

Report to: Greater Cambridge Partnership Joint Assembly

14th June 2018

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Transport Strategy - Future Public Transport Requirements

1. Purpose of this paper

- 1.1. This paper updates the Assembly on the work to further define the public transport elements of the Greater Cambridge Partnership's (GCP) transport strategy. It provides a reminder of the range of schemes currently under development.
- 1.2. It also presents emerging analysis of quantitative data to allow us to define the scale and nature of the public transport system required to achieve the traffic reduction goals of GCP, and to define priority interventions needed to deliver a transformative public transport system. The analysis aims to answer the questions:
 - How much additional pressure from growth should we expect on those networks?
 - How much additional public transport demand is implied by meeting the headline City Access target of 10-15% road traffic demand reduction?
 - In light of these considerations, where should we prioritise investment, and what type of investment is likely to best support modal shift?
- 1.3. This paper is submitted in parallel with a separate to City Access paper which focuses on the options to manage demand for road space.
- 1.4. The Joint Assembly is asked to comment on the progress to date on the public transport elements of this paper and provide any views on the options for achieving modal shift outlined in this paper.
- 1.5. These proposals will be discussed during June and July with Cambridgeshire & Peterborough Combined Authority, as the strategic transport authority, as part of developing final City Access proposals. The planned discussions between the GCP and Combined Authority as agreed at the CPCA meeting on 30th May 2018 will focus on aligning short, medium and long term policies and future work programme, including a review of the Combined Authority evidential basis and delivery strategies. The City Access proposals will be adapted to reflect the outcome of these discussions.

2. Context

- 2.1. Greater Cambridge is a national economic success story, an important contributor to UK Plc and host to some of the most productive and innovative parts of the UK economy. The role of the Greater Cambridge Partnership is to support the continued economic success of the Greater Cambridge area, to ensure that this growth is supported and that everyone in Greater Cambridge is able to access the opportunities offered by that growth.
- 2.2. In doing so, the GCP is working, and will continue to work, closely with the Mayor and Combined Authority of Cambridgeshire & Peterborough.
- 2.3. The GCP must ensure that the benefits that draw people to Greater Cambridge including: beautiful landscape; historic environment; good high quality jobs; educational offer; and are not allowed to be offset by the costs that can come with growth for example: increasingly unaffordable housing; traffic congestion; poorer air quality.
- 2.4. Congestion is a major problem. People are spending too much of their spare time in traffic jams. This has an impact on people's quality of life, the local environment and business productivity. Preliminary economic analysis published in the draft Cambridgeshire & Peterborough Independent Economic Review (CPIER) suggests that at current rates of transport infrastructure investment, the ability to deliver planned growth is threatened.
- 2.5. This paper outlines the work to date to explore the scale and shape of public transport required to support reducing congestion and improving air quality in and around Cambridge.
- 2.6. This way of managing demand is predicated on putting in place demonstrable improvements in public transport in order for there to be an effective, reliable and affordable alternative to the car prior to interventions designed to manage demand. The City Access programme is designed to support the development of a world class transport system for Greater Cambridge.

3. Vision and objectives for public transport

- 3.1. Our vision is for a public transport system that:
 - offers a genuine alternative to the car;
 - is rapid, reliable and, where possible, segregated from cars;
 - is an integrated network of bus, rail and mass transit services, including timetable, ticketing and information;
 - focuses on better serving the key employment centres outside of the city centre: Cambridge Science Park, Cambridge Biomedical Campus, West Cambridge and the cluster around Cambridge Airport;
 - is both affordable and feasible to deliver and sustain.
- 3.2. The headline metric of success is the longstanding objective that city centre traffic should be reduced by 10% to 15% over 2011 levels. This is a sufficient reduction to make tangible improvements to people's day to day lives and reduce time lost to traffic jams. In terms of how this feels to people using the roads - this would equate to traffic levels during school holidays.
- 3.3. In practice, this means considerably greater than 10% to 15% mode shift. In the time between 2011 and 2016 there has been a background growth in road traffic across the city which means that we now must achieve a 24% mode shift compared to current traffic levels. And

