⁴⁰). Source Protection Zones (SPZs) are defined for groundwater supplies used for human consumption. The Environment Agency's position statement relating to the use of sustainable drainage systems can be found within these guides.

9.2.2.3 Land Drainage Act 1991

The Land Drainage Act 1991 is also relevant to manage flood risk for any works within eight metres of ordinary watercourses. In these cases land drainage consent is required for development to proceed. There are two field ditches crossing the site which are likely to be considered ordinary watercourses where development would occur within eight metres of the watercourses.

9.2.3 National policy

9.2.3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2019⁴¹ applies to this scheme under Chapter 14 ("Meeting the challenge of climate change, flooding and coastal change") and the supporting technical guidance, in relation to flood risk. A site-specific flood risk assessment will be required for the preferred option as part of the planning application because the proposed site for this scheme is located within a Flood Zone 1 and is larger than 1 hectare in size.

9.2.4 Local Policy

The current local planning policy and guidance relevant to the water environment is contained in the adopted (2018) South Cambridgeshire and the City of Cambridge Local Plans.

The South Cambridgeshire Local Plan⁴² contains three policies relevant to this scheme. "Policy CC/7: Water Quality" mentions the need for proposals to have adequate water supply, sewerage and land drainage systems for the whole development. The proposal also needs to demonstrate that the quality of the ground, surface water and waterbodies will not be harmed, and that sources of pollution and Sustainable Drainage Systems (SuDS) measures are considered. "Policy CC/8: Sustainable Drainage Systems" also refers to the need for proposals to incorporate appropriate SuDS. "Policy CC/9: Managing Flood Risk" describes the need to minimise flood risk associated with the proposed development by incorporating suitable flood protection / mitigation measures to the level and nature of the flood risk and by ensuring there is no increase in flood risk. The policy also refers to the need to undertake a site-specific flood risk assessment depending on the size of the proposed development and the flood zone it is located in.

Two policies from the Cambridge Local Plan⁴³ are relevant to the water environment for this scheme. "Policy 31: Integrated water management and the water cycle" suggests that surface water management features are multi-functional wherever possible in their land use and measures need to be implemented to contain the run-off from all hard surfaces. It also refers to

⁴⁰ Environment Agency (2013). Groundwater protection: Principles and practice (GP3). August 2013 Version 1.1. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/598799/LIT_7660.pdf (last accessed April 2019).

⁴¹ National Planning Policy Framework [online] available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf (last accessed April 2019).

⁴² South Cambridgeshire District Council (2018). South Cambridgeshire Local Plan, Adopted September 2018. Available online at: https://www.scambs.gov.uk/media/12740/south-cambridgeshire-adopted-local-plan-270918_sml.pdf (last accessed April 2019).

⁴³ Cambridge City Council (2018). Cambridge Local Plan. October 2018. Available online at: <https://www.cambridge.gov.uk/media/6890/local-plan-2018.pdf> (last accessed April 2019).

the need for all hard surfaces to be permeable surfaces where reasonably practicable, and having regard to groundwater protection. “Policy 32: Flood Risk” describes the need for proposals to address the potential flood risk following the principles of the NPPF.

9.3 Assessment Methodology

The water resources assessment has followed the process set out in WebTAG Unit 3A.

An initial scoping assessment (informal) of water resources identified that the scheme is in close proximity to Flood Zones 2 and 3 associated with the River Cam and has direct impacts on ditches which cross the proposed P&R site which are classified as ordinary watercourses. The site is also located on a Principal Aquifer, namely the chalk aquifer.

The WebTAG methodology allows the assessment of the value of water resource features that occur in the study area, based on their quality (physical condition of the feature), scale (local, regional, national), rarity (how common the feature is in the area) and substitutability (how easily can the feature be replaced in the area).

A qualitative assessment is made on the potential magnitude of any impact of the options and from the combination of importance and magnitude the significance of the effect is defined.

9.4 Study Area

The study area for four of the potential options (Yellow, White, Cyan and Purple) covers the potential carpark site at the J11 of the M11 and associated access and egress routes, while the study area for the remaining option (Magenta) includes the existing Trumpington P&R site and the sections of road around J11 of the M11.

The precise boundary of study area for each option varies depending on whether groundwater or surface water assets are being considered. While the study area focussed on the footprint of the elements of each option, the extent of the impacts could migrate off the scheme under the influence of natural surface or groundwater flow, or could have knock on impacts on surface or groundwater off site, and so it was also important to look beyond the potential scheme footprints as well.

The study area also has to account for the nature of the feature considered. For example, the “recreation and value to the economy” of the River Cam took into account that, in Cambridge, the river is a source of significant economic value to the tourism industry so the study area extended to cover the city.

For groundwater the study area extended out beyond two kilometres from the proposed location of the main footprint for the options. There are no licensed users in the study area.

9.5 Baseline Information and Receptors

9.5.1 Surface Water

Rivers in the River Cam catchment generally flow south to north through Cambridge. The scheme is located in the vicinity of several tributaries joining the River Cam and the naming of the rivers on the OS maps the rivers in the study area are referred to as the “River Cam or Rhee” (running south to north to the west of the study area) and the “River Cam or Granta” (running south to north west along the southern edge of the study area).

The Environment Agency have given more unique identifications to these stretches of river in the area. The river section running south and west of the scheme is identified as the River Cam (Stapleford to Hauxton Junction)⁴⁴ Waterbody ID GB105033037600.

In the vicinity of the proposed site by J11 of the M11, the River Cam (Stapleford to Hauxton Junction) runs east/west just north of Hauxton and then bends to the north just after crossing the A10 (at Hauxton Mill) before joining the River Cam at Hauxton Junction, just south of the M11 bridge. At its closest point, this water body is located approximately 150m from access and egress routes over the accommodation bridge, and approximately 250m from the carpark footprint.

Downstream (i.e. north) of this point the Environment Agency identify the river section as the River Cam (waterbody ID GB105033042750) which flows past the existing Trumpington Park and Ride (over 500m west of the existing Park and Ride).⁴⁵

Baseline information on the condition of the River Cam from the Environment Agency website in Table 13 below.

Table 13: Main Watercourses in Study Area

Watercourses	ID	Overall Status	Ecological Status	Chemical Status
Cam (Stapleford to Hauxton Junction)	GB105033037600	Moderate	Moderate	Good
Cam	GB105033042750	Moderate	Moderate	Good

Source: Environment Agency Catchment Data Explorer website – status as 2016

Other surface water features present At the proposed site near J11 of the M11 there are two field ditches around the field boundaries and three surface water ponds (referred to as the coprolite ponds) marking the edge of the Trumpington Meadow Country Park. None of these directly connect to the River Cam.

At the existing P&R site, a small open pond has been used as a storage facility for surface water runoff from the P&R site. The pond discharges via a storm drainage system into the River Cam at an unknown location. As part of the approved Trumpington P&R expansion works, the pond is being replaced with a buried storage facility, therefore it has not been taken into account in this assessment. There are no other surface water features of interest in the study area.

9.5.2 Groundwater

9.5.2.1 Superficial Geology

The existing Trumpington P&R site is underlain by River Terrace Deposits that are sand and gravels. However, as the site is already covered by hard surfacing, significant additional disturbance to these superficial deposits is unlikely. The deposits will be in hydraulic continuity with the underlying bedrock.

⁴⁴ EA Catchment Data Explorer website. <https://environment.data.gov.uk/catchment-planning/WaterBody/GB105033037600> (last accessed April 2019).

⁴⁵ EA Catchment Data Explorer website. <https://environment.data.gov.uk/catchment-planning/WaterBody/GB105033042750> (last accessed April 2019).

There are no superficial deposits underlying the proposed site by J11 of the M11.

Along the River Cam there is Alluvium, characterised by clays, silt and sands.

9.5.2.2 Bedrock Geology

The entire study area (both for a proposed site by J11 of the M11 and the existing Trumpington P&R) is at the northern limit of the outcropping West Melbury Marly Chalk Formation which dips away to the south-south east. The West Melbury Marly Chalk Formation is part of the Grey Chalk Subgroup⁴⁶. This formation is characterised as “buff, grey and off-white, soft, marly chalk and hard grey limestone”. This formation is defined as a Principal Aquifer by the Environment Agency. Principal aquifers are designated as strategically important rock units that have high permeability and water storage capacity.

There is a boundary between the chalk and the Gault Formation roughly along the alignment of the River Cam to the west of the study area. The Gault Formation underlies the West Melbury Marly Chalk Formation and dips to the south and south east. It is characterised as “pale to dark grey or blue-grey clay or mudstone, glauconitic in part, with a sandy base”.

9.5.2.3 Source Protection Zones

Source Protection Zones (SPZ) are identified by the Environment Agency around public water supply abstractions from groundwater. There are numerous SPZ to the south and south east of the study area which are located around abstractions sited on White Chalk Subgroup which overlies the West Melbury Marly Chalk Formation. SPZ have three zones as follows:

- SPZ1 – inner source protection zone indicating travel time of less than 50 days to the point of abstraction.
- SPZ2 – outer source protection zone indicating travel time of 400 days to 50 days to the point of abstraction.
- SPZ3 – total catchment zone indicating the whole groundwater catchment likely to be supplying the abstraction.

None of the SPZ3 boundaries extend much into the outcropping West Melbury Marly Chalk Formation, indicating this formation is not likely to contribute any significant flow to groundwater abstractions in the area. Consequently none of the SPZs extend into the study area.

9.6 Results of Assessment

A summary of the assessment is presented here, however more details on the assessment of the potential effects of the options can be found in the Water WebTAG worksheets in Appendix G.

In completing the assessment the features in each option were assessed as being of medium or lower value. The magnitude of impact from the options were all identified as negligible as there were no direct impacts on the features of the water resources, except in the case of potential tunnel access under the A10 (options Cyan, Purple, White). Where a tunnel is required there is the potential for groundwater to be encountered at shallow depth. However, it is understood the tunnel would be a sealed unit resulting in negligible risk of quality impacts from road runoff, and the scale would not create any significant change in groundwater flow. Therefore the proposed scheme is unlikely to result in significant impacts on water resources for all options considered.

⁴⁶ British Geological Survey website. <https://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=WMCH> (last accessed April 2019).

For the purpose of the assessment it was assumed that all P&R drainage would be discharged to a SuDS system with appropriate pollution control measures. The design capacity and discharges would be managed to minimise flood risks and risks to water quality. These assumptions are considered reasonable as the drainage from any option will require approval by the local lead flood authority.

10 AST

This section presents a summary of the WebTAG worksheets for each option (Tables 14 to 19) which include a short description of the overall impact, an assessment of the magnitude of the potential impact and a rating. Table 20 presents a comparison of the different options based on their magnitude and rating.

Table 14. Summary of the WebTAG worksheets for the Cyan option

Disciplines	Overall potential impact	Magnitude of potential impact	Rating
Air quality	Relatively small affected road network and causes more improvements in air quality than deteriorations.	Neutral	0
Biodiversity	Moderate adverse impacts due to the potential impact on waterbodies, the presence of native hedgerows and the potential for protected species.	Moderate adverse	-2
Greenhouse gases	Small increase in total vehicles, however also in increase in average speeds which suggests a more constant flow of traffic, which could slightly improved GHG emissions. Without a full assessment of modelled traffic data, negligible impact at this stage.	Neutral	0
Historic environment	Moderate adverse impacts due to the potential impact on archaeological remains.	Moderate adverse	-2
Landscape	Moderate adverse impacts due to the proposed site to be located in arable fields, the introduction of a new source of lighting, the addition of a new junction on the A10 and a road tunnel under the A10. And while the proposed landscape mitigation would in time screen the site, buses using the accommodation bridge would remain prominent in the landscape.	Moderate adverse	-2
Noise	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.	Slight adverse	-1
Water	Negligible impact on water resources.	Neutral	0

Table 15. Summary of the WebTAG worksheets for the White option

Disciplines	Overall potential impact	Magnitude of potential impact	Rating
Air quality	Relatively small affected road network and causes more improvements in air quality than deteriorations.	Neutral	0
Biodiversity	Moderate adverse impacts due to the potential impact on waterbodies, the presence of native hedgerows and the potential for protected species.	Moderate adverse	-2
Greenhouse gases	Small increase in total vehicles, and decrease in average speeds which suggests a less constant flow of traffic, which could slightly worsen GHG emissions. Without a full assessment of modelled traffic data, negligible impact at this stage.	Neutral	0
Historic environment	Moderate adverse impacts due to the potential impact on archaeological remains.	Moderate adverse	-2
Landscape	Moderate adverse impacts due to the proposed site to be located in arable fields, the introduction of a new source of lighting, the addition of a new junction on the A10 and a road tunnel under the A10. And while the proposed landscape mitigation would in time screen the site, buses using the accommodation bridge would remain prominent in the landscape.	Moderate adverse	-2
Noise	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.	Slight adverse	-1
Water	Negligible impact on water resources.	Neutral	0

Table 16. Summary of the WebTAG worksheets for the Yellow option

Disciplines	Overall potential impact	Magnitude of potential impact	Rating
Air quality	Relatively small affected road network and causes more improvements in air quality than deteriorations.	Neutral	0
Biodiversity	Moderate adverse impacts due to the potential impact on waterbodies, the presence of native hedgerows and the potential for protected species.	Moderate adverse	-2
Greenhouse gases	Greatest increase of all options in total vehicles, and greatest decrease in average speeds which suggests a less constant flow of traffic, which could slightly worsen GHG emissions. Without a full assessment of modelled traffic data, negligible impact at this stage.	Neutral	0
Historic environment	Moderate adverse impacts due to the potential impact on archaeological remains.	Moderate adverse	-2
Landscape	Moderate adverse impacts due to the proposed site to be located in arable fields, the introduction of a new source of lighting and the addition of a new junction on the A10. And while the proposed landscape mitigation would in time screen the site, buses using the accommodation bridge would remain prominent in the landscape.	Moderate adverse	-2
Noise	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.	Slight adverse	-1
Water	Negligible impact on water resources.	Neutral	0

Table 17. Summary of the WebTAG worksheets for the Purple option

Disciplines	Overall potential impact	Magnitude of potential impact	Rating
Air quality	Relatively large affected road network and causes more improvements in air quality than deteriorations.	Neutral	0
Biodiversity	Moderate adverse impacts due to the potential impact on waterbodies, the presence of native hedgerows and the potential for protected species.	Moderate adverse	-2
Greenhouse gases	Small increase in total vehicles, and decrease in average speeds which suggests a less constant flow of traffic, which could slightly worsen GHG emissions. Without a full assessment of modelled traffic data, negligible impact at this stage.	Neutral	0
Historic environment	Moderate adverse impacts due to the potential impact on archaeological remains.	Moderate adverse	-2
Landscape	Slight adverse impacts due to the proposed site to be located in arable fields, the introduction of a new source of lighting, the construction of a structure across J11 and the addition of a junction on the A10 and a road tunnel under the A10. The proposed landscape mitigation would in time screen the site	Slight adverse	-1
Noise	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.	Slight adverse	-1
Water	Negligible impact on water resources.	Neutral	0

Table 18. Summary of the WebTAG worksheets for the Purple with CAP option

Disciplines	Overall potential impact	Magnitude of potential impact	Rating
Air quality	Relatively large affected road network and causes more improvements in air quality than deteriorations.	Neutral	0
Biodiversity	Moderate adverse impacts due to the potential impact on waterbodies, the presence of native hedgerows and the potential for protected species.	Moderate adverse	-2
Greenhouse gases	Decrease in total vehicles, and increase in average speeds which suggests a better constant flow of traffic, which could slightly improve GHG emissions. With the addition of CAP there is a large increase of HGVs. Without a full assessment of modelled traffic data, slight adverse impact at this stage.	Slight adverse	-1
Historic environment	Moderate adverse impacts due to the potential impact on archaeological remains.	Moderate adverse	-2
Landscape	Slight adverse impacts due to the proposed site to be located in arable fields, the introduction of a new source of lighting, the construction of a structure across J11 and the addition of a junction on the A10 and a road tunnel under the A10. The proposed landscape mitigation would in time screen the site	Slight adverse	-1
Noise	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.	Slight adverse	-1
Water	Negligible impact on water resources.	Neutral	0

Table 19. Summary of the WebTAG worksheets for the Magenta option

Disciplines	Overall potential impact	Magnitude of potential impact	Rating
Air quality	Option with the largest affected road network of all the options and therefore affects the most receptors with more improvements in air quality than deteriorations, however the magnitude of the potential impact remains similar.	Neutral	0
Biodiversity	Slight adverse impacts due to the northern edge of the site being adjacent to the country park and the potential impact habitats (semi-improved grassland and dense scrub).	Slight adverse	-1
Greenhouse gases	Smallest increase of all options in total vehicles, and decrease in average speeds which suggests a less constant flow of traffic, which could slightly worsen GHG emissions. Without a full assessment of modelled traffic data, negligible impact at this stage.	Neutral	0
Historic environment	Slight adverse impacts due to the potential for associated remains to be present within the footprint of the option.	Slight adverse	-1
Landscape	Slight adverse impacts due to the construction of a car park on a an existing landscaped, surface level car park.	Slight adverse	-1
Noise	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.	Slight adverse	-1
Water	Negligible impact on water resources.	Neutral	0

Table 20. Comparison of the options

	Cyan		White		Yellow		Purple		Magenta	
Disciplines	Magnitude of potential impact	Rating	Magnitude of potential impact	Rating	Magnitude of potential impact	Rating	Magnitude of potential impact	Rating	Magnitude of potential impact	Rating
Air quality	Neutral	0	Neutral	0	Neutral	0	Neutral	0	Neutral	0
Biodiversity	Moderate adverse	-2	Moderate adverse	-2	Moderate adverse	-2	Moderate adverse	-2	Slight adverse	-1
Greenhouse gases	Neutral	0	Neutral	0	Neutral	0	Neutral	0	Neutral	0
Historic environment	Moderate adverse	-2	Moderate adverse	-2	Moderate adverse	-2	Moderate adverse	-2	Slight adverse	-1
Landscape	Moderate adverse	-2	Moderate adverse	-2	Moderate adverse	-2	Slight adverse	-1	Slight adverse	-1
Noise	Slight adverse	-1	Slight adverse	-1	Slight adverse	-1	Slight adverse	-1	Slight adverse	-1
Water	Neutral	0	Neutral	0	Neutral	0	Neutral	0	Neutral	0
Total		-7		-7		-7		-6		-4

11 Glossary

Acronym	Meaning
AADT	Annual average daily traffic
AAWT	Annual Average Weekly Traffic
AQMA	Air Quality Management Area
ARN	Affected road network
BAP	Biodiversity Action Plan
BCR	Benefit Cost Ratio
CAP	City Access Penalty
CCC	Cambridge City Council
CHER	Cambridgeshire Historic Environment Record
CO ₂	Carbon dioxide
CSRM2	Cambridge Sub Regional Model
CSWPR	Cambridge South West Park and Ride
EAR	Environmental Appraisal Report
EPR	Environmental Permitting Regulations
GCP	Greater Cambridge Partnership
GHG	Greenhouse gases
HGV	Heavy Goods Vehicles (including buses)
J10, J11, J12	Junction 10, Junction 11, Junction 12
LNR	Local Nature Reserve
NHLE	National Heritage List for England
NPPF	National Planning Policy Framework
NO ₂	Nitrogen dioxide
OBC	Outline Business Case
PCM	Pollution Climate Mapping
P&R	Park and Ride
PM _{2.5} , PM ₁₀	Particulate matter with an aerodynamic diameter of less than 2.5 (PM _{2.5}) or 10 (PM ₁₀) microns
SCDC	South Cambridgeshire District Council

SPZ	Source Protection Zone
SuDS	Sustainable Drainage Systems
WRA	Water Resources Act
Zol	Zone of influence

A. Air Quality

Appraisal Summary Table

Date produced:

Contact:

Name of scheme:		CSWPR – Cyan option				Name		
Description of scheme:		Cyan is one of four schemes that contains an additional Park and Ride site west of J11 of the M11. Cyan makes use of an existing accommodation bridge to the north for buses to cross the motorway. Here, buses can cross the M11 as part of a two-way bus lane, before heading south and travelling parallel to the existing road network towards Trumpington. Vehicles approaching Junction 11 Northbound on the M11 enter the new site via a dedicated access lane which passes through a tunnel running under the A10. Traffic can also exit via this tunnel and join a dedicated exit lane which merges with the A10 heading westbound. For traffic wishing to enter or exit the new site via the A10 Eastbound there is a dedicated off-slip and on-slip located further to the south				Organisation		
						Role	Promoter/Official	
Impacts		Summary of key impacts		Assessment				
				Quantitative		Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers			Value of journey time changes(£)				
	Net journey time changes (£)							
	0 to 2min			2 to 5min	> 5min			
	Reliability impact on Business users							
	Regeneration							
	Wider Impacts							
Environmental	Noise							
	Air Quality	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. Cambridge City Council undertake passive monitoring along Trumpington road which demonstrate an annual mean NO2 concentration of 25 µg/m3. This 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 on the A1134 from southern tip of the Cambridge AQMA to Long Road. 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, this option has a relatively small affected road network and causes more improvements in air quality than deteriorations.		Local air quality effects at properties (improvement/Deterioration) (567/178)				
	Greenhouse gases			Change in non-traded carbon over 60y (CO2e)				
				Change in traded carbon over 60y (CO2e)				
	Landscape							
	Townscape							
	Historic Environment							
	Biodiversity							
	Water Environment							
Social	Commuting and Other users			Value of journey time changes(£)				
	Net journey time changes (£)							
	0 to 2min			2 to 5min	> 5min			
	Reliability impact on Commuting and Other users							
	Physical activity							
	Journey quality							
	Accidents							
	Security							
	Access to services							
	Affordability							
	Severance							
	Option and non-use values							
Public Account	Cost to Broad Transport Budget							
	Indirect Tax Revenues							

Appraisal Summary Table					Date produced:		Contact:	
Name of scheme:		CSWPR - White option					Name	
Description of scheme:		The white scheme proposes a similar access strategy to purple with the new site. Vehicles approaching Junction 11 Northbound on the M11 enter the new site via a tunnel. Whilst all other traffic enters and exits the site via the proposed signal-controlled junction					Organisation	
							Role	
							Promoter/Official	
Impacts		Summary of key impacts		Assessment				
				Quantitative		Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers			Value of journey time changes(£)				
				Net journey time changes (£)				
				0 to 2min	2 to 5min	> 5min		
	Reliability impact on Business users							
	Regeneration							
	Wider Impacts							
Environmental	Noise							
	Air Quality	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 between southern tip of the Cambridge AQMA and Long Road. There is an increase in vehicle movements on Church Road through Hauxton. 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, this option has a relatively small affected road network and causes more improvements than deteriorations.		Local Air quality effects at properties (Improvements / Deterioration) (482/459)				
	Greenhouse gases			Change in non-traded carbon over 60y (CO2e)				
				Change in traded carbon over 60y (CO2e)				
	Landscape							
	Townscape							
	Historic Environment							
	Biodiversity							
Social	Water Environment							
	Commuting and Other users			Value of journey time changes(£)				
				Net journey time changes (£)				
				0 to 2min	2 to 5min	> 5min		
	Reliability impact on Commuting and Other users							
	Physical activity							
	Journey quality							
	Accidents							
	Security							
Public Account	Access to services							
	Affordability							
	Severance							
	Option and non-use values							
	Cost to Broad Transport Budget							
	Indirect Tax Revenues							

Appraisal Summary Table				Date produced:			Contact:			
Name of scheme:		CSWPR - Yellow option						Name		
Description of scheme:		Yellow includes an additional signalised egress for all traffic wishing to exit the site and head westbound on the A10.Traffic wishing to enter the site from junction 11 or the A10 use the new signalised junction south of the site together with traffic exiting the site and travelling back towards junction 11						Organisation		
								Role	Promoter/Official	
Impacts		Summary of key impacts		Assessment						
				Quantitative			Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
Economy	Business users & transport providers			Value of journey time changes(£)						
	Net journey time changes (£)									
	0 to 2min			2 to 5min	> 5min					
	Reliability impact on Business users									
	Regeneration									
	Wider Impacts									
Environmental	Noise									
	Air Quality	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 flows 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 also an increase in vehicles between M11 Junction 11 and Junction 12, however no receptors are within 200m of this location. 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 24.8µg/m3 in the opening year. This option is therefore unlikely to cause non-compliance with the EU Air Quality Directive Limit Value. Overall, this option has a relatively small affected road network and causes more improvements in air quality than deteriorations.		Local Air Quality effects at properties (improvements/ Deterioration) (563/2)						
	Greenhouse gases			Change in non-traded carbon over 60y (CO2e)						
			Change in traded carbon over 60y (CO2e)							
		Landscape								
		Townscape								
		Historic Environment								
		Biodiversity								
	Water Environment									
Social	Commuting and Other users			Value of journey time changes(£)						
	Net journey time changes (£)									
	0 to 2min			2 to 5min	> 5min					
		Reliability impact on Commuting and Other users								
		Physical activity								
		Journey quality								
		Accidents								
		Security								
		Access to services								
Public Account	Affordability									
	Severance									
	Option and non-use values									
	Cost to Broad Transport Budget									
	Indirect Tax Revenues									

Appraisal Summary Table

Date produced:

Contact:

Name of scheme:		CSWPR – Purple option				Name	
Description of scheme:		Buses travel through the existing Junction 11 roundabout on a new bridge, with their own dedicated signal stage. Vehicles approaching Junction 11 Northbound				Organisation	
						Role	Promoter/Official
Impacts		Summary of key impacts	Assessment				
			Quantitative			Qualitative	Monetary £(NPV)
							Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers		Value of journey time changes(£)				
			Net journey time changes (£)				
			0 to 2min	2 to 5min	> 5min		
	Reliability impact on Business users						
	Regeneration						
	Wider Impacts						
Environmental	Noise						
	Air Quality	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 AQMA's within the schemes Affected Road Network (ARN). There is a decrease in flows 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 M11 J11 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 M11 J11. 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, this option has a relatively large affected road network and causes more improvements in air quality than deteriorations.	Local air quality effects at properties (improvement/ Deterioration) (767/99)				
	Greenhouse gases		Change in non-traded carbon over 60y (CO2e)				
			Change in traded carbon over 60y (CO2e)				
	Landscape						
	Townscape						
	Historic Environment						
	Biodiversity						
Social	Water Environment						
	Commuting and Other users		Value of journey time changes(£)				
			Net journey time changes (£)				
			0 to 2min	2 to 5min	> 5min		
	Reliability impact on Commuting and Other users						
	Physical activity						
	Journey quality						
	Accidents						
	Security						
Public Account	Access to services						
	Affordability						
	Severance						
	Option and non-use values						
Public Account	Cost to Broad Transport Budget						
	Indirect Tax Revenues						

Appraisal Summary Table					Date produced:		Contact:			
Name of scheme:		CSWPR – Purple option with CAP					Name			
Description of scheme:		Buses travel through the existing Junction 11 roundabout on a new bridge, with their own dedicated signal stage. Vehicles approaching Junction 11 Northbound on the M11 enter the new site via a dedicated access lane which passes through a tunnel running under the A10. To the south there is a new					Organisation			
							Role	Promoter/Official		
Impacts		Summary of key impacts		Assessment						
				Quantitative			Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
Economy	Business users & transport providers			Value of journey time changes(£)						
				Net journey time changes (£)						
				0 to 2min	2 to 5min	> 5min				
	Reliability impact on Business users									
	Regeneration									
	Wider Impacts									
Environmental	Noise									
	Air Quality	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. There is 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, this option has a relatively large affected road network and causes more deteriorations than improvements.		Local air quality effects at properties (improvement/ Deterioration) (135/771)						
	Greenhouse gases			Change in non-traded carbon over 60y (CO2e)						
				Change in traded carbon over 60y (CO2e)						
	Landscape									
	Townscape									
	Historic Environment									
	Biodiversity									
	Water Environment									
Social	Commuting and Other users			Value of journey time changes(£)						
				Net journey time changes (£)						
				0 to 2min	2 to 5min	> 5min				
		Reliability impact on Commuting and Other users								
		Physical activity								
		Journey quality								
		Accidents								
		Security								
		Access to services								
	Affordability									
	Severance									
	Option and non-use values									
Public Account	Cost to Broad Transport Budget									
	Indirect Tax Revenues									

Appraisal Summary Table					Date produced:		Contact:		
Name of scheme:		CSWPR - Magenta option					Name		
Description of scheme:		Magenta assumes expansion of the existing site through the implementation of decked parking, and an improved system of on-slips at Junction 11. Magenta					Organisation		
							Role		
							Promoter/Official		
Impacts		Summary of key impacts	Assessment						
			Quantitative			Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp	
Economy	Business users & transport providers		Value of journey time changes(£)						
			Net journey time changes (£)						
			0 to 2min	2 to 5min	> 5min				
	Reliability impact on Business users								
	Regeneration								
	Wider Impacts								
Environmental	Noise								
	Air Quality	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 AQMA and Long Road. There is an increase in vehicles movements along Church Road through Hauxton and on the M11 bewteen Junction 11 and Junction 10. 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, this 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.	Local air quality effects at properties (improvement/Deterioration) (716/576)						
	Greenhouse gases		Change in non-traded carbon over 60y (CO2e)						
			Change in traded carbon over 60y (CO2e)						
		Landscape							
		Townscape							
		Historic Environment							
		Biodiversity							
	Water Environment								
Social	Commuting and Other users		Value of journey time changes(£)						
			Net journey time changes (£)						
			0 to 2min	2 to 5min	> 5min				
	Reliability impact on Commuting and Other users								
	Physical activity								
	Journey quality								
	Accidents								
	Security								
	Access to services								
Affordability									
Severance									
Option and non-use values									
Public Account	Cost to Broad Transport Budget								
	Indirect Tax Revenues								

B. Biodiversity

TAG Biodiversity Impacts Worksheet - Cyan option

Step 2		Step 3				Step 4	Step 5
Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment Score
Byron's Pool Local Nature Reserve	652m north, the site includes woodland and small ponds managed for amphibians.	County	Medium		Medium	Neutral	Neutral
Trumpington Meadows Country Park	Northern edge of development site is within the country park. It is managed grassland with grazing and hay cutting with areas of broad-leaved woodland. Species occurring here include kingfisher (Alcedo atthis), otter (Lutra lutra), broad-bodied chaser (Libellula depressa) and adder's-tongue fern (Ophioglossum vulgatum).	County	Medium		Medium	Minor negative	Slight adverse
River Cam County Wildlife Site	174m west of development site. A major river (together with adjacent semi-natural habitat) that has not been grossly modified by canalisation and/or poor water quality. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Old Mill Plantation City Wildlife Site	105m north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
River Rhee County Wildlife Site	A major river not grossly modified by pollution or canalisation. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Granchester Road Plantations City Wildlife Site	1.1km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Eight Acre Wood and Seven Acres Wood City Wildlife Site	1.9km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Cyan potential P&R site.	Arable fields.	Local	Low		Low	Minor negative	Slight adverse
Cyan potential P&R site.	Semi-improved grassland field margins.	Local	Low		Low	Minor negative	Slight adverse
Cyan potential P&R site.	Dense scrub.	Local	Low		Low	Minor negative	Slight adverse
Cyan potential P&R site.	Scattered trees.	Local	Low		Low	Minor negative	Slight adverse
Cyan potential P&R site.	Semi-natural broadleaved woodland, which is a priority habitat on the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Cyan potential P&R site.	Four waterbodies, of which one is within the footprint. Ponds are a priority habitat on the Cambridgeshire and Peterborough BAP and are also likely to be Section 41 habitats.	County	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Species-poor native hedgerows (Section 41 habitats of principal importance). All native hedgerows are also Section 41 habitats of principal importance.	County	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Tall ruderal.	Local	Low		Low	Minor negative	Slight adverse
Cyan potential P&R site.	Hardstanding	Local	Negligible		Low	Neutral	Neutral
Cyan potential P&R site.	Potential for breeding birds listed on Section 41 or Red Listed Birds of Conservation Concern.	County	High		High	Minor negative	Slight adverse
Cyan potential P&R site.	Potential for breeding birds listed on Section 41 or Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Minor negative	Slight adverse
Cyan potential P&R site.	Potential for breeding birds listed on Section 41 or Green Listed Birds of Conservation Concern.	Local	Low		Low	Minor negative	Slight adverse
Cyan potential P&R site.	Potential for wintering bird species listed on Section 41 or as Red Listed Birds of Conservation Concern.	County	High		High	Minor negative	Slight adverse
Cyan potential P&R site.	Potential for wintering bird species listed on Section 41 or as Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Minor negative	Slight adverse
Cyan potential P&R site.	Potential for wintering bird species listed on Section 41 or as Green Listed Birds of Conservation Concern.	Local	Low		Low	Minor negative	Slight adverse
Cyan potential P&R site.	Potential for roosting bats in scattered trees and trees within woodland. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Major negative	Moderate adverse
Cyan potential P&R site.	Potential for commuting bats along hedgerows, scrub, trees and woodland features. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Potential for foraging bats along hedgerows, scrub, trees and woodland features and over waterbodies. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Potential for badger setts, badger foraging and commuting habitat.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Potential for badger foraging habitat in woodlands and scrub.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Potential for badger commuting habitat along hedgerows and woodland and field edges.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Potential for otters in waterbodies. Listed on Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Potential for water vole in waterbodies. Listed on Section 41 of the NERC Act and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Brown hare. They are listed on Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Cyan potential P&R site.	Hedgehog. Listed on Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Cyan potential P&R site.	Potential for great crested newt breeding in waterbodies. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Potential for great crested newt refuges in woodland, hedgerow and scrub habitats. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Cyan potential P&R site.	Potential for widespread reptiles in the semi-improved grassland, hedgerows, scrub and tall ruderal vegetation. Reptiles are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	Local	Low		Low	Minor negative	Slight adverse

Reference Sources

Preliminary Ecological Appraisal, including a Phase 1 Habitat Survey of the site and a desk study, of the proposed park and ride, Mott MacDonald, 2019.

Summary Assessment Score

Moderate adverse effect.

Qualitative Comments

The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance. The features have been assessed without consideration of potential mitigation options.

TAG Biodiversity Impacts Worksheet - **White option**

Step 2		Step 3				Step 4	Step 5
Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment Score
Byron's Pool Local Nature Reserve	652m north, the site includes woodland and small ponds managed for amphibians.	County	Medium		Medium	Neutral	Neutral
Trumpington Meadows Country Park	Northern edge of development site is within the country park. It is managed grassland with grazing and hay cutting with areas of broad-leaved woodland. Species occurring here include kingfisher (Alcedo atthis), otter (Lutra lutra), broad-bodied chaser (Libellula depressa) and adder's-tongue fern (Ophioglossum vulgatum).	County	Medium		Medium	Minor negative	Slight adverse
River Cam County Wildlife Site	174m west of development site. A major river (together with adjacent semi-natural habitat) that has not been grossly modified by canalisation and/or poor water quality. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Old Mill Plantation City Wildlife Site	105m north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
River Rhee County Wildlife Site	740m west. A major river not grossly modified by pollution or canalisation. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Granchester Road Plantations City Wildlife Site	1.1km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Eight Acre Wood and Seven Acres Wood City Wildlife Site	1.9km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
White potential P&R site.	Arable fields.	Local	Low		Low	Minor negative	Slight adverse
White potential P&R site.	Semi-improved grassland field margins.	Local	Low		Low	Minor negative	Slight adverse
White potential P&R site.	Dense scrub.	Local	Low		Low	Minor negative	Slight adverse
White potential P&R site.	Scattered trees.	Local	Low		Low	Minor negative	Slight adverse
White potential P&R site.	Semi-natural broadleaved woodland, which is a priority habitat on the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
White potential P&R site.	Four waterbodies, of which one is within the footprint. Ponds are a priority habitat on the Cambridgeshire and Peterborough BAP and are also likely to be Section 41 habitats.	County	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Species-poor native hedgerows (Section 41 habitats of principal importance). All native hedgerows are also Section 41 habitats of principal importance.	County	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Tall ruderal.	Local	Low		Low	Minor negative	Slight adverse
White potential P&R site.	Hardstanding	Local	Negligible		Low	Neutral	Neutral
White potential P&R site.	Potential for breeding birds listed on Section 41 or Red Listed Birds of Conservation Concern.	County	High		High	Minor negative	Slight adverse
White potential P&R site.	Potential for breeding birds listed on Section 41 or Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Minor negative	Slight adverse
White potential P&R site.	Potential for breeding birds listed on Section 41 or Green Listed Birds of Conservation Concern.	County	Low		Low	Minor negative	Slight adverse
White potential P&R site.	Potential for wintering bird species listed on Section 41 or as Red Listed Birds of Conservation Concern.	County	High		High	Minor negative	Slight adverse
White potential P&R site.	Potential for wintering bird species listed on Section 41 or as Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Minor negative	Slight adverse
White potential P&R site.	Potential for wintering bird species listed on Section 41 or as Green Listed Birds of Conservation Concern.	County	Low		Low	Minor negative	Slight adverse
White potential P&R site.	Potential for roosting bats in scattered trees and trees within woodland. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Major negative	Moderate adverse
White potential P&R site.	Potential for commuting bats along hedgerows, scrub, trees and woodland features. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Potential for foraging bats along hedgerows, scrub, trees and woodland features and over waterbodies. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Potential for badger setts, badger foraging and commuting habitat.	Local	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Potential for badger foraging habitat in woodlands and scrub.	Local	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Potential for badger commuting habitat along hedgerows and woodland and field edges.	Local	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Potential for otters in waterbodies. Listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Potential for water vole in waterbodies. Listed on Section 41 of the NERC Act and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Brown hare. They are listed on Section 41 of the NERC Act 2006 and are priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
White potential P&R site.	Hedgehog. Listed on Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
White potential P&R site.	Potential for great crested newt breeding in waterbodies. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Potential for great crested newt refuges in woodland, hedgerow and scrub habitats. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
White potential P&R site.	Potential for widespread reptiles in the semi-improved grassland, hedgerows, scrub and tall ruderal vegetation. Reptiles are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	Local	Low		Low	Minor negative	Slight adverse

Reference Sources

Preliminary Ecological Appraisal, including a Phase 1 Habitat Survey of the site and a desk study, of the proposed park and ride, Mott MacDonald, 2019.

Summary Assessment Score

Moderate adverse effect.

Qualitative Comments

The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance. The features have been assessed without consideration of potential mitigation options.

TAG Biodiversity Impacts Worksheet - Yellow option

Step 2		Step 3				Step 4	Step 5
Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment Score
Byron's Pool Local Nature Reserve	652m north, the site includes woodland and small ponds managed for amphibians.	County	Medium		Medium	Neutral	Neutral
Trumpington Meadows Country Park	Northern edge of development site is within the country park. It is managed grassland with grazing and hay cutting with areas of broad-leaved woodland. Species occurring here include kingfisher (Alcedo atthis), otter (Lutra lutra), broad-bodied chaser (Libellula depressa) and adder's-tongue fern (Ophioglossum vulgatum).	County	Medium		Medium	Minor negative	Slight adverse
River Cam County Wildlife Site	174m west of development site. A major river (together with adjacent semi-natural habitat) that has not been grossly modified by canalisation and/or poor water quality. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Old Mill Plantation City Wildlife Site	105m north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
River Rhee County Wildlife Site	740m west. A major river not grossly modified by pollution or canalisation. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Granchester Road Plantations City Wildlife Site	1.1km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Eight Acre Wood and Seven Acres Wood City Wildlife Site	1.9km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Yellow potential P&R site.	Arable fields.	Local	Low		Low	Minor negative	Slight adverse
Yellow potential P&R site.	Semi-improved grassland field margins.	Local	Low		Low	Minor negative	Slight adverse
Yellow potential P&R site.	Dense scrub.	Local	Low		Low	Minor negative	Slight adverse
Yellow potential P&R site.	Scattered trees.	Local	Low		Low	Minor negative	Slight adverse
Yellow potential P&R site.	Semi-natural broadleaved woodland, which is a priority habitat on the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Yellow potential P&R site.	Four waterbodies, of which one is within the footprint. Ponds are a priority habitat on the Cambridgeshire and Peterborough BAP and are also likely to be Section 41 habitats.	County	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Species-poor native hedgerows (Section 41 habitats of principal importance). All native hedgerows are also Section 41 habitats of principal importance.	County	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Tall ruderal.	Local	Low		Low	Minor negative	Slight adverse
Yellow potential P&R site.	Hardstanding	Local	Negligible		Low	Neutral	Neutral
Yellow potential P&R site.	Potential for breeding birds listed on Section 41 or Red Listed Birds of Conservation Concern.	County	High		High	Minor negative	Slight adverse
Yellow potential P&R site.	Potential for breeding birds listed on Section 41 or Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Minor negative	Slight adverse
Yellow potential P&R site.	Potential for breeding birds listed on Section 41 or Green Listed Birds of Conservation Concern.	County	Low		Low	Minor negative	Slight adverse
Yellow potential P&R site.	Potential for wintering bird species listed on Section 41 or as Red Listed Birds of Conservation Concern.	County	High		High	Minor negative	Slight adverse
Yellow potential P&R site.	Potential for wintering bird species listed on Section 41 or as Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Minor negative	Slight adverse
Yellow potential P&R site.	Potential for wintering bird species listed on Section 41 or as Green Listed Birds of Conservation Concern.	County	Low		Low	Minor negative	Slight adverse
Yellow potential P&R site.	Potential for roosting bats in scattered trees and trees within woodland. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Major negative	Moderate adverse
Yellow potential P&R site.	Potential for commuting bats along hedgerows, scrub, trees and woodland features. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Potential for foraging bats along hedgerows, scrub, trees and woodland features and over waterbodies. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Potential for badger setts, badger foraging and commuting habitat.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Potential for badger foraging habitat in woodlands and scrub.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Potential for badger commuting habitat along hedgerows and woodland and field edges.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Potential for otters in waterbodies. Listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Potential for water vole in waterbodies. Listed on Section 41 of the NERC Act and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Brown hare. They are listed on Section 41 of the NERC Act 2006 and are priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Yellow potential P&R site.	Hedgehog. Listed on Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Yellow potential P&R site.	Potential for great crested newt breeding in waterbodies. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Potential for great crested newt refuges in woodland, hedgerow and scrub habitats. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Yellow potential P&R site.	Potential for widespread reptiles in the semi-improved grassland, hedgerows, scrub and tall ruderal vegetation. Reptiles are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	Local	Low		Low	Minor negative	Slight adverse

Reference Sources

Preliminary Ecological Appraisal, including a Phase 1 Habitat Survey of the site and a desk study, of the proposed park and ride, Mott MacDonald, 2019.

Summary Assessment Score

Moderate adverse effect.

Qualitative Comments

The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance. The features have been assessed without consideration of potential mitigation options.

TAG Biodiversity Impacts Worksheet - Purple option

Step 2		Step 3				Step 4	Step 5
Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment Score
Byron's Pool Local Nature Reserve	652m north, the site includes woodland and small ponds managed for amphibians.	County	Medium		Medium	Neutral	Neutral
Trumpington Meadows Country Park	Northern edge of development site is within the country park. It is managed grassland with grazing and hay cutting with areas of broad-leaved woodland. Species occurring here include kingfisher (Alcedo atthis), otter (Lutra lutra), broad-bodied chaser (Libellula depressa) and adder's-tongue fern (Ophioglossum vulgatum).	County	Medium		Medium	Minor negative	Slight adverse
River Cam County Wildlife Site	174m west of development site. A major river (together with adjacent semi-natural habitat) that has not been grossly modified by canalisation and/or poor water quality. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Old Mill Plantation City Wildlife Site	105m north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
River Rhee County Wildlife Site	740m west. A major river not grossly modified by pollution or canalisation. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Granchester Road Plantations City Wildlife Site	1.1km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Eight Acre Wood and Seven Acres Wood City Wildlife Site	1.9km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Purple potential P&R site.	Arable fields.	Local	Low		Low	Minor negative	Slight adverse
Purple potential P&R site.	Semi-improved grassland field margins.	Local	Low		Low	Minor negative	Slight adverse
Purple potential P&R site.	Dense scrub.	Local	Low		Low	Minor negative	Slight adverse
Purple potential P&R site.	Scattered trees.	Local	Low		Low	Minor negative	Slight adverse
Purple potential P&R site.	Semi-natural broadleaved woodland, which is a priority habitat on the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Purple potential P&R site.	Four waterbodies, of which one is within the footprint. Ponds are a priority habitat on the Cambridgeshire and Peterborough BAP and are also likely to be Section 41 habitats.	County	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Species-poor native hedgerows (Section 41 habitats of principal importance). All native hedgerows are also Section 41 habitats of principal importance.	County	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Tall ruderal.	Local	Low		Low	Minor negative	Slight adverse
Purple potential P&R site.	Hardstanding	Local	Negligible		Low	Neutral	Neutral
Purple potential P&R site.	Potential for breeding birds listed on Section 41 or Red Listed Birds of Conservation Concern.	County	High		High	Minor negative	Slight adverse
Purple potential P&R site.	Potential for breeding birds listed on Section 41 or Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Minor negative	Slight adverse
Purple potential P&R site.	Potential for breeding birds listed on Section 41 or Green Listed Birds of Conservation Concern.	County	Low		Low	Minor negative	Slight adverse
Purple potential P&R site.	Potential for wintering bird species listed on Section 41 or as Red Listed Birds of Conservation Concern.	County	High		High	Minor negative	Slight adverse
Purple potential P&R site.	Potential for wintering bird species listed on Section 41 or as Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Minor negative	Slight adverse
Purple potential P&R site.	Potential for wintering bird species listed on Section 41 or as Green Listed Birds of Conservation Concern.	County	Low		Low	Minor negative	Slight adverse
Purple potential P&R site.	Potential for roosting bats in scattered trees and trees within woodland. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Major negative	Moderate adverse
Purple potential P&R site.	Potential for commuting bats along hedgerows, scrub, trees and woodland features. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Potential for foraging bats along hedgerows, scrub, trees and woodland features and over waterbodies. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Potential for badger setts, badger foraging and commuting habitat.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Potential for badger foraging habitat in woodlands and scrub.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Potential for badger commuting habitat along hedgerows and woodland and field edges.	Local	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Potential for otters in waterbodies. Listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Potential for water vole in waterbodies. Listed on Section 41 of the NERC Act and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Brown hare. They are listed on Section 41 of the NERC Act 2006 and are priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Purple potential P&R site.	Hedgehog. Listed on Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Minor negative	Slight adverse
Purple potential P&R site.	Potential for great crested newt breeding in waterbodies. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Potential for great crested newt refuges in woodland, hedgerow and scrub habitats. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Intermediate negative	Moderate adverse
Purple potential P&R site.	Potential for widespread reptiles in the semi-improved grassland, hedgerows, scrub and tall ruderal vegetation. Reptiles are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	Local	Low		Low	Minor negative	Slight adverse

Reference Sources

Preliminary Ecological Appraisal, including a Phase 1 Habitat Survey of the site and a desk study, of the proposed park and ride, Mott MacDonald, 2019.

Summary Assessment Score

Moderate adverse effect.

Qualitative Comments

The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance. The features have been assessed without consideration of potential mitigation options.

TAG Biodiversity Impacts Worksheet - **Magenta option**

Step 2		Step 3				Step 4	Step 5
Area	Description of feature/ attribute	Scale (at which attribute matters)	Importance (of attribute)	Trend (in relation to target)	Biodiversity and earth heritage value	Magnitude of impact	Assessment Score
Byron's Pool Local Nature Reserve	652m north, the site includes woodland and small ponds managed for amphibians.	County	Medium		Medium	Neutral	Neutral
Trumpington Meadows Country Park	Northern edge of development site is within the country park. It is managed grassland with grazing and hay cutting with areas of broad-leaved woodland. Species occurring here include kingfisher (Alcedo althia), otter (Lutra lutra), broad-bodied chaser (Libellula depressa) and adder's-tongue fern (Ophioglossum vulgatum).	County	Medium		Medium	Minor negative	Slight adverse
River Cam County Wildlife Site	174m west of development site. A major river (together with adjacent semi-natural habitat) that has not been grossly modified by canalisation and/or poor water quality. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Old Mill Plantation City Wildlife Site	105m north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
River Rhee County Wildlife Site	740m west. A major river not grossly modified by pollution or canalisation. Additionally, it has areas with concentrations of mature pollard willows.	County	Medium		High	Neutral	Neutral
Granchester Road Plantations City Wildlife Site	1.1km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Eight Acre Wood and Seven Acres Wood City Wildlife Site	1.9km north. Woodland over 1ha in area and with 5 or more woodland plants.	County	Medium		Low	Neutral	Neutral
Magenta potential P&R site.	Arable fields.	Local	Low		Low	Neutral	Neutral
Magenta potential P&R site.	Semi-improved grassland field margins.	Local	Low		Low	Minor negative	Slight adverse
Magenta potential P&R site.	Dense scrub.	Local	Low		Low	Minor negative	Slight adverse
Magenta potential P&R site.	Scattered trees.	Local	Low		Low	Neutral	Neutral
Magenta potential P&R site.	Semi-natural broadleaved woodland, which is a priority habitat on the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Four waterbodies, of which one is within the footprint. Ponds are a priority habitat on the Cambridgeshire and Peterborough BAP and are also likely to be Section 41 habitats.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Species-poor native hedgerows (Section 41 habitats of principal importance). All native hedgerows are also Section 41 habitats of principal importance.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Tall ruderal.	Local	Low		Low	Neutral	Neutral
Magenta potential P&R site.	Hardstanding	Local	Negligible		Low	Neutral	Neutral
Magenta potential P&R site.	Potential for breeding birds listed on Section 41 or Red Listed Birds of Conservation Concern.	County	High		High	Neutral	Neutral
Magenta potential P&R site.	Potential for breeding birds listed on Section 41 or Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for breeding birds listed on Section 41 or Green Listed Birds of Conservation Concern.	County	Low		Low	Neutral	Neutral
Magenta potential P&R site.	Potential for wintering bird species listed on Section 41 or as Red Listed Birds of Conservation Concern.	County	High		High	Neutral	Neutral
Magenta potential P&R site.	Potential for wintering bird species listed on Section 41 or as Amber Listed Birds of Conservation Concern.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for wintering bird species listed on Section 41 or as Green Listed Birds of Conservation Concern.	County	Low		Low	Neutral	Neutral
Magenta potential P&R site.	Potential for roosting bats in scattered trees and trees within woodland. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for commuting bats along hedgerows, scrub, trees and woodland features. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for foraging bats along hedgerows, scrub, trees and woodland features and over waterbodies. Seven species of bat are listed on Section 41 of the NERC Act 2006.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for badger setts, badger foraging and commuting habitat.	Local	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for badger foraging habitat in woodlands and scrub.	Local	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for badger commuting habitat along hedgerows and woodland and field edges.	Local	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for otters in waterbodies. Listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for water vole in waterbodies. Listed on Section 41 of the NERC Act and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Brown hare. They are listed on Section 41 of the NERC Act 2006 and are priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Hedgehog. Listed on Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for great crested newt breeding in waterbodies. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for great crested newt refuges in woodland, hedgerow and scrub habitats. Great crested newts are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	County	Medium		Medium	Neutral	Neutral
Magenta potential P&R site.	Potential for widespread reptiles in the semi-improved grassland, hedgerows, scrub and tall ruderal vegetation along slip road. Reptiles are listed on Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP.	Local	Low		Low	Minor negative	Slight adverse

Reference Sources

Preliminary Ecological Appraisal, including a Phase 1 Habitat Survey of the site and a desk study, of the proposed park and ride, Mott MacDonald, 2019.

Summary Assessment Score

Slight adverse effect.

Qualitative Comments

The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance. The features have been assessed without consideration of potential mitigation options.

C. Greenhouse Gases

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSWPR - Cyan option

Present Value Base Year

Current Year

Proposal Opening year:

Project (Road/Rail or Road and Rail):

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£):

£0

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes):

(between 'with scheme' and 'without scheme' scenarios)

0

Of which Traded

0

Change in carbon dioxide equivalent emissions in opening year (tonnes):

(between 'with scheme' and 'without scheme' scenarios)

0

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£):

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

£0

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	0
Non-traded sector	0	0	0	0

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. The addition of the dedicated left-turn lane from the A10 into the new P&R site will better the flow of traffic reducing the potential for GHG emissions to increase. 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 P&R 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 P&R will be implemented. The dedicated slips off the M11 into either the new P&R or Trumpington P&R will aid in reducing any queuing traffic on the M11 northbound and southbound. 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. However, 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. As such it is not possible to state which options are expected to result in the highest or lowest operational emissions - this will be assessed at Stage 2 when a full assessment is undertaken (if this scheme option is taken to Stage 2).

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

£0

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

£0

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSWPR - White option

Present Value Base Year

Current Year

Proposal Opening year:

Project (Road/Rail or Road and Rail):

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£):

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes):
 (between 'with scheme' and 'without scheme' scenarios)

Of which Traded

Change in carbon dioxide equivalent emissions in opening year (tonnes):
 (between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£):

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Non-traded sector	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. A new junction on the A10 will be created. This may increase the GHG emissions due to potential queues along the A10 even with a dedicated left-turn lane operating from the A10 at Hauxton into the P&R site. There will also be free flow left turn lane from the southbound motorway off slip to the A1309 for Trumpington P&R. 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.

However, 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. As such it is not possible to state which options are expected to result in the highest or lowest operational emissions - this will be assessed at Stage 2 when a full assessment is undertaken (if this scheme option is taken to Stage 2).

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSWPR - Yellow option

Present Value Base Year

Current Year

Proposal Opening year:

Project (Road/Rail or Road and Rail):

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£):

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes):
 (between 'with scheme' and 'without scheme' scenarios)

Of which Traded

Change in carbon dioxide equivalent emissions in opening year (tonnes):
 (between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£):

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Non-traded sector	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. The design may result in potential queues on the Cambridge Road A10 due to the traffic signalled junction for cars to enter and exit the new Park and Ride. The dedicated slips off the M11 into either the new P&R or Trumpington P&R will aid in reducing any queuing traffic on the M11 northbound and southbound. 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. However, 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. As such it is not possible to state which options are expected to result in the highest or lowest operational emissions - this will be assessed at Stage 2 when a full assessment is undertaken (if this scheme option is taken to Stage 2).

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSWPR - Purple option

Present Value Base Year

Current Year

Proposal Opening year:

Project (Road/Rail or Road and Rail):

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£):

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes):
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded

Change in carbon dioxide equivalent emissions in opening year (tonnes):
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£):

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Non-traded sector	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. 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 with traffic signals which may increase the GHG emissions, due to a less steady flow of traffic as a result. 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 P&R will also be implemented. The buses will also need to cross the current roundabout across the new structure resulting in the cars at the roundabout being held by traffic lights resulting in a more stop, start traffic. During construction the traffic management to build the new structure across the M11 will result in poorer flows round the roundabout. 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. However, 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. As such it is not possible to state which options are expected to result in the highest or lowest operational emissions - this will be assessed at Stage 2 when a full assessment is undertaken (if this scheme option is taken to Stage 2).

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

£0

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

£0

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSWPR - Purple with CAP option

Present Value Base Year

2010

Current Year

2015

Proposal Opening year:

0

Project (Road/Rail or Road and Rail):

road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£):

£0

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes):

0

(between 'with scheme' and 'without scheme' scenarios)

Of which Traded

0

Change in carbon dioxide equivalent emissions in opening year (tonnes):

0

(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£):

£0

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	0
Non-traded sector	0	0	0	0

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. This option is the same as the Purple Option with the addition of the City Access Penalty measure. 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 with traffic signals which may increase the GHG emissions, due to a less steady flow of traffic as a result. 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 P&R will also be implemented. The buses will also need to cross the current roundabout across the new structure resulting in the cars at the roundabout being held by traffic lights resulting in a more stop, start traffic. During construction the traffic management to build the new structure across the M11 will result in poorer flows round the roundabout. All options have been assessed with some limited flow data providing total vehicle flows, HGV percentage and speed. The Purple with CAP option has a decrease in total vehicles (5.3%) against the Do Minimum. This option does also increase in average speeds by 1.1% which implies a better constant 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 HGVs (7.8%) however this is due to the number of other vehicles decreasing which will result in the percentage of HGVs to increase. However, 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. As such it is not possible to state which options are expected to result in the highest or lowest operational emissions - this will be assessed at Stage 2 when a full assessment is undertaken (if this scheme option is taken to Stage 2).

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

£0

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

£0

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSWPR - Magenta option

Present Value Base Year

Current Year

Proposal Opening year:

Project (Road/Rail or Road and Rail):

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£):

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes):
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded

Change in carbon dioxide equivalent emissions in opening year (tonnes):
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£):

(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a net benefit (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Non-traded sector	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. The dedicated slips off the M11 into either the Trumpington P&R will aid in reducing any queuing traffic on the M11 northbound. There may be additional traffic queuing from the M11 southbound on the roundabout due to additional vehicles exiting to access the Trumpington P&R. 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. However, 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. As such it is not possible to state which options are expected to result in the highest or lowest operational emissions - this will be assessed at Stage 2 when a full assessment is undertaken (if this scheme option is taken to Stage 2).

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£):

Data Sources:

D. Historic Environment

TAG Historic Environment Impacts Worksheet - **Buried Archaeology for Cyan, Yellow, Purple and White options**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	<p>A provisional search of the Cambridgeshire County Council Historic Environment Record (CHER) data has been undertaken. 47 archaeological monument and events are recorded within 250m of the option.</p> <p>The CHER, identified the following archaeological assets within the footprint of the option: The site of a World War II Prison of War Camp (Just to the north of the M11 junction (CHER reference number. MCB21193); Medieval ridge and furrow and evidence of post medieval activity to the north of the M11 junction (MCB20491); An Iron Age pit recorded in the access road to the park and ride (04414); Fieldwalking to the north of the M11 junction recovered artefacts dating from the Lower Palaeolithic to the medieval period (MCB20490); Iron Age occupation features have been identified just to the south of the park and ride (MCB20489).</p> <p>In addition: The archaeological assessment/fieldwork undertaken as part of the Trumpington Meadows development (TMA Ltd 2008); identified the following assets within the footprint of the option; Air photo evidence of bank features in the field to the north of the M11 junction; Prehistoric pot boilers, within the proposed park and ride site; Metal detecting (by a local enthusiast) in the area of the proposed park and ride recovered Roman material (Archaeological Zone VI).</p> <p>The geophysical survey (WYAS 2018) of the proposed park and ride site and the fields to the south and west of the M11 junction identified potential linear features that predated the known historic boundaries. Some of these anomalies are located in the area of the Roman material recovered during metal detecting (Archaeological Zone VI).</p> <p>Ponds located on the north western edge of the proposed park and ride site are related to coprolite quarrying in the 19th century.</p> <p>See Scheduled Monument TAB.</p>	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be low to moderate .	It is not rare within rural England to encounter archaeological remains associated with the former landscape.	Potential for major adverse impact on; Archaeological remains identified by the geophysical survey and the Trumpington Meadows investigations; Remains associated with the former Prisoner War Camp, and unidentified remains in areas that have not been subject to archaeological investigation.
Survival	Unknown - where the proposed route follows the existing road, below ground remains will have undergone significant truncation. It is probable that the majority of the previously undeveloped land take will have been ploughed which is likely to have disturbed archaeological remains to an unknown degree dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive well then they have the potential to be local/regionally significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-damaged.	Major adverse impact. Although the survival of the resources is currently unknown, should archaeological remains be located within the footprint of the proposed option any survival will be adversely affected.
Condition	Unknown - where the proposed route follows the existing road, below ground remains will have undergone significant truncation. It is probable that the majority of the previously undeveloped land take will have been ploughed which is likely to have disturbed archaeological remains to an unknown degree dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive well then they have the potential to be local/regionally significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough	Major adverse impact. Although the survival of the resources is currently unknown, should archaeological
Complexity	Unknown - Should remains be present they will likely be moderately complex as they lie within a rich archaeological landscape which shows evidence of activity and settlement since the prehistoric period.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Unknown. Should archaeological remains survive their complexity will contribute to their significance.	Moderately complex archaeological remains are not rare within the agricultural landscape.	Major adverse impact - the complexity of any surviving remains will be affected by their removal or disturbance through the construction of the scheme.

Context	The western half of the route has a rural context, up to the edge of the city, where the context is of urban modern and historic fringe.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The context of any archaeological remains will contribute to their significance.	Buried archaeological remains generally do not survive in an undisturbed original context. Should they be found to survive in their original context then they this will contribute to their significance.	Major adverse impact. Although the survival of the resources is currently unknown, should archaeological remains be located within the footprint of the proposed option their context will be adversely affected.
Period	Unknown - likely prehistoric to post medieval.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Undesignated asset. Unknown. Prehistoric/Roman remains of good quality would be of particular significance.	It is not rare to encounter archaeological remains.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018); Cambridgeshire County Council Historic Environment Record; WYAS 2018 Western Orbital Park and Ride Site, Cambridgeshire; Geophysical Survey; TMC Ltd (2007) Trumpington Meadows; Environmental Statement, Technical Appendices C Cultural Heritage

Step 5 - Summary Assessment
Score

Moderate Adverse Effect

Qualitative Comments

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.
--

TAG Historic Environment Impacts Worksheet - **Grade 1 Listed buildings for Cyan, Yellow, Purple and White options**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	There are no Grade I Listed buildings within 500m of the option. However, Anstey Hall, Trumpington (NHLE 1331876, located 600m north) and the Grade I Church of St Mary and St Michael (NHLE 1081526, 650m north east), are close enough to be assessed.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2018; National Policy Statement for National Networks (NPSNN) 2014; City of Cambridge Local Plan (2018)	Grade I listed buildings are of highest significance of all listed buildings. Each asset is significant for its aesthetic, historic and evidential value.	Grade I listed buildings total 2.5% of all listed buildings. They are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Survival	Assumed good survival - internal and external. Listing description for Anstey Hall is limited but house is now used as a hotel so assume good survival.	Grade I listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade I listed buildings are inherently of high significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade I listed buildings total 2.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Condition	The listed buildings are not included in the Historic England Heritage at Risk Register, and are assumed to be in good condition.	The good condition of the assets contributes to their grade I listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their high significance.	Grade I listed buildings total 2.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Complexity	The church and house have both had many later alterations and additions.	The complexity of the structures contributes to their grade I listed status.	The complexity of the structures contributes to their grade I listed status.	Grade I listed buildings total 2.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Context	The church is located within its own churchyard. The church and house are prominent in the Trumpington Conservation Area. Modern development to the south has reduced there rural village context, with views of the meadows now screened by the Trumpington Meadows development.	The preservation of the context of these assets contributes to their national importance.	The preservation of the context of these assets contributes to their national importance due to the retained, largely unchanged, immediate surroundings.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	No impact (Intervening development screens the option).

