

Cambridge Biomedical Campus Transport Needs Review

Part 2

Cambridgeshire County Council

11 October 2018

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Executive Summary

What Is This Transport Needs Review?

Cambridgeshire County Council (CCC), on behalf of the Greater Cambridge Partnership (GCP), commissioned Atkins to undertake a transport needs review of the Cambridge Biomedical Campus (CBC). CBC is an international centre of innovation and excellence in healthcare. Significant development is in progress on the site and further growth is planned over the next 10 to 15 years, increasing demand for travel to the site.

This Report is Part 2 of a three-part Study. This Report:

- Draws together evidence on the changes in transport demand and supply at CBC between 2022 and 2031;
- Identifies areas where supply is not predicted to match demand; and
- Suggests Potential Interventions to address those gaps, whilst also supporting further growth.

What Did Part 1 Conclude?

Part 1 of the Study¹ covered a wide range of evidence on transport supply, including available services and quality factors such as reliability and congestion, and on transport demand (travel patterns). Analysis of this evidence built up a picture of what travel to CBC looks like now and how it could look in five years' time (2022, based on a 2017 baseline year) when considering the planned growth on the site.

There are several existing challenges, particularly:

- Highway congestion on Babraham Road and Addenbrooke's Road;
- Gaps in the range of direct bus services available from key travel origins;
- Concern over staff parking impacts on surrounding residential streets;
- Low levels of walking (1% mode share for patients and visitors and 3% mode share for staff); and
- A deficit in cycle parking capacity.

This will lead to future challenges, with planned development up to 2022 increasing overall travel demand at CBC by 30%-40%. Increases in parking supply are proposed, but the highway network does not have the capacity to accommodate additional vehicular trips which would worsen air quality, increase congestion and lengthen journey times.

Part 1 of the Study suggests Potential Interventions for the short term (to 2022) which are focused on improving access for sustainable modes. For growth to be managed effectively, car use must be discouraged where possible to maintain access to the site for patients with no with no other practical option other than travel by private vehicle and for emergency vehicles. Implementation should be undertaken through a coordinated, holistic approach to ensure that measures are as effective as possible.

What Has Part 2 Looked At?

Part 2 of the Study looks at transport access to CBC from 2022 to 2031 and assesses how it could look with and without Cambridge South Station. A picture of the Station's potential impact on transport access has been built up, considering multi-modal and wider economic impacts. Consideration has also been given to the requirements for immediate access to the Station itself.

Changes to the level of transport demand up to 2031 have been assessed using the following methodology:

- The five-year forecast (2022) values from the Part 1 Report have been used as a starting point;
- The predicted change in employment levels on-site between 2022 and 2031 has been applied to the Part 1 travel demand levels to forecast the change in staff trips to 2031;

¹ Cambridge Biomedical Campus Transport Needs Review: Part 1 Report (April 2018)

- The predicted change in patient numbers has been applied to the 2022 values to forecast the change in patient and visitor numbers up to 2031;
- An assumption has been made that no change occurs to the existing mode shares over this time period;
- Changes in transport supply have been derived based on known information about developments or expansion of facilities;
- The increased demand level has been compared against changes in transport supply; and
- The phasing of growth has been compared against the provision of transport infrastructure to identify the relationship between the two over time.

What Are The Transport Needs Of CBC Up To 2031?

Part 2 focuses on a set of Targets for traffic levels accessing the CBC Site as follows:

- Target: Maintaining traffic at 2017 levels up to 2031; and
- Stretch Target: a 10% to 15% reduction in peak highway trips from 2011 levels, which is aligned with the target of the GCP City Access Strategy.

For CBC, this means a reduction in daily one-way person-trips of between 17,925 (Target) and 25,354 (15% Stretch Target) on the highway is required by 2031. To meet this Target, several measures beyond those presented in Part 1 will be required.

It is important to recognise that although this reduction is significant, much of the growth included within the 2031 scenario is yet to happen. The timing of delivery of interventions will be critical in maximising the benefits from sustainable modes and reduce pressure on the transport system. Potential Interventions need to be coordinated and implemented such that sustainable travel behaviours are enabled and instilled from the start of this period of rapid growth.

What Are The Overall Findings And Recommendations From The Part 2 Report?

To accommodate the extensive growth planned at CBC up to 2031, significant Potential Interventions are required to manage access to CBC, alongside the provision of Cambridge South Station. These measures are needed to achieve sustainable growth, meet the highway traffic reduction Targets and ensure that CBC achieves its vision of becoming a sustainable travel campus. Potential Interventions suggested by this Study include:

- Demand management measures such as further restrictions on existing and proposed parking and car access to CBC;
- Infrastructure improvements such as new or improved footpaths/footways or cycleways;
- Behavioural change programmes such as car sharing initiatives; and
- Other sustainable transport interventions, such as enhancements to bus, Park and Ride, walking and cycling provision.

With high levels of growth anticipated over the next 6 to 18 months, Potential Interventions should be coordinated and be bought forward in a holistic manner as soon as possible to ensure that sustainable travel patterns are enabled and instilled in users from the outset.

The proposed Cambridge South Station would contribute significantly to meeting CBC's transport needs by:

- Offering direct rail access from a wide range of locations where staff, patients and visitors live now and could live in the future – making rail access easier, quicker and more reliable for existing users and more attractive to potential new users;
- Relieving capacity pressure on other parts of the transport network, offering them the opportunity to accommodate more existing and new trips in a sustainable way; and
- Providing additional sustainable transport capacity to support other interventions aimed at reducing car traffic to CBC.

What Further Work is Required?

The next stage of work, to be covered by the Part 3 Report, will:

- Assess the impact of the Potential Interventions from the Part 1 and Part 2 Reports, as well as Cambridge South Station and its accompanying infrastructure, to determine their impact on the Targets identified in this report; and
- Identify the phasing requirements of the Potential Interventions to help manage growth up to 2031.

Following this, further study is recommended to:

- Understand the feasibility of each Potential Intervention;
- Understand the increase in footfall at Stations at the other end of the rail journey to determine if any infrastructure improvements at those Stations are required; and
- Undertake scheme design and stakeholder engagement with a view to implementation of selected Potential Interventions.

It will be essential to bring the work on Part 3 forward swiftly to ensure that measures are prioritised and in place to promote the required mode shift to accommodate the growth on site.

1. Introduction

1.1. Background And Context

Atkins has been commissioned by Cambridgeshire County Council (CCC), on behalf of the Greater Cambridge Partnership (GCP), to undertake a Transport Needs Review of Cambridge Biomedical Campus (CBC).

CBC, including Cambridge University Hospitals NHS Foundation Trust (CUH), generates intense travel activity, with over 28,000 person-trips to and from the site daily (2017) comprised of staff, patients and visitors, alongside other trips through the site including ambulances, operational and delivery services. It strives to be considered as an exemplar sustainable travel Campus and an example of best practice in terms of delivering environmentally sound, active and healthy outcomes.

The purpose of this Study is to masterplan the future transport needs of CBC beyond the current programme of works and in scenarios with and without a new Cambridge South Station.

This Report, Part 2 of the Study, follows on from a baseline Part 1 Report² to understand:

- The longer-term travel supply and demand up to 2031;
- Constraints in supply and demand; and
- Recommendations for Potential Interventions that could be implemented to address these constraints, with and without Cambridge South Station located to the west of the CBC site.

1.1.1. The Cambridge Phenomenon

The Cambridge Phenomenon has an exceptionally successful story to tell. Cambridge is a member of the UK's Fast-Growing Cities group which contains some of the UK's most successful cities in terms of economic indicators such as productivity and knowledge-based jobs. Cambridge's Gross Value Added (GVA) per worker was £55,900 in 2014, having grown 21% since 2004. Over the same period Cambridge's population grew by 14.5%³.

Greater Cambridge competes on a global stage and is a gateway for high-tech investment into the UK. It is also the innovation capital of the country, with more patents per 100,000 population than the next six UK cities combined⁴. Greater Cambridge's current economic success is attributed to being a networked and connected City region, characterised by world-leading innovation. Research⁵ into The Cambridge Phenomenon, the cluster of technology firms around Cambridge, indicates that this success is due to:

- *"A world class university drawing talent into the area from across the globe, fostering innovation and encouraging business spinout which has developed into strong hi-tech, bio-medical and other clusters (with over 1,525 technology companies employing more than 54,000 people and, with a combined annual revenue of more than £12 billion);*
- *The area's scale and connectiveness allows overlapping networks to develop and facilitate a culture of co-operation and cross-fertilisation between entrepreneurs and with academics; and*
- *Being an attractive place and competing with other world cities as a good place for business leaders and their families to live, not just a good place to do business". (pg2)*

Greater Cambridge has a diverse economic base with strengths across a broad base of knowledge-intensive sectors: professional, scientific, biomedical, clean-technology and advanced manufacturing.

² Cambridge Biomedical Campus Transport Needs Review, Part 1 Report, Atkins, 2018

³ Centre for Cities, Williams, M, March 2016: Fast Growth Cities: The opportunities and challenges ahead

⁴ Greater Cambridge Partnership -

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/321722/Greater_Cambridge_City_Deal_Document.pdf

⁵ Greater Cambridge Partnership -

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/321722/Greater_Cambridge_City_Deal_Document.pdf

Whilst economic success to date has been widely celebrated, it is now contributing to a shortage of housing and significant transport congestion that threatens to choke further economic growth and compromise a high quality of life.

1.1.2. Cambridge Biomedical Campus

CBC is an international centre of innovation and excellence in healthcare and is a significant asset in the development of the UK's life science research, teaching and healthcare industries.

A significant increase in the number of people working at and visiting the Campus will take place within the next five years, with further increases expected up until 2031. Short-term growth includes the relocation of Royal Papworth Hospital and AstraZeneca. There is also expansion to the existing hospital provision, University research and commercial organisations, with further growth planned up to 2031 and aspirations to continue this growth beyond 2031.

Growth at CBC will increase pressure on the transport network used both to access the Campus and travel within the site. There is a need to understand the future travel demand of patients, visitors and employees, to best plan sustainable transport options that will enable and support future growth.

1.2. About This Study

This Study has three parts, as set out below:

Part 1: Baseline to 2022

Part 1 provided an understanding of the following for a five-year horizon:

- Current travel demand to, from and within CBC, including the volume of travel to and from the site and the breakdown by mode, purpose and direction;
- Current travel supply for these trips, including the challenges and opportunities;
- Current mismatches between supply and demand for trips to, from and within CBC;
- Future travel demand to, from and within CBC;
- Future travel supply for these trips, including CBC proposals, GCP proposals and bus and rail improvements; and
- Future mismatches between the supply and the demand for trips.

Part 1 recommended Potential Interventions for the next five years to manage growth and reduce the gaps between supply and demand.

Part 2: 2022 to 2031

Part 2 examines the transport needs of CBC beyond 2022 and recommends additional transport measures needed for CBC during this time period, for scenarios both with and without the addition of a Cambridge South Station.

The station will be considered by assessing:

- Its fit with CBC and the regional growth strategy;
- Options for access to a new Station; and
- Wider economic impacts of a new Station.

This Report provides the output of Part 2. A separate Non-Technical Summary will also be produced to summarise the outcomes of the entire Study (Parts 1, 2 and 3).

Part 3: Impact of Interventions and Cambridge South Station on Access to CBC

Part 3 will assess the impact of the Potential Interventions identified in the Part 1 and Part 2 Reports, as well as Cambridge South Station, on access to CBC between 2018 and 2031. This will determine their impact on the Targets identified in Part 2, as well as identify the phasing requirements to help manage growth up to 2031.

Part 3 will form a separate report.

1.3. Part 1 Summary

Part 1 of the Study covered a wide range of evidence on transport supply, available routes and services, plus quality factors such as reliability and congestion and travel patterns. Analysis of this evidence built up a picture of what travel to CBC looks like now and what travel could look like in five years' time when considering the planned growth on the site. The key findings of the Part 1 Report are:

- There are several existing challenges, particularly highway congestion on Babraham Road and Addenbrooke's Road;
- There are gaps in the range of direct bus services available from key travel origins;
- There is concern over staff parking impacts on surrounding residential streets;
- Mode share indicates low levels of walking (1% mode share for patients and 3% mode share for staff) and a deficit in cycle parking capacity. This will lead to future challenges with planned development increasing travel demand by 30% to 40% by 2022 for all modes;
- Although additional car parking is planned, the highway network has little capacity to accommodate additional car trips to / from the site;
- Congestion and journey times will increase and access to the site by car will be further constrained;
- Highway traffic growth would also have a consequential impact on air quality; and
- With the growing congestion around CBC, there will be growing concerns over emergency vehicle response times.

Potential Interventions for the short term (a five-year horizon) are therefore focused on improving access for sustainable modes. Given the relocation of Royal Papworth Hospital and AstraZeneca to CBC in 2019 and 2020 respectively, pressure on transport infrastructure on the CBC site is an immediate short-term issue, with some interventions required within the next 6-18 months to accommodate this pressure. Given the interactions between the availability and use of sustainable modes, the level and management of highway capacity and the level and management of parking capacity, these factors must be addressed through a coordinated, holistic approach.

A full list of the Potential Interventions identified in the Part 1 Report is included within Appendix A.

1.4. What Defines CBC's Transport Needs

Part 1 of the Study reported the policy objectives that CBC operates within and strives to meet. These include a shift towards the provision of sustainable travel to access the Campus and enable growth on site to be achieved without an adverse impact on transport conditions surrounding the site (Chapter 3 of the Part 1 Report).

Part 2 focuses on a set of Targets for traffic levels accessing the CBC Site as follows:

- Target: Maintaining traffic at 2017 levels up to 2031; and
- Stretch Target: a 10% to 15% reduction in peak highway trips from 2011 levels, which is aligned with the Target of the GCP City Access Strategy.

Details of the volume of trips that these Targets equate to can be found in Chapter 4 of this Report. A policy steer has also been given that any road space no longer required in future for general highway traffic should be reallocated to more sustainable travel modes, although this does not explicitly mean that the existing highway network is operating within capacity and therefore this should be considered on a site by site basis.

This Study identifies Potential Interventions recommended for additional scheme development. The Potential Interventions collectively could encourage mode shift away from the private car by the level required to meet the Target reduction in highway trips. Together, these represent CBC's transport needs for the purposes of this Study.

1.5. Study Area

For this Study, we have defined:

- A Local Study Area, representing CBC itself; and
- A Wider Study Area, representing the main concentration of areas where trips to CBC originate and that interventions are most likely to be concerned with.

Full details of these can be found within the Part 1 Report (Section 1.4). Figure 1 and Figure 2 show the Local and Wider Study Area.

Figure 1 - Site Plan and Extent of Local Study Area

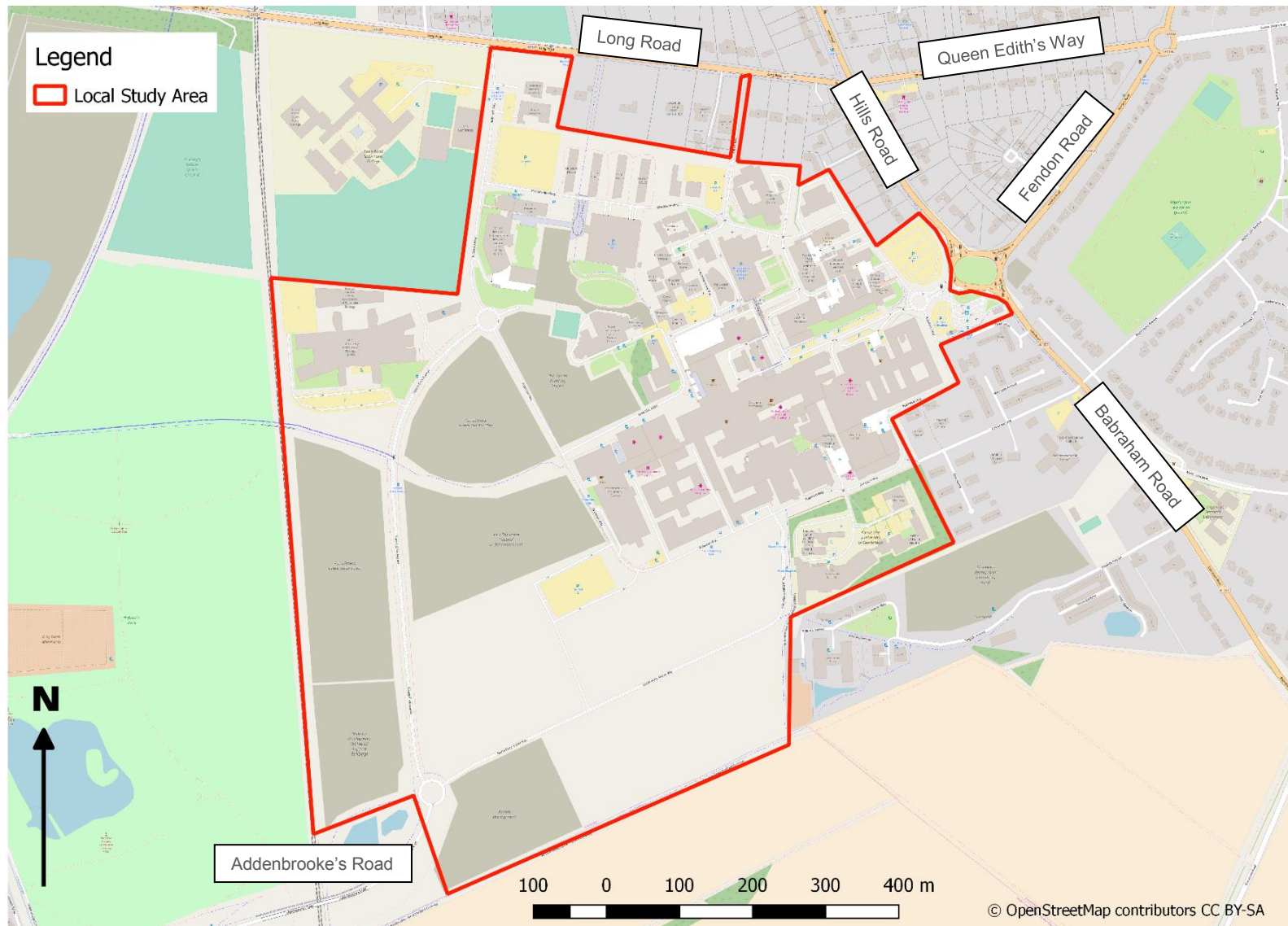
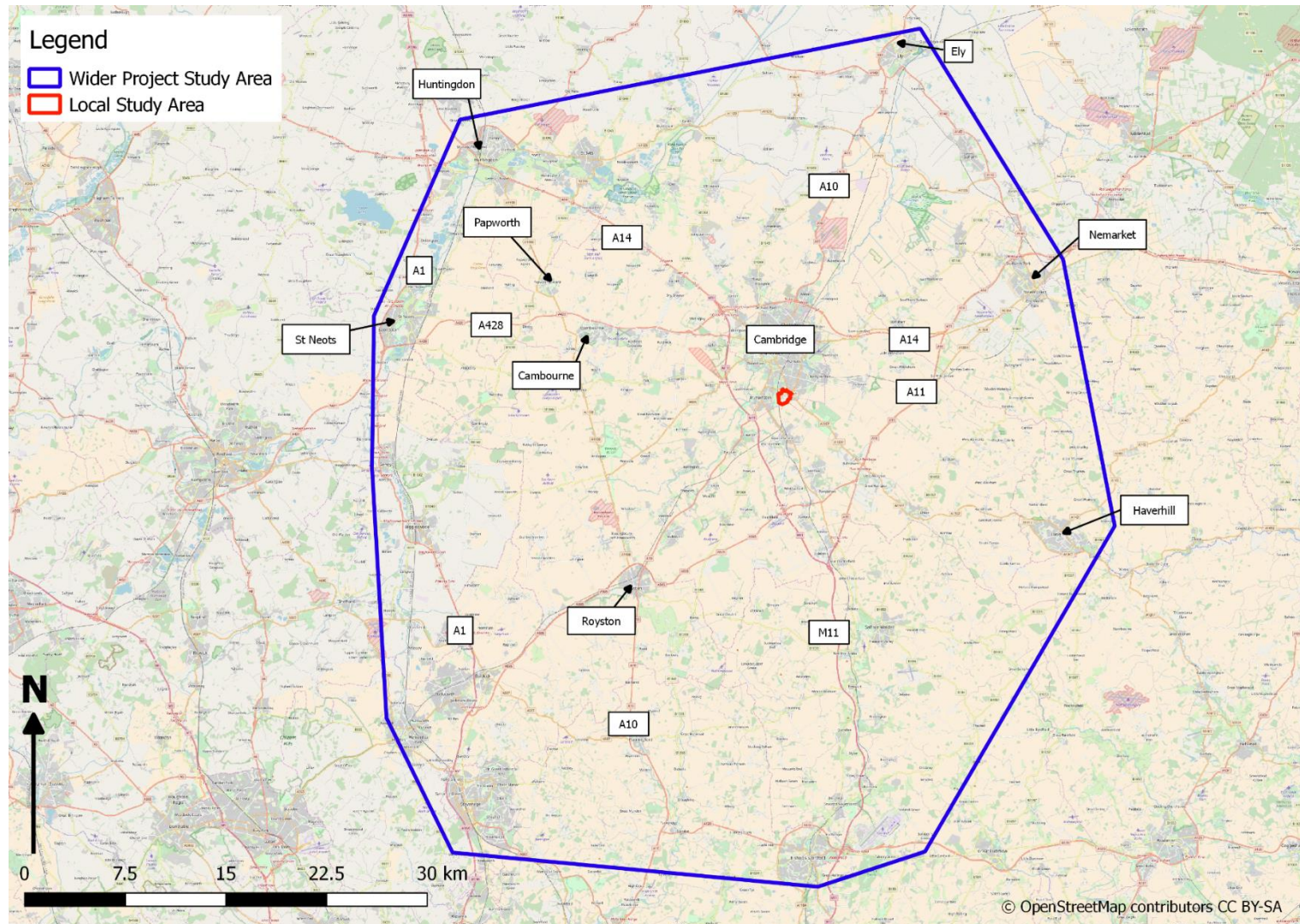


Figure 2 - Extent of Wider Study Area



1.6. Report Structure

The remainder of this Report is structured as follows:

- Chapter 2 sets out the future transport conditions in and around CBC;
- Chapter 3 presents the impact that of these conditions on access to CBC;
- Chapter 4 identifies Potential Interventions that could be put in place to meet the transport needs of CBC;
- Chapter 5 presents the context for and requirements of a Rail Station at the CBC Site;
- Chapter 6 discusses wider economic impacts of a Rail Station at the CBC site; and
- Chapter 7 summarises the findings of this Report.

2. Future Transport Conditions

This Chapter identifies the transport conditions in and around the CBC site up to 2031. The following details are presented:

- The methodology to assess the change in transport demand from 2022 (the end of the five-year horizon used in the Part 1 Report) to 2031;
- What are the changes to transport supply, beyond those identified within the Part 1 Report?
- What are the changes to transport demand, beyond those identified within the Part 1 Report?
- What is the timeline for these changes? and
- What is the impact of these changes and their timing on overall transport conditions?