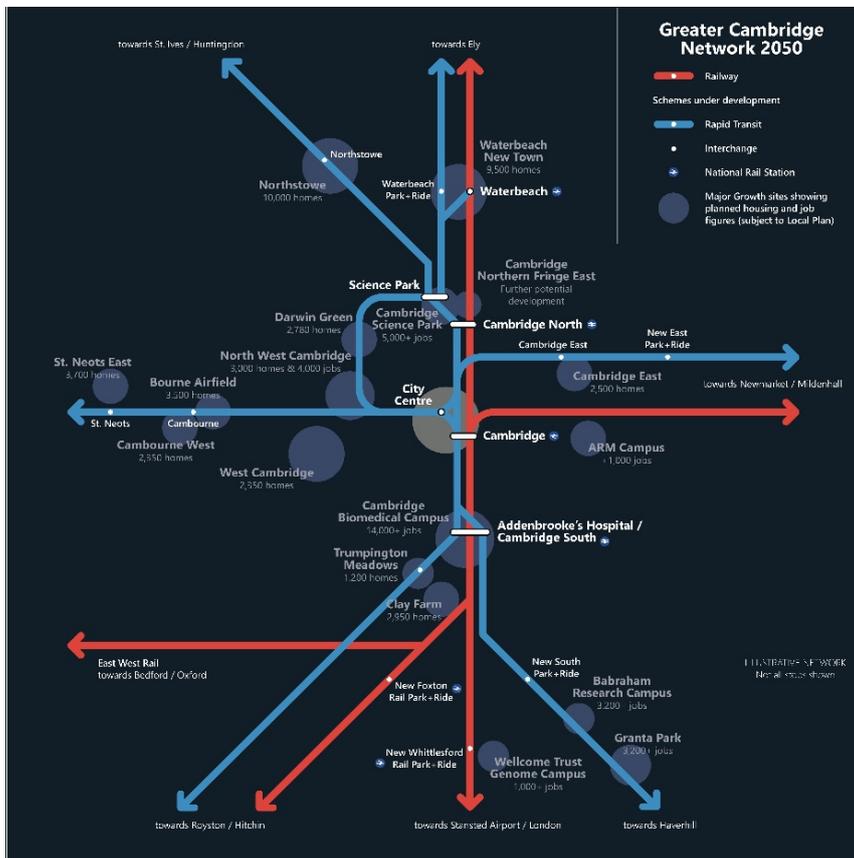
this must be achieved whilst absorbing all of the forecast population and employment growth that is allowed for in the local plan.

3.4. Transport schemes currently under development by the Greater Cambridge Partnership, in collaboration with the Combined Authority, the Department for Transport, Highways England and Network Rail include:

- Working with the Mayor and Combined Authority to progress proposals for a mass rapid transit system, currently referred to as the Cambridgeshire Autonomous Metro (CAM)
- Delivery of a new station at Cambridge South to support the 14,000 new jobs expected at the Cambridge Biomedical Campus.
- Trials of autonomous on demand vehicles, launching next year to provide out of hours services on the southern section of the Busway between the station and Trumpington Park & Ride via Addenbrookes.
- Substantial investment in cross city walking and cycling improvements, including the Chisholm Trail to provide an almost fully segregated route between Cambridge Science Park and Addenbrookes via the station.
- A network of greenways, high quality walking and cycling routes, to link surrounding towns and villages to the city centre
- Improvements in cycling infrastructure including cycle parking
- Working with government to secure an upgrade of the M11 to Smart Motorway between J8 and J14, with associated junction improvements, including allowing for movements between west and south at Girton Interchange.
- Public transport, walking and cycling improvements to Histon and Milton Roads
- Supporting measures for integrated public transport, including integration of ticketing, information and timetabling between bus and rail (and any future mass transit system).
- Development of proposals for freight consolidation
- Proposals for integrated click and collect services at enhanced travel interchanges at current park & ride locations.
- Proposals for electric buses and provision of electric taxi charging points
- New rural travel hubs at selected villages around Cambridge, with the potential to extend the pilot if successful.
- Provision of park and ride capacity along the A10/Trumpington Road corridor in to the City.

In addition there are two ongoing study's that will help guide future development of the public transport network;

- Combined Authority's review of bus services in the Cambridgeshire and Peterborough area,
- Combined Authority and GCP review of rail capacity in the Greater Cambridge area over the next 25 years.