Period	The church is medieval in date with later alterations. The house is 17th century with later additions.	The age of the structures identifies them as nationally important.	The age of the structures identifies them as of high significance.	Buildings of this date comprise a generally small percentage nationwide.	No impact.
--------	--	--	--	--	------------

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018); https://historicengland.org.uk/listing/the-list/ ; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Neutral

Qualitative Comments

--

TAG Historic Environment Impacts Worksheet - **Grade 2 Listed buildings for Cyan, Yellow, Purple and White options**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	<p>There are four Grade II listed buildings with 500m of the option.</p> <p>Milestone (Hauxton Road, Trumpington Meadows) about half of a mile south of junction with Shelford Road (NHLE 1126190); Milestone, Hauxton Mill Bridge (NHLE 1127840); Hauxton Watermill (NHLE 1127839); Hauxton Watermill Bridge (NHLE 1127839)</p>	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) (2018), National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018)	Grade II listed buildings are of medium national significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II listed buildings total 92% of all listed buildings and though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level.	Potential large adverse physical impact on the Hauxton Road Trumpington Meadows milestone, which is located in the area of the proposed two way P&R access road. However, design will ensure the milestone is preserved.
Survival	Assumed good survival except for the Hauxton Mill Bridge Milestone, which is overgrown and is potentially at risk.	Grade II listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II listed buildings are inherently of medium national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 18th/19th buildings tend to survive better than earlier structures due to changes in construction and fabric, particularly the wider availability of brick. This contributes to the structures' good survival.	Potential large adverse physical impact on the Hauxton Road Trumpington Meadows milestone, which is located in the area of the proposed two way P&R access road.
Condition	The structures are assumed to be in generally good condition, except the Hauxton Mill Bridge milestone. The watermill is currently empty but there are plans to reuse it as a business centre.	The good condition of the assets contributes to their grade II listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their medium national significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 17th to 19th century buildings tend to survive in better condition than earlier structures due to changes in construction and fabric during the period, particularly the wider availability of brick.	No impact.
Complexity	<p>The milestones are fairly simple single phase structures.</p> <p>The watermill and associated bridge have add later alterations and additions.</p>	The limited complexity of these structures contributes to their grade II listed status.	The limited complexity of these structures contributes to their significance and grade II listed status.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. The majority of these structures are of limited complexity and are therefore not particularly rare but are good examples of particular architectural practices.	No impact.

Context	<p>The watermill and associated bridge form part of a group including the Grade II Old Mill House (NHLE 1331083, located outside of the 500m study area). Which are located on the River Cam/Granta, screened from the road and the M11 by tall trees. However, directly to the south was the site of a former paint factory now a housing development.</p> <p>The milestones retain there original context as roadside markers. The Hauxton Road, Trumpington Meadows milestone was relocated following previous road widening schemes.</p>	<p>The preservation of the context of these buildings contributes to their national importance and Grade II listed status.</p>	<p>The preservation of the context of these buildings contributes to their medium national significance.</p>	<p>It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.</p>	<p>Potential loss of setting for milestone on Hauxton Road (Trumpington Meadows). Relocation of milestone in similar position would restore roadside context.</p>
Period	<p>All of the grade II listed buildings date to the 18th to 19th centuries.</p>	<p>The period the structures were built identifies them as nationally important.</p>	<p>The age of the structures identifies them as of medium national significance. They were likely selected as they are good examples of that period and building type.</p>	<p>The majority of grade II listed buildings date to this broad period, within this category they are therefore not rare. However, buildings of this date comprise a generally small percentage nationwide.</p>	<p>No impact.</p>

Reference Sources

<p>South Cambridgeshire and City of Cambridge Local Plan (2018); https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record</p>
--

Step 5 - Summary Assessment Score

<p>Moderate adverse effect.</p>

Qualitative Comments

<p>Loss of the milestone would result in a large adverse effect. However, design will ensure the milestone is preserved.</p>
--

TAG Historic Environment Impacts Worksheet - **Conservation areas for Cyan, Yellow, Purple and White options**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	Trumpington Conservation Area is located 400m to the north of the option. Hauxton Conservation Area is located outside the study area 700m to the south.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Conservation areas are considered to be of high significance. The form of each conservation area is unique and reflects a unique set of circumstances resulting in the development of the area into one that warrants special protection.	Each conservation area is unique and as such, the assets are very rare.	No impact.
Survival	The conservation areas survive in good condition.	Conservation areas are nationally important, their level of survival contributes to their significance and therefore their national importance.	The survival of the conservation areas contributes to their high significance.	The survival of the assets contributes to their rarity.	No impact
Condition	The conservation areas are in good condition.	The good condition of the assets contributes to their high national importance.	The condition of the assets contributes to their high significance.	The condition of the assets contributes to their rarity.	No impact
Complexity	The assets are complex as they incorporates a variety of structures built over a number of years.	The complexity of the assets contributes to their national importance.	The complexity of the assets contributes to their high significance.	The complexity of the assets contributes to their rarity.	No impact
Context	The Trumpington Conservation is surrounded by modern development but retains some of its earlier context. Hauxton, retains its rural context despite its proximity to the M11.	The preservation of the context of the assets contributes to their national importance.	The context of the assets contributes to their significance.	The context of the assets contributes to their rarity.	No impact
Period	Both Trumpington and Hauxton date to the medieval period, with the conservation areas including medieval, post medieval and modern buildings.	The age of the assets identifies them as nationally important.	The age of the assets contributes to their high significance.	It is not unusual for conservation areas to be dated to this period.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018); https://historicengland.org.uk/listing/the-list/ ; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment
Score

Neutral

Qualitative Comments

--

TAG Historic Environment Impacts Worksheet - **Scheduled monuments for Cyan, Yellow, Purple and White options**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	There are two scheduled monument with 500m of the proposed option.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): City of Cambridge Local Plan (2018).	Scheduled Monuments of national significance.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact.
	A Romano-British settlement site SW of Trumpington (NHLE 1006903), 400m north east of the option.				
	A settlement complex north of Hauxton (NHLE 1006892), 250m south east of the scheme. Air photos have identified a number of rounded, sub-rectangular and rectangular enclosures, ditch alignments and groups of pits. Excavations in 1975-76 identified a single Late Neolithic/ Early Bronze Age ditch, a large enclosure ditch containing sherds of Early Iron Age pottery , and a large complex of pits which also Iron Age sherds. Two late Iron Age ditches were also identified. A series of ditches, pits and postholes of Roman date and a series of post-medieval field drains were recorded to north of the site.				
Survival	Both scheduled monument s have subject to modern agricultural activity.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact.
	The Hauxton settlement complex was bisected by the M11 in the late 1970s.				
Condition	Moderate - protected under Ancient Monuments and Archaeological Areas Act 1979. Modern agricultural activity is slowly reducing the survival of the Hauxton Scheduled Monument.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. Condition of monument makes a significant contribution to the evidential value of the asset.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact.
Complexity	The level complexity is not fully understood for the Trumpington Roman settlement as it has not been subject to investigation.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. The complexity of the monument adds value because of the evidence it provides for past cultures and land use.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact.
	The Hauxton scheduled monument has been identified as containing complex multiperiod occupation remains.				
Context	Both scheduled monuments form part of a larger pattern of late prehistoric to Roman occupation across this area of Cambridgeshire.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. The relationship with the landscape is essential to the understanding of the monument and its history and therefore of high significance.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	Slight impact, due to the potential for associated remains to be present within the option footprint.
Period	Neolithic, Bronze Age, Iron Age, Roman	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018); https://historicengland.org.uk/listing/the-list/ ; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse negative effect on context, otherwise neutral.

Qualitative Comments

The scheduled monuments 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.
--

TAG Historic Environment Impacts Worksheet - **Buried archaeology for Magenta option**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	<p>A provisional search of the Cambridgeshire County Council Historic Environment Record (CHER) data has been undertaken. 38 archaeological monument and events are recorded within 250m of the option.</p> <p>The CHER, identified the following archaeological assets within the footprint of the option: Iron Age/Roman features and artefacts were encountered during soil improvement works (CHER Ref. 09716), now located within the footprint of the park and ride; Neolithic to to Late Iron Age remains were excavated in advance of the construction of the park and ride in 2000 - 2001. These included settlement remains, land division and three Iron Age mortuary enclosures (CB15749/ECB1158); An Iron Age pit recorded in the access road to the park and ride (04414); The park and ride was formerly crossed by the Sandy to Cambridge railway line (03344).</p>	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be negligible due to the previous development of the option area.	It is not rare within rural England to encounter archaeological remains associated with the former landscape.	No impact.
Survival	Within the footprint of the option the archaeological remains have been removed by development.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be negligible due to the previous development of the option area.	It is likely that any remains within the footprint of the proposed option would have been removed by development.	No impact.
Condition	Within the footprint of the option the archaeological remains have been removed by development.gh.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be negligible due to the previous development of the option area.	It is likely that any remains within the footprint of the proposed option would have been removed by development.	No impact
Complexity	Within the footprint of the option the archaeological remains have been removed by development.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be negligible due to the previous development of the option area.	It is likely that any remains within the footprint of the proposed option would have been removed by development.	No impact
Context	The archaeological remains in this area form part of a larger landscape of prehistoric to medieval archaeological remains, comprising, settlement, land division, land/water management, funerary activity etc.. However, the archaeology within the footprint of the option has been removed.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be negligible due to the previous development of the option area.	It is likely that any remains within the footprint of the proposed option would have been removed by development..	No impact
Period	The remains have been recorded date to the prehistoric to post medieval periods.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be negligible due to the previous development of the option area.	It is likely that any remains within the footprint of the proposed option would have been removed by development.	No impact.

Reference Sources

<p>South Cambridgeshire and City of Cambridge Local Plan (2018); Cambridgeshire County Council Historic Environment Record; WYAS 2018 Western Orbital Park and Ride Site, Cambridgeshire; Geophysical Survey; TMC Ltd (2007) Trumpington Meadows; Environmental Statement, Technical Appendices C Cultural Heritage</p>

Step 5 - Summary Assessment Score

<p>Negligible</p>

Qualitative Comments

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.

TAG Historic Environment Impacts Worksheet - **Grade 1 Listed buildings Magenta option**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	There is one Grade I Listed buildings within 500m of the option. However, Anstey Hall, Trumpington (NHLE 1331876), is located 450m to the north of the park and ride. The Grade I Church of St Mary and St Michael (NHLE 1081526) is located 550m to the north.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2018; National Policy Statement for National Networks (NPSNN) 2014; City of Cambridge Local Plan (2018)	Grade I listed buildings are of highest significance of all listed buildings. Each asset is significant for its aesthetic, historic and evidential value.	Grade I listed buildings total 2.5% of all listed buildings. They are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Survival	Assumed good survival - internal and external. Listing description for Anstey Hall is limited but house is now used as a hotel so assume good survival.	Grade I listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade I listed buildings are inherently of high significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade I listed buildings total 2.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Condition	The listed buildings are not included in the Historic England Heritage at Risk Register, and are assumed to be in good condition.	The good condition of the assets contributes to their grade I listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their high significance.	Grade I listed buildings total 2.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Complexity	The church and house have both had many later alterations and additions.	The complexity of the structures contributes to their grade I listed status.	The complexity of the structures contributes to their grade I listed status.	Grade I listed buildings total 2.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Context	The church is located within its own churchyard. The church and house are prominent in the Trumpington Conservation Area. Modern development to the south has reduced the rural village context, with views of the meadows now screened by the Trumpington Meadows development.	The preservation of the context of these assets contributes to their national importance.	The preservation of the context of these assets contributes to their national importance due to the retained, largely unchanged, immediate surroundings.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	No impact (Intervening development screens the option).

Period	The church is medieval in date with later alterations. The house is 17th century with later additions.	The age of the structures identifies them as nationally important.	The age of the structures identifies them as of high significance.	Buildings of this date comprise a generally small percentage nationwide.	No impact.
--------	--	--	--	--	------------

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018); https://historicengland.org.uk/listing/the-list/ ; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Neutral

Qualitative Comments

--

TAG Historic Environment Impacts Worksheet - **Grade 2 Listed buildings for Magenta option**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	There are six Grade II listed buildings with 500m of the option. Milestone (Hauxton Road, Trumpington Meadows) about half of a mile south of junction with Shelford Road (NHLE 1126190); Milestone, Hauxton Mill Bridge (NHLE 1127840); Hauxton Watermill (NHLE 1127839); Hauxton Watermill Bridge (NHLE 1127839); Dovecote at Anstey Hall Farm (NHL3 104224); 60 and 63 High Street, Trumpington (NHLE 1331850).	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) (2018), National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018)	Grade II listed buildings are of medium national significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II listed buildings total 92% of all listed buildings and though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level.	Potential large adverse physical impact on the Hauxton Road Trumpington Meadows milestone, which is located in the area of the proposed two way P&R access road. However, design will ensure the milestone is preserved.
Survival	Assumed good survival except for the Hauxton Mill Bridge Milestone, which is overgrown and is potentially at risk.	Grade II listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II listed buildings are inherently of medium national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 18th/19th buildings tend to survive better than earlier structures due to changes in construction and fabric, particularly the wider availability of brick. This contributes to the structures' good survival.	Potential large adverse physical impact on the Hauxton Road Trumpington Meadows milestone, which is located in the area of the proposed two way P&R access road.
Condition	The structures are assumed to be in generally good condition, except the Hauxton Mill Bridge milestone. The watermill is currently empty but there are plans to reuse it as a business centre.	The good condition of the assets contributes to their grade II listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their medium national significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 17th to 19th century buildings tend to survive in better condition than earlier structures due to changes in construction and fabric during the period, particularly the wider availability of brick.	No impact.
Complexity	The milestones are fairly simple single phase structures. The watermill and associated bridge have added later alterations and additions.	The limited complexity of these structures contributes to their grade II listed status.	The limited complexity of these structures contributes to their significance and grade II listed status.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. The majority of these structures are of limited complexity and are therefore not particularly rare but are good examples of particular architectural practices.	No impact.

Context	<p>The watermill and associated bridge form part of a group including the Grade II Old Mill House (NHLE 1331083, located outside of the 500m study area). Which are located on the River Cam/Granta, screened from the road and the M11 by tall trees. However, directly to the south was the site of a former paint factory now a housing development.</p> <p>The milestones retain their original context as roadside markers. The Hauxton Road, Trumpington Meadows milestone was relocated following previous road widening schemes.</p> <p>Dovecote and 60 and 62 High Street, Trumpington are both located within the core of the Trumpington Conservation Area.</p>	<p>The preservation of the context of these buildings contributes to their national importance and Grade II listed status.</p>	<p>The preservation of the context of these buildings contributes to their medium national significance.</p>	<p>It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.</p>	<p>Potential loss of setting for milestone on Hauxton Road (Trumpington Meadows). Relocation of milestone in similar position would restore roadside context.</p>
Period	<p>All of the grade II listed buildings date to the 18th to 19th centuries.</p>	<p>The period the structures were built identifies them as nationally important.</p>	<p>The age of the structures identifies them as of medium national significance. They were likely selected as they are good examples of that period and building type.</p>	<p>The majority of grade II listed buildings date to this broad period, within this category they are therefore not rare. However, buildings of this date comprise a generally small percentage nationwide.</p>	<p>No impact.</p>

Reference Sources

<p>South Cambridgeshire and City of Cambridge Local Plan (2018); https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record</p>
--

Step 5 - Summary Assessment Score

<p>Neutral</p>

Qualitative Comments

<p>Loss of the milestone would result in a large adverse effect. However, design will ensure the milestone is preserved.</p>
--

TAG Historic Environment Impacts Worksheet - **Conservation areas for Magenta option**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	Trumpington Conservation Area is located 270m to the north of the option. Hauxton Conservation Area is located outside the study area 700m to the south.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Conservation areas are considered to be of high significance. The form of each conservation area is unique and reflects a unique set of circumstances resulting in the development of the area into one that warrants special protection.	Each conservation area is unique and as such, the assets are very rare.	No impact.
Survival	The conservation areas survive in good condition.	Conseration areas are nationally important, their level of survival contributes to their significance and therefore their national importance.	The survival of the conservation areas contributes to their high significance.	The survival of the assets contributes to their rarity.	No impact
Condition	The conservation areas are in good condition.	The good condition of the assets contributes to their high national importance.	The condition of the assets contributes to their high significance.	The condition of the assets contributes to their rarity.	No impact
Complexity	The assets are complex as they incorporates a variety of structures built over a number of years.	The complexity of the assets contributes to their national importance.	The complexity of the assets contributes to their high significance.	The complexity of the assets conributes to their rarity.	No impact
Context	The Trumpington Conservation is surrounded by modern development but retains some of its ewrlieer context. Hauxton, retains its rural context dispite its proximity to the M11.	The preservation of the context of the assets contributes to their national importance.	The context of the assets contributes to their significance.	The context of the assets contributes to their rarity.	No impact
Period	Both Trumpington and Hauxton date to the medieval period, with the conservation areas including medieval, post medieval and modern buildings.	The age of the assets identifies them as nationally important.	The age of the assets contributes to their high significance.	It is not unusual for conservation areas to be dated to this period.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018); https://historicengland.org.uk/listing/the-list/ ; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Neutral

Qualitative Comments

--

TAG Historic Environment Impacts Worksheet - **Scheduled monuments for Magenta option**

Step 2		Step 3			Step 4
Feature	Description	Scale it matters	Significance	Rarity	Impact
Form	There are two scheduled monument with 500m of the proposed option. A Romano-British settlement site SW of Trumpington (NHLE 1006903), 400m north east of the option. A settlement complex north of Hauxton (NHLE 1006892), 250m south east of the scheme. Air photos have identified a number of rounded, sub-rectangular andrectangular enclosures, ditch alignments and groups of pits. Excavations in 1975-76 identified a single Late Neolithic/ Early Bronze Age ditch, a large enclosure ditch containing sherds of Early Iron Age pottery , and a large complex of pits which also Iron Age sherds. Two late Iron Age ditches were also identified. A series of ditches, pits and postholes of Roman date and a series of post-medieval field drains were recorded to north of the site.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): City of Cambridge L;ocal Plan (2018).	Scheduled Monuments of national significance.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgshire. However, the potential compecity of the sheduled monuments increases there rarity.	No impact.
	Both scheduled monument s have subject to modern agricyrual activity. The Hauxton settlement complex was bisected by the M11 in the late 1970s.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgshire. However, the potential compecity of the sheduled monuments increases there rarity.	No impact.
	Moderate - protected under Ancient Monuments and Archaeological Areas Act 1979. Modern agricultural activity is slowly reducing the survival of the Hauxton Scheduled Monumant.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. Condition of monument makes a significant contribution to the evidential value of the asset.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgshire. However, the potential compecity of the sheduled monuments increases there rarity.	No impact.
	The level complexitiy is not fully understood for the Trumpington Rpman settlement as it has not been subject to investigation. The Hauxton scheduled monument has been identfied as containing complex multiperiod occupation remains.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. The complexity of the monument adds value because of the evidence it provides for past cultures and land use.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgshire. However, the potential compecity of the sheduled monuments increases there rarity.	No impact.
	Both scheduled monuments form part of a larger pattern of late prehistoric to Roman occupation across this area of Cambridgshire.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. The relationship with the landscape is essential to the understanding of the monument and its history and therefore of high significance.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgshire. However, the potential compecity of the sheduled monuments increases there rarity.	Slight impact, due to the potential for assoated remains to be present within the option footprint.
Period	Neolithic, Bronze Age, Iron Age, Roman	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance.	Roman settlements and prehistoric occupation sites are not uncommon in Cambridgshire. However, the potential compecity of the sheduled monuments increases there rarity.	No impact.

Reference Sources
South Cambridgeshire and City of Cambridge Local Plan (2018); https://historicengland.org.uk/listing/the-list/ ; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment
Score

Slight adverse negative effect on context, otherwise neutral.

Qualitative Comments
The scheduled monuments will not be physcialy impacted by the construction of the scheme and the setting are unlikley to be harmed. However, there is potential to impact assocoited archaeological remains, as the archaeological remains form part of a large late prehistoric/Roman occuplation/settlement pattern.

E. Landscape

TAG Landscape Impacts Worksheet - **Cyan Option**

	Step 2	Step 3				Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact
Pattern	The park and ride site is adjacent to the M11 and close to the urban edge of Cambridge. The pattern of the landscape reflects the rural-urban edge location of the site, with large, open, tree-less fields in arable cultivation and sparse hedgerows. The M11 severs the landscape between Cambridge and the surrounding countryside. The car park site is partially screened by the A10 which rises to meet the roundabout over the M11. The landscape becomes more small scale along the Rivers Rhee and Granta, west and south of the site, with trees and woodland belts lining the course of the rivers.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of access roads in cutting and on embankment in to the flat arable fields east and west of the A10. Land isolated between the new roads and the A10 would no longer be suitable for agriculture. It could be planted with new woodland to screen the new roads, but this would change the pattern of the landscape which is currently open. The existing approaches to the farm access bridge would be widened and there would be an additional cycle bridge adjacent to the bridge, enlarging the footprint of the existing crossing substantially, increasing its prominence in the landscape and leading to a loss of existing vegetation. The new road junction on the A10 and entrance and exit access tunnel under the A10 would widen the A10 south-west of the Junction 11 roundabout, resulting in a loss of road side vegetation. Existing field boundaries would be strengthened with mitigation planting. The impact would be moderate adverse.
Tranquillity	The tranquillity of the area is low due to the noise and activity generated by the M11 and A10. Ongoing construction on buildings sites adjacent to the existing Trumpington Park and Ride site is another source of noise and activity. The M11 and the car park site are unlit at night, but the A10 and Junction 11 roundabout are brightly lit. This lighting and the street lights of Cambridge contribute to general sky glow in the area. The landscape becomes darker to the south and west, where street lighting is restricted to village streets and is contained by woodland.	Local	Tranquillity is already low	Local	Tranquillity cannot be easily be recreated.	The existing low tranquillity would be reduced in operation by lighting in a currently unlit area and the movement of vehicles including buses on the farm access overbridge. At night, the lit car park would be seen from the north against a dark background of woodland lining the river corridors and around Hauxton. From the south, the car park lighting would be seen against the street lighting along the A10 and in Cambridge. Mitigation planting would, in time, screen much of the car park from the surrounding area. The impact would be slight adverse.
Cultural	There are remains of Roman and Saxon settlements in the area and more recently coprolite (phosphatic nodules of the fossilised remains of land and sea organisms) was mined for use as a fertiliser, leaving linear ponds, adjacent to the proposed park and ride site. A long distance cycle path runs through the Trumpington Meadows Nature Reserve.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The setting of the Trumpington Meadows Nature Reserve would be adversely affected by the use of the existing accomodation access bridge over the M11 by buses, the widening of the embankment on the eats side and the addition of a cycle bridge. In in time, maturing mitigation woodland and new meadows would restore part of the setting but the buses using the overbridge would remain prominent in the landscape. The impact would be moderate adverse.
Landcover	The park and ride site and the fields to the north-east and south-east are currently arable fields. Trumpington Meadows Nature Reserve, west of the park and ride site, is partly wooded, with trees lining the River Granta and hedgerows, wildflower meadows, walking trails and ponds. North of the site is urban and the expansion of Trumpington towards the south is ongoing. Woodlands become larger and more extensive around the edges of Hauxton and Harston to the south	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the park and ride site would be replaced by a car park with paving, lighting and moving vehicles. Existing hedgerows would be restored and strengthened. New woodland and wildflower meadows would not restore the land to its arable condition, but to a land cover typical of the surrounding area. The impact would be slight adverse.

Summary of character	The park and ride site is in the Rhee and Bourne Valleys landscape character area. The character of the landscape is influenced by its location close to the M11 and the urban edge of Cambridge. The M11 severs the landscape between Cambridge and the surrounding countryside. It becomes less urban towards the south and west, with large, open, tree-less fields in arable cultivation and sparse hedgerows. There is woodland around Hauxton and Harston and along the rivers Rhee and Granta.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	There would be a loss of trees and shrubs from fields bordering the A10 and M11 and the approaches to the farm access bridge over the M11 due to road widening. The arable field south-west of Junction 11 would be replaced by a car park with paving, lighting, signage and a one-storey building, diminishing the rural character of the area around the junction. However, a car park in this location would not be wholly uncharacteristic of the landscape as it would be seen in the context of the motorway and junction 11 roundabout. The A10 and M11 are already busy roads, but tranquillity would be further reduced due to the increase in activity in the car park, the introduction of lighting in an arable field and the movement of buses over the farm access bridge. A wide belt of mitigation woodland around and through the central section of the car park and the local topography would contain most effects to an area immediately surrounding the car park, but buses using the farm access would remain prominent in views. Substantial areas of the site would be seeded with a wildflower and grass seed mix to create new wildflower meadows. Over time the car park would become more wooded in character and the woodland and meadows would integrate it into the landscape of the neighbouring nature reserve. The impact would be moderate adverse in operation.
----------------------	---	-------	----------------	-------	---	---

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, Landscape Design Associates, 2003

Step 5 - Summary Assessment Score

The Cyan Option would result in a moderate adverse impact in operation.

Qualitative Comments

In conclusion, the Cyan 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.

TAG Landscape Impacts Worksheet - White option

	Step 2	Step 3				Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact
Pattern	The park and ride site is adjacent to the M11 and close to the urban edge of Cambridge. The pattern of the landscape reflects the rural-urban edge location of the site, with large, open, tree-less fields in arable cultivation and sparse hedgerows. The M11 severs the landscape between Cambridge and the surrounding countryside. The car park site is partially screened by the A10 which rises to meet the roundabout over the M11. The landscape becomes more small scale along the Rivers Rhee and Granta, west and south of the site, with trees and woodland belts lining the course of the rivers.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of access roads in cutting and on embankment in to the flat arable fields east and west of the A10. Land isolated between the new roads and the A10 would no longer be suitable for agriculture. It could be planted with new woodland to screen the new roads, but this would change the pattern of the landscape which is currently open. The existing approaches to the farm access bridge would be widened and there would be an additional cycle bridge adjacent to the bridge, enlarging the footprint of the existing crossing substantially, increasing its prominence in the landscape and leading to a loss of existing vegetation. The new road junction on the A10 and entrance and exit access tunnel under the A10 would widen the A10 south-west of the Junction 11 roundabout, resulting in a loss of road side vegetation. Existing field boundaries would be strengthened with mitigation planting. The impact would be moderate adverse.
Tranquillity	The tranquillity of the area is low due to the noise and activity generated by the M11 and A10. Ongoing construction on buildings sites adjacent to the existing Trumpington Park and Ride site is another source of noise and activity. The M11 and the car park site are unlit at night, but the A10 and Junction 11 roundabout are brightly lit. This lighting and the street lights of Cambridge contribute to general sky glow in the area. The landscape becomes darker to the south and west, where street lighting is restricted to village streets and is contained by woodland.	Local	Tranquillity is already low	Local	Tranquillity cannot be easily be recreated.	The existing low tranquillity would be reduced in operation by the introduction of lighting in a currently unlit area and the movement of vehicles including buses on the farm access overbridge. At night, the lit car park would be seen from the north against a dark background of woodland lining the river corridors and around Hauxton. From the south, the car park lighting would be seen against the street lighting along the A10 and in Cambridge. Mitigation planting would, in time, screen much of the car park from the surrounding area. The impact would be slight adverse.
Cultural	There are remains of Roman and Saxon settlements in the area and more recently coprolite (phosphatic nodules of the fossilised remains of land and sea organisms) was mined for use as a fertiliser, leaving linear ponds, adjacent to the proposed park and ride site. A long distance cycle path runs through the Trumpington Meadows Nature Reserve.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The setting of the Trumpington Meadows Nature Reserve would be adversely affected by the widening of the approaches to the farm access overbridge and construction of the cycleway structure, leading to a loss of vegetation. The introduction of regular buses on the bridge, currently used by occasional farm vehicles, cyclists and walkers, would be prominent in views from the nature reserve, eroding its natural character. Maturing mitigation woodland and new meadows would in time, partly restoring the setting. The impact would be moderate adverse.
Landcover	The park and ride site and the fields to the north and south-east are currently arable fields. Trumpington Meadows Nature Reserve, west of the park and ride site, is partly wooded, with trees lining the River Granta and hedgerows, wildflower meadows, walking trails and ponds. North of the site is urban and the expansion of Trumpington towards the south is ongoing. Woodlands become larger and more extensive around the edges of Hauxton and Harston to the south.	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the park and ride site would be replaced by a car park with paving, lighting and moving vehicles. Farmland would be lost from the field south-east of the site due to the construction of a dedicated access road from the M11 in cutting. The two-way bus link to the Trumpington Park and Ride site would extend into the field north of the M11, leading to further loss of farmland. Existing hedgerows and boundary vegetation would be restored or replaced on the new boundaries created by the option. The woodland and wildflower meadows would not restore the land to its existing condition, but to a land cover typical of the surrounding area. The impact would be slight adverse.

Summary of character	The park and ride site is in the Rhee and Bourne Valleys landscape character area. The character of the landscape is influenced by its location close to the M11 and the urban edge of Cambridge. The M11 severs the landscape between Cambridge and the surrounding countryside. It becomes less urban towards the south and west, with large, open, tree-less fields in arable cultivation and sparse hedgerows. There is woodland around Hauxton and Harston and along the rivers Rhee and Granta.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	There would be a loss of trees and shrubs from fields bordering the A10 and M11 and the approaches to the farm access bridge over the M11 due to road widening. The arable field south-west of Junction 11 would be replaced by a car park with paving, lighting, signage and a one-storey building, diminishing the rural character of the area around the junction. However, a car park in this location would not be wholly uncharacteristic of the landscape as it would be seen in the context of the motorway and junction 11 roundabout. The A10 and M11 are already busy roads, but tranquillity would be further reduced due to the increase in activity in the car park, the introduction of lighting in an arable field and the movement of buses over the farm access bridge. A wide belt of mitigation woodland around and through the central section of the car park and the local topography would contain most effects to an area immediately surrounding the car park, but buses using the farm access would remain prominent in views. Substantial areas of the site would be seeded with a wildflower and grass seed mix to create new wildflower meadows. Over time the car park would become more wooded in character and the woodland and meadows would integrate it into the landscape of the neighbouring nature reserve. The impact would be moderate adverse in operation.
----------------------	---	-------	----------------	-------	---	---

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, Landscape Design Associates, 2003
--

Step 5 - Summary Assessment Score

The White Option would result in a moderate adverse impact in operation.
--

Qualitative Comments

In conclusion, the White 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.
--

TAG Landscape Impacts Worksheet - **Yellow Option**

Step 2		Step 3				Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact
Pattern	The park and ride site is adjacent to the M11 and close to the urban edge of Cambridge. The pattern of the landscape reflects the rural-urban edge location of the site, with large, open, tree-less fields in arable cultivation and sparse hedgerows. The M11 severs the landscape between Cambridge and the surrounding countryside. The car park site is partially screened by the A10 which rises to meet the roundabout over the M11. The landscape becomes more small scale along the Rivers Rhee and Granta, west and south of the site, with trees and woodland belts lining the course of the rivers.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of access roads in cutting and on embankment in to the flat arable fields east and west of the A10. Land isolated between the new roads and the A10 would no longer be suitable for agriculture. It could be planted with new woodland to screen the new roads, but this would change the pattern of the landscape which is currently open. The existing approaches to the farm access bridge would be widened and there would be an additional cycle bridge adjacent to the bridge, enlarging the footprint of the existing crossing substantially, increasing its prominence in the landscape and leading to a loss of existing vegetation. The new road junctions on the A10 would widen the A10 south-west of the Junction 11 roundabout, resulting in a loss of road side vegetation. Existing field boundaries would be strengthened with mitigation planting. The impact would be moderate adverse.
Tranquillity	The tranquillity of the area is low due to the noise and activity generated by the M11 and A10. Ongoing construction on buildings sites adjacent to the existing Trumpington Park and Ride site is another source of noise and activity. The M11 and the car park site are unlit at night, but the A10 and Junction 11 roundabout are brightly lit. This lighting and the street lights of Cambridge contribute to general sky glow in the area. The landscape becomes darker to the south and west, where street lighting is restricted to village streets and is contained by woodland.	Local	Tranquillity is already low	Local	Tranquillity cannot be easily be recreated.	The existing low tranquillity would be further reduced due to the introduction of lighting into a currently unlit area and the movement of vehicles, including buses on the farm access overbridge. At night, the lit car park would be seen from the north against a dark background of woodland lining the river corridors and around Hauxton. From the south, the car park lighting would be seen against the street lighting along the A10 and in Cambridge. Mitigation planting would, in time, screen much of the car park from the surrounding area. The impact would be slight adverse.
Cultural	There are remains of Roman and Saxon settlements in the area and more recently coprolite (phosphatic nodules of the fossilised remains of land and sea organisms) was mined for use as a fertiliser, leaving linear ponds, adjacent to the proposed park and ride site. A long distance cycle path runs through the Trumpington Meadows Nature Reserve.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The setting of the Trumpington Meadows Nature Reserve would be adversely affected by the use of the existing accomodation access bridge over the M11 by buses, the widening of the embankment on the east side and the addition of a cycle bridge. In in time, maturing mitigation woodland and new meadows would restore part of the setting but the buses using the overbridge would remain prominent in the landscape. The impact would be moderate adverse.
Landcover	The park and ride site is currently an arable field. Trumpington Meadows Nature Reserve, west of the site, is partly wooded, with trees lining the River Granta and hedgerows, wildflower meadows, walking trails and ponds. North of the site is urban and the expansion of Trumpington towards the south is ongoing. Woodlands become larger and more extensive around the edges of Hauxton and Harston to the south.	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the park and ride site would be replaced by a car park with paving, lighting and moving vehicles. The two-way bus link to the Trumpington Park and Ride site would extend into the field north of the M11, leading to further loss of farmland. Existing hedgerows would be restored and strengthened. New woodland and wildflower meadows would not restore the land to its arable condition, but to a land cover typical of the surrounding area. The impact would be slight adverse.
Summary of character	The park and ride site is in the Rhee and Bourne Valleys landscape character area. The character of the landscape is influenced by its location close to the M11 and the urban edge of Cambridge. The M11 severs the landscape between Cambridge and the surrounding countryside. It becomes less urban towards the south and west, with large, open, tree-less fields in arable cultivation and sparse hedgerows. There is woodland around Hauxton and Harston and along the rivers Rhee and Granta.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	There would be a loss of trees and shrubs from fields bordering the A10 and M11 and the approaches to the farm access bridge over the M11 due to road widening. The arable field south-west of Junction 11 would be replaced by a car park with paving, lighting, signage and a one-storey building, diminishing the rural character of the area around the junction. However, a car park in this location would not be wholly uncharacteristic of the landscape as it would be seen in the context of the motorway and junction 11 roundabout. The A10 and M11 are already busy roads, but tranquillity would be further reduced due to the increase in activity in the car park, the introduction of lighting in an arable field and the movement of buses over the farm access bridge. A wide belt of mitigation woodland around and through the central section of the car park and the local topography would contain most effects to an area immediately surrounding the car park, but buses using the farm access would remain prominent in views. Substantial areas of the site would be seeded with a wildflower and grass seed mix to create new wildflower meadows. Over time the car park would become more wooded in character and the woodland and meadows would integrate it into the landscape of the neighbouring nature reserve. The impact would be moderate adverse in operation.

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, Landscape Design Associates, 2003

Step 5 - Summary Assessment Score

The Yellow Option would result in a moderate adverse impact in operation.

Qualitative Comments

In conclusion, the Yellow Option would result in adverse impacts due to the construction of a car park on an arable field, the farm access bridge widening and the construction of access roads off the A10 and M11. 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 into its landscape setting.

TAG Landscape Impacts Worksheet - **Purple Option**

	Step 2	Step 3				Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact
Pattern	The park and ride site is adjacent to the M11 and close to the urban edge of Cambridge. The pattern of the landscape reflects the rural-urban edge location of the site, with large, open, tree-less fields in arable cultivation and sparse hedgerows. The M11 severs the landscape between Cambridge and the surrounding countryside. The car park site is partially screened by the A10 which rises to meet the roundabout over the M11. The landscape becomes more small scale along the Rivers Rhee and Granta, west and south of the site, with trees and woodland belts lining the course of the rivers.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of access roads in cutting and on embankment into the flat, arable fields east and west of the A10. Land isolated between the new roads and the A10 would no longer be suitable for agriculture. It could be planted with woodland to screen the new roads, but this would change the character of the landscape which is currently open. There would be a loss of trees and shrubs from narrow bands of vegetation bordering the M11 exit slip roads at Junction 11 due to road widening. The new signal controlled road junction and access road tunnel would widen the A10 south-west of Junction 11, leading to a loss of road side vegetation. Existing field boundaries would be strengthened with mitigation planting. The impact would be slight adverse.
Tranquillity	The tranquillity of the area is low due to the noise and activity generated by the M11 and A10. Ongoing construction on buildings sites adjacent to the existing Trumpington Park and Ride site is another source of noise and activity. The M11 and the car park site are unlit at night, but the A10 and Junction 11 roundabout are brightly lit. This lighting and the street lights of Cambridge contribute to general sky glow in the area. The landscape becomes darker to the south and west, where street lighting is restricted to village streets and is contained by woodland.	Local	Tranquillity is already low	Local	Tranquillity cannot be easily be recreated.	The existing low tranquillity would be reduced in operation due to the introduction of lighting into a currently unlit area and the movement of vehicles. At night, the lit car park would be seen from the north against a dark background of woodland lining the river corridors and around Hauxton. From the south, the car park lighting would be seen against the street lighting along the A10 and in Cambridge. Mitigation planting would, in time, screen much of the car park from the surrounding area. The impact would be slight adverse.
Cultural	There are remains of Roman and Saxon settlements in the area and more recently coprolite (phosphatic nodules of the fossilised remains of land and sea organisms) was mined for use as a fertiliser, leaving linear ponds, adjacent to the proposed park and ride site. A long distance cycle path runs through the Trumpington Meadows Nature Reserve.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The setting of the Trumpington Meadows Nature Reserve would be adversely affected initially, but over time maturing mitigation woodland and new meadows restore or enhance the setting. The impact would be slight adverse.
Landcover	The park and ride site and the fields to the north and south-east are currently arable fields. Trumpington Meadows Nature Reserve, west of the park and ride site, is partly wooded, with trees lining the River Granta and hedgerows, wildflower meadows, walking trails and ponds. North of the site is urban and the expansion of Trumpington towards the south is ongoing. Woodlands become larger and more extensive around the edges of Hauxton and Harston to the south	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the park and ride site would be replaced by a car park with paving, lighting and moving vehicles. Farmland would be lost from the field south-east of the site due to the construction of a dedicated access road from the M11 in cutting. Existing hedgerows and boundary vegetation would be restored or replaced on the new boundaries created by the option. The woodland and wildflower meadows would not restore the land to its existing condition, but to a land cover typical of the surrounding area. The impact would be slight adverse.

Summary of character	The park and ride site is in the Rhee and Bourne Valleys landscape character area. The character of the landscape is influenced by its location close to the M11 and the urban edge of Cambridge. The M11 severs the landscape between Cambridge and the surrounding countryside. It becomes less urban towards the south and west, with large, open, tree-less fields in arable cultivation and sparse hedgerows. There is woodland around Hauxton and Harston and along the rivers Rhee and Granta.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	The arable field south-west of Junction 11 would be replaced by a car park with roads, parking areas, lighting, signage and a one-storey building. The junction on the A10, the tunnel under the A10 and the new slip roads would result in a loss of farmland and vegetation. A car park, tunnel and access roads in this location would not be wholly uncharacteristic of the landscape as it would be seen in the context of the motorway and junction 11 roundabout. Tranquillity would be reduced, but the change would not be noticeable as the A10 and M11 are already busy roads. A wide belt of mitigation woodland around and through the central section of the car park and the local topography would contain effects to an area immediately surrounding the car park. Substantial areas of the site would be seeded with a wildflower and grass seed mix to create new wildflower meadows. Over time the car park would become more wooded in character and the woodland and meadows would integrate it into the landscape of the neighbouring nature reserve. The introduction of a new car park into the landscape would therefore affect a small proportion of the landscape character area. The impact would be slight adverse in operation.
----------------------	---	-------	----------------	-------	---	--

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, Landscape Design Associates, 2003
--

Step 5 - Summary Assessment Score

The Purple Option would result in a slight adverse impact in operation.

Qualitative Comments

In conclusion, the Purple 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.

TAG Landscape Impacts Worksheet - **Magenta Option**

	Step 2	Step 3				Step 4
Features	Description	Scale it matters	Rarity	Importance	Substitutability	Impact
Pattern	The Trumpington Park and Ride site is situated in the urban area of Trumpington. The site is paved, lit and planted throughout with a network of trees, now reaching early maturity. The planting screens views across the car park. A substantial timber building is located in the centre of the site. The car park is surrounded by woodland and shrub planting and is a fairly discreet presence in the urban area. The tree-lined (in places) A1309 Hauxton Road is a busy road linking Cambridge with the M11 and the villages of Hauxton and Harston to the south. The Magenta option also includes minor changes to the M11 Junction 11 roundabout, with a widening of the bridge structure and dedicated access lanea on the A10 and M11.	Local	Locally common	Local	The pattern can be substituted or recreated.	The semi-mature trees within the footprint of the site would be removed, leading to a substantial loss of the landscape framework of the car park and an opening up of views within the car park. The widening of the bridge structure over the M11 would have no effect on the pattern of the landscape. The impact would be moderate adverse.
Tranquillity	The tranquillity of the area is low due to the noise and activity generated by the M11, A1309 and the operation of the existing car park. Ongoing construction on buildings sites adjacent to the Trumpington Park and Ride site is another source of noise and activity.	Local	Tranquillity is already low	Local	Tranquillity cannot be easily be recreated.	In operation, tranquillity levels would be similar to those of the existing car park. The impact would be negligible.
Cultural	The site has already been developed as a car park and consequently there are no cultural elements which contribute to landscape character on the site.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The impact would be negligible.
Landcover	The park and ride site is an existing surface level car park, situated in an urban area. The setting is urban, with housing, a school, commercial/industrial sheds and a construction site adjacent. The tree-lined (in places) A1309 is a busy road linking Cambridge with the M11 and the villages of Hauxton and Harston to the south.	Local	Locally common	Local	The landcover can be recreated or substituted.	The trees within the footprint of the car park site would be lost. The existing paved surface level car park would be replaced by a substantial building. This would not be an uncharacteristic new feature in the landscape, due to the presence of the John Lewis distribution shed to the north. However, the change would be particularly noticeable from the flats on Spring Drive to the north which overlook the existing car park. The impact would be slight adverse.

Summary of character	The park and ride site is in Trumpington. The character of the landscape is influenced by its location in an urban area, its proximity to the A1309, M11 and the surrounding commercial, industrial and residential land uses. The park and ride site is well vegetated with a landscape framework of trees and shrubs which is reaching maturity. Tranquillity is low due to the busy local roads, the M11 and all streets in the area and the car park are lit at night.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	The option would result in the replacement of a surface level car park with a substantial new building. There would be a loss of the maturing landscape framework of the car park, which screens views and provides a verdant character to the landscape in summer. Views from the flats on Spring Drive to the north would be particularly affected. Views from other directions would be largely screened by intervening vegetation. The decked car park would not be wholly uncharacteristic of the landscape due to the large-scale John Lewis building adjacent. The impact in would be slight adverse.
----------------------	--	-------	----------------	-------	---	--

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, Landscape Design Associates, 2003
--

Step 5 - Summary Assessment Score

The Magenta Option would result in a slight adverse impact in operation.
--

Qualitative Comments

In conclusion, the Magenta 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.

F. Noise

Noise assessment - Results and Assessment

1.1 Affected Road Network

Appendix A provides a summary of all road links for each option which show noise level change of 1 dB or greater (increase or decrease) due to a change in road traffic flow for road links within the 1km study area.

It is noted that several road links also show noise level changes of at least 1 dB at significant distances from the scheme (up to 25km away from the scheme). As there are multiple potential causes for these changes such as other committed developments or traffic model factors, they are not considered further in this assessment.

1.2 Quantitative results

Table 1 provides a summary of quantitative results shown for both AM and PM peak hour periods.

Table 1: Quantitative results

Scheme option	Households experiencing increased AM noise in forecast year:	Households experiencing reduced AM noise in forecast year:	Households experiencing increased PM noise in forecast year:	Households experiencing reduced PM noise in forecast year:
Cyan	277	46	265	58
Magenta	179	30	335	30
Purple	277	46	409	58
White	277	46	393	58
Yellow	277	46	409	58
Purple CAP	373	46	311	46

Source: Mott MacDonald

1.3 Qualitative results

Table 2 summarises qualitative results for each scheme option.

Table 1: Qualitative results

Scheme option	Qualitative results
Cyan	<p>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.</p> <p>Decreases are noted at sections of Hauxton Road where new bus routes alter traffic flow.</p> <p>Generally, 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.</p>
Magenta	<p>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.</p> <p>Decreases are noted at sections of Hauxton Road where new bus routes alter traffic flow.</p> <p>Generally, 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.</p>
Purple	<p>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, on Hauxton Road and in Hauxton village.</p>

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Scheme option	Qualitative results
	Decreases are noted at sections of Hauxton Road where new bus routes alter traffic flow. Generally, 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.
White	Within the study area, the majority of receptors near roads which will experience a 1 dB or greater change are located; along the Cambridgeshire Guided Busway, on Hauxton Road and in Hauxton village. Decreases are noted at sections of Hauxton Road where new bus routes alter traffic flow. Generally, 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.
Yellow	Within the study area, the majority of receptors near roads which will experience a 1 dB or greater change are located; along the Cambridgeshire Guided Busway, on Hauxton Road and in Hauxton village. Decreases are noted at sections of Hauxton Road where new bus routes alter traffic flow. Generally, 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 CAP	Within the study area, the majority of receptors near roads which will experience a 1 dB or greater change are located; along the Cambridgeshire Guided Busway, on Hauxton Road and in Hauxton village. Decreases are noted at sections of Hauxton Road where new bus routes alter traffic flow. Generally, 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.

Source: Mott MacDonald

A. Affected Road Network

Tables A-1 and A-2 present roads for each option which show noise level change of 1 dB or greater (increase or decrease) due to a change in road traffic flow for road links within the 1km study area. The road links ID (A-node to B-node) represents two-way traffic flow.

Table A-1: AM Peak Hour affected roads within study area

Link ID	Road Name	Number of dwellings within 50m	1dB or greater noise level change					
			Cyan	Magenta	Purple	White	Yellow	Purple CAP
10001-15907	Forty Acre Road junction to Hauxton Road	23	Increase	Increase	Increase	Increase	Increase	Increase
10001-15909	Hauxton Road north of Forty Acre Road junction	29	Increase	Increase	Increase	Increase	Increase	Increase
10002-10003	Bus route north Forty Acre Road (parallel with Hauxton Road)	25	Increase	Increase	Increase	Increase	Increase	Increase
10002-15904	Bus route from P&R to Forty Acre Road	55	Increase	Increase	Increase	Increase	Increase	Increase
10003-15909	Bus route junction joining with Hauxton Road	19	Increase	Increase	Increase	Increase	Increase	Increase
15509-15905	Hauxton Road	63	No change	No change	No change	No change	No change	Increase

Link ID	Road Name	Number of dwellings within 50m	1dB or greater noise level change					
			Cyan	Magenta	Purple	White	Yellow	Purple CAP
15516-15914	Shelford Road	59	No change	No change	No change	No change	No change	Increase
15904-15905	Existing P&R Hauxton Road access	12	Increase	No change	Increase	Increase	Increase	No change
15904-96009	Cambridgeshire Guided Busway	70	Increase	No change	Increase	Increase	Increase	No change
15905-15907	Hauxton Road	56	No change	No change	No change	No change	No change	Increase
15907-10002	Forty Acre Road junction to Hauxton Road	28	Increase	Increase	Increase	Increase	Increase	Increase
15907-15909	Trumpington Road	30	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
24101-24303	Cambridge Road (Church Road to J11 roundabout)	16	Decrease	No change	Decrease	Decrease	Decrease	Decrease
24101-44406	Cambridge Road (south of proposed P&R to Church Road)	16	Increase	No change	No change	No change	No change	No change
24101-50004	Cambridge Road (south of proposed P&R to Church Road)	16	No change	No change	No change	Increase	Increase	No change
24101-80013	Cambridge Road (south of proposed P&R to Church Road)	16	No change	No change	Increase	No change	No change	Increase

Source: Mott MacDonald

Table A-2: PM Peak Hour affected roads within study area

Link ID	Road Name	Number of dwellings within 50m	1dB or greater noise level change					
			Cyan	Magenta	Purple	White	Yellow	Purple CAP
10001-15907	Forty Acre Road junction to Hauxton Road	23	Increase	Increase	Increase	Increase	Increase	Increase
10001-15909	Hauxton Road north of Forty Acre Road junction	29	Increase	Increase	Increase	Increase	Increase	Increase
10002-10003	Bus route north Forty Acre Road (parallel with Hauxton Road)	25	Increase	Increase	Increase	Increase	Increase	Increase

Link ID	Road Name	Number of dwellings within 50m	1dB or greater noise level change					
			Cyan	Magenta	Purple	White	Yellow	Purple CAP
10002-15904	Bus route from P&R to Forty Acre Road	55	Increase	Increase	Increase	Increase	Increase	Increase
10003-15909	Bus route junction joining with Hauxton Road	19	Increase	Increase	Increase	Increase	Increase	Increase
15904-15905	Existing P&R Hauxton Road access	12	Decrease	Increase	Decrease	Decrease	Decrease	Increase
15904-96009	Cambridgeshire Guided Busway	70	Increase	No change	Increase	Increase	Increase	Increase
15907-10002	Forty Acre Road junction to Hauxton Road	28	Increase	Increase	Increase	Increase	Increase	Increase
15907-15909	Trumpington Road	30	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
15909-15914	Hauxton Road with Shelford Road junction	10	No change	No change	No change	No change	No change	Increase
15911-15912	High Street	34	No change	No change	No change	No change	No change	Increase
24101-24205	Cambridge Road	6	No change	No change	No change	No change	No change	Increase
24101-24303	Cambridge Road (Church Road to J11 roundabout)	16	Decrease	No change	Decrease	Decrease	Decrease	Decrease
24101-27502	Hauxton Road	144	No change	Increase	Increase	Increase	Increase	No change
24101-44406	Cambridge Road (south of proposed P&R to Church Road)	16	Increase	No change	No change	No change	No change	No change
24101-50004	Cambridge Road (south of proposed P&R to Church Road)	16	No change	No change	No change	No change	Increase	No change
24101-80013	Cambridge Road (south of proposed P&R to Church Road)	16	No change	No change	Increase	No change	No change	No change

Source: Mott MacDonald

G. Water

TAG Water Environment Impacts Worksheet - **Cyan, White and Purple options**

	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The area around proposed new park and ride site on the northern side of the A10 as it approaches J11 on the M11. A wider study area extends to the north of the potential park and ride site up to the River Cam, and along potential access routes into and out of the park and ride site. This includes a relatively small area of land between the new site and the existing park and ride site at Trumpington.									
OPTION ASSESSED : CYAN, WHITE and PURPLE Options - these have no significant difference in layout relative to water resources - new park and ride at J11 has similar footprint across the options although the orientation varies , all have tunnel access below A10 from M11 northbound slip.									
change to surface water runoff quantity and quality	River Cam	Water supply	No water supply abstraction in vicinity of scheme	Local (not used for public water supply - could be local farmer abstractions)	Commonplace	Not substitutable	No abstractions for water supply in project area	Negligible - scheme would not affect any abstraction from River Cam	Insignificant
		Biodiversity	Route is within 160 metres of River Cam - not designated for biodiversity until approximately 1.2km downstream to Byrons Pool Nature Reserve	Local	Byrons Pool NR is scarce locally	Not substitutable	Medium	Negligible - scheme unlikely to impact on biodiversity in the nature reserve	Insignificant
		Recreation and value to economy	Route is within 160 metres of River Cam - downstream stretches in particular are important for tourism (punting and riverside walks) and fishing downstream.	Local	Scarce locally	Not substitutable	Medium	Negligible as scheme would not affect recreation associated with River Cam	Insignificant
Potential impact on flood plain	River Cam Floodplain	Conveyance of flood flows - Flood Zones 2 and 3	Flood Zone 2 and Flood Zone 3 boundaries are within 100m of the northern site boundary (EA Website)	Regional	Commonplace	Substitutable if compensatory flood storage provided if development intrudes into flood plain	Medium	Negligible - scheme would have no loss of flood plain.	Insignificant
quality impacts on surface water runoff quality and quantity	Stillwater Ponds one is on the site and three are along the northern edge of proposed park and ride site	Biodiversity	three small copralite ponds on the northern edge and one ditch bisecting proposed site.	Regional potential for GCN in the ponds - HSI assessment reported in PEA (2019)	Commonplace in Cambridgeshire	Substitutable if compensatory habitat is required within scheme footprint	Medium	Negligible impact on ponds themselves - so no impact on GCN habitat likely - may increase potential habitat as part of SUDS scheme.	Insignificant
		Aesthetics - contribution to landscape character	three small copralite ponds on the northern edge and one ditch bisecting proposed site.	Local	Commonplace in Cambridgeshire	Substitutable as part of SUDs design for scheme	Low	Negligible - not likely to impact three copralite ponds of site and intend to keep onsite ditch feature.	Insignificant
spillage of contaminants infiltrate the ground	Groundwater	Water supply	No source protection zones in project area (EA Website) - maybe used by some farmers in area for agricultural supplies.	Local as no potable water supplies from within reasonable distance of the project site	Commonplace	Not substitutable	Medium	Negligible as no source protection zones so groundwater below site not likely to be used for potable water supply. Scheme design will include provision for collection of spillage in drainage, scheme should minimise risk of spillages due to accidents on the M11 J11 roundabout by reducing traffic in future. Tunnel access below A10 will be below groundwater in sealed section - all drainage pumped to SUDS - no impact on groundwater quality. Construction will be in accordance with EA Pollution Prevention requirements.	Insignificant
reduction in flow in groundwater	Groundwater	Chalk aquifer - conveyance of good quality groundwater	Aquifer is principal aquifer (outcropping Grey Chalk - no superficial cover) - BGS data Soils are thin (aerial imagery shows chalk presence below soils) so groundwater will have high vulnerability	Regional	Commonplace	Not substitutable	Medium	Negligible as scheme will not affect conveyance. The low permeability car park surface will lead to change in recharge but on a very small percentage area of aquifer outcrop, and much of the runoff will be collected and discharged to SUDS draining to ground.	Insignificant

Reference Sources

Public data sources - Defra Magic website, EA website (flood zone information), BGS data sources Mott MacDonald "CSWT Preliminary Ecological Report" (January 2019) - doc ref 53699-AMM-ENV-XX-RP-EN-0037. Cambridge South West Park and Ride consultation brochure - 26 November 2018 Option layout drawings provided by Skanska. (H17273-ST5-00-XX-M2-C-CYAN, H17273-ST5-00-XX-M2-C-WHITE, H17273-ST5-00-XX-M2-C- PURPLE)
--

Summary Assessment Score

Insignificant impact on water resources.
--

Qualitative Comments

--

TAG Water Environment Impacts Worksheet - **Yellow option**

	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The area around proposed new park and ride site on the northern side of the A10 as it approaches J11 on the M11. A wider study area extends to the north of the potential park and ride site up to the River Cam, and along potential access routes into and out of the park and ride site. This includes a relatively small area of land between the new site and the existing park and ride site at Trumpington.									
OPTION ASSESSED : <u>YELLOW</u> - new park and ride site at J11, access roads from M11 and A10 at grade.									
change to surface water runoff quantity and quality	River Cam	Water supply	No water supply abstraction in vicinity of scheme	Local (not used for public water supply - could be local farmer abstractions)	Commonplace	Not substitutable	No abstractions for water supply in project area	Negligible - scheme would not affect any abstraction from River Cam	Insignificant
		Biodiversity	Route is within 160 metres of River Cam - not designated for biodiversity until approximately 1.2km downstream to Byrons Pool Nature Reserve	Local	Byrons Pool NR is scarce locally	Not substitutable	Medium	Negligible - scheme unlikely to impact on biodiversity in the nature reserve	Insignificant
		Recreation and value to economy	Route is within 160 metres of River Cam - downstream stretches in particular are important for tourism (punting and riverside walks) and fishing downstream.	Local	Scarce locally	Not substitutable	Medium	Negligible as scheme would not affect recreation associated with River Cam	Insignificant
Potential impact on flood plain	River Cam Floodplain	Conveyance of flood flows -Flood Zones 2 and 3	Flood Zone 2 and Flood Zone 3 boundaries are within 100m of the northern site boundary (EA Website)	Regional	Commonplace	Substitutable if compensatory flood storage provided if development intrudes into flood plain	Medium	Negligible - scheme would have no loss of flood plain.	Insignificant
quality impacts on surface water runoff quality and quantity	Stillwater Ponds - one is on the site and three are along the northern edge of proposed park and ride site	Biodiversity	three small copralite ponds on the northern edge and one ditch bisecting proposed site.	Regional potential for GCN in the ponds - HSI assessment reported in PEA (2019)	Commonplace in Cambridgeshire	Substitutable if compensatory habitat is required within scheme footprint	Medium	Negligible impact on ponds themselves - so no impact on GCN habitat likely - may increase potential habitat as part of SUDS scheme.	Insignificant
		Aesthetics - contribution to landscape character	three small copralite ponds on the northern edge and one ditch bisecting proposed site.	Local	Commonplace in Cambridgeshire	Substitutable as part of SUDS design for scheme	Low	Negligible - not likely to impact three copralite ponds offsite and intend to keep onsite ditch feature.	Insignificant
spillage of contaminants infiltrate the ground	Groundwater	Water supply	No source protection zones in project area (EA Website) - maybe used by some farmers in area for agricultural supplies.	Local as no potable water supplies from within reasonable distance of the project site	Commonplace	Not substitutable	Medium	Negligible as no source protection zones so groundwater below site not likely to be used for potable water supply. Scheme design will include provision for collection of spillage in drainage, scheme should minimise risk of spillages due to accidents on the M11 J11 roundabout by reducing traffic in future. No significant requirement for construction below water table as all access roads from A10/M11 at grade.	Insignificant
reduction in flow in groundwater	Groundwater	Chalk aquifer - conveyance of good quality groundwater	Aquifer is principal aquifer (outcropping Grey Chalk - no superficial cover) BGS data Soils are thin (aerial imagery shows chalk presence below soils) so groundwater will have high vulnerability	Regional	Commonplace	Not substitutable	Medium	Negligible as scheme will not affect conveyance. The low permeability car park surface will lead to change in recharge but on a very small percentage area of aquifer outcrop, and much of the runoff will be collected and discharged to SUDS draining to ground.	Insignificant

Reference Sources

Public data sources - Defra Magic website, EA website (flood zone information), BGS data sources
Mott MacDonald "CSWT Preliminary Ecological Report" (January 2019) - doc ref 93689-MMD-ENV-XX-RP-EN-0037.
Cambridge South West Park and Ride consultation brochure - 26 November 2018
Option layout drawings provided by Skanska. (H17273-ST5-00-XX-M2-C-YELLOW)

Summary Assessment Score

Insignificant impact on water resources.