2.1. How Transport Demand Changes Have Been Forecast

All changes to the level of transport demand have been assessed using the following methodology, with any forecast numbers presented within this Report derived using this consistent approach:

- The five-year forecast (2022) values from the Part 1 Report have been used as a starting point;
- The anticipated percentage change in employment on the site between 2022 and 2031 has then been applied to the Part 1 demand levels to forecast the change in staff trips to 2031;
- The predicted change in patient numbers (4% annual compound growth) has been applied to the 2022 values to forecast the change in patient and visitor trips to 2031. It has been assumed that the number of visitors will be directly related to the level of patients;
- Where no information on the split between staff and patient/visitor trips is available, a composite growth value has been applied, combining the growth for both elements above;
- There is an assumption that no change occurs to the mode share over this time period. The interventions considered in Part 2 of the Study would determine the core modal shift into the future, which is discussed in Sections 4.2 and 5.3 of this Report;
- The increased demand level has been compared against the changes in transport supply; and
- The phasing of growth has been compared against the provision of transport infrastructure, to identify the relationship between the two over time.

All changes to transport supply have been derived based on known information about developments or expansions of facilities, such as car and cycle parking spaces.

2.2. What Changes In Transport Supply Will Occur up to 2031?

2.2.1. Cambridge Biomedical Campus Transport Supply

Ongoing developments such as AstraZeneca, Capella, Abcam and the Royal Papworth Hospital relocation propose to include foot and cycle connections between existing and new infrastructure as well as considerable levels of cycle parking and some car parking.

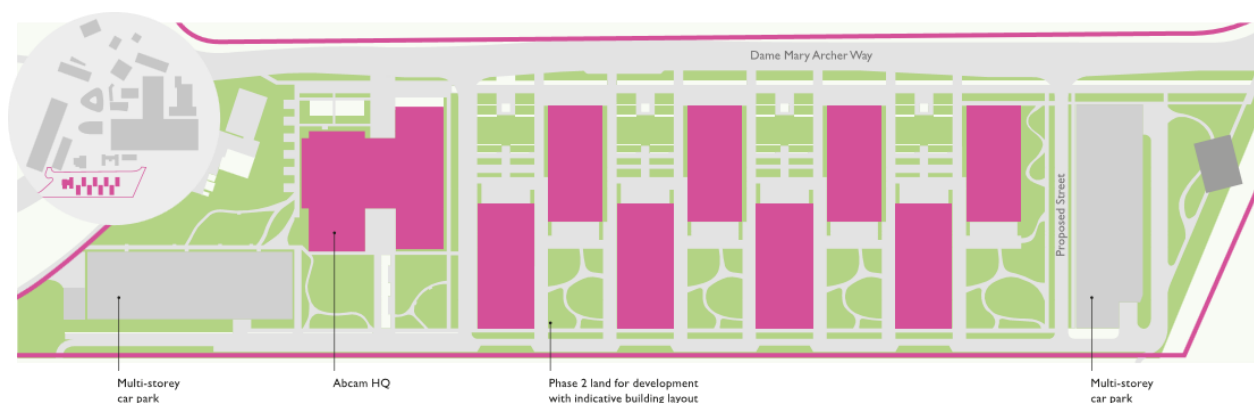
CBC Phase 2 (Planning Application Reference Number: 16/0176/OUT⁶) proposes three shared footway/cycleways linking the development with Dame Mary Archer Way, with pedestrian crossings on Dame Mary Archer Way to connect with the northern part of the Campus. A tree-lined boulevard is proposed at the northern boundary of the site which would connect with existing infrastructure. Cycle parking is proposed to the north of each building near to Dame Mary Archer Way. Facilities are proposed for cyclists along the eastern boundary of the site and connect with the existing off-road cycleway along the southern boundary. Access for vehicles to the development will be from Dame Mary Archer Way, and to the proposed multi-storey car parks from the Perimeter Road.

⁶ <https://idox.cambridge.gov.uk/online-applications/simpleSearchResults.do?action=firstPage>

Parking Supply

As part of the CBC Phase 2 Planning Application, additional on-site parking is proposed in the form of two multi-storey car parks. One location to the west is proposed to initially be installed as a surface car park (approximately 50 spaces⁷) until demand for parking suggests a need for further spaces to be considered. The proposed multi-storey on the eastern edge of the site would provide 1,200 spaces and the proposed multi-storey on the western edge, if fully built out, would provide 694 spaces. The location of the proposed multi-storey car parks within the Phase 2 land, to the south of the existing CBC site, are shown in Figure 3. It is also proposed that 579 spaces of commercial parking will be provided on the Phase 2 land by 2025.

Figure 3 - Proposed Multi-Storey Car Parks within Phase 2 Land⁸



Over the next 3 years CBC are proposing changes to their car parking supply. It is proposed that the Forum Car Park is to be re-opened as a temporary car park consisting of between 368-520 spaces subject to planning discussions for up to 3 years or until the Forum Development is brought forward. A temporary car park of 397 spaces will also be made available for approximately 18 months on the AstraZeneca site for between 400 and 600 contractors who currently park at Trumpington Park and Ride. To manage this parking, access will be restricted to avoid movements during peak hours and access will only be permitted for those contractors who car share. It is considered that this proposal will help alleviate existing capacity constraints at Trumpington Park and Ride.

In terms of staff car parking, CUH has recently reviewed and updated its eligibility criteria focusing on providing access to parking for those where alternate methods are limited, such as staff who work late or early and staff who have caring or childcare commitments. This change is currently being implemented in preparation for new developments on CBC becoming occupied. Although CUH is not the sole occupier on CBC and other occupiers have their own parking policies, trips by CUH staff make up a large proportion of trips.

It is clear that all those travelling to CBC need to be encouraged to seek sustainable methods of travel to balance the needs of staff, patients and visitors who are restricted to travelling by car, particularly given the existing level of congestion on the adjacent highway network.

2.2.2. External Transport Supply

Chapter 7 of the Part 1 Report includes the details of future transport schemes and capacity enhancements that the schemes will provide. Any changes or additional information, beyond the details reported in Part 1, are summarised below. This information has been provided by the GCP as a high-level estimate of when the projects could come online.⁹

⁷ CBC Phase 2 Transport Assessment. Chapter 6 (Parking Strategy)

https://idox.cambridge.gov.uk/online-applications/files/392DC1A51A7EB168BD6BDD7101A9DFE3/pdf/16_0176_OUT-NON-TECHNICAL_SUMMARY_APPENDIX_8.1_-_CBC_PHASE_2_TRANSPORT_ASSESSMENT_-_PART_2-1886231.pdf

⁸ <https://cambridge-biomedical.com/property/>

⁹ This information was correct at the time of compilation in August 2018.

A10 Royston – Cambridge Cycle/Footway

Construction is likely to be completed for the full cycleway by the mid-2020s.

Cambridge South East Transport Study

Since the Part 1 Report, this Study has gone out to consultation. There is a proposed short-term package of measures (Phase 1) which include road safety, walking, cycling and bus priority measures along the A1307 between Haverhill and Cambridge. A continuous multi-user path for pedestrians, cyclists and horse riders is planned from Cambridge to Linton and will form part of the Linton Greenway, which is aligned to the delivery of the Cambridge South East Transport Study. Additional cycle parking will also be provided at Babraham Park and Ride.

Phase 2 of the scheme, which is considered to be aligned with the first phase of Cambridge Autonomous Metro (CAM) has three potential longer-term strategies¹⁰:

- Strategy 1:
 - A new segregated Mass Rapid Transit route from the A11 via Sawston to the Cambridge Biomedical Campus;
 - A Park and Ride near the A11/A505 junction; and
 - Strategy 1 would most likely form part of the Cambridgeshire Autonomous Metro being proposed by the Combined Authority;
- Strategy 2;
 - A new dedicated public transport link between the existing Babraham Road Park and Ride and the Cambridge Biomedical Campus;
 - An inbound bus lane from Babraham Research Campus to the Babraham Road Park and Ride site; and
 - A Park and Ride near the A11/A1307 junction;
- Strategy 3;
 - An inbound bus lane along the A1307 from Babraham Research Campus to the Addenbrooke's Hospital roundabout; and
 - A Park and Ride near the A11/A1307 junction.

Phase 1¹¹ is due to be completed by 2020/2021, while Phase 2 will be dependent on the CAM proposals.

Cambourne to Cambridge

The phasing of this project is not yet confirmed, with an anticipated delivery date for all elements of the scheme to be no earlier than 2024.

Chisholm Trail

Construction is aimed to be completed by 2023.

City Access

Work to develop the detail of the various proposed workstreams within the City Access programme is ongoing. Delivery of this programme is anticipated to take place within the lifetime of the GCP, up until 2031.

Greenways

The phasing of the Greenways will be linked to the other GCP studies which align to each specific Greenway, for example, the Linton Greenways is proposed to be delivered as part of the Cambridge South East Transport Study. It is therefore likely that the entire network would not be constructed until 2031, however individual Greenways may be constructed before this depending on availability of funding.

¹⁰ https://www.greatercambridge.org.uk/transport/transport-projects/cambridge_south_east_study/
Accessed 15th March 2018

¹¹ As described in Section 3.2 of the Part 1 Report

Histon Road

It is currently expected that this scheme may be open by late 2020.

Milton Road

This scheme is expected to be open by the end of 2021.

Park and Ride

A planning application has been submitted which proposes to increase parking capacity at Trumpington Park and Ride by 279 spaces. This application was submitted at the end of April and is awaiting determination. Additionally, a new Cambridge South West Park and Ride is being considered, which would expand Park and Ride capacity substantially.

West of Cambridge Package

The timescale for delivery of this scheme is 2022/2023 with a new Cambridge South West Park and Ride to be constructed by 2023.

A10 Ely to Cambridge

As with the City Access workstream, there are several phases to this potential scheme. The exact timing of each phase is uncertain, but it is expected that the full scheme would be complete by 2031.

Autonomous Vehicle Shuttle¹²

A trial of ten fifteen-seater autonomous shuttles is proposed to start in summer 2019, on the southern section of the existing Cambridgeshire Guided Busway (CGB), with the potential for passengers to be able to use the system by the summer of 2020. Initially the services would run between Trumpington Park and Ride and Cambridge Station, via CBC, facilitating onward travel connections. They would include services only in the early mornings and late evenings to fill the current gaps in public transport service provision at these times.

Rural Travel Hubs¹³

The GCP is considering the potential for Rural Travel Hubs to be created as bespoke rural transport interchanges to connect residents in South Cambridgeshire with public transport, walking and cycling routes. As well as improving connections between neighbouring towns and villages, the hubs could encourage use of sustainable transport rather than the private vehicle. Oakington and Sawston are currently being considered as potential Rural Travel Hubs and are subject to further feasibility work and public engagement.

Cambridgeshire Autonomous Metro (CAM)

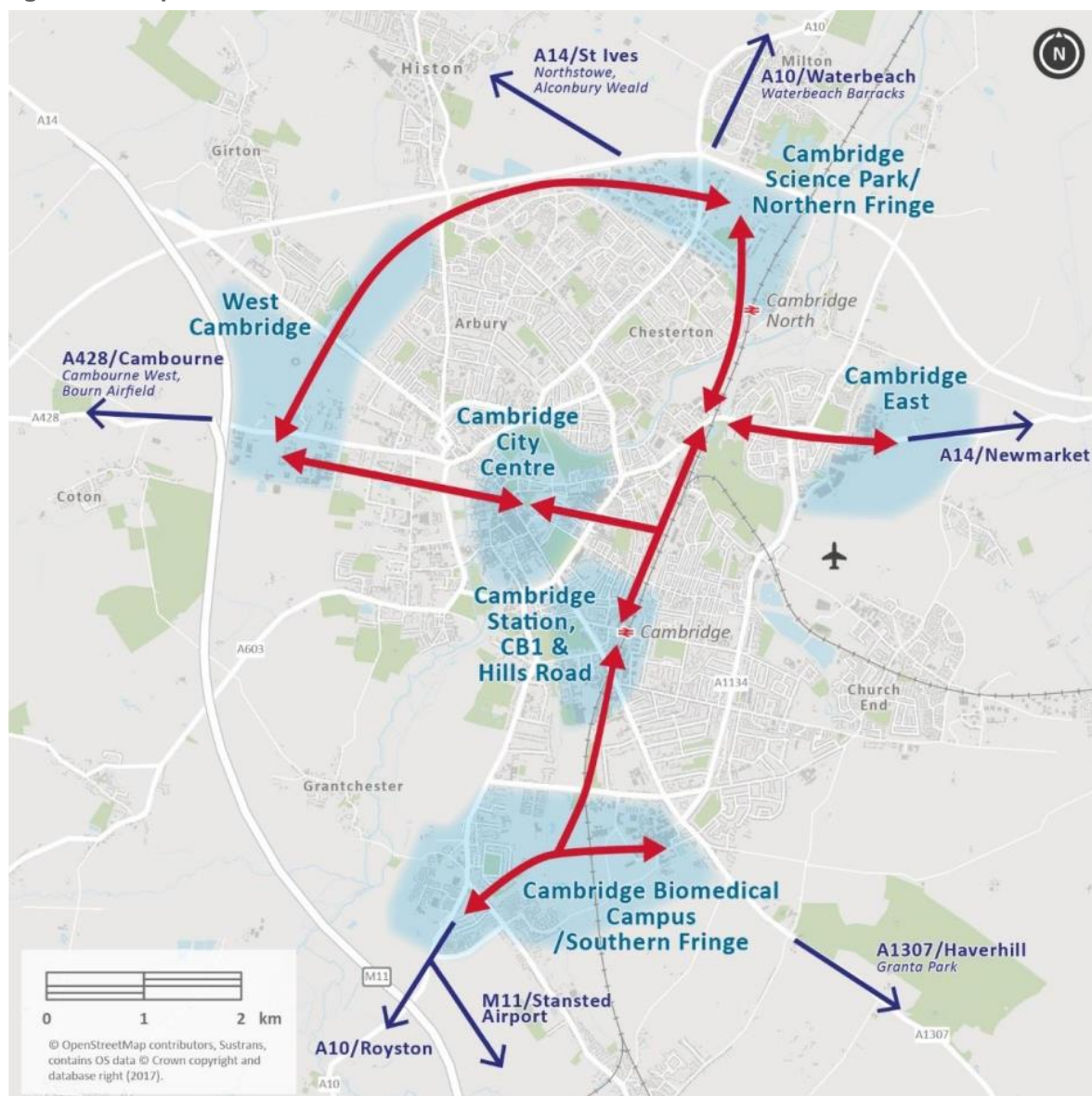
An Option Assessment¹⁴ has been undertaken to identify the extent to which a Mass Transit system in Cambridge could play a role in delivering high quality transport infrastructure to facilitate economic growth. It suggested that the system should have a capacity of 4,000 people per hour, per direction, per corridor to cater for long-term potential demand. As shown in Figure 4, one corridor assessed passes adjacent to CBC and one through, with this site identified as a key location for services. It is considered that the proposals contained within the Cambridgeshire Autonomous Metro Study would require a tunnelling element and therefore would be unlikely to be implemented until to the mid to late 2020s.

¹² <https://www.cambridgeshire.gov.uk/news/cambridge-wins-3-2million-to-develop-one-of-the-first-autonomous-shuttle-services-in-the-uk/>

¹³ <https://www.greatercambridge.org.uk/transport/transport-projects/rural-travel-hubs/>

¹⁴ <http://cambridgeshirepeterborough-ca.gov.uk/assets/Combined-Authority/Item-2.1-Additional-report-Greater-Cambridge-mass-transit-options-assessment-report-January-2018.pdf>

Figure 4 - Proposed Autonomous Metro Network Schematic¹⁵



The Cambridgeshire Autonomous Metro Study is currently in an early stage, is not part of any adopted plans and is not likely to be in place until towards the end of this Study horizon (most likely mid to late 2020s). Given this, this Study identifies Potential Interventions that could be introduced ahead of any Autonomous Metro Scheme.

Should a Cambridge-wide system not be developed further, Mass Transit to CBC specifically could be considered. The viability of such a system would need careful consideration, since the geographical spread of users of the CBC site is wide, making it difficult to identify key corridors that would capture the required number of users in relation to CBC alone rather than as part of a city-wide system.¹⁶

¹⁵ 'Greater Cambridge Mass Transit Options Assessment Report (January 2018) Steer Davis Gleave, Greater Cambridge Partnership and Cambridgeshire and Peterborough Combined Authority (Figure 4.1, page 23) <http://cambridgeshirepeterborough-ca.gov.uk/assets/Combined-Authority/Item-2.1-Additional-report-Greater-Cambridge-mass-transit-options-assessment-report-January-2018.pdf>

¹⁶ It should be noted that the Combined Authority is also partly responsible for some GCP projects including but not limited to A10 Royston – Cambridge Cycle/Footway and CAM.

2.3. What Changes In Transport Demand Will Occur Up To 2031?

2.3.1. Planned Employment Growth At CBC

Planned growth on CBC up to 2026 will lead to an employment level of 26,000 jobs¹⁷. This level is 51% greater than the current level of 17,250¹⁸ jobs on site and a 16% increase above the 22,450 jobs identified in the Part 1 Report as being in place by 2022. No details beyond this number of jobs predicted are currently reported, therefore these figures have also been applied to the future scenario in 2031. These figures and the percentage change are presented in Table 1.

Table 1 - 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%

2.3.2. Patient And Visitor Growth At CBC

Data regarding the number of patients currently accessing CBC has been obtained from the CUH website¹⁹. CUH has advised that patient numbers are anticipated to rise by 3% to 4% every year. Based on this, Table 2 and Figure 5 show the anticipated patient numbers up to 2031, with 4% compound annual growth assumed.

Table 2 - Predicted Annual Patient Numbers to 2031

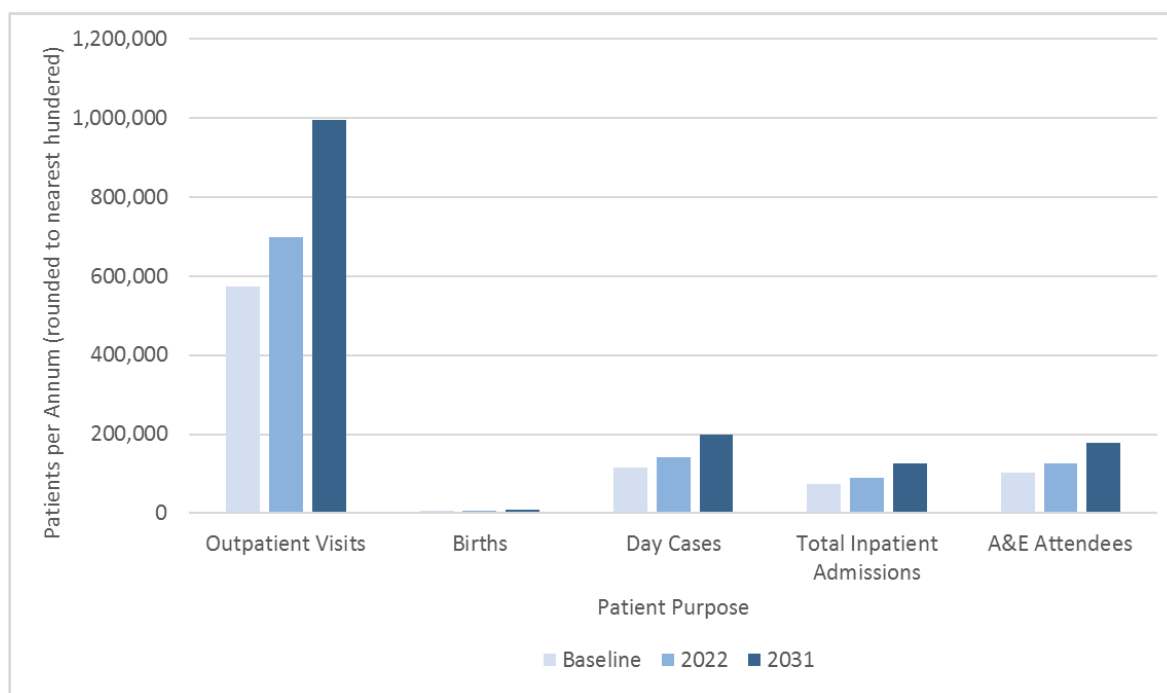
Patients	Baseline 2017	2022	2031
Total to the nearest 100 (excluding inpatients as assumed double counting)	798,600	971,500	1,382,800
Percentage Change from Baseline	-	+21%	+73%

¹⁷ Greater Cambridge CaMKOx First/Last Mile Strategy, Greater Cambridge Partnership, September 2017. <https://www.nic.org.uk/wp-content/uploads/Greater-Cambridge-Partnership-First-Last-Mile-Strategy-Report-2017.pdf>

¹⁸ Data provided by CBC

¹⁹ <https://www.cuh.nhs.uk/about-us/our-profile/facts-and-figures>
(based on 2016/2017 numbers)

Figure 5 - Predicted Annual Patient Numbers up to 2031



Total annual patient numbers are anticipated to increase by approximately 584,200 up to 2031, which equates to approximately 1,600 additional patients per day when averaged across a seven-day week (Monday to Friday values are likely to be higher). This additional number does not include people accompanying patients, so the increase in trips to the site for patients and visitors combined will be considerably higher.

2.3.3. Housing Development In Cambridgeshire

Major housing developments in the area including Northstowe (3,216 dwellings by 2031²⁰), Waterbeach (2,300 dwellings by 2031²¹) and Cambourne (2,605 dwellings by 2031²²) are all likely to house people who will access the CBC site for different purposes. It is acknowledged that individual developments will have their own travel characteristics and mode shares, but these are unlikely to have significant overall impacts on the mode share to the CBC site compared to the existing situation depending on the number of staff that reside within these developments.

Including trip generation from these residential developments within this Study would lead to double counting of trips, since both the origin and destination end of the same trip would be represented in any analysis. Trip numbers are therefore derived from planned growth at CBC as a destination, while the locations of the major residential developments inform the picture of where people may travel from.

2.3.4. Increased Travel To CBC

Application of the predicted growth in employment, patients and visitors on site (Sections 2.3.1 and 2.3.2) to the numbers of trips reported in Part 1²³ of the Study gives the likely change in person-trips to the site to 2031, as shown in Table 3 and Figure 6. Values have been calculated by applying the percentage changes shown in Table 1 for staff and Table 2 for patients and visitors. This has enabled a combined percentage change for person-trips to CBC to be derived. It should be noted that a robust assessment has been used to derive the forecast person trips. However, these figures may differ as a result of changes in development proposals and baseline data provision. For example, additional employment growth may take place if use of the site intensifies, especially if new transport links trigger additional development on the CBC site. Furthermore, it is noted that the

²⁰ <http://www.northstowe.com/content/homes>

²¹ <http://www.waterbeach.co.uk/homes.php>

²² <http://www.cambournewest.com/>

²³ Part 1 Report – Section 5.1.1 and 5.2.2 for staff and patients and visitors respectively.