4. Feedback from Our Big Conversation Reinforces the City Access Strategy

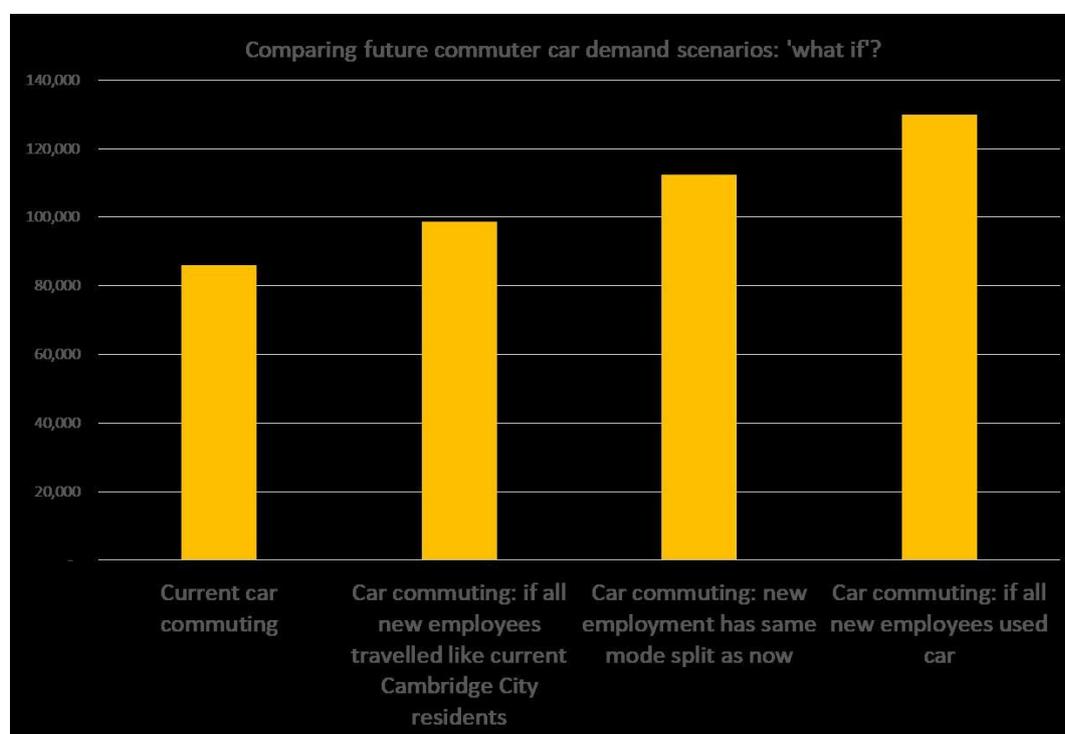
- 4.1. Our Big Conversation analysis shows that a vast majority of strategic aims for improving transport are supported or strongly supported.
- 4.2. Improving public transport is identified as the measure which would benefit respondents most (55.9 %).
- 4.3. The Systra residents' travel survey revealed that reliability is most frequently cited as the reason for the choice of travel mode (40.6%). In addition, of those who do not use alternative modes, the top three reasons were due to: speed, reliability and price of public transport.
- 4.4. Commuters make up highest proportion of those travelling in/around Cambridge five or more times per week (86.5%). Moreover, 47.7% of commuters cycle compared to 38.7% other respondents.

5. The scale of the challenge: capacity and growth analysis

- 5.1. Census 2011 data shows that 144,000 people work in Greater Cambridge. Geospatial analysis of the underlying data suggests that 101,000 employees work within the functional city boundary shown below (which includes all of the City and some parts of South Cambridgeshire). Census data shows that of the total 144,000 Greater Cambridge workers, 86,000 (60%) say their main mode of transport to work is driving themselves to work¹. 13,500 people (9%) travel to work in Greater Cambridge by public transport.

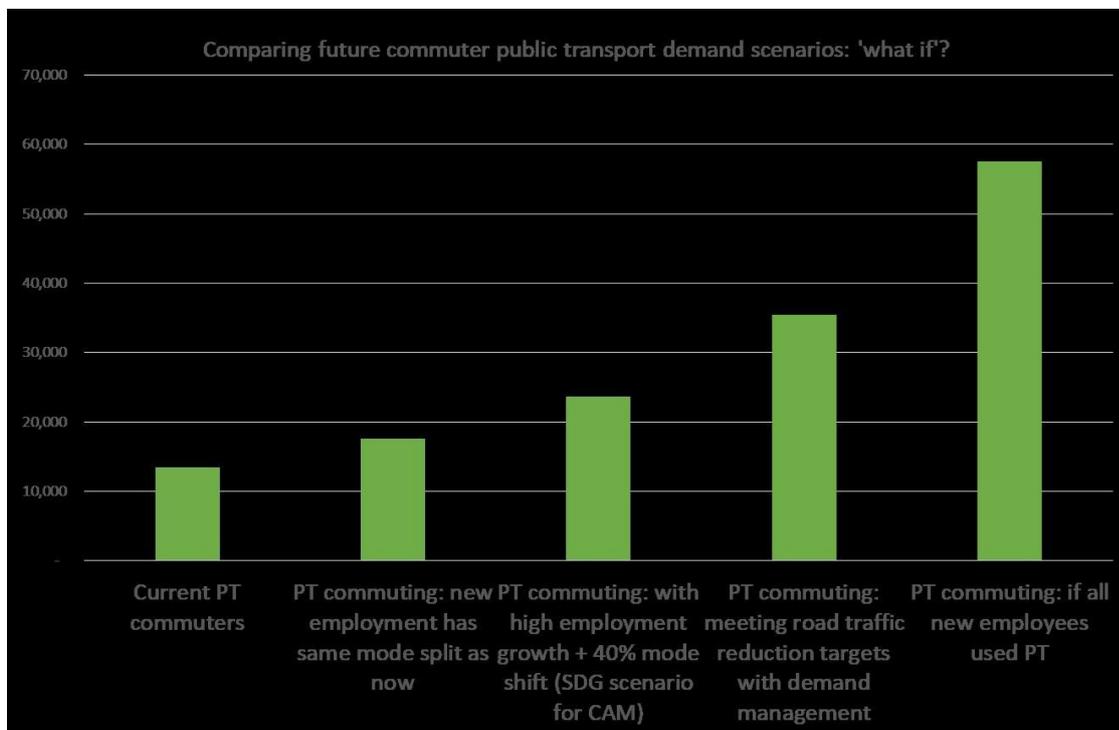
¹ This does not include people that travel to work as car passengers. Note that is likely to include many peak hour park & ride users, as the Census asks people to categorise their mode of travel by longest leg of journey which in most cases is likely be car where P&R is used as a 'last mile'.