Qualitative Comments

TAG Water Environment Impacts Worksheet - **Magenta option**

	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The area around proposed new park and ride site on the northern side of the A10 as it approaches J11 on the M11. A wider study area extends to the north of the potential park and ride site up to the River Cam, and along potential access routes into and out of the park and ride site. This includes a relatively small area of land between the new site and the existing park and ride site at Trumpington.									
OPTION ASSESSED -MAGENTA OPTION- Decking option on existing Trumpington Park and Ride Site - at grade access lanes off M11 and on A10 approach to M11 J11 Roundabout.									
change to surface water runoff quantity and quality	River Cam	Water supply	No water supply abstraction in vicinity of scheme	Local (not used for public water supply and housing or Trumpington Countryside Park surrounding site so no agricultural abstractions in vicinity)	Commonplace	Not substitutable	No abstractions for water supply in project area	Negligible	Insignificant
		Biodiversity	Route is within 550 metres of River Cam - not designated for biodiversity, Approximately 500m east of closest point to Byrons Pool Nature Reserve	Local	Byrons Pool NR is scarce locally	Not substitutable	Medium	Negligible - scheme will not directly affect biodiversity in the nature reserve or in River Cam.	Insignificant
		Recreation and value to economy	Route is within 550 metres of River Cam at closest point - downstream stretches in particular are important for tourism (punting and riverside walks) and fishing downstream.	Local	Scarce locally	Not substitutable	Medium	Negligible as scheme would not affect recreation associated with River Cam	Insignificant
Potential impact on flood plain	River Cam Floodplain	Conveyance of flood flows -Flood Zones 2 and 3	Flood Zone 2 and Flood Zone 3 boundaries are at least 500m the northern site boundary (EA Website)	Regional	Commonplace	Substitutable if compensatory flood storage provided if development intrudes into flood plain	Medium	Negligible - scheme would have no loss of flood plain.	Insignificant
spillage of contaminants infiltrate the ground	Groundwater	Water supply	No source protection zones in project area (EA Website) - no agriculture ongoing as surrounding areas are housing development and Trumpington Countryside Park.	Local as no potable water supplies from within reasonable distance of the project site	Commonplace	Not substitutable	Medium	Negligible as no source protection zones so groundwater below site not likely to be used for potable water supply. Development largely on area of existing hard standing/road surfaces. All drainage will be compliant with EA Pollution Prevention requirements and discharges to SUDS with approvals to be confirmed with EA.	Insignificant
reduction in flow in groundwater	Groundwater	Chalk aquifer - conveyance of good quality groundwater	Aquifer is principal aquifer (outcropping Grey Chalk - no superficial cover) - BGS data River Terrace Gravels overly the Chalk below the Park and Ride site. Permeable and likely to be in hydraulic continuity with the Chalk.	Regional	Commonplace	Not substitutable	Medium	Negligible as scheme will not affect conveyance. The existing low permeability car park surface are will not be increased. All works are mainly above ground - some foundations for decking will be required but unlikely to have any significant impact on groundwater flow.	Insignificant

Reference Sources

Public data sources - Defra Magic website, EA website (flood zone information), BGS data sources Cambridge South West Park and Ride consultation brochure - 26 November 2018 Option layout drawings provided by Skanska. (H17273-ST3-00-XX-M2-C-MAGENTA)
--

Summary Assessment Score

Insignificant impact on water resources.
--

Qualitative Comments

--



Project Risk Ref No.	Project Risk Category	Project Stage	Project Risk Description	Potential Impact	Inherent Risk Rating			CCC Project Manager	Associated Strategic Risk Ref	Risk Mitigation Measures	Residual Risk Rating			Risk Mitigation Owner	ActionsTaken/Actions Identified	Residual Risk Allowance			Current Status	Current RAG Status	Date of last update
					Likelihood	Impact	Score				Likelihood	Impact	Score			Time Allowance in Programme	Budget Contingency	Additional Resource Contingency			
1	Internal Stakeholders		Preferred option does not align with Interim Mayoral Transport Strategy	Challenge to terms of GCP approval process and subsequently any public inquiry	3	4	12	Tim Watkins		Escalation of issues via political process. Continue to develop compliant business case.	3	4	12	Client	Escalation of issues via political process. Continue to develop compliant business case. Draft Technical Note of preferred option being best aligning option with strategy				LIVE	Amber	16/04/2019
2	Internal Stakeholders		Other schemes are brought forward on Trumpington Rd in the short term	Options available for bus priority will be further limited	3	3	9	Tim Watkins		Regular communication with other department heads to ensure schemes along the corridor are cognicent of each other	2	3	6	Client	Regular communication with other department heads to ensure schemes along the corridor are cognicent of each ot. Separate into another scheme, awaiting board approval				LIVE	Green	16/04/2019
3	Internal Stakeholders		City Access scope is not clearly defined	Changes to demand forecasting puts P&R and options considered for bus priority to the City Centre at risk of challenge.	3	5	15	Tim Watkins		Flag as strategic risk. Reguarl liaison with the City Access team to ensure their thinking is included in our optioneering.	3	3	9	Client	Flag as strategic risk. Reguarl liaison with the City Access team to ensure their thinking is included in our optioneering. Report going to June Exec Board				LIVE	Amber	16/04/2019
4	Internal Stakeholders		CAM-specific infrastructure not yet known as vehicle type yet to be determined	Design changes if assumptions are incorrect, leading to cost and programme increases.	3	3	9	Tim Watkins		Design needs to be developed so as to be CAM-compliant as much as possible	2	3	6	Client	Design needs to be developed so as to be CAM-compliant as much as possible				LIVE	Green	16/04/2019
5	City Deal Governance		Political/governance change within GCP could introduce new or conflicting priorities	Delay to delivery and scope creep. Potential for project to be significantly amended or cancelled	3	3	9	Tim Watkins		Continued communication with senior officers/project board on benefits of the project	2	3	6	Client	Continued communication with senior officers/project board on benefits of the project				LIVE	Amber	16/04/2019
6	Statutory Process		New LTP does not support Park & Ride	Undermine strategic case for scheme	3	2	6	Tim Watkins		Escalation of issues via political process. Engagement with CCC policy team.	3	2	6	Client	Escalation of issues via political process. Engagement with CCC policy team.				LIVE	Amber	16/04/2019
7	Statutory Process		Consequences of planning process results in reassessment of site selection.	Abandonment of OBC in its current form	3	5	15	Tim Watkins		Continue to develop the business case to set out the implications clearly and concisely	3	5	15	Project team	Continue to develop the business case to set out the implications clearly and concisely. involve LPA with regular meetings				LIVE	Green	16/04/2019
8	Internal Stakeholders		Emerging recommeded scheme not supported by the Board	Delay / abandonment of OBC	2	5	10	Tim Watkins		Inform board of preferred option prior to board meeting.	2	5	10	Client	Inform board of risks of selecting an alternative to the preferred option, prior to board meeting.				LIVE	Amber	16/04/2019
9	Consultation/Comms		Recommended option is opposed by local residents.	Loss of political support for the scheme.	3	4	12	Tim Watkins		Engagement with stakeholders and effective project governance	3	4	12	Project team	Engagement with stakeholders and effective project governance				LIVE	Amber	16/04/2019
10	Project Funding		Development of processes and procedures related to GCP funding introduces new decision points and reporting requirements.	Delay to programme and increased costs.	3	4	12	Tim Watkins		Emphasis on needd for clear decision making framework.	3	4	12	Client	Emphasis on needd for clear decision making framework.				LIVE	Green	16/04/2019
11	Scheme Development		Conflicting resource allocations with other schemes E.g. Foxton, A1307 project, C2C	Further restrictions on options development, delay to programme and / or erosion of W.O. Scheme objectives.	3	5	15	Tim Watkins		Regular communication with other department heads to ensure adjacent or overlapping schemes are cognicent of each other. Develop a shared approach to assessment.	2	5	10	Client	Regular communication with other department heads to ensure adjacent or overlapping schemes are cognicent of each other. Develop a shared approach to assessment.				LIVE	Amber	16/04/2019
12	Scheme Development		Commuted sum for maintenance cannot be agreed. County Council not willing to accept the maintenance liability.	Cannot implement scheme	3	5	15	Tim Watkins		Engagement with County Council. Bus operational plan within management case.	3	5	15	Client	Engagement with County Council. Bus operational plan within management case.				LIVE	Green	16/04/2019
13	Scheme Development		Impact of new P&R on existing local bus services.	Local bus services become unviable.	3	4	12	Tim Watkins		Liaise with bus service providers.	3	4	12	Project Manager	Liaise with bus service providers and City Centre Access team.				LIVE	Amber	16/04/2019
14	Scheme Development		Lack of clarity on programme - Is CPO required for the park and ride site?	Delay to programme and increased costs.	3	4	12	Tim Watkins		Seek an agreement / liaise with Grosvenor when preferred option is known.	1	4	4	Project Manager	Seek an agreement / liaise with Grosvenor when preferred option is known.				LIVE	Amber	16/04/2019
15	Scheme Development		SOBC and Addendum recommendations not accepted by Board	delay, cost, programme	3	3	9	Tim Watkins		Provide basis for evidence-based decision making.	3	3	9	Project team	Provide basis for evidence-based decision making.				CLOSED	Amber	05/09/2018
16	Scheme Development		Incomplete traffic modelling	Forces a reconsideration of options	3	4	12	Tim Watkins		Agree all modelling assumptions and early warning if results suggest any issues	3	4	12	Project team	Agree all modelling assumptions and early warning if results suggest any issues				LIVE	Amber	16/04/2019
17	Scheme Development		Emerging Greenways project proposals complicates options across the M11	Complicates options across the M11	3	4	12	Tim Watkins		Engage with Greenways team	3	4	12	Project Manager	Engage with Greenways team				LIVE	Green	16/04/2019
18	Scheme Development		Junctions options negatively impact Highways England's network	Highways England will not allow that section of the scheme to be implemented. Could require revision of OBC.	3	4	12	Tim Watkins		Include Highways England in the optioneering process and ensure they agreement on modelling assumptions.	3	4	12	Project team	Include Highways England in the optioneering process and ensure they agreement on modelling assumptions.				LIVE	Amber	16/04/2019
19	External Stakeholders		Delay in receipt of procurement information from WYG	Delay in finalising OBC	3	3	9	Tim Watkins		Early and timely supply if information to WYG to ensure sufficient time for procurement information to be developed	2	3	6	Project team	Early and timely supply if information to WYG to ensure sufficient time for procurement information to be developed				LIVE	Green	16/04/2019
20	External Stakeholders		Discrepancy with AECOMs modelling approach at J11	Modelling has to be amended to suit HE's needs. Delay to programme further junction options required.	3	4	12	Tim Watkins		Ongoing management to ensure both modelling teams communicate early on to prevent change for the project.	2	4	8	Project team	Ongoing management to ensure both modelling teams communicate early on to prevent change for the project.				LIVE	Amber	16/04/2019
21	Scheme Development		HE strategic modelling not included within CSRM .	Programme delay & business case impact	3	4	12	Tim Watkins		Ongoing management to ensure both modelling teams communicate early on to prevent change for the project.	2	4	8	Project team	Ongoing management to ensure both modelling teams communicate early on to prevent change for the project.				LIVE	Green	16/04/2019
22	Design		Designs require amendment of existing GCP schemes	Cost, reputation	3	3	9	Tim Watkins		Regular communication with other cycle team heads	2	3	6	Project team	Regular communication with other cycle team heads, report being issued to June GCP Exec Board				LIVE	Green	16/04/2019
23	Supply Chain		Significant Statutory Undertaker's diversions required	Increased construction costs and delays to programme. Greater disruption during construction.	3	5	15	Tim Watkins		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	Project team	Early consultation with Stats bodies to understand the need for diversionary works. C2/C3 estimates to be sent out to provide accurate cost estimates.				LIVE	Green	16/04/2019
24	External Stakeholders		Unfavourable ground conditions, particuarly for the P&R and tunnel options	Increased construction costs and delays to programme. Possibly also future maintenance liabilities	2	4	8	Tim Watkins		Geotechnical investigations when preferred scheme identified to ensure full costs are captured in the business case	1	4	4	Project team	Geotechnical investigations when preferred scheme identified to ensure full costs are captured in the business case				LIVE	Green	16/04/2019
25	Scheme Development		The accomodation bridge is required by Highways England for other purposes	Access options that don't interact with the J11 are limited to new structures	3	5	15	Tim Watkins		Include Highway England in the optioneering process to secure an agreement on use of bridge is permissible.	1	5	5	Project team	Include Highway England in the optioneering process to secure an agreement on use of bridge is permissible.				LIVE	Green	16/04/2019
26	Scheme Development		Slip road enforcement to prevent rat-running through existing site	Rat running traffic causing increased traffic congestion and delays. Potential dispute with HE.	3	2	6	Tim Watkins		Investigate traffic control and enforcement options	1	2	2	Project team	Investigate traffic control and enforcement options				LIVE	Green	16/04/2019
27	Scheme Development		Scheme BCR shows poor or low value for money	Makes scheme approval more challenging and threatens scheme progression.	3	5	15	Tim Watkins		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	Project team	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.				LIVE	Red	16/04/2019
28	External Stakeholders		Waitrose not amenable to amendments to their access	Options available for bus priority along this section will be limited	3	3	9	Tim Watkins		Work within highway boundary and early engagement with Waitrose	1	3	3	Project team	Work within highway boundary and early engagement with Waitrose				CLOSED	Amber	05/09/2018
29	External Stakeholders		J11 Structure cannot be easily widened	Numbers of options reduced / costs increase.	3	3	9	Tim Watkins		Early assessment of structures / obtain as-built drawings from HE.	1	3	3	Project team	Early assessment of structures / obtain as-built drawings from HE.				CLOSED	Amber	16/04/2019
30	Design		Tunnel into site from M11 impacts vertical alignment.	Increased costs, increased visual impacts	3	3	9	Tim Watkins		Identify vertical alignment, discuss with LPA. Ensure costs are considered as part of options sift.	1	3	3	Project team	Identify vertical alignment, discuss with LPA. Ensure costs are considered as part of options sift.				CLOSED	Red	05/09/2018
31	External Stakeholders		Delay in receipt of HE models	Delay to programme further junction options required.	3	3	9	Tim Watkins		Liaise with HE on obtaining all relevant information to enable model alignment and consistency.	3	3	9	Project team	Liaise with HE on obtaining all relevant information to enable model alignment and consistency.				LIVE	Amber	16/04/2019
32	Scheme Development		Managed motorways currently not in HE model.	If included further down the line, M11J11 model may not align with HE version and modelling / options have to be amended to suit HE's needs.	3	3	9	Tim Watkins		Maintain engagement with HE. Progress with current strategy of undertaking sensitivity test of M11J11 models with and without managed motorways.	2	3	6	Project team	Maintain engagement with HE. Progress with current strategy of undertaking sensitivity test of M11J11 models with and without managed motorways.				LIVE	Amber	16/04/2019
33	Design		Difficulty in developing options that work in both managed motorways and current layout.	Lack of resilience for options to deal with potential HE decisions	3	3	9	Tim Watkins		Ensure flexibility to ensure some of the options can accommodate either scenario.	2	3	6	Project team	Ensure flexibility to ensure some of the options can accommodate either scenario.				LIVE	Amber	16/04/2019
34	Scheme Development		The addition of further development sites in the area leads HE to look at introducing an additional junction (e.g. 'Junction 11b').	Incompatibility of M11J11 P&R access options with preferred HE option - delays to programme and additional modelling required.	3	3	9	Tim Watkins		Maintain engagement with HE to monitor the likely path of their decision making	2	3	6	Project team	Maintain engagement with HE and LPA to monitor the likely path of their decision making				LIVE	Amber	16/04/2019

35	Scheme Development		October Board meeting results in different instruction wrt consultation approach / direction	May not be able to meet November consultation start date	3	5	15	Tim Watkins		Evidence-based Board briefing highlighting consequences.	2	5	10	Client	Evidence-based Board briefing highlighting consequences.				CLOSED	Red	05/03/2019
36	City Deal Governance		Delays in approving consultation material results in delay to consultation period	May not be able to meet November consultation start date	3	5	15	Tim Watkins		Early engagement with Comms team to discuss whether period is likely to be sufficient	2	5	10	Client	Early engagement with Comms team to discuss whether period is likely to be sufficient				CLOSED	Red	05/03/2019
37	City Deal Governance		LPA objects to proposed options.	Application rejected.	3	5	15	Tim Watkins		Early identification of proposals to ensure options taken to public consultation already have stakeholder support.	2	5	10	Project team	Early identification of proposals to ensure options taken to public consultation already have stakeholder support.				CLOSED	Amber	05/03/2019
38	Scheme Development		Public opposition to the M11 to City Centre bus priority improvements	Political support for bus priority on Trumpington Road is reduced, potentially impacting effectiveness of P&R services operating from Trumpington. Impact on business case	3	4	12	Tim Watkins		Early identification of proposals to ensure options taken to public consultation already have stakeholder support.	3	4	12	Project team	Early identification of proposals to ensure options taken to public consultation already have stakeholder support. Now recommended included in future separate scheme, report to go to June GCP Exec Board				LIVE	Amber	16/04/2019
39	CCC Resources		Risk that A428, CSETS (A1307) and M11/J11 consultation programmes clash	Programme impacts - potentially resulting in insufficient preparation time.	3	4	12	Tim Watkins		Engagement with GCP Comms team	3	4	12	Project team	Engagement with GCP Comms team				CLOSED	Green	05/09/2018
40	External Stakeholders		Scoping for EIA not well defined	We do more than is needed, or not enough. Cost incurred unnecessarily for the first case, programme and cost delay for the latter.	2	4	8	Tim Watkins		Carry out scoping and consultation with statutory bodies and LPA asap once preferred scheme defined. This will require scoping to commence before final OBC produced.	1	4	4	EIA lead	Carry out scoping and consultation with statutory bodies and LPA asap once preferred scheme defined. This will require scoping to commence before final OBC produced.				LIVE	Green	16/04/2019
41	Project Management		Surveys not carried out in time to inform EIA process	Delay to programme and increased costs.	3	4	12	Tim Watkins		Agree planning programme with EIA so we can properly plan for survey works (to cover all appropriate seasons). Ensure business case programme is aligned with EIA and planning application programme.	2	4	8	EIA lead	Agree planning programme for EIA so we can properly plan for survey works (to cover all appropriate seasons). Ensure business case programme is aligned with EIA and planning application programme. Urgent surveys to be undertaken by MM as programme dictates.				LIVE	Amber	16/04/2019
42	Project Management		Access to land for surveys denied	Unable to carry out required surveys	3	3	9	Tim Watkins		Early identification of land ownership and discussion with owners to seek approval to gain access. Where access not likely, develop approach to EIA that ensures this is not a show stopper for the EIA.	1	3	3	EIA lead	Early identification of land ownership and discussion with owners to seek approval to gain access. Where access not likely, develop approach to EIA that ensures this is not a show stopper for the EIA.				LIVE	Amber	16/04/2019
43	Statutory Process		Construction phase impacts on the strategic network could be significant	Extended detailed TM development stage to ensure impacts are minimised	3	3	9	Tim Watkins		Construction phasing to be developed in conjunction with HE / detailed design.	1	3	3	Project team	Construction phasing to be developed in conjunction with HE / detailed design.				LIVE	Amber	16/04/2019
44	Scheme Development		Instruction for high growth to be used in the modelling for FBC											Project team	Justification for current assumptions and explain impacts of changing to high growth				LIVE	Amber	16/04/2019
45	Scheme Development		Capacity of site may increase or decrease											Project team	Demand modelling to be completed and finalised				LIVE	Green	16/04/2019
46	Scheme Development		Conflicting resource allocations with other schemes E.g. Foxton, A1307 project, C2C	Client				Regular communication with						Project team	Regular communication with other department heads to ensure adjacent or overlapping schemes are cognicent of each other. Develop a shared approach to assessment.				LIVE	Amber	16/04/2019
47	Scheme Development		Conflicting programme with other schemes E.g. Foxton, A1307 project, C2C, South Cambridge Station and EastWest Rail											Project team	Regular communication with other department heads to ensure adjacent or overlapping schemes are cognicent of each other. Develop a shared approach to assessment.				LIVE	Green	16/04/2019
48	Scheme Development		Power grid insufficient to support requirements											Project team	Early design considerations, liaison with DNO once requirements are confirmed				LIVE	Green	16/04/2019
49	Scheme Development		Stability of approach embankments for accommodation bridge raises a concern during HE inspections												Early GI work				LIVE	Amber	16/04/2019
50	Scheme Development		Lack of clarity regarding LPA contacts for scheme developments versus regulatory												Early agreement on list and roles				LIVE	Amber	16/04/2019
51	Scheme Development		Poor communication/lack of integration between design and environmental disciplines											Project team	design meetings and regular communication between discipline leads				LIVE	Green	16/04/2019
52	Scheme Development		Trial trenching not carried out in time to inform the EIA process											Project team	Trenching to be procurred through Skanska				LIVE	Amber	16/04/2019



Cambridge South West Park and Ride

SATURN Modelling and Economic Assessment

January 2019

Mott MacDonald
Stoneham Place
Stoneham Lane
Southampton SO50 9NW
United Kingdom

T +44 (0)23 8062 8800
F +44 (0)23 8064 7251
mottmac.com

Cambridge South West Park and Ride

SATURN Modelling and Economic Assessment

January 2019

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
1.0	31/10/18	T Nugraha/ R Howles	N Gordon	H Clarke	For comment
2.0	14/11/18	R Howles	N Gordon	H Clarke	For comment
3.0	15/01/19	N Gordon	H Clarke	H Clarke	Updated following comments

Document reference: 393699BB03 | 1 | 3

Information class: Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Contents

1	Introduction	1
2	Base Model	2
2.1	Introduction	2
2.2	Re-calibration of Base Model	3
2.2.1	Traffic Data	3
2.2.2	Model Calibration	6
2.2.3	Motorway Flows	10
3	Forecast Year Models	11
3.1	Introduction	11
3.2	Matrix changes	11
3.2.1	Re-allocation of traffic between 'drop-off' and 'park and ride' zones	11
3.2.2	Creation of a new park and ride zone	13
3.3	Scheme Options	14
3.4	Bus improvement schemes North of Trumpington	19
3.5	Sensitivity Tests	22
4	Transport Impacts	23
4.1	Park and Ride flows	23
4.2	Bus journey time savings	23
4.3	Sensitivity Test Results	24
5	Economics	26
5.1	Decongestion benefits	26
5.2	Bus passenger benefits	26
5.2.1	Determination of Routes Affected by The Scheme	27
5.2.2	Estimation of Demand for Each Route	29
5.2.3	Calculation of Journey Time Saving for Each Route	30
5.3	Wider Economic Benefits	32
5.4	PVB Results	32
5.5	Sensitivity Test Results	33

Tables

Table 1: Calibration and Validation Summary of Received Model	6
Table 2: Calibration and Validation Summary	6
Table 3: Calibration screenlines	6

Table 4: Validation screenlines	7
Table 5: AM Peak Screenline/Cordon Validation	7
Table 6: Interpeak Screenline/Cordon Validation	7
Table 7: PM Peak Screenline/Cordon Validation	8
Table 8: AM Peak A10 / A1309 Corridor Count Validation	8
Table 9: Interpeak A10 / A1309 Corridor Count Validation	8
Table 10: PM Peak A108 / A1309 Corridor Count Validation	9
Table 11: A1309 Journey Time Route Validation – received model	9
Table 12: A10 Journey Time Route Validation – received model	10
Table 13: M11/J11 turning count comparison	10
Table 14: Five-day average purpose split – entering Trumpington	12
Table 15: Five-day average purpose split – exiting Trumpington	13
Table 16: Summary of Do Something (DS) scheme options	14
Table 17: Summary of northern bus scheme improvements	20
Table 18: 2031 Park and Ride bus passengers	23
Table 19: 2031 Bus Journey Time Savings (mins) between Existing Park and Ride to City Centre	24
Table 20: 2031 Sensitivity Test Park and Ride bus passengers	24
Table 21: 2031 Sensitivity Test: Bus Journey Time Savings (mins) from Existing Park and Ride to City Centre	25
Table 22: Total Route Time Saving (minutes)	30
Table 23: Present Value Benefits for all Options	32

Figures

Figure 1: CSRM Validation Count Locations	2
Figure 2: Calibration Count Sites – Cambridge	3
Figure 3: Flow Calibration Screenline and Cordon Locations	4
Figure 4: Journey Time Validation Routes – Cambridge	5
Figure 5: A10 journey time route	5
Figure 6: Magenta scheme drawing	15
Figure 7: Cyan Scheme drawing	16
Figure 8: Purple Scheme Drawing	17
Figure 9: White Scheme Drawing	18
Figure 10: Yellow Scheme Drawing	19
Figure 11: Waitrose Junction Improvements	20
Figure 12: Bus lane extension, Trumpington road	21
Figure 13: New bus lane, Trumpington road	21
Figure 14: PVB Calculation Process	26
Figure 15: Entry and Exit Car Routes for expanded existing P&R Site Scenario	28
Figure 16: Entry and Exit Car Routes for existing P&R plus new P&R Site Scenario	28
Figure 17: Inbound and Outbound Bus Routes for existing P&R plus new P&R Sites Scenario	29

1 Introduction

Mott MacDonald has been commissioned by the Greater Cambridge Partnership (GCP) to test the impact of various public transport improvement options along the Trumpington Road corridor to the south west of the city which form part of the Western Orbital Project.

The Cambridge Sub-Regional Model 2 C Series (CSRM2) SATURN highway traffic model has been used to model the proposed options and the resulting assignments used to provide the inputs into the economic assessment of each option.

A spreadsheet-based calculation has been used to estimate benefits to:

- Existing and new P&R passengers, and;
- Existing bus-only passengers.

Travel time savings to bus passengers have been estimated by comparing journey times between the Park and Ride site approaches and The Fen Causeway in Cambridge, combining car legs and bus legs of the journey as appropriate for each option.

Traffic decongestion benefits resulting from providing the additional bus infrastructure have been calculated using the TUBA (Transport Users Benefit Appraisal) program, which carries out an economic appraisal in accordance with published DfT guidance.

2 Base Model

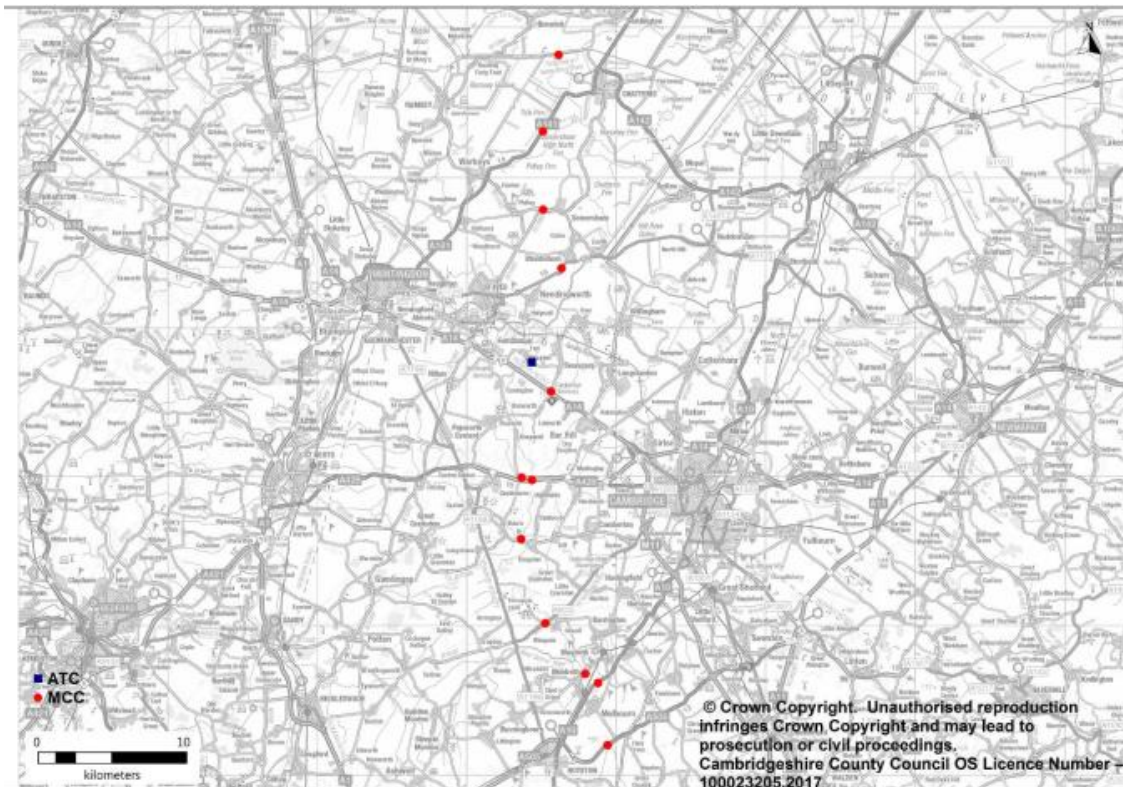
2.1 Introduction

This chapter summarises the review and re-calibration of the C-Series 2015 base year highway traffic model undertaken to improve the suitability of use of the SATURN highway model for the assessment of the proposed M11 Jcn11 Park and Ride scheme.

The model is well validated at a strategic level but for looking at local schemes it was considered sensible to see if any further minor improvements were possible at the local level.

The scheme is also slightly outside the core area of model validation, with the closest screenline 'West of Cambridge', as shown in the figure below.

Figure 1: CSRM Validation Count Locations



Source: Figure 5-4, December 2017 Cambridge Sub-Regional Model 2 C-Series Highway Local Model Validation Report

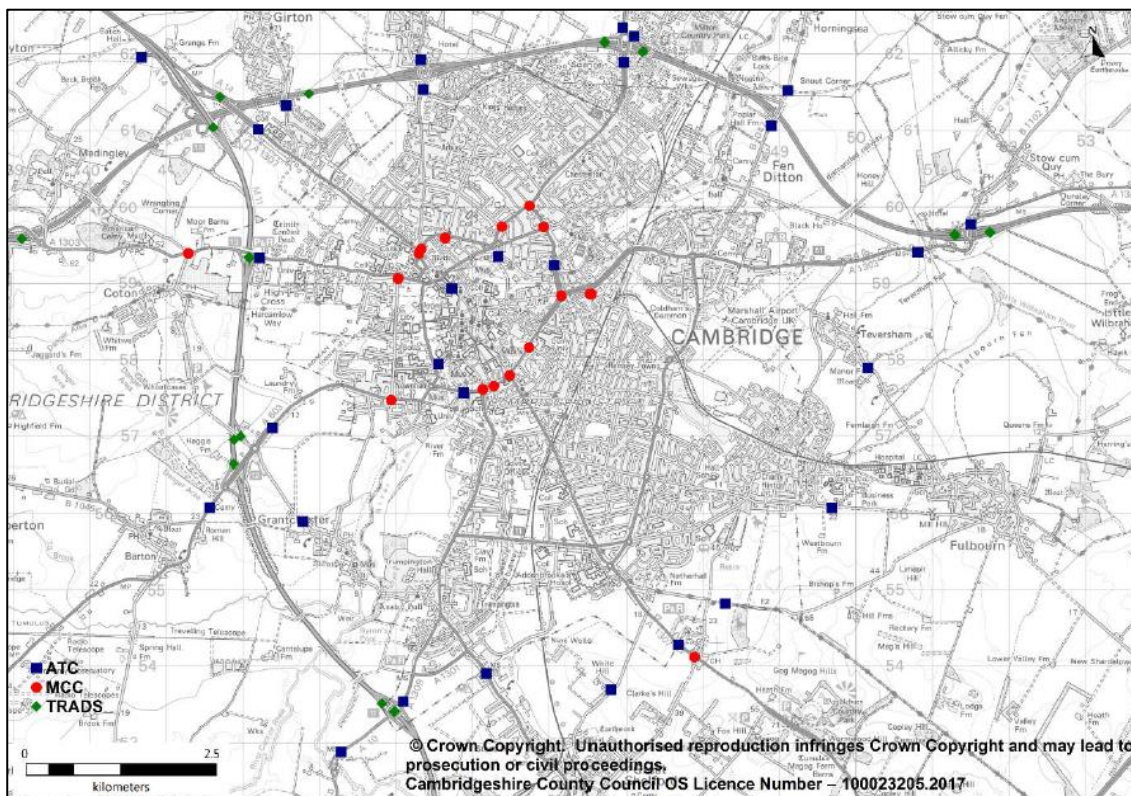
The review of the CSRM therefore concentrated on how well the model replicated observed flows and journey times in the vicinity of the M11 Jcn11 Park and Ride scheme.

2.2 Re-calibration of Base Model

2.2.1 Traffic Data

Figure 1, an extract from the C-Series LMVR shows the location of count data along the A1309 corridor and wider area used in model building. Along the corridor, there are calibration counts on the A10 west of the M11 and A1309 east of the M11 as well as calibration count data on the M11 itself close to junction 11. Count data was converted to an average November weekday if collected during an alternative time-frame.

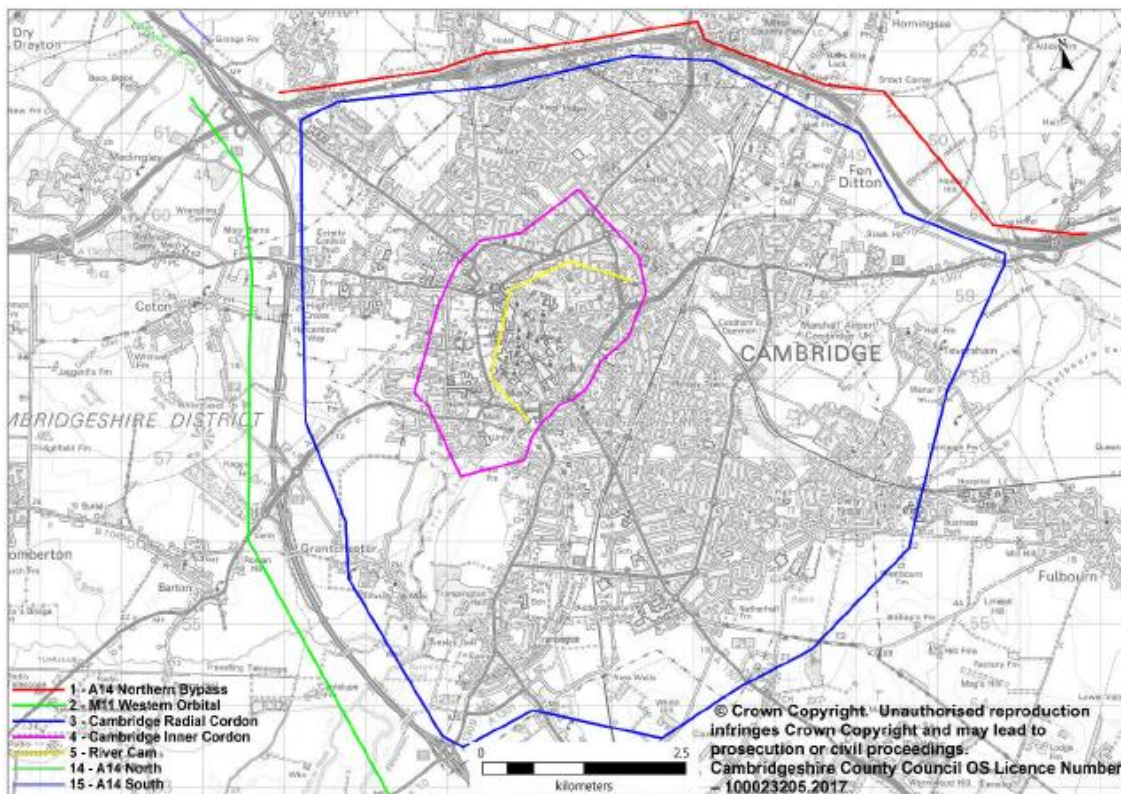
Figure 2: Calibration Count Sites – Cambridge



Source: Figure 5-3, December 2017 Cambridge Sub-Regional Model 2 C-Series Highway Local Model Validation Report

The count data in Figure 1 was organised into a number of screenlines and cordons as shown in Figure 2.

Figure 3: Flow Calibration Screenline and Cordon Locations

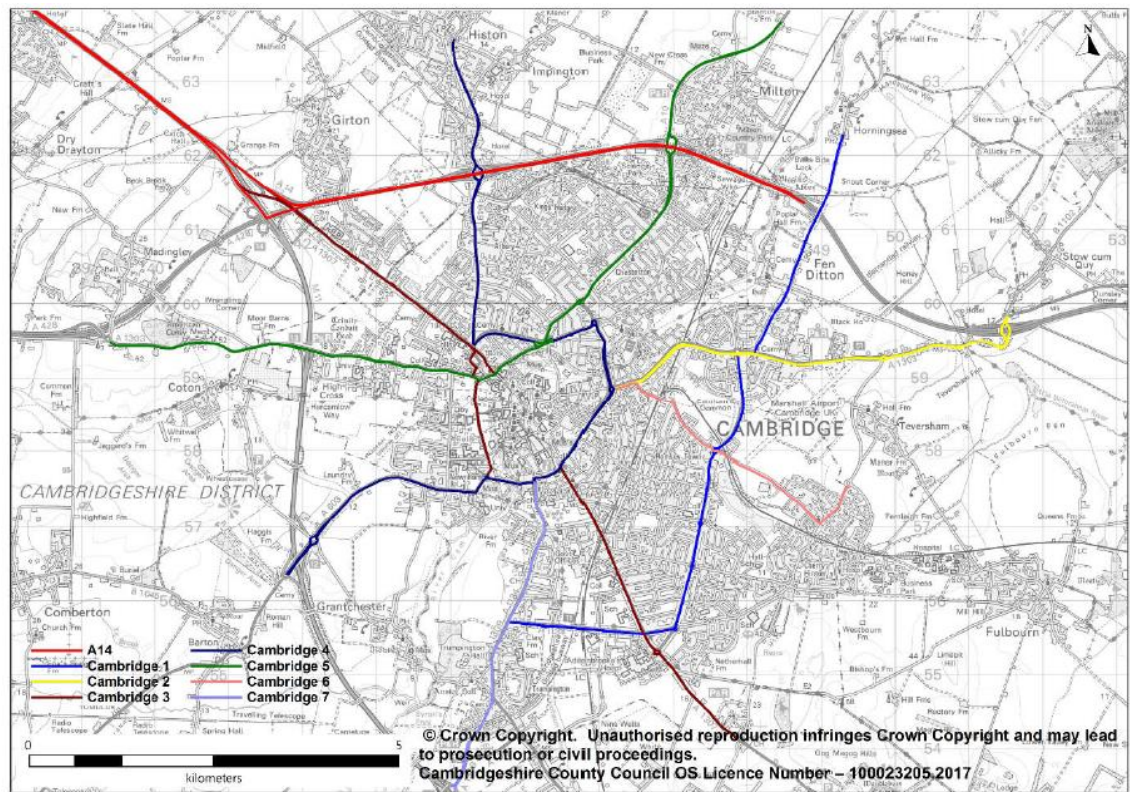


Source: Figure 8-6, December 2017 Cambridge Sub-Regional Model 2 C-Series Highway Local Model Validation Report

In addition to the count data, TrafficMaster data was used to provide observed journey times along specific routes in the model area. Figure 3 shows the journey time routes in Cambridge. This includes one route along the A1309 into the centre of Cambridge.

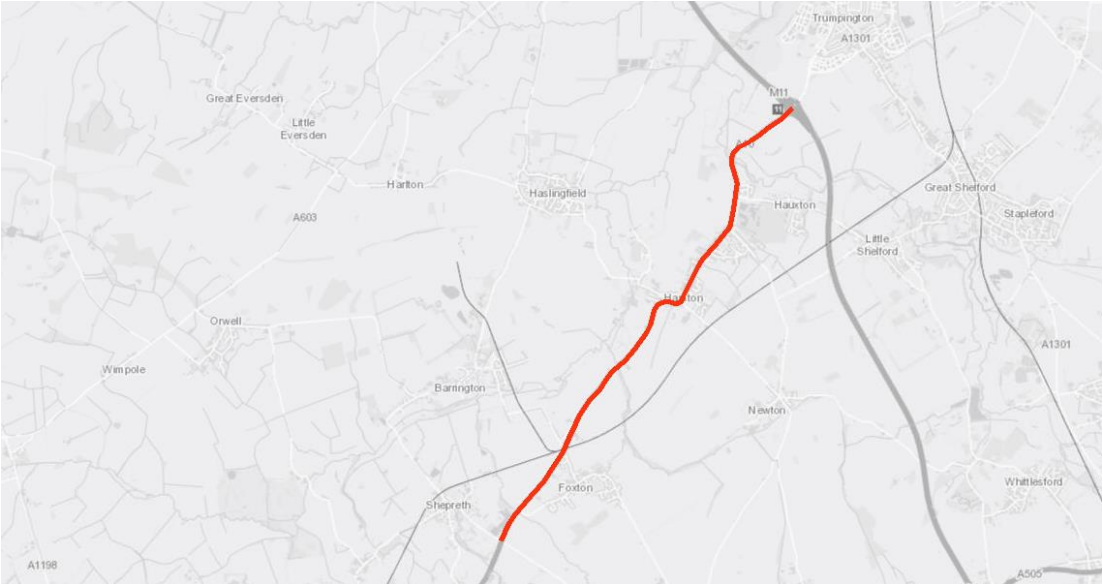
Some of the observed journey times appeared counter-intuitive but, on investigation, it was apparent that there were roadworks in place at the time. For the M11 Jcn11 Park and Ride modelling we have therefore replaced these observed times with Nov 2016 Trafficmaster data. We have also used these data to produce a new journey time route along the A10, from the crossroads south of Shepreth to just east of J11, as shown in Figure 4.

Figure 4: Journey Time Validation Routes – Cambridge



Source: Figure 5-6, December 2017 Cambridge Sub-Regional Model 2 C-Series Highway Local Model Validation Report

Figure 5: A10 journey time route



2.2.2 Model Calibration

Table 1 shows the performance summary of the CSRM 2015 base year model as received for work on this scheme. The percentage of links with GEH statistic lower than 5 is lower than 80% for the AM and PM Peak periods. Moreover, less than 50% of the calibration screenline achieved a flow difference less than 5% in the PM Peak period. For a more detailed report about the calibration of received model please refer to the report 393699-MMD-TMO-XX-RP-TA-0024.

Table 1: Calibration and Validation Summary of Received Model

Screenline Criteria	AM	IP	PM
Links - GEH* <5	78%	84%	75%
Links - GEH <7	86%	89%	84%
Links - WebTAG Flow Criteria	83%	90%	79%
Calibration Screenline - Flow Difference <5%	75%	64%	43%
Validation Screenline - Flow Difference <5%	50%	100%	50%

*The GEH statistic is a measure of 'goodness of fit' of a traffic model. A value less than 5.0 is considered to represent a good fit.

A limited number of changes were made to speed flow curves and signal timings in the received model in order to improve the fit of flows and journey times along the A1309/A10 corridor. Following these changes, there has been an improvement in the calibration and validation statistics in the majority of the cases, but with one additional screenline now just failing in the interpeak period. Tables 2-4 show the overall calibration and validation statistics for the whole model.

Table 2: Calibration and Validation Summary

Screenline Criteria	AM	IP	PM
Links - GEH <5	80%	85%	77%
Links - GEH <7	87%	90%	85%
Links - WebTAG Flow Criteria	85%	90%	81%
Calibration Screenline - Flow Difference <5%	75%	64%	50%
Validation Screenline - Flow Difference <5%	50%	100%	50%

Table 3: Calibration screenlines

Calibration	AM		IP		PM	
	Total	%	Total	%	Total	%
Total number of screenlines	28	-	28	-	28	-
Total flow difference across all screenlines	-6,384	-6%	-3,654	-5%	-7,270	-7%
Screenlines with flow difference <5%	21	75%	17	61%	14	50%
Screenlines with flow difference < 7.5%	22	79%	21	75%	19	68%
Screenlines with GEH <5	22	79%	25	89%	20	71%

Table 4: Validation screenlines

Validation	AM		IP		PM	
	Total	%	Total	%	Total	%
Total number of screenlines	2	-	2	-	2	-
Total flow difference across all screenlines	-686	-4%	-71	-1%	938	5%
Screenlines with flow difference <5%	1	50%	2	100%	1	50%
Screenlines with flow difference < 7.5%	2	100%	2	100%	1	50%
Screenlines with GEH <5	1	50%	2	100%	1	50%

Tables 5 - 7 indicate how well the Cambridge Radial Cordon and the M11 Western Orbital screenline now perform overall in each modelled time period. In the AM and PM peaks, total flows across each of the screenlines/cordons are very similar to the model prior to network edits. In the interpeak, the modelled inbound flow on the radial cordon is now marginally (5.3%) too high to meet the criteria.

Table 5: AM Peak Screenline/Cordon Validation

Screenline/Cordon	Direction	Total Observed Flow (vehs)	Total Modelled Flow (vehs)	Diff	% Diff	Flow Criteria	GEH	Overall
Cambridge Radial Cordon	Inbound	14,295	13,936	-359	-3%	√	√	√
	Outbound	7,256	7,475	219	3%	√	√	√
M11 western orbital screenline	Eastbound	4,487	4,586	99	2%	√	√	√
	Westbound	2,895	2,924	29	1%	√	√	√

Table 6: Interpeak Screenline/Cordon Validation

Screenline/Cordon	Direction	Total Observed Flow (vehs)	Total Modelled Flow (vehs)	Diff	% Diff	Flow Criteria	GEH	Overall
Cambridge Radial Cordon	Inbound	6,759	7,114	355	5%	x	x	x
	Outbound	6,460	6,855	395	6%	x	x	x
M11 western orbital screenline	Eastbound	1,686	1,758	72	4%	√	√	√
	Westbound	1,657	1,711	55	3%	√	√	√

Table 7: PM Peak Screenline/Cordon Validation

Screenline/Cordon	Direction	Total Observed Flow (vehs)	Total Modelled Flow (vehs)	Diff	% Diff	Flow Criteria	GEH	Overall
Cambridge Radial Cordon	Inbound	8,463	8,625	163	2%	√	√	√
	Outbound	13,771	13,625	-145	-1%	√	√	√
M11 western orbital screenline	Eastbound	2,726	3,000	274	10%	x	x	x
	Westbound	4,872	4,527	-345	-7%	x	x	x

Tables 8 - 10 contain a comparison of the modelled and observed flows at the individual A10, A1309 and M11 count sites within the above screenlines/cordons. All of the count locations now meet the WebTAG validation criteria in both directions in all three time periods, although the modelled flow is marginally too high on the A10 eastbound in the PM peak, the GEH still meets the criteria.

Table 8: AM Peak A10 / A1309 Corridor Count Validation

Count Location	Direction	Total Observed Flow (vehs)	Total Modelled Flow (vehs)	Diff	% Diff	Flow Criteria	GEH	Overall
A10 (south of M11) Hauxton	Eastbound	894	1024	131	15%	√	√	√
	Westbound	985	1066	81	8%	√	√	√
A1309 Hauxton Road	Eastbound	1704	1645	-59	-3%	√	√	√
	Westbound	960	974	14	1%	√	√	√

Table 9: Interpeak A10 / A1309 Corridor Count Validation

Count Location	Direction	Total Observed Flow (vehs)	Total Modelled Flow (vehs)	Diff	% Diff	Flow Criteria	GEH	Overall
A10 (south of M11), Hauxton	Eastbound	640	716	76	12%	√	√	√
	Westbound	606	692	86	14%	√	√	√
A1309 Hauxton Road	Eastbound	994	899	-95	-10%	√	√	√
	Westbound	897	898	1	0%	√	√	√

Table 10: PM Peak A108 / A1309 Corridor Count Validation

Count Location	Direction	Total Observed Flow (vehs)	Total Modelled Flow (vehs)	Diff	% Diff	Flow Criteria	GEH	Overall
A10 (south of M11) Hauxton	Eastbound	742	867	125	17%	x	√	√
	Westbound	952	1060	108	11%	√	√	√
A1309 Hauxton Road	Eastbound	1081	1011	-70	-6%	√	√	√
	Westbound	1759	1794	35	2%	√	√	√

Table 11 shows the comparison of modelled and observed journey times along the A1309 from the M11 to the centre of Cambridge. Eastbound modelled journey times in the AM peak are still quicker (18%) than observed. Westbound modelled journey times in the PM peak are also significantly slower than observed (37%).

Table 12 shows the comparison of modelled and observed journey times along the A10 from the M11 to Shepreth. Westbound modelled journey times in the AM and PM peaks are significantly slower (21% and 36%) than observed.

However, all modelled journey times are closer to the observed values than originally received and provide a better basis for evaluating the scheme. This model will also be used to test the proposed measures at Foxton, therefore it was imperative that the journey times were as accurate as possible.

Table 11: A1309 Journey Time Route Validation – received model

Time Period	Direction	Observed (mins:secs)	Modelled (mins:secs)	Difference (mins:secs)	% Difference	Within 15% (or 60 secs if higher)
AM Peak	Eastbound	19:38	16:11	-03:27	-18%	x
	Westbound	13:29	12:27	-01:02	-8%	√
Interpeak	Eastbound	08:56	10:12	01:16	14%	√
	Westbound	09:54	10:26	00:32	5%	√
PM Peak	Eastbound	10:22	10:36	00:14	2%	√
	Westbound	09:51	13:37	02:41	37%	x

Table 12: A10 Journey Time Route Validation – received model

Time Period	Direction	Observed (mins:secs)	Modelled (mins:secs)	Difference (mins:secs)	% Difference	Within 15% (or 60 secs if higher)
AM Peak	Eastbound	14:05	13:51	-00:14	-2%	√
	Westbound	10:07	12:15	02:08	21%	x
Interpeak	Eastbound	11:16	09:59	-01:17	11%	√
	Westbound	10:22	09:48	-00:34	-5%	√
PM Peak	Eastbound	09:54	10:22	00:28	5%	√
	Westbound	10:36	14:28	03:52	36%	x

2.2.3 Motorway Flows

We also compared the updated modelled flows to the turning count recently carried out at M11 J11 (April 2018), as shown in Table 13, This was undertaken to make sure that the modelled flows were satisfactory, although the date of the count is several years later than the modelled base year. The comparison showed that the modelled through movements and turning movements at the junction were largely in proportion with observed data.

Table 13: M11/J11 turning count comparison

M11 Junction Count		Arm A A1309		Arm B M11 SE		Arm C A10		Arm D M11 NW		Total	
cars/lgvs /hgvs		entry	exit	NB off- slip	SB on- slip	entry	exit	SB off- slip	NB on- slip	entry	exit
0800- 0900	obs	868	1524	428	108	916	850	1129	859	3341	3341
	mod	974	1645	310	130	1025	1066	1417	881	3727	3721
		12%	8%	-28%	20%	12%	25%	26%	3%	12%	11%
ave 1000- 1600	obs	987	909	163	201	558	550	639	687	2347	2347
	mod	898	899	381	207	716	692	592	788	2587	2587
		-9%	-1%	134%	3%	28%	26%	-7%	15%	10%	10%
1700- 1800	obs	1814	1152	216	349	707	924	917	1229	3654	3654
	mod	1794	1011	310	554	867	1060	699	1020	3670	3644
		-1%	-12%	44%	59%	23%	15%	-24%	-17%	0%	0%

3 Forecast Year Models

3.1 Introduction

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.

3.2 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

3.2.1 Re-allocation of traffic between 'drop-off' and 'park and ride' zones

Currently at the Trumpington Park and Ride (P&R) site, vehicles are entering and leaving the site from different access points and using the site for multiple purposes. Within the site there is a John Lewis click and collect service as well as the local Trumpington Meadows primary school. Trips to and from these destinations were previously included in a single zone with Park and Ride.

The single zone was therefore split into two, one representing the origin and destination for purely park and ride trips and the other, an additional zone, dedicated to 'drop offs'.

To produce a split of trips between the two zones, we categorised journeys through the analysis of Automatic number-plate recognition (ANPR) data. We looked at registration plates entering and leaving the current P&R site and grouped them based on which hour they arrived or left the site. Duration of stay was also calculated to produce a matrix of how many vehicles entered in any given hour and how long those vehicles stayed for. The reverse was conducted for exiting vehicles.

This process was repeated for an additional four weekdays to produce a five-day average matrix. From this 'drop-off's' and 'parkers' are identified, creating a split ratio between the two (Table 14 and Table 15).

'Drop-offs' were defined as any traffic entering and leaving the park and ride zone within a one-hour time period. Any trips staying longer than this were assumed to be using the park and ride services and categorised as 'parkers'.

Table 14: Five-day average purpose split – entering Trumpington

Entering		Summary	
Hour Beginning	Total Drop-offs	Total Parkers	Split Drop-offs
0	0	0	0.00
1	0	0	1.00
2	0	0	1.00
3	0	0	0.67
4	1	0	0.75
5	3	11	0.19
6	10	194	0.05
7	145	274	0.35
8	104	214	0.33
9	24	155	0.14
10	12	107	0.10
11	15	82	0.16
12	12	58	0.17
13	16	39	0.29
14	25	25	0.49
15	24	13	0.66
16	30	5	0.86
17	20	3	0.89
18	20	1	0.93
19	10	0	0.96
20	7	1	0.86
21	3	0	1.00
22	4	0	1.00
23	1	0	1.00

Table 15: Five-day average purpose split – exiting Trumpington

Exiting		Summary	
Hour Beginning	Total Drop-offs	Total Parkers	Split Drop-offs
0	0	0	0.00
1	0	0	1.00
2	0	0	0.00
3	1	0	1.00
4	1	0	1.00
5	3	0	1.00
6	8	0	1.00
7	117	0	1.00
8	130	0	1.00
9	29	4	0.88
10	12	13	0.47
11	15	32	0.32
12	13	56	0.19
13	14	69	0.16
14	15	88	0.14
15	29	139	0.17
16	35	229	0.13
17	19	287	0.06
18	22	180	0.11
19	10	45	0.18
20	7	26	0.22
21	4	7	0.36
22	4	5	0.41
23	2	1	0.57

Most vehicles entering the park and ride do so between 6AM and 9AM (See Table 14). However, approximately a third stay for less than an hour and are therefore classified as ‘droppers’.

Times at which vehicles exit the park and ride vary more, with a significant number of cars leaving the site at approximately midday (Table 15). Having said this, the majority of vehicles classified as ‘parkers’ follow typical commuting behaviours, leaving the site between 4pm and 7pm.

3.2.2 Creation of a new park and ride zone

Four out of the five scheme options contain plans for an additional Park and Ride site; so an additional zone was included to represent this.

It has been assumed that cars heading south bound on the M11 will use the existing park and ride site, whilst cars approaching Junction 11 northbound on the M11 and eastbound on the A10 will use the new park and ride site.

3.3 Scheme Options

In total, five options have been assessed. One option is the expansion of the existing site through the implementation of decked car parking and nearby access improvements to the site. Whilst the other four options include an additional Park and Ride site situated west of M11 J11 with the existing site not being expanded.

Table 16 highlights some of the key features of each scheme including number of sites, how the buses cross the M11 and how vehicles enter and exit the new site.

Across all schemes with multiple sites, it has been assumed that vehicles travelling southbound on the M11 will be encouraged via signage to use the existing P&R. In this instance, access from this approach stays the same, with vehicles continuing to use the existing roundabout and existing slip road across all options.

Table 16: Summary of Do Something (DS) scheme options

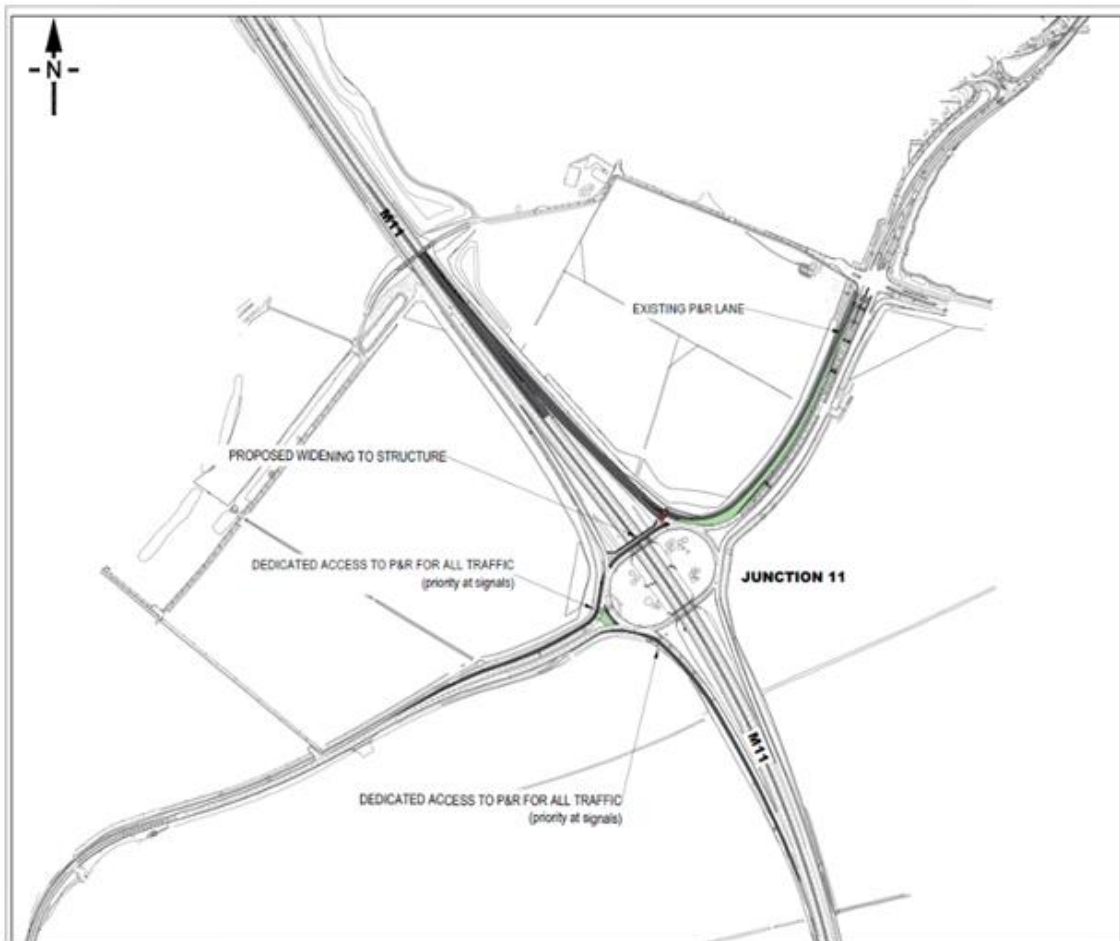
Scheme	No of P&R locations	How buses cross the M11	How cars enter the new / existing site	How cars leave the new / existing site
Magenta	1	N/A	Existing slip road	Signalised T-Junction
		N/A	Signalised T-Junction	Signalised T-Junction
Cyan	2	Existing Accommodation Bridge	Proposed tunnel under A10	Proposed tunnel under A10
			A10 EB slip road	Additional, A10 EB slip road
Purple	2	Through J11 roundabout	Proposed tunnel under A10	Proposed tunnel under A10
			Proposed signalised junction, A10	Proposed signalised junction, A10
White	2	Existing Accommodation Bridge	Proposed tunnel under A10	Proposed tunnel under A10
			Proposed signalised junction, A10	Proposed signalised junction, A10
Yellow	2	Existing Accommodation Bridge	Priority Junction, A10 WB	Additional Priority junction, A10 WB
			A10 EB slip road	Additional A10 EB slip road

Magenta

As stated in Table 16, the first key difference between schemes is the number of Park and Ride sites. Four out of five schemes include plans for an additional site to the west of Junction 11 of the M11. However, Magenta does not.

Magenta assumes expansion of the existing site through the implementation of decked parking, and an improved system of on-slips at Junction 11. Magenta also includes dedicated access lanes for park and ride traffic and a series of priority signals, allowing traffic to enter the site more smoothly (See Figure 6).

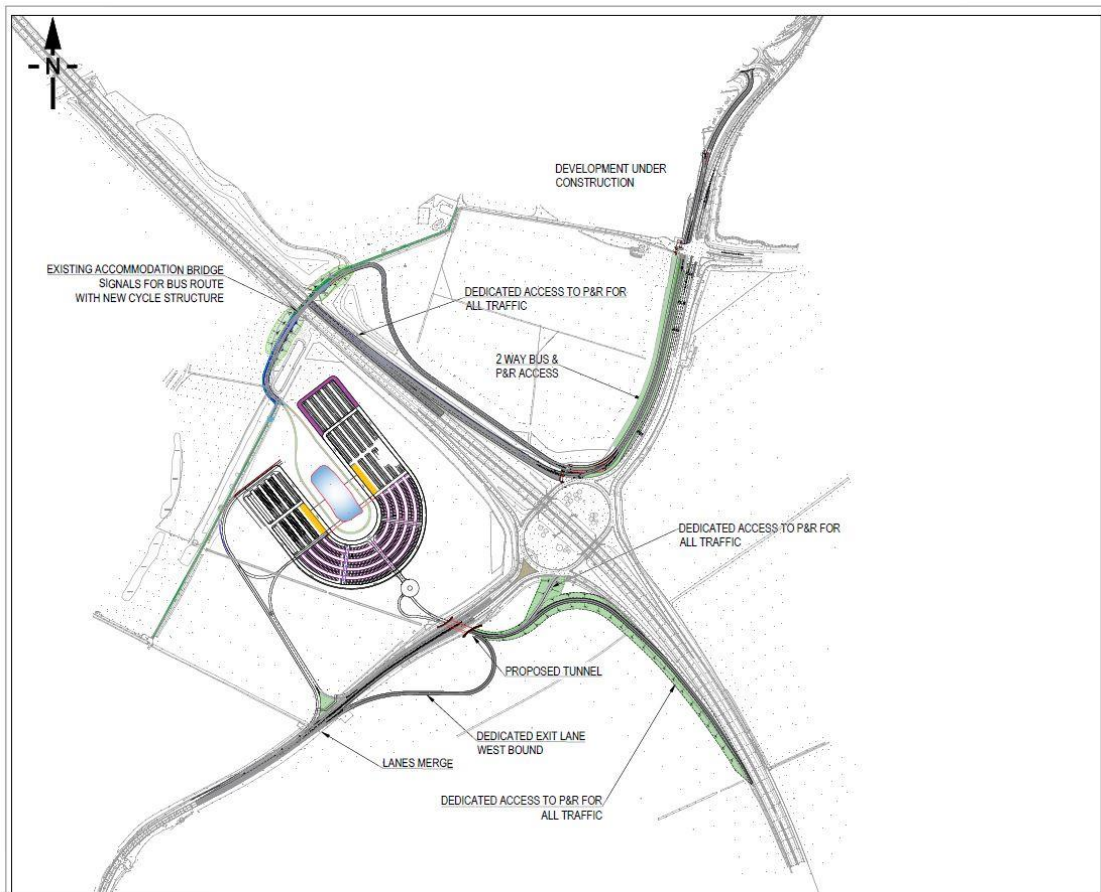
Figure 6: Magenta scheme drawing



Source: Skanska Technology LTD

The second proposal, Cyan is one of four schemes that contains an additional Park and Ride site west of J11 of the M11. Cyan makes use of an existing accommodation bridge to the north for buses to cross the motorway. Here, buses can cross the M11 as part of a two-way bus lane, before heading south and travelling parallel to the existing road network towards Trumpington (See Figure 7).

Figure 7: Cyan Scheme drawing



Source: Skanska Technology LTD

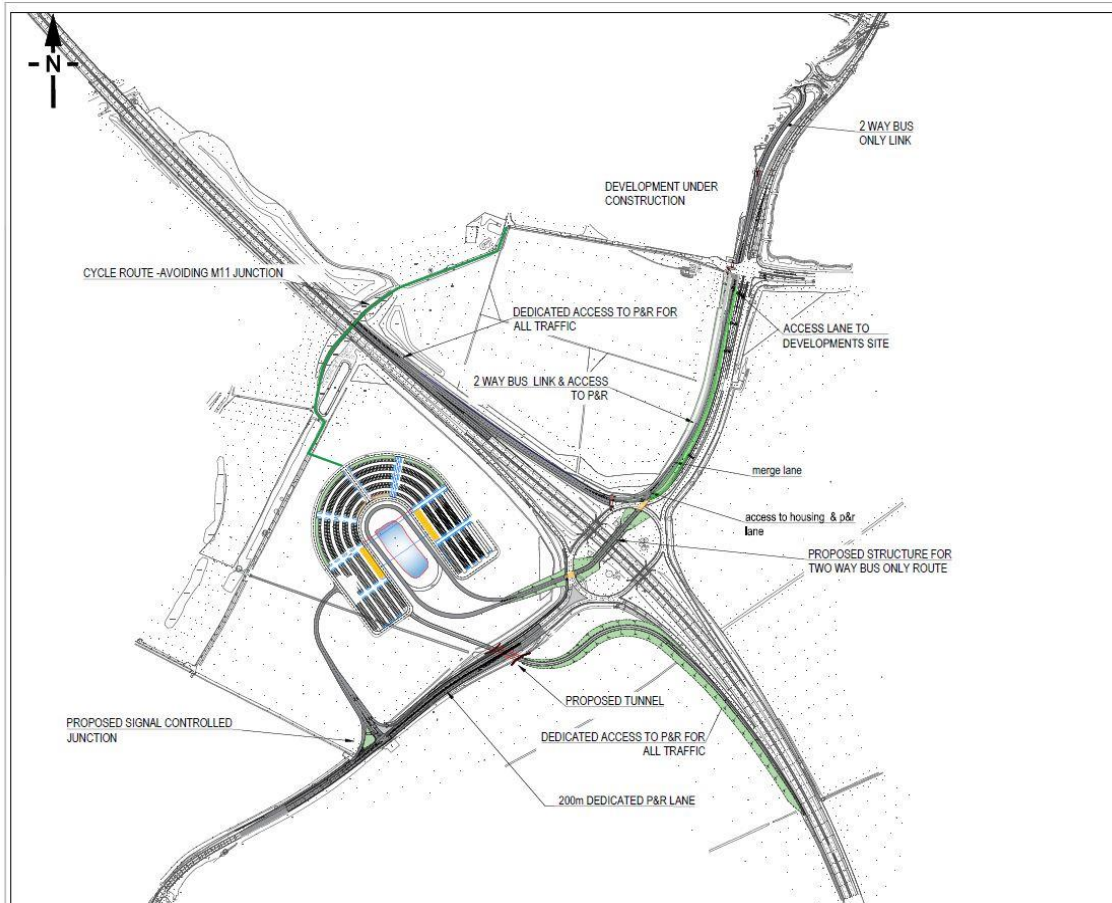
Vehicles approaching Junction 11 Northbound on the M11 enter the new site via a dedicated access lane which passes through a tunnel running under the A10. Traffic can also exit via this tunnel and join a dedicated exit lane which merges with the A10 heading westbound.