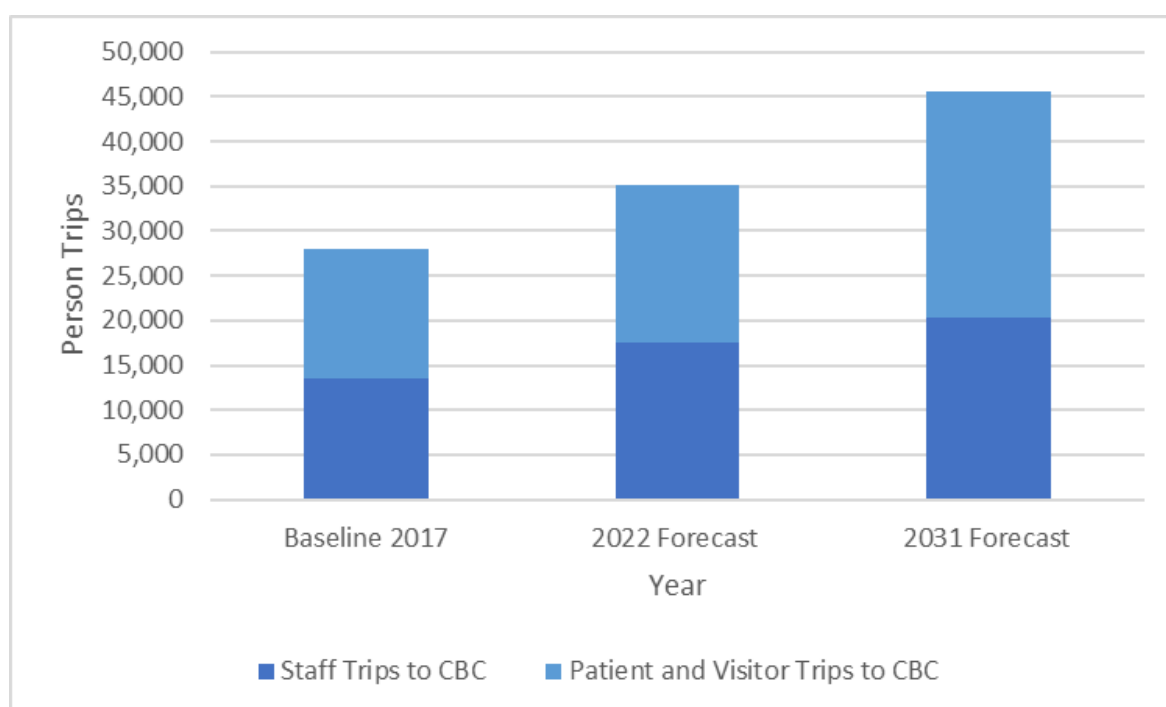
2011 Census figures may be less than the actual 2017 baseline however, there is no data available that categorises staff and patients.

Table 3 - Daily One-Way Person-trips to CBC up to 2031

Trip Type	Baseline 2017*	2022 Forecast	2031 Forecast
Staff Trips to Site	13,552 ²⁴	17,600	20,400
Patient and Visitor Trips to Site	14,500 ²⁵	17,500	25,100
Total Trips to the Site	28,052	35,100	45,600
Percentage Change from Baseline (Total Trips)	-	+25%	+63%

*It is acknowledged that staff trips to the site are from 2011, however, no other data is available that differentiates between staff and patients in 2017.

Figure 6 - Daily One-Way Person-trips to CBC up to 2031



Data from the latest CBC cordon survey presents the total number of one-way person-trips by mode entering the site in 2017. This also captures trips that travel through CBC, either on route to another location or as part of a multi-stage journey, such as drop-offs (the latter accounts for the differences in total volumes between Table 3 and Table 4). The 2017 baseline values have been forecast to 2022 and 2031 using the percentage change shown in Table 3 to show forecast trips to the site by mode.

²⁴ 2011 Census Journey To Work

²⁵ Data provided by CBC

Table 4 - One-way Daily Person-trips Entering CBC up to 2031 by Mode*

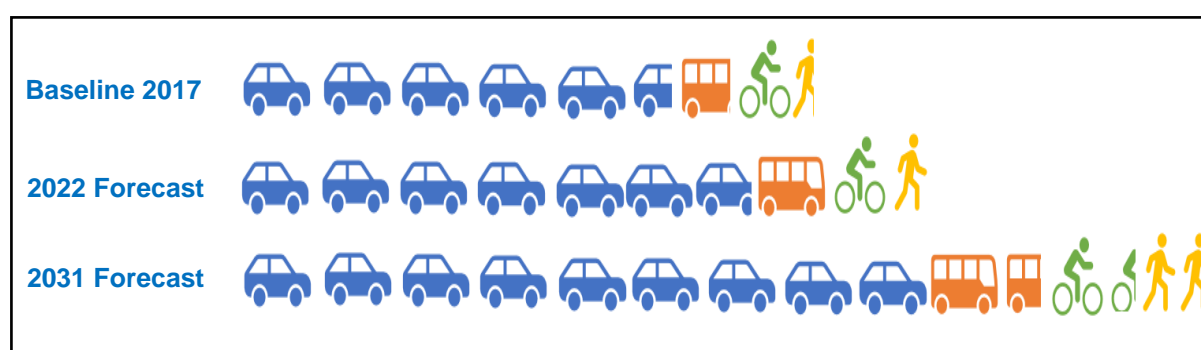
Person-trips to CBC	Baseline 2017 ²⁶	2022 Forecast	2031 Forecast
Car	28,475	35,600	46,400
Bus	4,313	5,400	7,000
Cycle	4,779	6,000	7,800
Pedestrian	3,820	4,800	6,200
Total	41,387	51,700	67,500
Percentage change from Baseline (Table 3)**		+25%	+63%

*includes through-trips

**numbers have been rounded so may not correspond directly with percentage change

Table 3 and Table 4 demonstrate the rapid pace of development at CBC over the next five years which is expected to be followed by further development and increased travel demand through to 2031, increasing pressure on the transport network²⁷. This is shown diagrammatically in Figure 7.

Figure 7 - Daily Person-trips Entering CBC up to 2031 by Mode (1 Unit = 5000 trips)



2.4. What Is The Timeline for These Changes?

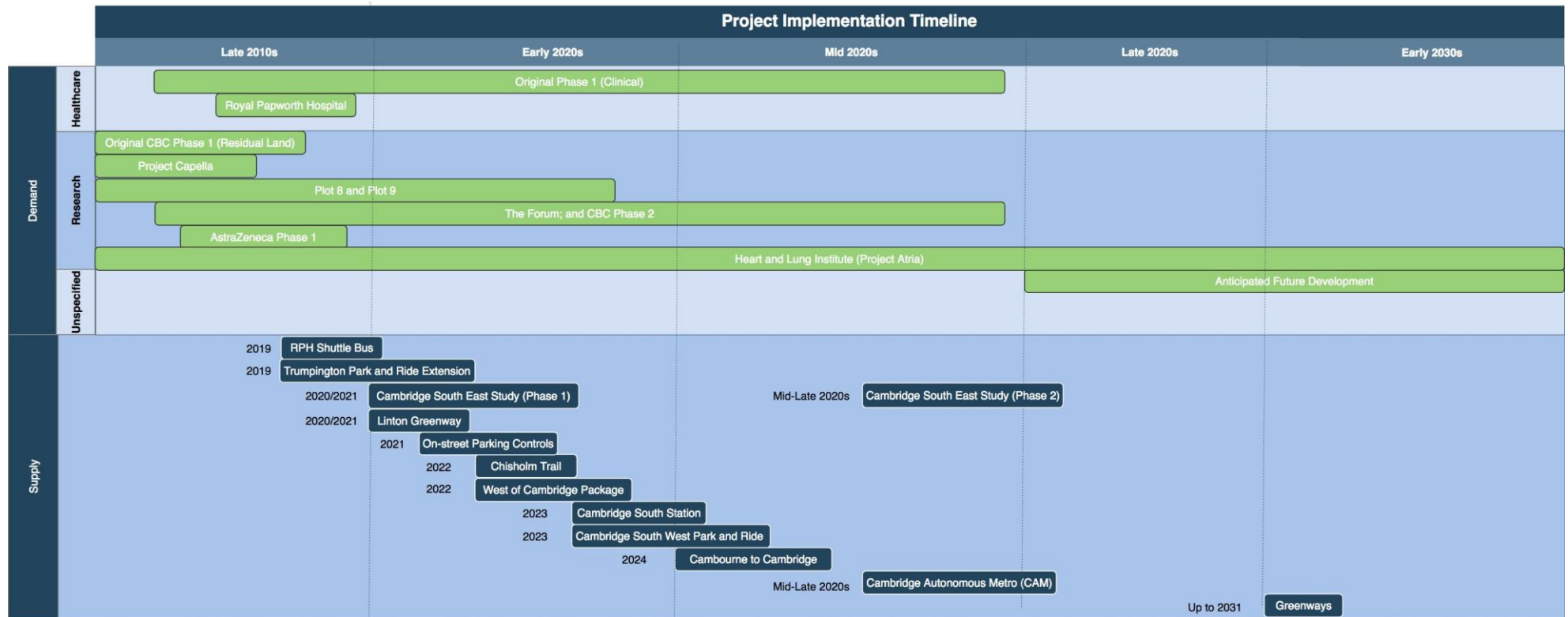
Figure 8 shows the timeline for the changes that were described in Sections 2.2 and 2.3.

Many of the transport schemes identified are in the initial stages of development and do not have committed timescales. It is therefore difficult to provide an accurate picture of the timeline for these developments. Similarly, there are limited details available as to the precise phasing of developments on the CBC site beyond the short-term horizon, particularly the build-out and occupation of new developments and the timing of any new parking supply.

²⁶ Cambridge Biomedical Campus Transport Needs Review, Part 1 Report, Table 5.4, Atkins, 2018

²⁷ Predicted trip numbers are extrapolated from 2017 baseline figures and assumes no mode shift.

Figure 8 - Timeline for Planned and Proposed Changes in Transport Supply and Demand



As shown in Figure 8, the majority of the GCP transport schemes are proposed to become operational from the early to mid 2020s.

There is a very rapid pace of development at the site over the next 18 months, with four key developments all being occupied by the end of 2020. This is likely to put increasing pressure on the transport network and emphasise the need to bring forward Potential Interventions outlined in the Part 1 Report, given that it will not be before 2020 that schemes such as Phase 1 of the Cambridge South East Transport Study will be operational.

The next milestone for development on CBC is 2026, when a further three developments (CBC Phase 1, Phase 2 and The Forum) are due to be fully occupied. By this stage, local enhancements such as the Cambridge South West Park and Ride and Phase 2 of the Cambridge South East Transport Study are proposed to be operational, which would provide increased capacity for Park and Ride and sustainable travel to the site.

The schemes identified in Figure 8 would also be implemented in conjunction with other parking controls that could focus on the short-term management of on-street parking, and then implementing tighter controls brought in over the medium to long-term.

The impact of these schemes, as well as the Potential Interventions recommended in the Part 1 and Part 2 Reports, will be assessed in the Part 3 Report. The required phasing of Potential Interventions to keep up with growth will also be assessed in Part 3.

2.5. Summary

The Greater Cambridge area has several transport infrastructure schemes that are being developed up to 2031, with many of these having a relationship with the transport demand to CBC.

Significant growth at and around the CBC site will continue until at least 2031. The number of staff accessing the site is expected to increase by 51% from 2017 to 2031, with a 73% growth in patient and visitor levels over the same time period. This will give rise to an increase in demand of 17,500 one-way person²⁸ trips per day to the site compared to 2017 levels.

Growth to 2031 will have a consequential impact on the transport network in the area. The interrelationship between the construction of the proposed schemes and the phasing of the on-site developments is critical in managing the impact of growth on the local transport network.

²⁸ Difference in total trips from 2017 to 2031 from Table 3.

3. Impacts on Access to CBC

This Chapter builds upon the summary of planned and proposed infrastructure measures outlined in Chapter 2 by presenting the changes from 2017 up to 2031 on access to CBC for each transport mode and detailing any constraints to growth that have been identified.

3.1. Highway

There remains a requirement for the highway network to provide access to the site for some staff and patients, as well as emergency vehicles, servicing vehicles, public transport services and taxis. Given the anticipated phasing of the GCP schemes there is a probability that growth in travel to the site in the short term will lead to an increase in highway traffic, despite the existing congestion and parking constraints. Existing planning applications seek to improve sustainable transport provision. However, with limited improvements to other alternatives in some instances, there is little incentive, or in some cases the option, to travel to the site by sustainable modes.

3.1.1. Change From 2017

Highway Capacity

Table 4 shows an additional 17,925 one-way person-trips by car are predicted to access the site in 2031 compared to 2017, with a total of 46,400 one-way person-trips accessing the site per day by car by 2031. Babraham Road, Addenbrooke's Road, and Hauxton Road back to M11 Junction 11 were identified in the Part 1 Report as having existing high levels of congestion, which will be exacerbated by this continued growth. The area around CBC was also identified as a concern in terms of air quality. Future increases in highway trips may give rise to 'peak spreading', where people will choose or are forced to travel earlier or later than planned to avoid the peak periods of congestion. This may be feasible for some journeys, but not all, especially for those working shifts.

There were also several junctions identified in Part 1 which would experience further increased congestion because of growth up to 2031, including:

- Dame Mary Archer Way/Addenbrooke's Road/Francis Crick Avenue;
- Babraham Road/Hills Road/Fendon Road; and
- Queen Edith's Way/Hills Road/Long Road.

The increase in highway trips is also likely to have an impact on congestion on-site, which could impede access for emergency vehicles, and compromise air quality in the local area. Accesses to car parks will experience higher levels of congestion in the next five years than they do currently. As car drivers find it more difficult and time consuming to access the on-site car parks, they may be encouraged to seek spaces elsewhere. This may have a knock-on impact on levels of demand for on-street parking in surrounding areas, which is not desirable.

Impacts of Congestion

Increased congestion on the highway network has the potential to affect economic growth and expansion in Cambridge. *"If left unaddressed, congestion would become a real threat to economic growth, business success and resident health and wellbeing"*²⁹.

3.1.2. Constraints To Be Addressed

Changes in demand and access to CBC by highway in 2031 have highlighted the following constraints:

- Corridor capacity constraints on Babraham Road, Addenbrooke's Road and Hauxton Road, back to M11 Junction 11;
- Negative impacts on air quality caused by additional highway demand;
- Congestion on-site causing delays for emergency vehicles;

²⁹ Greater Cambridge Partnership First/Last Mile Strategy Report (2017) (pg13)
<https://www.nic.org.uk/wp-content/uploads/Greater-Cambridge-Partnership-First-Last-Mile-Strategy-Report-2017.pdf>

- Congestion on-site causing delays at entrances and exits to car parks;
- Junction capacity constraints at Dame Mary Archer Way/Addenbrooke's Road/Francis Crick Avenue, Babraham Road/Hills Road/Fendon Road and Queen Edith's Way/Hills Road/Long Road;
- The impact of highway congestion on the efficiency and reliability of public transport;
- Constraints to economic growth; and
- Increased capacity constraints within on-site car parks and surrounding residential streets (Section 3.2).

3.2. Parking

Parking for cars and cycles is already heavily in demand on the site and the continued growth will lead to greater pressure on these facilities. Provision of additional capacity may reduce the pressure on car parking and cycle parking; however, additional car parking spaces have the potential to cause other adverse effects on the surrounding highway network as identified above. Increased numbers of staff and patients being able to park their private vehicles on-site may encourage and/or divert trips previously accessing the site by more sustainable modes, causing further congestion on the approaches to and within the site.

3.2.1. Change From 2017

Car Parking

Several new car parks are proposed as part of the CBC Extension and CBC Phase 2 developments as follows:

Table 5 - Proposed Car Parking 2017 - 2025³⁰

Location	Spaces	Construction	Comments
Temporary Car Parking*			
Forum Site	368-520		Temporary (approximately 3 years from 2018)
AstraZeneca	397	2018	Contractors parking only. Approximately 400-600 workers.
Permanent Car Parking			
Royal Papworth Hospital	Minimal	2018	The Royal Papworth Hospital Relocation includes some on-site spaces but otherwise existing spaces within Car Park 2 will be reallocated to the Royal Papworth Hospital.
AstraZeneca Head Office Car Park	620	2019/2020	300 spaces expected to become operational in 2018, the remainder to follow in 2019.
Abcam Car Park	115	2018	
Plots 8 and 9 Car Park	237	2018	
Total by 2018	972		
Forum Development Car Park	226	No firm date (assumed by 2025)	The Forum will also use 120 existing spaces in Hospital Car Parks
New Hospital Multi-Storey	1,200	By 2025	Has Outline Planning Permission, however, plans and strategies to develop the multi-storey may be subject to change.
Second Hospital Multi-Storey	694	By 2025	Has Outline Planning Permission, however, plans and strategies to develop the multi-storey may be subject to change. Proposed to be implemented as a surface level car park with approximately 50 spaces initially.
Commercial Parking	579	By 2025	Located on top of Abcam Parking
Total by 2025	3,671		

*Temporary car parking is considered to have a short-term impact on the parking supply at CBC and has therefore not been considered further when analysing future parking demand and supply.

The total number of parking spaces predicted to be located on-site by 2025 is 8,621 (4,950³¹ existing spaces plus 3,671 additional spaces as detailed within Table 5). No details of any further increase beyond this are known. This proposed level of additional parking has the potential to increase highway travel demand to the site, which, as stated in Section 3.1, is not sustainable.

Table 6 shows the predicted average daily car parking demand for CBC (formal on-site, informal on-site and on-street parking off-site) up to 2031 assuming no change in modal split. The increase in demand has been calculated using the % change in person-trips outlined in Table 3 and Table 4.

³⁰ Data provided by CBC

³¹ Table 4-3 in the Part 1 Report

Table 6 shows the growth as a percentage which assumes turnover rates stay constant, however as future patient and staff numbers grow at different rates, the overall turnover rate will likely change over time. The numbers within the table are considered to be approximations. The Part 3 Report will look at this in more detail and will include turnover rates which assesses staff and patients separately.

Table 6 - Car Parking Demand* and Supply up to 2031³²

Location	Baseline 2017	2022 Forecast	2031 Forecast
Formal Car Parking On-site ³³	4,451	5,564	7,255
Informal Parking On-site ³⁴	198 ³⁵	248	323
On Street Parking (Off-site)	1,106 ³⁶	1,383	1,803
Total Supply	4,950	5,922	8,621
% change in supply from baseline	-	20%	46%
Total Demand**	5,755	7,195	9,381
% change in demand from baseline	-	25%	30%
Capacity Demand / Supply***	116% (+805)	121% (+1273)	109% (+760)

*Formal and Informal Parking on-site baseline figures are based on occupancy surveys conducted in 2017. Highest occupancies used.

**Demand includes staff, patients and visitors.

***Values over 100% indicate parking supply deficits.

The total car parking demand for CBC in 2031 is predicted to be 9,381 spaces. Total parking supply on-site is likely to be 8,621 by 2025³⁷ with no confirmed growth in spaces beyond this level to 2031, leaving a demand for 760 spaces above the available on-site supply.

On-street parking controls proposed by the GCP City Access Strategy also have the potential to discourage parking in local residential areas, which in turn could increase parking pressure on-site or direct private vehicles either towards Park and Ride sites or other modes of travel.

Any public parking could also potentially be used by people accessing Cambridge South Station (if this were to come forward and if the location and pricing of parking at CBC were attractive to rail users). Any use of on-site parking facilities in this way would cause even greater over-demand for spaces, which would result in greater search-time for visitors searching for on-street parking or congestion from visitors waiting within the site for free spaces in the multi-storey car parks, could lead to the potential for greater levels of informal parking on-and-off-site and congestion.

Cycle Parking

Existing cycle parking is over-capacity, with a significant level of informal cycle parking taking place. By 2022, an additional 2,995³⁸ cycle parking spaces are proposed. These additional spaces will consist of planned growth to the existing sites and a further 1,200 new spaces coming forward as part of the AstraZeneca, Royal Papworth Hospital and Project Capella development sites.

³² Changes calculated in line with methodology presented in Section 2.1

³³ Formal spaces also include accessible bays and allocated pick-up/drop-off areas.

³⁴ Number of additional vehicles parked in car parks, where occupancy is over capacity. Assumed to be parked informally as space is not available for them to park. Informal parking is also considered to take into account pick-up/drop-off and illegal parking

³⁵ Part 1 Report Section 4.7.2

³⁶ Part 1 Report Section 4.7.2

³⁷ No further car parks are assumed to be constructed post-2025 therefore the 2025 scenario is the same as 2031. The Study uses 2025 as data has been available for this year.

³⁸ Information provided by CBC

Predicted occupancy for cycle parking by 2031 has been calculated by applying the growth from Table 3 to the 2017 observed levels. The resultant occupancy levels are presented in Table 7 alongside the level of cycle parking spaces.

Table 7 - Cycle Parking Demand and Supply³⁹

	Baseline 2017	2022 Forecast	2031 Forecast
Supply	2,973 ⁴⁰	5,968	5,968
% change in supply from baseline	-	101%	101%
Demand*	3,150 ⁴¹	3,900	5,100
% change in demand from baseline	-	25%	63%
Capacity Demand / Supply**	106% (-177)	65% (+2,068)	85% (+868)

*excluding informally parked cycles away from designated cycle parking locations

**Values over 100% indicate parking supply deficits. Values under 100% indicate spare supply capacity.

Demand in the short term will continue to outstrip supply, but the level of informal parking could reduce as the existing cycle parking facilities expand and the new facilities are constructed. This will only be the case should these facilities be in attractive locations for cyclists in relation to their destination and designed to accommodate likely demand at each destination.

Figure 9 - Cycle Parking Demand and Supply

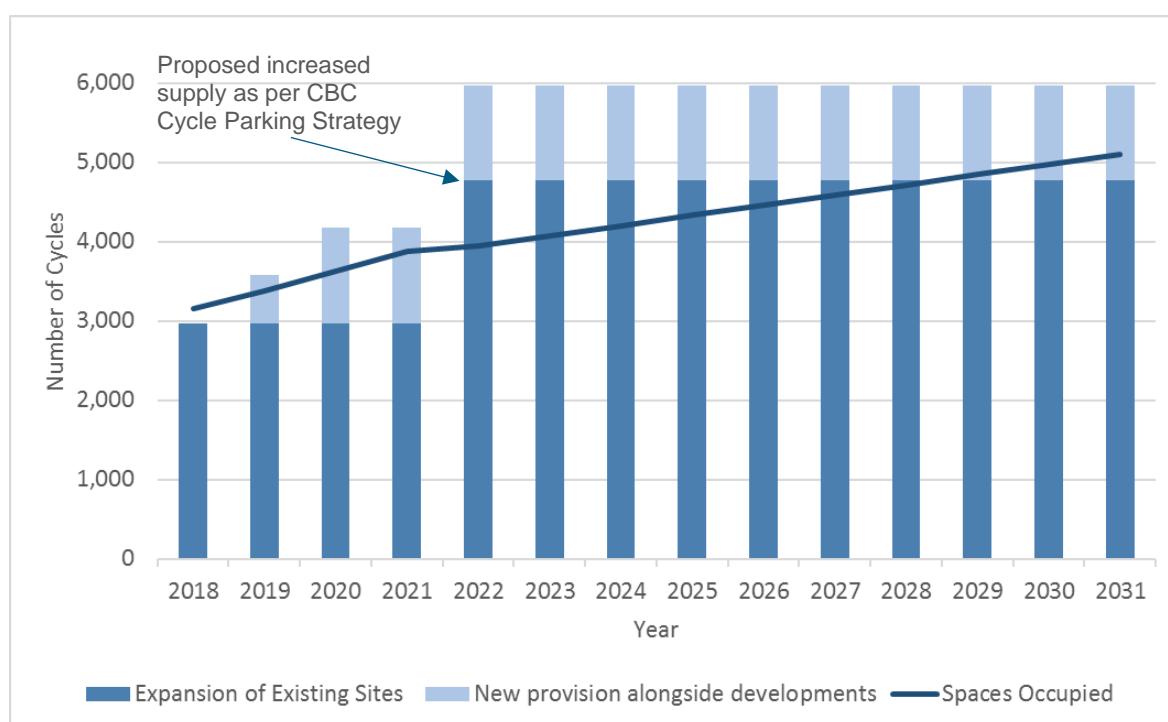


Figure 9 shows that currently more spaces are being occupied than provided, which means that bicycles are being parked in informal locations. Despite this, it is predicted that there will be a cycle parking surplus from 2019 due to the new cycle space provision as per the CBC Cycle Parking Strategy, alongside the proposed developments such as AstraZeneca and Royal Papworth

³⁹ Calculations based on existing supply and planned increases in supply as well as the demand scaling detailed in Section 2.1.