- 5.2. The total capacity of the current public transport is approximately 70,000 passengers during the 3-hour morning peak². This is made up of inbound rail passenger capacity of 17,000 from the north, and 24,000 the south (41,000 total morning peak inbound rail capacity). There is approximate capacity for 29,000 on inbound buses during the same time period. This analysis is based on timetable data and vehicle capacity. Evidence from operators suggests that capacity utilisation is variable between services.
- 5.3. Given the planned scale of employment growth, if all new workers had the same travel behaviours as today's workers, there would be around 4,100 additional passengers on public transport by 2031. There is likely to be sufficient capacity by stretching the existing public transport network to accommodate this 'business as usual' level of public transport demand growth.
- 5.4. However, if those new workers have the same tendency to drive to work as current trends, there would be an additional 26,000 cars on the road network. The network cannot sustain this 'business as usual' level of car demand growth. Preliminary modelling analysis underpinning the Cambridgeshire & Peterborough Independent Economic Review (CPIER) suggests that Greater Cambridge will be unable to maintain its current rate of growth given current infrastructure and housing plans.



- 5.5. To achieve the objective of reducing traffic in the city centre by 10-15% below 2011 levels, and account for currently planned growth, some 20,000 – 25,000 trips shifting from car to public transport will be required. To put this figure in context: 13,500 people are recorded as getting public transport to work in Greater Cambridge 2011.

² 7am to 10am, Monday to Friday



5.6. It is therefore clear that a substantial increase in the number of passengers using the public transport network as a whole, as well as active modes, is an imperative. The question that inevitably follows is: what does the public transport network need to look like to support this, in scale and shape?

6. Where do people want to travel?

6.1. In seeking to develop the public transport network necessary to meet this challenge, we must focus upon improving accessibility between home and work. To facilitate this understanding analysis has been carried out of the scale of the major journey to work flows for six key employment locations in Greater Cambridge:

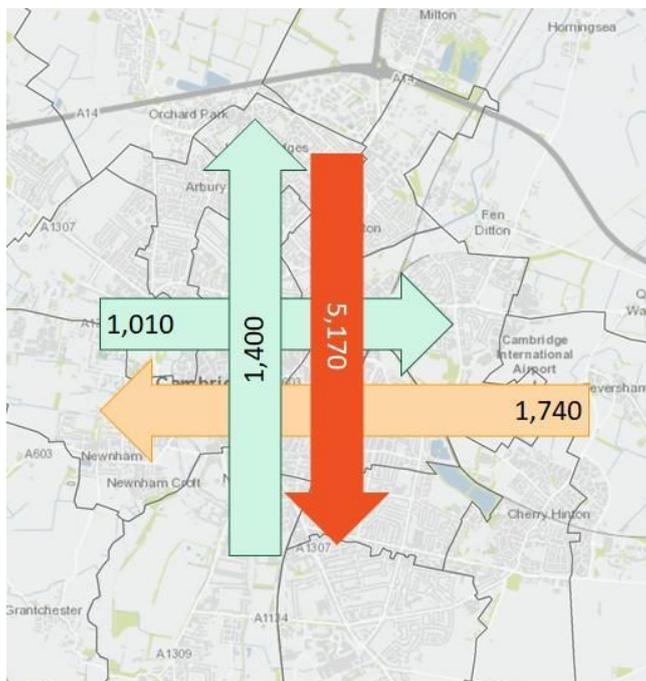
- The city centre
- The Hills Road/Station area
- Cambridge Science Park
- Addenbrookes/Cambridge Biomedical Campus
- East Cambridge (Airport/Marshalls/ARU)
- West Cambridge

6.2. Between them, these six locations broadly defined make up around 70% of all employment in the GCP area: hence, serving them well with public transport would address a substantial proportion of car based traffic currently in the city.