For traffic wishing to enter or exit the new site via the A10 Eastbound there is a dedicated off-slip and on-slip located further to the south.

Purple

The third proposal, Purple; takes a more direct approach when considering how buses are to cross the M11. Buses travel through the existing Junction 11 roundabout on a new bridge, with their own dedicated signal stage. (See Figure 8).

Figure 8: Purple Scheme Drawing



Source: Skanska Technology LTD

Vehicles approaching Junction 11 Northbound on the M11 enter the new site via a dedicated access lane which passes through a tunnel running under the A10.

To the south there is a new signalised junction where traffic can enter the site from Junction 11 using a dedicated lane or leave the site and head westbound on the A10.

For unopposed traffic wishing to enter or exit the new site via the A10 Eastbound there is a dedicated off-slip and on-slip designed in as part of the same junction.

Figures 8 and 9 show the layouts for the White and Yellow options. Both options take a similar approach to Cyan in their approach for buses to cross the M11. However, they vary in their vehicle access and egress.

White

Figure 9: White Scheme Drawing

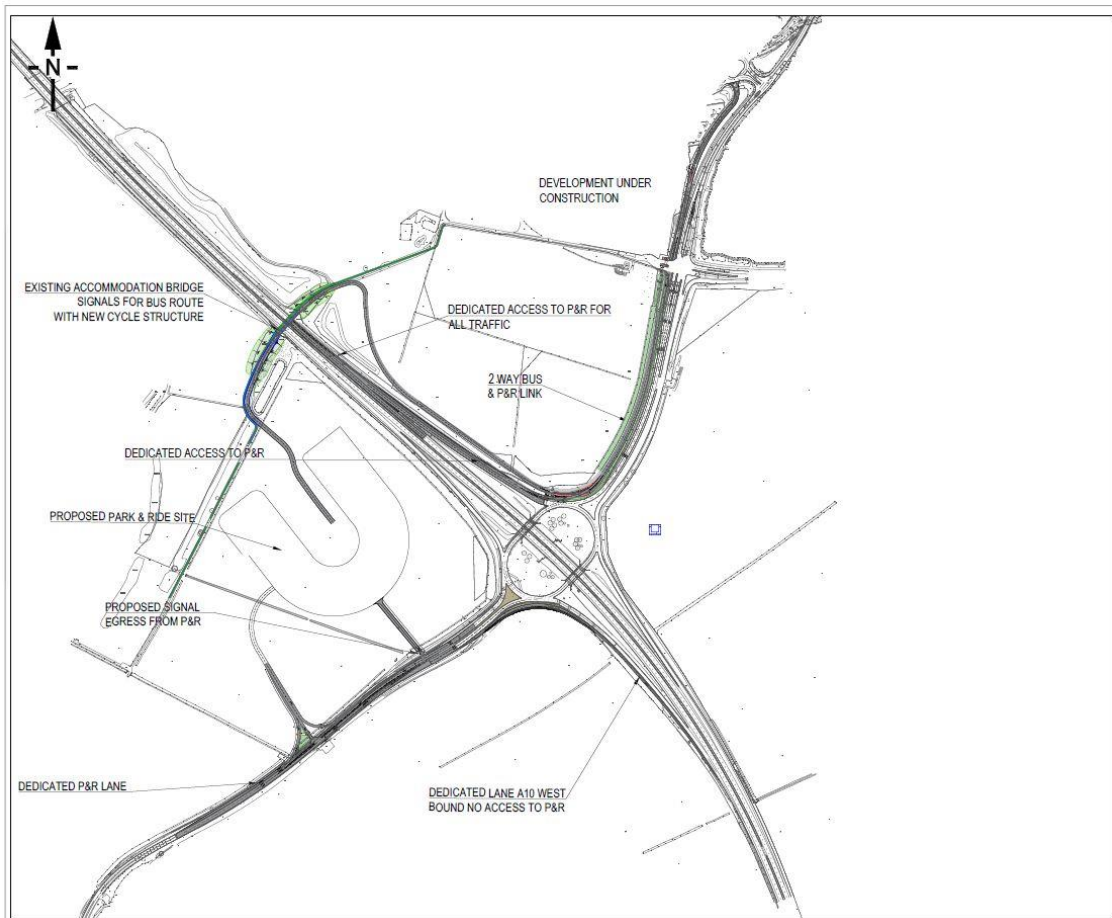


Source: Skanska Technology LTD

White (Figure 9) proposes a similar access strategy to purple. Vehicles approaching Junction 11 Northbound on the M11 enter the new site via a tunnel. Whilst all other traffic enters and exits the site via the proposed signal-controlled junction.

Yellow

Figure 10: Yellow Scheme Drawing



Source: Skanska Technology LTD

Yellow includes an additional signalised egress for all traffic wishing to exit the site and head westbound on the A10.

Traffic wishing to enter the site from junction 11 or the A10 use the new signalised junction south of the site together with traffic exiting the site and travelling back towards junction 11.

3.4 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 options. These include new bus lanes, bus lane extensions, road widening and improved signalling.

A summary of these northern improvements are shown in Table 17 and are depicted in Figures 10, 11 & 12. 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 17: 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
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.

Figure 11: Waitrose Junction Improvements



Figure 12: Bus lane extension, Trumpington road



Figure 13: New bus lane, Trumpington road



As highlighted in Table 17, 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 10), where a series of improvements ease access in and out of the park and ride. These include dedicated bus lanes.

3.5 Sensitivity Tests

Sensitivity tests were also run assuming that capacity into Cambridge city centre was reduced. The City Access Penalty (CAP) 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 P&R sites. The resulting 2031 matrices were provided from the CSRM model.

Revised Do Minimum and Purple assignments with the capacity reduction impacts were produced (as the purple option performed well under micro-simulation). These assignments were then assessed and compared against their without CAP counterparts to see the impact of the CAP under a DM scenario and the benefits of a CAP in conjunction with a positive scheme option (See Chapters 4.3 & 5.4).

4 Transport Impacts

4.1 Park and Ride flows

Traffic flows to and from the Park and Ride sites have been extracted from the model assignments.

P&R flows for the AM Peak Period were the number of trips accessing the P&R sites while flows for the PM Peak period were the number of trips exiting the P&R sites. For the interpeak period an average of trips arriving and leaving the P&R was used.

A conservative assumption for car occupancy rate of 1.00 was used to convert these car trips into bus passengers. The final P&R flows for each site in each time period are shown in Table 18: .

Table 18: 2031 Park and Ride bus passengers

Time Period	Do Minimum	Magenta	Two P&R Options (Cyan, Purple, White, and Yellow)	
	Existing P&R	Existing P&R	Existing P&R	New P&R
AM	314	448	231	217
IP	109	153	72	81
PM	426	568	301	267

The first two columns of the table show the existing P&R demand in the singular P&R options (Do Minimum and Magenta). As discussed in section 3.2 , in the two P&R sites options (Cyan, Purple, White, and Yellow), some of the total trips inbound and outbound of the existing P&R in the single P&R options were reallocated to the new site.

Demand for the existing P&R consists of trips accessing the P&R 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 P&R which access the site from the southeast and southwest approaches of Junction 11 of the M11.

4.2 Bus journey time savings

Improvement of bus priority measures along Trumpington Road are expected to improve bus journeys between Trumpington Park and Ride and Cambridge City Centre. Consistent with the assumptions on demand estimation, bus journey time savings for the P&R of the inbound routes and for the outbound routes were used to calculate the total time savings in the AM and PM Peak periods respectively. Meanwhile, the average of inbound and outbound journey time savings was used for the interpeak period. Bus journey time changes are presented in Table 19.

Table 19: 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 both impacted by the northern changes made along Trumpington road but also influenced by the knock-on effects of localised congestion improvements in the surrounding area. Predominantly Junction 11 improvements, but also tweaked 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.

Changes in bus journey time in the IP peak 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 assessments of Purple, White, and Yellow options indicate the signal junction between Trumpington Road and Long Road as 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.

4.3 Sensitivity Test Results

Table 20 provides the revised bus passenger numbers assuming that capacity into Cambridge city centre was reduced through the implementation of a City Access Penalty (CAP).

Table 20: 2031 Sensitivity Test Park and Ride bus passengers

Time Period	Do Minimum	Purple Option	
	Existing P&R	Existing P&R	New P&R
AM	314	415	301
IP	109	158	121
PM	426	530	337

Bus passenger numbers remain the same for Do Minimum with the CAP, as the existing Park and Ride site is already operating at capacity.

Bus passenger numbers increase across all time periods for the Purple option when the capacity of Cambridge City centre is reduced. When comparing the Purple with CAP option with Table 18, the increases in demand are consistent across all time frames. With total demand across both sites increasing by approximately 30-55%.

The results of this increased demand caused by a reduction in city centre capacity can be seen in the reduction in Bus journey times, presented in Table 21.

Table 21: 2031 Sensitivity Test: Bus Journey Time Savings (mins) from Existing Park and Ride to City Centre

Option	AM	IP	PM
Purple Sensitivity Test	1.1	0.7	-0.3

Having applied the CAP to both the DM and purple scenarios, the purple option with CAP portrays similar time saving characteristics as before 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 signalled 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.

5 Economics

5.1 Decongestion benefits

Vehicle, time, and distance matrices were skimmed 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.

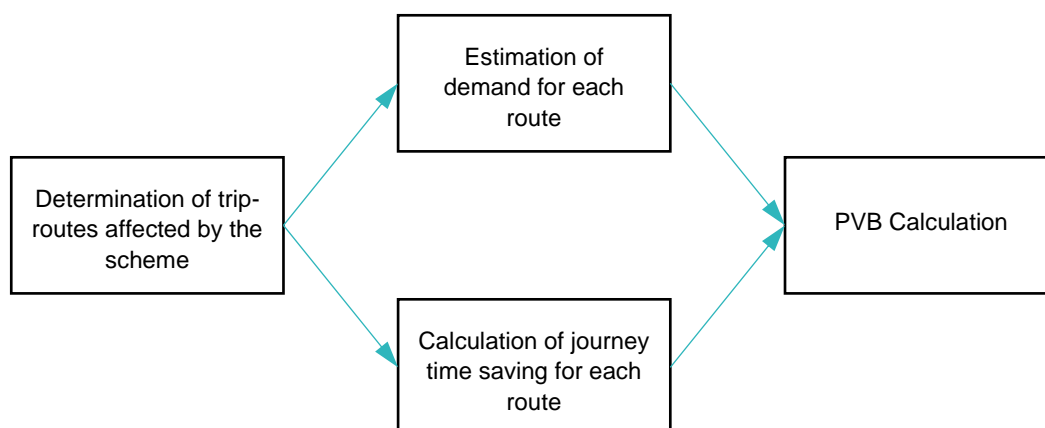
Standard annualisation factors of 759 for the AM peak, 1518 for the interpeak and 759 for the PM peak were used. These assume that the benefits in the modelled AM peak hour of 0800-0900 will be the same for 0700-0800 and 0900-1000. Similarly, they assume that the benefits in the modelled PM peak hour 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. Therefore, it has been assumed that there are no significant decongestion benefits resulting from the project.

5.2 Bus passenger benefits

PVBs were calculated instead 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 13.

Figure 14: PVB Calculation Process



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.

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.

5.2.1 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 P&R from north west of Junction 11 of the M11
2. **South approach** – approach to the P&R from south east of Junction 11 of the M11
3. **West approach** – approach to the P&R from south west of Junction 11 of the M11
4. **Other approach** – approaches to the P&R from elsewhere

The first three approaches represent the main ways drivers are accessing the P&R 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 P&R and Grantchester Road West of the P&R. 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 P&R facility, all approaches access Trumpington Park and Ride. Meanwhile, in Cyan, Purple, White, and Yellow options where there are two P&R sites, the South and West approaches are linked to the new P&R. This assumption was based on the relative ease of accessing the new P&R site from the South and West approaches as cars would not need to go through Junction 11 of the M11. The car-journey routes to enter and exit the P&R in one and two P&R sites scenarios are presented in Figure 15 and Figure 16 respectively.

Further, the inbound and outbound P&R bus routes in the different Scenarios are presented in Figure 17. The inbound P&R bus route between Trumpington and Cambridge City Centre goes north of the P&R towards Trumpington Road and on to the city centre whereas the P&R bus route from Trumpington to Biomedical Campus utilises the guided busway from the P&R 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 15: Entry and Exit Car Routes for expanded existing P&R Site Scenario

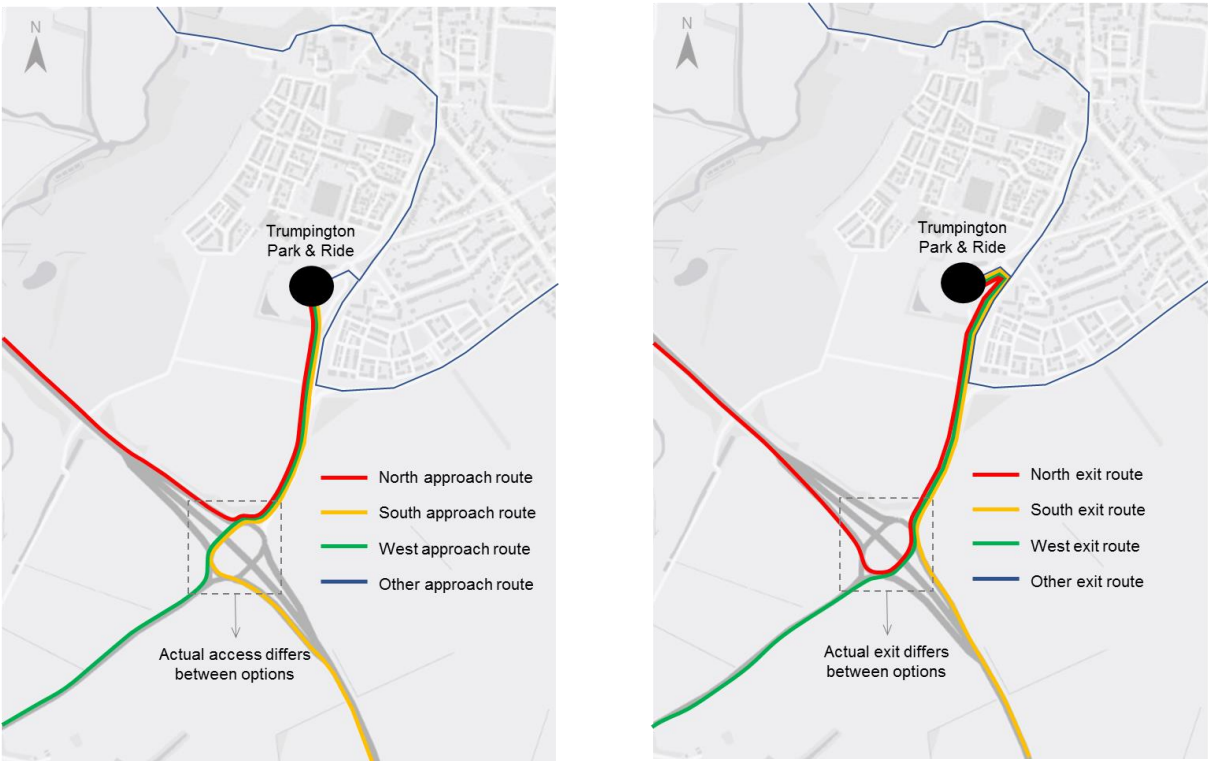


Figure 16: Entry and Exit Car Routes for existing P&R plus new P&R Site Scenario

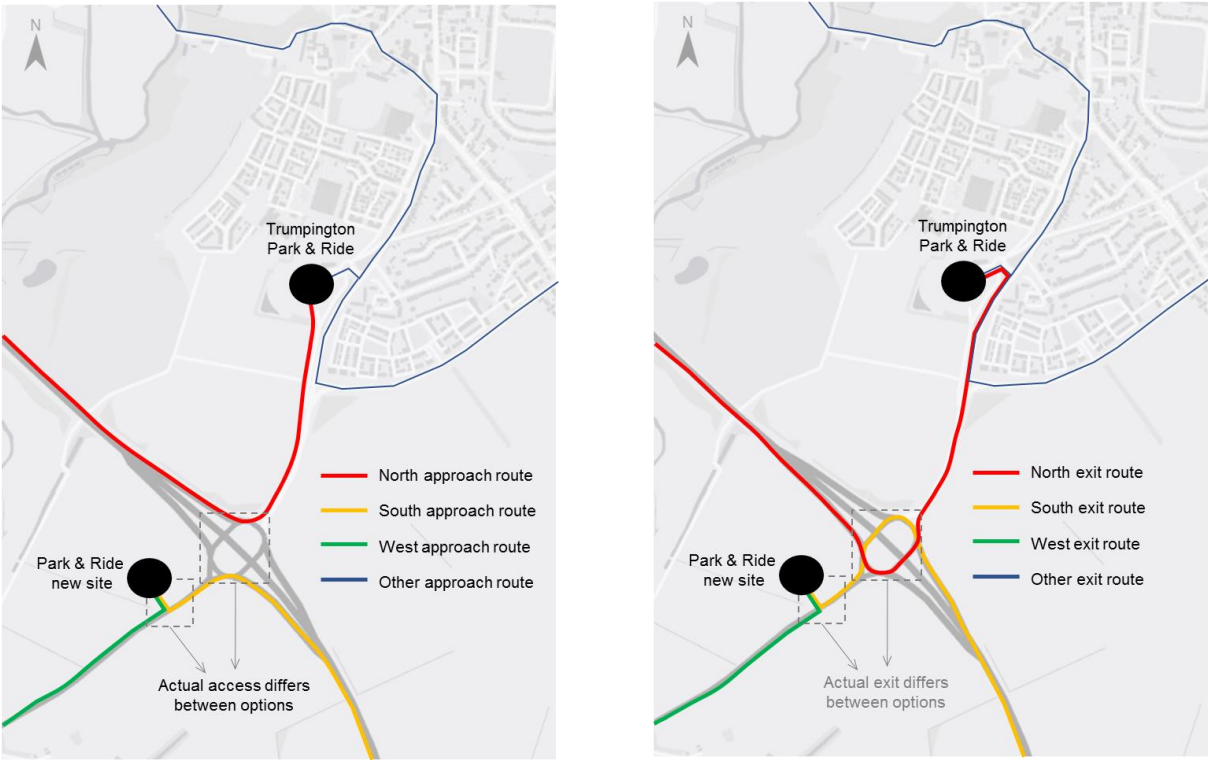


Figure 17: Inbound and Outbound Bus Routes for existing P&R plus new P&R Sites Scenario



5.2.2 Estimation of Demand for Each Route

To obtain P&R demand along each entry route within each time period, a series of select link analysis' have been conducted for the car-journey routes as described in section 5.2.1.

P&R 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 P&R 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 P&R do not utilise the main exit (M11 Northbound). Instead, these trips avoid Junction 11 and go through Grantchester village to either join the M11 in Junction 12, continue towards 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 P&R site, traffic through Grantchester is considerably lower. This is because the new P&R 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 Road to deter drivers from using it as a cut-through.

5.2.3 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 P&R 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 P&R of the inbound routes and for the 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 P&R 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 P&R and biomedical campus with six buses per hour between the new P&R and biomedical campus proposed. This results in a 2.5-minute waiting time reduction for passengers traveling to biomedical campus from the new P&R 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 19 of Chapter 4. Table 22 presents the total journey time saving for traffic using the three main approaches.

Table 22: 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

Approach	Park and Ride Buses to/from City Centre			Park and Ride Buses to/from Biomedical Campus		
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
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 22 shows that total time savings across magenta are generally negative, particularly in the PM peak period. Despite the positive bus time savings in Table 19, 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 P&R traffic from general traffic an additional stage has to be added in two of the three signalised junctions in Junction 11; the entry arms from A10 and from M11 northbound off slip.

In contrast, in Cyan, White, and Yellow options, only the M11 Southbound off slip requires an additional stage. Additionally, in Magenta option there are no additional P&R 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 P&Rs.. 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 P&R. This, however, is reduced by the reduction in waiting time for people using the biomedical campus route.

The Cyan options, while promising higher bus time saving benefits as shown in Table 19: , does not perform particularly better than 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.

5.3 Wider Economic Benefits

The scheme has six objectives, identified under two key headings as follows:

- Reduce (or avoid a negative impact on) general traffic levels and congestion
- Maximise the potential for journeys to be undertaken by sustainable modes of transport

The scheme alone does not unlock any additional development and is unlikely to result in any significant land use changes or intensification. The level of journey time benefits predicted are unlikely to result in any changes in the level and location of economic activity.

The options might widen the travel to work area and increase the supply of labour for the major employment growth areas. More detailed wider economic assessments will be undertaken for the Outline Business Case.

5.4 PVB Results

Standard annualisation factors of 759 for the AM peak, 1518 for the interpeak and 759 for the PM peak were used. 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 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 VOT for EB follows the WebTAG standard for car driver/passenger rather than PSV for working purpose as P&R passengers use cars for part of their journeys.

The PVB for all options are shown in Table 23.

Table 23: Present Value Benefits for all Options

Options	Present Value Benefits		
Magenta	-	£	2,134,950
Cyan		£	4,357,809
Purple		£	4,282,455
White		£	2,665,586
Yellow		£	2,916,003

Note: All PVB values are in 2010 market prices, discounted to 2010

Consistent with the time saving values in Table 22, Magenta resulted in a negative PVB. As discussed in the previous subsection, Magenta suffers from more delays in Junction 11 due to the need for additional stages in two entry arms of the roundabout. This need for additional stages may possibly be eliminated by further design work.

The increase in service frequency is a substantial source of benefits in the other options. The absence of additional P&R bus services in Magenta is another reason for Magenta's negative PVB.

Cyan, White, and Yellow options are similar in terms of their networks. The slightly higher PVB of Cyan compared to White and Yellow may be attributed to the relatively easier exit access from the new P&R through the tunnel. Some of this advantage could also arise from the lower delay in the junction between Trumpington Road and Long Road in the PM Peak period. This, however, is not directly related to the scheme but nevertheless indicates that PVB for the other options may be improved by addressing the delay in this junction.

There are marginal differences between the PVB's of the two P&R sites options. Purple appears to have a slight advantage due to the shorter distance that buses travel through and better signal staging in the junction between M11 southbound off-slip and the circulatory flows in Junction 11. However, the marginal differences of the PVB between the four options provide no definitive evidence to support one option over the other.

5.5 Sensitivity Test Results

The same approach as described in section 5.3 was used to calculate bus passenger benefits for the sensitivity tests run assuming that capacity into Cambridge city centre was reduced. The resulting PVB for the purple option is £5,062,398 In 2010 prices discounted to 2010.

This is greater than the equivalent assessment without the capacity reduction of £4,282,455 (See Table 23), due to the reduction in increased travel time in the PM peak outbound resulting from the reduced levels of traffic.



Cambridge South West Park and Ride

Stakeholder Engagement and Communications Plan

April 2019

Mott MacDonald
10 Fleet Place
London EC4M 7RB
United Kingdom

T +44 (0)20 7651 0300
F +44 (0)20 7248 2698
mottmac.com

Greater Cambridge
Partnership

Cambridge South West Park and Ride

Stakeholder Engagement and Communications Plan

April 2019

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
V0.1	08/03/19	E Jackson	H Kenyon	J Pearson	Initial Draft
V0.2	25/04/19	E Jackson	H Kenyon	J Pearson	Final Draft

Document reference: 393699-MMD-BCA-XX-RP-BC-0041

Information class: Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Contents

1	Introduction	7
1.1	Context	7
1.2	Purpose of this document	7
1.3	Consultation Programme	7
2	Communications	8
2.1	Introduction	8
2.2	Approach to Communications	8
2.3	Recording Communications	8
2.4	Branding	8
2.5	Communication Methods	8
2.5.1	Website	8
2.5.2	Email	9
2.5.3	Social Media	9
2.5.4	Printed Materials	9
2.5.5	Events	10
2.5.6	Advertisements	10
2.5.7	Face to Face meetings	10
2.5.8	Briefings	11
2.5.9	Third Party Publicity	11
3	Stakeholders	12
3.1	Introduction	12
3.2	Approach to Stakeholder Engagement	12
3.2.1	Stakeholder Identification	12
3.2.2	Stakeholder Classification	12
3.3	Statutory Stakeholders	13
3.3.1	Other Stakeholders	14
4	Next Steps	15
4.1	Engagement Beyond OBC	15
4.2	Full Business Case	15
	Appendices	16
A.	Stakeholder Engagement Matrix	17

1 Introduction

1.1 Context

This document supports the Outline Business Case (OBC) for the Cambridge South West Park and Ride project, led by the Greater Cambridge Partnership (GCP). Mott MacDonald has been appointed as technical and environmental advisors to GCP to develop the Business Case for this scheme.

Stakeholder engagement and communications will play a key role in the development of the scheme and will ensure that all necessary stakeholders are appropriately engaged in the scheme development.

1.2 Purpose of this document

The purpose of this document is to set out the planned approach to communication and engagement with stakeholders in support of the OBC. This is a live document that will be updated in the future if the scheme proceeds to a Final Business Case (FBC).

The aim of stakeholder engagement and communications is 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.

1.3 Consultation Programme

Consultation for the Cambridge South West Park and Ride is based upon three stages to determine the preferred option;

1. 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.
2. 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.
3. 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.

2 Communications

2.1 Introduction

This section sets out the plan for communications regarding the proposals up to the planned submission of the OBC. Communications will be led by the GCP Communications team with support from the GCP Project team and Mott MacDonald and other consultants. Supporting technical materials for the consultation and other communication materials will be produced by Mott MacDonald and other consultants.

2.2 Approach to Communications

The approach to communications and consultation is in line with the principles of the Greater Cambridge Partnership Communications Strategy and complies with Department for Transport requirements. The Autumn 2018 consultation aims to gather stakeholder feedback on the proposals which will be considered in the appraisal to determine a preferred option. Further stakeholder consultation on a preferred option will be undertaken, including a statutory consultation that will take place as part of the planning process.

2.3 Recording Communications

All written communications will be recorded in the communications log – providing a record of engagement with stakeholders and the public. Written communications received during consultation will be treated as consultation responses and recorded separately in the consultation report. The details of telephone communications will not be recorded in the same way, with stakeholders advised to put consultation responses in writing.

2.4 Branding

Communication materials will be branded in accordance with the adopted GCP Branding Guidelines. The guidelines ensure a consistent look and feel to communications across the different GCP projects regardless of the method of delivery. The branding aims to be clear and legible to as many people as possible, and effectively communicate the key points required.

2.5 Communication Methods

Communications relating to the Cambridge South West Park and Ride project will be delivered through a variety of methods, aiming to reach a wide audience, particularly during the Autumn 2018 consultation. The target audience for the Autumn 2018 consultation is primarily commuters using the existing Trumpington Park and Ride site, and local residents. The communication methods employed will be appropriate to the stakeholders they are aimed at. More information on the classification of stakeholders and methods of communication for different stakeholder groups is contained in chapter 3 of this document.

2.5.1 Website

The GCP website will host all relevant public facing materials in appropriate formats for stakeholders and the public to download and will act as the main source of information throughout the development of the proposals. In most cases, stakeholders seeking information on the proposals will be directed to information already published on the website.

For the Autumn 2018 consultation, a specific consultation website will be set up on the Consult Cambs portal, hosting an online version of the consultation leaflet and questionnaire, as well as other supporting documentation on air quality and the business case process. The website will also host short videos outlining the context and the details of the proposals for consultation.

Following analysis of the consultation outcomes, the reporting will be published on the GCP website.

2.5.2 Email

Information will be emailed to relevant stakeholders where possible, with direct emails about the Cambridge South West Park and Ride proposals specifically, and as part of more general updates including other GCP projects. Emails will inform stakeholders about the Autumn 2018 consultation and alert stakeholders to consultation outcomes and project developments throughout the life of the project.

2.5.3 Social Media

GCP has a presence across the most popular social media platforms, including Facebook and Twitter. These platforms will be used primarily as a tool to raise awareness of consultations and events, and direct users to information on the website, with a particular focus on engaging with younger people who may not be well engaged through other more traditional means. Social media provides a mechanism for stakeholders to get in touch with GCP in relation to the proposals, and comments on the Autumn 2018 consultation received via social media channels will be recorded along with other written responses.

Social media sentiment across these platforms will also be monitored in relation to the proposals to understand the strength of positive and negative feeling in relation to the scheme. Some paid social media advertising will be undertaken.

2.5.4 Printed Materials

Printed materials including an information booklet and questionnaire for the Autumn 2018 consultation will be delivered to residents who are most likely to be affected by the proposals. The questionnaire will include a combination of closed questions to establish the level of support for different options, and open questions allowing respondents to feed back more detailed points.

Consultation leaflets will be sent to approximately 13,000 addresses in the following areas;

- Barrington,
- Foxton,
- Fowlmere,
- Grantchester,
- Haslingfield,
- Harston,
- Hauxton,
- Little Shelford,
- Meldreth,
- Melbourn,
- Newton,
- Trumpington,

- Shepreth

The materials will also be sent to Parish Councils for distribution locally. Printed materials will be available on request to anyone wishing to receive a hard copy of the information, and will be made available at libraries, Park and Ride sites and at public consultation events.

2.5.5 Events

Several events will be held in support of the Autumn 2018 consultation. These will primarily be evening events in residential areas close to the project area and will provide the public with the opportunity to view consultation materials and speak to project and technical staff. Smaller 'pop-up' events will be held during the morning peak at Trumpington Park and Ride, and at lunchtime at Addenbrookes Hospital – aimed at raising awareness amongst commuters and hospital workers respectively. Table 1 shows the planned events schedule.

Table 1: Autumn 2018 Consultation Events

Event Location	Date	Time
Trumpington Park and Ride	Tuesday 20 th November 2018	07:30 – 09:00
	Tuesday 11 th December 2018	07:30 – 09:00
Hauxton Primary School	Wednesday 21 st November 2018	18:00 – 20:00
Trumpington Village Hall	Thursday 29 th November 2018	17:30 – 20:00
Addenbrooke's Treatment Centre	Wednesday 5 th December 2018	12:00 – 14:00
Harston Village Hall	Thursday 6 th December 2018	18:00 – 20:00

Source: GCP

2.5.6 Advertisements

Advertisements will be placed in the local press and on local radio, as well as in key outdoor sites, including bus shelters at the Trumpington Park and Ride site, and on buses, directing the public to sources of information on the proposals during the Autumn 2018 consultation, and encouraging consultation responses.

2.5.7 Face to Face meetings

Face to face meetings will be regularly held with key stakeholders throughout the scheme development and will form part of the Autumn 2018 consultation. The meetings allow a regular dialogue with influential stakeholders and the sharing of more detailed information about the proposals as required. A schedule of face to face meetings with Parish Councils is shown in Table 2.

Table 2: Parish Council Meeting Schedule

Parish Council	Date
Little Shelford	Monday 19 th March 2018
Harston and Hauxton	Friday 5 th October 2018
Foxton	Monday 5 th November 2018
Barrington	Thursday 24 th January 2019

Source: GCP

2.5.8 Briefings

Briefings will be held at key stages of the proposal development, including around consultation. These briefings will be led by the GCP Project team and will aim to inform more influential stakeholders of the proposals and give the opportunity for stakeholders to ask questions of the Project team. Councillors and Executive Board Members, as part of the decision-making process, will be briefed on the proposals through scheduled meetings, with feedback taken from these meetings.

2.5.9 Third Party Publicity

Requests will be sent to other organisations to communicate details of the consultation through their own channels. In particular, information will be channelled to parents through schools and to residents through Parish Councils.

Information on the Autumn 2018 consultation will be published in a press release and is expected to be reported in local news outlets.

3 Stakeholders

3.1 Introduction

This section sets out the plan for stakeholder engagement in relation to the Cambridge South West Park and Ride proposals. The role of stakeholder engagement is to raise awareness of the proposals amongst interested parties and identify potential objections and mitigations to increase acceptability of the proposals.

3.2 Approach to Stakeholder Engagement

Stakeholder Engagement is led by the GCP Communications team, with technical input from the GCP Project team and consultant support as required. Stakeholder engagement for this stage of the project development will build on existing engagement with key stakeholders and introduce other stakeholder groups to the proposals for the first time.

3.2.1 Stakeholder Identification

An exercise to identify stakeholders relevant to this project has been undertaken. The exercise aimed to establish the principal stakeholders with any interest in the project.

The level of interest and influence of the stakeholders in this project will largely dictate the method of engagement. However, as GCP is undertaking several large projects simultaneously, there is some overlap in stakeholder interest between projects, which may influence how some stakeholders are managed.

3.2.2 Stakeholder Classification

The interest and position of stakeholders relevant to the project has been considered and will inform the appropriate methods of communication with each stakeholder group.

Stakeholder interest can be broadly classified as follows;

Manage Closely

Key stakeholders need to be actively and closely managed through frequent communications to keep this group fully engaged with the project.

Methods of engagement will include regular face-to-face meetings and activities to allow for active discussion and consultation, supported by tailored communications that maintain an open dialogue between those closely involved with the project.

Keep Satisfied

Relationships with higher profile stakeholders who may not have a direct interest in the project should be focussed on keeping the stakeholders satisfied.

Methods of engagement will include regular, tailored communications that provide an appropriate level of information without excessive detail. Proactive communications on specific areas of interest may be appropriate and can increase these stakeholders' interest and support for the project.

Keep Informed

Stakeholders in this group will be kept informed of developments through regular communications providing general updates and relevant information. Information will be accessible and general, with opportunities for stakeholders to share views on specific areas of interest as required.

Methods of engagement will include project specific emails and updates, newsletters and briefings on items of specific interest.

Monitor

Stakeholders in this group are unlikely to be actively seeking information about the project but may require general, accessible communications of the key messages.

Methods of engagement will include wider communications techniques that may cut across several GCP projects, such as newsletters, articles and social media.

3.3 Statutory Stakeholders

Some key stakeholders have a statutory role, and it is important that the GCP engages with them prior to the submission of the planning application. There are also some key non-statutory stakeholders that are also likely to be consulted at planning application stage and should be consulted prior to the application submission. In order to ensure that any issues and potential objections from statutory stakeholders can be addressed or mitigated early, appropriate engagement with these groups prior to the planning process is advantageous.

Statutory and non-statutory stakeholders for this project have been identified as the following groups;

- Landowners
- Designated Neighbourhood Forum/Resident Groups
- Environment Agency
- The Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire
- Cambridgeshire Bat Group
- The Royal Society for the Protection of Birds
- Cambridge Past Present and Future
- Highways England
- Historic England
- Natural England
- Cambridgeshire Parish Councils
- Utilities companies (Anglian Water Services, Cambridge Water, National Grid Gas, National Grid Electricity Transmission, Openreach, Virgin Media, UK Power Networks, Cadent Gas, Cityfibre).
- Cambridgeshire County Council (Including in their role as relevant Planning Authority, Highway Authority, Lead Local Flood Authority, Public Rights of Way and Ecology Officer).
- Greater Cambridge Shared Planning Service (South Cambridgeshire District Council & Cambridge City Council). This will include internal officers relating to planning, environmental health, landscaping, sustainability/energy, drainage, ecology, arboricultural and public health matters.
- Emergency Services

- University of Cambridge (Mullard Radio Astronomy Observatory)
- Sustrans
- Cycling Groups (Including A10 Cycling Campaign)

3.3.1 Other Stakeholders

Appendix A shows a comprehensive list of stakeholders with an interest in the proposals and sets out their role and interest in the project.

4 Next Steps

4.1 Engagement Beyond OBC

This Stakeholder Engagement and Communications Plan sets out the plan for management of stakeholders up to the expected submission of the OBC for approval in summer 2019.

If the OBC is approved and a single preferred proposal option is taken forward, additional consultation on the preferred option will take place.

A programme of engagement will take place in support of this preferred option and will include the engagement as shown in Table 3.

Table 3: Forthcoming stakeholder engagement events

Stakeholder or Stakeholder Group	Meeting Details	Meeting Schedule
Local Planning Authorities	Regular meetings with Local Planning Authorities	Every six weeks
Cambridge Biomedical Campus	Regular meetings with CBC employers on interaction with CBC site	Every six weeks
Highways England	Workshop with Highways England on interaction with M11	TBC
Local Engagement Group	Forum for engagement with residents, businesses and the public	June meeting scheduled – subsequent meetings TBC
Landowners	Regular meetings to cover land ownership negotiations	Every three months

Source: GCP

Three events will be held in September as part of the Planning Pre-Application discussions. In line with Cambridgeshire County Council's Statement of Community Involvement (2019) best practice, staffed events will take place, allowing the public to view the proposals prior to a planning application. In addition, it is intended to present the proposals to member of the Joint Development Control Committee and attend the Design Quality Panel in July 2019.

4.2 Full Business Case

If the proposals are taken forward to an FBC, this plan will be updated to document the proposed communication and management of stakeholders for the next stage of the business case.

Appendices

A.	Stakeholder Engagement Matrix	17
----	-------------------------------	----

A. Stakeholder Engagement Matrix

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.		✓		

Stakeholder	Role / Interest	Management Strategy	Statutory Consultee	Local Interest Group / Organisation	Wider Interest Group / Organisation	The Public
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.		✓		
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.			✓	

Stakeholder	Role / Interest	Management Strategy	Statutory Consultee	Local Interest Group / Organisation	Wider Interest Group / Organisation	The Public
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.		✓		
Transport Operators	Impact on rail services or stations. Bus operators as potential operators of the Park and Ride service. Bus operators will have significantly more influence on the scheme.	Close engagement on scheme development, proposals and construction.			✓	
East West Rail	Scheme impact on proposed alignments of the East West Rail project.	Close engagement on scheme development, proposals and construction.			✓	

Produced by the Cambridgeshire Research Group



Cambridge South West Park & Ride: Summary Report of Consultation Findings

Version 0.2

February 2019

'Cambridgeshire Research Group' is the brand name for Cambridgeshire County Council's Research function based within the Business Intelligence Service. As well as supporting the County Council we take on a range of work commissioned by other public sector bodies both within Cambridgeshire and beyond.

All the output of the team and that of our partners is published on our dedicated website

www.cambridgeshireinsight.org.uk

For more information about the team phone 01223 715300

Document Details	
Title:	Cambridge South West Park & Ride: Summary Report of Consultation Findings
Date Created:	25/02/2019
Description:	
Produced by:	Cambridgeshire County Council Business Intelligence Service
On behalf of:	Greater Cambridge Partnership
Geographic Coverage:	Cambridge and South Cambridge
Format:	PDF
Key Contact	Aaron.Rowinski@cambridgeshire.gov.uk
Status:	Draft V0.2
Usage Statement:	This product is the property of the Research and Performance Team, Cambridgeshire County Council. If you wish to reproduce this document either in whole, or in part, please acknowledge the source and the author(s).
Disclaimer:	Cambridgeshire County Council, while believing the information in this publication to be correct, does not guarantee its accuracy nor does the County Council accept any liability for any direct or indirect loss or damage or other consequences, however arising from the use of such information supplied.

Contents

Executive Summary.....	5
Methodology Summary	6
Key findings	6
Individual elements of the proposed scheme	6
Introduction	9
Background	9
Consultation and Analysis Methodology	10
Background	10
Consultation Strategy	10
Identification of the Audience	10
Design of Consultation Materials.....	10
Design of Consultation Questions.....	11
Diversity and Protected Characteristics.....	11
Analysis	11
Quality Assurance	13
Data Integrity	13
Survey Findings	14
Respondent Profile	14
Respondent location	14
Respondents usual mode of travel	15
Respondents Park & Ride network usage.....	15
Respondents usual workplace destination if commuting in the area	16
Respondents age range	16
Respondents employment status	17
Respondents disability status	17
Question 1: Do you think there is a need to improve bus, cycling and walking journeys to the South West of Cambridge to help ease congestion into and out of the city centre and Cambridge Biomedical Campus?	18
Question 2: How far do you support the following options for increased Park & Ride capacity?	18
Option 1 - multi-storey expansion of Trumpington Park & Ride site'	19
Question 3: How far do you support the proposed private vehicle access arrangement for Option 1 (extra spaces at Trumpington Park & Ride)?	20
Question 4: How far do you support the proposed private vehicle access arrangements for Option 2 (a new Park & Ride site North West of M11 Junction 11)?	20

‘Private vehicle access Option B’	21
‘Private vehicle access Option C’	22
Question 5: How far do you support the public transport access proposals?	23
‘Public transport access Option B’	24
Question 6: Do you support the aim of improving bus journey times between the Park & Ride site and the city centre?	25
Question 7: Are there any measures that you would like to see between Trumpington Park & Ride and Downing Street to help reduce bus journey times?	26
Summary of major themes	26
Question 8: We have a duty to ensure that that our work promotes equality and does not discriminate or dis-proportionally affect or impact people or groups with protected characteristics under the Equality Act 2010. You can find more information on the groups affected by the Equality Act 2010 at www.gov.uk/definition-of-disability-under-equality-act-2010 . Please comment if you feel any of the proposals would either positively or negatively affect or impact on any such person/s or group/s.....	29
Question 9: We welcome your views. If you have further comments on the project or particular options, please add these in the space below.	31
Question 12: How likely is it that you would use a new Park & Ride site to the north west of Junction 11 M11?	37
Map comments	39
Stakeholders responses	40
Background	40
Summary of major themes	40
Email, social media and consultation event responses	44
Summary of major themes	44

Executive Summary

Between 05 November and 21 December 2018 the Greater Cambridge Partnership (GCP) held a consultation on a scheme to improve Park & Ride capacity and accessibility in the South West of Cambridge.

The key findings of this piece of work are:

- Analysis of the geographical spread (see figure 1) and the breadth of responses from different groups demonstrates that the Greater Cambridge Partnership has delivered a sufficiently robust consultation.
- The majority of respondents supported 'Option 2 – new Park & Ride site North West of M11 Junction 11'
- For the private vehicle access arrangements for Option 2:
 - The majority of respondents supported 'a southbound M11 Park & Ride exit slip road' and 'an additional dedicated left turn lane'
 - Over half of respondents supported 'private vehicle access Option B' and 'private vehicle access Option C'
- The majority of respondents supported 'public transport access Option A'
- A great deal of detailed comments were received. From these there were most debate/concerns about:
 - The impact of Option 2 on residents of nearby villages and the environment
 - The impact of Option 1 on Trumpington residents and during the construction period
 - The need for further cycling and pedestrian route improvements
 - The need for improvements to the bus services routes and costs
- Responses were also received on behalf of 20 different groups or organisations. All of the responses from these groups will be made available to board members in full and will be published alongside the results of the public consultation survey.

Methodology Summary

The consultation adopted a multi-channel approach to promote and seek feedback including through traditional and online paid-for, owned and earned media, community engagement events in key or high footfall locations along the route and through the wide-spread distribution of around **13,000** consultation leaflets.

5 drop-in events were held across the area to enable people to have their say in person and the opportunity to question transport officers and consultants.

Quantitative data was recorded through a formal consultation questionnaire (online and hard-copy) **with 1569 complete responses** in total recorded. A significant amount of qualitative feedback was gathered via the questionnaire, at events, via email and social media and at other meetings.

This report summarises the core 1569 responses to the consultation survey and the 82 additional written responses received.

Key findings

Individual elements of the proposed scheme

Quantitative

- 92% of respondents felt there was a need to improve bus, cycling and walking journeys to the South West of Cambridge to help ease congestion into and out of the city centre and Cambridge Biomedical Campus.
- 71% of respondents supported 'Option 2 – new Park & Ride site North West of M11 Junction 11' for increased Park & Ride capacity.
- Over half (56%) of respondents supported the proposed private vehicle access arrangement for Option 1.
- The majority of respondents supported both of the optional elements for the proposed private vehicle access arrangements for Option 2:
 - 59% supported 'a southbound M11 Park & Ride exit slip road'
 - 58% supported 'an additional dedicated left turn lane'

In addition, over half of respondents also supported 'private vehicle access Option B' (52%) and 'private vehicle access Option C' (52%), with nearly half of respondents opposed 'private vehicle access Option A' (48%)

- The majority of respondents supported 'public transport access Option A' (67%)

- The majority of respondents supported the aim of improving bus journey times between the Park & Ride site and the city centre (89%).

Qualitative

- Question 7 asked respondents if there were any measures they would like to see between Trumpington Park & Ride and Downing Street to help reduce bus journey times. The main themes were:
 - That there was a need for a dedicated bus lane from the Park & Ride into the city
 - Concerns about the timings and number of traffic lights in the area
 - That there was a need for some form of private vehicle restriction such as congestion charging
 - That there was a need for more cycle lanes in the area
 - Concerns about the levels of school based traffic
 - That there was a need for bus service improvements, such as areas served and cost
 - That there were issues with the Trumpington Road/Shelford Road junction that needed fixing
 - That there was a need for the removal of on street parking
 - That the guided bus route needed to be utilised more
 - That alternative forms of public transport, such as the CAM, needed to be implemented
 - Concerns around the traffic access/exiting the Grand Arcade carpark
- Respondents were asked to leave comments about whether they felt the proposals would either positively or negatively affect or impact on any person/s or group/s that fall under the Equality Act 2010. The main themes were:
 - Debate about the benefits the proposals would offer to those with disabilities
 - Debate about the impact the proposals would have on younger and older residents
 - That there were no issues
 - General concerns about the proposals negative impact on local residents
- Question 9 asked respondents if they had any further comments on the project or particular options. The main themes were:
 - Debate about the impacts and benefits Option 2 would have on residents and users
 - Debate about the impacts and benefits Option would have on residents and users
 - That cycle routes needed implementing and improving in the area
 - That the bus service needed improvements, such as routes and cost
 - Concerns about the impact Option 2 would have on the environment
 - Concerns about the impact the proposals would have on local residents
 - Concerns about the lack of exit options for the Trumpington Park & Ride site

- Debate about the proposals impact on congestion on the A10 and M11
- Debate about parking arrangements for businesses in the area
- Concern about the disruption to parking arrangements caused by Option 1's construction
- Concerns about public transport access option A's impact on cycling and walking provision
- That neither Option 1 or Option 2 would be of benefit
- That links to train routes needed to be better utilised
- That there were alternative places for the Park & Ride site
- That there should be some form of private vehicle restrictions, such as congestion charging
- That Park & Ride facilities, such as cycle parking, sheltered waiting areas, and toilets, should be provided

Quantitative

- Over half (51%) of respondents indicated they would be 'very likely' or 'likely' to use a new Park & Ride site to the North West of Junction 11 on the M11.

Introduction

Background

Leaflets were delivered to: Barrington, Foxton, Fowlmere, Grantchester, Haslingfield, Harston, Hauxton, Little Shelford, Meldreth, Melbourn, Newton, Trumpington and Shepreth. Around 13,000 leaflets were distributed in these towns and villages. Copies were also sent to Parish Councils and made available at the Park & Ride site as well as at events.

The consultation was also advertised in the local area on radio, via 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. Events were held at Harston, Hauxton, Trumpington and two events at the Trumpington Park & Ride site. Emails with information and the offer of meetings with the Project Manager were sent to Councillors and stakeholders. Schools in the areas were also contacted and requested to raise awareness of the consultation via their regular parent mailings. All information available in the leaflet and the survey were also made available online via ConsultCambs, which was also promoted through our own and Partner's social media channels.

Consultation and Analysis Methodology

Background

The consultation strategy for this stage of the Cambridge South West Park & Ride proposals was designed by the Greater Cambridge Partnership communications team with input from the County Council's Research Team. During the design process reference was made to the County Council's Consultation Guidelines, in particular taking into account the following points:

- The consultation is taking place at a time when proposals are at a formative stage (with a clear link between this consultation round and the previous consultation);
- Sufficient information and reasoning is provided to permit an intelligent response from the public to the proposals;
- Adequate time given for consideration and response given the significance of the decision being taken;
- Plans in place for a full analysis of the results and for these to be presented at a senior level to enable the consultation to be conscientiously taken into account in finalising any proposals.

Consultation Strategy

Identification of the Audience

The consultation was open for anyone to contribute to. The key target audience was identified as commuters who use the current Trumpington Road Park & Ride and travel in the area, as well as local residents including those from Harston, Hauxton, Trumpington and other nearby villages. Councillors and nearby Parish Councils were also specifically targeted. This understanding of the audience was then used as a basis upon which to design the consultation materials, questions and communication strategy.

Design of Consultation Materials

It was identified that the audience for the consultation required a great deal of detailed information upon which to base their responses. So whilst the key consultation questions were relatively straight forward (people were asked to express whether they felt there was a need to improve all forms of travel to ease congestion into and out of the city centre and Cambridge Biomedical Campus, how far they supported options for improving Park & Ride capacity, how far they supported the options for private vehicle access and public transport access, and whether they supported the aim of improving bus journey times between the Park & Ride site and the city centre) a twelve page information document was produced and supplemented with additional information available online and at key locations.

Design of Consultation Questions

The consultation questions themselves were designed to be neutral, clear to understand and were structured to enable people to comment on all the key areas of decision making. Helping people to understand and comment on both the Greater Cambridge Partnership's strategy and the local implications of this.

For the first half of the consultation survey there was a focus on questions relating to the options for the Cambridge South West Park & Ride scheme. Questions then moved on to capture the detail of why respondents were choosing particular options. The second half of the survey focused on multiple choice questions relating to respondents' journeys and personal details, allowing measurement of the impact of the Cambridge South West Park & Ride scheme on various groups.

The main tool for gathering comments was an online survey and also a paper return survey attached to the consultation document. It was recognised that online engagement, whilst in theory available to all residents, could potentially exclude those without easy access to the internet. Therefore the paper copies of the questions were widely distributed with road-shows held to collect responses face to face. Other forms of response e.g. detailed written submissions were also received and have been incorporated into the analysis of the feedback.

The survey included the opportunity for 'free text' responses and the analysis approach taken has enabled an understanding of sentiment as well as the detailed points expressed.

Diversity and Protected Characteristics

A complete set of questions designed to monitor equality status (gender, ethnicity, sexuality) were not included within the direct questions on the survey. This was because previous feedback from the public has suggested that these questions were overly intrusive given the context of providing comments on the strategic aspects of a new transport route. Previous consultation has highlighted the importance of taking into account accessibility at the detailed scheme design stage.

It was decided therefore to only collect information on matters pertinent to travel, that is to say age, employment status and disability (although not the nature of disability). A free text option provided opportunity for respondents' to feedback on any issues they felt may impact on protected groups.

Analysis

The strategy for analysis of the consultation was as follows:

- An initial quality assurance review of the data was conducted and a review with the engagement team carried out to identify any issues or changes that occurred during

the consultation process.

- A set of frequencies were then produced and checks made against the total number of respondents for each question and the consultation overall. A basic sense check of the data was made at this point with issues such as checking for duplicate entries, data entry errors and other quality assurance activities taking place.
 - **Duplicate Entries.** Measures were in place to avoid analysing duplicated entries. The online survey software collects the timestamp of entries so patterns of deliberate duplicate entries can be spotted and countered.
 - **Partial Entries.** The system records all partial entries as well as those that went through to completion (respondent hit submit). These are reviewed separately and in a few cases, where a substantial response has been made (as opposed to someone just clicking through) then these are added to the final set for analysis.
 - Within the analysis a search for any unusual patterns within the responses was carried out, such as duplicate or 'cut and paste' views being expressed on proposals.
- Closed questions (tick box) are then analysed using quantitative methods which are then presented in the final report through charts, tables and descriptions of key numerical information.
- Data was also cross-tabulated where appropriate, for example, to explore how respondents in particular areas or with different statuses answered questions. Characteristic data was then used to provide a general over-view of the 'reach' of the consultation in terms of input from people of different socio-economic status and background.
- Free text questions were analysed using qualitative methods, namely through thematic analysis. Key themes are identified using specialist software and then responses tagged with these themes (multiple tags can be given to the same response). At this stage totals of tagged themes are created and sample quotes chosen for the final report that typify particular tagged themes. Comment themes are listed in order of the number of comments received, from most to least. 'Most' represents where over 50% of respondents' comments were applicable, 'some' represents 25%-49%, and 'few' represents less than 25% of comments.
- The 'Places' tool on Consult Cambs allowed respondents to place a 'pin' on to a map covering the scheme's area and leave a comment. Thematic analysis was conducted on these comments and are discussed in the report where multiple comments are provided in an area.

- The final report is then written to provide an objective view of the results of the consultation.

Quality Assurance

Data Integrity

To ensure data integrity was maintained, checks were performed on the data.

- A visual check of the raw data show no unusual patterns. There were no large blocks of identical answers submitted at a similar time.
- Date / time stamp of submissions showed no unusual patterns.
- Text analysis showed no submissions of duplicate text.

Survey Findings

Respondent Profile

In total, 1569 residents responded to the consultation survey.

Respondent location

Respondents were asked for their postcode during the survey, but were not forced to enter a response. 1133 respondents entered recognisable postcodes. Based on the postcode data provided most respondents resided in Trumpington (18%), Harston (7%), and Melbourn (7%).

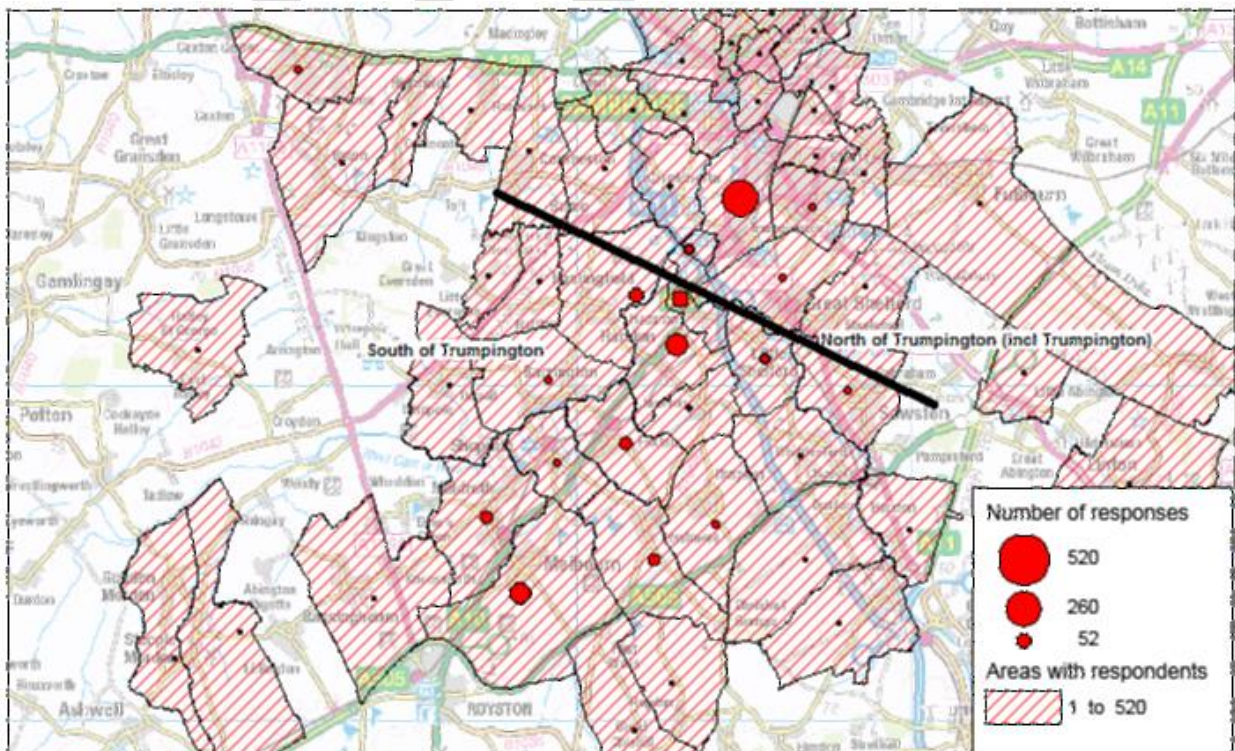
The postcodes were also used to group respondents by parish (or ward in the case of Cambridge) and then into one of two categories;

- 'North of Trumpington (including Trumpington)' (covering 29% of respondents);
- 'South of Trumpington' (covering 40% of respondents).

A full breakdown of respondent locations can be found in Appendix 1.

The following map shows the rate of response by parish/ward:

Figure 1: Map to show areas of response

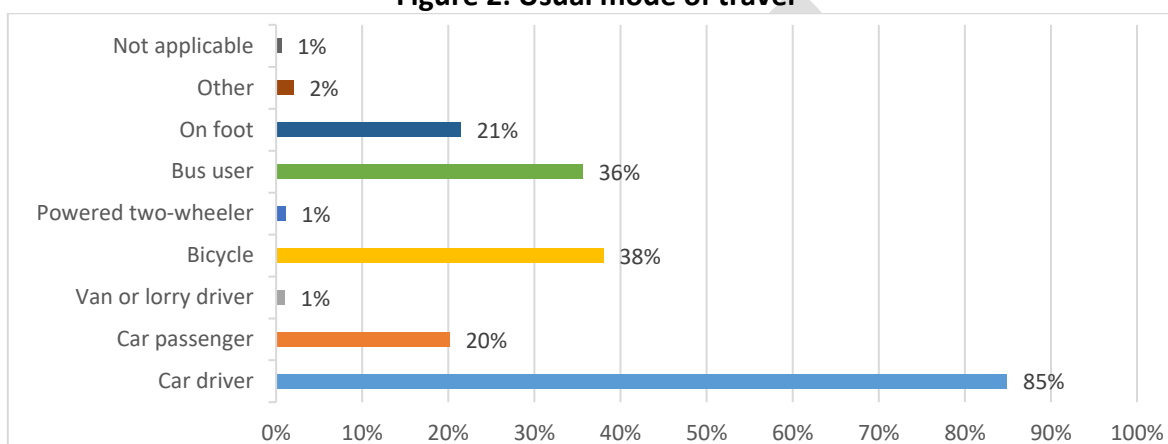


Respondents were asked a series of questions about their personal circumstances and the results can be seen below. Please note that respondents did not have to enter information on these questions.

Respondents usual mode of travel

1503 respondents answered the question on their usual mode of travel in the area. Respondents could select multiple answers for this question. The majority of respondents indicated they travelled as a 'car driver' (85%).

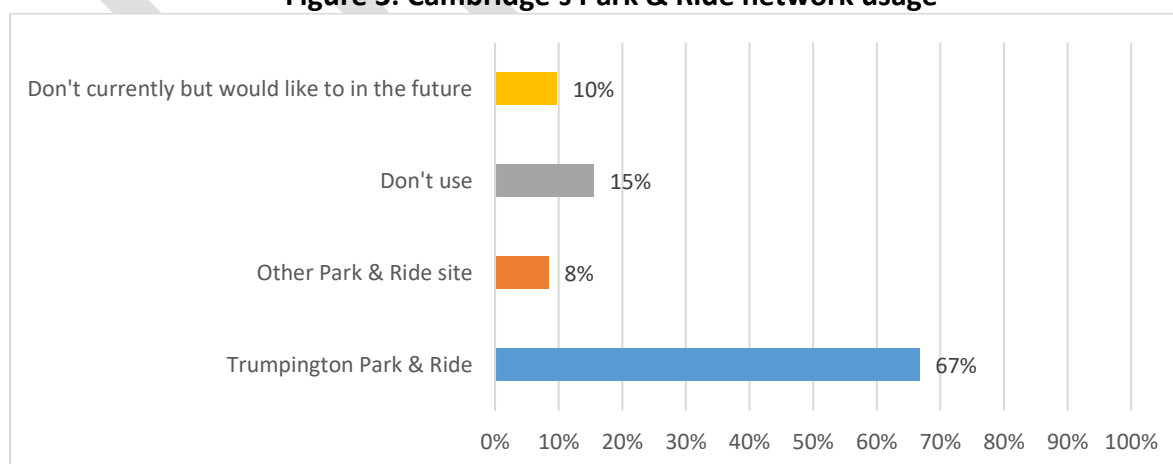
Figure 2: Usual mode of travel



Respondents Park & Ride network usage

1504 respondents answered the question on which part of Cambridge's Park & Ride network they used. The majority of respondents indicated they use the 'Trumpington Park & Ride' (67%), with less than a fifth indicated they don't use the Park & Ride network (15%).

