Future Mobility Zone
for
Greater Cambridge

Contents

SECTION A – Name, location and description of the FMZ

A1. FMZ name and location (Map is provided in Appendix A):

The Greater Cambridge Future Mobility Zone (FMZ) will be focussed on Cambridge City and the area covered by South Cambridgeshire District Council. Within the Greater Cambridge area we will be working within concentrated areas that create a coherent, integrated 'future mobility zone' (see maps – appendix a). We will work with travellers from across the whole 'travel to work' area, and will scale at pace from Greater Cambridge across the Cambridgeshire and Peterborough Combined Authority (CPCA) area including Peterborough, Fenland, East Cambridgeshire and Huntingdonshire as well as the Cambridge – Milton Keynes – Oxford arc.

A2. FMZ description

The Greater Cambridge area is located within the Cambridgeshire and Peterborough Combined Authority region and has an internationally significant reputation with considerable growth in employment and housing. Greater Cambridge is leading the way in sustainable mobility as the UK's number one cycling city, with plans for a world leading autonomous metro system (CAM).

Greater Cambridge will become a model for how smaller cities can harness new and emerging mobility technologies to create a public transport system for all that is better than the car. It will do this by creating an integrated, end to end mobility system, putting the traveller at its heart.

The FMZ will deliver a number of schemes that will come together with existing infrastructure investment plans to create a world class transport system:

- Tackling the first/last mile challenge to allow seamless travel to homes, work, education and leisure, through demand responsive transport, micromobility and autonomous shuttles;

- Implementing smart network management to create a better traveller experience which supports our shift to sustainable modes, making it easy for drivers to link to the public transport system at the city's edge, managing demand and making more efficient use of limited road space with solutions for deliveries, parking and routing;

- Capitalising on advanced data techniques such as Artificial Intelligence (AI), machine learning and big data analytics, to improve the traveller experience with better information and more convenient payment options. Gaining a deeper understanding of travellers' experiences and reasons for their choices, so we can build a mobility eco-system tailored to support travellers making sustainable choices.

In delivering these projects we will build on Cambridge's innovation networks creating a mobility marketplace to support innovators to develop new products, helping them pilot and grow new solutions for the benefit of the UK, and opening up opportunities using our strong international connections.

Table of changes made to original outline proposal as submitted in Phase One as a result of DfT feedback	
Area identified by DfT	**Nature of change made**
Clarify our role in mobility marketplace	Better described our role in the Mobility Marketplace
Narrow down/clarify zone geography	Developed maps (available in Appendix A) that show the specific geographies we propose to work in for each project and how the projects come together in specific areas to create a coherent whole – the FMZ of Greater Cambridge.
Identify revenue funding	Throughout the document we have identified opportunities for on-going revenue funding to ensure that successful schemes are sustainable.
More on how we can achieve modal shift	Clarified how the proposed projects support modal shift away from the car and onto more sustainable modes – Public Transport, Shared Transport, Walking, Micro-mobility
More on risk	A detailed risk register is available in Section E1
More on Cybersecurity	Created a work-stream within project 7 which will ensure that we embed robust Cybersecurity approaches in all our projects.
Not Applicable	Number of projects within the programme has risen from 4 to 7

SECTION B – The Strategic Case

B1. Background - What are the zone's objectives

Greater Cambridge is growing rapidly with plans to deliver 33,500 new homes[1] and 44,000 additional jobs[2] by 2031 and to date employment growth has been ahead of target. Congestion is a significant issue and if we continue as we are, by 2031 the time travellers spend in traffic will double. To address this we need to get 1 in 4 people out of their cars[3] and onto more sustainable modes.

Existing CPCA and Greater Cambridge Partnership (GCP) schemes focus on providing high quality public transport and cycling infrastructure to reduce congestion and enable growth in jobs and housing. Given the substantial levels of modal shift required, the provision of such infrastructure is necessary but not sufficient. Different types of transport services are needed to extend the range of options for travellers, making public and sustainable transport more attractive. Understanding what encourages travellers to adopt sustainable modes of transport will support policy development and behaviour changes required to achieve modal shift.

The FMZ's objectives:
- Complement and enhance CPCA and GCP infrastructure schemes by addressing gaps in service provision, particularly first/last mile, and developing a mobility marketplace to achieve this;

- Enable equitable access to employment and education opportunities for those living inside and outside Greater Cambridge;

- Remove barriers to the use of public and sustainable transport, and improve the traveller experience;

- Understand traveller behaviour and influences upon it, so that future interventions can be as targeted and impactful as possible.

The zone will help to deliver our ambition to increase prosperity and improve quality of life now and into the future by supporting the creation of a world class transport network that makes sustainable modes more attractive than the car.

B2. Strategic Case - What does the FMZ contribute to the programme objectives?

Introduction

Cambridge experiences over 206,000 vehicle movements into and out of the city every day[4]. Issues with affordability of housing (affordability ratio of 15.62[5]) means travellers are moving further away from the city and spending more time travelling, significantly impacting quality of life and health as well as creating dependence on the private car. The area is growing rapidly with plans to build 33,500 houses by 2031 and to create 44,000 new jobs. This will put increasing pressure on the transport network and if we don't do

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[1] Cambridge Local Plan 2018 - https://www.cambridge.gov.uk/local-plan-2018
South Cambs Local Plan 2018 - https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/the-adopted-development-plan/south-cambridgeshire-local-plan-2018/
[2] Local plans
[3] Agreed Greater Cambridge Partnership Board target
[4] Traffic Monitoring Report 2018 https://ccc-live.storage.googleapis.com/upload/www.cambridgeshire.gov.uk/residents/travel-roads-and-parking/Traffic%20Monitoring%20Report%202018.pdf?inline=true
[5] Centre for Cities - https://www.centreforcities.org/city/cambridge/

anything traffic will increase by 30% at peak in Cambridge and by 40% at peak[6] in surrounding areas doubling the time travellers will spend in traffic.

This will mean a significant worsening of air quality. The centre of Cambridge has been within an Air Quality Management Area since 2004. Air quality has been improving, albeit slowly, in most parts of Cambridge in recent years, but there are parts of the city, including the busy central streets, where levels of nitrogen dioxide (NO_2) continue to be high. The main source of NO2 in Cambridge is vehicle emissions. Public Health data attributed 257 deaths in Cambridgeshire in 2013 to Particulate Air Pollution, compared with 34 from Road Traffic Accidents. The data indicated that of those 257, 47 deaths in Cambridge could be attributed to Particulate Air Pollution[7][8] in 2013.

Cambridge has declared a climate emergency and aspires to be carbon free by 2050. To achieve this we need to radically change the way people travel.

The FMZ will help the CPCA and GCP in their objective to:

Get 1 in 4 people out of their cars and using more sustainable modes including walking, cycling or public transport by creating a world class public transport system that is better than the private car.

Background

The Cambridgeshire and Peterborough Independent Economic Review (CPIER) report (https://www.cpier.org.uk/) explicitly draws the link between transport and economic success, health and well-being, and quality of life of residents, and states the important role of public transport to 'connect students to education and widen employment opportunities, as well as working to alleviate loneliness and isolation among the elderly'. One of the reports key recommendations is that:

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

Cambridge has a global brand thanks to the success of the University of Cambridge and more recently the growth of significant business clusters. The CPIER report identified the importance of Cambridge to the UK and recommended that: '*The UK Government should adopt a 'Cambridge or overseas' mentality towards knowledge-intensive (KI) business in this area, recognising that in an era of international connectivity and footloose labour, many high-value companies will need to relocate abroad if this area no longer meets their needs. Ensuring that Cambridge continues to deliver for KI businesses should be considered a nationally strategic priority'*

The clusters identified by the CPIER report will support the CPCA in leading the way on the government's 'Grand Challenges' set out in the UK Industrial Strategy, doing so in a way which bonds specialisms into a single innovation ecosystem, pioneering and exemplifying better living.

The CPCA's Local Industrial Strategy is focussed on the interventions which will support business growth in a way that is global, productive, and inclusive. The Future Mobility strand is one of the key areas of ambition as we recognise that harnessing new and emerging technology to help address issues such as congestion, pollution and improved connectivity will support our growth ambitions and help to create better places.

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[6] GCP modelling 2018 - Cambridgeshire Strategic Regional Model

[7] Cambridge Air Quality Action Plan 2018 – 2023 - https://www.cambridge.gov.uk/media/3451/air-quality-action-plan-2018.pdf

[8] Cambridge Clean Air Zone feasibility study, https://citydeal-live.storage.googleapis.com/upload/www.greatercambridge.org.uk/cityaccess/Cambridge_CAZ_Final_Report_optimised_web.pdf

The CPCA commissioned 'Cambridgeshire and Peterborough Strategic Bus Review: Options Report' sets out significant improvements needed for public transport that will enhance the network, including: a minimum level of service; committed equity of access for areas of deprivation; evolution of a 'turn up and go' network, and enhancement of access to key employment sites. This is supported by the emerging Local Transport Plan for the CPCA area. Both the report and the plan support the approaches taken in the Future Mobility Zone (FMZ) proposal, articulating how they play an integral part in supporting the ambitions of Greater Cambridge.

Despite its economic success, Cambridge was identified in a Centre for Cities (CfC) report as the most unequal city in the country. The report used experimental data on incomes of residents (which includes wages, pensions, benefits and other income) released by the ONS. It allowed CfC to create a Gini coefficient to measure what inequality looks like across our cities. Using this measure Cambridge was the most unequal with a score of 0.460[9]. The way this inequality is made manifest is in people being forced out of the city by the house price to income ratio and having to travel ever further distances back to the city to access employment. Consequently improving public transport is directly relevant to addressing this inequality, and highlights the need to create a transport system which gives opportunity to all. The FMZ will be for the benefit of all our residents including those accessing employment, education and leisure as well as residents outside the FMZ who travel into or through the zone, in particular opening up access to opportunities for those in deprived communities.