⁴⁰ Table 4-4 in Part 1 Report.

⁴¹ Part 1 Report Section 4.7.2

Hospital. Further increases are likely to come throughout 2022 (arrowed) and the two together will mean the surplus will continue through to at least 2031.

Should the new cycle space provision not come forward as planned, there will likely be a deficit until 2022 prior to the increase in supply as per the CBC Cycle Parking Strategy. This would provide a surplus until 2028-2029, beyond which there would be a deficit of spaces. This highlights the importance of securing the proposed new provision of cycle spaces alongside new developments.

3.2.2. Constraints To Be Addressed

Changes to parking demand and supply up to 2031 have highlighted the following potential issues:

- Proposed increased levels of car parking available on-site, which could encourage more trips by private car; and
- Potential need to actively manage the level and impacts of CBC staff parking on-street in surrounding areas, taking into account the on-site parking supply and the availability of sustainable modes as alternatives.

3.3. Walking and Cycling

Cycling currently makes up a considerable proportion of trips to CBC for staff (33%), with walking making up a much lower proportion (3%). With more than 50% of CBC staff residing in the built-up area of Cambridge, the promotion of walking and cycling access to the Campus is key to improving access to the site as a whole as well as discouraging the use of the private car and reducing pressure on car parking. Without intervention, additional trips by cycle would put capacity pressure on existing cycling infrastructure. This quality of this infrastructure has been highlighted in the Part 1 Report as being inconsistent within the CBC site.

3.3.1. Change From 2017

Table 4 shows an additional 3,021⁴² cycle trips and 2,380 pedestrian trips are predicted to access CBC across the day by 2031, compared to 2017 levels. Based on existing travel patterns, most of these trips are predicted to access the site from the CGB to the west of CBC, the Hills Road Roundabout, Red Cross Lane and accesses from Long Road. Trips mainly originate in the built-up area of the City and at Trumpington and Babraham Park and Ride sites.

Several GCP studies, detailed in Section 7.2 of the Part 1 Report, include walking and cycling infrastructure and capacity improvements that would help accommodate this level of growth. In particular, the Cambridge South East Transport Study and the Greenways Project, which are due to be completed by 2031, could involve cycle improvements into the site from the south east (Cambridge South East Transport Study) and the south and east (Greenways Project) which further encourages sustainable travel into the site.

3.3.2. Constraints To Be Addressed

Additional cycles on the network would increase the impacts of problems associated with inconsistent infrastructure and wayfinding, potentially including the risk of pedestrian and cycle conflicts. This emphasises the need for clear, formalised and dedicated signage which denotes the nature of the infrastructure, whether it be cycle only or shared with pedestrians. This is specifically the case within the Campus, where cyclists and pedestrians will be at their highest concentration and where footways, cycleways and wayfinding is inconsistent at present, as detailed within the Part 1 Report.

3.4. Public Transport

Changes to Public Transport supply can be hard to quantify. While there are several proposed infrastructure schemes that are in development, the performance and operational nature of these would be partly dependent on the services that private operators run on any such new infrastructure.

⁴² Two-Way Trips – an outbound and a return journey (either to CBC and back, or from CBC and back)

3.4.1. Change From 2017

Table 4 shows an additional 2,687 one-way person-trips by bus are predicted to access the site in 2031 compared to 2017.

Infrastructure Changes

As outlined in Section 2.2, several new Public Transport infrastructure schemes are proposed. Each of these could have direct influence on access to the CBC site. Those that could have the most direct impact on the CBC site would include:

- The Cambridge South East Transport Study, Phases 1 and 2;
- Expansion of Trumpington Park and Ride;
- A new Cambridge South West Park and Ride ;
- Cambridgeshire Autonomous Metro (CAM);
- Cambourne to Cambridge;
- The West of Cambridge Package; and
- Greenways - Linton, Sawston, Melbourn and Fulbourn Routes.

The Cambridge South East Transport Study and CAM proposals include direct links from the south east to the CBC site, targeting the cluster of employees, patients and visitors in the Haverhill corridor. This is a large market, so a frequent and reliable public transport service coupled with dedicated infrastructure has the potential to offer significant enhancements over the current provision.

The combination of the Cambourne to Cambridge and West of Cambridge Package schemes could have a similar potential impact to the west of the site. With the relocation of Royal Papworth Hospital to the CBC site and planned housing developments at Bourn Airfield and Cambourne West, this will be a key corridor in which to provide reliable Public Transport links.

A new Cambridge South West Park and Ride could also operate in connection with these schemes. For example, any West of Cambridge Package service could capture demand from the west and the M11 heading towards the site. This new site would provide significant increases to the parking capacity off-site from the west, which is currently under considerable capacity constraint, in terms of parking availability, which could deter potential users.

Park and Ride

Increases in highway demand of the scale shown in Table 4, coupled with a proposed new Cambridge South West Park and Ride, have the potential for significant impacts on the performance of that Junction, as well as any access to Park and Ride sites located off the junction.

Use of a new Cambridge South West Park and Ride may mean longer bus journey times to access CBC compared to access via the existing Trumpington Park and Ride site depending on the service patterns implemented. However, the car leg of the journey may be shorter, depending on the level of infrastructure and also highway network congestion. For example, if a Park and Ride service from a new Park and Ride site also calls at the existing Trumpington Park and Ride, this could lengthen journey times and discourage use of the new site for staff and visitors to CBC.

A new Cambridge South West Park and Ride could provide sufficient capacity to accommodate the parking deficit of 760 (as shown in Table 6 on the CBC site by 2031. This could require a considerable proportion of the Park and Ride spaces to be dedicated to users of CBC.

Given the potential increases in Park and Ride parking provision outlined in Section 2.2 it would be expected that there would be a commensurate increase in Park and Ride bus services to accommodate the additional demand.

An additional Park and Ride would also allow non-CBC users to use the service, which could have a further positive effect on congestion. This site would also serve other growth areas within Cambridge and surrounding areas and therefore.

Bus Services

Future changes to bus services (excluding Park and Ride services) are less easily defined due to them generally being privately operated. However, as identified in Part 1, additional bus routes are required to support sustainable travel to the Campus, alongside enhanced frequencies on existing routes to better serve the existing markets and to cater for growth through to 2031.

Bus Capacity on the CBC Site

Addenbrooke's Bus Station currently has capacity for four buses, plus others queuing behind. With the number of additional services likely to be required to serve the Campus as it expands, this level of capacity is likely to increasingly become a constraint.

To get to their ultimate destination, bus users are often required to walk a considerable distance, use the Campus Shuttle Bus or use an alternative bus service. Although CUH will continue to be a focus for travel, the eastern location of the Bus Station is less convenient for others whose ultimate destination lies elsewhere on the Campus, leading to significant walk times between the bus station and destination. Walking distances from the Addenbrooke's Bus Station to destinations at the west of the Campus, such as the MRC Laboratory of Molecular Biology, are up to 1km or 13 minutes' walk. Development on-site restricts space for a bus station elsewhere, particularly towards the west of the site. Some bus movements on Campus are also restricted, such as right turning is prohibited from Adrian Way onto Long Road.

A new link is being constructed that would allow services to continue eastwards from the CGB track passing between AstraZeneca North and Royal Papworth Hospital, to Robinson Way, then turn around in a short loop to the north of the Rosie Hospital.

With the provision of additional infrastructure such as a bus station, existing air quality concerns may be heightened although use of Euro VI standard buses, comprehensive management and monitoring may mitigate these concerns.

3.4.2. Constraints To Be Addressed

As the Campus grows and develops further, the western and southern areas of the site build out. This means that future bus routing will need to consider the locations of these new developments. However, there is a balance to be struck between desirable coverage and operating time and cost, particularly for the routes that currently run along Hills Road. The following constraints on access to the expanding Campus for buses have been identified:

- Encouraging use of a new Cambridge South West Park and Ride, in preference to driving closer to the site or using the existing Trumpington Park and Ride;
- Access to a new Cambridge South West Park and Ride for cars and buses, which could impact on the performance of M11 Junction 11.
- The position of the existing bus station is not easily accessible for services originating from the west or bus users working at the west of the site;
- The existing bus station is constrained in terms of access for additional services;
- East-west routing is convoluted and therefore leads to extended journey times and exposes buses to congestion within the site;
- Space for a bus interchange at the west of the site is limited; and
- The 'no-right-turn' restriction outbound on Adrian Way to Long Road restricts this route for buses intending to access the City Centre via Hills Road.

3.5. Key Constraints To Be Addressed

There are several existing and potential constraints that have been highlighted throughout Chapter 3 which will need to be addressed to help support the growth on-site through to 2031. These are summarised below and will be used to consider Potential Interventions to address the constraints in Section 4.2:

- A. Corridor capacity constraints on Babraham Road, Addenbrooke's Road and Hauxton Road leading back to M11 Junction 11;
- B. Congestion on-site causing delays for emergency vehicles;
- C. Congestion on-site causing delays at entrances and exits to car parks;
- D. Junction capacity constraints at Dame Mary Archer Way/Addenbrooke's Road/Francis Crick Avenue, Babraham Road/Hills Road/Fendon Road and Queen Edith's Way/Hills Road/Long Road;
- E. The impact of highway congestion on the efficiency and reliability of public transport;

- F. Constraints to economic growth due to congestion around CBC and the wider Cambridge region;
- G. Increased capacity constraints within on-site car parks and surrounding residential streets;
- H. Increasing levels of car parking proposed on-site may encourage more trips by private car;
- I. Encouraging use of a proposed new Cambridge South West Park and Ride instead of driving closer to the site or using the existing Trumpington Park and Ride will increase the parking opportunities within the local area and reduce highway trips accessing CBC.⁴³;
- J. Access to any new Cambridge South West Park and Ride for cars and buses and the potential impact of this on the performance of M11 Junction 11;
- K. The position of the existing Bus Station is not easily accessible for services originating from the west or bus users working at the west of the site;
- L. East-west bus routing is convoluted and therefore leads to extended journey times and exposes buses to congestion within the site;
- M. Space for a Bus Interchange at the west of the site is limited; and
- N. The 'no-right-turn restrictions' outbound on Adrian Way to Long Road restrict this route for buses intending to access the City Centre via Hills Road.

3.6. Summary

This Chapter shows that increases in transport demand between 2022 and 2031 across all modes are predicted to have a significant impact on the transport network accessing CBC. Although several enhancements to bus, walking and cycling infrastructure are proposed between 2022 and 2031, the timing of these improvements towards the end of this time period could mean that growth at CBC is likely to be biased towards highway travel in the intervening period. Any additional highway trips will impact upon existing high levels of congestion in the area. Once driving habits are instilled, it is difficult to reverse these behaviours and encourage people to make the change to a more sustainable mode. To instil sustainable travel habits from the start, sustainable transport infrastructure should be in place at the opening of key developments on the Campus.

⁴³ Drivers have a tendency to try to drive as close as possible to their final destination. Therefore, even with the addition of another Cambridge South West Park and Ride, people may have the tendency to want to continue to drive to CBC or to Trumpington Park and Ride. This could lead to further congestion closer to the site which could also have a negative impact on Park and Ride buses accessing the site.

4. Meeting the Transport Needs of CBC Without Cambridge South Station

This Chapter uses the constraints identified in Chapter 3 to identify the transport needs of CBC without the provision of Cambridge South Station. To achieve this, this Chapter considers:

- What are the transport needs of CBC?; and
- What are the Potential Interventions required to meet this need?

4.1. What Are The Transport Needs Of CBC?

As described in Section 1.4, the transport requirements of CBC are aligned to the following Targets:

- Target: Maintaining traffic at 2017 levels up to 2031; and
- Stretch Target: a 10% to 15% reduction in peak highway trips from 2011 levels, which is aligned with the Target of the GCP City Access Strategy.

To consider the Stretch Target, highway person trip levels accessing CBC have been estimated by the change in traffic volumes on Hauxton Road, Granhams Road, Babraham Road and Shelford Road⁴⁴ from 2011 to 2016 using annual traffic counts undertaken by CCC. This is shown in Table 8.

Table 8 - Change in Highway Traffic in the CBC Area, 2011 to 2016

	2011	2016	Growth Per Year
Babraham Road	13,113	14,086	1%
Granhams Road	2,942	3,369	3%
Shelford Road	9,691	10,145	1%
Hauxton Road	22,503	28,040	4%
Overall Change	48,249	55,640	2%

Figure 10 presents the predicted increase in person-trips on the highway network at CBC, combining the estimated 2011 levels with the growth to 2017 from Table 4. The 2011 traffic level is presented, with each subsequent bar showing the predicted increase in person-trips on the highway network to the relevant year. The 2017 level is represented by the 28,475 car person trips reported in Table 4.

The figures shown in Figure 10 assume:

- The growth in highway trips continues to increase without a cap, until 2031; and
- Patient numbers grow by 4% each year until 2031.

Daily figures have been used, as travel patterns to CBC are broader than a typical two-peak commuting profile. It is likely that in addition to the change required here, some peak spreading would occur during highest levels of traffic intensity.

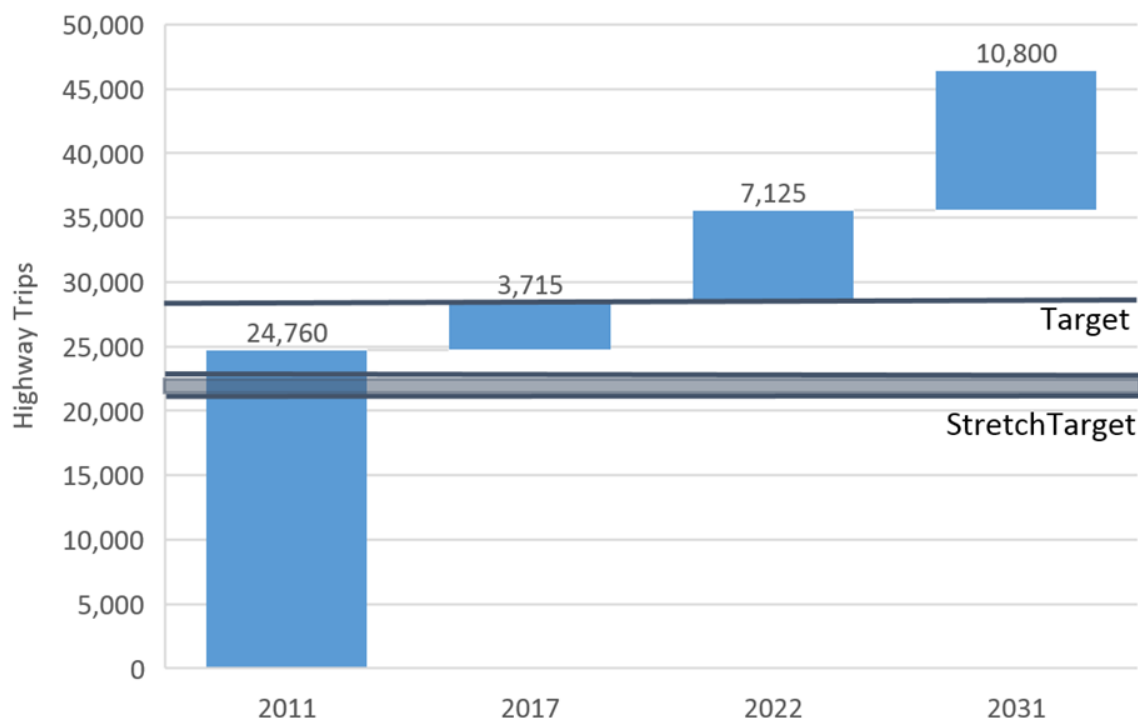
Figure 10 shows that there is significant growth in travel demand expected from 2011 up to 2031. To maintain traffic at 2017 levels up to 2031 to meet the Target, a reduction (compared to the do-minimum figures shown in Figure 10) of **17,925 one-way daily person-trips** will be required. To achieve a Stretch Target of a reduction to 10% below the 2011 traffic levels by 2031, a reduction of **24,116 one-way daily person-trips**, to 22,284 daily person trips, will be required. This reduction is a volume equivalent to 85% of the 2017 traffic levels accessing the site. To achieve a reduction to 15% below the 2011 traffic levels by 2031, a reduction of **25,354 one-way daily person-trips**, to

⁴⁴ Roads with available traffic data

21,046 daily person trips, will be required. This reduction is a volume equivalent to 89% of the existing 2017 traffic levels accessing the site.

It is important to recognise that although this level of reduction is significant, a lot of the growth included within the 2022 and 2031 scenarios is yet to happen. If actions are taken now to introduce Potential Interventions to mitigate traffic growth before it happens (i.e. to capture growth using sustainable modes), the 10%-15% Target for reduction could involve fewer established car trips than the figures shown in Figure 10.

Figure 10 - Forecast Change and Target Reduction in Daily Highway Person Trips



4.2. What Are The Potential Interventions Required?

Table 9 outlines the Potential Interventions that could be implemented to address the constraints identified in Section 3.5. These have been derived in line with the policy steer that any highway capacity released by transport enhancements should be used to improve the capacity and quality of sustainable modes.

Existing highway trips could be being made by people for whom it is not viable, or possible, to walk or cycle to CBC due to many factors, such as cycle availability, ability to walk/cycle, and distance to/from CBC. Therefore, maintaining access to the site by car for some people is vital. Specifically targeting pedestrian and cycle trips for intervention is not likely to lead to the step change required to meet the Target. The Potential Interventions listed in Table 9 are presented as to give most weight to interventions aimed at bus and Park and Ride improvements and Public Transport priority on the highway.

Many of the Potential Interventions shown in Table 9 have the same or similar dependencies which have been summarised below:

- **Planning Approval:** All Potential Interventions that seek to 'build something new'⁴⁵; make major changes to existing infrastructure or change the use of existing infrastructure will generally require planning permission; and
- **Project Funding:** All Potential Interventions will require funding to be implemented and maintained which can be obtained through various means but is not guaranteed. As such the suggested Potential Interventions are dependent on the level of funding that they may receive.

⁴⁵ <https://www.gov.uk/planning-permission-england-wales> [Accessed: 04.10.2018]

Table 9 - Potential Interventions for access to CBC without Cambridge South Station

Ref	Potential Intervention	Description	Benefit	Dependency
Potential Bus Interventions				
1	CBC Bus Strategy	A coordinated bus strategy for CBC developed by all stakeholders and bus operators.	Effective bus management, potentially including timetable coordination (through a Qualifying Agreement) where operators overlap, to encourage more use of bus to access the Campus.	Commercial buy-in from Bus Operators and/or suitable subsidies.
2	Season Ticket Loans for Staff	Providing a loan to employees to buy bus season tickets.	Encourage bus travel by making it a more financially attractive alternative to the private car.	Commercial buy-in from Bus Operators and/or suitable subsidies.
3	Subsidised Ticketing for Staff	A contribution toward bus tickets provided to staff.		
4	Free Bus Pass for New / Relocated Staff	New / relocated staff to receive free bus passes that cover the first month of their employment in order to instil positive travel habits from the outset.		
5	Inter-Operator Ticketing	Ability to buy tickets that are useable on all bus services. A detailed description of the potential application of Inter-Operator Ticketing can be found in Appendix B.	Allow bus users to be flexible with their journeys on all services.	Commercial buy-in from Bus Operators and/or suitable subsidies.
6	Bus Hub / Interchange at the West of CBC	A bus interchange located to the west of the site to be served by CGB buses, buses accessing the site via Addenbrooke's Road and Robinson Way.	Provide a coordinated approach to bus services to the West of the Site and provide an interchange point with other transport services. Reduction in walking distance to some destinations compared to the existing Bus Station.	Commercial buy-in from Bus Operators and/or suitable subsidies. Available land on Campus.
7	Reconfiguration of Addenbrooke's Bus Station	An opportunity to expand and rework the existing Addenbrooke's Bus Station, potentially by using the Car Park H land to the north of the existing site or Car Park A adjacent to the existing site.	Increased capacity of the existing bus station.	Available land on Campus.

Ref	Potential Intervention	Description	Benefit	Dependency
8	Permitted Right Turn for Buses and Cycles from Adrian Way	Allow all movements for buses and cycles at the Adrian Way junction with Long Road to enable different routing patterns.	More routing options and freedom for buses to exit via the north of the site instead of Hills Road Roundabout. Cyclists benefit in terms of journey times and routing.	This intervention may require signalisation of the junction. This would be subject to traffic modelling and junction design.
9	Bus service pattern Review to Accommodate Off-Peak Working Hours	Engagement with bus operators to provide off-peak hour services for employees of CBC whose shift pattern includes late or early working.	More travel options for those staff who start work before or finish after the regular bus services operate.	Commercial buy-in from Bus Operators and/or suitable subsidies.
10	Safer Routes to Bus Stops	Based on the outcomes of the pedestrian audit recommended in Part 1, provide suitable lighting and visibility at, and on routes to, bus stops.	Encouraging use of bus services by enhancing perceived safety of access and waiting facilities.	Suitable subsidies/funding.
11	Royston to Cambridge bus service redirected to CBC	Rerouting of the Stagecoach 26 service from Royston to Cambridge to call at CBC. Could involve routing via the CGB or via Addenbrooke's Road and Long Road.	Provide a viable bus service for those staff and visitors residing in Royston (significant cluster as shown in postcode mapping in Figure 5-3 of Part 1 Report) without need for a change at Trumpington Park and Ride. Could lead to a reduction in private vehicles on the road network which could have a positive impact on congestion and air quality.	Commercial buy-in from Bus Operator and/or suitable subsidies.
12	Bus Service from Papworth Everard and Cambourne	Providing a temporary bus service from / to Papworth Everard / Cambourne in advance of the West of Cambridge Package.	Beneficial for those travelling from the west, especially following the Royal Papworth Hospital relocation and considering housing developments at Cambourne West and Bourn Airfield. Could lead to a reduction in private vehicles on the road network which could have a positive impact on congestion and air quality.	Commercial buy-in from Bus Operators and/or suitable subsidies.
13	Additional Bus Priority on Addenbrooke's Road	Provide bus priority on Addenbrooke's Road, to provide segregated access to CBC.	Improved access for bus services along Addenbrooke's Road with potential positive impacts on reliability and journey times, especially during peak hours.	Available highway land on Addenbrooke's Road.