Figure 3: Cambridge's Park & Ride network usage



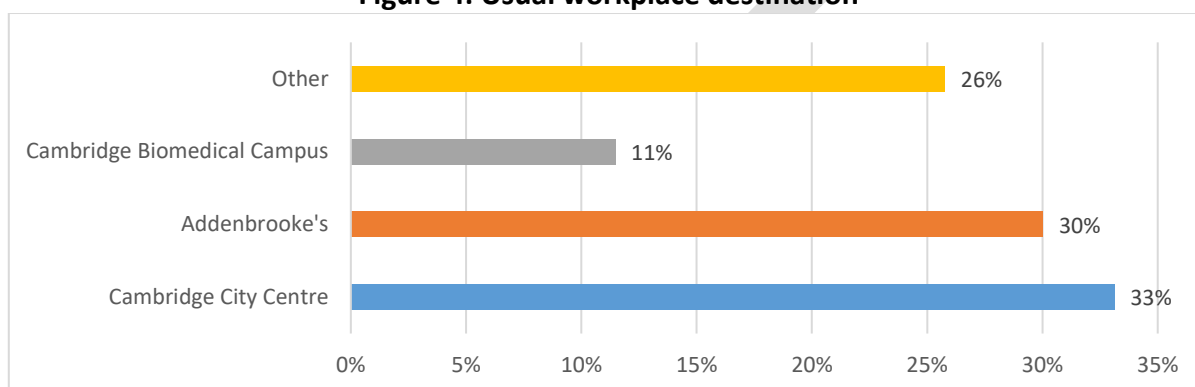
Note, although only one option could be selected, 4 paper respondents selected both 'yes, I use Trumpington Park & Ride' and 'yes (Milton/Babraham Road/Madingley Road/Newmarket Road/St Ives Busway Park & Ride)'.

Respondents usual workplace destination if commuting in the area

776 respondents answered the question asking where their usual workplace destination was, if they travelled in the area. Over a third of respondents indicated their usual workplace destination was for both Cambridge City Centre (33%) or Addenbrooke's (30%).

Just over a quarter of respondents indicated other (26%), these included: London, Fulbourn, Milton, Huntingdon, St Ives, Papworth Everard, Cambourne, Girton, Histon, Cambridge city centre, Litlington, Melbourn, Hinxton, Babraham, Chesterford, Royston, Tempsford, and Hitchin.

Figure 4: Usual workplace destination

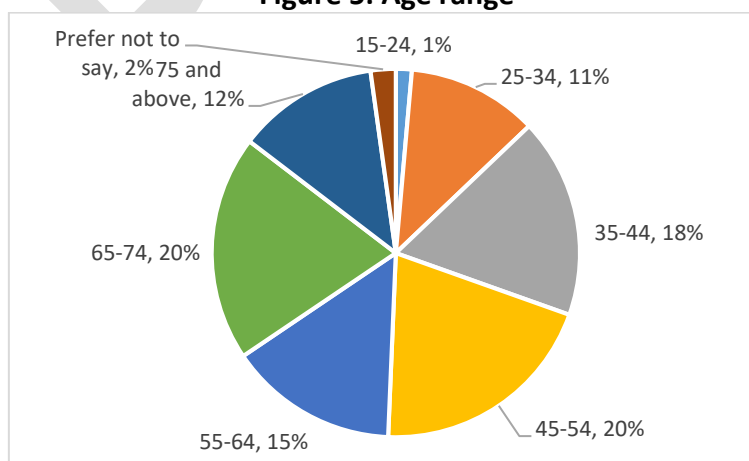


Note, although only one option could be selected, 1 paper respondent indicated all four destinations ('Cambridge City Centre', 'Addenbrooke's', 'Cambridge Biomedical Campus', 'Other').

Respondents age range

1498 respondents answered the question about their age range. Average working ages from '25-34' to '55-64' were well represented when compared to the general Cambridgeshire population, working ages from '15-24' were slightly under represented, only accounting for 1% of respondents.

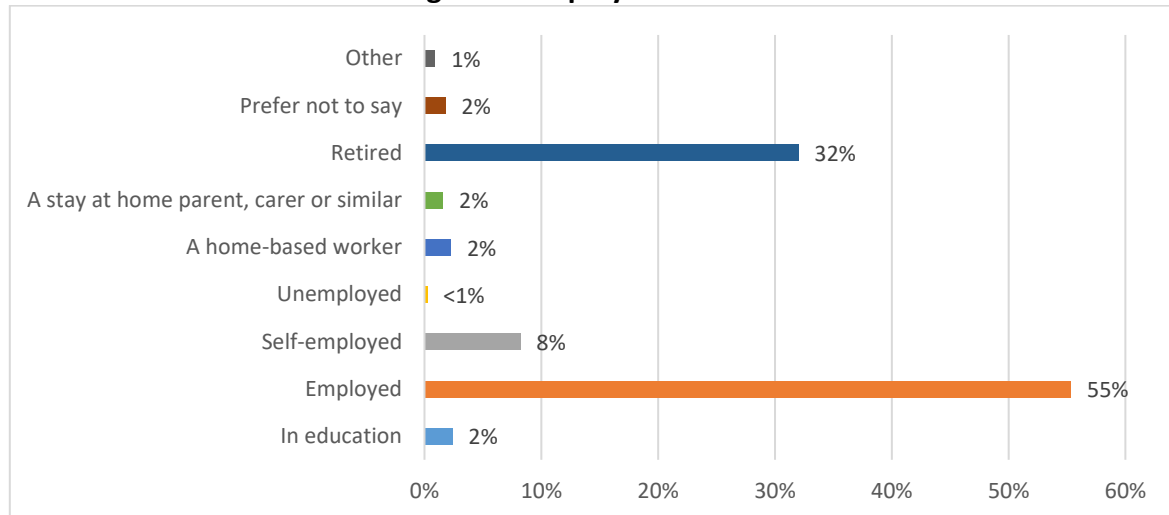
Figure 5: Age range



Respondents employment status

1496 respondents answered the question on their employment status. The majority of respondents indicated they were 'employed' (55%) or 'retired' (32%).

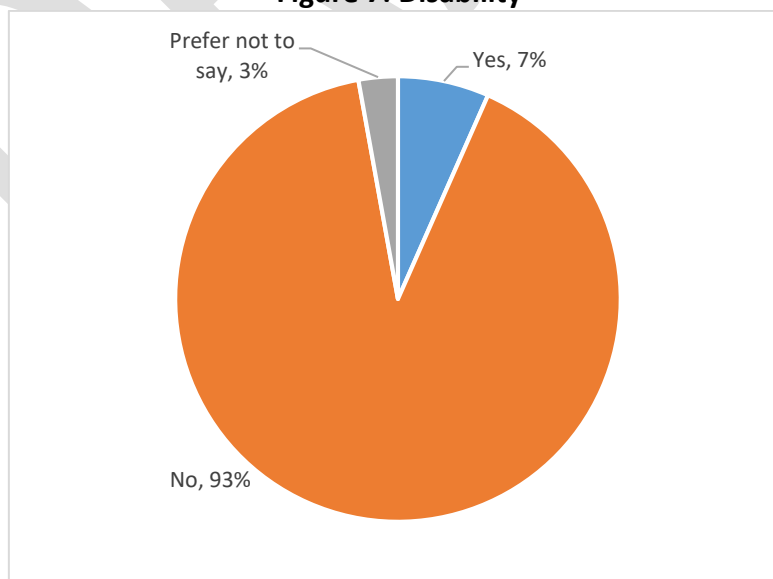
Figure 6: Employment status



Respondents disability status

1569 respondents answered the question on whether they had a disability that influences travel decisions, 7% of respondents indicated that they did.

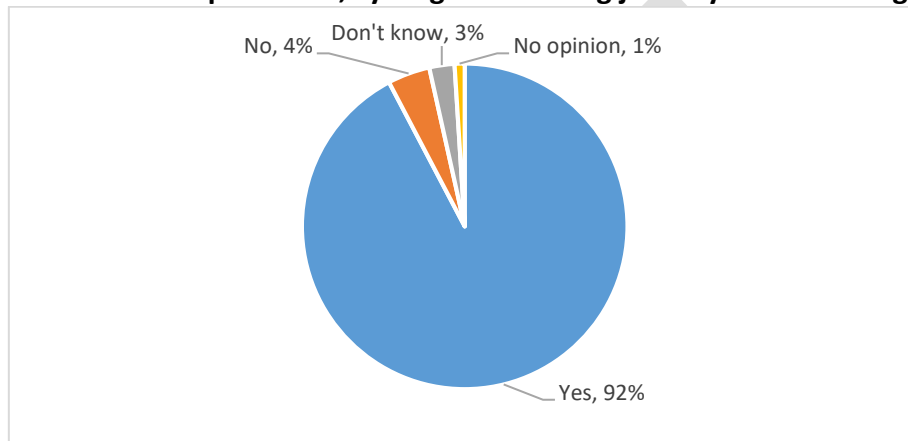
Figure 7: Disability



Question 1: Do you think there is a need to improve bus, cycling and walking journeys to the South West of Cambridge to help ease congestion into and out of the city centre and Cambridge Biomedical Campus?

1489 respondents answered the question on whether they felt there was a need to improve bus, cycling and walking journeys to the South West of Cambridge to help ease congestion into and out of the city centre and Cambridge Biomedical Campus. The majority of respondents felt there was a need for these improvements (92%).

Figure 8: Need to improve bus, cycling and walking journeys to ease congestion

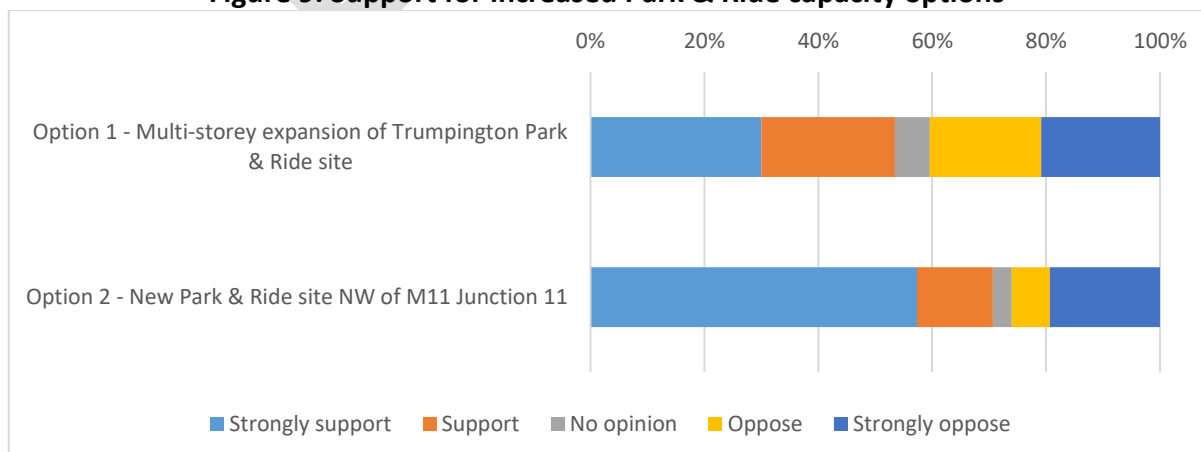


Question 2: How far do you support the following options for increased Park & Ride capacity?

1509 respondents answered the question on how far they supported the options for increased Park & Ride capacity.

- 'Option 1 – multi-storey expansion of Trumpington Park & Ride site' 53% of respondents supported this option.
- 'Option 2 – new Park & Ride site North West of M11 Junction 11' 71% of respondents supported this option.

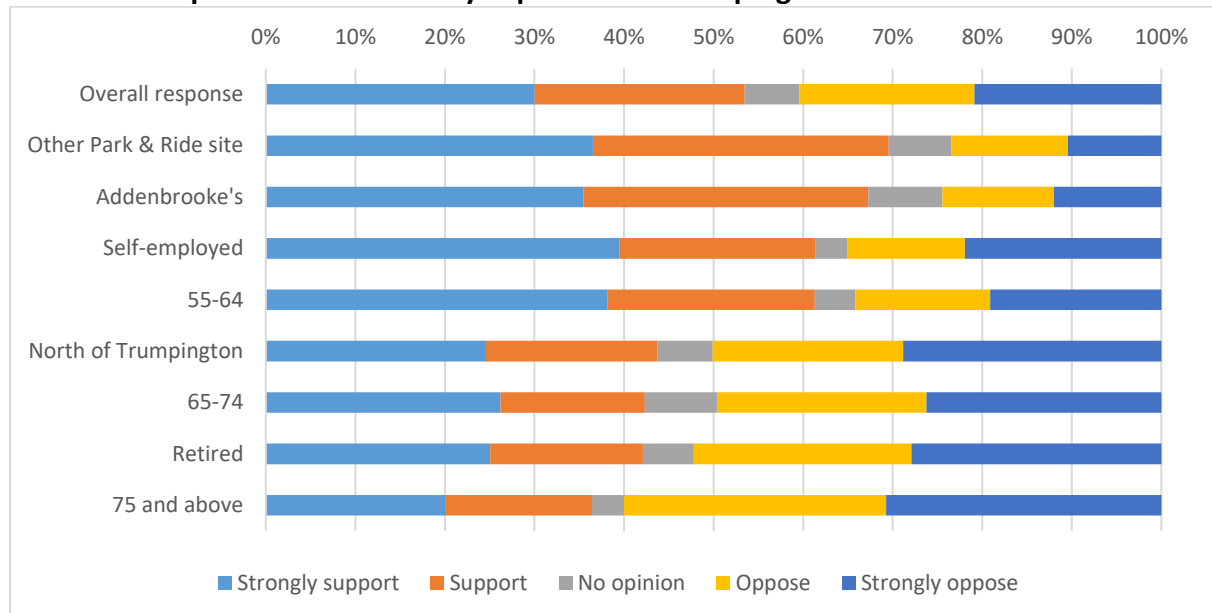
Figure 9: Support for increased Park & Ride capacity options



Option 1 - multi-storey expansion of Trumpington Park & Ride site'

Cross-tabulation of the data showed significant differences in the levels of support and opposition reported for 'Option 1' by a number of different groups. Noticeable differences, when compared with the overall response, are depicted in figure 10.

**Figure 10: Difference in support for
'Option 1 – multi-storey expansion of Trumpington Park & Ride site'**

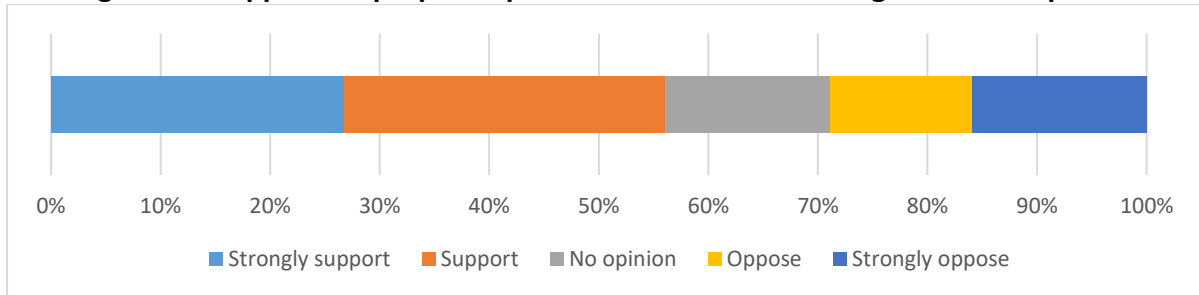


- Respondents were more opposed to 'Option 1 – multi-storey expansion of Trumpington Park & Ride site' than the overall response when they indicated they:
 - Were '75 and above' (60%)
 - Were 'retired' (52%)
 - Were located 'North of Trumpington' (50%)
 - Were '65-74' (50%)
- Respondents were more supportive to 'Option 1 – multi-storey expansion of Trumpington Park & Ride site' than the overall response when they indicated they:
 - Used 'other Park & Ride sites' (70%)
 - Had a usual workplace destination of 'Addenbrooke's' (67%)
 - Were 'self-employed' (61%)
 - Were '55-64' (61%)

Question 3: How far do you support the proposed private vehicle access arrangement for Option 1 (extra spaces at Trumpington Park & Ride)?

1429 respondents answered the question on how far they supported the proposed private vehicle access arrangement for Option 1. Over half of respondents supported the proposed private vehicle access arrangement for Option 1 (56%) and over a quarter of respondents opposed (29%).

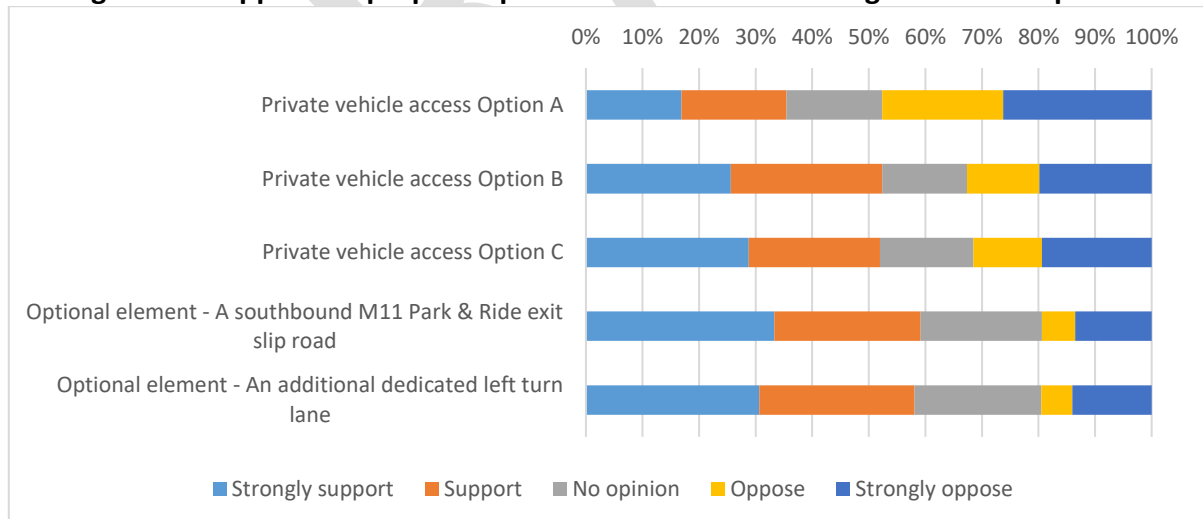
Figure 11: Support for proposed private vehicle access arrangement for Option 1



Question 4: How far do you support the proposed private vehicle access arrangements for Option 2 (a new Park & Ride site North West of M11 Junction 11)?

1379 respondents answered the question on how far they supported the proposed private vehicle access arrangements for Option 2.

Figure 12: Support for proposed private vehicle access arrangements for Option 2

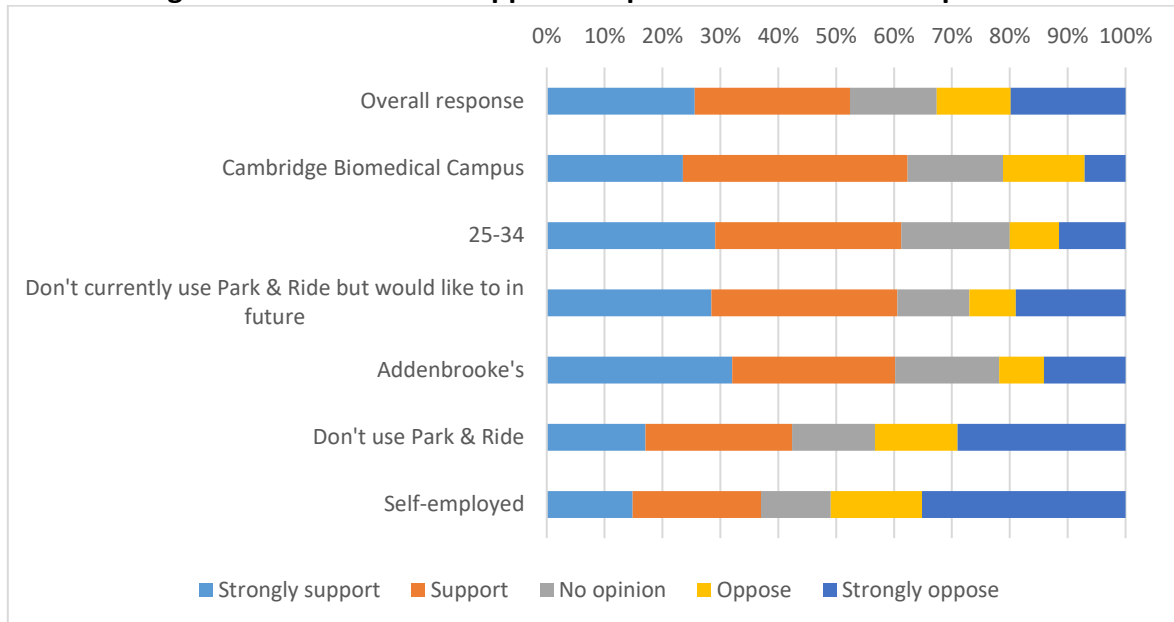


- Nearly half (48%) of respondents opposed 'private vehicle access Option A'.
 - Across the other options, over half of respondents supported with:
 - 59% supporting 'a southbound M11 Park & Ride exit slip road'
 - 58% supporting 'an additional dedicated left turn lane'
 - 52% supporting 'private vehicle access Option B'
- 52% supporting 'private vehicle access Option C'

'Private vehicle access Option B'

Cross-tabulation of the data showed significant differences in the levels of support and opposition reported for 'private vehicle access Option B' by a number of different groups. Noticeable differences, when compared with the overall response, are depicted in figure 13.

Figure 13: Difference in support for 'private vehicle access Option B'

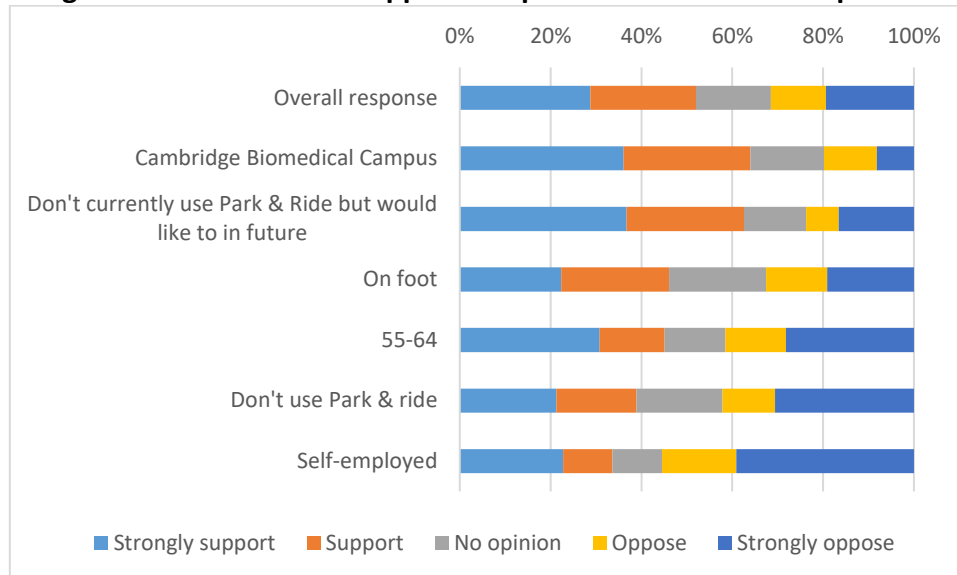


- Respondents were more opposed to 'private vehicle access Option B' than the overall response when they indicated they:
 - Were 'self-employed' (51%)
 - Indicated they 'don't use Park & Ride' (43%)
- Respondents were more supportive to 'private vehicle access Option B' than the overall response when they indicated they:
 - Had a usual workplace destination of 'Cambridge Biomedical Campus' (62%)
 - Were '25-34' (61%)
 - Indicated they 'don't currently use Park & Ride but would like to in future' (61%)
 - Had a usual workplace destination of 'Addenbrooke's' (60%)

'Private vehicle access Option C'

Cross-tabulation of the data showed significant differences in the levels of support and opposition reported for 'private vehicle access Option C' by a number of different groups. Noticeable differences, when compared with the overall response, are depicted in figure 14.

Figure 14: Difference in support for 'private vehicle access Option C'

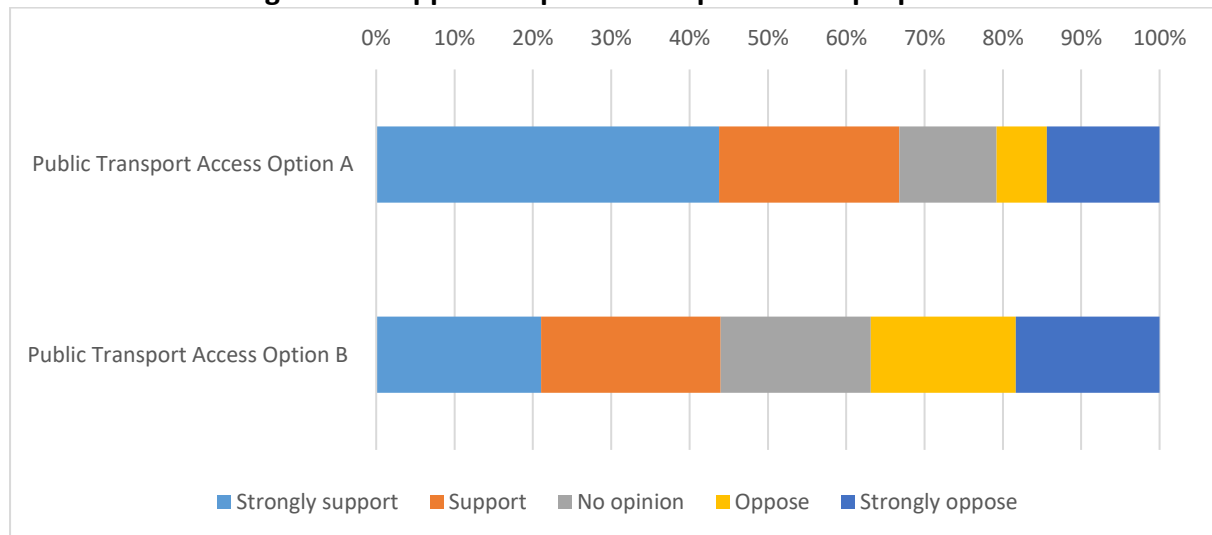


- Respondents were more opposed to 'private vehicle access Option C' than the overall response when they indicated they:
 - Were 'self-employed' (56%)
 - Indicated they 'don't use Park & Ride' (42%)
 - Were '55-64' (42%)
- Respondents who indicated they travelled 'on foot' were less clear on their support for 'private vehicle access Option C', with just under half supporting it (46%) and over a quarter opposing it (33%)
- Respondents were more supportive to 'private vehicle access Option C' than the overall response when they indicated they:
 - Had a usual workplace destination of 'Cambridge Biomedical Campus' (64%)
 - Indicated they 'don't currently use Park & Ride but would like to in future' (63%)

Question 5: How far do you support the public transport access proposals?

1433 respondents answered the question on how far they supported the public transport access proposals. The majority of respondents supported 'public transport access Option A' (67%), whereas less than half of respondents supported 'public transport access Option B' (44%) with just under two fifths opposed it (37%).

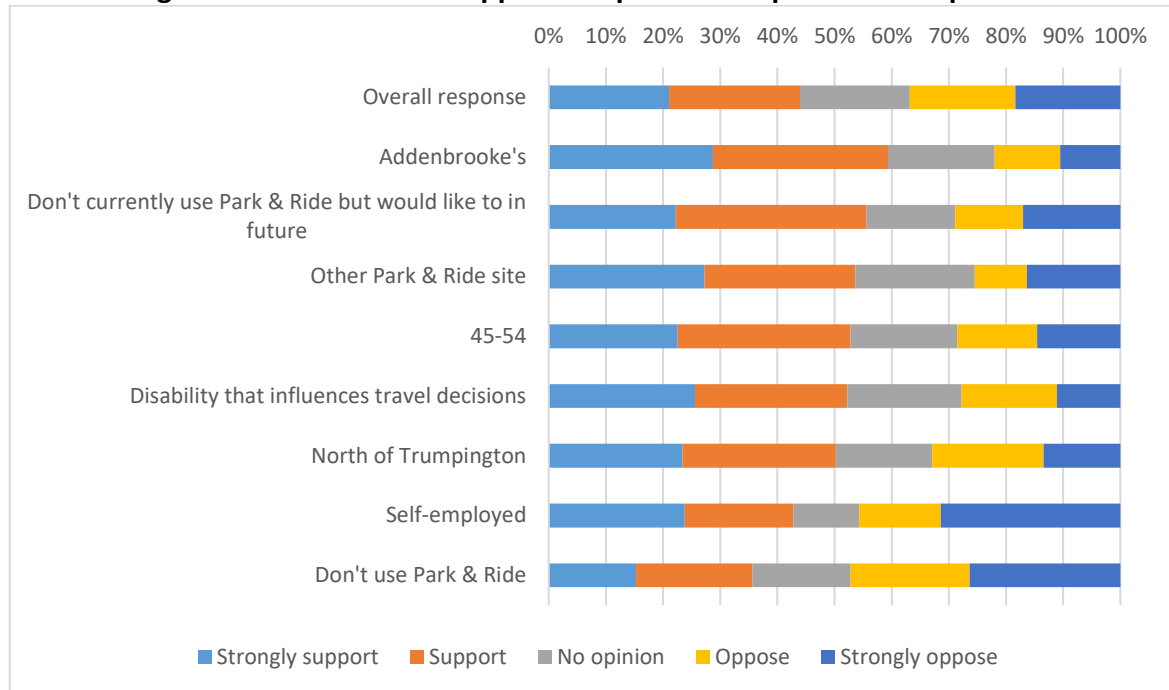
Figure 15: Support for public transport access proposals



'Public transport access Option B'

Cross-tabulation of the data showed significant differences in the levels of support and opposition reported for 'public transport access Option B' by a number of different groups. Noticeable differences, when compared with the overall response, are depicted in figure 16.

Figure 16: Difference in support for 'public transport access Option B'

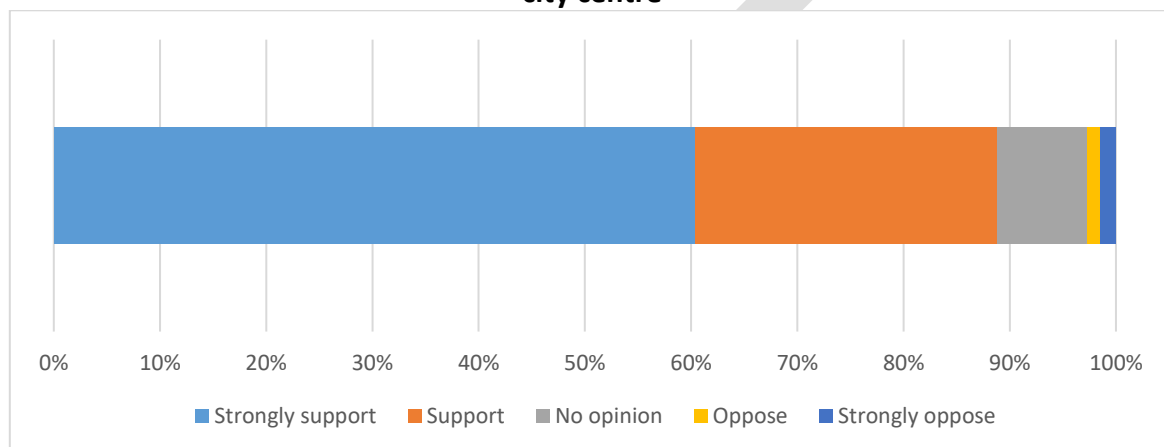


- Respondents were more opposed to 'public transport access Option B' than the overall response when they indicated they:
 - 'Don't use Park & Ride' (47%)
 - Were 'self-employed' (46%)
- Respondents were more supportive to 'public transport access Option B' than the overall response when they indicated they:
 - Had a usual workplace destination of 'Addenbrooke's' (59%)
 - 'Don't currently use Park & Ride but would like to in future' (56%)
 - Use 'other Park & Ride sites' (54%)
 - Were '45-54' (53%)
 - Had a 'disability that influences travel decisions' (52%)
 - Were located 'North of Trumpington' (50%)

Question 6: Do you support the aim of improving bus journey times between the Park & Ride site and the city centre?

1483 respondents answered the question on whether they supported the aim of improving bus journey times between the Park & Ride site and the city centre. The majority of respondents supported the aim of improving bus journey times between the Park & Ride site and the city centre (89%).

Figure 17: Support for improving bus journey times between the Park & Ride site and the city centre



Question 7: Are there any measures that you would like to see between Trumpington Park & Ride and Downing Street to help reduce bus journey times?

763 respondents left comments on question 7, which asked if there were any measures they would like to see between Trumpington Park & Ride and Downing Street to help reduce bus journey times.

Summary of major themes

Comment theme	Respondent comments
Bus lanes	<ul style="list-style-type: none"> • Most respondents who discussed this theme felt that a dedicated bus lane was needed from the Park & Ride into the city <ul style="list-style-type: none"> ○ Some of these respondents were concerned this would be difficult to build with the space available on Trumpington Road <ul style="list-style-type: none"> ▪ A few of these respondents felt that Trumpington Road should be widened to accommodate bus lanes ○ Some of these respondents felt that the bus lane should be just into the city ○ Some of these respondents felt that the bus lane should be tidal, going into the city in the morning and to the Park & Ride in the evening • A few respondents who discussed this theme felt that a bus lane with a dedicated non-stop route was needed <ul style="list-style-type: none"> ○ Some of these respondents felt this was needed to Addenbrooke's or the Biomedical Campus ○ Some of these respondents felt this was needed into the city centre
Traffic lights	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that there were issues with the traffic lights in the area <ul style="list-style-type: none"> ○ Most of these respondents felt the traffic lights needed to be better synchronised or use smart technology to improve the flow of traffic ○ Some of these respondents felt that the traffic lights near Waitrose on the Trumpington Road/Shelford Road junction were the cause behind much of the congestion in the area <ul style="list-style-type: none"> ▪ Some of these respondents felt these traffic lights needed removing ▪ Some of these respondents felt that they needed to be synchronised with other nearby traffic lights

	<ul style="list-style-type: none"> ○ Some of these respondents felt that there should be bus priority for the traffic lights in the area ○ Some of these respondents felt that there were too many traffic lights in the area and that they should be removed
Private vehicle restrictions	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that there needed to be restrictions placed on private vehicles in the city in order to reduce congestion <ul style="list-style-type: none"> ○ Most of these respondents felt that a congestion charge was needed <ul style="list-style-type: none"> ▪ A few of these respondents felt that this should not apply to Cambridge residents ○ A few of these respondents felt that more areas of the city needed to be pedestrianised or only be accessible by public transport
Cycle lanes	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that there needed to be more cycle lanes in the area and the ones already in place needed improving
School traffic	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that some of the congestion issues in the area were caused by pick up/drop off by private vehicles to the schools on Trumpington Road <ul style="list-style-type: none"> ○ Most of these respondents felt that these schools should be required to use a school bus service to alleviate this, which could run from the Park & Ride sites ○ Some of these respondents felt that school pick up and drop off by private vehicle should be banned <ul style="list-style-type: none"> ▪ A few of these respondents felt that fines should be in place for those that do this
Improvements to the bus service	<ul style="list-style-type: none"> • Most of the respondents who discussed this theme felt the buses needed to run more often, both those at Park & Ride sites and those that serve other routes <ul style="list-style-type: none"> ○ Some of these respondents also felt the buses needed to run earlier and later and more often on weekends, in order to better serve shift workers in the area • Some of the respondents who discussed this theme felt that the buses needed to be more reliable • Some of the respondents who discussed this theme felt that the cost of using the bus service needed reducing • A few respondents who discussed this theme indicated they wanted the number 7 service to be reinstated, as this service better served those living in the Trumpington Road area

Trumpington Road/Shelford Road junction	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that this junction, particularly where it serves the Waitrose store needed redesigning, as it was felt to cause congestion <ul style="list-style-type: none"> ○ Most of these respondents felt the traffic light timings needed to be adjusted or use smart technology to better serve traffic flow ○ Some of these respondents felt that junction and lanes needed redesigning to reduce traffic queuing for Waitrose <ul style="list-style-type: none"> ▪ A few of these respondents felt that the Waitrose entrance needed to be moved elsewhere
On street parking	<ul style="list-style-type: none"> • Most of the respondents who discussed this theme felt that on street parking along the route should be removed • A few of the respondents who discussed this theme felt that delivery vehicles should be restricted to off peak times
Guided bus	<ul style="list-style-type: none"> • Most of the respondents who discussed this theme felt that more of the buses should make use of the guided bus route • A few of the respondents who discussed this theme felt that the guided bus route needed to extended to the Park & Ride site
Alternative public transport	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that alternative forms of public transport needed to be implemented. These included implementing the CAM, using trams, monorail, or an underground system
Grand Arcade	<ul style="list-style-type: none"> • Some of the respondents who discussed this theme felt that the bus route needed to avoid the Grand Arcade entrance/exit, as queues for parking here caused congestion • Some of the respondents who discussed this theme felt that the Grand Arcade access on Downing Street should be removed • A few of the respondents who discussed this theme felt that parking at Grand Arcade should be limited to disabled parking only

Question 8: We have a duty to ensure that that our work promotes equality and does not discriminate or dis-proportionally affect or impact people or groups with protected characteristics under the Equality Act 2010. You can find more information on the groups affected by the Equality Act 2010 at www.gov.uk/definition-of-disability-under-equality-act-2010. Please comment if you feel any of the proposals would either positively or negatively affect or impact on any such person/s or group/s

210 respondents left comments on question 10, which asked respondents whether they felt any of the proposals would either positively or negatively affect or impact any person/s or group/s with protected characteristics under the Equality Act 2010.

Comment theme	Respondent comments
Disability	<ul style="list-style-type: none"> Some of the respondents who discussed this theme felt that proposals would benefit those with disabilities, as long as there were ample disabled parking spaces, buses were accessible and congestion was reduced to allow easier access for those who need to use private vehicles Some of the respondents who discussed this theme felt that the multi-storey car park (Option 1) would negatively impact on disabled users as they could be difficult to navigate A few of the respondents who discussed this theme felt that Park & Ride facilities, such as toilets and waiting places, needed to be included that took disabled users into consideration
Age	<ul style="list-style-type: none"> Most of the respondents who discussed this theme also discussed the issues indicated in the 'disability' comment theme A few of the respondents who discussed this theme were concerned that the bus service routes weren't designed with elderly and young users in mind, requiring them to travel further on foot than if the services came to them A few of the respondents who discussed this theme were concerned the new Park & Ride site North West of M11 Junction 11 (Option 2) would increase traffic in Harston, impacting on the health of elderly and younger residents while also being difficult for them to access
Impact on residents	<ul style="list-style-type: none"> Respondents who discussed this theme felt that the proposals would have a negative impact on local residents <ul style="list-style-type: none"> Most of these respondents felt that Option 2 would have an adverse effect on residents of nearby villages, as it would increase congestion and pollution from vehicles in the area

	<ul style="list-style-type: none">○ Some of these respondents felt that Option 1 would have a negative impact on residents of Trumpington, particularly during construction and from the increased traffic
--	--

DRAFT

Question 9: We welcome your views. If you have further comments on the project or particular options, please add these in the space below.

813 respondents left comments on question 9, which asked respondents if they had any further comments on the project or its options.

Comment theme	Respondent comments
Option 1	<ul style="list-style-type: none"> Some of the respondents who discussed this theme indicated they were opposed to Option 1 because they felt that: <ul style="list-style-type: none"> the construction of Option 1 and the loss of spaces during this period would result in an increase in congestion and illegal parking in the area without improvements to the exits, which respondents felt were already causing issues with congestion, the increased number of vehicles would worsen congestion Option 1 was not future proof, particularly for the planned increase in employment in the area multi-storeys were visually unappealing and were dangerous at night Some of the respondents who discussed this theme indicated they supported Option 1 because they felt that: <ul style="list-style-type: none"> Option 2 would have a negative impact on Greenbelt land and nearby villages It had a lower cost than Option 2 Option 1 would be easier to walk/cycle to/from Option 1 would be preferred by drivers even if both sites were available due to its proximity to employment sites and shorter journey times Some of the respondents who discussed this theme felt that both Options would be needed to remain futureproof
Option 2	<ul style="list-style-type: none"> Most of the respondents who discussed this theme had concerns about Option 2, feeling that: <ul style="list-style-type: none"> It would have a negative impact on the surrounding villages, particularly Harston, and the A10 due to increased traffic coming through to use the site It would have a negative impact on the environment as it was being built on Greenbelt land and close to Trumpington Meadows Country Park

	<ul style="list-style-type: none"> ○ It would result in further growth in developments in the area • Some of the respondents who discussed this theme felt that Option 2 offered the best long term solution with a better cost to parking space ratio than Option 1 , while removing congestion earlier along the route <ul style="list-style-type: none"> ○ A few of these respondents felt that Option 2 would improve public transport access for nearby villages, something they felt was currently lacking ○ A few respondents felt Option 2 would be needed first to limit disruption but both Options would need to be constructed eventually • A few of the respondents who discussed this theme were concerned about the access to cycle paths from the new site
Cycling	<ul style="list-style-type: none"> • Some of the respondents who discussed this theme felt that cycle routes needed to be improved in the area, particularly Trumpington Road and around where the new Park & Ride site would be located for Option 2 <ul style="list-style-type: none"> ○ Some of these respondents felt that new segregated cycle lanes were needed ○ Some of these respondents felt that current cycling provision needed improvements and more maintenance ○ A few of these respondents felt that better lighting was needed • Some of these respondents were concerned about the impact the public transport/private vehicle access Options for Option 2 would have on cycling provision, particularly Public Transport Access Option A • A few of the respondents who discussed this theme felt that cycling facilities, such as cycle parking and changing rooms, needed to be included at the Park & Ride sites

Improve bus service	<ul style="list-style-type: none"> • Most of the respondents who discussed this theme felt that the bus services, both Park & Ride and other routes, needed to be more frequent as it was currently felt to be unreliable or too full • Some of the respondents who discussed this theme felt that the cost of using the bus was too high and needed to be reduced to attract users • Some of the respondents who discussed this theme felt that bus service needed to serve more routes <ul style="list-style-type: none"> ○ Some of these respondents felt that there needed to be more direct buses to employment sites <ul style="list-style-type: none"> ▪ A few of these respondents felt that Addenbrooke's needed a direct service both for staff and patients ○ Some of these respondents felt that Trumpington Road and villages in the area had had services cut, resulting in a modal shift towards personal vehicle use, and that these needed to be replaced • Some of the respondents who discussed this theme felt that the bus services, particularly Park & Ride, needed to operate longer hours, so that it was available early morning/late evening and on Sundays <ul style="list-style-type: none"> ○ A few of these respondents indicated they were shift workers and that they were unable to use the bus service because of current operating hours
Environment	<ul style="list-style-type: none"> • Respondents who discussed this theme were concerned about the environmental impact Option 2 due to the location on Greenbelt land and proximity to Trumpington Meadows Country Park
Impact on residents	<ul style="list-style-type: none"> • Most of the respondents who discussed this theme were concerned about the negative impact Option 2 would have on local residents, particularly Harston and Hauxton, due to increased congestion from vehicles accessing the new site and an increase in air and noise pollution from the increased congestion <ul style="list-style-type: none"> ○ Some of these respondents felt that a bypass was needed at Harston and that this need would increase with a new Park & Ride site • A few of the respondents who discussed this theme were concerned about the negative impact Option 1 would have on local residents during the construction

	<p>period, feeling there would be an increase in illegal parking</p> <ul style="list-style-type: none"> ○ Some of these respondents were also concerned about the increased traffic once built, particularly due to its proximity to a primary school
Trumpington Park & Ride site exit	<ul style="list-style-type: none"> • The respondents who discussed this theme were concerned about the time it takes to exit the existing Park & Ride site at Trumpington (Option 1), feeling there needed to be more than one exit <ul style="list-style-type: none"> ○ Most of these respondents felt that Option 1 would increase this issue without more exit options ○ A few of these respondents indicated that the Park & Ride is currently being used as a cut through traffic by some drivers and that this needed some of enforcement to stop
A10/M11 congestion	<ul style="list-style-type: none"> • The respondents who discussed this theme felt that congestion along the A10 and M11, particularly around Junction 11 was currently a serious issue <ul style="list-style-type: none"> ○ Some of these respondents felt that access to whichever Park & Ride site is built needed to take this into consideration <ul style="list-style-type: none"> ▪ A few of these respondents felt that a dedicated access road to the Park & Ride site or a route that avoids the roundabout would alleviate this issue ○ Some of these respondents felt that Option 2 would increase this congestion ○ A few of these respondents felt that Option 2 could help alleviate this issue as it took traffic off the roads earlier than the current site ○ A few of these respondents felt that Option 2 should not have a slip road from the A10, as queues on the slip road would have an adverse effect on the A10
Business parking arrangements	<ul style="list-style-type: none"> • The respondents who discussed this theme felt that the Park & Ride sites were primarily being used by staff at the Biomedical Campus and Addenbrooke's <ul style="list-style-type: none"> ○ Some of these respondents felt that this needed to be taken into consideration when planning operating times for the bus services and consideration should be given to operating dedicated bus services

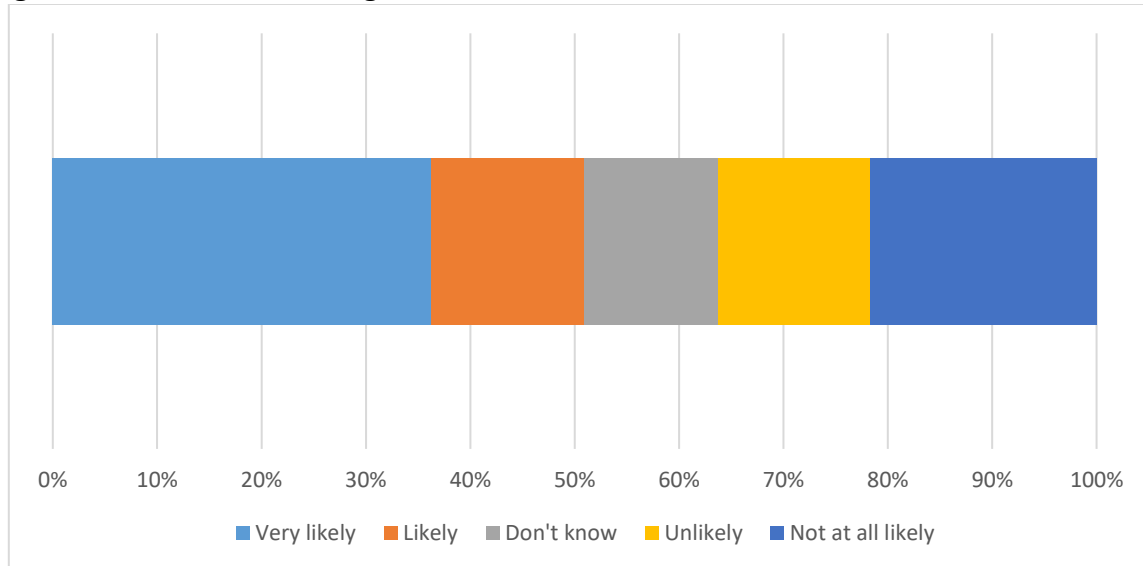
	<p>Some of these respondents felt that these employers had some responsibility in managing the increase in traffic, either by providing adequate parking at their own sites or funding the development of the Park & Ride sites</p>
Construction disruption	<ul style="list-style-type: none"> • The respondents who discussed this theme were concerned about the disruption caused by the construction of Option 1. These respondents felt that the loss of spaces during the construction period would need to be adequately mitigated elsewhere, as parking was already an issue without this loss <ul style="list-style-type: none"> ○
Public Transport Access Option A	<ul style="list-style-type: none"> • The respondents who discussed this theme were concerned about how this would impact on pedestrian and cycle access. These respondents felt that pedestrian and cycle access needed to remain in place <ul style="list-style-type: none"> ○ Some of these respondents felt that if this Option was chosen then measures needed to be put in place to ensure safety was also ensured for cyclists and pedestrians ○ A few of these respondents felt that this Option would also negatively impact on Trumpington Meadows Country Park
Neither Option 1 or Option 2	<ul style="list-style-type: none"> • The respondents who discussed this theme indicated they opposed both Options for Park & Ride provision because they felt that: <ul style="list-style-type: none"> ○ Both would have a negative impact on residents local to the sites ○ They would increase traffic along the A10/M11, an area already felt to be heavily congested ○ That a site should be located elsewhere, suggestions included Foxton, Duxford, further south of Harston or at Junction 12 of the M11 ○ That funding should be spent on improving public transport overall, particularly connecting nearby villages
Train links	<ul style="list-style-type: none"> • The respondents who discussed this theme felt that links to train journeys needed to be further considered and encouraged <ul style="list-style-type: none"> ○ Some of these respondents felt that the development of the South Cambridge railway station would alleviate some of the congestion issues <p>That travel hubs should be developed near current railway stations</p>

Alternative Park & Ride site	<ul style="list-style-type: none"> The respondents who discussed this theme felt that a new Park & Ride site should be located elsewhere in order to remove traffic earlier along the route. These suggestions included Foxton, Duxford, further south of Harston or at Junction 12 of the M11
Private vehicle restrictions	<ul style="list-style-type: none"> The respondents who discussed this theme felt that some form of private vehicle restrictions should be implemented in Cambridge. These suggestions included congestion charging, bans on large delivery vehicles, bans on all private vehicles in the city, and a reduction of speed limits in nearby villages
Park & Ride facilities	<ul style="list-style-type: none"> The respondents who discussed this theme discussed facilities they felt would be needed at Park & Ride sites. These included changing facilities, toilets, sheltered waiting areas, cycle parking, lockers, security features such as CCTV and staff, signage indicating bus times and space availability

Question 12: How likely is it that you would use a new Park & Ride site to the north west of Junction 11 M11?

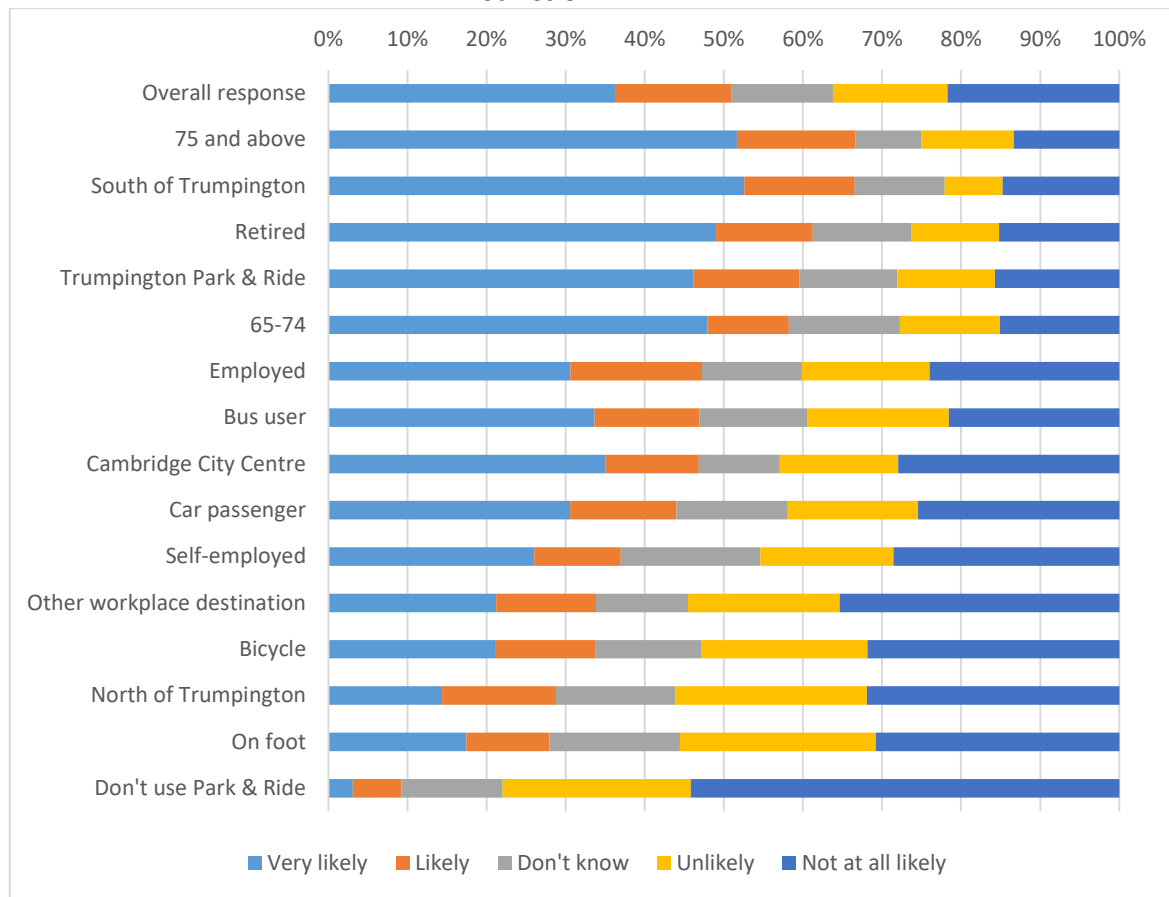
1477 respondents answered the question on how likely it would be for them to use a new Park & Ride site to the North West of Junction 11 on the M11.

Figure 18: Likelihood of using new Park & Ride site to the North West of Junction 11 M11



- Over half of respondents indicated they would be 'very likely' or 'likely' to use a new Park & Ride site (51%)
- Just under two fifths indicated they would be 'unlikely' or 'not at all likely' to use a new Park & Ride site (36%)

Figure 19: Difference in Likelihood of using new Park & Ride site to the North West of Junction 11 M11

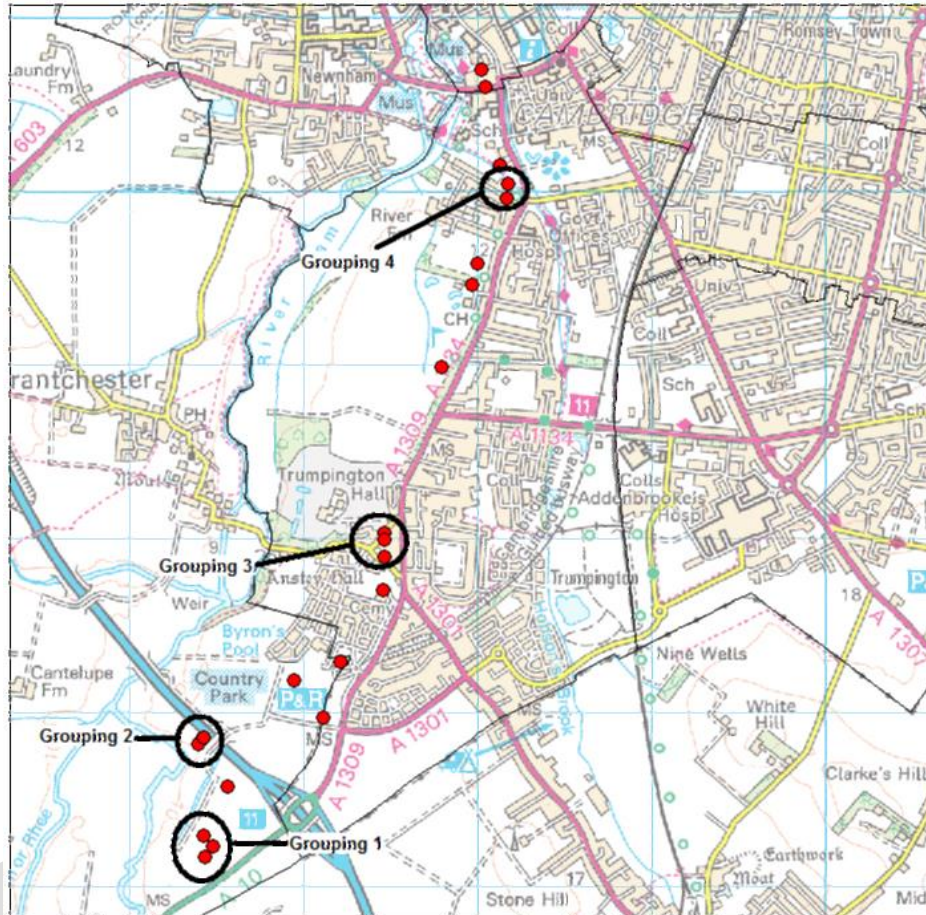


- Respondents were less likely to 'use a new Park & Ride site to the North West of Junction 11 M11' than the overall response when they indicated they:
 - 'Don't use Park & Ride' (78%)
 - Were located 'North of Trumpington' (56%)
 - Usually travelled 'on foot' (56%)
 - Had an 'other workplace destination' (55%)
 - Usually travelled by 'bicycle' (53%)
 - Were 'self-employed' (45%)
 - Had a usual workplace destination of 'Cambridge City Centre' (43%)
 - Were a 'car passenger' (42%)
 - Were 'employed' (40%)
 - Usually travelled as a 'bus user' (39%)
- Respondents were more likely to 'use a new Park & Ride site to the North West of Junction 11 M11' than the overall response when they indicated they:
 - Were '75 and above' (67%)
 - Were located 'South of Trumpington' (67%)
 - Were 'retired' (61%)
 - Currently use the 'Trumpington Park & Ride' (60%)
 - Were '65-74' (58%)

Map comments

22 comments from 11 respondents were left on the 'places' interactive map.

Figure 20: Map of 'places' comments



Grouping 1 – Cambridge Road/Park & Ride Option 2 site. These respondents felt that this site was unsuitable for a Park & Ride site due to its location on Greenbelt land.

Grouping 2 – M11, Haslingfield/Public Transport Access Option A. These respondents felt this bridge needed to be kept as cycle/pedestrian access to the area and were concerned turning it into a bus route would result in this access being lost.

Grouping 3 – High Street. These respondent felt that cycling and pedestrian provision along Trumpington High Street needed repairing and developing to improve safety and accessibility for these users.

Grouping 4 – Trumpington Road. These respondents felt that cycle lanes needed to be developed here to improve safety and access for cyclists.

Other responses were too singular to be grouped together for analytical purposes but can be viewed at <https://consultcambs.uk/engagementhq.com/m11junction11/maps/m11-junction-11-pr-provision>

Stakeholders responses

Background

20 responses were received on behalf of a number of different groups and organisations

Energy Investment Unit

Offord and Camp LLP

Addenbrooke's Hospital

Cambridge University Hospitals

Harston Parish Council

A10 Corridor Cycling Campaign

Camcycle

South Trumpington Parish Meeting

Campaign to Protect Rural England

Kings College School, West Road

Cambridge University Health Partners and

Cambridge Biomedical Campus

Wildlife Trust

Trumpington Residents' Association

Royal Papworth Hospital

Cambridgeshire Local Access Forum

Trumpington Meadows Land Company

Cambridge Past, Present & Future

Lands Improvement Holdings and Pigeon Land

Hauxton Parish Council

Smarter Cambridge Transport

All of the responses from these groups have been made available to board members in full and will be published alongside the results of the public consultation survey. The following is a brief summary of the common themes expressed through this correspondence; it should be noted that stakeholder responses can contradict each other therefore we've made no reference to the relative merit or otherwise of the information received.

Summary of major themes

Comment theme	Stakeholder comments
Option 1	<ul style="list-style-type: none"> Most of the stakeholders that discussed this theme indicated they were opposed to Option 1 as they felt: <ul style="list-style-type: none"> The expansion would not offer enough spaces to be futureproof The loss of spaces during construction would be difficult to manage The expansion would have a negative impact on local residents due to the increased traffic and proximity to a primary school The expansion would have a negative impact on congestion in the area due to the increased users accessing the site and the current difficulty exiting it Some of the stakeholders that discussed this theme indicated they supported Option 1 as they felt: <ul style="list-style-type: none"> The expansion would have the least impact on residents

	<ul style="list-style-type: none"> ○ The expansion did not require the use of Greenbelt land ○ The cost of development was lower than Option 2 ○ The expansion was easier for pedestrians/cyclists to access and travel from ○ Alternative transport solutions would negate the need for as many parking spaces ● A few stakeholders felt that whichever Option was chosen the exit to Trumpington Park & Ride needed further development to ease congestion
Option 2	<ul style="list-style-type: none"> ● Most of the stakeholders that discussed this theme indicated they supported Option 2 as they felt: <ul style="list-style-type: none"> ○ The site offered the most futureproofed solution to parking accessibility ○ The site offers a better cost to parking space ratio ○ Offered minimal disruption to current conditions during construction ○ Would reduce congestion further along the route into Cambridge ● Some of the stakeholders that discussed this theme indicated they were opposed to Option 2 as they felt: <ul style="list-style-type: none"> ○ The site would have a negative impact on residents in nearby villages due to the increased traffic ○ The site would have a negative impact on the environment as it is located on Greenbelt Land and nearby to the Trumpington Meadows Country Park ○ Would increase congestion on the A10/M11 as drivers sought to access the site ○ The site was difficult to access for pedestrians/cyclists and had limited options for people wishing to travel from the site these ways
Public Transport Options	<ul style="list-style-type: none"> ● Most of the stakeholders that discussed this theme indicated they supported Option A for public transport as they felt this would minimise impact on the M11 and allow the quickest movement for public transport. <ul style="list-style-type: none"> ○ These stakeholders indicated that the existing access, particularly for pedestrians and cyclists, needed to be maintained ● A few of the stakeholders that discussed this theme indicated they were opposed to Option B, as they felt it complicated the junction and required the use of more land

	<ul style="list-style-type: none"> • A few of the stakeholders that discussed this theme indicated they opposed Option A as they felt it would reduce cycle/pedestrian access, as well as have a negative impact on the Trumpington Meadows Country Park •
Cycling	<ul style="list-style-type: none"> • Most of the stakeholders that discussed this theme felt that cycling provision needed to be considered, including: <ul style="list-style-type: none"> ○ The availability of cycling facilities such as parking at the Park & Ride site ○ Suitable cycle routes to/from the Park & Ride sites and to/from nearby villages and Trumpington Road ○ That the development of any site and access to the site not have a negative impact on cycle routes • Some of the stakeholders felt this also applied to pedestrian usage • A few stakeholders felt this also applied to equestrians
Private Vehicle Access Options	<ul style="list-style-type: none"> • Stakeholders that discussed this theme indicated they opposed Option A, feeling it would have a negative impact on congestion in the area • Most of stakeholders that discussed this theme indicated they supported private vehicle access Option C as it offered the best access to/from the site with the potential to reduce congestion <ul style="list-style-type: none"> ○ Some of these stakeholders also supported Option B but felt the signals would have a negative impact on congestion • Some stakeholders indicated they opposed Option B for the same reason as Option A • A few stakeholders opposed all three Options, as they felt the site access would negatively impact on congestion
Impact on residents	<ul style="list-style-type: none"> • Most of the stakeholders that discussed this theme felt that Option 2 would have a negative impact on residents of nearby villages, such as Harston and Hauxton, as it would increase traffic travelling through them to access the site. These stakeholders indicated this was already a significant issue • A few of the stakeholders that discussed this theme felt that Option 1 would have a negative impact on local residents due to the sites proximity to a primary school • A few stakeholders felt that both Options would negatively impact on residents in Trumpington and

	<p>nearby villages as they would increase the amount of traffic looking to access the sites</p>
Improve bus service	<ul style="list-style-type: none"> Stakeholders that discussed this theme felt that the bus service needed improvements in order to be an effective mode of transport that attracted users. Suggestions included: <ul style="list-style-type: none"> Increasing the routes the buses served, particularly for nearby villages as services had been cut, but also more direct services to employment sites such as Cambridge Biomedical Campus Decreasing the cost of bus tickets
Guided bus route	<ul style="list-style-type: none"> Stakeholders who discussed this theme felt that both Park & Ride buses and other services needed to make more use of the guided bus route as it would offer a significant increase in reliability and reduce journey time <ul style="list-style-type: none"> A few of these stakeholders felt that the guided bus route should extend to the Park & Ride sites
Neither Option 1 or 2	<ul style="list-style-type: none"> Stakeholders who discussed this theme felt that neither Park & Ride Option was suitable as they would not reduce congestion. These stakeholders felt that traffic needed to be 'caught' further down the A10/M11. These stakeholders also opposed these Options for similar reasons as other stakeholders
Park & Ride facilities	<ul style="list-style-type: none"> Stakeholders who discussed this theme felt that the Park & Ride sites should offer sheltered waiting areas, toilets, changing facilities, lockers and cycle parking in order to attract users

Email, social media and consultation event responses

82 responses were received regarding the consultation through email; social media platforms such as Facebook and Twitter; and letters. Following a thematic analysis of these responses the following themes have been noted.