Work is ongoing through the CPCA and the GCP to address these issues. However the nature of the funding and the scale of the problem mean that there is currently little opportunity to systematically explore, trial and deploy innovations in the mobility market which could make a significant impact. The FMZ proposal will fill this gap and allow us to answer some of the key questions we have about the future of mobility. The key areas of learning will be:

- In a small city setting such as Cambridge with a large semi-rural hinterland, how can the core public transport system be developed to support the joint objectives of reducing congestion and improving air quality?
- In particular, can we make public transport more attractive than the private car, financially sustainable, and accessible to all irrespective of circumstance by:

    a) Supplementing the core network with first and last mile services to provide end-to-end transport?
    b) Removing or reducing sources of friction including improved network management to reduce delays, and well as providing improved ticketing and payment?
    c) Providing appropriate 'incentives' to use the new services including mobility credits for relevant groups to achieve personal and societal benefits?

To answer these questions, we have designed a series of seven projects which complement existing investments.

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[9] Centre for Cities - https://www.centreforcities.org/city/cambridge/
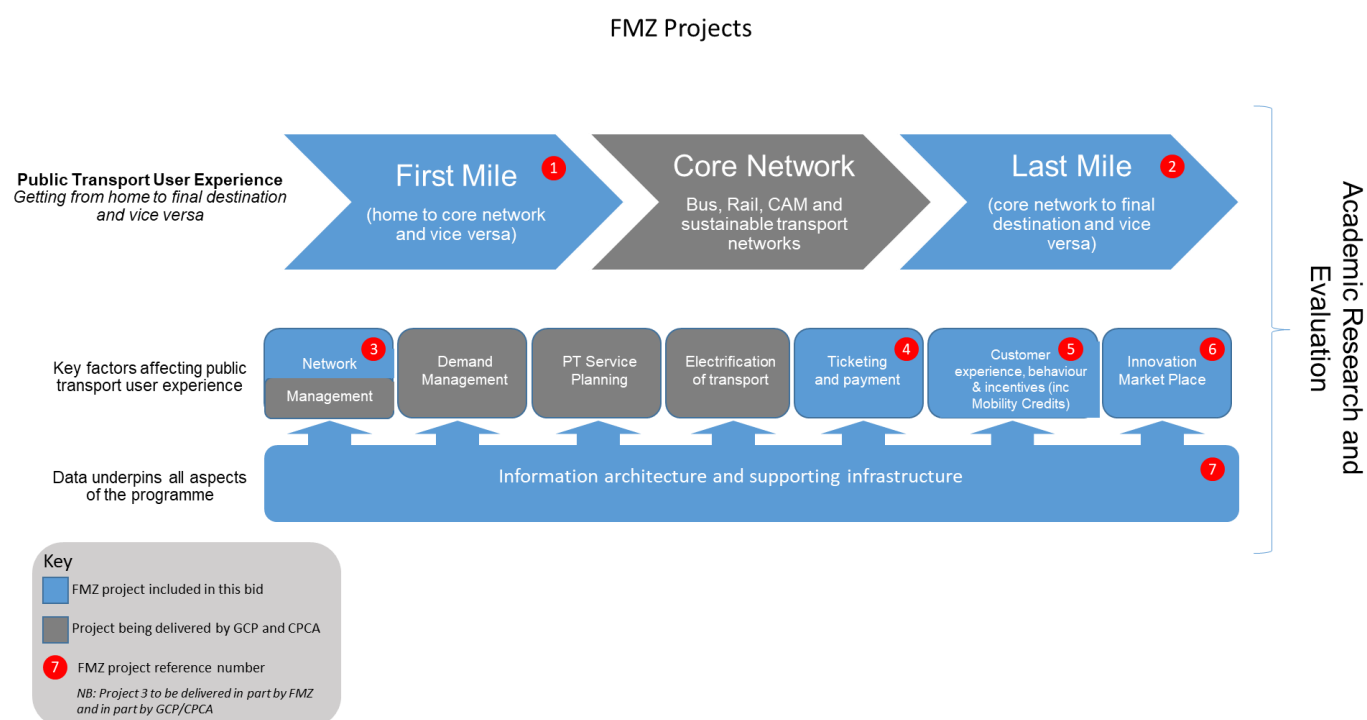
FMZ Projects

The diagram shows how the proposed FMZ projects come together and complement existing and planned GCP/CPCA projects. The key aim of these projects is to create modal shift away from the private car and on to sustainable modes by:

- putting the traveller at the heart of our transport system by understanding traveller behaviour and using a variety of techniques including incentives to achieve modal shift;
- Implementing innovative transport solutions to provide end-to-end public and sustainable journeys with viable business cases;
- Improving access for all to transport for the purposes of employment, education, health and leisure opportunities;
- Ensuring public and sustainable transport is easy to use;
- Facilitating the removal of delays to the network to enable fast and reliable public and sustainable transport.

The geography of the FMZ is shown in Appendix A, and has been selected for the following reasons:

- We need a zone with sufficient population to run trials that are large enough to achieve statistical significance but not so large that we are unable to manage effective delivery;
- The 'target' destination selected is Cambridge Biomedical Campus (CBC) because of the significant level of growth anticipated and the current transport challenges; a strong evidence base prepared as part of the CBC Transport Needs Review Report; and the fact it is representative of many other local campuses and business parks offering the potential to rapidly roll out solutions to these;
- The 'starting' area for people's journeys to the northwest of the city has been chosen because of the challenges residents have in accessing public transport; the fact that it requires cross-city journeys to reach CBC which makes it more challenging; the availability of travel hubs where DRT can enable users to access the core network; and the variety of established and new communities in the area.
- The starting area and target area are only joined by passing through the city centre since major travel hubs including bus and rail stations are located here.

PROJECTS

Project 1 – First Mile (Home into the Core Network)

Traditional bus services have been withdrawn from large areas of the rural and peri-urban area as they are not financially viable without significant subsidies, which have been considerably reduced due to constraints in public finance[10] Residents living in settlements surrounding Cambridge are unable to access alternative transport modes so those that can, drive to employment, education, health and leisure destinations. This has a number of impacts:

- elderly residents become stranded in villages exacerbating issues of loneliness which can have significant health and social impacts;
- residents on lower incomes and/or benefits who don't have access to a car, find it particularly difficult to access the job market;
- young people and residents looking to re-train find it difficult to access educational opportunities;
- residents have no option but to use the private car when they travel to Cambridge for some or all of their journey creating a culture of 'car dependency';
- 'car dependency' adds to congestion and poor air quality.

Cambridgeshire County Council has previously experimented with Demand Responsive Transport (DRT), but it did not produce a sustainable model because the pressure on budgets meant that there was not enough investment in the back-end software and consumer app to provide a customer experience that encouraged behaviour change, vehicles were not to the specification required and no funding was invested in customer acquisition and marketing. Where budgets are tight, a fear of failure has prevented innovation and the testing of multiple models until the right operating model has been found. The FMZ funding will enable the area to be much more innovative in its approach and underwrite the risks of delivery models.

We propose to develop a trial DRT service linking rural areas to travel hubs/employment sites: providing people living outside urban areas with a better level of service that is more cost effective and environmentally friendly than the current option of the private car. The initial geography for the trial is shown on the map in Appendix A. It is an area to the north of Cambridge which will initially link villages and towns in the surrounding area into the core rail/bus and cycling network. This will demonstrate how in the future a DRT service would support the objectives of the Cambridgeshire Autonomous Metro (CAM), by connecting the wider sub-region into the network without generating additional car trips. Of particular interest is how the villages to the north can be linked to employment in the south particularly CBC.

Opportunities to scale will be explored, particularly opportunities to solve the issue of travel into the dispersed network of campuses/business parks located in rural and peri-urban areas which are currently not served by public transport. Currently businesses are investing significantly in their own private transport, which has the unintended consequence of further undermining the viability of the local transport network. By demonstrating how DRT can serve these campuses we can develop a business case for organisations to invest in new public services providing sustainable revenue support.

DRT is particularly relevant for providing integrated transport services for shift workers at both Addenbrooke's and Royal Papworth hospitals on the CBC, including those who are lower paid or for whom transport would otherwise present a barrier to employment. The challenges of accessing CBC are described in the 2019 report "Cambridge Biomedical Campus Transport Needs Review Report"[11] which has also influenced our proposed geography for the FMZ (shown in Appendix A). The report and our evidence base

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[10] Cambridgeshire and Peterborough Strategic Bus Review: Options Report, 16 Jan 2019
[11] Cambridge Biomedical Campus Transport Needs Review Report, 2019

shows that in 2017, there were more than 41,000 daily trips to the campus of which over 28,000 were made by car. By 2031, CBC is expected to see 26,000 workers, 25,100 patients and 16,400 other visitors accessing the campus each day. If current travel patterns continue, this will equate to 67,500 daily trips to the biomedical campus, 46,400 of which are predicted to be made by car.

In the short term the focus will be on connecting residents to the north of Cambridge into the Cambridgeshire Guided Busway and the network of park & ride travel hubs that already exist to support journeys to CBC. The main questions that we aim to answer in this project include:

- What is the optimal operating model for DRT to connect residents to the north of Cambridge into the Cambridgeshire Guided Busway and the network of park & ride travel hubs that already exist to support journeys to CBC?
- How can this operating model be made scalable to other areas in Greater Cambridge and beyond?

We have already engaged with market leaders such as Via-Van as well as operators like Stagecoach and Uber to understand how the market is developing and areas of innovation. Discussions with market leaders have included:

- better use of data (origin and destination, demand and supply etc) in planning how a DRT would operate including geographical scope etc.;
- efficient operating models which match supply and demand dynamically through advanced algorithms and data science;
- better integration. In particular, we have engaged with companies such as MaaS Global, Fleet On-Demand and key operators to understand how we can integrate services bringing more accurate customer information and one-click ticketing, and we have spoken to companies such as Zipabout regarding personalisation/reward and loyalty;
- innovation in the commercial model to optimize the use of the vehicle, using downtime for health and social care transport, parcels etc;
- more demand responsive mobility systems. In particular, we have engaged with Uber, Urban Mobility Partnership, Stagecoach, Ascendal and others about how we can make DRT much more responsive to demand and lower the barriers of entry for potential providers/drivers.