Ref	Potential Intervention	Description	Benefit	Dependency
14	Enhanced CGB Capacity	Provide increased capacity on the CGB to the east of Trumpington Park and Ride, which currently has a single track of approximately 700m.	Increase capacity and facilitate more services.	Technical solution to mitigate constraint imposed by single track section which cannot practically be double tracked in the conventional manner.
15	Bus Priority at Signals in Vicinity of CBC	Allow buses an extended green phase at traffic signals in the vicinity of the CBC site.	More reliability, improved timetable compliance and journey times.	Subject to traffic modelling.
16	Central Spine Road for Buses	Provision of a bus-only route through the centre of the Campus.	Improvements to east-west connectivity, reducing interaction with cars around the Campus and reducing journey times.	Available land on Campus (potentially dependent in turn on hospital redevelopment). Commercial buy-in from Bus Operators.
17	Demand Responsive Bus Service Around CBC Campus	Demand responsive bus service, which could be in the form of autonomous pods, around the CBC site. To be developed in accordance with CBC Bus Strategy.	Out-of-hours bus service to connect with existing transport infrastructure, which could make sustainable journeys viable for those staff who work early or late shifts.	Technology advances. Connections to onward sustainable infrastructure. Coordination with Trumpington Park and Ride autonomous pods trial.

Potential Park and Ride Interventions

18	Expanding Parking Capacity at Existing Park and Rides to Accommodate Growth	Provide additional parking capacity at Trumpington and Babraham Road Park and Ride sites, as well as at a new Cambridge South West Park and Ride to help manage demand for travel to the CBC site. Table 6 indicates a requirement for approximately 1,500 spaces for CBC users only.	Provide capacity to meet current demand as well as demand displaced by other initiatives related to parking and highway constraints. Could lead to a reduction in private vehicles on the road network close to CBC which could have a positive impact on congestion and air quality.	Dependent on GCP proposals for expansion of Trumpington Park and Ride and provision of a new Cambridge South West Park and Ride.
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Ref	Potential Intervention	Description	Benefit	Dependency
19	Direct Bus Service from a New Cambridge South West Park and Ride to CBC	Provide a direct bus service from a new Cambridge South West Park and Ride to CBC without calling at Trumpington Park and Ride, to encourage use of Cambridge South West Park and Ride.	Encourages use of Cambridge South West Park and Ride for CBC users and releases pressure on Trumpington Park and Ride and Hauxton Road. Could lead to a reduction in private vehicles on the road network close to CBC which could have a positive impact on congestion and air quality.	Dependent on GCP proposals for provision of a new Cambridge South West Park and Ride.
20	Extend Existing Patient Courtesy Bus to Babraham Park and Ride	Extension of the existing Patient Courtesy Bus to Babraham Park and Ride, to encourage use of this site by patients who would otherwise drive to CBC.	Makes Park and Ride a more viable alternative for those patients and other users of CBC for whom the door-to-door, more personal service is of particular value.	Viability to extend patient courtesy bus. May require a second bus in order to maintain frequency. Suitable subsidies/funding.
21	Service Directly from Milton, Newmarket and Madingley Park and Rides to Serve CBC ⁴⁶	Provide a direct bus service from other Park and Ride sites around the City to CBC.	As CBC becomes a destination for more and more trips from around Cambridge, increased demand for Park and Ride services from all sites could make CBC a viable destination. Encourages more use of public transport around the City.	Commercial buy-in from Bus Operators and/or suitable subsidies.
22	Park and Ride Capacity to the East	Provision of a Park and Ride and Park and Cycle to accommodate demand from the east. This could come in the form of the Park and Ride associated with the Cambridge South East Transport Study depending on exact location, which could provide some eastern Park and Ride Capacity.	Provides additional Park and Ride Capacity and offers a connection with the Fulbourn Greenway. A rural cycle hub in the form of a Park and Cycle could be provided for the Fulbourn Greenway in the interim. Could lead to a reduction in private vehicles on the road network close to CBC which could have a positive impact on congestion and air quality.	Dependent on land availability and commercial buy-in from Bus Operators and/or suitable subsidies.
23	Allocated Spaces at Park and Ride for CBC Staff	Allocated spaces for CBC staff and visitors at Park and Ride sites to encourage use by providing convenient and dedicated spaces to lessen the requirement for CBC staff to search for a space.	More use of Park and Ride sites leads to fewer vehicles on the highway network around CBC.	Agreement with CCC car park operators.

⁴⁶ Table 5-2 in the Part 1 Report shows that staff origins are evenly spread around the City but a large proportion of staff (48%) approach the site from the south west. Enhanced Park and Ride service provision could help disperse trips and lessen the impact on the highway network.

Ref	Potential Intervention	Description	Benefit	Dependency
24	Bus (or Autonomous Pods) to/from CBC/ Park and Rides Before and After Main Park and Ride Service Ends.	Engagement with bus operators to provide services to/from Park and Ride sites before and after the core City Centre service has finished, to accommodate early/late shift working. This could consist of a dedicated service (e.g. use of the patient shuttle bus when it is not in use) or an extension of existing services.	To make Park and Ride a viable alternative to the private car for those with variable shift patterns. Could lead to a reduction in private vehicles on the road network close to CBC which could have a positive impact on air quality.	Commercial buy-in from Bus Operators and/or suitable subsidies.
25	Priority Access for Buses to/from Cambridge South West Park and Ride	Bus priority measures into the new Park and Ride site, segregated from other Road users.	Segregated and reliable access to the site which could also be used by cyclists. This increases the opportunity for a Cambridge South West Park and Ride to be a viable Park and Cycle Option.	Dependent on GCP proposals for provision of a Cambridge South West Park and Ride.
26	Effective Access for Vehicles to/from South West Park and Ride	Explore potential for Park and Ride lane or segregated access from M11 Junction 11 for the proposed new Park and Ride. Real-time information about space availability at Trumpington Park and Ride and a new Cambridge South West Park and Ride, as well as journey time to Trumpington Park and Ride, could help manage demand.	Reduces the pressure on M11 Junction 11 roundabout and encourages use of the Park and Ride site. Manages demand between the two Park and Ride sites. Could lead to a reduction in private vehicles on the road network close to CBC which could have a positive impact on congestion and air quality.	Dependent on GCP proposals for provision of a Cambridge South West Park and Ride.

Ref	Potential Intervention	Description	Benefit	Dependency
27	Further restrictions on Car Access	Restrictions on the majority of vehicles entering the Campus, with exceptions for emergency vehicles, A&E and Rosie emergency access, blue badge holders, staff access required due to limited alternative options and specific site needs, servicing (off-peak), buses, taxis and perhaps some car sharers.	High positive impact on the road network, and air quality, within and around CBC with vehicles being encouraged to use Park and Ride sites as an alternative to driving to site.	Dependent on suitable alternatives for travel to the site – bus and Park and Ride initiatives especially. Any restriction will need to reflect and accommodate the 24/7/365 nature of many functions on CBC, and those staff and patients for whom alternatives are not available or suitable.

Potential Parking Interventions

28	Extension of the On-street Parking Controls	Extension of the on-street parking controls to streets surrounding CBC, focussing on the short-term management of on-street parking impacts and aligning the implementation of any further controls with the phasing of potential interventions over the medium to long term.	Benefits for residents in terms of parking capacity and congestion and air quality in residential areas. Encourage CBC users to park in designated car parks on-site or at Park and Ride sites. Safer and more pleasant walking and cycling in residential streets due to reduced traffic volumes, emissions and noise.	Dependent on suitable alternatives for travel to the site – bus initiatives and Park and Ride initiatives especially. This Potential Intervention is also subject to statutory public consultation process. Implementation should be aligned with other control initiatives such as Potential Intervention 31 (Restriction on Car Park Growth) to avoid parking issues elsewhere in order to holistically manage, delivery, impacts and benefits.
29	Bring Cycle Parking Expansion Forward	Implement planned cycle parking sooner than predicted to accommodate demand and encourage further use. This could also include provision and parking for hire or pool cycles and provision for charging electric cycles.	Ensure that supply meets demand and a surplus of spaces are available in appropriate locations to encourage further use and reduce the chance of users having to search for a space.	Dependent on proposals by CBC and other occupiers.

Ref	Potential Intervention	Description	Benefit	Dependency
30	Restrictions on Car Park Growth	Restrict the level of car park growth on-site. Consider whether those car parks planned/approved will be beneficial to the overall transport picture.	Discourages vehicle trips to the Campus and encourages use of sustainable modes and Park and Ride Sites. Reduced car trips to the Campus could have a positive impact on congestion and air quality in the area.	Dependent on suitable alternatives for travel to the site – bus and Park and Ride initiatives and capacity especially. Should be implemented with other control initiatives such as Potential Intervention 29 (Extension of the On-Street Parking Controls) to avoid parking issues elsewhere.
31	Needs Based Prioritisation of Parking Allocation	Allocation of parking on-site based on a hierarchy of need with priority given (as now) to patients and visitors followed by staff on a basis of need.	Discourages vehicle trips to the Campus and encourages use of sustainable modes and Park and Ride Sites. Reduced car trips to the Campus could have a positive impact on congestion and air quality in the area.	Dependent on suitable alternatives for travel to the site – bus and Park and Ride initiatives especially. Dependent on staffing to manage. Any restriction will need to reflect and accommodate the 24/7/365 nature of many functions on CBC, and those staff and patients for whom alternatives are not available or suitable.
Potential Peak Hour Spreading Interventions				
32	Review Staggering Shift Patterns of Workers	Varying the start and finish times of staff to stagger arrival and departure to CBC.	Distributes trips across the day and reduces the likelihood of the demand for the site peaking at the same time as the surrounding highway network.	Dependent on suitable alternatives for travel to the site outside of core hours – bus and Park and Ride initiatives especially.
33	Review Potential to Change Visiting Hours	Changing or staggering visiting hours so that the peak arrival and departure times do not coincide with the network peak hours.		Agreement with CBC and coordination between all wards on Campus.

Ref	Potential Intervention	Description	Benefit	Dependency
34	Restrict Non-Essential Deliveries During Peak Hours	Restrict all non-essential deliveries to arrive at CBC outside of the peak hours.		Coordination between all stakeholders on Campus as well as delivery companies.
Potential Cycling and Walking Interventions				
35	Local Connections to the West	Review and improvement of connections for pedestrians and cyclists to the west of the Campus via Alpha Terrace and Anstey Way towards Grantchester.	Cycle and pedestrian connections towards Grantchester and further afield towards West Cambridge.	Land availability, existing carriageway and footway widths.
36	Greenways Project Implementation and Connection with CBC	Creation of a link between the Fulbourn Greenway and CBC for those travelling from the east, routing via High Street, Queen Edith's Way, Nightingale Avenue and Red Cross Lane.	Enhanced cycle connections to the east of the Campus, particularly towards Cherry Hinton and Fulbourn.	Land availability, existing carriageway and footway widths.
37	Audit of Pedestrian and Cycle Routes and Connectivity Requirements within CBC	Audit of pedestrian and cycle wayfinding and infrastructure.	Lead to a strategy for improving the consistency, continuity and quality of these routes.	Identified and Active Transport Coordinators.
38	Segregated Cycle Routes On-site	Where possible, cycle routes should be segregated from traffic and pedestrians.	Reduce the risk of conflict between modes.	Land availability and existing footway and carriageway widths.
39	Monitoring the Cycle Demand on an Annual Basis	Annual monitoring of cycle parking capacity and condition, as well as an audit on cycle infrastructure and connections across the site.	To ensure that if there is a shortfall in supply or defects are highlighted, they can be rectified within an appropriate timescale. This information could be linked to larger monitoring systems and used in wider Cambridge studies.	Identified and Active Transport Coordinators.

Ref	Potential Intervention	Description	Benefit	Dependency
Potential 'Other' Interventions				
40	Consolidation of Non-Urgent / Time Sensitive Deliveries	Consolidation of deliveries at an off-site centre (perhaps at a Park and Ride site) to limit the number of delivery vehicles accessing the CBC site, and increase the use of off-peak hours for the final delivery leg to site.	Reduces the number of delivery vehicles accessing the site.	Dependent on buy-in from CBC occupiers on site and delivery contractors.
41	Integrated Online Journey Planning Tool	Creation of an online travel portal on CBC and CUH websites for use by staff, patients and visitors.	Increase knowledge of and confidence in the range of travel options available to staff and visitors of the Campus. Priority should be given to sustainable modes.	Coordination between all stakeholders on Campus – advertising through all organisations.
42	Personalised Travel Planning for Staff (and visitors if requested)	Personalised journey planning for site occupants / staff. Those that register for a personal travel plan could receive a free bus ticket or equivalent.	Increase knowledge of the range of travel options available to staff and visitors of the Campus. Priority should be given to sustainable modes.	Coordination between all stakeholders on Campus – advertising through all organisations.
43	Car Sharing Initiatives	Car sharing initiatives including guaranteed ride home (whereby car sharers are provided with a return journey in an emergency or unforeseen circumstance), dedicated or priority parking spaces and discounts on parking.	Reduce the number of single occupancy vehicles on the road network. Reduced car trips to the Campus could have a positive impact on air quality in the area.	Coordination between all stakeholders on Campus to provide consistent benefits and guaranteed ride home for all employees irrespective of employer.
44	Staff Car Share Database	Dedicated CBC Staff Car Share Database that is coordinated between all Campus Stakeholders. Each organisation currently offers their own closed system, which limits the effectiveness of the scheme.	Encourage car sharing and increased likelihood of a suitable journey match.	Agreement between stakeholders regarding parking arrangements and charges for car sharers from different organisations.

Ref	Potential Intervention	Description	Benefit	Dependency
45	Pool Cars/Car Club	A car club or pool cars for use by staff travelling for work or as a guaranteed ride home.	Reduce the need for those who travel for work to use their own vehicle to access CBC. Provide alternative means of travel for staff who cycle, walk or use the bus, for emergencies or occasions when a car is needed. Reduced car trips to the Campus could have a positive impact on congestion and air quality in the area.	Coordination between all stakeholders on Campus to provide consistent services and access to cars.
46	Travel Advice Centre	Creation of a Travel Advice Centre at CBC for staff and visitors. To provide marketing information, timetables, advice etc.	Increase knowledge of the range of travel options available to staff and visitors of the Campus.	Land availability on-site, or willingness of existing organisation(s) to dedicate space within existing buildings, efficient advertising for staff, patients and visitors. Staffing at appropriate times to capture demand.
47	Encourage Home-Working	Encourage and enable employees to work from home if possible.	Reduces the number of trips on the transport network. Reduced car trips to the Campus could have a positive impact on congestion and air quality in the area.	Buy-in from CBC stakeholders and employers for whom working at home is a viable option.

4.2.1. Interventions Not Considered Further

In addition to the interventions listed in Table 9, some interventions were considered, but not taken forward. These Potential Interventions and the reasons for not being considered further are outlined in Table 10.

Table 10 - Potential Interventions Not Considered Further

Potential Intervention	Description	Reason for Not Considering Further
Provision of a Large Car Park and Dedicated Access Road to Accommodate Highway Growth to and from CBC	It is predicted that there could be approximately 20,100 additional highway trips to CBC between 2011 and 2031. Providing spaces for the additional trips could reduce congestion on the local highway network if access was unrestricted. A dedicated entrance to a large car park could be located south of the site to take trips away from the City Centre.	This Potential Intervention goes against policy and would not decrease daily person trips on the highway network, but facilitate, and potentially encourage, additional trips into the site. The required land is unlikely to be available near CBC.
Autonomous Metro for CBC	A Mass-Rapid-Transit system that connects CBC to key areas within the City including West Cambridge, Cambridge Science Park, Cambridge East and key housing developments.	The CAM Study is currently in early feasibility stages therefore may provide such a system. CBC would likely serve as a stop within a Mass-Rapid-Transit system but will not be provided specifically for the site itself. If CAM was to not proceed, CBC may want to consider similar options but on a smaller scale.
Car-free Campus	A total ban on cars entering the Campus.	This would have the greatest impact on reducing highway trips into the site. However, would not be appropriate as this would restrict options for patients accessing the site. This Potential Intervention would also require bus and rail services to be available at all times including throughout the night, weekend and public holidays as these would be the only routes into CBC.
Site-Specific Workplace Parking Levy	A charge on CBC employers who provide parking on-site – employers choose whether to pass this charge onto their employees	Any such demand management measures are best considered as part of a wider holistic approach.

4.3. Summary

In combination, the Potential Interventions summarised in Table 9 could promote sustainable forms of transport and discourage car use, to achieve a reduction in daily highway trips. The level of parking availability is also a major factor in the level of highway trips to and from CBC and could form a part of a potential demand management intervention to further abstract highway trips to other modes. The impact of Potential Interventions will be considered further in the Part 3 Report.

5. Cambridge South Station

5.1. What Is The Strategic Fit Of The Station?

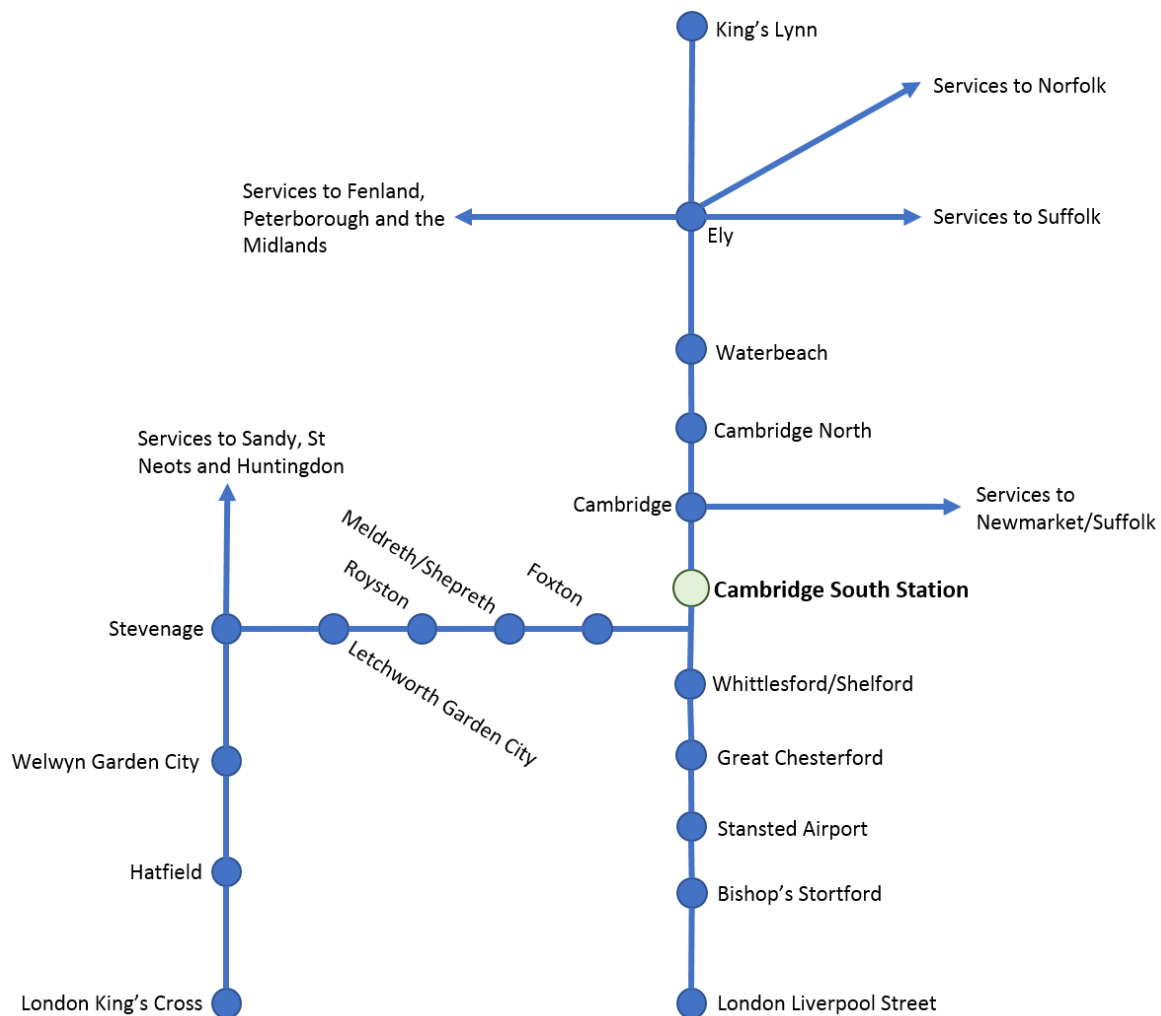
Rail access to CBC is currently limited. Passengers must travel to Cambridge Station and switch to alternative modes for the final leg of their journey. This can take between 9 and 17 minutes by bus⁴⁷, around 30 minutes on foot, 15 minutes by cycle or 10 minutes by taxi. The current Local Transport Plan and other policy documents have identified the potential for a Station at CBC to improve access, encourage modal shift and support economic growth. In 2017 the Government announced funding to support development of proposals for this Station, known as Cambridge South, with matched funding from local and private sector partners.

The Station would be located to the west of CBC. In rail network terms, this is between Cambridge Station and Shepreth Branch Junction (near Great Shelford) where the lines towards Royston or Great Chesterford split. This means it has the potential for a range of services, including routes to London King's Cross, London Liverpool Street, Stansted Airport, King's Lynn, Norwich and Birmingham. The Station design is under consideration, but work undertaken by Network Rail has indicated that a four-platform Station would be required to meet future timetable requirements.

At present Cambridge is served by a mixture of fast and stopping services to London (King's Cross and Liverpool Street), King's Lynn, Norwich and CrossCountry services to Stansted and Birmingham. Over the coming years, service levels will be enhanced through the completion of the Thameslink project. This will see peak period London services increase from 4 trains per hour (tph) to 6tph, including direct connections to alternative London stations and through to South East destinations. Thameslink also brings higher capacity rolling stock, while Greater Anglia are committed to replace their current commuter stock from 2019 onwards. All of this will provide enhanced capacity and alleviate crowding levels on key commuter routes. Figure 11 shows the strategic fit of Cambridge South Station on the existing rail network and highlights the range of destinations potentially accessible depending on calling patterns and connections.

⁴⁷ Table 4-2 in the Part 1 Report

Figure 11 - Strategic Fit of Cambridge South Station on Existing Rail Network⁴⁸



A Rail Station at CBC would be a step change in the mode choice available to patients, visitors and employees when travelling to and from the site and is part of the wider rail enhancements underway and proposed in the Cambridge area.

In the longer-term, plans for East West Rail would also see a notable change in rail connectivity options from Cambridge and a potential Cambridge South Station, providing direct links to locations such as Bedford and Oxford. The Station design should bear this in mind and have the flexibility to build on the service opportunities East West Rail brings as the scheme develops.

Direct access to a range of potential routes on the rail network would allow a Rail Station at CBC to provide a competitive travel choice that could generate significant passenger growth and mode shift for travel to and from CBC. The ability to serve the CBC market will reflect the rail network itself and its competitive position against other modes, which is reflected in the origin of passengers forecast to use Cambridge South Station.