Summary of major themes

Comment theme	Respondent comments
Impact on residents	<ul style="list-style-type: none"> • Most of the respondents who discussed this theme were concerned Option 2 would have a negative impact on residents of nearby villages due to the increase in traffic accessing the site • A few of the respondents who discussed this theme were concerned about the negative impact Option 1 would have on Trumpington residents due to the increase in traffic accessing the site and its proximity to a primary school
A10/M11 congestion	<ul style="list-style-type: none"> • Respondents who discussed this theme were concerned about the congestion on the A10 and M11 and felt that this may not be reduced by the proposals <ul style="list-style-type: none"> ○ Some of these respondents felt that the proposals would increase this congestion and that other solutions were needed
Improve bus service	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that the bus service needed to be improved <ul style="list-style-type: none"> ○ Most of these respondents felt that rural bus services were lacking and funding needed to be put in place to increase village access to Cambridge ○ A few of these respondents felt that the cost of bus tickets needed to be reduced
Option 2	<ul style="list-style-type: none"> • Most of the respondents who discussed this theme felt that Option 2 would have a negative impact on nearby villages, the environment, and the A10/M11 • A few of the respondents who discussed this theme indicated they supported Option 2 • A few of the respondents who discussed this theme felt that neither Option would be of benefit

Alternative Park & Ride location	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that the Park & Ride site needed to be located further out, to remove traffic before congestion started <ul style="list-style-type: none"> ○ Most of these respondents suggested Foxton due to its train links
Cycling	<ul style="list-style-type: none"> • Some of the respondents who discussed this theme had concerns that Option 2 would have a negative impact on cycling provision • Some of the respondents who discussed this theme felt that cycling provision from nearby villages and along Trumpington Road needed to be improved • A few of the respondents who discussed this theme felt that cycling facilities were need at the Park & Ride sites
Option 1	<ul style="list-style-type: none"> • Some of the respondents who discussed this theme were concerned about the impact Option 1 would have on local residents due to the increased use and proximity to a primary school • A few of the respondents who discussed this theme indicated they preferred Option 1 • A few of the respondents who discussed this theme felt that neither Option would be of benefit
Train links	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that links to the railway should be utilised as it would remove more traffic from the roads. <ul style="list-style-type: none"> ○ Many of these respondents discussed the development of a railway station near to Addenbrooke's and how a travel hub at Foxton could allow commuters to use the train
Alternative forms of public transport	<ul style="list-style-type: none"> • Respondents who discussed this theme felt that the development of alternative forms of public transport, such as the CAM and autonomous vehicles, needed to be considered in the design of Park & Ride sites <ul style="list-style-type: none"> ○ Some of these respondents felt that these changes may negate the need for Park & Ride sites
Environment	<ul style="list-style-type: none"> • Respondents who discussed this theme indicated they were opposed to Option 2 as it was being built on Greenbelt land and close to Trumpington Meadows Country Park, which would result in the site having a negative impact on the environment



South West Cambridge Park and Ride Social and Distributional Impact Appraisal

May 2019

Mott MacDonald
Ground floor
Royal Liver Building
Pier Head
Liverpool L3 1JH
United Kingdom

T +44 (0)151 482 9910
F +44 (0)151 236 2985
mottmac.com

South West Cambridge Park and Ride Social and Distributional Impact Appraisal

May 2019

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
1	28/01/19	K Bell	C Walley	K Scott	SI review
2	11/02/19	K Bell	C Walley	K Scott	DI review
3	30/04/19	K Bell	C Walley	K Scott	Reassessment of SI scores

Document reference: 393699-MMD-BCA-XX-BC-0045

Information class: Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Contents

1	Executive summary	1
2	Introduction	3
2.1	Report overview	3
2.2	Report purpose.	3
3	Social impact appraisal	4
3.1	Accident impacts	4
3.2	Physical activity impacts	8
3.3	Security impacts	11
3.4	Severance impacts	13
3.5	Journey quality impacts	15
3.6	Option values and non-use values	18
3.7	Accessibility impacts	18
3.8	Personal affordability impacts	18
4	Distributional impact appraisal	20
4.1	Distributional impacts of user benefits	21
4.2	Distributional impacts of noise and air quality	22
4.3	Distributional impacts of accidents	27
4.4	Distributional impacts of severance	30
4.5	Distributional impacts of security	33
4.6	Accessibility impacts	37
4.7	Personal affordability impacts	38
	Appendices	39
A.	Distributional impacts of user benefits	40
B.	Distributional impacts of noise and air quality	41
C.	Distributional impacts of air quality	49
D.	Distributional impacts of accidents	55
E.	Distributional impacts of severance	63
F.	Distributional impacts of security	73

1 Executive summary

This report is a Social and Distributional Impact appraisal considering the impact of seven proposed park and ride (P&R) options (including Purple with City Access Plan (CAP)) for the South West Cambridge P&R scheme, one of which is a 'do nothing' scenario. The client has assigned colours to each of the five 'do something' options. Each option has been assessed using guidance from WebTAG, though due to a lack of quantitative data in some instances, this has been a qualitative assessment.

The summary assessment scores for the social impact (SI) and distributional impact (DI) appraisals can be seen in Tables 1 and 2 below. Discussion and appraisal surrounding each impact can be found in further chapters.

Table 1: Summary of social impact appraisal summary scores for scheme options

	Existing site		Proposed site				
	Do nothing	Magenta	Cyan	Purple	White	Yellow	Purple with CAP
Accidents	Slight adverse	Neutral	Beneficial	Beneficial	Beneficial	Slight adverse	Beneficial
Physical activity	Neutral	Slight beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Security	Adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Not assessed
Severance	Neutral	Neutral	Adverse	Adverse	Adverse	Adverse	Not assessed
Journey quality	Slight adverse	Slight beneficial	Beneficial	Beneficial	Beneficial	Slight beneficial	Not assessed
Option and non-use values	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Not assessed
Accessibility	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Not assessed
Personal affordability	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Scoped out	Not assessed

Source: Mott Macdonald

Across all options, option and non-use values, accessibility and personal affordability have been scoped out. There will be largely adverse security and severance impacts whereas physical activity and journey quality impacts will be largely beneficial. Overall, the magenta option has been assessed as having the fewest adverse social impacts while the cyan, purple and white options will likely give rise to the most beneficial impacts.

Table 2: Summary of distributional impact appraisal summary scores for scheme options

	Existing site		Proposed site			
	Do nothing	Magenta	Cyan	Purple	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

Across all options, accessibility and personal affordability have been scoped out. The proposed scheme options would realise more distributional impact benefits than the existing site scheme options, with cyan, purple and white performing the best.

2 Introduction

2.1 Report overview

Mott Macdonald has been commissioned by Greater Cambridge Partnership, on behalf of Cambridgeshire County Council, to support the development of the Outline Business Case (OBC) for the proposed South West Cambridge P&R scheme. The report aims to provide proportionate SI and DI input to inform the OBC.

2.2 Report purpose.

This is a non-WebTAG compliant social and distributional impact appraisal of seven options for the proposed South West Cambridge P&R scheme. These options are:

1. Do nothing
2. Magenta (expansion of existing P&R provision at the current Trumpington site)
3. Cyan
4. Purple
5. White
6. Yellow
7. Purple with CAP (assessed as part of accidents and physical activity social impact section only)

Due to the limited levels of quantitative data and the lack of modelling data available at this stage, WebTAG has been used as a guide only because a full appraisal of impacts is not possible. Where possible quantitative analysis is undertaken; where this is not possible qualitative analysis of the social and distributional impacts of the six proposed options is presented.

3 Social impact appraisal

This section presents the results of the SI appraisal of the scheme. The SI appraisal has been carried out at a high level, proportionate to the size of the scheme, availability of data and the stage of the appraisal. A more detailed SI appraisal will be prepared for the Full Business Case (FBC) stage.

A five-point scale has been used to assess whether there will be adverse, beneficial or neutral impacts of the scheme, as summarised in Table 3.

Table 3: Five-point scale to determine social impacts of each option

Adverse
Slight adverse
Neutral
Slight beneficial
Beneficial

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

Social impact appraisals cover the human experience of the transport scheme(s) and their impact on wider society. The impacts included are

- Accidents
- Physical activity
- Security
- Severance
- Journey quality
- Option and non-use values
- Accessibility
- Personal affordability

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 beneficial or adverse impacts (as per table 4 above). Where this is not possible due to a lack of quantifiable data, appraisal has been based on qualitative data.

A number of the social impacts identified here are further assessed as part of the DI appraisal, which looks at the impacts on sensitive population groups and whether or not the impacts are proportionate.

3.1 Accident impacts

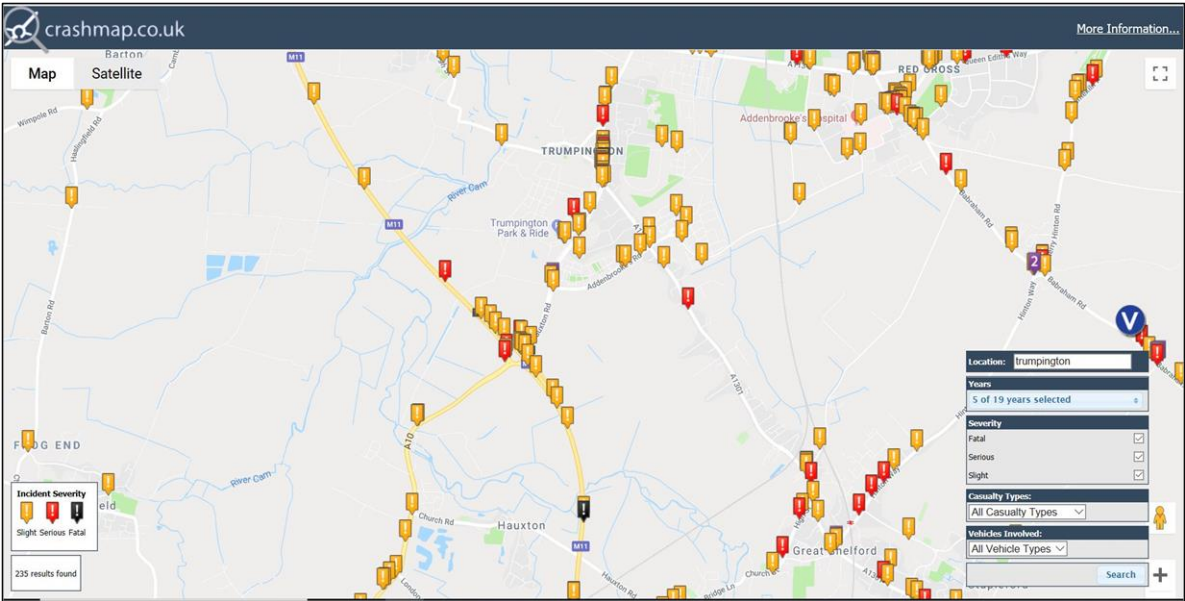
3.1.1 Accident overview

Transport interventions can affect the risk of injuries, casualties and fatalities as a result of accidents. Accidents can occur across all modes of transport and can impact non-users as well as users.

At present, modelling data and data showing the forecasted numbers and severity of accidents, and the associated monetary value, is not available and therefore a full appraisal cannot be carried out.

Figure 1 demonstrates that over a five-year period, there have been several accidents of varying severity in the areas surrounding the junction and the existing Trumpington P&R site. As a result of changes to the road alignment, changes in the number of vehicles on the network and other contributing factors, there may be an impact on the number of accidents in future years.

Figure 1: Collisions within the Trumpington area over a five-year period



Source: www.crashmap.co.uk. Collision data source: Department for Transport. Basemap: Google. Accessed 28/01/2019

Table 4 below compares the potential accident impacts for each of the scheme options.

Table 4: Summary of accident impacts

Option	Qualitative comments	Summary assessment score
Option 1 – Do nothing	The 'do nothing' approach will cause the facility at Trumpington P&R 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
Option 2 – 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 P&R lanes could introduce conflict points which could increase the risk of accidents.	Neutral
Option 3 - 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
Option 4 - 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
Option 5 - 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 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. Reduced vehicle kilometres on the road network could lead to a reduced number of accidents within Cambridge city centre	Beneficial
Option 6 – Yellow	The yellow option could increase the likelihood of accidents occurring as westbound traffic turns right from the A10 into the P&R and, upon exit, the traffic turning right onto the westbound A10. Traffic signals on the A10 may result in queueing traffic, increasing chances of collisions. In addition, of the four options with a proposed new P&R site, this is the only option without dedicated and segregated tunnel access for northbound M11 traffic. Increased interaction between the A10 traffic and the P&R 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	Slight adverse

Option	Qualitative comments	Summary assessment score
	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	
Option 7 – Purple with CAP	This 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 CAP could result in safer walking and cycling journeys, therefore reducing the risk of accidents and giving beneficial accident impacts.	Beneficial

Source: Mott Macdonald

3.2 Physical activity impacts

3.2.1 Physical activity overview

It is recognised that there is a relationship between transport, the environment and health. Transport can affect levels of physical activity both through the promotion of active modes over motorised transport but also through the provision of facilities at public transport access points and the provision of infrastructure to promote walking and cycling

Table 5 below compares the physical activity impacts for each of the scheme options.

Table 5: Summary of physical activity impacts

Option	Qualitative comments	Summary assessment score
Option 1 – Do nothing	The do nothing 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
Option 2 – Magenta	Additional cycle storage and hire facilities could increase cycle connectivity for commuters, therefore providing beneficial physical activity impacts.	Slight beneficial
Option3 - Cyan	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 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
Option 4 - Purple	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. 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
Option 5 - White	Cycle storage and hire facilities could encourage cyclists who live further afield to adopt a multi-modal journey where 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 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
Option 6 – Yellow	Cycle storage and hire facilities could encourage cyclists who live further afield to adopt a multi-modal journey where 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 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
Option 7 – 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. CAP aims to encourage	Beneficial

Option	Qualitative comments	Summary assessment score
	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	

Source: Mott Macdonald

3.3 Security impacts

3.3.1 Security overview

Interventions at the P&R site may affect levels of security for transport users as they are travelling around the site, while leaving their vehicle parked, and while they are travelling into the centre. Road users can become more vulnerable to crime when they are required to leave their vehicles in unsecured locations and when they are required to travel at slow speeds, for example approaching signals and in congested traffic. There are also perceived personal security implications for pedestrians and cyclists relating to surveillance, lighting and segregation.

Table 6 compares the security impacts for each of the scheme options.

Table 6: Summary of security impacts

Option	Qualitative comments	Summary assessment score
Option 1 – Do nothing	Minimal surface expansion could result in users parking in other, less secure locations because the secure P&R site has reached capacity. Personal security is a concern as result of a segregated route and intermittent lighting on an active travel route that cyclists and pedestrians would be required to use to access the centre. The route is well utilised during peak times but can cause problems during quieter and darker periods.	Adverse
Option 2 – Magenta	Increased surface expansion could result in more users being able to park in a secure location. Personal security is a concern as result of a segregated route and intermittent lighting on an active travel route that cyclists and pedestrians would be required to use to access the centre. The route is well utilised during peak times but can cause problems during quieter and darker periods.	Slight adverse
Option 3 – Cyan	A new P&R site would result in more users being able to park in a secure location. Personal security is a concern as result of a segregated route and intermittent lighting on an active travel routes that cyclists and pedestrians would be required to use to access the centre. The route is well utilised during peak times but can cause problems during quieter and darker periods.	Slight adverse
Option 4 – Purple	A new P&R site would result in more users being able to park in a secure location. Personal security is a concern as result of a segregated route and intermittent lighting on an active travel routes that cyclists and pedestrians would be required to use to access the centre. The route is well utilised during peak times but can cause problems during quieter and darker periods.	Slight adverse
Option 5 – White	A new P&R site would result in more users being able to park in a secure location. Personal security is a concern as result of a segregated route and intermittent lighting on an active travel routes that cyclists and pedestrians would be required to use to access the centre. The route is well utilised during peak times but can cause problems during quieter and darker periods.	Slight adverse
Option 6 – Yellow	A new P&R site would result in more users being able to park in a secure location. Personal security is a concern as result of a segregated route and intermittent lighting on an active travel routes that cyclists and pedestrians would be required to use to access the centre. The route is well utilised during peak times but can cause problems during quieter and darker periods.	Slight adverse

Source: Mott Macdonald

3.4 Severance impacts

3.4.1 Severance overview

Community severance is defined in WebTAG as the separation of residents from facilities and services they use within their community, caused by substantial changes in the transport infrastructure or changes in traffic flows which impede pedestrian movement or provide a physical barrier to movement. Severance is primarily concerned with those using non-motorised modes, particularly pedestrians.

Table 7 below compares the severance impacts for each of the scheme options.

Table 7: Summary of severance impacts

Option	Qualitative comments	Summary assessment score
Option 1 – Do nothing	Given there is no road realignment associated with this option, there are no associated severance impacts.	Neutral
Option 2 – Magenta	While there is some road realignment proposed as part of this option, there will be no major changes to pedestrian movement around the site and therefore no associated severance impacts.	Neutral
Option3 - Cyan	From the proposed new site, journeys could still be made into the centre but will require the crossing of the M11. This will likely be across a proposed cycle/footbridge to the north of the site as opposed to crossing the junction directly due to an increased number of slip roads and signal controlled junctions. Using the bridge to cross, while safer, will likely increase the length of the journey.	Adverse
Option 4 - Purple	From the proposed new site, journeys could still be made into the centre but will require the crossing of the M11. This will likely be across a proposed cycle/footbridge to the north of the site as opposed to crossing the junction directly due to an increased number of slip roads and signal controlled junctions. Using the bridge to cross, while safer, will likely increase the length of the journey.	Adverse
Option 5 - White	From the proposed new site, journeys could still be made into the centre but will require the crossing of the M11. This will likely be across a proposed cycle/footbridge to the north of the site as opposed to crossing the junction directly due to an increased number of slip roads and signal controlled junctions. Using the bridge to cross, while safer, will likely increase the length of the journey.	Adverse
Option 6 – Yellow	From the proposed new site, journeys could still be made into the centre but will require the crossing of the M11. This will likely be across a proposed cycle/footbridge to the north of the site as opposed to crossing the junction directly due to an increased number of slip roads and signal controlled junctions. Using the bridge to cross, while safer, will likely increase the length of the journey.	Adverse

Source: Mott Macdonald

3.5 Journey quality impacts

3.5.1 Journey quality overview

Travel is a derived demand that arises from people's desire to engage in activities, for example commuting for the purpose of getting to the workplace. High journey quality is often taken for granted and often goes unnoticed. However, poor journey quality can negatively impact a person's travel experience and can be easily recognised. This section includes factors not considered elsewhere in the appraisal such as journey times and traveller stress.

As per WebTAG guidance, a qualitative approach has been taken here. Journey quality impacts can be split into three groups, according to their nature. These are:

- Traveller care: aspects cleanliness, level of facilities, information and general transport environment
- Traveller views: the views and pleasantness of external surroundings
- Traveller stress: frustration, fear of accidents and route uncertainty

Table 8 compares the journey quality impacts for each of the scheme options.

Table 8: Summary of journey quality impacts

Option	Qualitative comments	Summary assessment score
Option 1 – Do nothing	The do nothing approach may provide quicker journey times into Cambridge as the site is located closer and does not need to cross the M11. The proposed addition of 274 car parking spaces could cause overcrowding issues both within the site due to the minimal surface expansion, and on the buses if capacity issues are not addressed. .	Slight adverse
Option 2 – Magenta	The magenta approach may provide quicker journeys into Cambridge as the site is located closer and does not need to cross the M11. The proposed addition of the new deck could cause overcrowding issues on the buses and steps must be taken to ensure existing buses can accommodate inevitable increased demand. There should be reduced frustration from users who currently experience congestion and an inability to find suitable parking spaces. While this option does not reduce trips from the circulatory, the addition of dedicated P&R lanes would increase traffic capacity, with potential to reduce overall journey times.	Slight beneficial
Option3 - Cyan	Although the proposed site is located slightly further away than the existing Trumpington site, there are dedicated access points and slip roads to the site, which would reduce traffic flow on the circulatory at Junction 11, therefore reducing delays to all journeys passing through the junction. This option routes buses via an existing bridge to the north of the site, therefore reducing conflict with general traffic and reducing journey times. Users will benefit from reduced traveller stress and frustration associated with congested roads and an inability to find suitable parking within the centre. Active travel users will benefit from a reduced fear of accidents on the segregated cycle/pedestrian bridge to the north of the site.	Beneficial
Option 4 - Purple	By intercepting trips via dedicated access points and slip roads into the P&R site, the purple option is expected to reduce traffic flows on the circulatory at Junction 11. This option includes a dedicated two-way bus only route through Junction 11 which should result in improved journey times into the centre. Users will benefit from reduced traveller stress and frustration associated with congested roads and an inability to find suitable parking within the centre. Active travel users will benefit from a reduced fear of accidents on the segregated cycle/pedestrian bridge to the north of the site.	Beneficial
Option 5 - White	The white option routes buses via an existing bridge, which should result in improved journey times into the centre, improving the journey quality for users. By intercepting journeys via dedicated slip roads into the proposed site, this will reduce traffic on the circulatory at junction 11, reducing congestion for all road users. Users will benefit from reduced traveller stress and frustration associated with congested roads and an inability to find suitable parking within the centre. Active travel users will benefit from a reduced fear of accidents on the segregated cycle/pedestrian bridge to the north of the site.	Beneficial
Option 6 – Yellow	The yellow option is the only option of the proposed new site options without dedicated tunnel access for northbound M11 traffic, therefore meaning that all P&R traffic must enter via an entrance on the A10. An increased number of vehicles that would be required to enter/egress on the A10 gives potential for increased congestion at this point for road users. While buses are routed via the accommodation bridge, avoiding any conflict with general traffic at Junction 11, the presence of two new junctions on the A10 may lead to an increase in delay between Harston and the M11. Users will benefit from reduced traveller stress and frustration associated with congested roads and an inability	Slight beneficial

Option	Qualitative comments	Summary assessment score
	to find suitable parking within the centre. Active travel users will benefit from a reduced fear of accidents on the segregated cycle/pedestrian bridge to the north of the site	

Source: Mott Macdonald

3.6 Option values and non-use values

3.6.1 Option values and non-use values overview

An option value is the willingness-to-pay to preserve the option of using a transport service for trips not yet anticipated (or currently undertaken by other modes), over and above the expected value of any such future use. A non-use value is the value that is placed on the continued existence of a service regardless of any possibility of future use by the individual in question¹.

3.6.2 Summary of option and non-use values

Option and non-use values require assessment if the scheme being appraised includes measures that will substantially change the availability of transport services within the study area (e.g. the opening or closure of a rail service, or the introduction or withdrawal of buses serving a rural area). It is not anticipated that the South West P&R scheme will affect option and non-use values, and therefore been scoped out of the appraisal.

3.7 Accessibility impacts

3.7.1 Accessibility overview

One of the aims of the P&R scheme is to improve accessibility for road users and active travel users into the centre of Cambridge. There is currently severe congestion within Cambridge and it is hoped that additional P&R spaces will alleviate this. The provision of additional cycle hire and storage facilities will improve accessibility for cyclists.

3.7.2 Summary of accessibility impacts

While accessibility is a major concern within this scheme, it is accessibility of car users and pedestrians/cyclists that is of the most concern. An accessibility impact appraisal generally looks at networks used by those without vehicle access. Given that this appraisal is looking at a P&R scheme, it could be assumed that users will have access to a vehicle. For this reason, this impact has been scoped out.

3.8 Personal affordability impacts

3.8.1 Personal affordability overview

Monetary costs can act as a major barrier to mobility for certain groups of people, with particularly acute effects on their ability to access key destinations. Although those on lower incomes can often spend less on transport in absolute terms than the rest of the population, the spend generally accounts for a greater proportion of their income. Affordability is a central issue and, WebTAG recommends there should be one or more objectives relating to affordable travel in a transport scheme.

¹ Definitions provided in TAG Unit A4.1 (Social Impact Appraisal)

3.8.2 Summary of personal affordability impacts

This scheme's impacts are unlikely to affect personal affordability. There are no proposed changes to the parking costs, which will remain free for up to 18 hours. Bus fares from the site into the centre will remain heavily subsidised. Considering the majority of P&R users will be commuters who will be parking for less than 18 hours a day, there are no immediate affordability impacts.

4 Distributional impact appraisal

DI appraisals consider the variance of a scheme's impact across different social groups. Social groups that are likely to be disproportionately positively or negatively impacted are identified, as well as amenities that could act as trip attractors for the relevant social groups. The impacts considered are:

- User benefits
- Noise
- Air quality
- Accidents
- Security
- Severance
- Accessibility
- Personal affordability

Table 9 displays the seven-point grading system used to determine whether and to what degree impacts are adverse, beneficial or neutral.

Table 9: Seven-point scale to determine distributional impacts of each option

Adverse and the population impacted is greater (>5%) than the proportion of the group in the total population	Large adverse
Adverse and the population impacted is broadly in line (+ or -5%) with the proportion of the population of the group in the total population	Moderate adverse
Adverse and the population impacted is smaller (<5%) 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 (<5%) than the proportion of the group in the total population	Slight beneficial
Beneficial and the population impacted is broadly in line (+ or -5%) with the proportion of the group in the total population	Moderate beneficial
Beneficial and the population impacted is greater (+5%) than the proportion of the group in the total population	Large beneficial

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

Due to a lack of modelling data at this stage, impacted areas have been estimated as either one kilometre around both the existing and proposed site locations, or Cambridge and South Cambridgeshire local authorities. At the FBC stage this could be reviewed if more accurate data becomes available and more detailed analysis is required.

For the purposes of this appraisal, options 'do nothing' and 'magenta' will be grouped together to show existing provision, while 'cyan', 'purple', 'white', and 'yellow' are grouped as part of a proposed new site.

4.1 Distributional impacts of user benefits

4.1.1 Introduction

User benefits are experienced by different groups of people in different areas. The proposed new P&R site and/or proposed expansion at the existing Trumpington site will both improve capacity and increase public transport usage, taking vehicles out of the centre of Cambridge therefore reducing user frustration associated with oversubscribed parking and congestion. In the absence of detailed modelling data, an analysis of income distribution is reviewed as part of this appraisal.

4.1.2 Stage 1: Screening

Table 10: Distributional impact: User benefits screening

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative comments	(d) Proceed to step 2
User benefits	The TUBA user benefit analysis software or an equivalent process has been used in the appraisal; and/or the value of user benefits Transport Economic Efficiency (TEE) table is non-zero.	Yes	In the absence of detailed user benefits data, benefits have been assumed to be positive.	Yes, proceed to step 2

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

4.1.3 Stage 2: Assessment

4.1.3.1 Stage 2a: Confirmation of impacted area

In the absence of detailed TUBA modelling, the impacted area has been assessed as the local authorities of Cambridge and South Cambridgeshire.

4.1.3.2 Stage 2b: Identification of social groups in the impact area

WebTAG guidance suggests that in the absence of detailed TUBA modelling, user benefits should be assessed in relation to income distribution in the impact area.

Table 11: Distribution of residents across income deprivation quintiles within Cambridge and South Cambridgeshire

	< Most deprived		Income quintile	Least deprived >	
	0% <20%	20 <40%	40% <60%	60% <80%	80% <100%
Impact area	0.4%	8%	19%	25%	48%
England	20%	20%	20%	20%	20%
England variance	-19.6%	-12%	-1%	5%	28%

Source: 2015 Index of Multiple Deprivation. 2017 Mid-Year Population Estimates

Broadly across the region, there are low levels of income deprivation. Only 0.4% of residents reside in the most deprived income quintile whereas 48% of residents live in the least deprived income quintile, as summarised in Table 11. All but the middle quintile displays significant variance to the national average and therefore the scheme is expected to realise disproportionate impacts.

4.1.3.3 Stage 2c: Identification of amenities in the impact area

As per WebTAG guidance, the identification of amenities within the impact area has not been conducted due to the impact area being too large and the appraisal focussing on the impact across income deprivation quintiles.

4.1.4 Stage 3: Appraisal of impacts

In the absence of quantitative user benefits data for the scheme, user benefits of the options are assumed to be positive.

Table 12: Summary assessment scores

	Scheme options	
	Existing site (do nothing, magenta)	Proposed site (cyan, purple, white, yellow)
Most deprived quintile	Slight beneficial	Slight beneficial
Second most deprived quintile	Slight beneficial	Slight beneficial
Third most deprived quintile	Moderate beneficial	Moderate beneficial
Second least deprived quintile	Moderate beneficial	Moderate beneficial
Least deprived quintile	Large beneficial	Large beneficial

Source: Mott Macdonald

Table 12 displays the summary appraisal score for each income quintile. There is no difference in this instance between the existing and proposed site in terms of impacts as the study area is so large. The variance figures in Table 12 have been scored using the seven-point scale method outlined in Table 10. The overall summary assessment score for income distribution, for both the existing and proposed site options, has been assessed as moderate as this is the average value.

4.2 Distributional impacts of noise and air quality

4.2.1 Introduction

This section presents the DI appraisal of noise and air quality. As the assessment of these impacts largely covers the same population groups and they use the same impact area, these have been grouped together for this DI appraisal. Noise and air quality impacts are likely to occur where an intervention results in changes to traffic flows, speeds or where the physical gap between people and traffic is altered. The scheme is appraised in terms of distributional impacts on children aged under 16, older people aged 70 and over, and income deprivation quintiles.

4.2.2 Stage 1: Screening

Table 13: Distributional impact: Noise screening

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative comments	(d) Proceed to step 2
Noise	Any change in alignment of transport corridor or any links with significant changes (>25% or <-20%) in vehicle flow, speed or %heavy duty vehicles (HDV) content. Also note comment in TAG Unit A3.	Yes	Increased traffic flows on roads in the vicinity of the site may increase noise, however this is likely to be offset by the potential reduction of vehicles on the wider road network.	Yes, proceed to step 2

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

Table 14: Distributional impact: Air quality screening

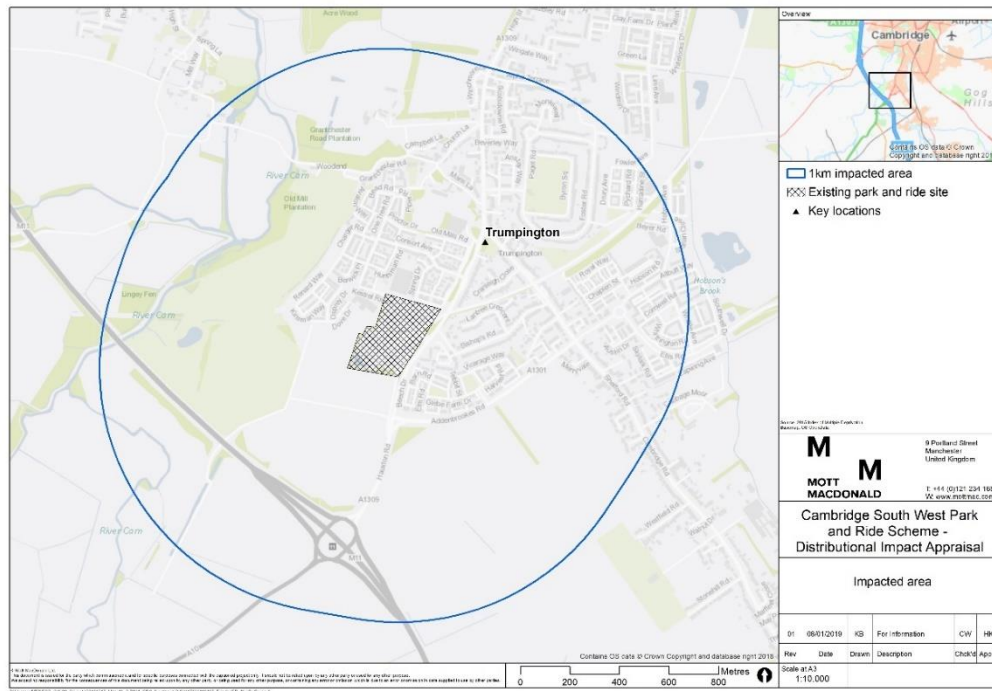
Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative comments	(d) Proceed to step 2
Air quality	Any change in alignment of transport corridor or any links with significant changes in vehicle flow, speed or %HDV content: <ul style="list-style-type: none"> • Change in 24 hour Average Annual Daily Traffic(AADT) of 1000 vehicles or more • Change in 24 hour AADT of HDV of 200 HDV vehicles or more • Change in daily average speed of 10kph or more • Change in peak hour speed of 20kph or more • Change in road alignment of 5m or more 	Yes	Increased traffic flows on roads in the vicinity of the site may reduce air quality, however this is likely to be offset by the potential reduction of vehicles on the wider road network.	Yes, proceed to step 2

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

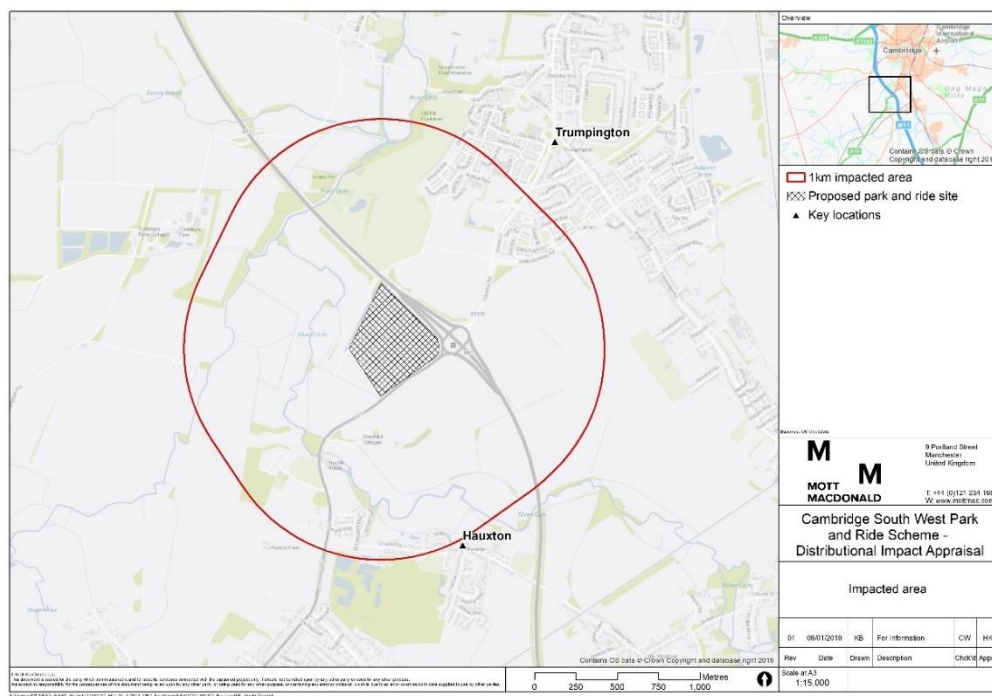
4.2.3 Stage 2: Assessment

4.2.3.1 Stage 2a: Confirmation of areas impacted by the intervention

In the absence of detailed noise and air quality analysis at this stage, a 1km buffer around both the existing and proposed P&R sites has been used, as displayed in Figure 2 and Figure 3. For the FBC stage it is proposed that detailed analysis of the preferred option will be undertaken to give a more detailed impacted area.

Figure 2: 1km impacted area surrounding existing P&R site

Source: Mott Macdonald

Figure 3: 1km impacted area surrounding the proposed P&R site

Source: Mott Macdonald

4.2.3.2 Stage 2b: Identification of social groups in the impact areas

Noise: Children are identified as an at-risk group and are vulnerable to noise impacts as noise disturbance and annoyance has an adverse impact on children's sleep and can impair their ability to learn effectively while at school.² Older people are more at risk of coronary problems and cognitive disorders such as Alzheimer's or dementia, and evidence suggests that increased exposure to environmental noise can exacerbate these problems.³ Those from more income deprived areas may not have the capacity to make alterations to their property, such as the installation of double glazing, and therefore could experience disproportionate adverse impacts caused by environmental noise compared to those from less income deprived areas.

Air quality: Evidence suggests that children are particularly at risk from air pollution. In general, children spend an increased amount of time outside and therefore become more vulnerable to harmful pollutants. Children also have faster breathing rates and their lungs are still developing and could be left with lasting problems such as asthma.⁴⁵

Table 15: Proportion of residents aged under 16 within the 1km impacted area surrounding the P&R site options

Population aged under 16s	
Existing site study area population	1570
Existing site study area proportion	29%
Existing site variance to national average	10%
Proposed site study area population	444
Proposed site study area proportion	25%
Proposed site variance to national average	6%
National average (England)	19%

Source: 2017 Mid-Year Population Estimates

The existing site options give a greater variance to the national average. There would be a 10% positive variance compared to a 6% positive variance under the proposed site options.

Table 16: Proportion of residents aged 70 and over within the 1km impacted area surrounding the P&R site options

Population aged 70 and over	
Existing site study area population	462
Existing site study area proportion	9%
Existing site variance to national average	-4%
Proposed site study area population	225
Proposed site study area proportion	13%
Proposed site variance to national average	0%
National average (England)	13%

Source: 2017 Mid-Year Population Estimates

² Shield, B. and Dockrell, J. (2008). The effects of environmental and classroom noise on the academic attainments of primary school children. *The Journal of the Acoustical Society of America*, 123(1), pp.133-144.

³ World Health Organisation (2019) *Noise: Data and statistics* <http://www.euro.who.int/en/health-topics/environment-and-health/noise/data-and-statistics>

⁴ Asthma UK (2016), *Pollution*, <https://www.asthma.org.uk/advice/triggers/pollution/>

⁵ UNICEF UK (2019) *Keeping children safe from toxic air* <https://www.unicef.org.uk/clean-air-child-health-air-pollution/>

There is a 4% negative variance in the proportion of older people compared to the national average for existing site options and no variance to the national average for proposed site options.

Table 17: Distribution of residents across income deprivation quintiles in the 1km impacted areas surrounding the P&R site options

	< Most deprived		Income quintile	Least deprived >	
	0% <20%	20 <40%	40% <60%	60% <80%	80% <100%
Existing site study area ⁶	0%	0%	35%	56%	10%
Existing site variance	-20%	-20%	15%	36%	-10%
Proposed site study area	0%	0%	12%	63%	25%
Proposed site variance	-20%	-20%	-8%	43%	5%
England	20%	20%	20%	20%	20%

Source: 2015 Index of Multiple Deprivation

Appendix B contains maps displaying the distribution of relevant social groups within both the proposed and existing P&R site 1km buffers.

4.2.3.3 Stage 2c: Identification of amenities in the impact area

The locations of amenities that could act as trip attractors for those from the relevant social groups are presented in Appendix B. Table 18 shows that the existing P&R site is in closer proximity to residential areas and associated services and amenities than the proposed site. In terms of amenities that could be adversely impacted by noise changes, the proposed site is within 1km of one school, Trumpington Meadows Primary School, whereas the existing site has three schools or nurseries within 1km, Trumpington Meadows Primary School, Trumpington Park Primary School and the Rainbow Day Nursery. Children attending these schools who may not necessarily reside within the impacted area could be impacted by increased levels of noise as a result of construction and an increased number of vehicles.

Table 18: Count of amenities located within the 1km impacted area surrounding the P&R site options

Amenity	Count of amenities within the existing site impacted area	Count of amenities within the proposed site impacted area
Sporting Facility	5	3
Community Facility	4	1
GP Surgery / Clinic	4	-
School / Nursery	3	1
Church	2	1
Health Care Services	2	-
Playground / Play Area	2	-

⁶ Totals may not equal 100% due to rounding

4.2.4 Stage 3: Appraisal of impacts

Given the lack of noise and air quality modelling data currently available, it is not possible to carry out a detailed appraisal of noise or air quality. It is expected that there will be an increase in noise levels and air pollutants in the localised areas surrounding the site due an increased number of vehicles. However, it is likely that this will be offset by a reduction in vehicles on the rest of the network, particularly Southern and Central Cambridge. As such, at this stage the impacts for both the existing and proposed P&R options have been assessed as neutral.

Table 19: Summary assessment scores

	Scheme options	
	Existing site	Proposed site
Children	Neutral	Neutral
Older people	Neutral	Neutral
Most deprived quintile	Neutral	Neutral
Second most deprived quintile	Neutral	Neutral
Third most deprived quintile	Neutral	Neutral
Second least deprived quintile	Neutral	Neutral
Least deprived quintile	Neutral	Neutral
Overall income deprivation impact	Neutral	Neutral

Source: Mott Macdonald

It is important to note that although neutral assessment scores have been assigned at this stage, detailed assessment data may reveal impacts to certain social groups or income quintiles. These impacts have therefore not been scoped out of the appraisal process and should be assessed at FBC stage if the data is available.

4.3 Distributional impacts of accidents

4.3.1 Introduction

Transport interventions can alter the risk of individuals being killed or injured as a result of accidents. Most transport related accidents, injuries and deaths occur on the road network. There is a strong link between the risks of accidents and the following social groups: children, young males, older people and those from deprived areas. At present, there is no modelling data available therefore an estimation of the impacted area has been made. Should more detailed data become available, this will be reviewed at the FBC stage.

4.3.2 Stage 1: Screening

Table 20: Distributional impact – accident screening

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
Accidents	Any change in alignment of transport corridor (or road layout) that may have positive or negative safety impacts, or any links with significant changes in vehicle flow, speed, %HGV (heavy goods vehicles) content or any significant change (>10%) in the number of pedestrians, cyclists or motorcyclists using road network.	Yes	Changes in the alignment of the transport corridors could have potential positive or negative impacts on accidents based on the option.	Yes, proceed to step 2

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

All options except 'do nothing' will cause a change in alignment of the transport corridor with varying beneficial and adverse impacts. The schemes aim to increase the number of pedestrians and cyclists using the road network as a means of accessing employment sites. An increased number of cyclists and/or pedestrians on the network could increase the potential for accidents.

4.3.3 Stage 2: Assessment

4.3.3.1 Confirmation of areas impacted by the intervention

At present, the impacted area is a 1km buffer surrounding the proposed and existing sites though at FBC stage this could be extended to include relevant links on the network such as pedestrian and cycling routes. The impacted areas are displayed in Figure 2 and Figure 3 above.

4.3.3.2 Identification of social groups in the impact area

As per WebTAG guidance, the distribution of children, young people (16-25) and older people are appraised as part of this chapter. Young people are particularly at risk of being in a traffic accident, particularly young male drivers. In general, children and older people are particularly at risk as pedestrians but given the nature of the intervention, i.e. significant road alignment surrounding a junction, it is likely that there will be no immediate risks to these users as pedestrians. Pedestrians and cyclists who use the proposed extension of an existing bridge and the guided pathway/cycleway as part of their journey could experience mixed levels of accident risk, dependent on option, but these will likely not be children or older people. Instead, the likely users will be working-age commuters.

Appendix C presents maps showing the distribution of affected social groups across the impacted areas.

Table 21: Proportion of residents aged under 16 within the 1km impacted area surrounding the existing P&R site

Population aged under 16s	
Existing site study area population	1,570
Existing site study area proportion	29%
<i>Existing site variance</i>	10%
Proposed site study area population	444
Proposed site study area proportion	25%
<i>Proposed site variance</i>	6%
National average (England)	19%

Source: 2017 Mid-Year Population Estimates

The existing site options give a greater variance to the national average. There would be a 10% positive variance compared to a 6% positive variance under the proposed site options.

Table 22: Proportion of residents aged between 16 and 25 within the 1km impacted area surrounding the existing P&R site

Population aged between 16 and 25	
Existing site study area population	537
Existing site study area proportion	10%
<i>Existing site variance</i>	-2%
Proposed site study area population	152
Proposed site study area proportion	9%
<i>Proposed site variance</i>	-3%
National average (England)	12%

Source: 2017 Mid-Year Population Estimates

In both instances, the proportion of young people is slightly lower than the national average, with a variance of -2% for the existing site and -3% for proposed site.

Table 23: Proportion of residents aged 70 and over within the 1km impacted area surrounding the existing P&R site

Population aged 70 and over	
Existing site study area population	462
Existing site study area proportion	9%
<i>Existing site variance</i>	-4%
Proposed site study area population	225
Proposed site study area proportion	13%
<i>Proposed site variance</i>	0%
National average (England)	13%

Source: 2017 Mid-Year Population Estimates

For residents aged over 70, there is a -4% variance to the national average under the existing site options and the proportion is in line with the national average in the area surrounding the proposed site.

4.3.3.3 Stage 2c: Identification of amenities within the impacted area

Discussion surrounding the location of amenities within the impacted area can be found in Section 4.2.3.3. There are 22 schools, sporting facilities, community facilities, health services

and churches within 1km of the existing site that could act as trip attractors for one or more of the vulnerable social groups mentioned, therefore increasing security risks. Within 1km of the proposed site there are only six amenities that could attract users of vulnerable groups. Maps relating to the distribution of amenities within the impacted area can be found in Appendix C.

4.3.4 Stage 3: Appraisal of impacts

At present, COBALT or other accident analysis has not been undertaken, therefore qualitative accident assessment from the SI appraisal has been used in the absence of data. therefore a qualitative approach is appropriate. At present, as shown in Figure 1, there is a concentration of accidents in the areas surrounding the P&R sites. Changes to the road alignment in these areas could increase the number of accidents, particularly on the junction 11 circulatory and on the proposed bridge crossing. However, the risk of accidents for the wider road network will likely be reduced because of fewer cars on the road.

Table 24: Summary assessment scores

Option	Study area	Expected overall impact (derived from SI appraisal)	Social group	Distributional impact (seven-point scale)
Option 1 – Do nothing	Existing	Adverse	Children	Large adverse
			Young People	Moderate adverse
			Older People	Moderate adverse
Option 2 – Magenta	Existing	Neutral	Children	Neutral
			Young People	Neutral
			Older People	Neutral
Option3 – Cyan	Proposed	Beneficial	Children	Large beneficial
			Young People	Moderate beneficial
			Older People	Moderate beneficial
Option 4 – Purple	Proposed	Beneficial	Children	Large beneficial
			Young People	Moderate beneficial
			Older People	Moderate beneficial
Option 5 – White	Proposed	Beneficial	Children	Large beneficial
			Young People	Moderate beneficial
			Older People	Moderate beneficial
Option 6 – Yellow	Proposed	Adverse	Children	Large adverse
			Young People	Moderate adverse
			Older People	Moderate adverse

Source: Mott Macdonald

Table 24 displays the summary appraisal score for each option and each social group. This has been assigned using the criteria in Table 10. The proposed site options bring about more beneficial impacts than the existing site option.

4.4 Distributional impacts of severance

4.4.1 Introduction

WebTAG guidance suggests that older people, those with disabilities, children and those without car access suffer the effects of severance disproportionately more than other groups. These groups can often experience longer journey times or are often required to use pedestrian routes that are inappropriate and/or difficult to use. Mitigation measures such as footbridges and underpasses can also cause severance by creating longer journey times for users.

4.4.2 Stage 1: Screening

Table 25: Distributional impact appraisal – severance screening

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative comments	(d) Proceed to step 2
Severance	Introduction or removal of barriers to pedestrian movement, either through changes to road crossing provision, or through introduction of new public transport or road corridors. Any areas with significant changes (>10%) in vehicle flow, speed, %HGV content.	Yes, potentially negative	It is expected that changes in the road alignment surrounding Junction 11 could cause changes to the pedestrian crossing provision. Existing accommodation to the north of the site is proposed as a cycle and pedestrian crossing point for a number of the proposed options.	Yes, proceed to step 2.

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

4.4.3 Stage 2: Assessment

4.4.3.1 Confirmation of areas impacted by the intervention

The impacted area has been estimated as 1km around both the proposed and existing sites, as displayed in Figure 2 and Figure 3.

4.4.3.2 Identification of social groups in the impact area

Groups that are particularly sensitive to the effects of severance include children, older people, those with a long-term health problem or disability (LTHD) and no car households.

Table 26: Proportion of residents aged under 16 within the 1km impacted area surrounding the P&R site options

	Population aged under 16s
Existing site study area population	1570
Existing site study area proportion	29%
<i>Existing site variance</i>	10%
Proposed study area population	444
Proposed site study area proportion	25%
<i>Proposed site variance</i>	6%
National average (England)	19%

Source: 2017 Mid-Year Population Estimates. 2011 Census

The proposed site options give a greater variance to the national average than the existing site options. There would be a 10% positive variance compared to a 6% positive variance under the existing site options.

Table 27: Proportion of residents aged 70 and over within the 1km impacted area surrounding the P&R site options

Population aged 70 and over	
Existing site study area population	462
Existing site study area proportion	9%
<i>Existing site variance</i>	<i>-4%</i>
Proposed study area population	225
Proposed site study area proportion	13%
<i>Proposed site variance</i>	<i>0%</i>
National average (England)	13%

Source: 2017 Mid-Year Population Estimates.

For residents aged over 70, there is a -4% variance to the national average under the existing site options and the proportion is in line with the national average in the area surrounding the proposed site.

Table 28: Proportion of residents with a LTHD within the 1km impacted area surrounding the P&R site options

Population with a LTHD	
Existing site study area population	427
Existing site study area proportion	15%
<i>Existing site variance</i>	<i>-3%</i>
Proposed study area population	190
Proposed site study area proportion	15%
<i>Proposed site variance</i>	<i>-3%</i>
National average (England)	18%

Source: 2011 Census

For residents with a LTHD, both sites see a -3% variance to the national average figure of 18%.

Table 29: Proportion of households with no car access within the 1km impacted area surrounding the P&R site options

Households with no car access	
Existing site study area population	242
Existing site study area proportion	20%
<i>Existing site variance</i>	<i>-6%</i>
Proposed study area population	67
Proposed site study area proportion	13%
<i>Proposed site variance</i>	<i>-13%</i>
National average (England)	26%

Source: 2011 Census

Under both the existing and proposed site options, there is significant positive variance to the national average figure of 26% of households with no car access. The existing site options give a variance of -6%, which the proposed site options give a variance of -13%.

4.4.3.3 Stage 2c: Identification of amenities within the impacted area

The distribution of and discussion surrounding the location of amenities within the impacted area can be found in Section 4.2.3.3. There are 22 schools, sporting facilities, community facilities, health services and churches within 1km of the existing site that could act as trip attractors for one or more of the vulnerable social groups mentioned, therefore increasing security risks. Within 1km of the proposed site there are only six amenities that could attract users of vulnerable groups. Maps relating to the distribution of amenities within the impacted area can be found in Appendix D.

4.4.4 Stage 3: Appraisal of impacts

As outlined in the severance chapter of the SI appraisal, existing site options are expected to see neutral impacts. Adverse severance impacts are anticipated at the proposed site. Older people and residents with disabilities may be adversely impacted by the proposed site as they will likely have to cross the M11 by means of a footbridge, which can be more difficult for those in wheelchairs or with limited mobility. As part of the 'do nothing' and 'magenta' approach, there will be no requirement to cross a bridge and the journey will likely be easier. Table 30 displays distributional impacts for each of the impacted social groups for the two site options.

Table 30: Summary assessment scores

	Scheme options	
	Existing site (do nothing, magenta)	Proposed site (cyan, purple, white, yellow)
Children	Neutral	Large adverse
Older people	Neutral	Moderate adverse
Residents with a LTHD	Neutral	Moderate adverse
Households with no car access	Neutral	Slight adverse

Source: Mott Macdonald

4.5 Distributional impacts of security

4.5.1 Introduction

Research evidence shows that there are several groups with particular concerns about their personal security, including women, young people, elderly people, people with a LTHD and those from BAME communities, who all tend to perceive risk more acutely. The predominant security impacts come from perceived personal security for those walking and cycling from the P&R into the centre of Cambridge. P&R users will travel from a large area and therefore a distributional impact appraisal may not be deemed necessary and could be scoped out at a later stage.

4.5.2 Stage 1: Screening

Table 31: Distributional impact screening – security impacts

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
Security	Any change in public transport waiting/interchange facilities including pedestrian access expected to affect user perceptions of personal security.	Yes, potentially negative	There are concerns surrounding personal security on cycle and pathways into the centre.	Yes, proceed to step 2

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

A proposed new site would give an improvement in public transport waiting facilities. While there is no change proposed in pedestrian access, there are perceived personal security risks for pedestrians and cyclists who will use active travel routes into the centre.

4.5.3 Stage 2: Assessment

4.5.3.1 Stage 2a: Confirmation of areas impacted by the intervention

A 1km impact area from each site has been used to estimate the security impacts for those who would walk to and from the site.

4.5.3.2 Stage 2b: Identification of social groups in the impacted area

Table 32: Proportion of residents aged under 16 within the 1km impacted area surrounding the P&R site options

	Population aged under 16s
Existing study area population	1570
Existing study area proportion	29%
<i>Existing study area variance</i>	10%
Proposed site study area population	444
Proposed site study area proportion	25%
<i>Proposed site study area variance</i>	6%
National average (England)	19%

Source: 2017 Mid-Year Population Estimates,

The proposed site options give a greater variance to the national average than the existing site options. There would be a 10% positive variance compared to a 6% positive variance under the existing site options.

Table 33: Proportion of residents aged 70 and over within the 1km impacted area surrounding the P&R site options

Population aged 70 and over	
Existing study area population	462
Existing study area proportion	9%
<i>Existing study area variance</i>	<i>-4%</i>
Proposed site study area population	225
Proposed site study area proportion	13%
<i>Proposed site study area variance</i>	<i>0%</i>
National average (England)	13%

Source: 2017 Mid-Year Population Estimates, 2011 Census

Older people aged 70 and over display a 4% negative variance to the national average under the existing site options and are in line with the national average in the area surrounding the proposed site.

Table 34: Proportion of residents with a LTHD within the 1km impacted area surrounding the P&R site options

Population with a LTHD	
Existing study area population	427
Existing study area proportion	15%
<i>Existing study area variance</i>	<i>-3%</i>
Proposed site study area population	190
Proposed site study area proportion	15%
<i>Proposed site study area variance</i>	<i>-3%</i>
National average (England)	18%

Source: 2017 Mid-Year Population Estimates, 2011 Census

For residents with a LTHD, both sites see a -3% variance to the national average figure of 18%.

Table 35: Proportion of residents from BAME communities within the 1km impacted area surrounding the P&R site options

Population from BAME communities	
Existing study area population	729
Existing study area proportion	25%
<i>Existing study area variance</i>	<i>5%</i>
Proposed site study area population	195
Proposed site study area proportion	16%
<i>Proposed site study area variance</i>	<i>-4%</i>
National average (England)	20%

Source: 2017 Mid-Year Population Estimates, 2011 Census

There is a 5% variance to the national average in the proportion of residents from BAME communities within one kilometre from the existing site. Conversely, the variance to the national average of BAME residents in the impacted area surrounding the proposed P&R site is -4%

4.5.3.3 Stage 2c: Identification of amenities within the impacted area

The distribution of and discussion surrounding the location of amenities within the impacted area can be found in Section 4.2.3.3. There are 22 schools, sporting facilities, community facilities, health services and churches within 1km of the existing site that could act as trip attractors for one or more of the vulnerable social groups mentioned, therefore increasing security risks. Within 1km of the proposed site there are only six amenities that could attract users of vulnerable groups. Maps relating to the distribution of amenities within the impacted area can be found in Appendix E.

4.5.4 Stage 3: Appraisal of impacts

The SI appraisal identified potential security impacts for existing and proposed site options. The likely users of the scheme will be commuters, travelling during the day and not necessarily residents living in the locality. It is difficult to assess the distribution of the population who will be using the P&R site given the large area that commuters travel from. Table 36 utilises the SI appraisal scores for the options and assesses this in accordance with the DI scoring criteria in Table 10.

Table 36: Summary assessment scores

	Scheme options	
	Existing site	Proposed site
Children	Large adverse	Large adverse
Older people	Moderate adverse	Moderate adverse
Residents with a LTHD	Moderate adverse	Moderate adverse
Residents from BAME communities	Moderate adverse	Moderate adverse

Source: Mott Macdonald

Table 36 Children may see large adverse impacts as they have study area proportions that are >+5% than the national average. All other social groups have study area proportions that are broadly in line with the national average.

4.6 Accessibility impacts

4.6.1 Introduction

An aim of the scheme is to improve accessibility for commuters to the centre of Cambridge. It is hoped that access to the centre for road users will improve as a result of reduced congestion, and for pedestrians and cyclists, improve as a result of the provision of additional cycle facilities.

4.6.2 Stage 1: Screening

Table 37: Distributional impact screening – accessibility impacts

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
Accessibility	Changes in routings or timings of current public transport services, any changes to public transport provision, including routing, frequencies, waiting facilities (bus stops / rail stations) and rolling stock, or any indirect impacts on accessibility to services (e.g. demolition & re-location of a school).	No	Accessibility appraisal focuses on the public transport accessibility aspect of accessing employment, services and social networks. There are no proposed changes to services, routings or timings of current public transport services.	No further assessment (scoped out)

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

Given that accessibility impacts appraisals look specifically at public transport networks and those that people without vehicle access rely upon, and this is an appraisal of a P&R scheme, it can be assumed that the users of these scheme will have vehicle access and therefore this option can be scoped out.

4.7 Personal affordability impacts

4.7.1 Introduction

Personal affordability impacts of an intervention should be considered throughout the process where applicable, since affordability is of key importance in the operation of the transport system.

4.7.2 Stage 1: Screening

Table 38: Distributional impact screening – affordability impacts

Indicator	(a) Appraisal output criteria	(b) Potential impact (yes / no, positive/negative if known)	(c) Qualitative Comments	(d) Proceed to Step 2
Affordability	In cases where the following charges would occur; Parking charges (including where changes in the allocation of free or reduced fee spaces may occur); Car fuel and non-fuel operating costs (where, for example, rerouting or changes in journey speeds and congestion occur resulting in changes in costs); Road user charges (including discounts and exemptions for different groups of travellers); Public transport fare changes (where, for example premium fares are set on new or existing modes or where multi-modal discounted travel tickets become available due to new ticketing technologies); or Public transport concession availability (where, for example concession arrangements vary as a result of a move in service provision from bus to light rail or heavy rail, where such concession entitlement is not maintained by the local authority[1]).	No	Parking for up to 18 hours at both the existing and proposed P&R site will remain free of charge while bus fares from the site into the centre remain heavily subsidised.	No further assessment (scoped out)

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

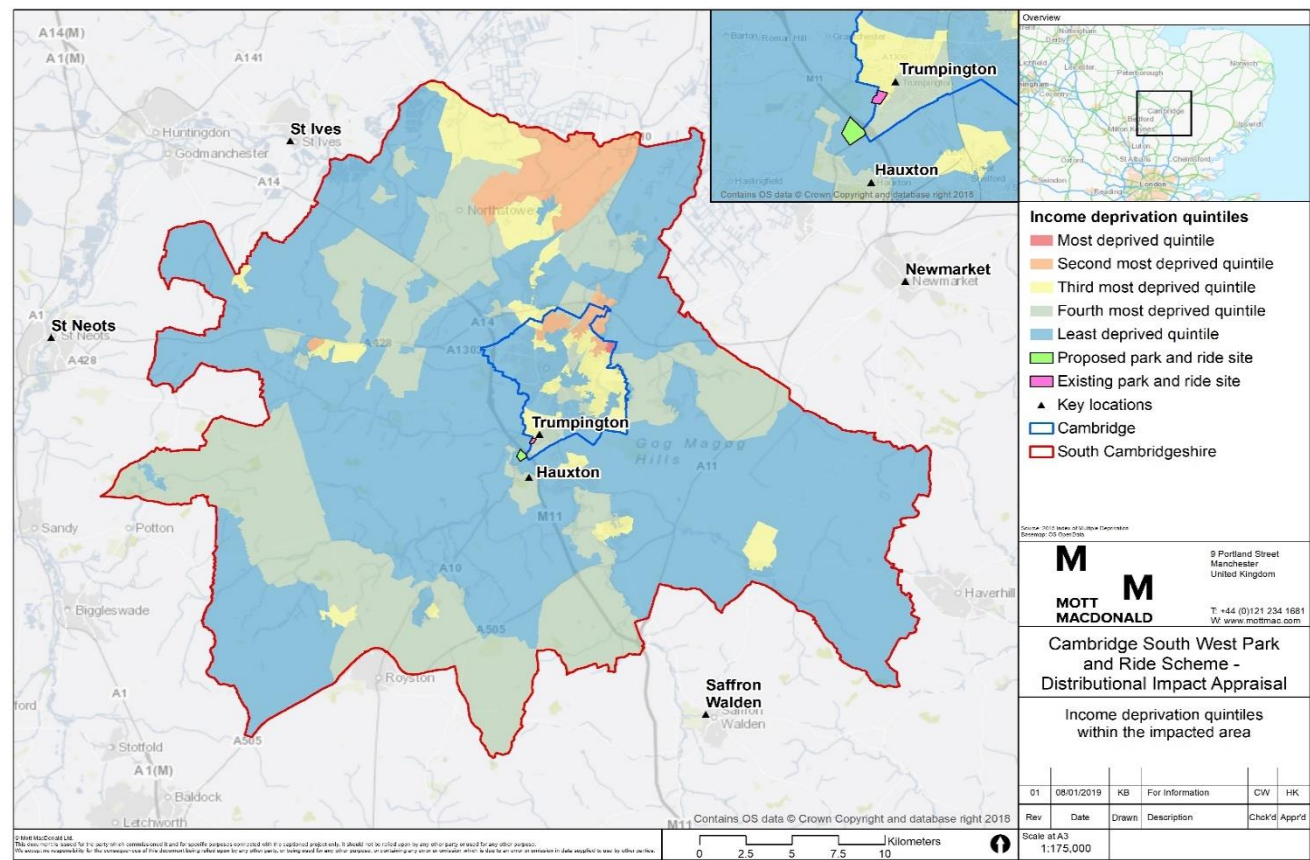
There are no substantial changes to affordability. The cost of parking will remain free for up to 18 hours and the cost of bus fares into the centre remain heavily subsidised, therefore this impact can be scoped out.