Links to other projects within the FMZ Programme:

Project	Name	
2	Last Mile	Ensuring that first mile solutions integrate with last mile and the core network to create an end-to-end public transport experience
4	Ticketing & Payment	Ensuring ticketing and payment for first mile solutions are easy to use and integrated into the wider transport network
5	Customer Experience, behaviour & incentives	Ensuring that first mile solutions are included in MaaS offerings and Mobility Credit schemes as appropriate
7	Information architecture & supporting infrastructure	Using real-time/static operational data to help plan and operate first mile services

Project 2 – Last Mile (Core Network to the Final Destination)

Last Mile (smart mobility in the city) addresses the need to disperse people to and from the core public transport network so that they can reach their final destinations more easily. Since business parks and campuses (some of which are ~2km from end to end) are a particular feature of the Greater Cambridge area, this will be a focus for the FMZ, with CBC and the historic city centre being the proposed trial sites as shown on the map in Appendix A. This aspect of the FMZ has potential applicability across other small cities in the UK which cannot and will never afford the extensive fixed public transport network that can be justified in the largest conurbations. This project will maximise the benefit of the fixed infrastructure that exists by providing fast, convenient, reliable connections from that network to the ultimate destination. These solutions will be supported by demand management measures ensuring alternative means of movement are viable to travellers, and will help to address issues of congestion and poor air quality.

Building on trials and engagements carried out to date, our Last Mile project will focus on micromobility and autonomous vehicles:

Micromobility: Greater Cambridge already has experience of working with micromobility providers (OfO and Mobike). We plan to build on that experience by working with a wide variety of providers, including services such as floating bikes, fixed bikes, electric bikes and scooters, to develop models that work for both the city and the providers. We will also deploy a network of on-demand bikes that are not currently provided such as cargo bikes, family bikes etc. This will be supported by the city's investment in safe, segregated cycling infrastructure. However to inform new and existing deployments there are a number of questions we are looking to answer:

- What is the best model for deploying micromobility in cities the size of Cambridge and achieving modal shift that ensures the success of the scheme, but avoids some of the anti-social issues associated with micromobility?

- Can we encourage more cycle use by providing different bikes not currently provided by companies such as Mobike, Lime etc, and cargo bikes, family bikes etc on-demand?

- What policies and legislation need to be in place to support deployments?

- What is the role of the city and how can city authorities and providers work better together including sharing mobility and contextual data?

The intention is to test innovative business models by developing a micromobility framework which supports successful deployment, an approach for cities to work with micromobility providers and the full integration of micromobility into the transport system.

Autonomous Vehicles: Greater Cambridge has developed a draft autonomous vehicle (AV) strategy which sets out a roadmap for how AV's can support the area's transport plans, including last mile. To demonstrate the role of autonomy in last mile solutions Cambridge is part of a CCAV3 project which will deliver 12 seater autonomous shuttles on the southern section of the Cambridgeshire Guided Busway serving an overnight market from the biomedical campus (which includes two large hospitals), the central railway station and a park & ride. The initial vehicle trial will begin this year and eventually expand to 6 vehicles. This will become part of the FMZ and we will look to expand its scope to measure the impact of being able to extend the service around the biomedical campus to create a much more customer focused offering.

We would use the FMZ funding to develop a further pilot in the city using a different provider to ensure that the operating model is robust. We have visited a number of autonomous vehicle deployments across Europe and engaged with both existing suppliers (Navya, Easy Mile and Parkshuttle) and a new supplier set to come into the market. Initial trials have concentrated mainly on the technology. We will work with operators to establish innovation in the way the vehicles operate and integrate, particularly concentrating on the business case. There are a number of questions we are looking to answer:

- What is the role for autonomy in the public transport system?
- What are the advantages for travellers?
- What is the public perception of autonomy?
- What is the business case and operating model for publicly available services?

Links to other projects within the FMZ Programme:

Project	Name	
1	First Mile	Ensuring that last mile solutions integrate with first mile and the core network to create an end-to-end public transport experience
4	Ticketing & Payment	Ensuring that ticketing and payment for last mile solutions are easy to use and integrated into the wider transport network
5	Customer Experience, behaviour & incentives	Ensuring that last mile solutions are included in MaaS offerings and Mobility Credit schemes as appropriate
7	Information architecture & supporting infrastructure	Using real-time/static operational data to help plan and operate last mile services

Project 3 – Network Management

Currently, as in many small cities, Cambridge has little active management of the road network with the emphasis being on reactive responses to problems. Within the city there is also no active management of the kerb for parking, deliveries etc. and this is causing significant issues such as congestion, delays to public transport and impact on air quality. The city is exploring how demand can be managed and the possible use of mechanisms such as road pricing, low emission zones, workplace parking levy (WPL) etc. This project needs to deliver better management of the network in a way that encourages and prioritises sustainable transport, supports infrastructure projects such as the re-allocation of road space and provides the revenue needed to support the current transport system.

Outside the City (along the main arterial routes as shown on map in Appendix A)

We will actively manage the road network in a way that supports a move toward more sustainable modes. This includes using improved real-time network and disruption data combined with machine learning to provide messaging both in the car and through roadside Variable Message Screens (VMS) encouraging drivers to switch to public transport before they enter the city, giving timely information on incidents/events etc and encouraging the use of park & rides. To do this we will need to exchange data between the strategic and local road network.

In the Cambridge region, the A14(M) is nearing completion and will be one of the 'smartest' sections of road in the country. In addition, there are already plans in place to improve the A428 and a bid to include the M11 Smart Motorway proposal in RIS2. These planned works offer a significant opportunity to enhance the road network management and to ensure that we take a holistic approach across both the local and strategic network. The proposed FMZ schemes will have the potential to build on this work and scale across the

Oxford – Cambridge arc in future, allowing strategic management of the wider network and east-west journeys, giving travellers access to better information to make more informed choices.

In the City

The project will result in improved management of the city network and will create a much more adaptive environment driven by real-time network and disruption data as well as an adaptive infrastructure. The project will primarily deploy within the central core of Cambridge with elements being deployed across the whole city. Key elements of network management in the city include:

Sensor Network:
- We will create a much better understanding of movement by deploying a network of hyperlocal sensors across the network that will provide movement data including cycling and walking. This builds on our work with Vivacity and Telensa (Urban Data project with Microsoft, Samsung, Qualcomm and Kainos) deploying state of the art cameras to collect movement data and examining the business case behind at scale deployments, these will feed into the LAMP deployment in project 7.

Kerb management:
- We will build on our work with AppyWay (previously AppyParking) to better manage the kerb through real-time data and the ability to be adaptive in the way the kerb and road space is used. AppyWay are leading innovation in kerbside management and we would look to further develop how data can be used to manage both the kerb and the network. Kerbside management can help councils to optimise revenues as parking spaces are removed to re-allocate road space to more sustainable modes (cycling, pedestrians and buses) and motorised vehicles become unable to access areas of the city through pedestriansation. As parking provision is reduced, real-time data will show availability to prevent unnecessary network usage by cars being driven round in search of a space.
- We will support the move to electric vehicles (EV) by enabling users to get real-time information on EV spaces and the ability to book charging points.
- The kerb will better support deliveries, coach parking, on-demand services and eventually autonomous vehicles by dynamically changing uses, allowing booking, monitoring dwell time and turnover rates, allowing frictionless charging and improving enforcement. This includes the management and monitoring of the large number of tourist coaches which are a cause of public concern.

Digitising the Traffic Regulation Order (TRO) and other Regulatory Processes:
- We have been collaborating with AppyWay to develop their Mapper tool and to digitise the TRO process. Having accurate kerbside data will support this work and we will look to develop the digitisation process further. Mapper can also be used to designate permitted drop-off and pick up zones for electric bikes and scooters, with geo-fence alerts. We recognise that there needs to be the right regulatory framework in place to support our kerbside management ambitions and will work with DfT on any changes needed.

Support for future demand management solutions:
- As part of this project, we will work with the GCP on any future demand management solutions should they be adopted which would manage the volume of traffic in the city and create opportunities to prioritise sustainable modes. As part of the pricing work we would look at dynamic pricing for the kerb to manage demand for space.

Signals:

- As part of this project, we will work with the GCP team to optimize the current signals network and begin to explore how better movement data and AI can create infrastructure which is more intelligent and better able to respond to predicted network conditions and prioritization strategies. This will build on our links with TfL, TRL and Vivacity all of whom are looking to innovate in the signals space.

By bringing multiple real-time (movement) and static contextual data streams together and leveraging the power of AI and machine learning, we will create an adaptive environment based on prediction which hasn't been seen in a city the size of Cambridge before. It will mean we can manage demand for both the network and the kerb and use these levers to address the challenge of congestion and poor air quality whilst supporting ambitions to re-allocate road space. To do this we will need an innovative federated data infrastructure that communicates with vehicles, infrastructure and travellers. We will develop revenue mechanisms that will make the system sustainable and affordable for other cities, creating a highly replicable model. It will enable new mobility models and demonstrate how technology can help create better places.

The questions we are seeking to answer in this project are:

- What is the optimal operating model for network management both inside and outside the city to promote public and sustainable transport?
- What revenue generating opportunities are there which would compensate for potential reductions in the number of parking spaces should such a policy be adopted as part of demand management?

Links to other projects within the FMZ Programme:

Project	Name	
1	First Mile	We will work with other projects (including those relating to the Core Network) providing transport solutions to ensure that the network is managed in ways which enable these to run smoothly and efficiently
2	Last Mile	We will work with other projects (including those relating to the Core Network) providing transport solutions to ensure that the network is managed in ways which enable these to run smoothly and efficiently
7	Information architecture & supporting infrastructure	Using real-time/static operational data fed into the LAMP to help plan network interventions, analyse their impacts and redesign future interventions

Project 4 – Ticketing and Payments

Currently, travellers using public transport in Greater Cambridge must use either cash or a variety of tokens including paper, magnetic stripe, chip based plastic cards including ITSO and bank cEMV cards, and mobile phones. Available products vary across operators and modes of transport, meaning that travellers often have to pay for each leg of their journey separately. The price charged for the same journey by different operators varies, in some cases significantly.

This situation is not conducive to persuading people to travel by public transport, and there is some evidence to suggest that the adoption of integrated ticketing can drive increased public transport ridership[12].