5.2. What Impact Could A Station Have On The CBC Transport Network?

Cambridge South Station could have a range of impacts across the wider transport network. These fall into three main categories:

1. Abstraction of highway trips to and from CBC that would use rail to travel to CBC in the future;

⁴⁸ Note: Only selected stations have been included within this figure.

2. Abstraction of rail demand from alternative stations, which will impact the wider transport networks surrounding CBC through:
 - Reduced congestion on other sections of the highway network, as less people drive into Cambridge for rail access at Cambridge Station;
 - Reduced use of guided bus links between Cambridge Station and the CBC site; and
 - Reduced taxi trips between CBC and Cambridge Station.
3. Generation of new rail trips (those in the future travelling to and from Cambridge South Station, adding trips to the local networks). This can have a range of possible impacts including:
 - Additional drop off and pick up movements at or near the Station;
 - Additional public transport use for local access legs;
 - Additional walking and cycling trips for local access legs; and
 - Increased demand for cycle and motor vehicle parking at the Station, on-street or in existing CUH patient and visitor parking⁴⁹.

The impact of Cambridge South Station in terms of demand forecasting of rail trips to CBC and the impact of additional versus abstracted highway trips will be presented in Part 3.

As the list of impacts above indicates Cambridge South Station may lead to additional trips from other stations particularly by CBC staff commuting between their local station and Cambridge South Station. The impacts on access to these local stations including potential additional car parking demand will need to be considered.

5.3. What Else Is Needed For The Station?

Providing efficient and sustainable access to the Station is vital in contributing to its success. Stations cannot be considered in isolation; the rail leg of a journey is almost always accompanied by a journey by another mode at the start, end or both. Therefore, effective access to and from the Station is vital in encouraging use.

This Section of the Report identifies site-specific requirements to support local access to the Station. As it is an indicative summary of those requirements, it does not cover general design standards or good practice, such as information provision or the design of cycle parking facilities. This would be addressed during future stages of Station development. These are beyond the scope of this Study; however, such standards and good practice should be considered as part of the Station development and specification process. For ease of reference, Table 11 summarises the key sources of these.

⁴⁹ Unlikely at CBC as there is a lack of parking available.

Table 11 - Sources for Station Access Design Standards and Good Practice**

*	Better Rail stations (Green and Hall, 2009)
*	Guidance on the Implementation of Station Travel Plans (ATOC (predecessor of the Rail Delivery Group) and RSSB)
*	Guidelines for Development Management for stations (Rail Delivery Group)
*	Investment in Stations Guide (Network Rail)
*	Cycle Rail Toolkit 2 (Rail Delivery Group)
*	Sustrans Design Manual: Chapter 9 Cycle and Rail Integration (December 2014 draft)
*	Motorcycle Parking at Rail Stations Guide (Rail Delivery Group)
	Design Standards for Accessible Railway Stations (code of practice), which also incorporates or refers to certain national and European standards and other guidance
	The Rail Delivery Group's Vision for Stations, particularly principle 3 "Seamless journey experience"
	Fixing the Link: Making Good the Walking Route from Station to Town Centre (Abellio and Campaign for Better Transport, 2013)
	Network Rail standards and guidance
	Rail Industry Standards (RISs)
	Non-rail-specific local and national design standards, such as Local Plan standards and the Cambridge Cycle Parking Guide (Camcycle, 2008)

* Denotes documents which include significant guidance on Potential Interventions to consider in support of local access to stations; this has been taken into account for identifying the interventions listed in this Report.

**The Rail Delivery Group's *Cycle-Rail Station Parking Prediction Tool* is not in the list as it is designed for existing stations, not new stations, and hence is not appropriate for this Study.

Using the Guidance Documents listed in Table 11 and the work conducted so far on access to CBC, infrastructure required to assist the delivery of the Station has been considered.

5.3.1. Pedestrian and Cycle Desire Lines and Access Routes

Providing high quality access routes along the key desire lines to the Station will be critical in maximising the use of the Station and its facilities. Pedestrians and cyclists to/from the Station will originate from, or travel to, a wide range of directions:

- The north east – e.g. AstraZeneca, MRC Laboratory of Molecular Biology and Long Road Sixth Form college;
- The east, via The Green and the Gardens development – particularly hospital staff and patients, but also others such as residents living east of Hills Road and users of the University sites;
- The south east – e.g. Abcam and proposed Phase 2 development sites;
- The south, via the Shelford Cycleway – e.g. Great Shelford residents requiring trains to/from the King's Cross route;
- The south west, via Addenbrooke's Road and/or Hobson's park – e.g. Trumpington residents; and
- The west and north west, via the CGB and/or Hobson's Park – e.g. Clay Farm residents or other Trumpington residents.

This range of directions suggests that step-free entrances should be provided at both the north and the south ends of the Station for optimum access (Figure 12). These entrances are both likely to primarily face east towards Francis Crick Avenue, but ideally should include direct access from the CGB and Addenbrooke's Road (items 2 and 5 on Figure 12) to minimise doubling-back.

Other elements that should be considered for pedestrian and cycle accessibility are:

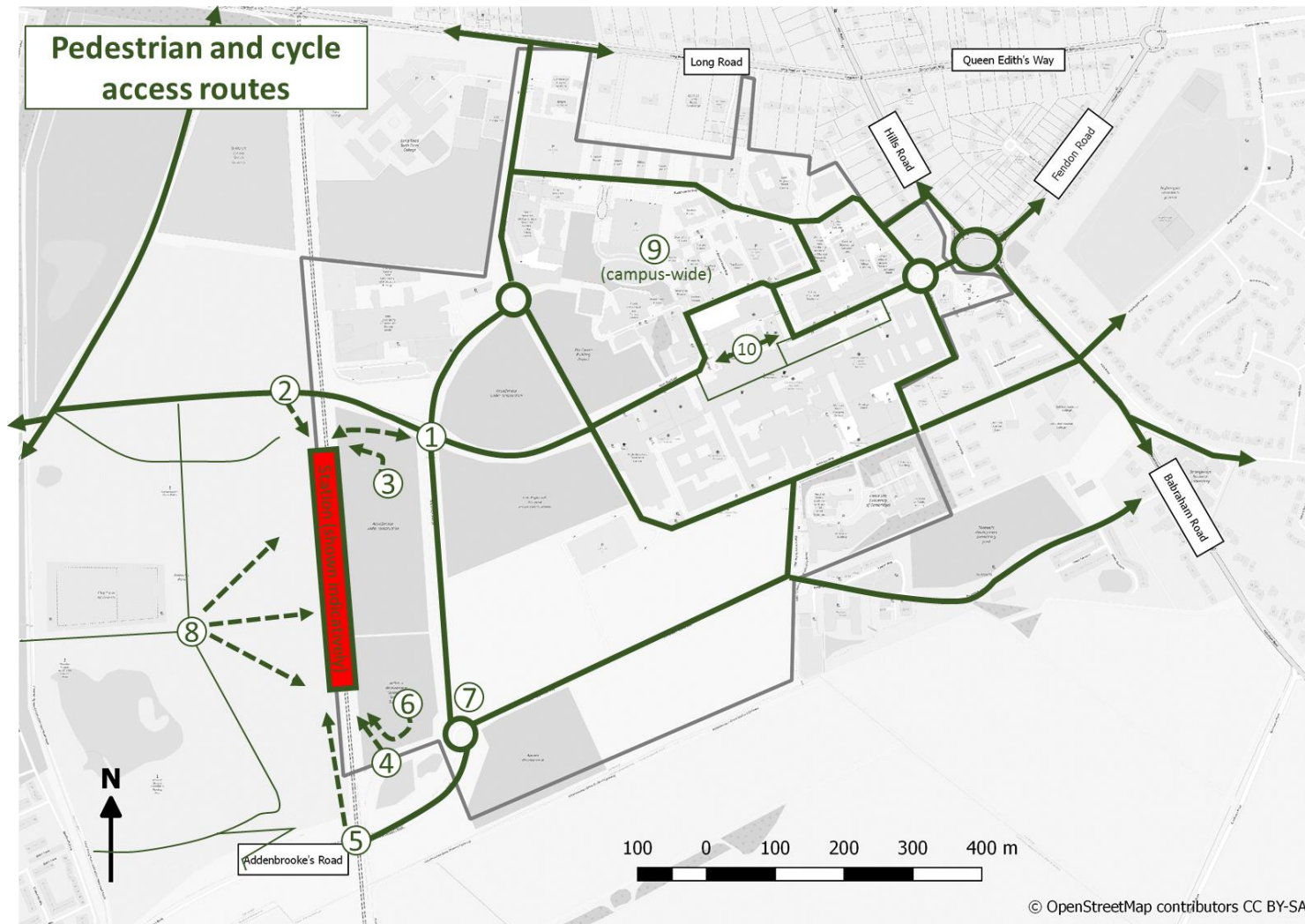
- Access for mobility impaired users (of particular importance given the site location);

- Crossing/pedestrian/cycle facilities on new desire lines and at any new junctions on these routes;
- Wayfinding for new desire lines to ensure clear direction to the new Station; and
- Connectivity to key locations within CBC.

These should be addressed as part of the CBC site pedestrian/cycle facility audit proposed in the Part 1 Report.

The new rail trips to/from Cambridge South will also increase the footfall at stations at the other end of the journey. The level and significance of this will need to be reviewed for each station and any necessary access or facility improvements at those stations identified. This is beyond the scope of this Study.

Figure 12 - Potential Pedestrian and Cycle Access Routes to/from the proposed Cambridge South Station*



*See next page for legend.

1	Step-free, cycle-friendly entrance serving pedestrian and cycle access routes to/from the north, west and east, including north/central parts of CBC; also serving bus stops in this location. High-quality 'gateway' approach to urban realm. Review highway junction layout in light of consequential pedestrian and cycle use.
2	Desirable direct access to/from guided busway bridge
3	Desirable direct access between entrance and adjacent site
4	Step-free, cycle-friendly entrance serving pedestrian and cycle access routes to/from the south, south-west and south-east, including southern parts of CBC; also serving bus stops in this location
5	Desirable direct access to/from Addenbrooke's Road bridge
6	Desirable direct access between entrance and adjacent site
7	Review Addenbrooke's Road roundabout in light of consequential pedestrian and cycle use
8	Desirable access to/from new developments via park (potential options shown)
9	Campus-wide enhancements to existing footways and cycle routes, as identified by audit
10	Future direct pedestrian/cycle link through heart of CBC (to be progressed through campus masterplanning)
<i>Lines and locations are diagrammatic and do not represent an exact alignment</i>	

5.3.2. Bus Service Access

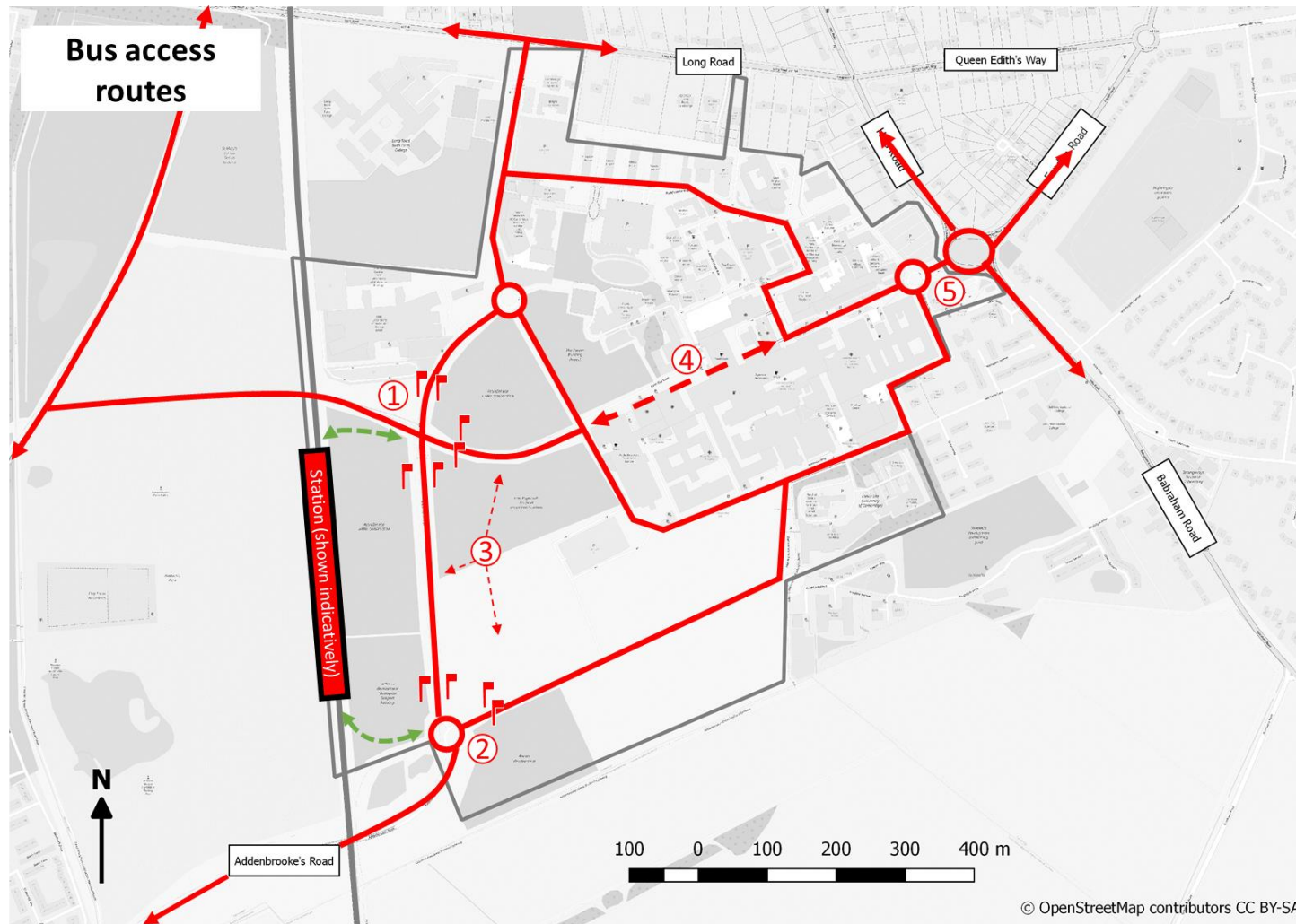
Bus services will need to reflect both the need for access to the new Station and the gradual building-out of the western and southern areas of CBC. The current focus on serving the eastern and central parts of the site will be widened, with broader coverage needed – potentially including a bus spine through the centre of the Campus. However, there is a balance to be struck between desirable coverage and operating efficiency, particularly for the routes that currently run along Hills Road.

To maximise the potential bus access:

- Current and future routes that run through, or in a loop around, CBC should be offered stops near the new Station. Their exact routing through CBC may change as the Campus develops. Provision for future stop locations as well as those required during the opening year of the Station should be considered. The Station is likely to require two clusters of bus stops (or locations reserved for future bus stops) on or near Francis Crick Avenue near the suggested northern and southern entrances;
- Routes that arrive at CBC from the east and terminate at the existing bus station should be offered the facility to continue through CBC to a terminating point serving Cambridge South Station (including set-down stops, a layover point and pick-up stops). The location, layout and capacity of this terminating point will require further consideration of options, including on-street provision on Francis Crick Avenue, use of The Green and the Gardens, or potentially an off-street location; and
- Taking these two requirements together, Cambridge South Station will have the potential to serve as a bus-to-bus interchange in addition to its other roles. The stops and pedestrian connections between them should be laid out with this interchange role in mind. This does not imply a formal 'bus station' at Cambridge South and there will be a continuing need for a bus station at the eastern end of CBC (see Table 9 earlier in this Report).

Figure 13 outlines the key access routes for buses serving the new Station, and the access requirements listed above. Exact locations will require further assessment considering road layouts and safety aspects.

Figure 13 - Potential Bus Service Access Routes to/from a Proposed Cambridge South Station*



*See next page for legend.

1	Bus interchange serving station north entrance (and nearby developments). Stops available to serve all potential routes through this location (not all stops will necessarily be required, depending on service patterns)
2	Bus interchange serving station south entrance (and nearby developments). Stops available to serve all potential routes through this location (not all stops will necessarily be required, depending on service patterns)
3	Layover area for buses terminating at Cambridge South Station. Potentially on-street or off-street Exact location and scale to be determined by further study.
4	Review potential for a bus spine through the heart of CBC, as part of campus masterplanning
5	Continuing requirement for a bus station at eastern side of campus. Review size and other operational requirements. Improve interchange with 'loop' routes. <i>Stop locations etc are diagrammatic and do not represent an exact position</i>

5.3.3. Station Facilities For Cyclists

Cyclists using the proposed Station will travel to the Station using:

- A full-size or folding cycle and carry it on the train;
- A hire service; or
- Park a cycle at the Station (typically, during the day for origin trips or overnight for destination trips).

Each of these is considered in turn, followed by discussion of a Cycle Hub which is relevant to all three categories.

Carrying Cycles On Trains

Experience at Cambridge's existing stations suggests that a relatively high proportion of passengers will want to take cycles onto trains. This includes peak periods, since even for full-size cycles, restrictions put in place by the train operator may apply to certain trains and locations. Station layout and design will need to take account of these high numbers, potentially going beyond standard design guidance. Specific design requirements are beyond the scope of this Report, but will need to consider the following:

- Number of wide-aisle ticket gates;
- Size and number of lifts; and
- Number and design of wheeling channels on steps.

Practical experience from Cambridge and Cambridge North should be gathered and reflected at Cambridge South.

Cycle Hire

Cycles for hire are currently in operation within CBC and are widely used in Cambridge. The Station should have a prominent designated area for these cycles, so that they are visible and ready to use to discourage parking at inappropriate locations.

The proposed Cycle Hub, described below, should also offer cycle hire.

Cycle Parking

Cycle parking facilities should be located close to the Station entrance(s), monitored by CCTV and should be overlooked where possible to improve the perception of safety and security around the Station.

Cycle parking should include provision for non-standard (often larger) cycles, particularly those used by families (particularly common in Cambridge) or by disabled cyclists.

Cycle Hub

One way to highlight the centralised facilities would be to provide and market a Cycle Hub format, which acts as a 'one stop shop' for cyclists using the Station. The level of facilities can vary. The Rail Delivery Group's guidance (*Cycle Rail Toolkit 2*) gives a five-star scale for cycle parking. The five-star level includes (as a minimum):

- Dedicated supervision of parked cycles;
- Cycle repairs;
- Sale of parts;
- Cycle hire;
- Free use of a tyre pump;
- Train departure information screens;
- Other added-value services such as changing facilities and lockers (optional); and

All of these should be located within the Station boundary and preferably in a single facility. This five-star level would be a reasonable aspiration for Cambridge South Station, due to:

- The high cycle mode share for staff at CBC and in Cambridge more generally;
- The level of patronage forecast for Cambridge South;
- The Station's role as a key gateway to a high-value, high-profile economic cluster; and

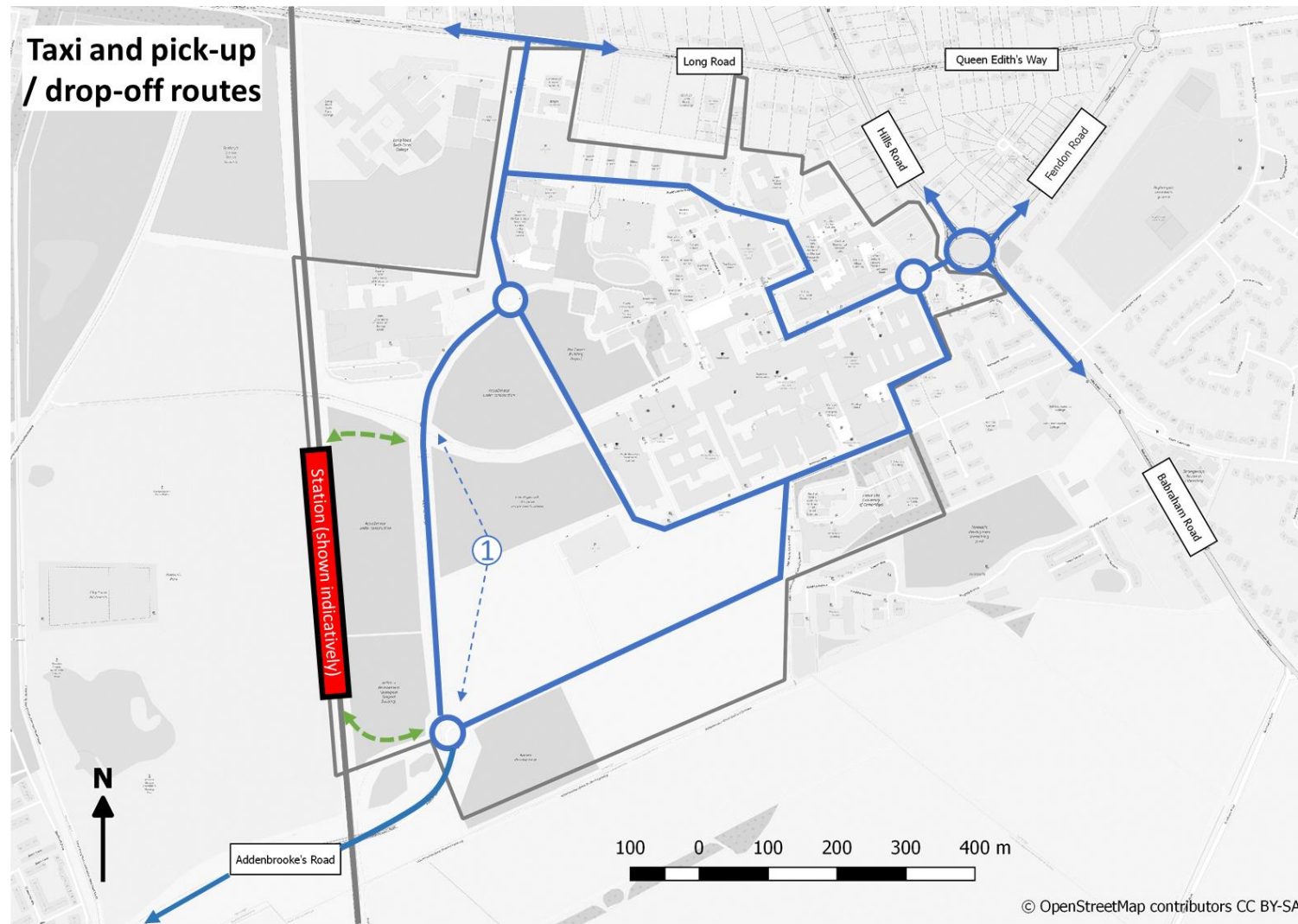
- The experience gained from the CyclePoint cycle hub at Cambridge Station.

The Station cycle hub would not necessarily replace, and indeed could have links with, the existing CBC cycle hub on Richard Howe Way (north of Addenbrooke's Hospital). The facility at the Station would be focused on rail passengers cycling to or from the Station, whilst also providing an additional service for the western part of CBC.