6.3. Any public transport network will also need to reflect the outlying rural nature of the South Cambridgeshire area.

6.4. Within Cambridge City, the highest journey to work demand originates from northern (11,000) and eastern areas (12,000) of the city covering Kings Hedges, Arbury, Chesterton (north) and Romsey Town, Cherry Hinton, Newmarket Road and Mill Road. Demand from south Cambridge is around 4,700 and from 1,500 from the west reflecting the lower residential densities in this area of the city.

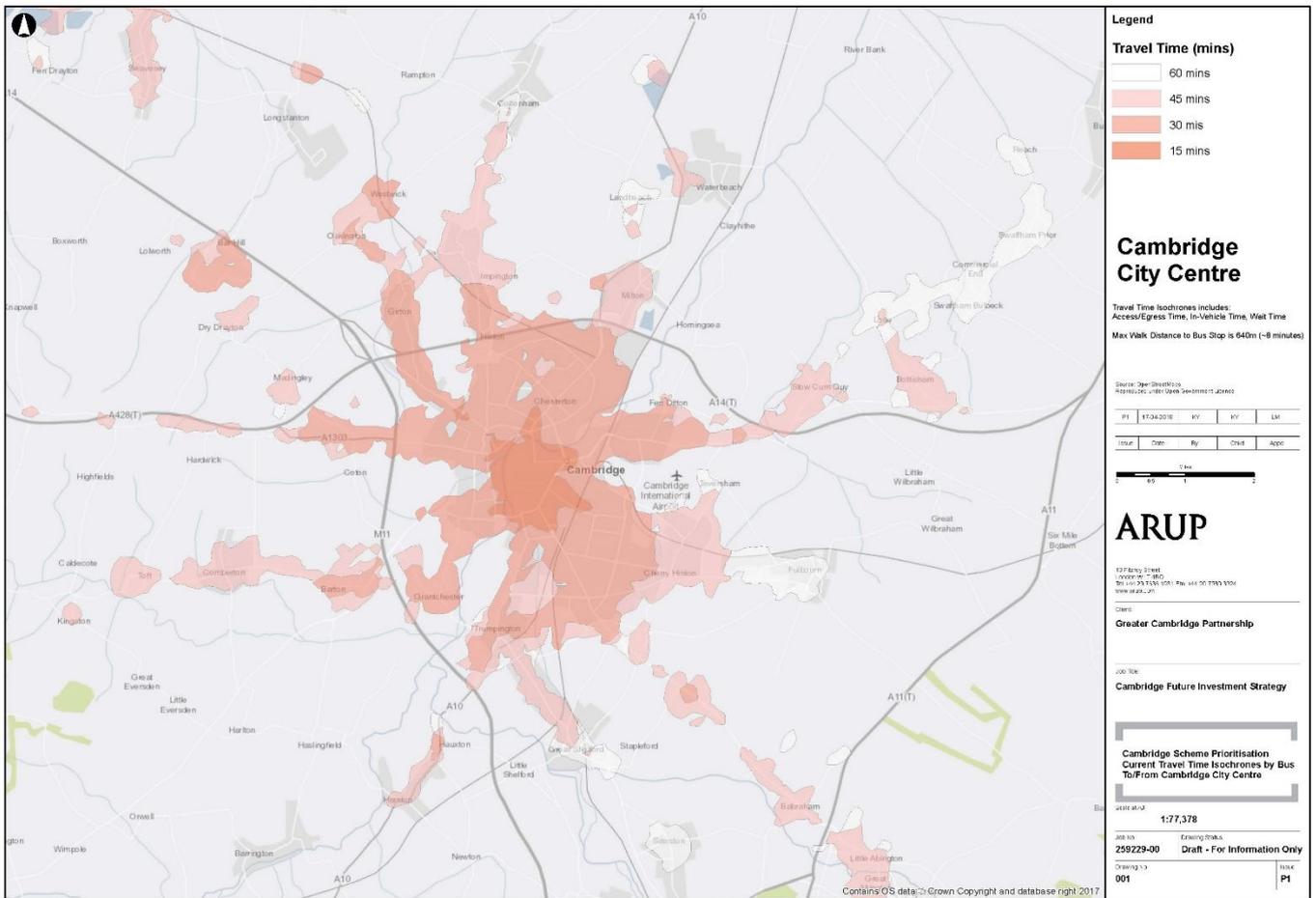
- 6.5. For trips originating from the wider county, the highest number of trips originate from the West (11,300), covering St Neots, Cambourne, St Ives and Huntingdon. These trips equate to around 75% of all trips approaching the city centre from the. 10,400 trips originate from northern areas covering Waterbeach, Ely, March and Chatteris.
- 6.6. External demand from areas significantly outside Cambridgeshire is relatively low in comparison. Demand is spread evenly between northern, southern and western areas and covers far-afield destinations including Kings Lynn, Hitchin/Letchworth, Bishops Stortford and Peterborough.
- 6.7. The evidence demonstrates that a significant amount of cross-city demand exists from northern areas to reach the high profile employment destinations within the south of the city, in particular Addenbrooke's, Hills Road, Biomedical Campus. Demand originating from within the city is coupled with passengers from Waterbeach, Ely and Chatteris creating significant cross-city demand.