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[12] What Works Centre for Local Economic Growth, 'Evidence Toolkit: Integrated Ticketing'
https://whatworksgrowth.org/resources/transport-toolkit-integrated-ticketing/

Travellers want consistency, ease of use and faster boarding. We need to develop a system used by all operators and meeting all the requirements of passengers on public service vehicles.

The Ticketing and Payments project is an important component of the FMZ proposal. We will put in place a system which integrates operators and potentially modes, supports through its back office the deployment of mobility credits and integrates with MaaS offerings. The Greater Cambridge Partnership Integrated Ticketing Study[13] sets out how this can be achieved and the associated costs. By developing ticketing in Greater Cambridge we will look at how we can use ticketing and payments to develop incentives such as Mobility Credits to support residents on low income, shift behavior to more sustainable modes and develop loyalty (under Project 5). This project will be important in enabling other elements of the FMZ focused on incentivising people out of their cars and onto public transport.

Improved ticketing and payments brings a number of opportunities and benefits to travellers and local authorities:

For travellers:
- Makes it as easy as possible to use public transport;
- Reduces dwell time so contributes to faster, more reliable and easier to use transport;
- Has the potential to lower costs including Automatic Best Fare provision;
- Flexible ticketing covering multi-modal, multi-operator journeys;
- Wider choice of token/payment method;
- Good advance and real-time information provision.

For Local Authorities:
- Increases use of public transport and reducing use of private cars thereby reducing congestion and pollution;
- Creates a more equitable transport system by supporting mobility credits, capping and more methods of payment.
- Creates higher public satisfaction by making it easier to pay for transport.

We will work with both the main transport operators in Cambridge and colleagues across the Oxford - Cambridge arc, who also have ambitions around integrated ticketing, to ensure that we don't create ticketing silos.

The innovation we will demonstrate is in creating an environment that supports multi-operator ticketing and how we can use a ticketing and payments back-office to support the implementation of mobility credits both for travellers on low incomes but also support business in using mobility credits to encourage sustainable travel.

We anticipate that improved ticketing will support and drive a shift in behaviours encouraging travellers out of their cars and on to more sustainable modes. This will be an important component in creating a public transport experience that is better than the private car.

Links to other projects within the FMZ Programme:

Project	Name	
1	First Mile	Ensuring that ticketing and payment for first mile solutions are easy to use and integrated into the wider transport network

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[13] https://www.connectingcambridgeshire.co.uk/wp-content/uploads/2019/08/Greater-Cambridge-Integrated-Ticketing-Final-20190529.pdf

2	Last Mile	Ensuring that ticketing and payment for last mile solutions are easy to use and integrated into the wider transport network
5	Customer experience, behaviour & incentives	To allow review of the Ticketing and Payment solutions put in place and to ensure initiatives such as mobility credits are integrated with the ticketing and payment solutions

Project 5 - Customer experience, behaviour & incentives (including Mobility Credits)

Greater Cambridge has an ambition to get 1 in 4 people out of their cars and to create a world class public transport system that supports this aim by providing public transport, cycling and walking options that are better than the private car to encourage the level of modal shift needed. A significant volume of work has been undertaken to engage with residents about public transport through the GCPs 'Our Big Conversation'[14] and 'Choices for Better Journeys'[15] large scale public consultations, and these have given us a broad understanding of people's current travel behaviours, and their perception of what would make them shift away from the private car.

The next step is to dedicate time to understanding why people make the decisions they do, and how their revealed preferences tally with their stated preferences. To do this, we propose to experiment with various components of the transport system including pricing, ticketing and information to measure what works and supports behaviour change most successfully. For example, our technical analysis of the system suggests that, where the generalised cost of public transport is higher than car (as it is for the majority of the major commuter traffic flows into Greater Cambridge) then in most cases reducing prices, even to zero, would not be sufficient to make public transport competitive. But when we ask people what would persuade them to leave their cars behind, they tell us price is an important factor. Subsidising public transport is very expensive, so it would be helpful to know whether this would actually induce the change people expect it will, or whether the money is better invested in improving the objective quality of the service (frequency, journey time, journey time reliability, investing in last mile etc).

The overall purpose of this project is to:

- Understand traveller behaviour and how schemes within FMZ projects impact modal shift;
- Design and implement trials aimed at changing traveller behaviour of including mobility credits and MaaS

Understanding traveller behaviour and how schemes within FMZ projects impact modal shift

We will carry out deeper research across a broad spectrum of demographics to really understand why people make the travel decisions they do. This will help us to identify friction in the transport system, sensitivity to price, demographic groups that are most likely to switch from the private car etc. We will also draw on the significant amounts of data we have about travel patterns. This research will inform the initial and ongoing design of trials.

Design and implement trials to change traveller behaviour

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[14] https://www.greatercambridge.org.uk/about-city-deal/the-big-conversation/
[15] https://www.greatercambridge.org.uk/cityaccess/choices-for-better-journeys/

We propose to develop a batch of small, robustly evaluated pilots which investigate the impact of behavioural ('nudge') interventions. These will make use of methods such as randomised control trials where possible. We have come up with a number of ideas as to which trials will be of most interest. On appointment, this list would need to be tested and refined in terms of which is deliverable as a meaningful evaluation. We envisage a scoping phase for this project to run in parallel with the evaluation scoping. In partnership with DfT and the partner organisations listed below, we would refine this list of trials on the basis of:

- what is most desirable to understand;
- where learning is most likely to be transferable;
- which are most amenable to delivering robust, transferrable findings – there are practical barriers to evaluation, particularly around sample size, and methodology for randomization which would need to be considered in more detail.

Proposed trials

Mobility Credits: Mobility credits will be made available to help those on lower incomes to access opportunities for work, education and leisure using public transport. It is anticipated that a number of schemes will be trialled, for example, credits to cover the whole cost of the journey for an initial period, and longer term credits subsidies.

As provision of benefits will be complex, we expect to work with several organisations such as employers, job centres, government departments and colleges over the lifecycle of the project. For example, we will need to understand how to identify groups of people for whom mobility can create social benefit; any impact to other benefits or tax implications of credits being provided to travellers and how subsidies could be arranged with operators and how to ensure that those who will benefit most from mobility credits are aware of their introduction and are able to access them easily. With this in mind, we would anticipate identifying a suitable partner, to help us deliver mobility credits in the future phases of the project.

However, following initial meetings with Cambridge Job Centre Plus, we would investigate the option of offering mobility credits as part of their existing Flexible Support Fund in phase one. Work Coaches and Managers at the Job Centre have the option to assess whether additional support (in this case, mobility credits) would assist their client in accepting a work placement which they would otherwise be unable to take on. While budgetary pressures mean that the fund has to be used increasingly carefully, it is at the discretion of the manager who is best placed to assess the need of their client. Working with the Job Centre offers us an excellent way to begin initial trials of mobility credits in the short term as well as giving us the opportunity to support those most in need and evaluate how to develop an offering that will achieve our aim of preventing cost being a barrier to the take up of jobs.

It should be noted that those in low income households already in work could be offered the same access to mobility credits.

We will look to answer a number of questions:

- Does access to affordable transport increase opportunity?
- How should a scheme be administered? For example: Should we provide access to multiple types of transport? How do we withdraw credits when a job is found?
- What is the optimal business and funding model for mobility credits?
- What are the health impacts of better access to transport? This could be an opportunity to work with the Centre for Diet and Activity Research (CEDAR) to establish the outcomes;

Better integration through MaaS: currently the customer experience in the Greater Cambridge area is fragmented, with each mode/operator having their own booking and payment portal, journey planner, information etc. which makes it difficult for travellers to plan multi-modal journeys. From our consultation work we know that this is a barrier to residents moving away from private car use. We have carried out a small pilot of a MaaS type offering at one of our Park & Rides with Atkins. Participants had a positive experience and gave the service an average net promoter score of 8 out of 10, with 75% of users saying they would give up their second car if this service was made permanently available. We want the opportunity to scale this work and to see whether these results can be replicated with a much larger user base.

We have been talking to a number of providers including MaaS Global and Citymapper and have engaged transport providers operating in Cambridge, but have been unable to progress to a pilot as the providers are not in a position to scale from initial trials. The FMZ programme will allow us to answer further questions such as:

- What are the barriers to deployment and how can we help overcome them and unlock the market?
- What is the role of the CPCA in delivering MaaS?
- Does better integration of ticketing, journey planning and information support our aim to get travellers out of their private cars and what is the impact on modal shift?
- What is the role of a Local Authority in the MaaS market?
- How can we support providers?

MaaS has yet to be proven in the UK as a sustainable offering. We will drive innovation in the market by working with MaaS providers to develop a sustainable business model that delivers the modal shift cities require. We anticipate any MaaS offering will include:

- Ubiquitous information and Wayfinding: to create a world class public transport offering we need to develop a world class user experience, and currently it can be difficult to: access accurate real-time data; to find out about predicted arrival times; understand when disruption happens, the impact and options; to navigate through transport hubs and understand what the onward journey options are. Concentrating initially on the station gateway, biomedical campus and the park & ride we will look to leverage new technologies such as Augmented Reality (AR) to deliver.
- Loyalty and reward: Micronex have been working with Stagecoach in Scotland to see how city loyalty cards can be used to reward sustainable behaviours. Cambridge already has a loyalty scheme managed by Micronex and we would look to use this infrastructure to experiment with reward/loyalty.
- Access to micromobility offerings described in Project 2: including cargo bikes, bikes for transporting children and electric bikes.

This project would provide the opportunity to understand how MaaS can change traveller behaviour and achieve modal shift.

To support this project we will work with the University of Cambridge and the What Works Centre for Local Economic Growth. We will also look to engage with the Behavioural Insights Unit at the Cabinet Office and draw on the cross-governmental Trials Advisory Panel. This will ensure that the trials have strong academic rigour and that we develop an understanding of the interventions that actually work and how they can be made scalable and easily transferable to other cities.

We propose to convene a group of transport users (including less able travellers) who will be able to help in the design of projects to ensure we design a transport system accessible to all. This will help to prevent issues such as technological abandonment, where new technology is not fit for purpose.