5.3.4. Other Highway Access

No car parking will be provided at the proposed Station. The Station would still need to accommodate pick-up and drop-off by car, a taxi rank and accessible parking spaces in line with local policy for access for those whom it is not feasible to use sustainable modes e.g. disabled users or users with luggage. The location and scale of these would need to be developed through the Station design and planning process. However, they are likely to make use of Francis Crick Avenue as the closest highway access. For other passengers who need to start or finish their journey by car, Car Clubs are one way to enable them to make part of the journey by rail, therefore potentially to reducing overall car usage on the highway network. Car Club spaces should therefore be considered at the Station. The vehicles would desirably be electric to reduce emissions on site. There is an active Car Club operator in Cambridge, and other operators could also be present at the Station.

Figure 14 - Potential Taxi Rank and Drop-off/Pick-up Locations and Routes to/from a Proposed Cambridge South Station*



*See next page for legend.

- | | |
|---|---|
| 1 | Taxi rank and pick/up drop-off zone(s) required. Location requires further study, but should be close to at least one of the station entrances. Size to be determined through further study but is likely to be constrained by land availability. |
|---|---|

<i>Lines and locations are diagrammatic and do not represent an exact position</i>	
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5.3.5. Access and Provision Summary

Table 12 summarises the suggested elements of local access to a new Station within CBC. It should be noted that this Study has not considered the location of Station facilities in detail but has assumed they would be primarily on the eastern side of the track. Elements identified are not exhaustive but represent considerations for future station masterplanning, modelling and funding.

Table 12 - Station Access and Provision

Provision	Description	Benefits
Key Access Routes and Desire Lines	<p>Step-free entrances at the north (near the Francis Crick Avenue / CGB / The Green and the Gardens junction) and south (near Addenbrooke's Roundabout).</p> <p>Access to/from these primarily facing towards Francis Crick Avenue, but ideally with additional direct access from the CGB and Addenbrooke's Road.</p> <p>Address crossing/pedestrian/cycle facilities, wayfinding and connectivity to key locations within CBC, as part of the CBC site pedestrian/cycle facility audit proposed in the Part 1 Report.</p>	Supports and prioritises walking and cycling, in turn minimising car use.
Review of Access to Key Origin Stations	<p>Review the footfall impact at stations at the other end of the journey, to identify any necessary access or facility improvements identified. Key locations with potentially significant trip volumes which might include a Park and Ride role include:</p> <ul style="list-style-type: none"> • Foxton and Royston; and • Waterbeach, Ely and stations to King's Lynn. <p>The review should consider station facilities including:</p> <ul style="list-style-type: none"> • Car and cycle parking; • Walking and cycling routes close to the station; and • Bus access to maximise the connectivity offered. 	<p>Encourages rail access to CBC. Potential to benefit other users at the relevant stations.</p> <p>This Study could incur wider economic benefits as other users at the potentially improved stations would benefit.</p>
Step-free Access and Accessible Routes	<p>The Station itself will be designed with step-free access in accordance with legal and rail-industry requirements. To maximise step-free local access:</p> <ul style="list-style-type: none"> • Both north and south entrances should be accessible routes; and • The extent of accessible routes throughout CBC, particularly routes between the Station and key destinations, should be reviewed as part of the pedestrian/cycle facility audit proposed in the Part 1 Report. 	Step-free access would promote non-car modes throughout the CBC site and to access the proposed Station.
Wayfinding from Key Access Routes	<p>Wayfinding totems should be placed throughout CBC, showing (in addition to any other wayfinding information) routes and walking times to the Station. These should also show live train departure information, as a user convenience and to further highlight the presence of the Station and the connectivity it offers. Other wayfinding options such as app-based information should also be considered as part of a holistic approach integrated with wider Cambridge wayfinding.</p>	Improved rail journey planning, attractiveness and visibility.

Provision	Description	Benefits
High Quality Street Infrastructure	<p>The location and design of pedestrian crossings on Francis Crick Avenue should be reviewed alongside the Station entrance locations to prioritise walking and cycling. These should connect with the step-free access.</p> <p>Urban realm approaches such as raised tables should be considered to support pedestrian and cycle access, providing traffic calming (subject to operational requirements for emergency vehicles and buses) and enhancing the sense of place around the Station.</p> <p>Footways around the site, especially within the vicinity of the proposed Station should be above the desired 2.5m width.</p> <p>Street and footway lighting should be reviewed to identify potential enhancements required for perceived security or due to increased usage.</p> <p>Address any condition or layout issues identified in the CBC site pedestrian/cycle facility audit proposed in the Part 1 Report.</p> <p>Consider the opportunity for a particularly high-quality, 'gateway' treatment of the Station access route linking the north entrance to The Green and the Gardens area.</p>	Encourages sustainable modes through improved safety, journey quality and perceived security.
Cycle Parking	<p>Cycle Parking should include provision for larger cycles used by families (particularly common in Cambridge) and disabled cyclists.</p> <p>Cycle parking facilities should be monitored by CCTV and should be open where possible to improve the perception of safety around the Station.</p> <p>Cycle parking facilities should take into account the existing CBC Cycle Parking Standards.</p> <p>Total cycle parking provision should be sufficient to cope with expected demand.</p>	Encourages cycling through providing sufficient and suitable spaces for a wide range of potential cyclists.
Train/Cycle Interaction	A relatively high proportion of passengers take cycles onto trains. The Station layout and design will need to take account of this and practical experience from Cambridge and Cambridge North Stations.	Further encouragement for mode-shift to cycling, benefiting both CBC and the other end of the journey.
Cycle Facilities within a Cycle Hub	A Cycle Hub at the Station, of a 'five-star' level as defined in the Rail Delivery Group's <i>Cycle Rail Toolkit 2</i> .	Further encouragement for mode-shift to cycling.
Cycle Hire	Hireable cycles are currently in operation within CBC and are widely used. The Station should have a designated location for these and similar operators' cycles. This is in addition to the cycle hire available at the Cycle Hub.	Further encouragement for mode-shift to cycling. Facilitates cycling by non-cycle owners and those who wish to vary their mode of travel.

Provision	Description	Benefits
Re-routing of Existing Bus Services	<p>Potential bus services that could serve the Station (in all cases, subject to operational feasibility) are the following:</p> <p><i>Potential to terminate at Cambridge South Station, requiring bus stops and a layover facility (see Figure 13):</i></p> <ul style="list-style-type: none"> Citi 2 and 114 – to create links from south-east and eastern Cambridge. These would be extended from the existing bus station to terminate at Cambridge South Station. <p><i>Potential to pass Cambridge South Station, requiring bus stops (see Figure 13):</i></p> <ul style="list-style-type: none"> Citi 1 – to provide links from south-east Cambridge, Cherry Hinton and Fulbourn, including Peterhouse Technology Park and Capital Park, although this would require significant additional mileage and increase journey times for other passengers; 13 and 31 – to create links from Babraham and Haverhill (including the Babraham Institute and Granta Park), although this would require significant additional mileage and increase journey times for other passengers; 16A – to create links from villages east of Cambridge, although it is currently a limited service; Citi 7 – links from Stapleford Road, Cambridge Road, Great Shelford, Stapleford, Sawston and Saffron Walden which would provide additional connectivity, notwithstanding these locations' existing links to the rail network (including Shelford station itself); 25 and 132 – links from Trumpington (and 132 additionally southwards to Saffron Walden) which would add a local feeder route supplementing walking, cycling and use of CGB. The 132 service would require re-routing to serve the Station; and CGB services (including U) - to provide links from Trumpington as well as the north and north-west of the City. <p>Bus stop facilities should take into account the existing CBC Bus Stop Standards.</p>	<p>Supports bus access throughout the catchment area for origin trips to the Station.</p> <p>Supports bus access to locations on CBC.</p> <p>Provides additional bus-bus interchange opportunities.</p> <p>Consequential impact on parking demand and highway traffic.</p> <p>Complements other GCP schemes.</p>

Provision	Description	Benefits
Bus Access for Potential New Routes	<p>There are three groups of potential new routes that could interact with the proposed Station:</p> <ul style="list-style-type: none"> • West of Cambridge Package routes – as described in Part 1. These could originate in places such as Camborne or north-west Cambridge and run on or near the M11 to Trumpington and then via the busway to CBC and potentially the City Centre. Exact service patterns have not yet been defined. • Other near-term additional routes identified in Part 1 are likely to approach CBC via the busway from the north or south and terminate at CBC. In this respect their requirements will be similar to those of existing route U (see 'CGB services' above) or the potential West of Cambridge Package routes. • Cambridge South East Transport Study options include potential new public transport access points to CBC. <p>Each of these, if implemented, would pass Cambridge South Station and therefore require bus stops as noted above and in Figure 13.</p>	<p>Supports bus access throughout the catchment area for origin trips to the Station.</p> <p>Supports bus access to locations on CBC.</p> <p>Provides additional bus-bus interchange opportunities.</p> <p>Consequential impact on parking demand and highway traffic.</p> <p>Complements other GCP schemes.</p>
Timetabling and co-ordination	<p>It is desirable for bus and train times to co-ordinate to reduce interchange times at the Station when they are not operating at high frequencies. This would require co-ordination between bus and train operators and should be considered at detailed design stage in the light of the timetables and route networks at the time.</p>	<p>Reduced journey times. Increased attractiveness of bus-rail journeys.</p>
Shuttle Service	<p>An orbital bus route within the CBC site, calling at the key employment sites, transport interchanges and healthcare facilities, could provide improved journey times around the site. This service could be used particularly by disabled users and other mobility-impaired users.</p> <p>The shuttle bus itself would desirably be emission free although low emission alternatives could be provided. It should run both peak and off-peak to provide connectivity and additional safe, accessible travel options.</p> <p>This service could be a development of the existing Campus shuttle, or an entirely new service.</p> <p>The service could potentially also be an autonomous or demand responsive system subject to technological advances, space on site and funding for implementation, operation and maintenance.</p>	<p>Improves mobility around the site.</p> <p>Complements other buses serving CBC.</p> <p>Encourages use of, and sustainable travel to/from, the Station.</p>
Integrated ticketing	<p>Integrated ticketing to allow users to use the same ticket on bus and train services would reduce booking time prior to the user's journey, reduce dwell time at bus stops and address the perception that buying and collecting tickets is time consuming.</p> <p>PlusBus already offers this to some extent. Further development of integrated ticking is most likely to be driven by wider policy and commercial developments.</p>	<p>Improved attractiveness of sustainable travel modes.</p> <p>Potential for reduced dwell times at bus stops.</p>

Provision	Description	Benefits
Interchange Information	Real Time Passenger Information within and around the Station can provide a summary of information including scheduled arrivals and departures of train/bus services. This could form part of the Wayfinding intervention proposed above to increase the awareness of other modes and allow users to plan their journey.	Increased awareness the Station is there will encourage users over time. Users that are informed of approximate journey length can use wayfinding as a tool to plan their journeys.
Taxi Access and Parking	A taxi rank, pick-up / drop-off zone and parking for Blue Badge holders should be adjacent to, or only a short walk, from the Station facilities. The location of these should be evaluated through the planning process and further detailed design.	Provides scope to use rail for the major part of a journey that would otherwise be made by private car.
Car Club	One or more dedicated Car Club spaces, and corresponding vehicles, should be provided. The vehicles would desirably be electric to reduce emissions on site.	Provides scope to use rail for the major part of a journey that would otherwise be made by private car.

5.4. Summary

Cambridge South Station could provide a step change in travel options available to CBC staff, visitors and residents in the CBC area. The availability of rail connections could help to accommodate growth at CBC and provide longer-term opportunities for increased rail mode share as services evolve and additional rail schemes come online, including East West Rail.

The relationship between the Station design, function and its impact on wider transport will be key in ensuring the Station is contributing most effectively to CBC's sustainability goals. Table 12 includes measures and infrastructure for promoting sustainable access to the Station.

This Chapter has highlighted a wide range of factors that will need to be managed both in terms of Station design, layout, development and transport infrastructure beyond the Station. GCP could consider further scheme development work, alongside Cambridge City Council as local planning authority, to set out the requirements and aspirations in more detail.

6. Wider Economic Impacts of Cambridge South Station

6.1. Introduction

As outlined in Chapter 5, Cambridge South Station could contribute to meeting the transport needs of CBC. The increased use of rail and reduced need for onward travel between Cambridge Station and CBC associated with the opening of Cambridge South Station would generate environmental and economic benefits. The benefits would include reduced traffic congestion and improved travel times and reliability for those travelling by road, as well as time savings for those already travelling by rail who previously used Cambridge Station.

CBC has specific economic characteristics, including its location and highly specialist, knowledge intensive activity. This combined with the characteristics of rail travel and the relatively direct, fast, reliable connections that it provides, mean that the Station would also have the potential to generate wider economic impacts. The potential for this is demonstrated by the private funding that has already been attracted for developing the Cambridge South Station proposals. The following Sections outline potential mechanisms through which the Station could impact on economic performance, considered from two perspectives:

- Net impact on the national economy (in line with WebTAG welfare assessments); and
- Specific local impacts.

This Chapter focuses on the impacts associated with CBC, recognising that the new Station would also generate similar benefits for other employment sites within its catchment area.

6.2. National Wider Economic Impacts

Wider Economic Impacts (WEI) are defined in WebTAG as national welfare economic impacts that are not captured in conventional economic appraisal based on transport user and provider benefits and costs. WebTAG identifies three possible categories of WEI with a potential to generate impacts for the national economy in addition to those captured through conventional appraisal; comprising:

- **Agglomeration impacts:** primarily agglomeration benefits, referring to the increased productivity caused by companies being closer to other companies and potential employees (both 'closer' in terms of reduced travel costs (including reducing travel times) and closer physically through land use changes). Benefits arise from effects including increased interactions, knowledge spill-overs and linkages and improved accessibility to customers and inputs, including labour markets (which allows better matching between employees and jobs);
- **Employment effects:**
 - More people being encouraged to work as a result of reduced commuting costs; and
 - Companies and employees choosing to relocate employment to more productive locations due to accessibility and connectivity changes resulting from a transport scheme.
- **Induced investment:** related to changes in level and location of investment in economic activity in response to a transport scheme. WebTAG considers two main types:
 - **Increased output in imperfectly competitive markets:** reflecting additional profit that companies make on each extra unit of output in real imperfect markets. When time savings allow a company to increase output, the value to the company (and society) is greater than the time saving captured in the conventional appraisal of business user benefits⁵⁰; and
 - **Dependent development:** benefits associated with land use changes that are enabled by changes in planning permission in response to the improvement in accessibility associated with a transport scheme. Planning permission may either enable a change in land use (e.g.

⁵⁰ The approach to estimating conventional economic benefits from travel time savings is based on the simplifying assumption that all markets behave in a theoretical 'perfect manner'. This benefit allows for the fact that they don't, allowing firms to make additional profit on each unit of output they produce, increasing the benefit to the firms and society overall. WebTAG recommends the value of this benefit is approximated as equivalent to 10% of conventional business transport user benefits.

from industrial to housing) or an increase in density of use. Where there is a shortage of land (usually particularly relevant for housing) this change can provide a net national economic impact. The value can be broadly approximated by an estimate of increase in land value generated by the planning change, offset by the cost of externalities associated with the extra development (such as traffic and environmental impacts).

Assuming good connectivity from Cambridge South Station to the CBC site and a beneficial timetable, the Station's opening would have the potential to generate benefits in all three WEI categories related to companies on CBC, as outlined further below.

6.2.1. Agglomeration Impacts

Agglomeration productivity impacts are particularly relevant, as the CBC already represents a successful agglomeration of activity in the life sciences and biopharma sectors, within the larger successful agglomeration of Greater Cambridge.

In work undertaken by Bidwells⁵¹ and referenced by Cambridge Ahead, CBC is identified as a key biopharma cluster within several clusters in Cambridge. The city is identified along with Oxford as an internationally recognised centre of excellence in biomedical science.

The Research and Development (R&D) element of the work undertaken on the Campus will be particularly responsive to agglomeration benefits⁵² through:

- Knowledge share and spill over;
- The development of specialist suppliers; and
- The ability to access a large pool of specialist potential employees, likely to match well with potential vacancies.

Within Cambridge, other key biopharma clusters are identified in the City Centre accessed by Cambridge Station and at the Science Park, Business Park and St John's Innovation Centre and Park, close to Cambridge North Station. Cambridge South Station would therefore provide possibilities for improved productivity for companies on CBC (and the other parks) through improved agglomeration with other clusters and R&D centres in the city and improved access to the staff working at them.

Over a larger scale, the Station would provide further agglomeration benefits by providing improved connections via London to similar activity and R&D in the 'Golden Triangle' of Cambridge, London and the Greater South East and Oxford⁵³. The significance of these linkages and the Station's role in them is illustrated in a quote from the VP of Cambridge Strategy and Operations at AstraZeneca who said that the Station would bring: *"significant and sustainable benefits to the Cambridge region and the UK life sciences sector.... This station will enhance connectivity within the 'Golden Triangle' of Cambridge, Oxford and London and internationally, which in turn will help drive growth and investment in UK science and innovation."*⁵⁴

Over the longer term, the Station could also be a stop on the proposed East West Rail link and thereby provide improved connections to the Cambridge-Milton Keynes-Oxford growth arc. The arc is identified by the National Infrastructure Commission (NIC) as including amongst the UK's most productive, successful and fast-growing cities. They are identified as having a highly skilled labour force, cutting edge research facilities, innovation and technology clusters which are internationally

⁵¹ <https://www.bidwells.co.uk/insights-and-research/cambridge-and-oxford-biopharma-clusters-research-findings/>

⁵² R&D falls within the Producer Services category identified in the WebTAG WI units which has the largest elasticity to agglomeration

⁵³ Top 5 R&D Hubs in the UK, Pharmafield, June 2017 <https://www.pharmafield.co.uk/Pf-Fox-News/Features/2017/06/Top-5-RD-hubs-in-the-UK>

⁵⁴ Dr Andy Williams, VP for Cambridge Strategy and Operations at AstraZeneca, quoted on the website for Heidi Allen, MP for South Cambridgeshire: <https://www.heidisouthcambs.co.uk/new-railway-station-addenbrookes>

competitive, but face the need for significant measures to improve housing and infrastructure to support ongoing potential growth⁵⁵.

The economic significance of Cambridge South Station for this wider growth area is highlighted by the fact that rapid progress with the Station was one of two interventions on which the NIC⁵⁶ recommended that the government should work with the private and local public sector to support housing and employment growth in the growth arc in the short term. The government's subsequent budget allocation to progress the scheme suggests further recognition of its economic importance.

6.2.2. Employment Effects

Employment effects generated would largely result from the new Station opening new options and improving travel costs, journey times and reliability for a range of commuting and business routes. These improvements could encourage companies to relocate to CBC, a more productive location for relevant companies (as outlined under agglomeration above) and similarly might encourage workers to change jobs, taking up a new, more productive role with a company on CBC.

6.2.3. Induced Investment

For induced investment benefits, any additional output produced because of time savings for business travel (employees and goods vehicles) bought about by the new Station (directly and through road congestion relief) would generate additional profit. It is also feasible that the presence of the Station could allow additional development on CBC that would not have been permitted in its absence (and therefore can be considered dependent). This would be the result of the additional transport options and capacity provided meaning that the development could be accommodated without undermining the performance of the road network.

This judgement would depend on planners' views of traffic and wider transport capacity and constraints, as developments progress within the site and across Cambridge and the surrounding area. Given the range of other modes providing access to CBC and the number of potential external influences, it is not possible to identify whether and when the presence of the Station would become a defining factor in planning decisions at this stage.

The development of the Station itself may also enable increased density of development around the Station (beyond CBC), which has the potential to increase the agglomeration impacts identified in Section 6.2.1.

6.3. Local Economic Impacts

In addition to the national level economic impacts identified, the presence of Cambridge South Station may have an influence on the characteristics of companies choosing to locate on the CBC site and the timing of development.

6.3.1. The Role Of Transport Connectivity In Companies' Locational Choices

The unique economic context of CBC, including the existing clustering of life science/biopharma activity on CBC and the wider Cambridge economic setting, are likely to be the key influences on locational decisions of companies. However, transport provision is likely to also be considered relevant as excellent transport connections are widely acknowledged as one of a few key characteristics that investors seek in identifying a location, nationally and internationally.

The Centre for Cities developed a list of characteristics that investors value most highly in selecting a city site⁵⁷, based on engagement with investors, developers, real estate professionals and city

⁵⁵ Partnering for Prosperity, A New Deal for the Cambridge-Milton Keynes -Oxford Arc, National Infrastructure Commission, 2017, <https://www.nic.org.uk/publications/partnering-prosperity-new-deal-cambridge-milton-keynes-oxford-arc>

⁵⁶ Partnering for Prosperity, A New Deal for the Cambridge-Milton Keynes -Oxford Arc, National Infrastructure Commission, 2017, <https://www.nic.org.uk/publications/partnering-prosperity-new-deal-cambridge-milton-keynes-oxford-arc>

⁵⁷ What investors want, A guide for Cities, Centre for Cities, 2017

authorities. Excellent transport connections were identified as one of four key factors, along with a strong economy with growth potential, pro-investment leadership and focus on delivery. Related research was undertaken by Grant Thornton⁵⁸ including literature review and engagement with relevant bodies such as LEPS and inward investment agencies. Again, transport and connectivity was identified as one of a small set of key factors considered in locational decisions, alongside economic scale, scale of workforce, productivity and innovation.

The Grant Thornton research highlighted the importance of easy access to longer distance connections, via motorways and inter-city rail. The Centre for Cities report also highlighted national (particularly to London) and international links as well as good local commuting provision and plans to provide sufficient transport supply for future growth.

Cambridge South Station would improve CBC as a potential location for investment against each of these identified transport related influences.

Visible and direct transport connections are also identified as particularly important to businesses in locational decisions, with areas near to stations often particularly popular. This is reinforced by the beneficial impact on image often gained from the 'gateway' effect in well-designed areas around stations⁵⁹.

The presence of the Cambridge South Station would therefore add to the existing attractions of CBC as a location, particularly for organisations in the life science/biopharma sector. This could help to attract higher value companies to locate on the site which would boost the productivity and economic impact of CBC.

6.3.2. Net National Economic Impact Of Companies Choosing To Locate At CBC

The net national impact of any locational decisions to site on CBC would depend on the alternative sites considered. As shown in the Biopharma Cluster Map⁶⁰, there would be potential alternative specialist locations in Cambridge and elsewhere in the UK. If selected instead of these alternative locations, the employment associated with the company locating at CBC would represent a local economic benefit but not a net national economic impact.

However, the Bidwells' review also highlights that the biopharma sites are internationally competitive with the implication that CBC might be selected in preference to an international location. The presence of strong longer distance transport links is likely to be particularly relevant in encouraging such decisions. Relocation internationally would mean that the employment associated with the company would be a net national economic benefit as well as a boost to CBC and Cambridge economic output.

6.3.3. Potential Impact Of Cambridge South Station On CBC Development Timescales

The proposed relatively short time frames for delivery of the Station (NIC suggest delivery by 2022) may also mean that it contributes to development at CBC progressing more quickly. The Station will provide a measure to help mitigate traffic related impacts of CBC growth and wider Cambridge growth by providing alternative journey options, helping to promote sustainable mode choice and support any demand constraint measures required. This would help to reduce traffic impacts and maintain quality and reliability of access to the site, in turn helping to alleviate planning concerns and provide firms considering locating on CBC confidence in the ongoing quality of transport links that have been identified as important in their locational decisions.