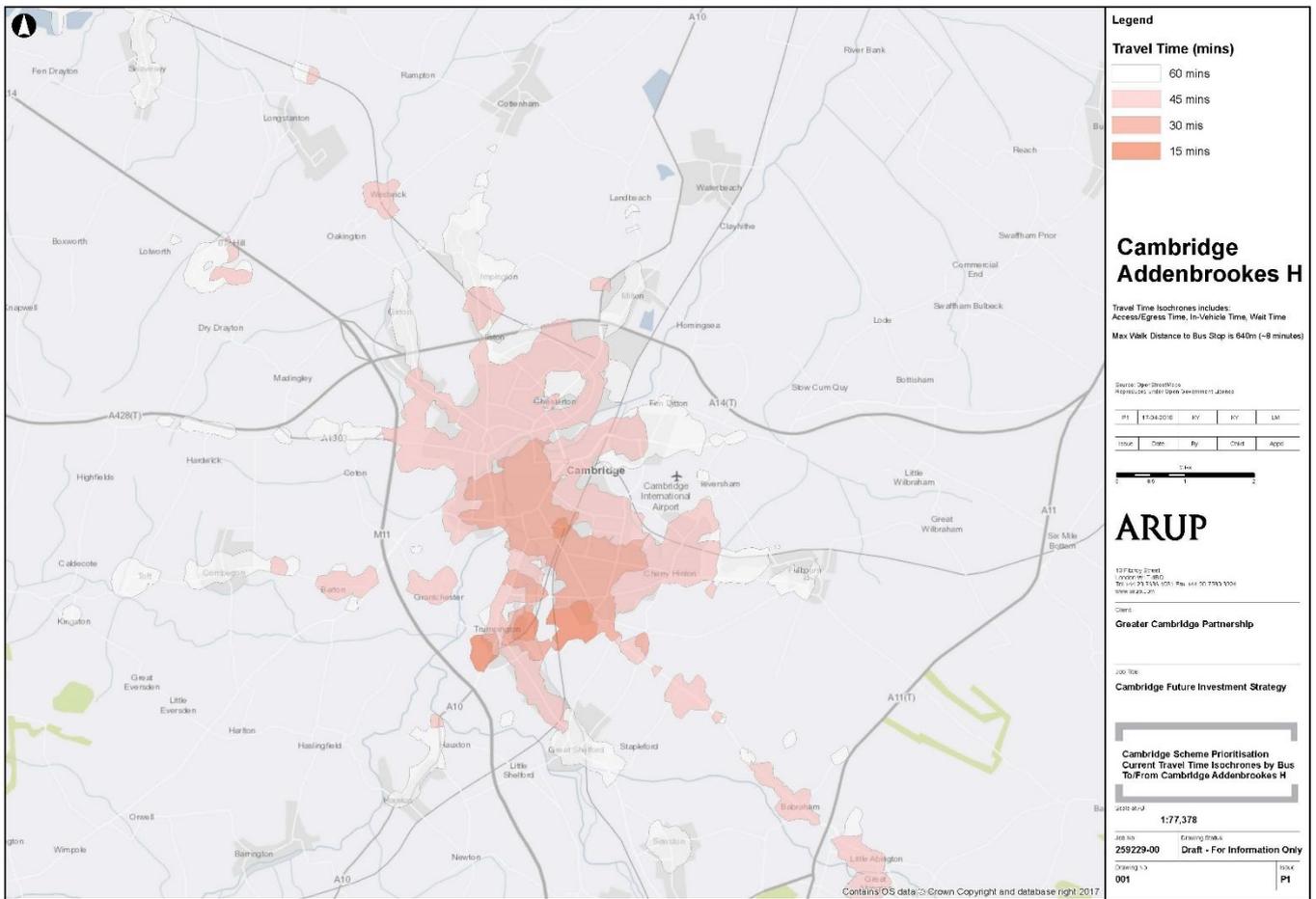
- 6.8. Demand from dense residential areas in the east of the city and key employment areas in the south is also a significant demand flow (3,550). This flow is potentially an area where east-west orbital connections by public transport need to be strengthened.