Links to other projects within the FMZ Programme:

Project	Name	
1	First Mile	First mile services will be provided directly to the traveller and take up of those services will consequently be reviewed in this project
2	Last Mile	Last mile services will be provided directly to the traveller and take up of those services will consequently be reviewed in this project
4	Ticketing & Payment	Ticketing and payment services will be provided directly to the traveller and take up and impact of these services will be reviewed as part of this project
7	Information architecture & supporting infrastructure	Using real-time/static operational data to help plan and operate last mile services

Project 6 – Mobility Marketplace

Cambridge is renowned for innovation and has the highest number of patent applications per 100,000 people for any city in the UK (341, which is more than twice the closest competitor, Coventry, with 118[16]) It also has one of the most successful University innovation eco-systems across the globe and a world class innovation eco-system of accelerators, incubators and venture capital. The Greater Cambridge cluster business networking culture is a unique phenomenon, the transfer of knowledge and development of opportune business relationships through 'chance' encounters at events are a hallmark of this region's success. Cambridge Wireless (CW) one of the largest networking organisations has an established mobility network with a Transport and Automotive and Smart Cities special interest groups and were founder members of the Midlands Autonomous Vehicle Cluster which sought to bring the manufacturing expertise of the Midlands together with the technology innovation cluster in Cambridge. CW has also partnered with Magna to run future mobility innovation days with the University of Cambridge. However our engagement with this cluster has been unstructured to date. The FMZ funding will support us in engaging with the Innovation eco-system in a much more structured way, framing the cities mobility challenges and engaging the market in helping to solve them.

The aim of this project is to develop this eco-system to ensure it is engaged with transport and related issues that the FMZ programme will address.

The project will deliver the following:

- Identification of barriers to innovation and development of solutions to address this;
- Ensuring that enabling infrastructure is available;
- Develop and execute a plan to engage more organisations in the innovation eco-system;
- Build an innovation accelerator;
- Ensure lessons are learned and knowledge is shared with other areas.

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[16] https://www.centreforcities.org/city/cambridge/

Our approach is informed by the Future of Mobility: Urban Strategy[17]
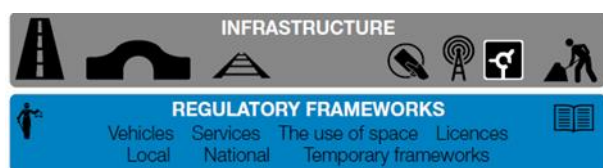
Identification of barriers to innovation and development of solutions to address this

We propose to work with DfT, colleagues in the public sector and business to identify the regulatory and policy barriers to deploying new mobility models and working with organisations to unlock opportunity. We have already begun to engage with the traffic commissioner on new mobility operating models through our autonomous vehicle project and will continue to do so for the FMZ. As part of an Innovate UK project with AppyWay we are working to digitise our TRO process and to make the data open.
We will look to create a regulatory and policy environment that supports our aims to encourage modal shift to more sustainable modes, shifting travellers away from the private car.

Ensuring that enabling infrastructure is available

- Connectivity: The Cambridgeshire County Council led Connecting Cambridgeshire programme is investing up to £80 million to ensure that connectivity is available across the county, investing in fibre networks, mobile coverage, public access WiFi and new technologies such as 5G. The programme has worked with the Smart Cambridge team to build LoRa and SIGFOX networks that will be open to the market and has formed a joint venture with the University that will make fibre and ducting across the city commercially available to the market. Public access WiFi is already available in parts of the city with plans to expand further. This will support the development of the mobility market.

- Barrier Busting: Cambridgeshire and Peterborough is among the first areas in the country to set up a dedicated team to proactively remove the barriers to the rapid delivery of digital infrastructure[18]. It will support the bid by providing a central contact point to resolve any deployment issues that arise.

- Data infrastructure: underpinning mobility data infrastructure will make data open to the market through Application Programme Interfaces (APIs). It will support both experimentation and commercial deployments with robust Service Level Agreements (SLAs) which give confidence in the supply of data. The data available will include real-time transit data, routing data, disruption data, network data, air quality, car park data etc. We have already established a base to build on through our Intelligent City Platform (iCP) collaboration with the university and have been working with ITO world who have developed an open transit data hub and are supporting us in feeding data into journey planners such as Google Transit and Apple Maps.

- Access to assets: where appropriate we will support the use of assets owned by the council to support the mobility market.

Develop and execute a plan to engage more organisations in the innovation ecosystem

Whilst Cambridge has a vibrant innovation eco-system, we want to ensure that we engage with all relevant organisations with an emphasis on SMEs and start-ups. We will develop an engagement plan working in

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[17] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/786654/future-of-mobility-strategy.pdf

[18] https://www.connectingcambridgeshire.co.uk/enabling-digital-delivery/

collaboration with established business networks such as Cambridge Network[19] and Cambridge Ahead[20] as well as the University of Cambridge, from which many start-ups spin out. This will be structured in a way that the eco-system can help to solve 'real-world' mobility challenges, using Cambridge as a test-bed.

Build an innovation accelerator

Mobility Services Layer

To support the existing core network and transformations already planned by the CPCA and the GCP, we would look for the marketplace to deploy solutions which support a move away from the private car and onto more sustainable modes through the deployment of micromobility, DRT, shared and on-demand vehicles, and improved infrastructure to support walking and cycling. To develop new mobility offerings and drive innovation we will work with Ascendal to build an accelerator. This first of its kind 'operational' accelerator will provide operators with a depot and engineers, to support trialling as well as the more traditional desk space and business support including a network of international contacts in the mobility space.

Option Selection and Purchasing layer

Other projects within the FMZ depend upon existing and new mobility providers, for example:
- Project 4: will develop a ticketing environment that supports better integration and easier payments.
- Project 7: we will look to provide to the market the best possible information on journey options (price, speed, modes, routes), disruption data etc.

We will work with providers to develop the commercial model for sharing data, creating interoperable payment systems and business models that can support better integration. Where regulatory arrangements are a barrier to integration we will work with the relevant bodies to help create a regulatory environment that enables the market.

Ensure lessons are learned and knowledge is shared with other areas.

As will all projects in the FMZ, we will provide learnings and knowledge transfer to enable other areas to benefit from our experience.

Links to other projects within the FMZ Programme:

Project	Name	
1	First Mile	
2	Last Mile	Ensure that innovations developed as a result of the mobility marketplace are complementary to existing solutions/services
3	Network Management	

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[19] https://www.cambridgenetwork.co.uk/

[20] https://www.cambridgeahead.co.uk/

4	Ticketing & Payment	offered across these projects, or that they offer the potential for
7	Information architecture & supporting infrastructure	improvements/changes to the existing solutions/services

Project 7 – Information Architecture and Supporting Infrastructure

Data is fundamental to the operation of future mobility in general and is a key foundation for the FMZ. For example, it will drive network management, inform adaptation of infrastructure, support new mobility models and inform planning and policy work.

This project will:

- Define an appropriate architecture that enables future mobility;
- Establish a scalable platform to support the DMZ including all relevant elements of technology and infrastructure.

Extensive work has already been completed to access data across the Cambridgeshire public sector. We have completed a mobility data audit and are investigating how to make this data (including network information, car parking, air quality, static transit data, real-time transit, assets etc.) available as well as working with partners to access further data (origin and destination, car parking etc.).

We have an existing real-time data platform known as the Intelligent City Platform (iCP) which was built in collaboration with the University of Cambridge and continues to be developed. This platform includes a sensor network, extensive data and analysis tools and is underpinned by the university's cutting edge research in areas such as predictive analytics, machine learning, artificial intelligence and big data analytics. The learnings from the iCP will inform this project so that we continue to innovate and push the boundaries. We have also worked with ITO World to develop a transit data hub that cleans and structures real-time and static data and feeds it into Google Transit, Apple Maps and our own journey planner Motion Map.

The iCP has been very successful but it is unlikely to meet all the needs of future mobility, the ITO world Data Hub provides a basis to build on for transit data and therefore the definition of an appropriate architecture will include a 'gap' analysis between the 'as is' and the 'to be'. We will use the DfT LAMP toolkit to develop a Local Authority Mobility Platform which will underpin the proposed projects and support the mobility marketplace. It will marry existing transport standards families (e.g. UTMC) with new and emerging standards for C-ITS, CAV and other IoT-enabled mobility solutions. This will enable us to establish mobility platforms which are able to accept multiple data types as input, host applications (traffic control, messaging, kerbside management etc) and provide data analysis as outputs. To procure this we will use the emerging DfT LAMP framework. We anticipate that we will work across a number of systems/platforms and interoperability and open standards will ensure that these platforms can work together.

As part of this work to design and implement an appropriate information architecture and supporting infrastructure, there are a number of key issues that will be addressed:

Standards:
- We will work with British Standards Institute to ensure that we take a standards based approach and to support the development of new mobility standards.
- The key question we will answer is: What standards do we need to adopt to ensure that developers can easily use our data and combine with data from other authorities supporting interoperability and open eco-systems?

Ethics:
- It is important that as we begin to collect more granular data particularly data which allows vehicles/individuals to be identified so that we develop an ethical framework and a mechanism for transparency. We will develop a methodology which brings local communities and decision makers into the process for deciding what data is collected and how it is used through a data trust/guardian model.
- The key question we will answer is "how do we collect the data that the authority and mobility market need in a way that is ethical and acceptable to communities, this is becoming more pertinent as cameras are increasingly used to collect data?"

Cybersecurity:
- We will work with experts in Cybersecurity both in the University of Cambridge computer laboratory and the private sector to ensure that projects are secure and comply with existing standards as well as anticipating future issues with emerging technology.

Connectivity:
- We will collaborate with partners to ensure that the correct connectivity is in place to support future mobility solutions.

Overcoming Barriers to Delivery:
- Support the delivery of projects by overcoming barriers.

Business Model
- What is the business model for local authorities in building data infrastructure and how can we generate on-going revenue?
- Data Market - What data does the market want – real-time, static, origin and destination etc?