⁵⁸ Turning up the Volume, The Business Location Index, Grant Thornton, October 2015. This research focussed on locational choices for inward international investment with findings also identified as relevant for location choices nationally.

⁵⁹ The Value of Rail Investment, Research on Regenerative Effects, Report for Network Rail, Steer Davies Gleave, November 2011
http://www.steerdaviesgleave.com/sites/default/files/newsandinsights/Station_Investment_Report.pdf

⁶⁰ <https://www.bidwells.co.uk/insights-and-research/cambridge-and-oxford-biopharma-clusters-research-findings/>

6.4. Summary

CBC provides an attractive location, particularly for organisations in the life sciences/biopharma sector. Connections between organisations are particularly important for many of the firms involved in innovative, knowledge intensive activities. Therefore, if Cambridge South Station is well served and connected to CBC the nature and quality of the local, national and international connections that it provides could further increase economic activity on the Campus, with benefits for economic output at the local, regional and national level. These benefits have the potential to provide an important contribution to the business case for the Station. Their likely scale and value could be investigated further through a more detailed review of the businesses on CBC and the role of rail in their locational choice and connections to related firms and potential employees.

7. Conclusions

Atkins has been commissioned by Cambridgeshire County Council (CCC) to undertake a Transport Needs Review of Cambridge Biomedical Campus (CBC) on behalf of the Greater Cambridge Partnership (GCP). Part 1 of the Study assessed the existing transport situation and made recommendations on Potential Interventions to accommodate growth at CBC over the next five years to 2021. This Report is Part 2 of the Study and is a review of forecast demand data and transport supply for all modes up until 2031. It considers how CBC can accommodate the demand with and without a Station located on the site.

7.1. Growth At CBC

CBC is to experience substantial amounts of growth to 2031 and beyond, with staffing levels on site expected to increase by 51% and patient and visitor levels expected to increase by 73% from 2017 to 2031. This results in an increased demand of 16,448 one-way person-trips per day in 2031 compared to 2017 levels.

There is a planned rapid pace of development at the site over the next 18 months, with four key developments all being occupied by the end of 2020. This is likely to put increasing pressure on the transport network and emphasise the need to bring forward Potential Interventions outlined in the Part 1 Report, given that it will not be before 2020 that schemes such as Phase 1 of the Cambridge South East Transport Study will be operational.

The next milestone for development on CBC is 2026, when a further three developments (CBC Phase 1, Phase 2 and The Forum) are due to be fully occupied. By this stage, local enhancements such as a Cambridge South West Park and Ride and Phase 2 of the Cambridge South East Transport Study are proposed to be operational, which would provide increased capacity for Park and Ride and sustainable travel to the site.

Several existing constraints have been highlighted that have the potential to restrict growth on-site:

- A. Corridor capacity constraints on Babraham Road, Addenbrooke's Road and Hauxton Road leading back to M11 Junction 11;
- B. Negative impacts on air quality caused by additional highway demand;
- C. Congestion on-site causing delays for emergency vehicles;
- D. Congestion on-site causing delays at entrances and exits to car parks;
- E. Junction capacity constraints at Dame Mary Archer Way/Addenbrooke's Road/Francis Crick Avenue, Babraham Road/Hills Road/Fendon Road and Queen Edith's Way/Hills Road/Long Road;
- F. The impact of highway congestion on the efficiency and reliability of public transport;
- G. Constraints to economic growth due to congestion around CBC and the wider Cambridge region;
- H. Increased capacity constraints within on-site car parks and surrounding residential streets;
- I. Increasing levels of car parking proposed on-site may encourage more trips by private car;
- J. Encouraging use of a proposed new Cambridge South West Park and Ride instead of driving closer to the site or using the existing Trumpington Park and Ride will increase the parking opportunities within the local area and reduce highway trips accessing CBC;
- K. Access to any new Cambridge South West Park and Ride for cars and buses and the potential impact of this on the performance of M11 Junction 11;
- L. The position of the existing Bus Station is not easily accessible for services originating from the west or bus users working at the west of the site;
- M. The existing bus station within CBC is constrained in terms of access for additional services;
- N. East-west bus routing is convoluted and therefore leads to extended journey times and exposes buses to congestion within the site;

- O. Space for a Bus Interchange at the west of the site is limited; and
- P. The 'no-right-turn restrictions' outbound on Adrian Way to Long Road restrict this route for buses intending to access the City Centre via Hills Road.

7.2. Effect Of Growth At CBC

Increases in transport demand between 2022 and 2031 across all modes is predicted to have a significant impact on the transport network. Any growth in highway trips will exacerbate existing congestion. Although several improvements to bus, walking and cycling infrastructure are proposed as part of planned schemes between 2022 and 2031, the timing of these improvements towards the end of this period could mean that growth in travel to CBC would be disproportionately highway / private-vehicle based in the intervening period (i.e. prior to 2031). Once driving habits are instilled, it is often difficult to encourage people to make the change to a sustainable mode. To instil sustainable travel habits from the start, infrastructure aimed at providing sustainable travel, should be in place prior to the opening of key developments.

The initial Target that this Study aims for is to maintain traffic at 2017 levels up to 2031. This equates to a reduction of **17,925 one-way daily person-trips** entering CBC by 2031 (Table 4).

The GCP have commissioned several studies to determine how to accommodate growth within Greater Cambridge, such as the City Access Strategy. The City Access Strategy has a target to reduce traffic within the City by 10%-15% by 2031 compared to 2011 demand figures. This is considered a Stretch Target as part of this Study. Applying the upper limit of this Stretch Target range to CBC equates to a Target reduction of **25,354 one-way person-trips** from the highway network by 2031.

7.3. Potential Interventions

Chapter 4 provides high level recommendations of Potential Interventions that could help accommodate growth on the CBC site up to 2031. Chapter 5 presents the Station as a Potential Intervention and recommends additional measures to help contribute to the success of the Station in the context of CBC as a Sustainable Travel Campus. Potential Interventions suggested by this Study include:

- Demand management measures such as further restrictions on parking and car access to CBC (Intervention 27 in Table 9) as well as measures to encourage trips to take place outside of the peak hours (Intervention 33-35);
- Infrastructure improvements such as new or improved footpaths/footways or cycleways (Intervention 36, 37, 39);
- Behavioural change programmes such as car sharing initiatives (Intervention 44); and
- Other sustainable transport interventions, such as enhancements to bus (Interventions 1-17), Park and Ride (Interventions 18-27), walking and cycling provision (Interventions 36-40).

A package of these Potential Interventions, including Cambridge South Station and its supporting measures, could encourage sustainable access to CBC and support the Targets set out in this Report. Phasing of the interventions in line with anticipated growth on-site is vital in providing effective access and enabling growth to occur in a sustainable manner.

7.4. Further Work And Next Steps

The next stage of work, to be covered by the Part 3 Report, will:

- Assess the impact of the Potential Interventions from the Part 1 and Part 2 Reports, as well as Cambridge South Station and its accompanying infrastructure, to determine their impact on the Targets identified in this report; and
- Identify the phasing requirements of the potential interventions to help manage growth up to 2031.

Following this, further study would be to:

- Understand the feasibility of each Potential Intervention;

- Understand the increase in footfall at Stations at the other end of the rail journey to determine if any infrastructure improvements at those Stations are required;
- Undertake scheme design and stakeholder engagement with a view to implementation of selected Potential Interventions;
- Actively manage the impacts of on-street parking by CBC commuters and visitors, as part of the planned on-street parking controls in areas around CBC, taking into account the on-site parking supply and the availability of sustainable modes as alternatives; and
- Carry out further scheme development work on the measures identified for securing the transport and public realm goals relating to Cambridge South Station.

It will be essential to bring this workstream forward swiftly to ensure that measures are in place to promote the required mode shift to accommodate the growth on site.

Appendices

Appendix A. Part 1 Potential Interventions

These are high level solutions and should be treated as a recommendation for further development and assessment of benefits and costs from Part 1 of the Study.

Within each of the categories below, the Potential Interventions have been listed in a broad priority order (1 being the highest priority). Nevertheless, all Potential Interventions are seen as providing benefit within the next five years, irrespective of their ranking. The rankings are indicative and would need to be reviewed in the light of further development and assessment

A.1. Potential Walking Interventions

The potential walking interventions are as follows:

1. An audit of existing pedestrian and cycling routes and connectivity requirements within CBC, leading to a strategy for improving the consistency, continuity and quality of these routes. On-site observations found that these routes are currently inconsistent and at times difficult to navigate. Observations also found some footways on site are narrow and uneven in places;
2. Review pedestrian and cycle wayfinding in the light of current routes and those proposed in the strategy described above. This should include the potential for 'best in class' solutions and tying in with current wayfinding strategy elsewhere in Cambridge;
3. Not all junctions have pedestrian crossings, such as the eastern side of the Long Road/Hills Road junction. Ensuring all crossings with pedestrian desire lines have pedestrian crossing provision would help to accommodate future pedestrian trips;
4. Reviewing lighting levels and perceived security on pedestrian routes within and around CBC. This is because stakeholders expressed concerns about inconsistent lighting levels; and

A.2. Potential Cycling Interventions

The potential cycling interventions are as follows:

1. An audit of the pedestrian and cycling routes, and subsequent strategy, as described above;
2. Providing an extensive cycle network to encourage cycling to CBC. The GCP Greenways cycleway scheme will connect local villages to the site and provide cyclists with a safer route into the site;
3. Develop a scheme to provide an attractive cycling route to CBC from the east (Cherry Hinton, Fulbourn and nearby villages), via Nightingale Avenue and the recently-upgraded cycle entrance at Red Cross Lane. For those originating from Fulbourn, access to CBC from the Fulbourn Greenway would involve cycling to Cambridge Railway Station and then along the recently improved cycling facilities on Hills Road or leaving the Greenway early and travelling down Wulfstan Way and Nightingale Avenue. Neither of these routes have dedicated cycle provision at present. Cycle improvements along these routes have the potential to improve access to CBC by cycle from the east;
4. Keep the capacity and condition of cycle lanes under review, to ensure they are in adequate condition to accommodate the additional demand;
5. Enhancements to the existing cycle/pedestrian cut-through via Car Park H and its linkage to Puddicombe Way and onwards to Main Drive. Building on the recently-implemented Hills Road cycling scheme which leads to this cut-through, it could become a high-quality and highly visible pedestrian/cycle access with good links into the rest of the campus;
6. Provide for cyclists to turn right out of Adrian Way into Long Road (an intervention previously identified by the Cambridge Cycling Campaign); and
7. Review the scope for cycle access directly between cycle routes and adjoining buildings, such as future developments between Dame Mary Archer Way and the cycle route to Shelford, and incorporate this into site design briefs.

A.3. Potential Public Transport Interventions

The potential public transport interventions are as follows:

1. Engage with bus operators to identify potential additional direct services to CBC. There are large gaps in direct services to the east, north east and west Cambridgeshire, which may deter users and reduce patronage. Gaps to address would include:
 - a. Papworth, especially after the relocation of the Royal Papworth Hospital to CBC;
 - b. Ely and Newmarket; and
 - c. New developments such as Cambourne West, Bourn, Northstowe and Waterbeach;
2. Consider the potential for dedicated staff shuttle buses to support key specific flows (e.g. Waterbeach Barracks, Eddington and Northstowe) if commercial bus services cannot provide adequately for these;
3. Engage with bus operators to identify improved off-peak services. Consider extending the duration of high frequency service periods to cover more of the pre-AM peak and post-PM peak periods which are particularly used by shift workers. This was one of the key issues identified by stakeholders. If not viable on a purely commercial basis, these may require a degree of financial support;
4. Review the impact of visiting hours and consider interventions to either increase bus capacity at relevant times or encourage visiting at off-peak times;
5. Consider fare promotions for staff, to further increase the attractiveness of public transport;
6. Further promotion of the existing patient courtesy bus through media campaigns and on-site promotional activities. Stakeholders commented that this is a useful service but under-used and under-promoted;
7. Measures to improve the attractiveness and awareness of existing bus services, including additional Real Time Passenger Information displays, amendment of timetables in line with actual journey times, off-bus ticket purchasing opportunities, further promotion and publicity such as face-to-face engagement on-site, and maintaining the condition of the buses and bus stops. These were identified by stakeholders as potentially valuable. This should include additional 'where to catch your bus' information, both to assist bus users and to promote the range of services available, given the complexity of existing bus stopping arrangements;
8. Carry out further work to understand the most desirable medium-term strategy for bus stop location and bus routing within CBC. This should consider and balance the goals of:
 - a. Offering passengers convenient access to all parts of CBC, from all bus routes;
 - b. Making the service offer comprehensible and 'marketable' as part of encouraging bus use;
 - c. Minimising bus journey times and mileage; and
 - d. Maximising connectivity to/from a future Cambridge South station;
9. This may ultimately point to a central bus station at the heart of CBC, a central bus spine route through CBC, or another solution, and might require a frequent campus shuttle bus to provide very local connectivity and reduce walking journey times; and
10. Use of EURO6 buses and provision of rapid charge electric vehicle points for use by Taxi's only in order to contribute to improving air quality in the area.

A.4. Potential Parking Interventions

The potential car parking interventions are as follows:

1. CCC are considering the extension of on-street parking controls. Although this may put additional pressure on parking within CBC, it could encourage individuals to take more sustainable forms of transport;
2. Identify the range of reasons why staff park in nearby residential areas and relevant policy responses (considering potential extensions of the on-street parking controls being considered by CCC);
3. Review existing small pockets of parking, particularly those at the heart of the campus, to identify those where users could be relocated to vacate space for pedestrian, cycling or public realm enhancements, as well as potentially reducing traffic volumes and conflicts in those areas;
4. Review the management of staff parking demand for existing and future occupiers across CBC, including potential adjustments to pricing structures or eligibility criteria, with the aim of:
5. Maintaining the correct level of parking demand within the available supply, bearing in mind that growing patient and visitor demand will need to get priority; and
6. Evening-out the issues with some parking areas being over-popular and others not fully used.

The potential cycle parking interventions are as follows:

1. Continuation/formalisation of the cycle clearing scheme which removes abandoned cycles, with a potential need to increase frequency if required. On-site observations found significant numbers of cycles that appeared to be abandoned;
2. Work closely with CBC to provide the additional cycle spaces recommended in the 2015 Access to Addenbrooke's Modal Choice Document and identify further areas where cycle parking on-site can be increased an intensified Stakeholders also highlighted the closure of an area, including cycle parking, near the Frank Lee Centre which could be re-opened to provide additional parking quickly;
3. Work with CBC Partners to identify possible funding sources for cycle parking improvements; and
4. Consider whether, as part of a sustainable transport focus, existing car parking spaces could be converted into cycle parking spaces (especially as one car parking space converts into multiple cycle parking spaces). See also recommendation above concerning existing small pockets of car parking that could be converted into cycle parking.

A.5. Potential Park and Ride/Park and Cycle Interventions

The potential Park and Ride/Park and Cycle Interventions are as follows:

1. Increase nearby Park and Ride capacity to encourage those who use/visit CBC to use this as a mode as opposed to parking on-site or on nearby residential streets. Possible interventions include:
 - a. Investigate the possibility of increasing the capacity at Trumpington Park and Ride in the immediate short term (by the end of 2018) to help provide capacity for the staff from Papworth travelling on to the site. Any proposals should also investigate if additional bus capacity from the Park and Ride sites is required;
 - b. Increased Park and Ride capacity to the south-west of Cambridge, such as that proposed by the GCP, is recommended for years 1-5, to help provide capacity for sustainable mode choice for those using CBC;
 - c. Investigate the possibility of increasing the parking capacity at Babraham Park and Ride in years 1-5. Any proposals should also investigate if additional bus capacity from the Park and Ride sites is required; and
 - d. Investigate the possibility of having dedicated CBC parking spaces at Park and Ride sites; and
 - e. Explore the possibility of moving a proportion of the contractor parking to Babraham Park and Ride, where evidence suggests that there is some available capacity whilst also complimenting this by providing a dedicated shuttle into the development sites as a short-term measure.
2. Provision of a Park and Cycle site outside CBC, to reduce congestion near the site and promote sustainable transport. Cambridge has a very large propensity to travel by cycle, as evidenced by mode share figures. Park and Cycle capacity may also come in the form of a bike hire scheme to and from Trumpington Park and Ride and Babraham Park and Ride, or a bike share scheme throughout the city (such as the existing Ofo scheme), as suggested by stakeholders. This could include formalisation of facilities at the existing Park and Ride sites, including measures such as dedicated areas for parking adjacent to cycle storage locations, with greater numbers and quality of storage facilities for cycles and associated equipment;
3. It is suggested that a Park and Ride for CBC only could be investigated closer to the site to relieve pressure from Trumpington and Babraham Park and Ride whilst providing a prioritised service for those using the site; and
4. Investigate the possibility of provision for dedicated/formalised Park and Cycle facilities from Park and Ride sites. This should include dedicating specific areas of the sites for 'Park and Cycle only', with accompanying facilities such as lockers, cycle parking stands and links to the nearby cycle network.

A.6. Potential Local Highway Interventions

The potential local highway interventions are as follows:

1. Stakeholders suggested improved traffic signals on Addenbrooke's Road could reduce the chance of traffic queues reaching the M11 Junction 11 bridge, which has been observed to be congested due to right turning on traffic on the northbound side of Hauxton Road;

2. Continue to support sustainable travel to reduce dependence on private car modes;
3. Stakeholders suggested the need to review signal timings at the Hills Road access to optimise traffic flow within the immediate vicinity of CBC. This is being monitored by CCC; and
4. Provision of additional electric vehicle charging points on Campus to encourage use of these vehicles to access the Campus.

A.7. Other Potential Interventions

Other Potential Interventions are as follows:

1. Reviewing the attractiveness and promotion of existing car-share options (including the Camshare county-wide platform and the specific arrangements at Cambridge University Hospitals, which include a dedicated parking area for car-sharers). It may be possible to enhance the range of benefits available for car-sharing, such as extending a dedicated/priority parking offer across CBC;
2. Set up mechanisms for staff of new occupiers, such as relocated Royal Papworth Hospital staff, to receive travel planning advice and support prior to relocation, to promote knowledge of their options when accessing CBC and ensure that sustainable travel patterns are established from the start. This could be in the form of an online travel plan through which the business provides incentives for employees to undertake. Through this, employees could request face-to-face guidance if required;
3. Annual surveys should continue for monitoring purposes, with a view to implementing new strategies should the existing proposals be ineffective;
5. Control of HGV's entering the Campus through an off-site freight consolidation point. This would reduce the number of HGV's accessing the site and contribute to improving air quality in the area; and
6. Inclusion of rapid electric charging points for taxis to encourage taxi fleets to include these vehicles and help improve air quality in the area.

Appendix B. Bus Operator Co-ordination and Combined Ticketing

B.1. Current Situation

At present, the major commercial bus operators in Cambridgeshire are Stagecoach East and Whippet Coaches. Stagecoach East provides all services to the CBC except for Whippet Coaches which operates route 'U', or Universal, between Eddington and the CBC under contract to University of Cambridge. Whippet Coaches' route X3 provides one journey each way from Huntingdon via Papworth through Cambridge city centre as far as Long Road Sixth Form College.

There is currently limited multi-operator ticketing. This is in the form of a 10-trip carnet available as a Smartcard, valid for use on any service travelling on the Busway (including route U). Its relevance to the CBC is for journeys made between Cambridge city centre or rail station to Addenbrooke's, where Stagecoach route A or Whippet route U can be used. In this case the carnet price is £20.00, or £2.00 per journey. This compares favourably to the Stagecoach fare of £2.80 single or £4.50 Dayrider.

The other alternative is PlusBus for rail journeys with a destination in Cambridge, for which the bus add-on fare is £3.80 for a day ticket or £14.50 weekly, so comparable to the Busway carnet fare and cheaper if the user is travelling for 4 days a week or more.

B.2. Statute Review

Whilst deregulation made the bus market contestable, there has been an evolution of permitting intervention in the market, short of local authorities securing services that the market will not provide, or even franchising services. This takes two forms:

- **Services co-ordination:** Under a voluntary partnership agreement, two bus operators can agree to co-ordinate services under the supervision of the local transport authority, which must certify that the benefits of doing so outweigh the reduction of competition. In practice, the burden of proof under this Competition Test is not high, and the so-called 'Qualifying Agreement' has been applied in a number of areas to co-ordinate competing services (but note that it cannot foreclose the market to new entrants); and
- **Multi-operator ticketing:** Competition and Markets Authority permits the provision of multi-operator ticketing under the so-called 'Block Exemption', subject to substantial commercial safeguards about the exchange of information between operators and about pricing of operators' own products. A local authority can require all bus operators in its area to participate in a multi-operator ticketing scheme, but only in the case of multi-operator travelcard or carnet products can the authority intervene in the pricing of these products. Rail operators can be invited but not required to participate in the scheme.

The Bus Services Act 2017 further developed these concepts. In the case of services co-ordination, the Act introduces the concept of Enhanced Partnership. In this scenario, the local transport authority must consider its objectives for the network (Enhanced Partnership Plan) and then develop Enhanced Partnership Schemes to meet those objectives. This can include tendering for departure slots to control access to congested bus station or on-street stop facilities.

Enhanced Quality Partnership also strengthens local authority powers with respect to fares – an EQP can set the prices of all multi-operator ticket products, not just Travelcards, though this cannot fetter the ability of operators to price their own products.

B.3. Options and Application to CBC

These options would need to be pursued by the Local Transport Authority – so the Cambridge and Peterborough Combined Authority, although it delegates its local transport powers to CCC. As can be seen, the extent of multiple operator involvement at CBC is limited.

However, it will be noted that between routes A and U each provides a bus every 15 minutes between the rail station and the CBC. At present these are spaced with six or nine-minute intervals from the rail station and seven to eight-minute intervals on the return journey from Outpatients. A

Qualifying Agreement could be used to hardwire this co-ordinated approach to prevent either operator re-timing one service to run at the same time as the other.

The carnet provides a reasonable product for this trip (as does PlusBus) but the issue is likely to be customer awareness. Nonetheless, it would be desirable (and possible) to provide a wider multi-operator ticket to provide more options for travel between the Cambridge area and the CBC, taking advantage of the potential for interchange for frequent services at Cambridge rail station. This could take the form of a through ticket, a multi-operator individual ticket or a multi-operator travelcard, but the Block Exemption takes the general view that a multi-operator travelcard can only be provided in isolation from the other products. An Enhanced Quality Partnership is not subject to the Block Exemption, so this restriction does not apply.

Whilst there is fairly limited application for such a multi-operator product at present, the presence of one would provide resilience in the event of bus operator or network changes and could promote competition or network development. For instance, through the distribution of revenue from a multi-operator product, it could assist an operator's business case to expand services or develop new ones.

Clearly though, this is reliant on the local transport authority. An alternative that CBC could pursue would be to establish its own staff travelcard scheme, with negotiated discounts with operators and an automatic presumption that such tickets would be valid not only on services serving CBC but on connecting services. Heathrow Airport operates a similar scheme, available to all staff on the Heathrow campus, and this offers significant discounts on local bus travel. This may raise issues of taxable employee benefits in kind, though we understand that Heathrow Airport has been able to design its scheme in such a way as to avoid these.

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