7. How does public transport connect people to work?

- 7.1. Analysis has been undertaken to establish what areas are accessible within a certain journey time from the six key employment locations. This analysis can then be compared with the information about the main demand flows for people working in that location.
- 7.2. The journey time analysis takes account of door-to-door access times. These include the time spent walking to access public transport stops, the time spent waiting for a specific service, the time spent in transit and any interchanges that may be required. The results are presented at 15-minute time bands up to a maximum of 60 minutes.
- 7.3. Accessibility by public transport in Cambridge is currently focused significantly on serving the city centre areas and Cambridge station. Most areas of central Cambridge are accessible within a 30 minute total travel time. This covers crucial areas of high demand in the north of the city and city employment centres situated in the south.



- 7.4. Locations immediately beyond the City boundary such as Histon and Impington are generally within a 45 minute PT journey time band, as well as Cherry Hinton to the south east. At this level, public transport journey times become uncompetitive with car journey times. Towns and villages located in the surrounding areas including Waterbeach, Stapleford, Sawston and Cottenham have a 60 minute or greater journey time by PT. These are areas where private car use for journey to work is likely to be significantly greater.
- 7.5. Similar analysis for key employment nodes outside of the city centre shows them to be less accessible by public transport than the pattern shown on map above. As a general rule, the out of centre employment nodes are only accessible within 45 minutes from settlements on the same side of Cambridge as the employment location (e.g. Cambridge Science Park in most cases is only accessible by areas to the north of Cambridge).
- 7.6. Journeys to work from outside Cambridge that need to cross or go round the city centre are much less likely to be possible within 45 minutes. In many cases this overall journey time is increased by the lack of through-services that cross the city. It should be noted that more cross-city bus services used to operate but because of city centre congestion reliability was too poor to sustain.
- 7.7. The guided busway helps to improve cross-city movements. This enables Addenbrooke's to be reached within 45 minutes or some areas of north Cambridge, but accessibility to other employment locations in the south is more limited and clearly demonstrates the benefit of segregated public transport solutions.



7.8. Movements across the city starting in the east are relatively well catered for in terms of service provision (most areas can be reached within 45 minutes), but this doesn't compare well with car journey times on those routes.

7.9. Movements across the city starting in the west are less well served. Routes are limited with many parts of Cambridge not accessible within a 60 minute and greater travel time by PT including the Newmarket Road corridor and Cambridge airport.

8. Where does (or can) public transport offer a competitive alternative to car based commuting?

8.1. Analysis has been undertaken to establish where and how public transport is – or can be made to be – a competitive commuting alternative to car. This has involved comparing average car and public transport journeys along key demand corridors.

8.2. Understanding relative competitiveness involves understanding the true cost of each option. People make travel decision based on a range of factors, but journey time is a key one, especially for commuting. Public responses to our Big Conversation travel survey, undertaken in 2017, bear out this observation.

8.3. To better understand how public transport and car options compare in different parts of the GCP area, a calculation has been made of the total cost of a journey in terms of a simple

'Generalised Journey Cost' (GJC) – that is to say, the total cost of a trip from A to B, by different modes. This GJC is a composite measure including both financial³ and time costs⁴.

8.4. Using the census journey to work analysis to understand the most important demand flows we have identified how the overall cost of journeys on those key flows are made up. The intention is that this can help to identify which policy levers might have the most impact:

- Reducing the financial cost of public transport
- In vehicle public transport journey time improvements
- Public transport wait time improvements (increased service frequencies);
- Public transport accessibility improvements (better connecting homes and workplaces with new routes)
- Increasing the financial cost of car travel

8.5. Headline findings of the competitiveness analysis are:

- In some parts of the City, public transport is very competitive, particularly for trips that begin in the City centre and travel south. However, cross-city (north to south) trips are less competitive (this is the major cross city demand flow).
- For the most important travel to work demand flows in Greater Cambridge, there are very few routes where public transport is currently more competitive than car for the same journey
- For travel within Cambridge City, the contribution that fare makes to overall journey cost is around 25% (the remainder being time cost). This may mean that investment to reduce public transport fares may be less effective than investment to reduce travel times.
- For travel within Cambridge City and for those settlements just outside Cambridge the largest element of time cost is usually time spent in-vehicle, suggesting that schemes geared towards reducing journey times may be most likely to include mode shift.
- For some of the larger settlements further out of Cambridge access times to public transport become important in the relative non-competitiveness of public transport.