Appendices

A.	Distributional impacts of user benefits	40
B.	Distributional impacts of noise and air quality	41
C.	Distributional impacts of air quality	49
D.	Distributional impacts of accidents	55
E.	Distributional impacts of severance	63
F.	Distributional impacts of security	73

A. Distributional impacts of user benefits

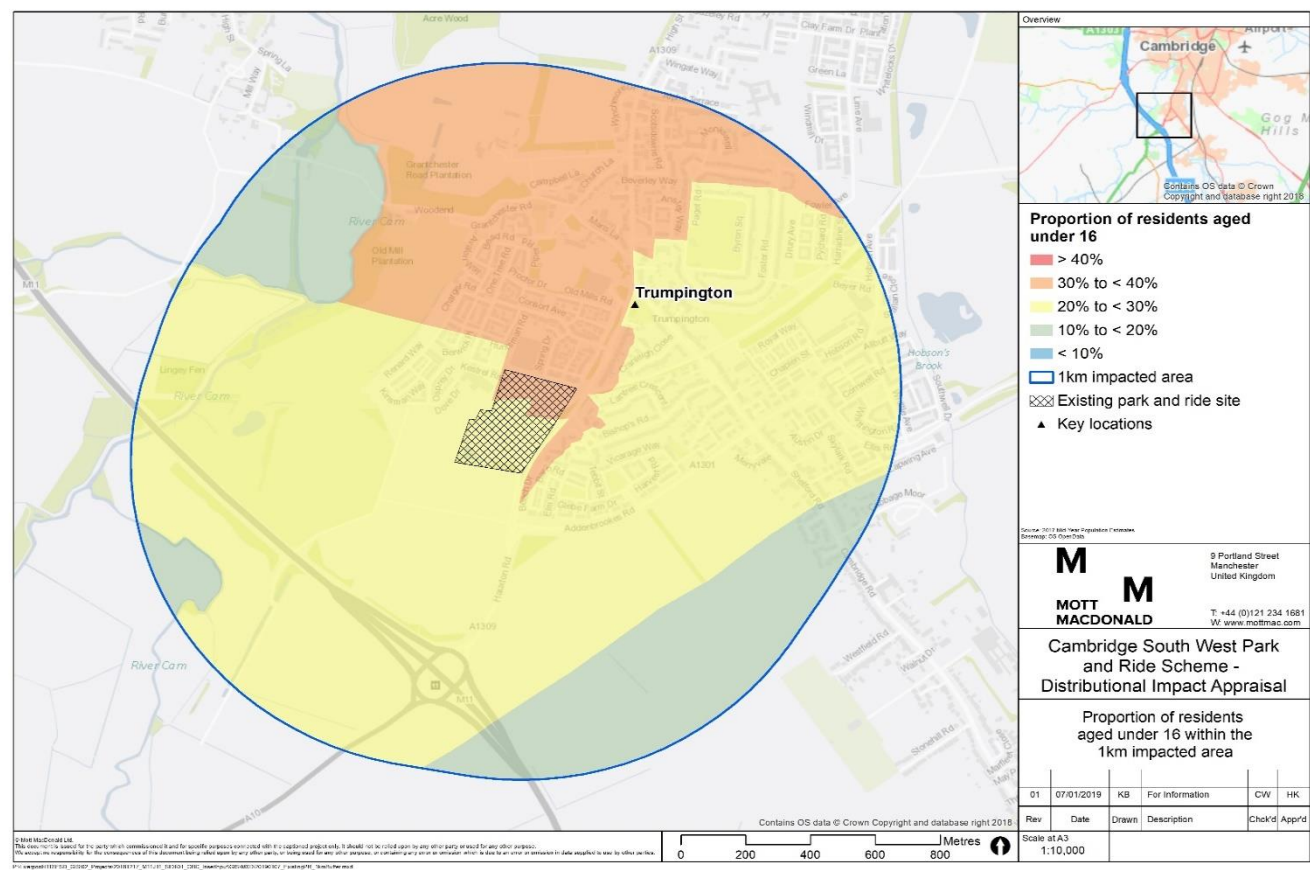
Figure 4: Income deprivation quintiles in Cambridge and South Cambridgeshire



Source: 2015 Index of Multiple Deprivation

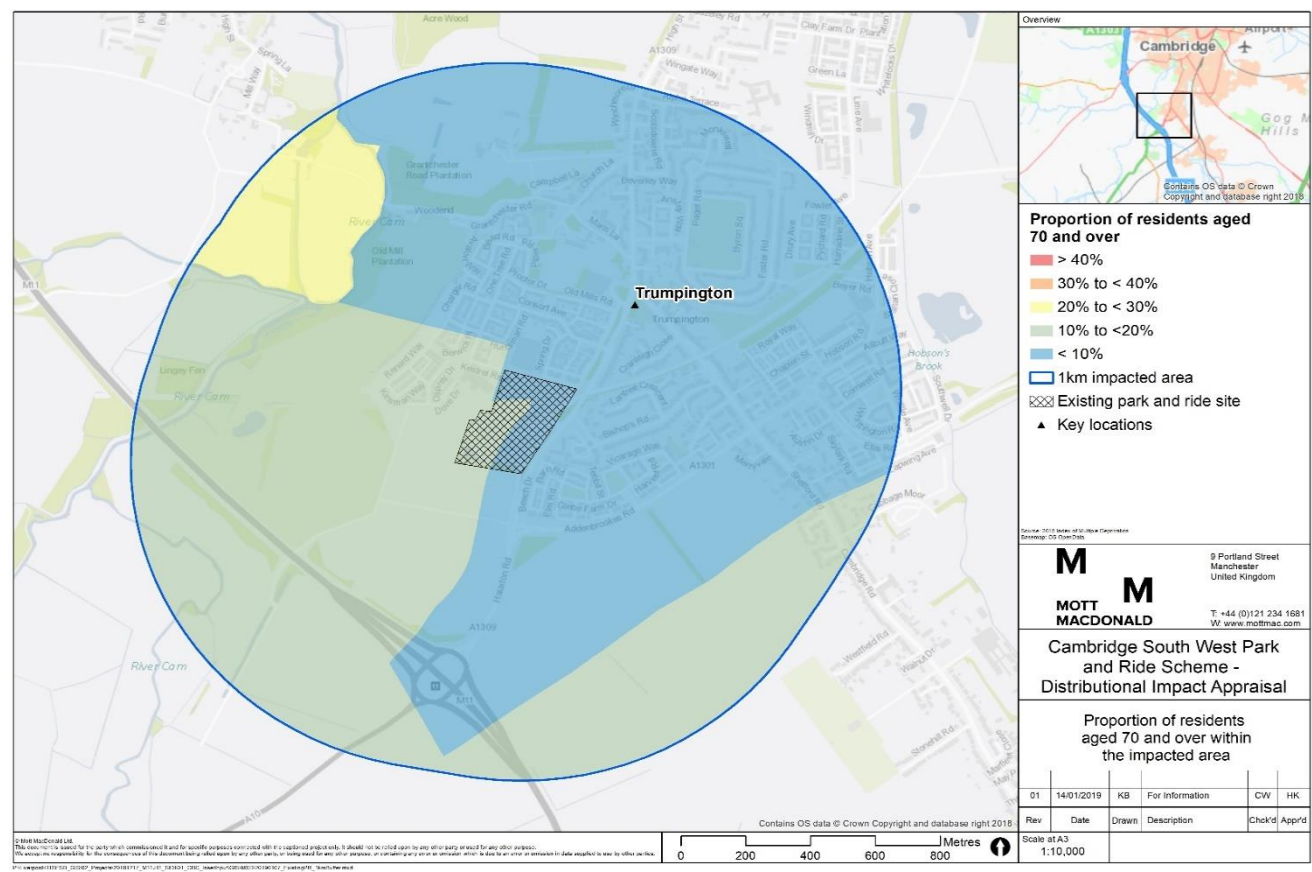
B. Distributional impacts of noise and air quality

Figure 5: Proportion of residents aged under 16 within 1km of the existing P&R site



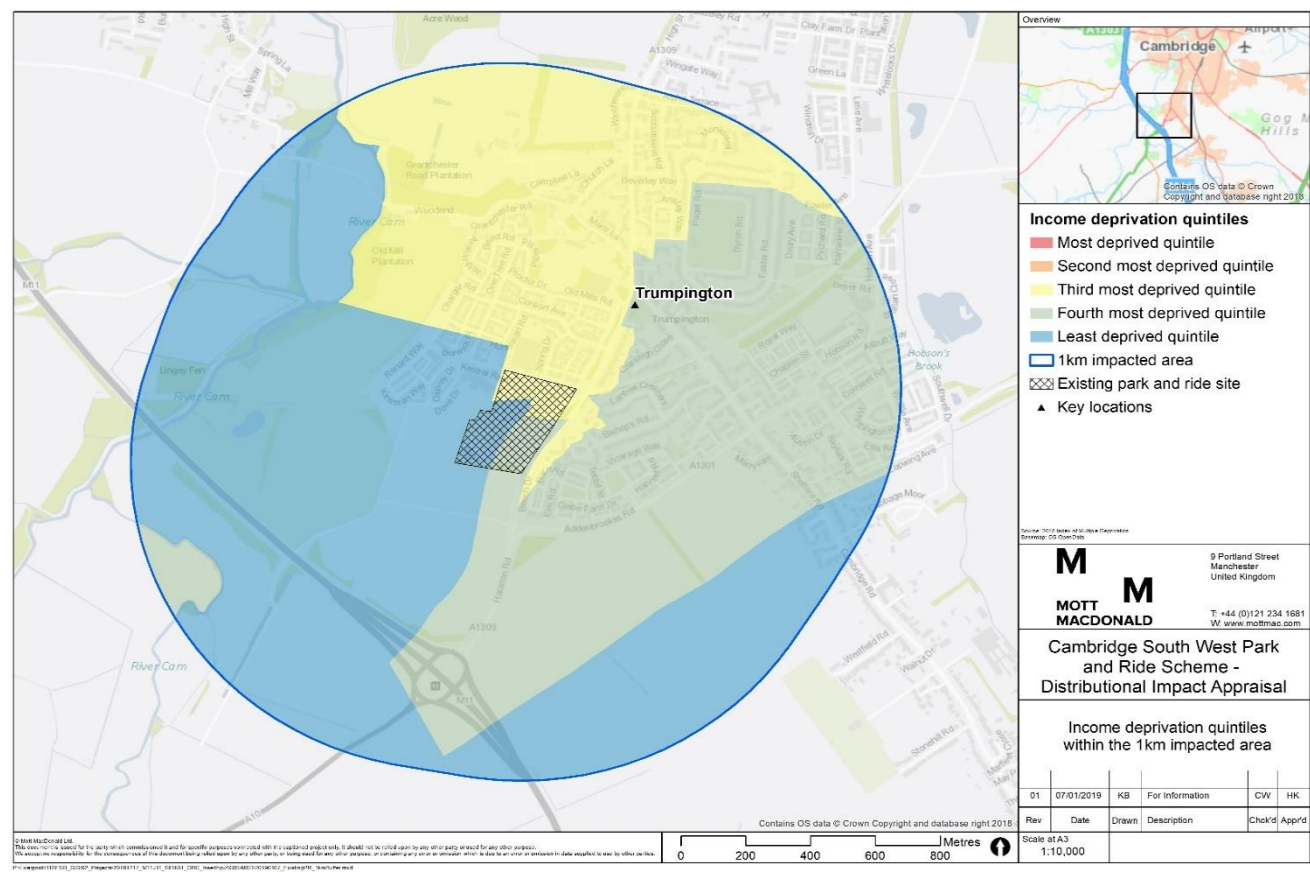
Source: 2017 Mid- Year Population Estimates

Figure 6: Proportion of residents aged 70 and over within 1km of the existing P&R site (noise impacts only)



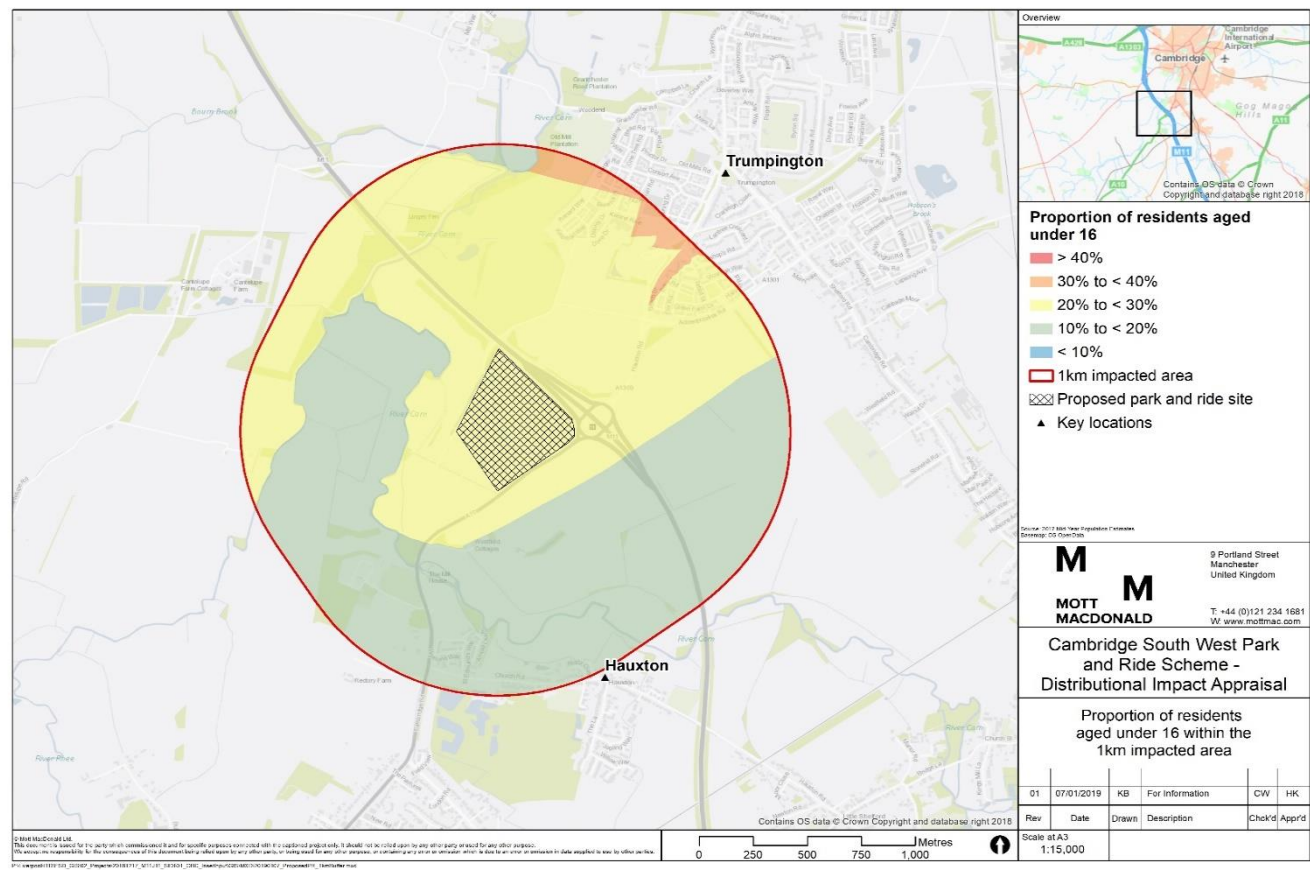
Source: 2017 Mid-Year Population Estimates

Figure 7: Income deprivation quintiles within 1km of the existing P&R site



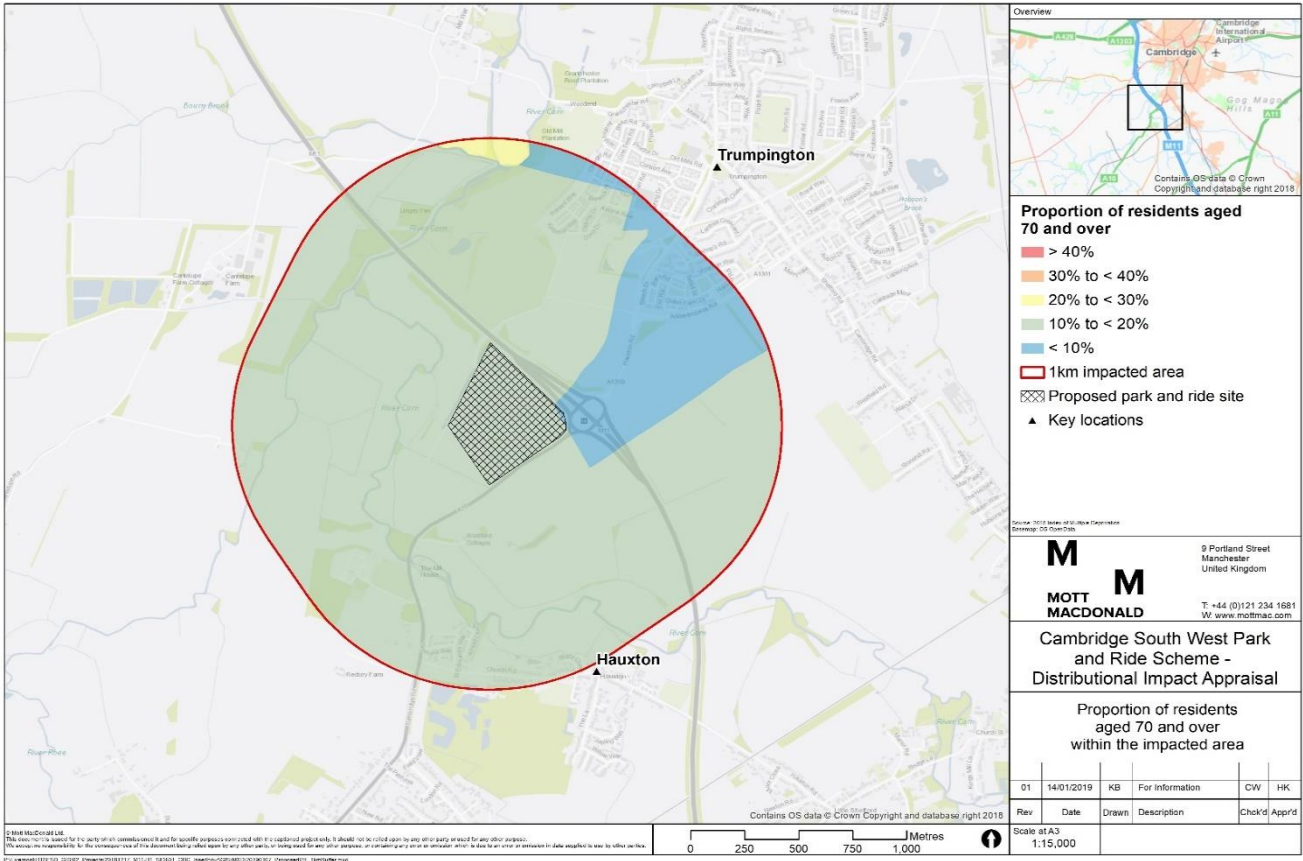
Source: 2015 Index of Multiple Deprivation

Figure 8: Proportion of residents aged under 16 within 1km of the proposed P&R site



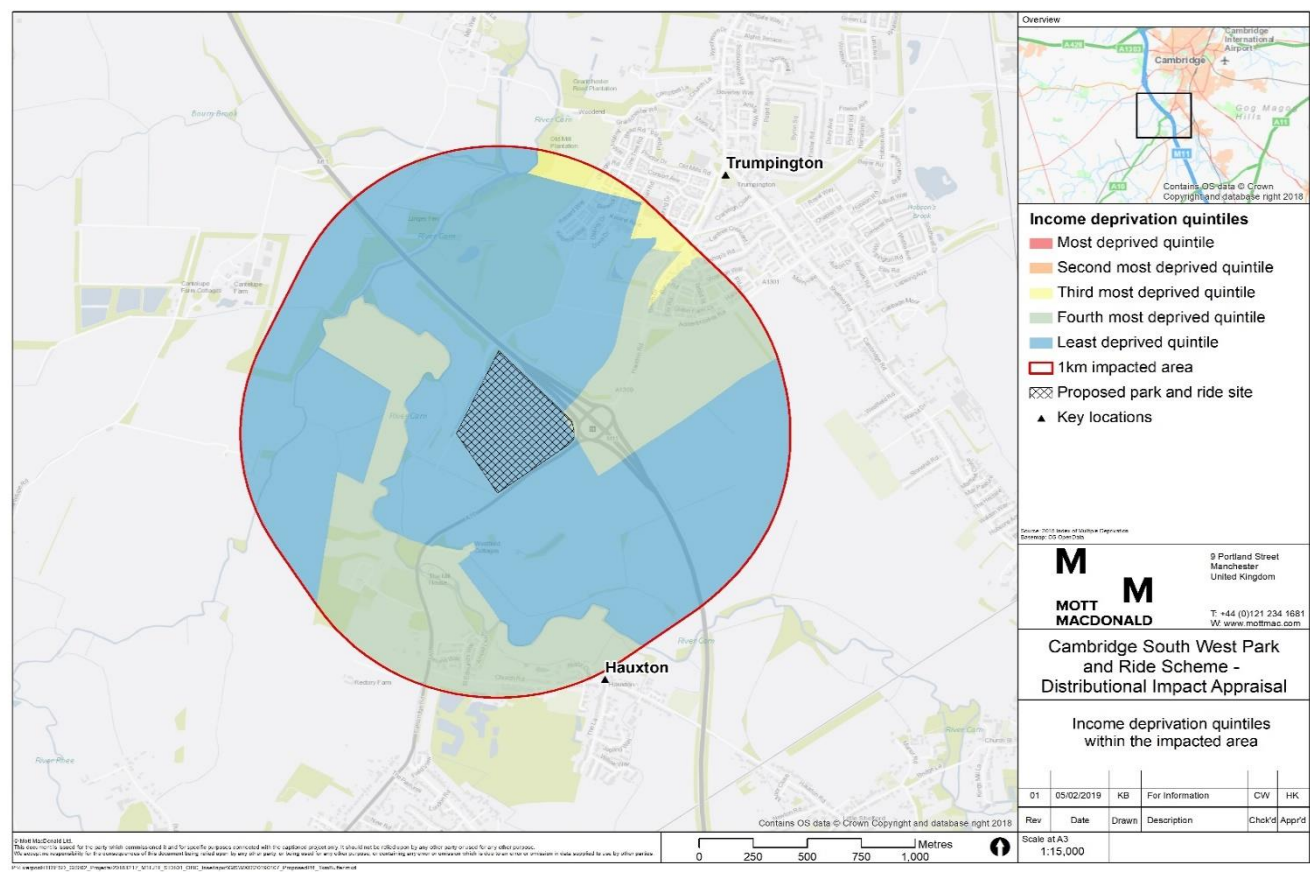
Source: 2017 Mid-Year Population Estimates

Figure 9: Proportion of residents aged 70 and over within 1km of the existing P&R site (noise impacts only)



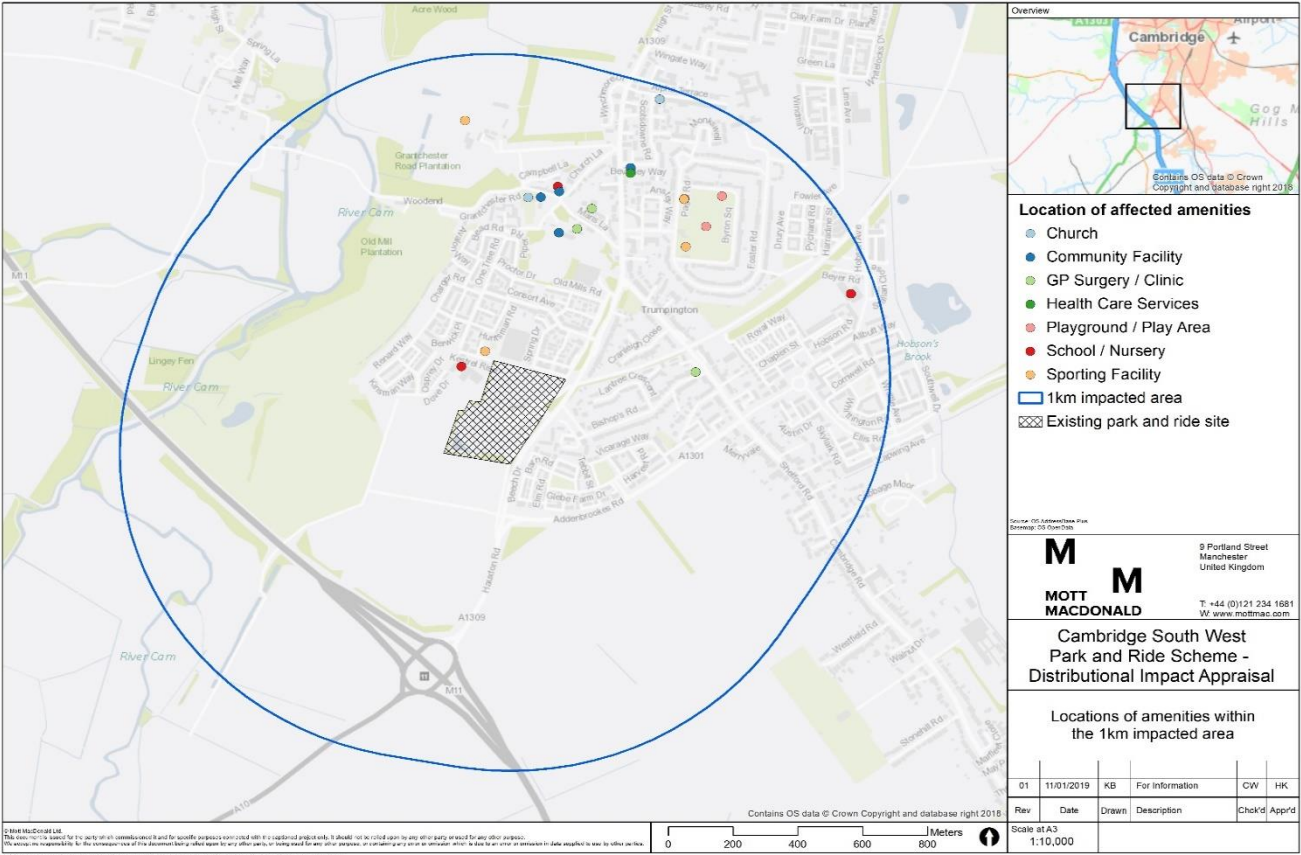
Source: 2017 Mid-Year Population Estimates

Figure 10: Income deprivation quintiles within 1km of the existing P&R site



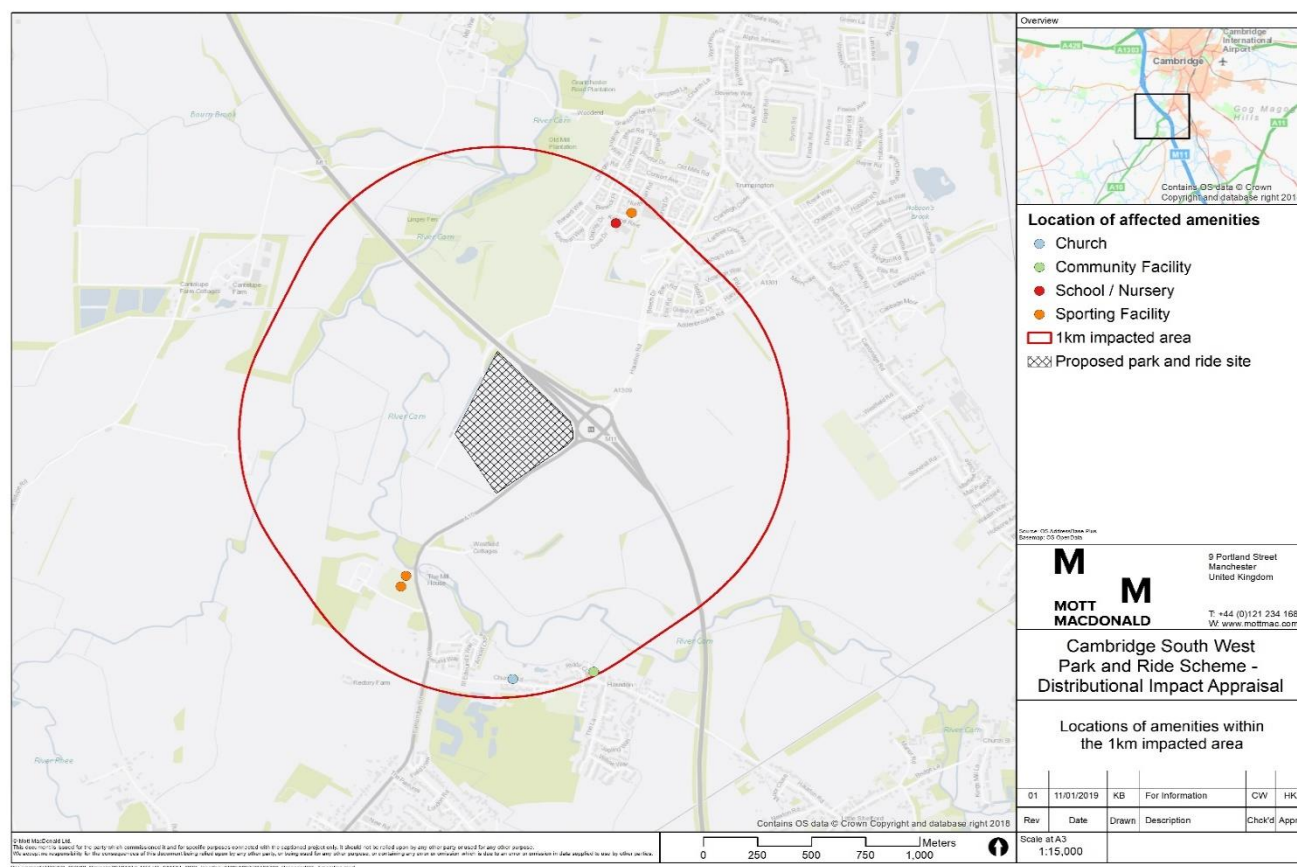
Source: 2015 Index of Multiple Deprivation

Figure 11: Location of amenities within 1km of the existing P&R site



Source: OS AddressBase Plus

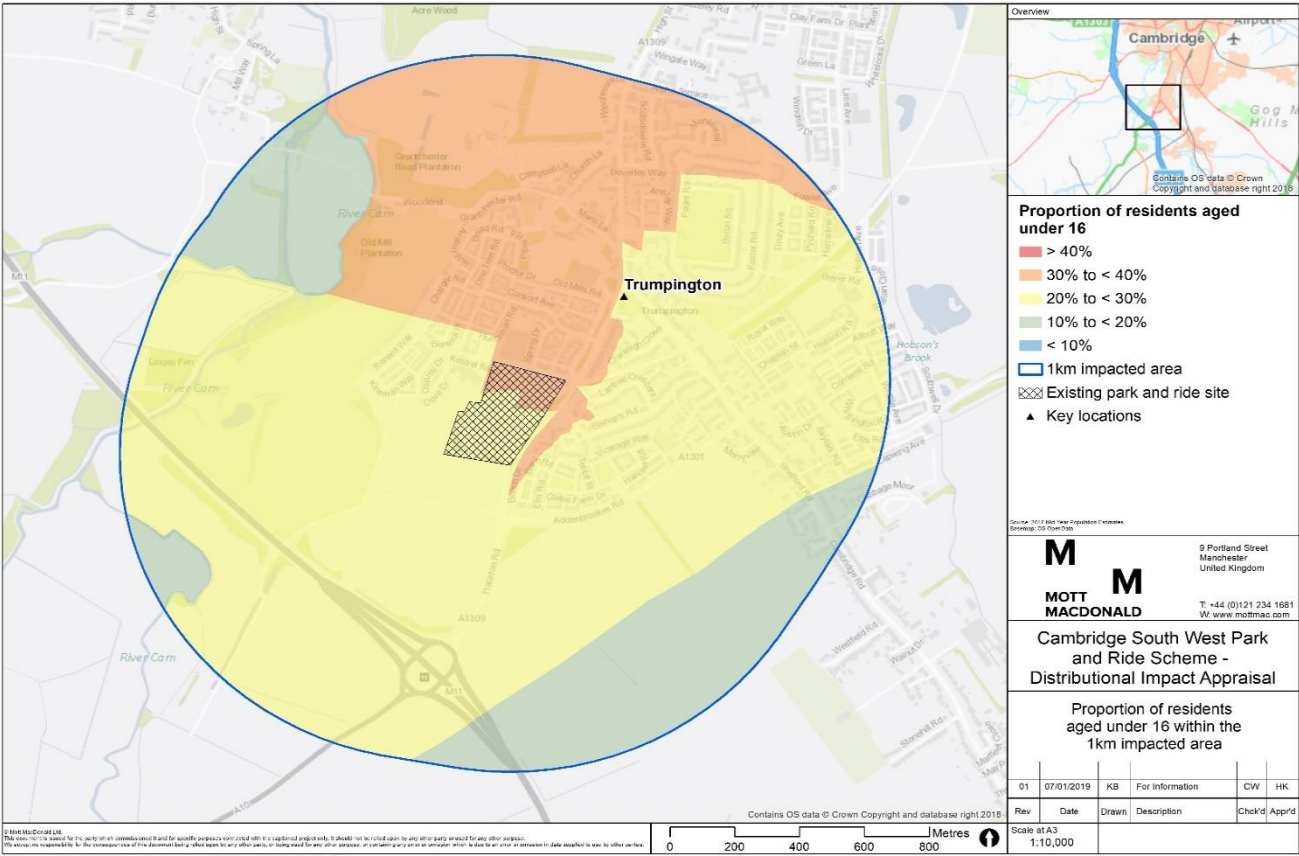
Figure 12: Location of amenities within 1km of the proposed P&R site



Source: OS AddressBase Plus

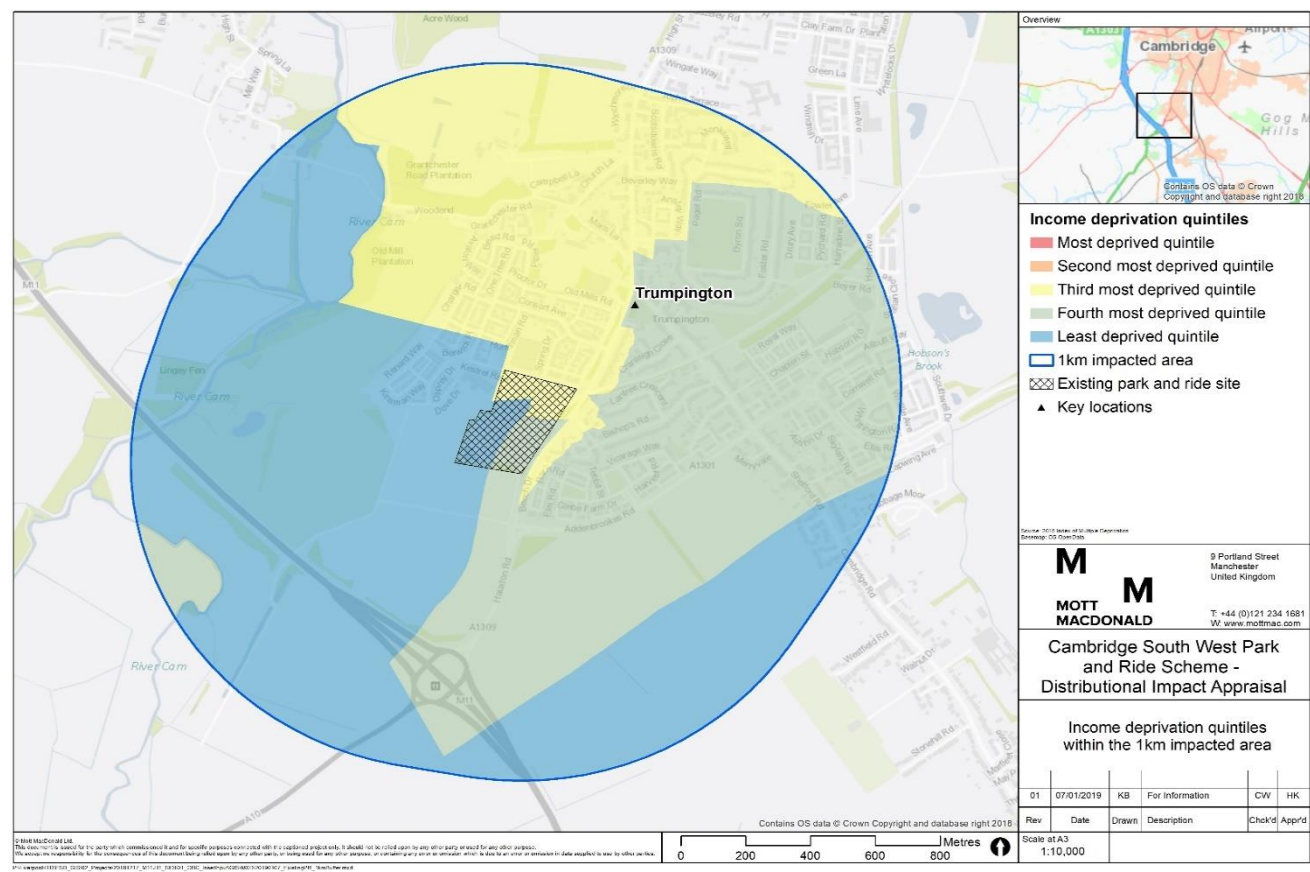
C. Distributional impacts of air quality

Figure 13: Proportion of residents aged under 16 within 1km of the existing P&R site



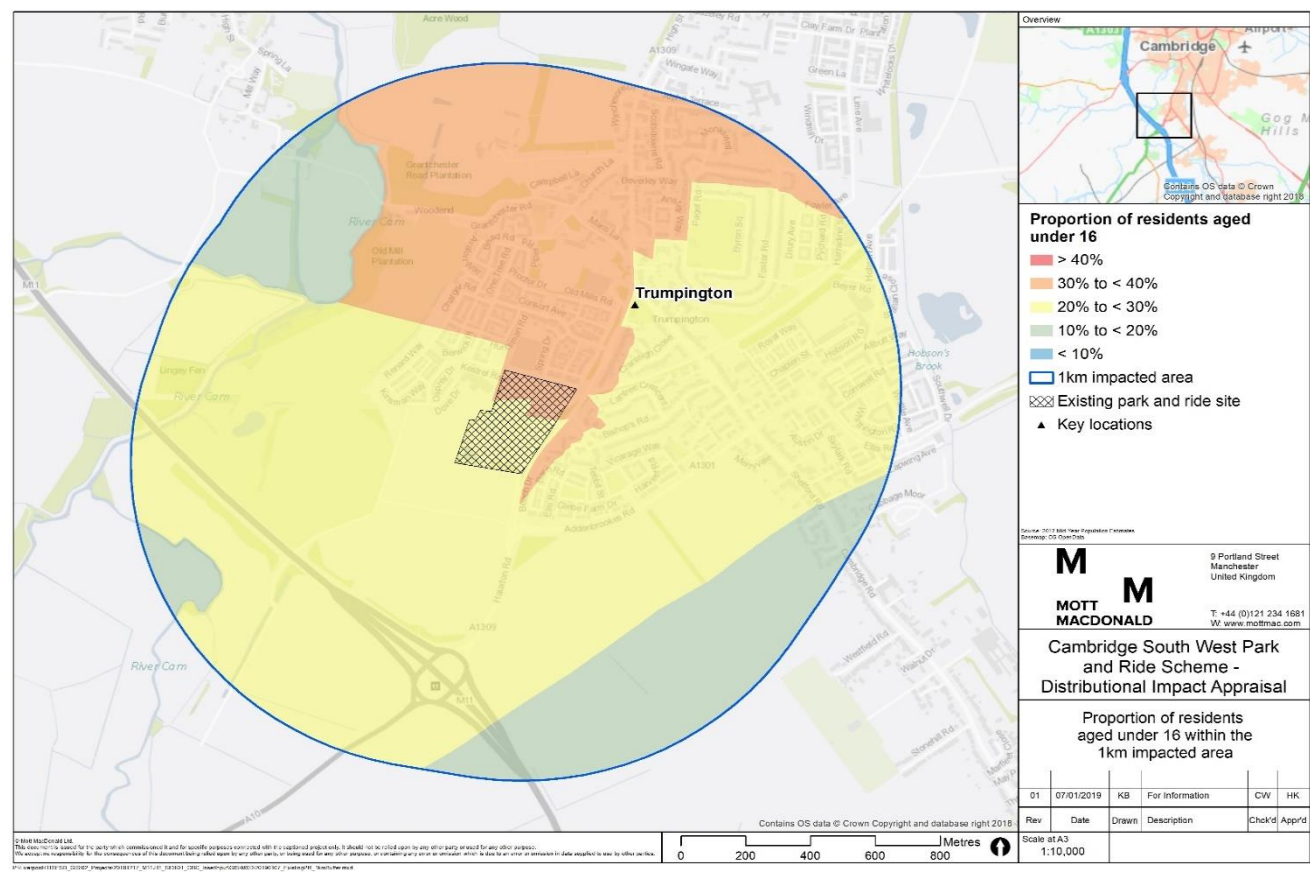
Source: 2017 Mid-Year Population Estimate

Figure 14: Income deprivation quintiles within 1km of the existing P&R site



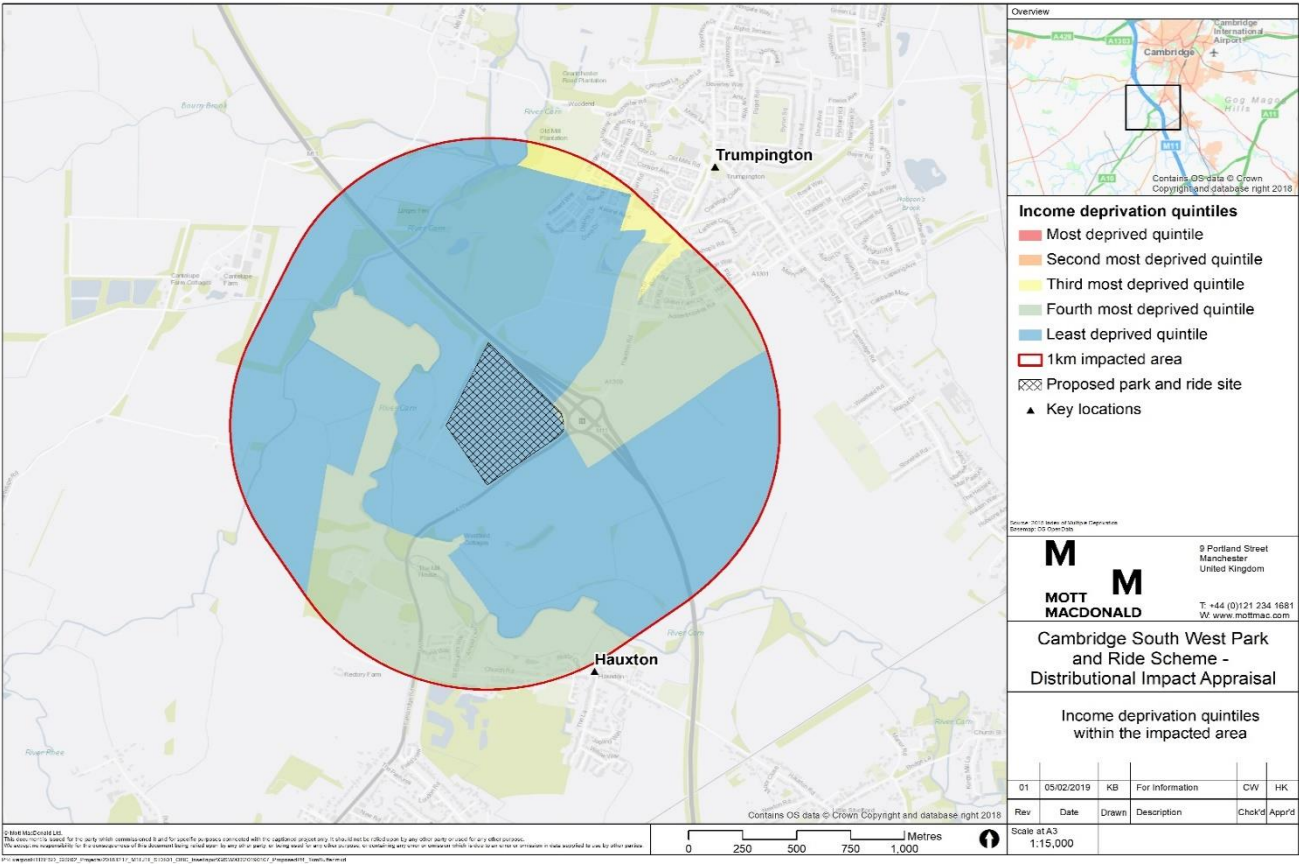
Source: 2015 Index of Multiple Deprivation

Figure 15: Proportion of residents aged under 16 within 1km of the proposed P&R site



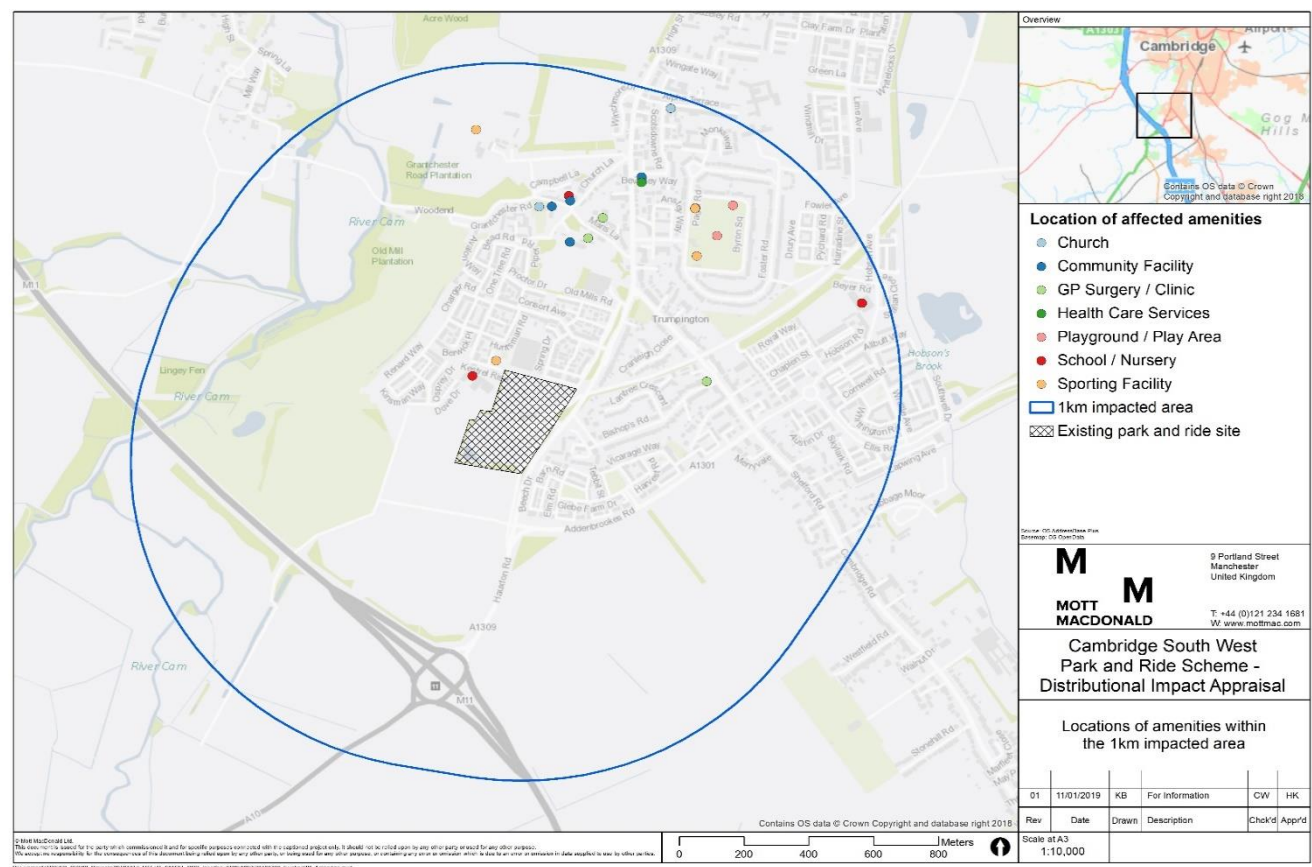
Source: 2017 Mid-Year Population Estimates

Figure 16: Income deprivation quintiles within 1km of the proposed P&R site



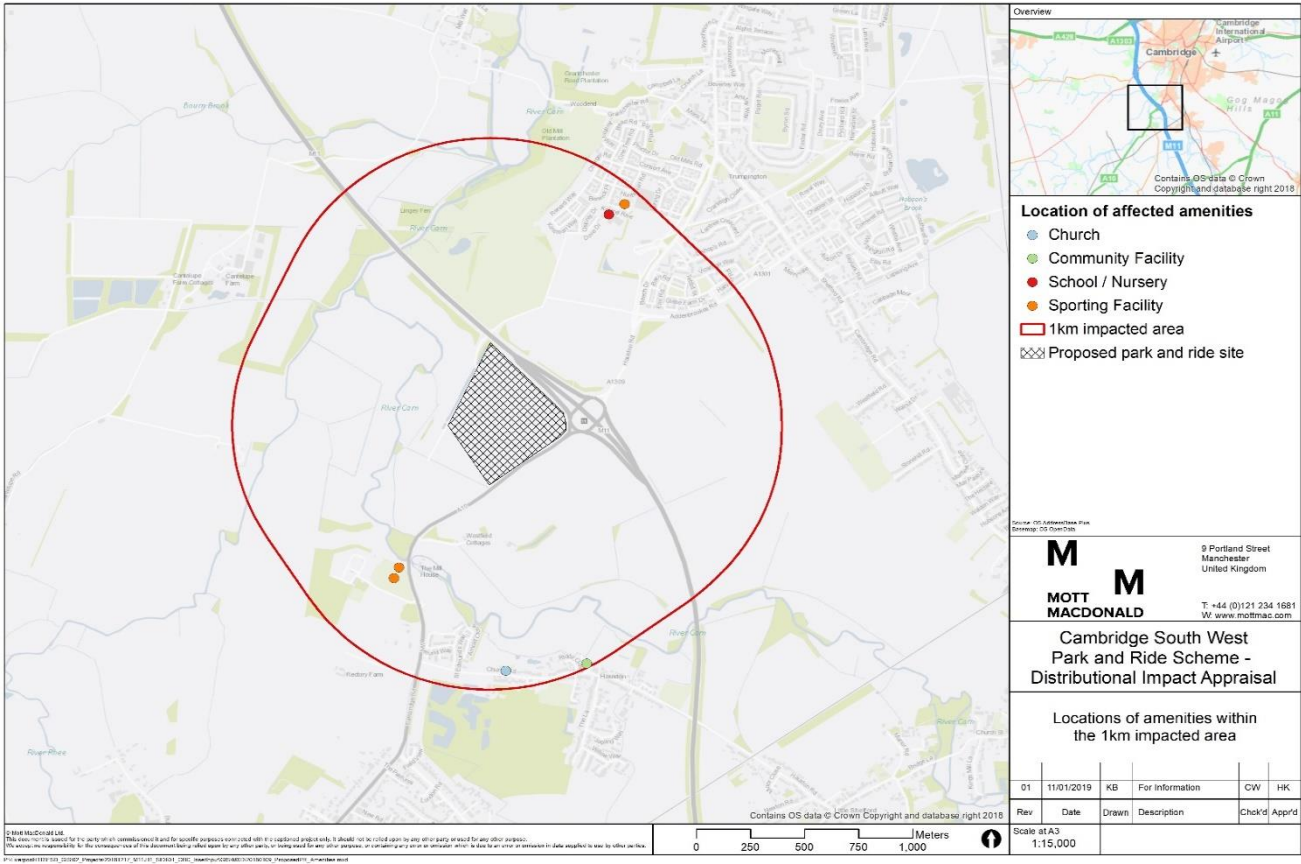
Source: 2015 Index of Multiple Deprivation

Figure 17: Location of amenities within 1km of the existing P&R site



Source: OS AddressBase Plus

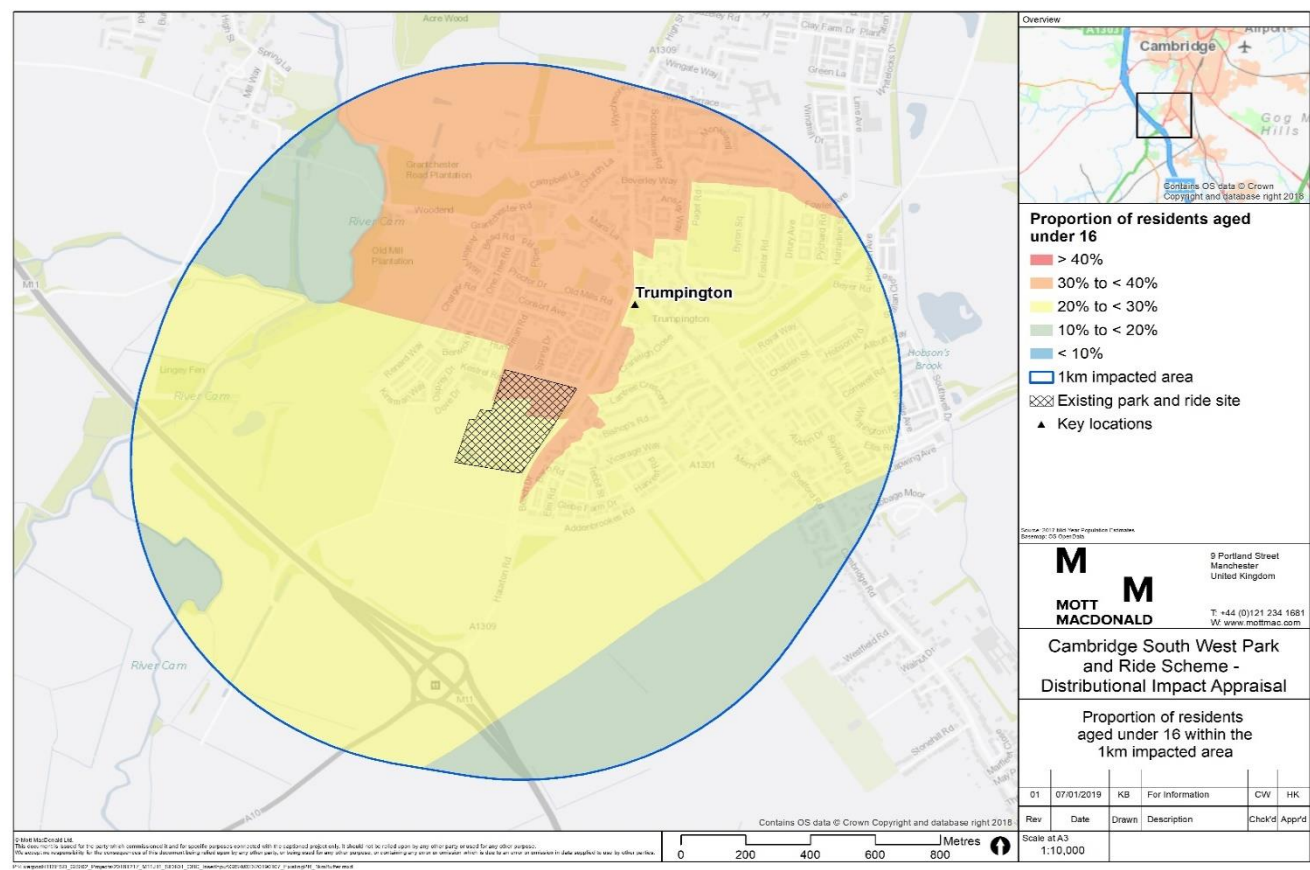
Figure 18: Location of amenities within 1km of the proposed P&R site



Source: OS Addressbase Plus

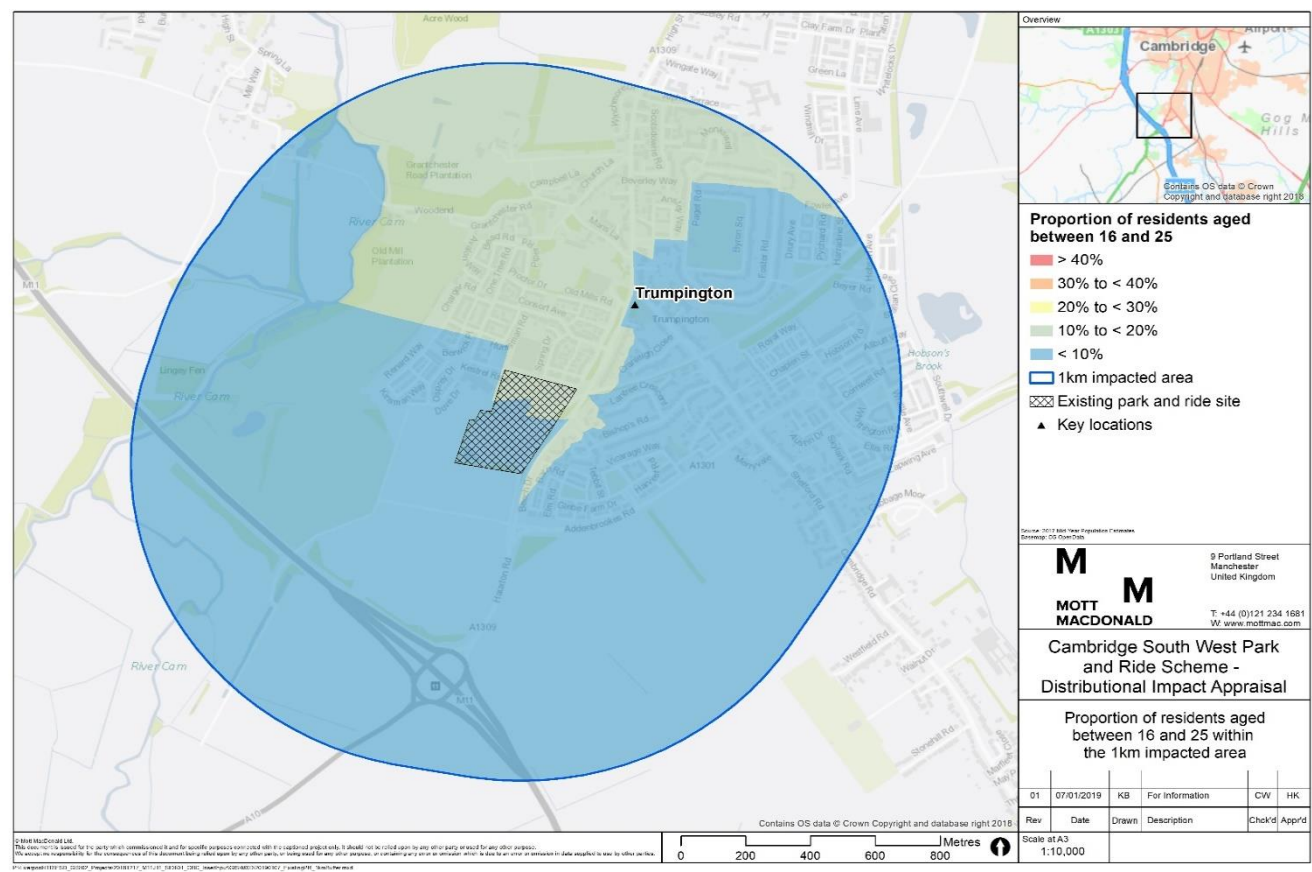
D. Distributional impacts of accidents

Figure 19: Proportion of residents aged under 16 within 1km of the existing P&R site