Innovation:
- We have been working with the mobility data market for some time. We have worked with Appy Way who are innovating in Kerbside management and we would look to integrate the Kerb into LAMP. We have been working with a number of innovative companies, ITO World, Zipabout, Alchera, Geospock Immense to help inform our proposed architecture as well as working closely with the University of Cambridge computer labs to ensure that we will take advantage of the very latest innovations. There may also be an opportunity to bring the new transport model being developed by Oxfordshire into the LAMP to drive predictive work and inform strategy.

Links to other projects within the FMZ Programme:
This project is closely related to all other FMZ projects all of which need and/or provide information to achieve their aims.

Relationship of the FMZ Programme to the other projects in the Greater Cambridge area

Many other projects and operations currently being conducted by the CPCA, County Council and the GCP will also make significant contributions to the FMZ and to the end experience of travellers within it. Since they are already in progress, these projects do not form part of the bid itself although they will may a significant contribution to it:

- **Future of Signals:** the relevant local authorities are currently going through a process of optimizing our SCOOT signals system. The approach is future focused and we are engaged with a number of

organizations including TFL, TRL and Vivacity to understand how signals will evolve. Our ambition is to become a pilot site for new technologies.

- **Bus Network:** Our primary operator Stagecoach is in the process of re-designing its network using data collected to ensure that it gives the best possible customer experience. The GCP and CPCA have also carried out significant work looking at how the network can be optimised and are also looking at how Advanced Quality Bus Partnerships or Franchising could support our ambition of a world class transport system. This work will also support our first/last mile work.

- **Demand Management:** The Greater Cambridge Partnership is considering different options for how demand management can help the city to achieve its ambition of getting 1:4 people out of their cars and onto more sustainable modes. Some options have the potential to generate income which could provide revenue support for the public transport system, although it should be noted that no decisions have yet been made on this.

- **Electrification of the transport system:** early pilots of electric buses will start in the city over the next year and will explore how these we can scale. We have deployed rapid chargers for taxi drivers in the city and have a target to convert all taxis to electric vehicles by 2028. We are trialling charging infrastructure for other vehicles in residential areas. The de-carbonisation of the transport system is key in helping us to improve air quality and to meet our aspiration of being zero carbon by 2050. This links with the County Council's MLEI programme which is developing the energy infrastructure needed to support electrification and will be deploying solar canopies on park & ride sites The MLEI team have already developed a smart grid on a park & ride site which include V2G capabilities

- **Cycling Infrastructure:** There are a number of cycling schemes that have been delivered or are planned that will support the FMZ. Cambridge has the UK's largest cycle park, located at Cambridge Station with 3000 spaces. Work has just started on the UK's first 'Dutch style' roundabout which gives priority to pedestrians and cyclists. The GCP are developing plans for a network of Greenways that will link rural areas with the City Centre. A high quality cycle way linking Cambridge North to the Central Station has commenced (Chisholm Trail) and a number of other high quality segregated routes have either been delivered or are planned for the city.

SECTION C – The economic case

C1. The economic case – Government funding

<u>Project 1 – First Mile</u>

Cambridge is a relatively small city, and the travel to work area consists of market towns with semi-rural and rural hinterlands and, at present, a very sparse mass transport infrastructure. The Cambridgeshire and Peterborough Strategic Bus Review: Options Report underscores the issue that traditional public transport is not commercially viable in such places and in a deregulated market the incentive to cross-subsidise unprofitable services with profitable ones is minimal. The under provision of rural bus services by the market compared to the social optimum has been observed for a long time. There is economic and social value to providing public transport to people in remote locations that is not fully captured through the farebox (social isolation, access to healthcare and employment); so local governments have long subsidised routes where possible in recognition of these positive externalities. This is becoming increasingly unaffordable. Several rural bus services have been withdrawn in recent years and the challenges this brings are laid out in the Cambridgeshire and Peterborough Strategic Bus Review[21]: . New solutions are needed to provide more efficient public sector provision. The learning from this could be applied to many rural and peri-urban communities around the UK.

The County Council has experimented with DRT, but it did not produce a sustainable model in part because the pressure on budgets meant that there was not enough investment in the back end software and consumer app to provide a customer experience that encouraged behaviour change, vehicles were not to the specification required and no funding was invested in customer acquisition and marketing. Where budgets are tight, a fear of failure has prevent innovation and the testing of multiple models until the right operating model has been found. The FMZ funding will enable the area to be much more innovative in its approach and underwrite the risks at least in part.

Based on our soft market testing, demand responsive schemes are of interest to local operators who would be prepared to contribute to costs, but the fragmented market leads to coordination failure where none of them will individually invest.

If FMZ funding was unavailable it is likely that DRT would not be deployed in Greater Cambridge for the foreseeable future because operators would not have the confidence to experiment to find the optimal solution.

<u>Project 2 - Last Mile</u>

Micromobility – to date the market has delivered micromobility into Cambridge (OfO and Mobike) with very little collaboration with the City. However, the OfO business failed and Mobike has reduced its area of operation. Public concerns have been expressed about the impact of these micromobility solutions on the city. The FMZ funding will support the City in helping to shape a market that delivers a model that both achieves the outcomes required by cities (Modal shift, clean air etc) and results in the financial viability of companies. Without this intervention, micromobility may not develop to fill current gaps in provision, or it may do so in a way that has negative impacts on the city.

Autonomy – delivering autonomous public transport is at a very early stage which comes with levels of risk usually not acceptable to cities. To be able to prove the business cases and begin to develop a market, cities need to be able to access funding to start trials and develop the concept. The FMZ would support our

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[21] Cambridgeshire and Peterborough Strategic Bus Review: Options Report, Jan 2019
https://cambridgeshirepeterborough-ca.gov.uk/assets/Uploads/Strategic-Bus-Review.pdf

existing CCAV funding to further push the boundaries of what autonomy can achieve, helping to create a market for both autonomous services and associated technologies.

Project 3 - Network Management

The FMZ funding will allow us to be much more innovative and experimental in our approach to network management. There is an inherent risk in developing such an approach to network management particularly investing in the underpinning data platforms and cutting edge technologies such as AI and experimenting with dynamic infrastructure and kerbs. Without FMZ funding it is likely that any investment will be in proven technology that does not support the way the network needs to operate in the future as mobility changes. New technologies that could revolutionise mobility and place would be unlikely to be deployed without FMZ funding as traditional systems, approaches and policies become significant barriers.

Project 4 - Ticketing and Payments

The fragmented and deregulated nature of the transport market has created a significant barrier to ticketing and payments across modes and operators. This is slowing the deployment of MaaS and creates friction within the transport system. The FMZ funding will support the City in working with operators to remove barriers and unlock an identified obstacle to the use of public transport. Without FMZ funding an incremental approach is likely to be taken which would be much more siloed and wouldn't unlock the significant benefits that a much more innovative, integrated approach would unlock.

Project 5 - Behavioural Insights

The funding will support the development of innovative mobility models that will de-risk future deployments for both Greater Cambridge and other cities within the UK and internationally.   This project includes trials of mobility credits which would not be possible without public funding. If such funding was not forthcoming, groups currently excluded from opportunities due to the cost of public transport might not benefit from improved transport services, perpetuating inequality.

Project 6 - Mobility Marketplace

This project aims to provide a public sector demand-side stimulus for market creation where one does not currently exist through regulatory incentives, provision of infrastructure and access to assets. If public sector support was not available, opportunities to innovate and create economic growth may be lost.

Project 7 - Data Infrastructure

The development of a data infrastructure is integral to the deployment of the programme. FMZ funding will allow us to procure cutting edge data platforms that have AI and machine learning capabilities not seen in the mainstream market. It will de-risk the innovative approach we propose to take giving us the resource to develop an open federated approach and supporting the development of business case that identifies revenue stream critical to creating an architecture that is highly scalable. Without the funding the County Council is likely to remain with one of the traditional providers which will create a barrier to innovation and hold back the development of the mobility market.

If public sector support was not available, key risks include:
- Rural bus services will continue to dwindle resulting in negative social welfare impacts. Communities will be excluded from jobs in Greater Cambridge, contributing to rural deprivation and widening social division and mental and physical health impacts.

- The fragmented nature of the deregulated bus market means investments will not be made that could have positive social welfare outcomes, and efficiency outcomes that could reduce the level of subsidy needed to operate profitably.
- Companies may struggle to attract and retain staff in an overheating area with a poor transport network, as quality of life suffers. There is a risk that companies considering Cambridge as a potentially desirable location may in reality choose cities outside the UK such as Stockholm and Singapore instead where transport is less of an issue (Key Recommendation #3 of the Cambridgeshire and Peterborough Independent Economic Review dated Sep 2018).
- For some residents, the lack of public transport means that the vibrant jobs market in and around Cambridge is simply not available to them, and this contributes to rural deprivation. For others, it means that they are forced to own and maintain a car which contributes to Cambridge's congestion and air quality problems and in some cases puts additional stress on household budgets.
- There is also a significant risk that some areas of Greater Cambridge (notably the city centre, campuses and business parks) will be negatively impacted by unmanaged and unregulated private sector provision. Many cities have suffered from the proliferation of undocked bike schemes with surplus bikes causing a variety of problems. There is equally a risk that single occupancy private hire vehicles could add to congestion and air quality problems if the public sector does not engage in the market to provide more attractive options.

The projects outlined in this submission will explore what the private sector will fund, and commercial models to minimise the gap to ensure that the public sector funds only what is necessary. Should the GCP decide to introduce a revenue raising demand management scheme in Cambridge City, this could provide a possible means of funding the gap in the long term

C2. The economic case – Benefits to transport users and wider society

Interventions are primarily aimed at reducing the generalised cost of non-car modes and promoting modal shift away from car for commuting trips, although leisure and other users would also be expected to benefit. Distributional impacts are of particular interest here given the targeted nature of some of the projects. Primary user segments that are expected to benefit from the FMZ are:

- Prospective workers with no current access to work, especially the less well-off who cannot afford to live in Cambridge due to high rents/house prices and who live further afield at some distance from the core public transport network.
- Those who have caring responsibilities and therefore have to make multiple stops on their journeys such as school runs or caring for a relative, who are typically much more reliant on private car. As the public transport network often lacks the regular, reliable options that make those trips possible, and walking and cycling trips can be harder when encumbered.
- Young people who live at some distance from the core public transport network wishing to study at Cambridge's sixth form and further education colleges but are currently unable to do so.
- Existing low paid workers who live far from the core public transport network who currently have no choices but to own and maintain a private car, sometimes placing their finances under strain.
- Those with mobility challenges who have the need for a more seamless end-to-end journey.
- Those who currently drive and can afford to do so. If Cambridge is to solve its congestion and air quality issues, these people will needed to be persuaded to use more sustainable means of transport. The GCP is delivering both improved core public transport and demand management including the potential for some form of charging, so this group is likely to find it relatively less attractive to drive in future. The FMZ will support modal shift by provision of first and last mile services, as well as incentives. This group will ultimately benefit because they will be better prepared for demand management measures when they are introduced.