8.6. Further analysis was undertaken to establish the likely impacts of different interventions. These included testing removing public transport fares from the calculations, testing reduced in vehicle journey times. Headline results from the sensitivity analysis are:

- Introduction of faster journey times significantly improves public transport attractiveness for Cambridge City. This could also apply to places outside of Cambridge including Huntingdon, Bedford, Royston, Haverhill and Ely.
- Removal of bus fares would help to improve public transport competitiveness within most areas of the inner city but would have much less in outer areas
- For some settlements outside of Cambridge, even where in vehicle journey times can be significantly reduced, the time to get from home to the bus or train may still prevent public transport from being as attractive as car.

9. What are the implications for prioritising investment?

Emerging recommendations

9.1. Analysis of the public transport evidence suggest that a mix of policy levers will be required to develop a system that is genuinely competitive with car and delivers the accessibility,

³ For the purposes of this analysis, the financial elements of the GJC for car made up of fuel costs and parking charges. For public transport it is bus or train fare.

⁴ For car journeys time cost relates to in vehicle travel time only. For public transport journeys the time cost is made up of the time taken to get to and from the bus stop or train station at either end of the journey, the average wait time for a service (based on timetable data), and the actual in-vehicle journey time.

competitiveness and capacity to serve current and future demand. The evidence supports the importance of schemes currently being developed by GCP and mass transit proposals being developed by the Combined Authority.

- 9.2. For most residents west of the M11 or north of the A14, Addenbrooke's/ Cambridge Biomedical Campus and other employment locations to the south are an unattractively long public transport commute. There are some 30,000 new homes planned to the north and west of Cambridge, and around 20,000 new jobs at CBC, Babraham Research Campus and Granta Park. Without investment in cross city connectivity, new residents of those areas are very unlikely to travel to work by public transport.
- 9.3. The proposed Cambridge South station will support an improvement by facilitating cross-city rail travel as well as supporting public transport to the Cambridge Biomedical Campus by removing the need for passengers from the south to go into Cambridge and out again.
- 9.4. GCP is already making investment to facilitate active travel routes crossing the city by walking or cycling with including the Chisholm Trail, cross city cycle links and targeted measures to support walking and cycling. Measures to improve bus journey times on Milton and Histon roads will also make improvements.
- 9.5. The analysis suggests that investment to deliver substantial journey time reductions for public transport is likely to have the biggest potential to impact mode shift from car. GCP continues to support the Mayor and Combined Authority in their current work to introduce the Cambridgeshire Autonomous Metro (CAM), with the intention of delivering journey time improvements of this scale.
- 9.6. Evidence shows that the existing guided busway already makes travel from areas served to the north east more competitive than car for areas along the segregated route. Proposals for segregated public transport solutions on routes into Cambridge will deliver significant improvements.
- 9.7. The competitiveness analysis suggests that the places that are likely to be the 'quickest wins' for mode shift are likely to be city fringe areas and the closest settlements outside of the City. For example, areas to the south east of Cambridge (Cherry Hinton and Fulbourne) are uncompetitive for public transport compared to other areas of similar distance from the centre, and the same is true of areas to the east of the station. Depending on the options emerging from the CAM options testing currently underway, additional investment may need to be made at city fringes to improve bus connectivity, journey times and reliability to support growth in those areas. Walking and cycling interventions will also be a more important part of the overall mix of provision in these areas in terms of targeting congestion.
- 9.8. GCP is currently developing options to achieve this for CAM and for the existing public transport network, including rural travel hubs, autonomous vehicles for last mile solutions at campus employment locations, increased park and ride provision to allow people to access existing and future public transport more easily and potentially traditional bus or on-demand public feeder services.

10. Summary

- 10.1. To achieve traffic demand reduction targets whilst accommodating planned growth in Greater Cambridge is likely to require significant additional public transport patronage as well as accommodating planned future growth in population and employment. This is a step change in public transport usage.

- 10.2. The public transport analysis presented here has identified the key weaknesses in the current situation and the priorities for improvement to make public transport a genuinely attractive alternative to car. This analysis supports the current list of scheme priorities identified all of which are targeted improving public transport competitiveness in areas of current concern, and supporting planned growth, as outlined in paragraph 4.4.
- 10.3. This analysis is ongoing and will be used to prioritise specific investments to be taken forward to ensure the right schemes proceed to more detailed analysis through the conventional project definition and scheme development process.
- 10.4. The Joint Assembly is asked to comment on the progress to date on the public transport elements of this paper and provide any views on the options for achieving modal shift outlined in this paper.