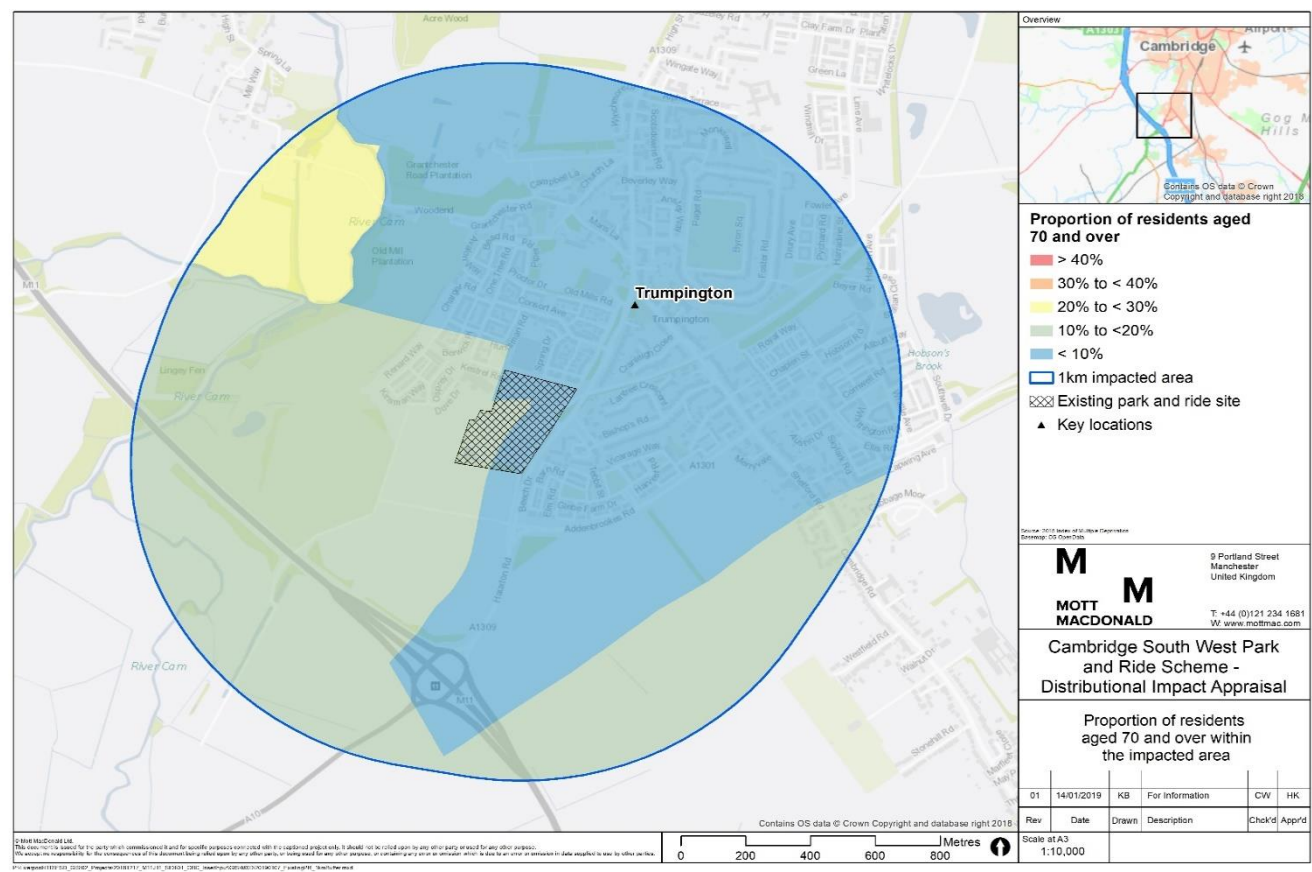
Source: 2017 Mid-Year Population Estimates

Figure 20: Proportion of residents aged between 16 and 25 within 1km of the existing P&R site



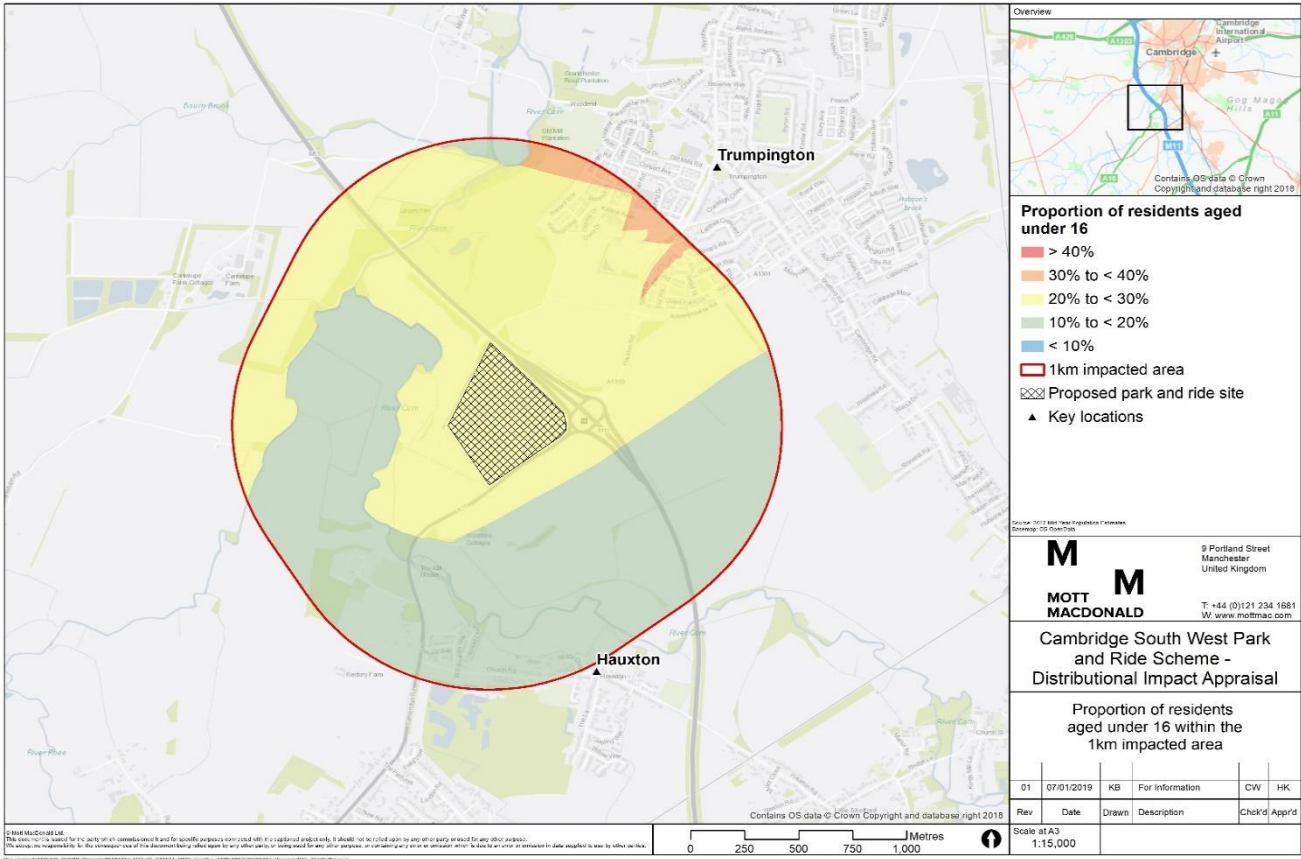
Source: 2017 Mid-Year Population Estimates

Figure 21: Proportion of residents aged 70 and over within 1km of the existing P&R site



Source: 2017 Mid-Year Population Estimates

Figure 22: Proportion of residents aged under 16 within 1km of the proposed P&R site



Source: 2017 Mid-Year Population Estimates

Source: 2017 Mid-Year Population Estimates

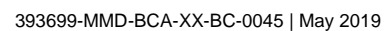
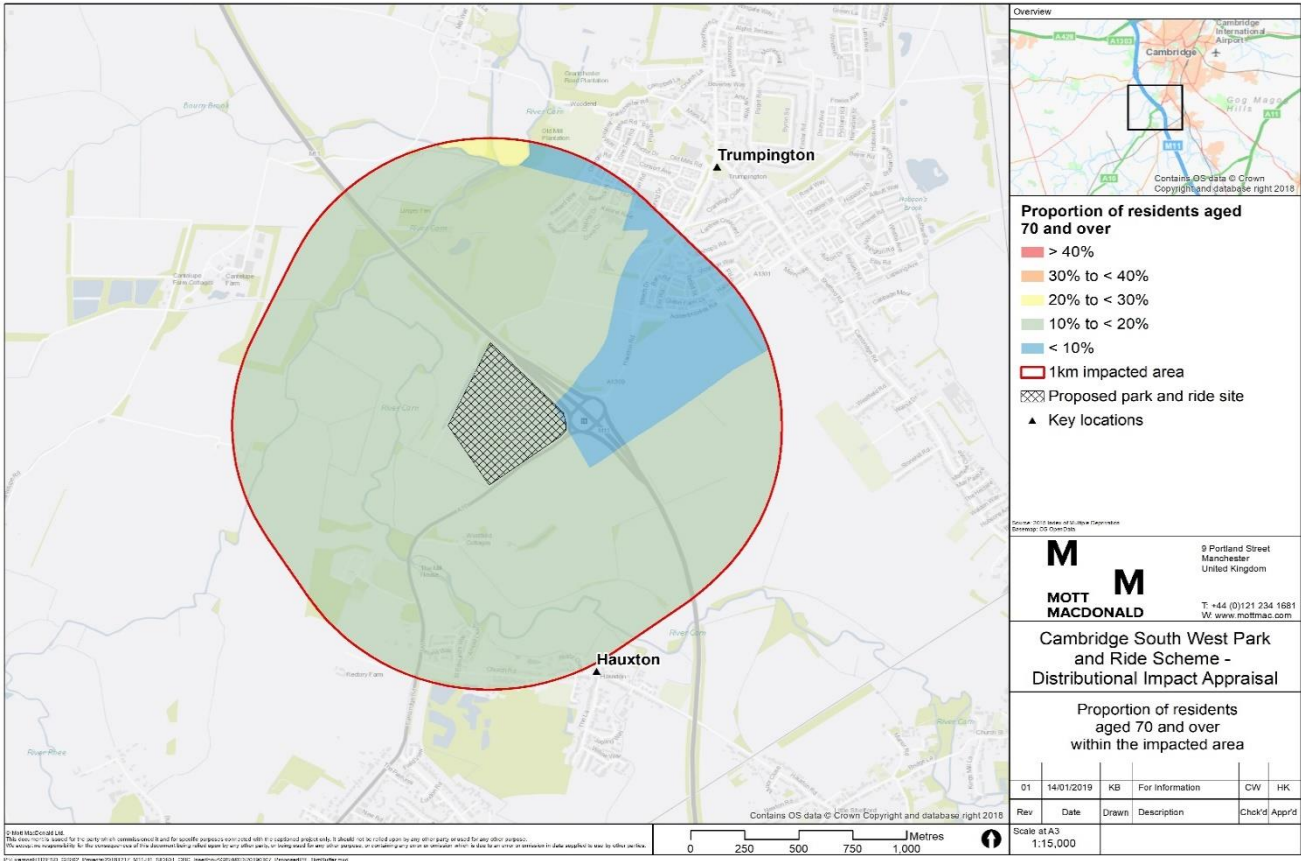
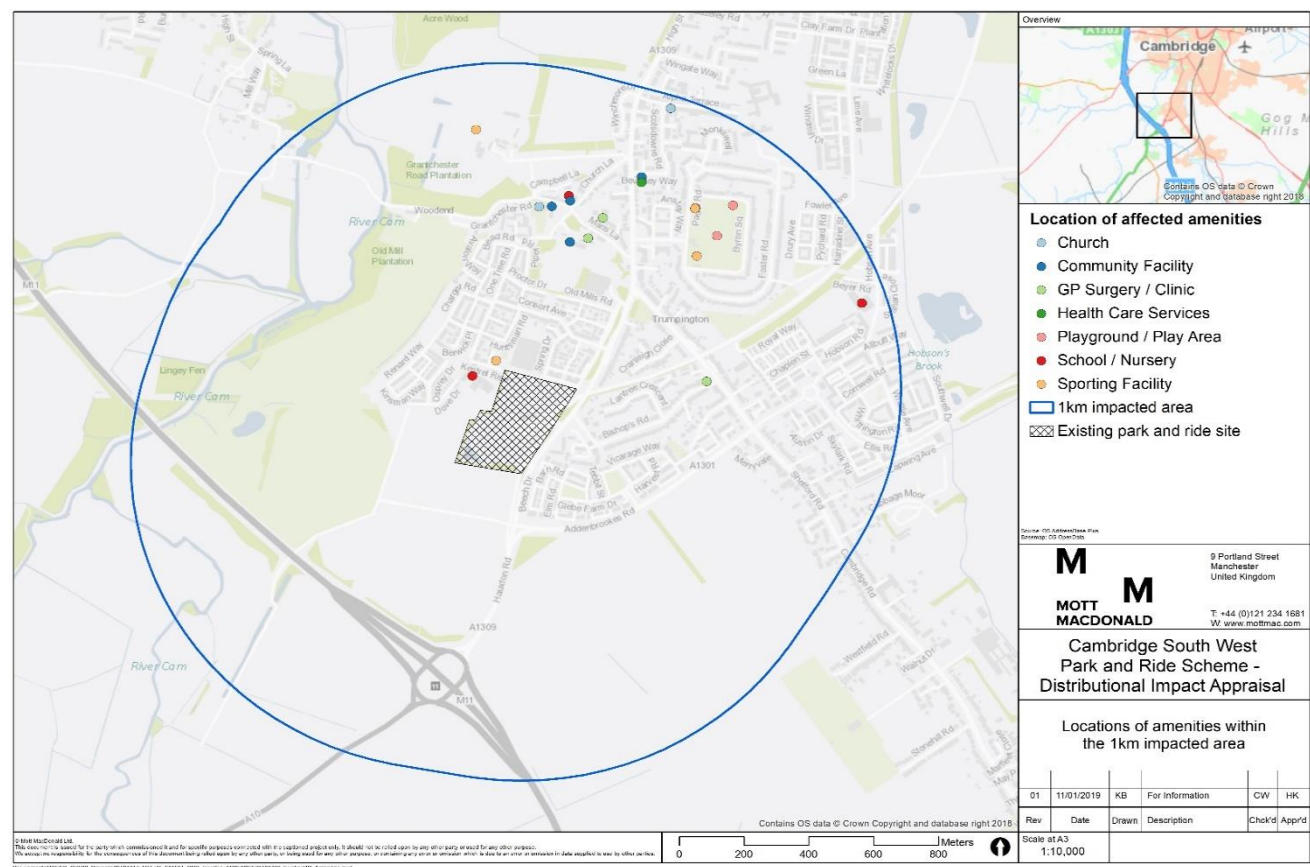


Figure 24: Proportion of residents aged 70 and over within 1km of the proposed P&R site



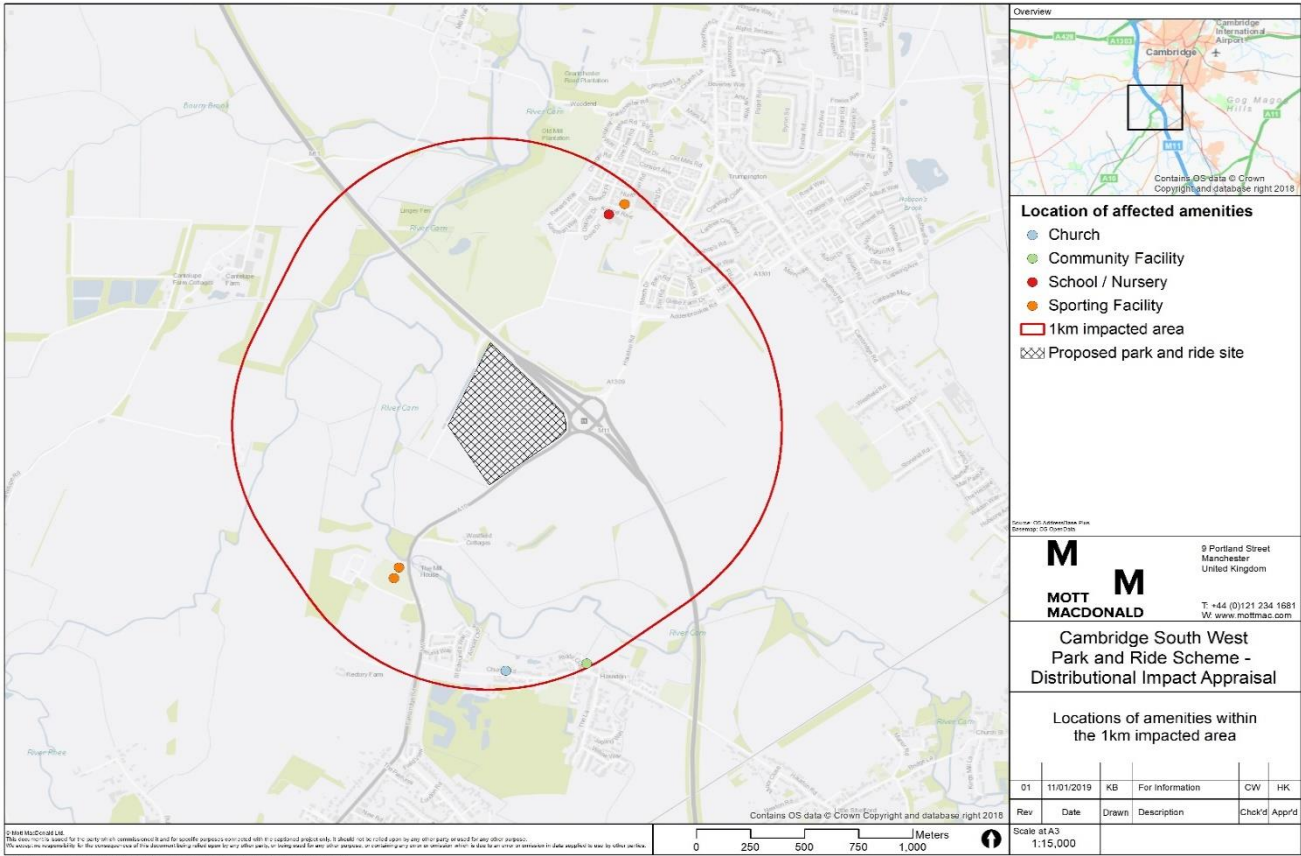
Source: 2017 Mid-Year Population Estimates

Figure 25: Location of amenities within 1km of the existing P&R site



Source: OS AddressBase Plus

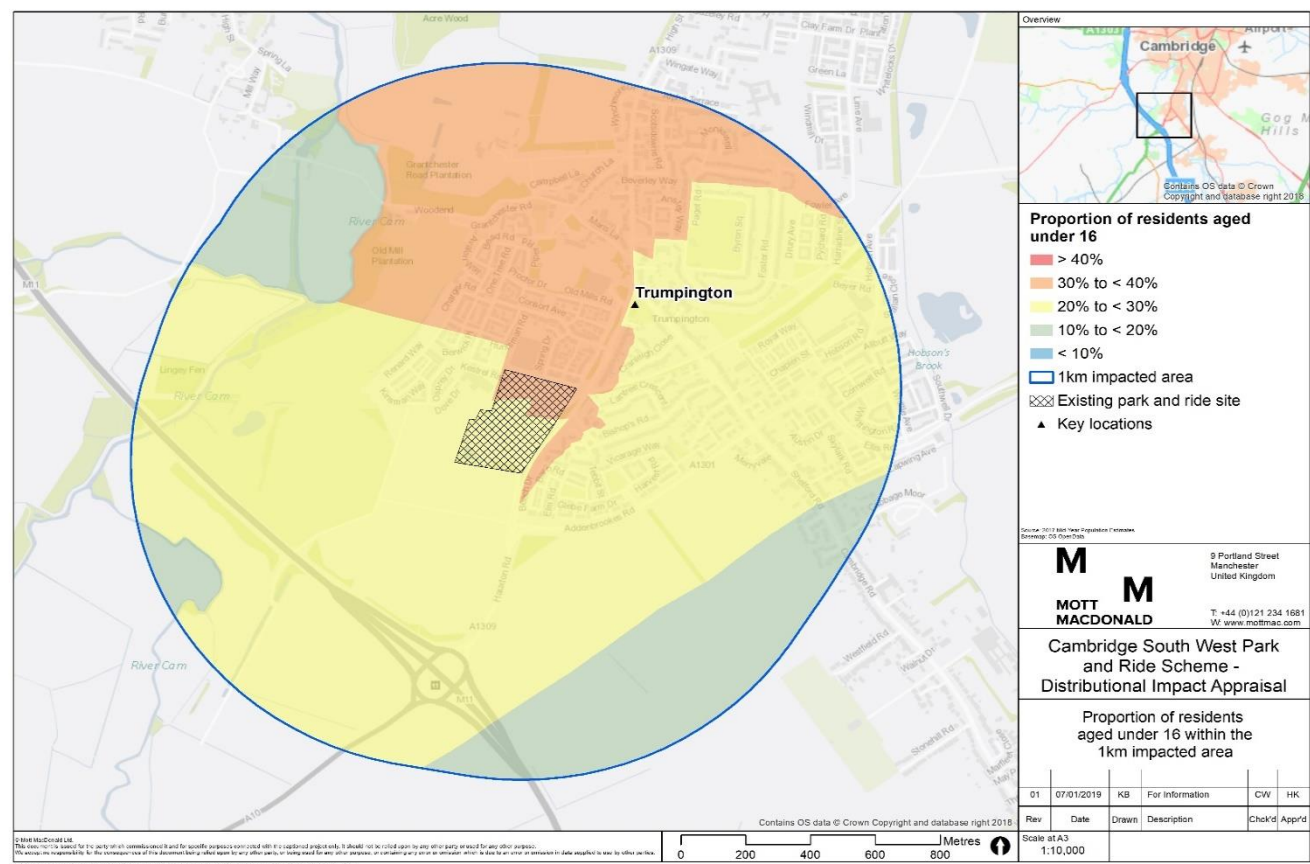
Figure 26: Location of amenities within 1km of the proposed P&R site



Source: OS AddressBase Plus

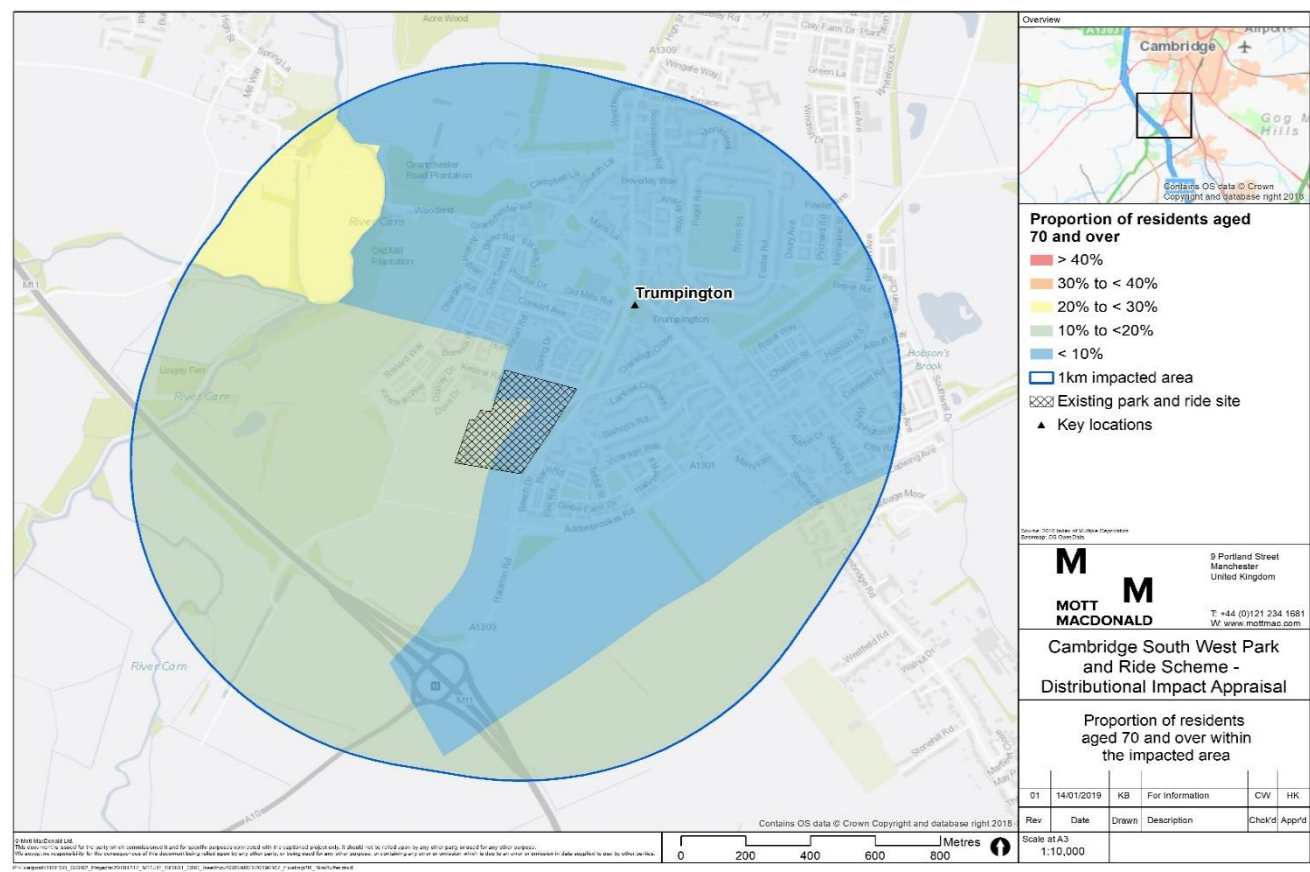
E. Distributional impacts of severance

Figure 27: Proportion of residents aged under 16 within 1km of the existing P&R site



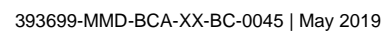
Source: 2017 Mid-Year Population Estimates

Figure 28: Proportion of residents aged 70 and over within 1km of the existing P&R site



Source: 2017 Mid-Year Population Estimates

Source: 2011 Census



Source: 2011 Census

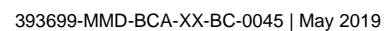
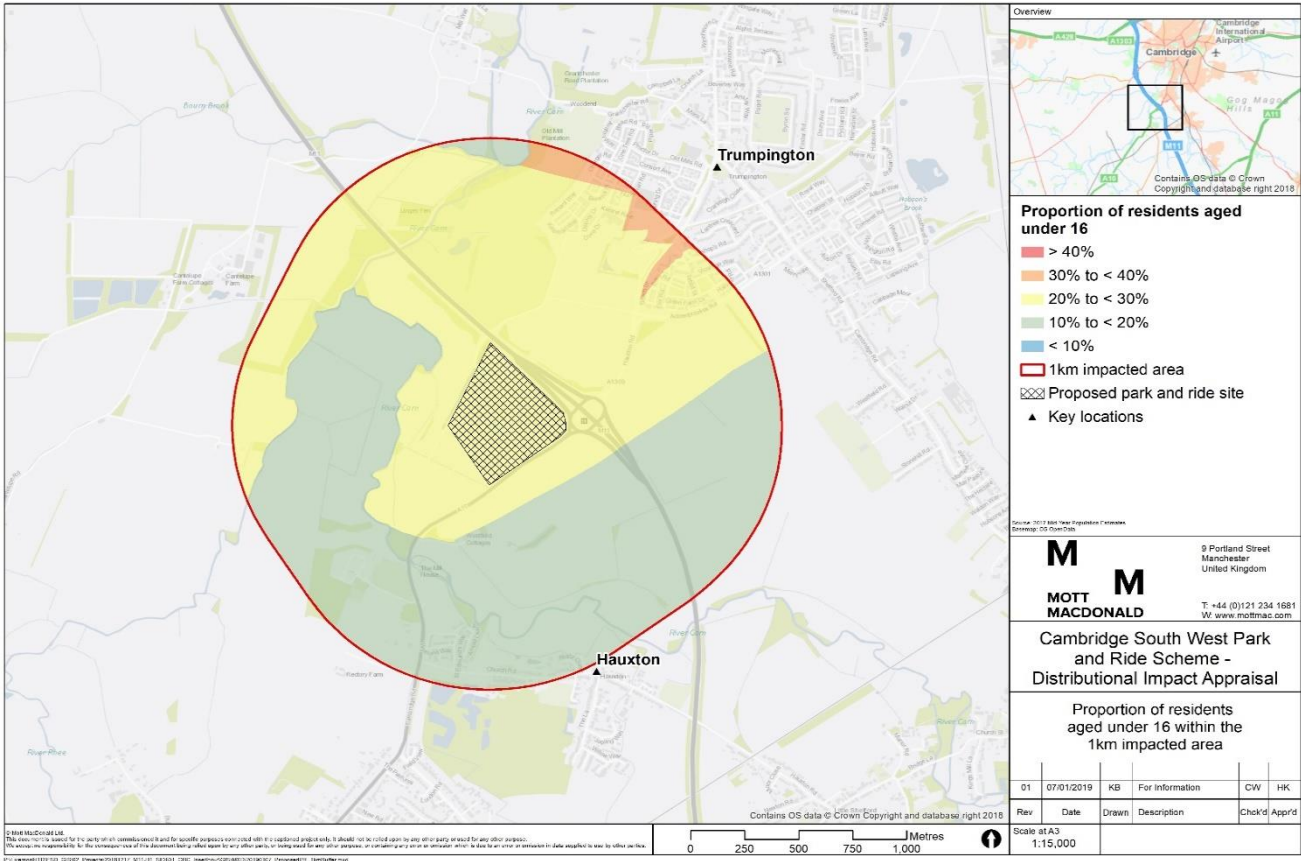
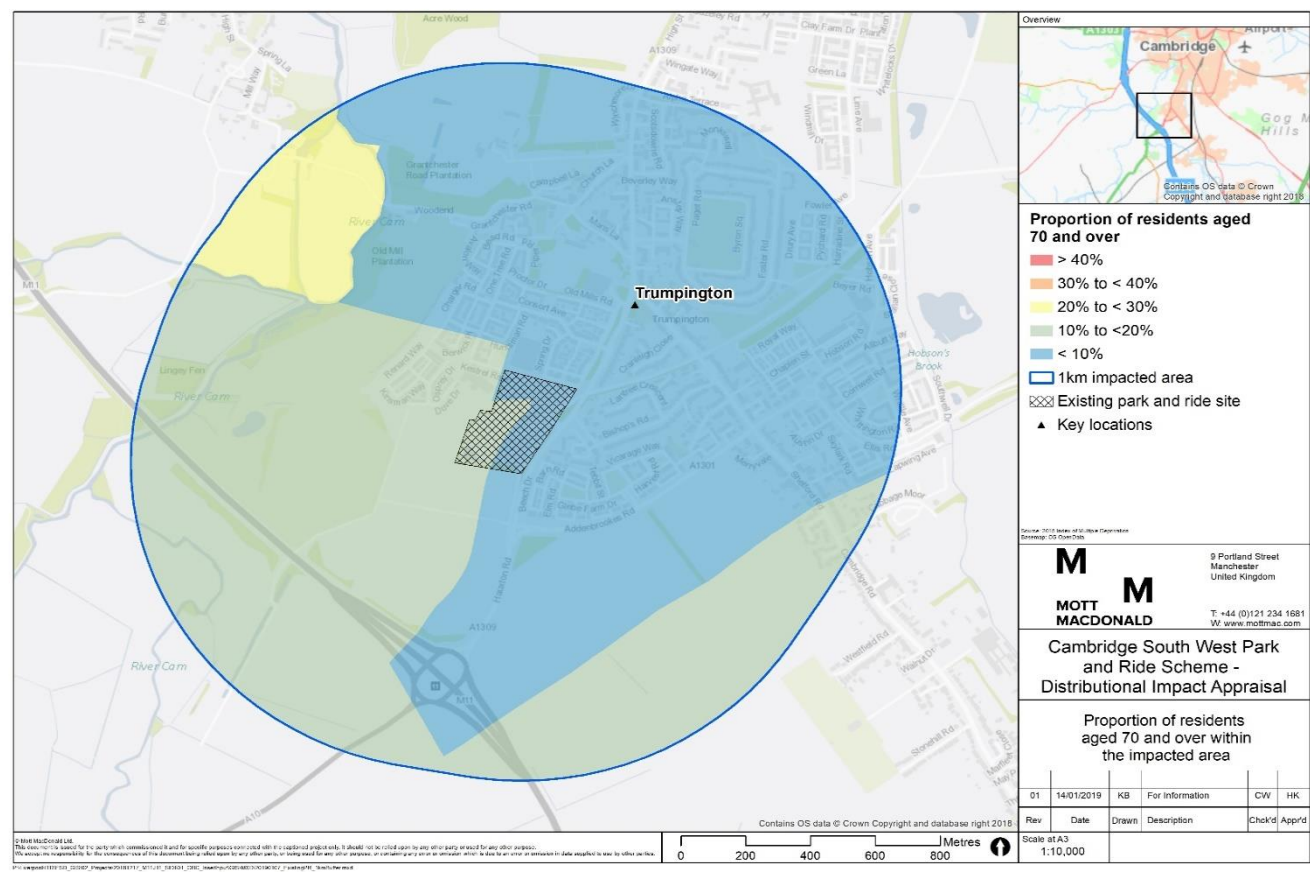


Figure 31: Proportion of residents aged under 16 within 1km of the proposed P&R site



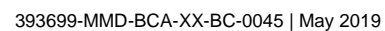
Source: 2017 Mid-Year Population Estimates

Figure 32: Proportion of residents aged 70 and over within 1km of the existing P&R site



Source: 2017 Mid-Year Population Estimates

Source: 2011 Census



Source: 2011 Census

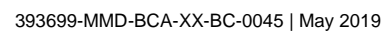
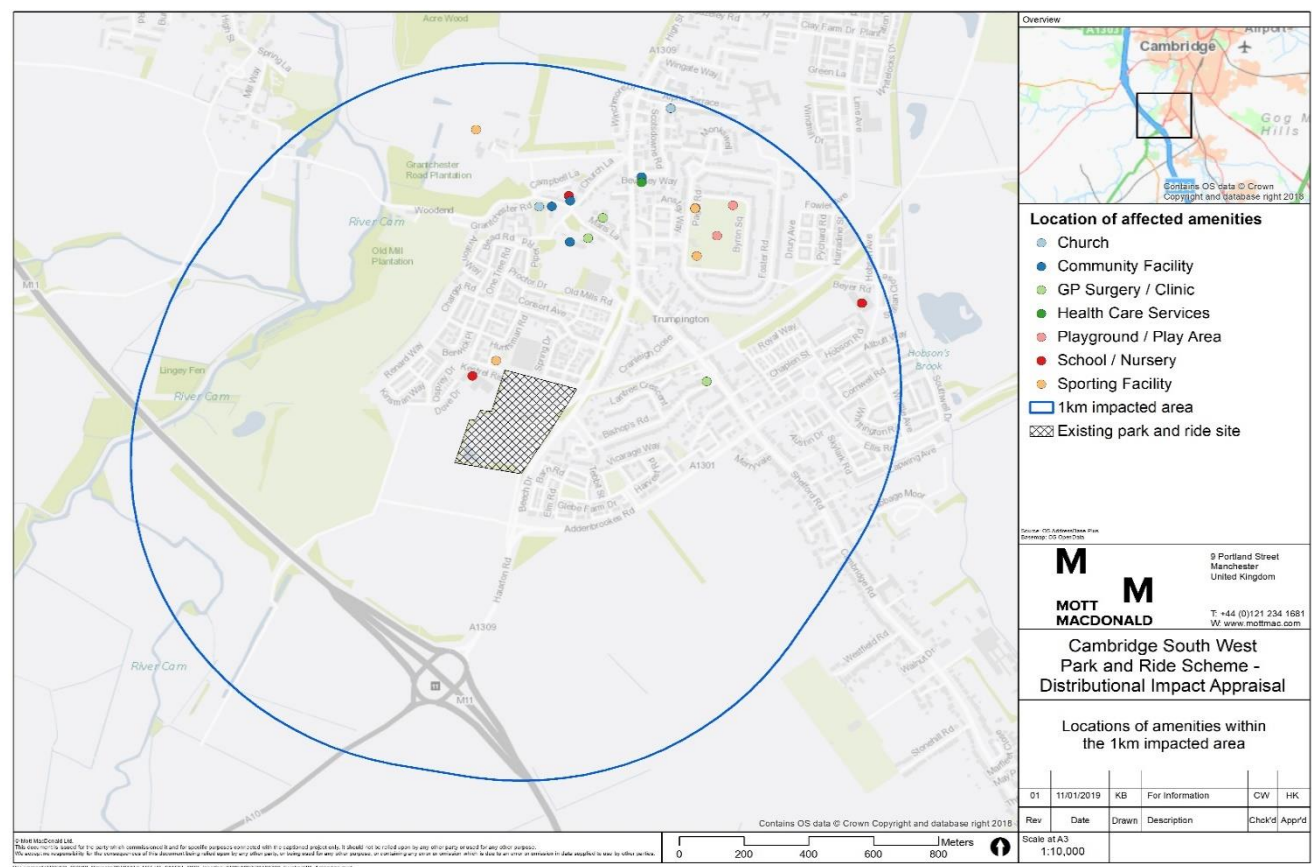
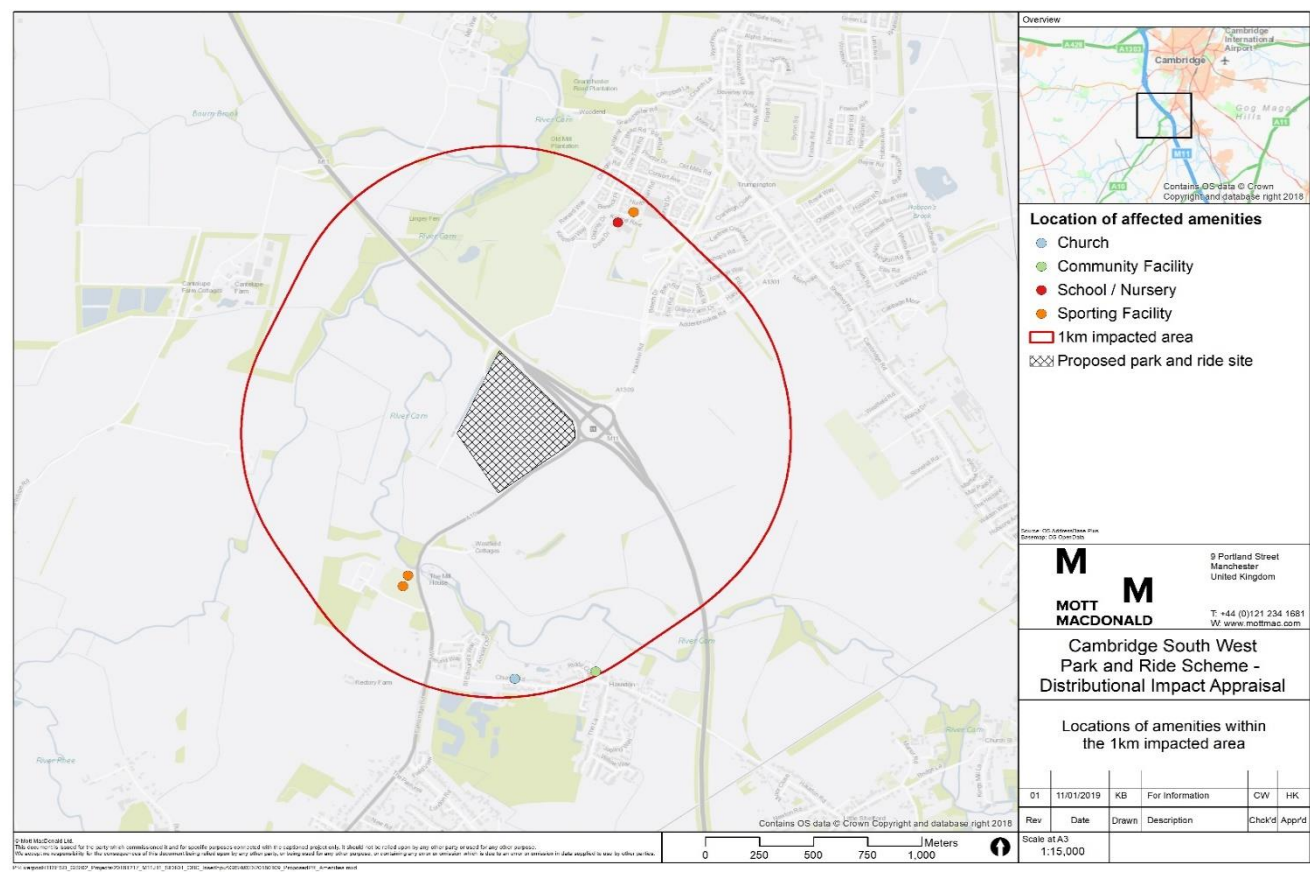


Figure 35: Location of amenities within 1km of the existing P&R site



Source: OS AddressBase Plus

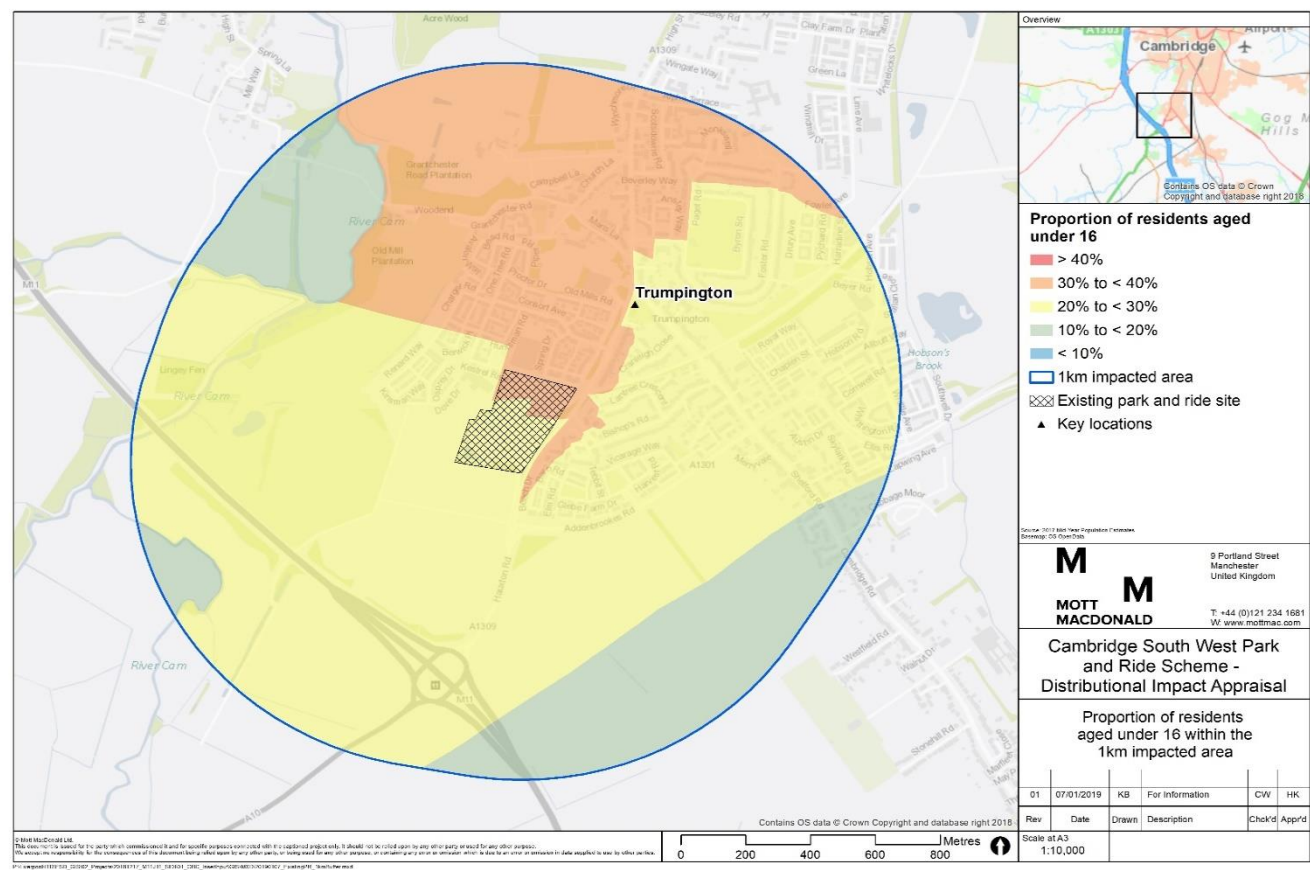
Figure 36: Location of amenities within 1km of the proposed P&R site



Source: OS AddressBase Plus

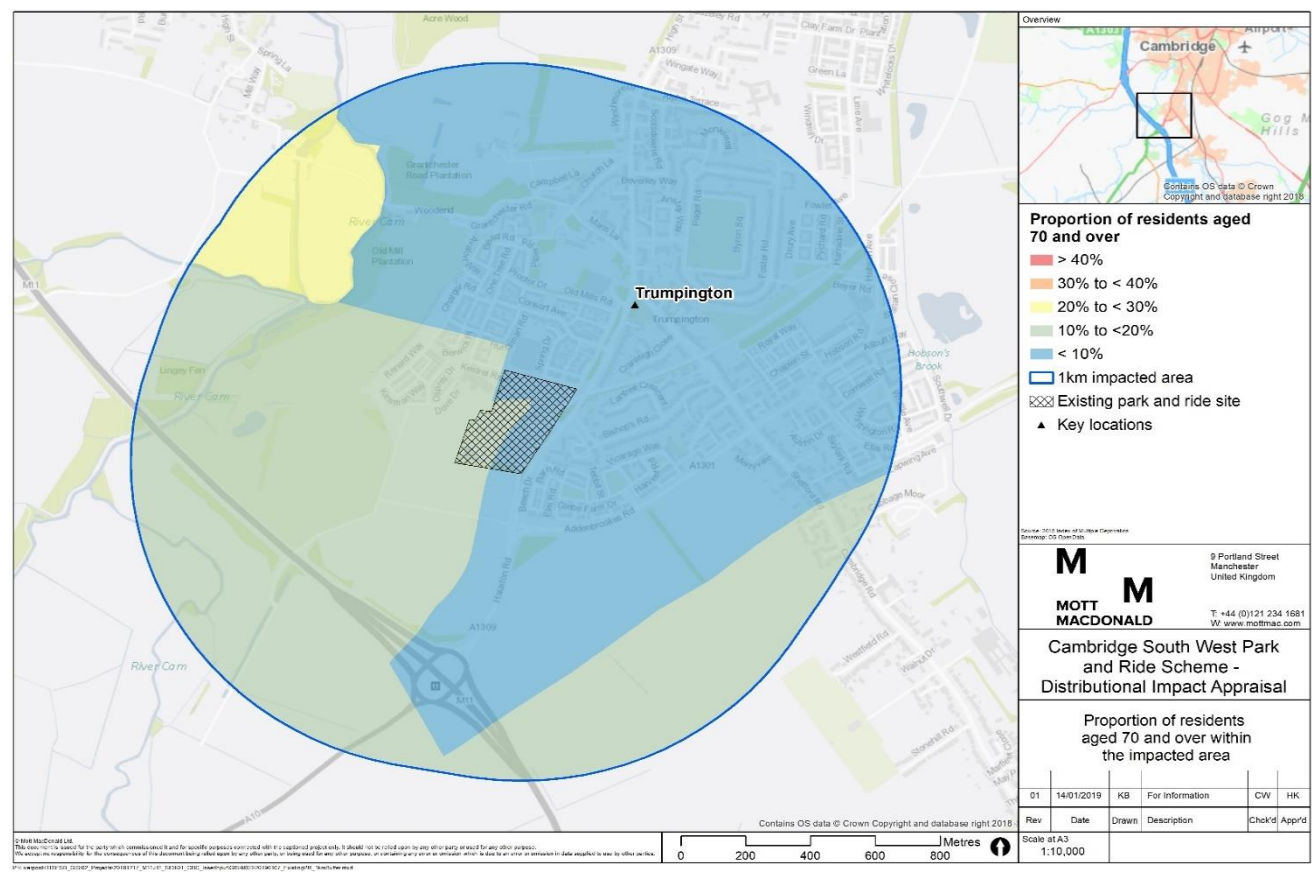
F. Distributional impacts of security

Figure 37: Proportion of residents aged under 16 within 1km of the existing P&R site



Source: 2017 Mid-Year Population Estimates

Figure 38: Proportion of residents aged 70 and over within 1km of the existing P&R site



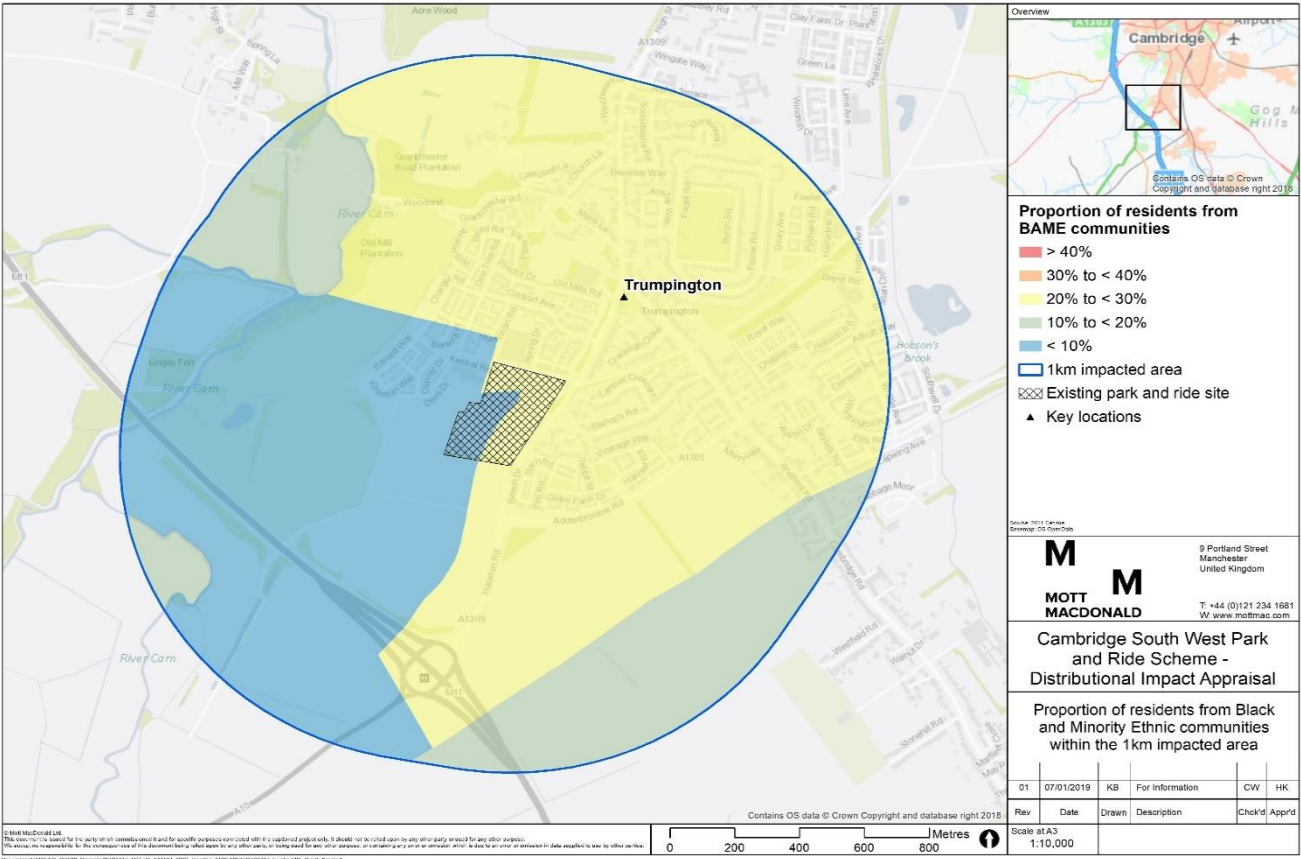
Source: 2017 Mid-Year Population Estimates

Figure 39: Proportion of residents with a long-term health problem or disability (LTHD) within 1km of the existing P&R site



Source: 2011 Census

Figure 40: Proportion of residents from BAME communities within 1km of the existing P&R site



Source: 2011 Census

Source: 2017 Mid-Year Population Estimates

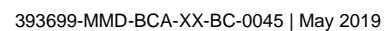
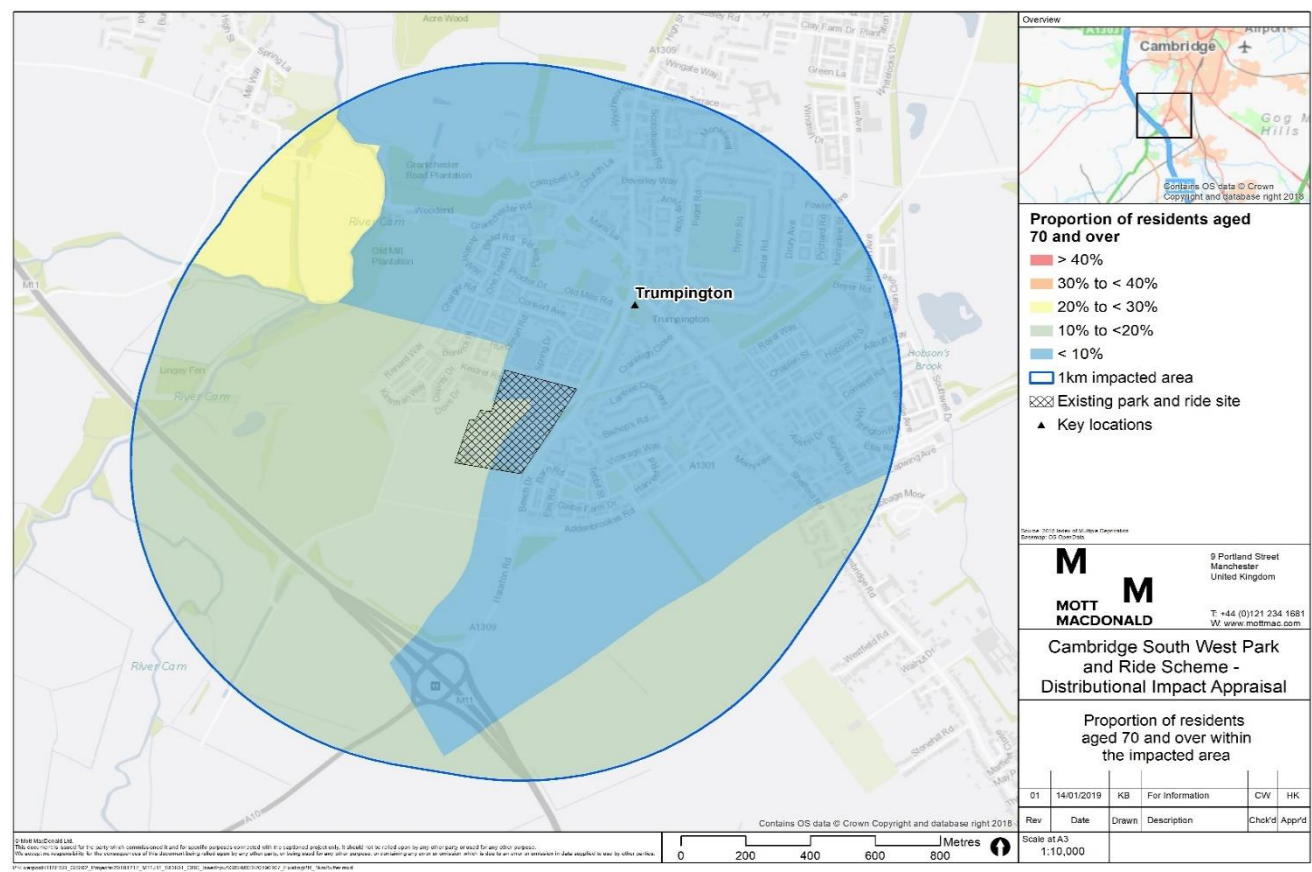
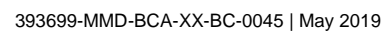


Figure 42: Proportion of residents aged 70 and over within 1km of the existing P&R site



Source: 2017 Mid-Year Population Estimates

Source: 2011 Census



Source: 2011 Census

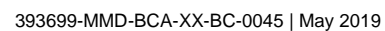
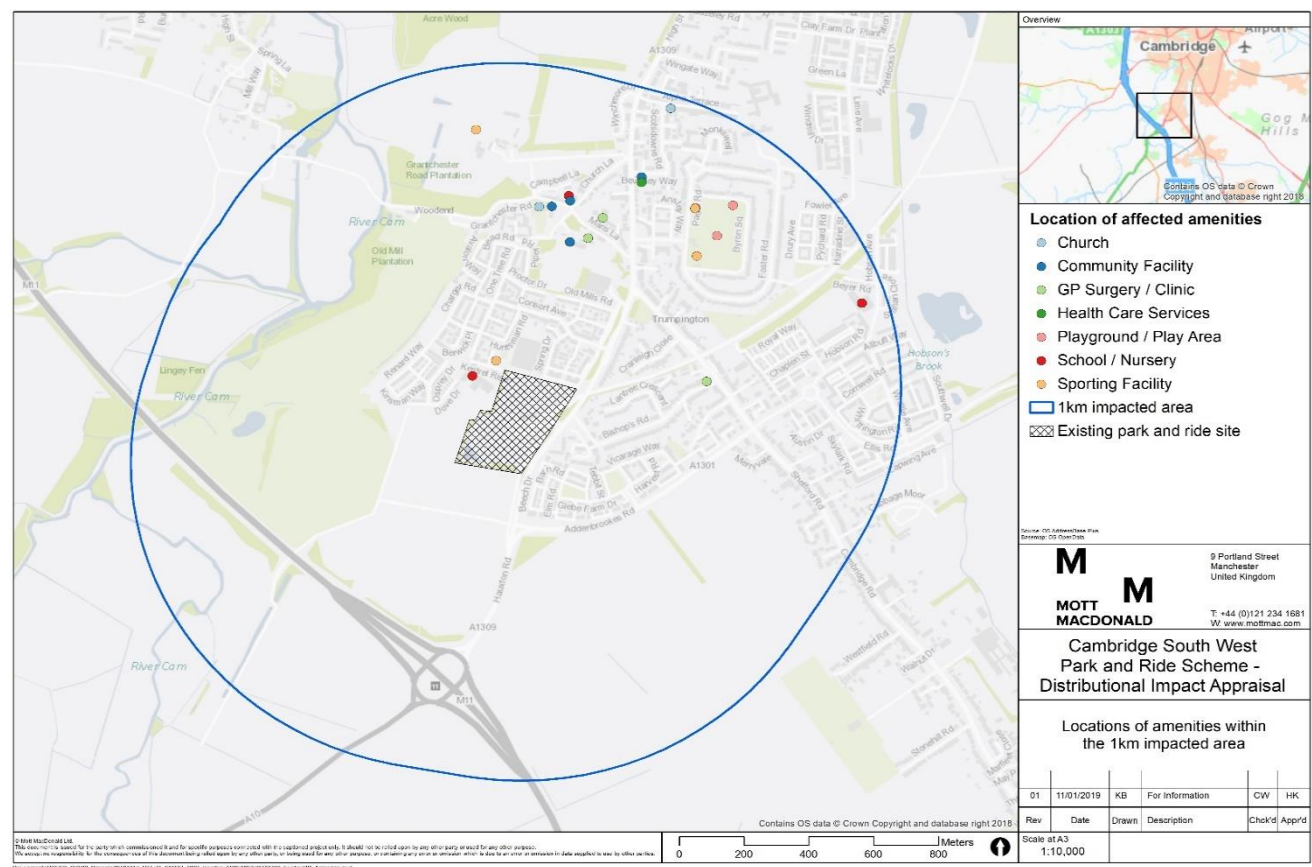
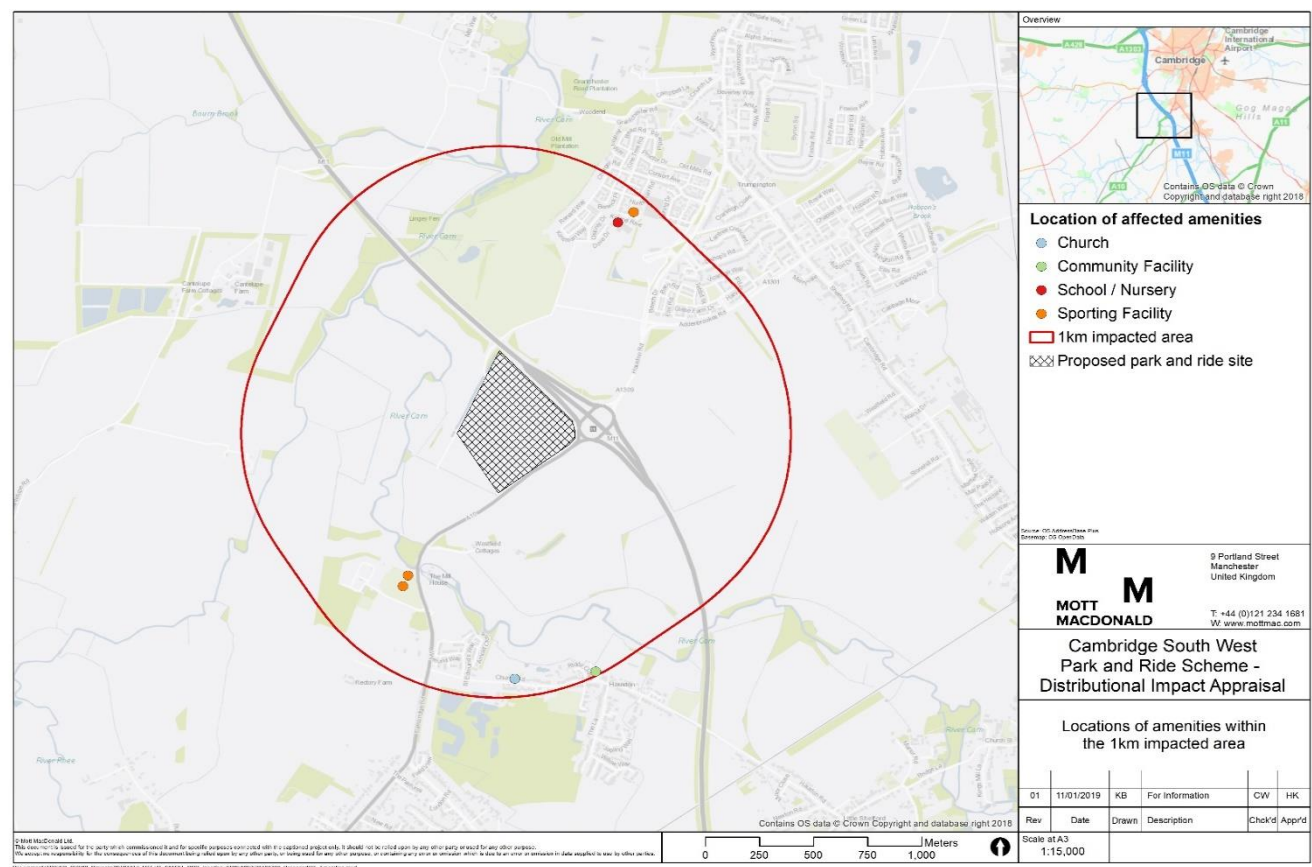


Figure 45: Location of amenities within 1km of the existing P&R site



Source: OS AddressBase Plus

Figure 46: Location of amenities within 1km of the proposed P&R site



Source: OS AddressBase Plus