The overall impacts of the FMZ are shown in the programme level logic map below:

Future Mobility Zone for Greater Cambridge — Theory of Change

Columns: Context | Inputs | Activities | Outputs | Impacts | Overall objectives

Context
- Jobs and housing growth
- Poor Air Quality – city centre and other locations
- Congestion
- Constrained, small city with rural and semi-rural hinterland
- Poor & significantly reduced rural bus provision
- Significant inequality in the
- Zero Carbon by 2050
- Ambition for a world class public transport system – better than the private car

Inputs
- City Deal /GCP funding & delivery inc. CAM Phase 1
- TCF and CPCA planning for CAM Phase 2
- Policy and strategy including:
  1. LTP
  2. Bus Reform Task Force
  3. City and South Cambs Joint Local Plan (3)
- Cambridgeshire and Peterborough Independent Economic Review
- FMZ Funding
- Transport operator investment

Activities
- Design, procure and deliver integrated first mile services
- Design, and enable integrated micromobility solutions
- Design and introduce active network management to favour sustainable transport
- Design incentives package to encourage use of public transport (2)
- Remove sources of friction by improving ticketing, payments and information
- Design, procure and deliver rigorous evidence and evaluation of schemes

Outputs
- New first mile services including DRT
- New last mile services including micromobility and AVs
- Incentives to use public and sustainable transport
- New network management measures which favour public and sustainable transport
- Simple ticketing including for multi-modal journeys
- Better information including real-time and for multi-modal journeys
- Evaluation feedback to inform future activities

Impacts
- Public and sustainable transport (including **end to end options** where appropriate) available and **accessible** to more people including disadvantaged groups
- New sources of revenue which are needed to address the reduction in parking charges
- Smoother running network so fewer delays to public and sustainable transport
- Supports ongoing LA financial sustainability
- **Public and sustainable journeys are faster and more reliable**
- Public and sustainable transport is more attractive
- Public and sustainable transport are easier to use including for multi-modal journeys
- Businesses can recruit from a wider area
- Businesses can recruit more easily
- People can engage more easily in employment, education and leisure, especially disadvantaged groups
- **Modal shift:** public and sustainable transport have more patronage
- Public and sustainable transport are more financially sustainable
- People spend less time travelling and it is less stressful
- Freed up road space
- Opportunities to reallocate road space for leisure and active travel
- Less private car use

Overall objectives
- Support for economic growth
- Less congestion
- Less pollution (1)
- Better quality of life

Causality is assumed by the presence of the arrows.

Other Key Assumptions
1. New public transport is clean
2. Improvements and incentives result in modal shift
3. Will influence FMZ although still in development

OVERALL PROGRAMME

Expected benefits to transport users and wider society from the Greater Cambridge FMZ programme as a whole are summarised below. Logic maps are then provided which set out the primary expected impacts from each project.

- User and non-user benefits: the provision of first and last mile services and improved network management all focus on reducing overall journey times and improve journey time reliability. This benefit applies to users of the newly provided services and for existing public transport users and essential car users (as road space is freed up and congestion reduces). These would apply to business, commuting and leisure trips.
- Improved air quality (reduction in NOX and particulates) and reduction in greenhouse gases associated with mode shift: by shifting people from private cars to public and sustainable transport, vehicle emissions are expected to reduce, especially when seen in conjunction with wider initiatives (outside the FMZ) for the electrification of public transport. Improved air quality will lead to health benefits in wider society.
- Physical activity benefits: associated primarily with the shift to active modes but also to public transport (because most public transport trips involve some element of walking) which creates better health outcomes.
- Accessibility impacts: Relevant to all people living in areas currently served but of particular reference to vulnerable groups including older people, those with disabilities or impairments that limit mobility, women (more likely to be making encumbered trips or complex trip chains) and those on low incomes, particularly in households with no access to a car. There is evidence locally that educational choices of young people are being constrained by the (non-) availability of public transport.
- Personal affordability impacts: associated primarily with the mobility credits elements of Project 5 and Project 1 but also applicable to the general user.

Additional, lesser impacts are expected through:

- Reduced accidents associated with mode shift away from private car towards public transport and active modes, both of which have lower accident rates.
- Journey quality impacts: these are likely to be primarily associated with traveller care (ease of ticketing and payments, real-time information provision, wayfinding).
- Option and non-use values: associated with substantial changes in the availability of new public transport and micromobility options which make new public transport route options possible by 'filling in' the gaps that traditional public transport cannot viably serve.

For those in low income households not currently able to access job and educational opportunities in Greater Cambridge because of availability of public transport, the FMZ will provide a means for them to get from their homes to their place of work or learning. It will also provide a mechanism to help address problems of social isolation where lack of public transport is a contributory factor. Mobility credits (Project 5) will be made available to help prevent cost being a barrier to take up. It is anticipated that a number of schemes will be trialled, for example, credits to cover the whole cost of the journey for an initial period, and longer term credits subsidies.

As provision of benefits will be complex, we expect to work with several organisations such as employers, job centres, government departments and colleges over the lifecycle of the project. For example, we will need to understand any impact to other benefits or tax implications of credits being provided to travellers, how subsidies could be arranged with operators and how to ensure that those who will benefit most from mobility credits are aware of their introduction and are able to access them easily. With this in mind, we

would anticipate identifying a suitable partner, to help us deliver mobility credits in the future phases of the project.

However, following initial meetings with Cambridge Job Centre Plus, we would investigate the option of offering mobility credits as part of their existing Flexible Support Fund in phase one. Work Coaches and Managers at the Job Centre have the option to assess whether additional support (in this case, mobility credits) would assist their client in accepting a work placement which they would otherwise be unable to take on. While budgetary pressures mean that the fund has to be used increasingly carefully, it is at the discretion of the manager who is best placed to assess the need of their client. Working with the Job Centre offers us an excellent way to begin initial trials of mobility credits in the short term as well as giving us the opportunity to support those most in need and evaluate how to develop an offering that will achieve our aim of preventing cost being a barrier to the take up of jobs.

It should be noted that those in low income households already in work could be offered the same access to mobility credits.

At this stage, it is not possible to complete a full economic case as this would require further programme definition. However, the following illustrates the nature of the approach we would consider when the economic case is progressed, although it will need significant further refinement.

ILLUSTRATIVE EXAMPLE OF THE ECONOMIC CASE APPROACH BASED ON THE PROPOSED ZONE FOR DRT (PROJECT 1)

Context of the core area proposed for DRT

In the 7 wards[22] that most closely align with this area:
- there are around 43,000[23] residents in 16,000 households[24]
- there are just under 1,900 households with no access to a car[25]
- 25% of households have no adults in employment – 242 of them (1%) have dependent children[26]
- 3,500 of them have a long term health problem or disability, which limits their day to day activities a little or a lot, so these are potentially isolated people poorly served by public transport.
- the town of Northstowe is located in this zone. It will provide homes for around 25,000 people over the next 25 years, and this provides a considerable opportunity to change travel behaviours as people more in to avoid car dependency becoming the norm.

Potential number of those who could shift to public transport
- of those that work out of the home, just under 15,000 people (73%) travel to work in a car, either as driver or passenger[27].
- this number can be used to estimate the maximum potential market for demand responsive transport/shift to public transport
- this is based on the most recent census figures. More recent data and growth projections which would include housing growth such as Northstowe would in reality be used to refine this. One possibility would be to use the Cambridge Sub Regional Model to achieve this.

Possible initial target for moving people from their cars to public transport
- there are a number of ways in which a target for modal shift from car to public transport could be established.
- currently, the highest public transport mode share for any ward in the Greater Cambridge area stands at 11%. Further work would be undertaken to establish whether this is an appropriate initial target.
- this (11%) is a relatively modest ambition so it could be seen as a minimum position

Potential benefits (FMZ area represented by the 7 wards)

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[22] Bar Hill, Cottenham, Girton, Histon & Impington, Longstanton, Swavesey, Willingham & Over (all South Cambridgeshire)

[23] Cambridgeshire County Council's 2015 base population projections

[24] 2011 Census

[25] 2011 Census

[26] 2011 Census

[27] 2011 Census

- in the 7 wards, just under 15,000 people (68% of the working population) travel less than 20km to work (it is 16km from Northstowe to the Cambridge Biomedical Campus, for example)
- assuming a midpoint average journey distance of 10km/per day for 15,000 travellers, roughly 150,000 km/day of car journeys could be targeted for modal shift.
- if the target of 11% were to be applied to these car drivers, there would be 1,650 passengers and 16,5000 removed daily from the network (between 3m and 4m car km annually depending on average number of working/travelling days assumed)

Potential benefits (all wards in Cambridge and South Cambridgeshire)
- If all wards in the whole of Greater Cambridge could reach the 11% target it would mean just under 22,700 new public transport passengers around Greater Cambridge, and a similar number fewer cars on the road.

Valuing the benefits
- The above reduction in car kms can be valued by considering: reductions in congestion; pollution; reduction in journey times and increased journey time reliability for public transport users.

The contributions of individual projects in the FMZ to the overall programme benefits and impacts are shown in the series of project level logic maps that follow. In each case, feedback and evaluation is undertaken during the course of the project, and this insight will then be used to inform further activities and 'course corrections' should things not go as planned. The risks that users do not behave in the ways expected is further mitigated by project 5 which is specifically designed to understand experience and behaviours, and to drive behaviour change.

Project 1: First Mile

The main output of this project is the delivery of demand responsive transport to those who are either isolated by the lack of transport options or have no other option but to use the private car.

Context | **Inputs** | **Activities** | **Outputs** | **Impacts** | **Overall objectives**

Context:
- Recent history of reduced rural public transport services
- Limited public transport encourages private car usage
- Limited public transport results in social isolation
- Limited public transport results in lack of access to jobs, education and leisure

Inputs:
- FMZ Funding
- Transport operator investment
- Learning from existing & previous schemes eg. Dial-a-Ride
- Potential for future revenue funding from demand management schemes (tbc)
- Inputs from other FMZ projects including:
  - P5: facility for Mobility Credits & other incentives
  - P5: integration into MaaS
  - P7: LAMP data etc
  - P7: data platform

Activities:
- Define scheme/trial e.g.
  - geography
  - vehicle type
  - hours etc
- Procure transport operator(s)
- Establish and operate of services
- Marketing and customer acquisition
- Define rigorous project evaluation
- Develop business case and operating model for scalable services

Outputs:
- New demand responsive services (home to core network)
- Awareness of new services
- Means to call / pay for the service
- Scalable business case and operating model for DRT services
- Applicability to other areas (2)
- Evaluation feedback from users to inform future activities

Impacts:
- Usage is established and patronage builds up (1):
  - Existing travellers switch mode from car to demand responsive services
  - Those without access to other modes use demand responsive services
- Potential for additional public and sustainable transport services (6)
- Higher patronage of core public transport to which the DRT services feed (3)
- Public and sustainable transport are more financially sustainable (5)
- Less private car use (4)
- Users have greater access to opportunities (work, leisure, education)

Overall objectives:
- Less congestion
- Less pollution (7)
- Support for economic growth (8)
- Better quality of life (9)

Key Assumptions
1. Provision and awareness of the new service leads to patronage
2. Experience of this geography is transferrable to other areas
3. Assuming patronage builds up for the first mile DRT services, additional passengers are 'funnelled onto' the core public transport network
4. Reduced private car assumes there is modal shift from people who previously drove rather than purely resulting from new demand
5. There are enough fare paying passengers to positively impact financial stability
6. Fares are ring-fenced to provide additional services
7. Services are sufficiently clean to provide a net improvement in air quality
8. The overall economic activity resulting from people having greater access to work, leisure and education provides a net positive impact on the economy
9. Greater access to work, leisure and education opportunities together with less pollution contributes to a better quality of life.
(Detailed comments and mitigations relating to these assumptions are available on request)

PROJECT 1: FIRST MILE

Project 2: Last Mile

The main output of this project is the provision of micromobility and AV solutions in the context of the Cambridge Biomedical Campus and city centre sites.

Context	Inputs	Activities	Outputs		Impacts	Overall objectives

Context
- Long distances from public transport stops to destination
- Large campus or business park sites with few public transport stops (hinders rapid door to door journey times)
- Public concern about impact of tourist buses

Inputs
- Micro-mobility partner investment
- FMZ Funding
- Land and other assets (1)
- Inputs from other FMZ projects including:
  - P5: integration into MaaS
  - P7: Digital wayfinding (to signpost to last mile solutions)
  - P7: data platform
- Cambridge Biomedical Campus Transport Needs Review Report

Activities
- Market and Provider engagement
- Define micro mobility / AV policy framework
- Design detailed output specification
- Procurement including AV operator
- Deploy cargo and family bikes
- Operate trials
- Define rigorous project evaluation
- Development of business case and operating model for AV's

Outputs
- New sustainable travel options available at CBC and transport hubs in the urban environment including:
  - AVs
  - Micromobility
- Awareness of new services
- Means to book / pay
- Operating models / business cases for deploying micromobility and AVs including supporting policy
- Evaluation feedback from:
  - Users
  - Non-users
  - Operators
  - Used to inform future activities

Impacts
- Travellers have additional options for last mile travel including the use of AVs outside normal working hours
- Usage is established and patronage builds up (2):
  - Existing travellers switch mode from car/taxi to last mile services
  - Those without access to other modes use last mile services
  - Tourist bus operators park at travel hubs and tourists use last mile solutions
- Providers of micromobility and AV services become more financially sustainable so less support required from others local authorities and businesses (3)
- Potential for operators reinvest profits locally (4)
- Approach can be applied to other areas (5)
- More travellers make all or part of their journey by public transport (6)
- Less private car use (6)
- Fewer tourist buses in city centre (6)
- Less use of taxis (6)

Overall objectives
- Less congestion
- Less pollution
- Better quality of life

Key Assumptions
1. Land owners and asset owners (including local authorities) are willing to provide access
2. Provision and awareness of the new service leads to patronage
   New public transport is clean
3. Increased patronage results in operators making sufficient profits
4. Operators choose to reinvest profits locally
5. Experience of this geography are transferrable to other areas
6. Modal shift rather than new demand

(Detailed comments and mitigations relating to these assumptions are available on request)

PROJECT 2: LAST MILE

Project 3: Network Management

The outputs of this project relate to the implementation of network management policies to improve the operation of the network, create a dynamic kerb and to enable public and sustainable transport to operate with fewer delays.

Context

- Current network is not fit for purpose and is over capacity
- Currently limited active network management
- Desire to reallocate road space – more sustainable modes
- Limited capacity of local government to influence network design
- Siloed network management approach
- Frequent public transport delays leading to poor public perception
- Need to maintain income for councils

Inputs

- FMZ Funding
- Collaboration agreement with relevant local authorities
- Public transport operator engagement
- City stakeholder engagement
- Bus Reform Task Force
- Inputs from other FMZ projects including:
  - P7: data, LAMP and data platform

Activities

- Analysis of major contributors to network delay
- All parties to agree a coherent set of network management principles
- Deploy sensors to collect real time network/, parking data
- Join up messaging on local/strategic roads and feed onto VMS and into connected cars incl GLOSA
- Dynamic kerbside management
- Define rigorous project evaluation
- Develop new operating model including income generation

Outputs

- Predictive, pro-active and holistic management of the network
- Managed demand of road space
- Dynamic management of the kerb for different uses
- Operating model that is affordable for cities – shows revenue generating opportunities (8)
- Evaluation feedback from users to inform future activities

Impacts

- Smoother running network with less delay for public and sustainable transport (1)
- Approach can be applied to other areas (2)
- Less dwell time (9)
- Public and sustainable journeys are faster and more reliable (3)
- Public and sustainable transport is more attractive (4)
- Public and sustainable transport have more patronage (4)
- Public and sustainable transport are more financially sustainable (5)
- People spend less time travelling and it is less stressful (6)
- Less private car use (7)

Overall objectives

- Less congestion
- Less pollution (1)
- Better quality of life (6)

Key Assumptions
1. Measures lead to a smother running network
2. Experience of this geography is transferrable to other areas
3. Less delay on the network actually translates into faster and more reliable services
4. These changes result in improved perceptions and increased patronage
5. Higher patronage results in greater financial sustainability
6. Faster and more reliable journeys result in less stress and a better quality of life
7. This assumes modal shift away from the car rather than new trips only
8. A way can be found to manage the network in ways that encourage public/sustainable travel AND maintain council revenues

(Detailed comments and mitigations relating to these assumptions are available on request)

PROJECT 3: NETWORK MANAGEMENT

Project 4: Ticketing and payment

The main output of this project is the provision of an appropriate ticketing system.

Context	Inputs	Activities	Outputs	Impacts	Overall objectives

Context

- No integrated – multi operator ticketing offer
- Little ability to offer incentives and discounts
- Closed systems with lack of interoperability
- Poor customer experience
- Ambition for a world class public transport system – better than the private car

Inputs

- FMZ Funding
- Transport operator investment
- Ticketing research and requirements
- Franchising and enhanced partnership business case

Activities

- Confirm operator plans
- Determine gap between plans and requirements
- Agree investment roadmap
- Ticketing solution Implementation
- Support for multi-operator adoption
- Awareness raising with users and potential users
- Define rigorous project evaluation

Outputs

Open account based ticketing platform with provision of facilities for:
- Fare capping
- Mobility credits
- Other incentives and promotions
- Better integration
- An open back office
- Support for MaaS

Awareness raising for for new ticket types

Evaluation feedback from users to inform future activities

Impacts

- Adoption by transport operators (1)
- Travellers buy new ticket types including in advance and multi-modal (2)
- Reduced dwell times for buses because a higher proportion of tickets purchased in advance and better information available in advance (3)
- Improved satisfaction with simplified ticketing (5)
- Improved perception of public and sustainable transport (5)
- Faster and more reliable journey times (4)
- Increased patronage for participating transport providers (6)
- Less private car use (7)

Overall objectives

- Less congestion
- Less pollution (8)

PROJECT 4: TICKETING & PAYMENT

Key Assumptions
1. Transport operators do in reality adoption the new ticketing and payments solution
2. New ticketing and payment options are attractive enough for users to buy them
3. In advance tickets reduce dwell times
4. Reduced dwell times are sufficient for operators to run timetabled and demand responsive services faster
5. New ticketing and faster services actually lead to improved traveller satisfaction
6. Improved traveller satisfaction results in more patronage
7. Higher patronage results in modal shift away from the private car rather than generating new demand on creating shift from other forms of transport.
8. Less congestion results in less pollution

(Detailed comments and mitigations relating to these assumptions are available on request)

Project 5 Customer experience, behaviours and incentives

The primary aims of this project are:

- to help disadvantaged groups such as the unemployed, those on low incomes and the isolated to derive benefits from having reliable, end-to-end public and sustainable transport options through the provision of incentives, and
- using understanding and insight about behaviours to encourage broader modal shift.

Context

Congestion and poor air quality means we need to get people out of their cars

Poor public transport user experience

Challenges of achieving and maintaining modal shift and resistance to it

Some groups unable to access work & educational opportunities due to cost/provision of public transport

Inputs

Insights from major public engagement "Big Conversation" (2017)

Insights from major public engagement "Choices for Better Journeys" (2019)

FMZ funding

Existing research

Key data sets including:
- Employment & deprivation data
- Transit data

On-Demand bikes deployment (Last mile project)

Open Account Based Ticketing Platform (ticketing and payments project)

Activities

Behavioural research and insights

Output specification and procurement of partner(s)
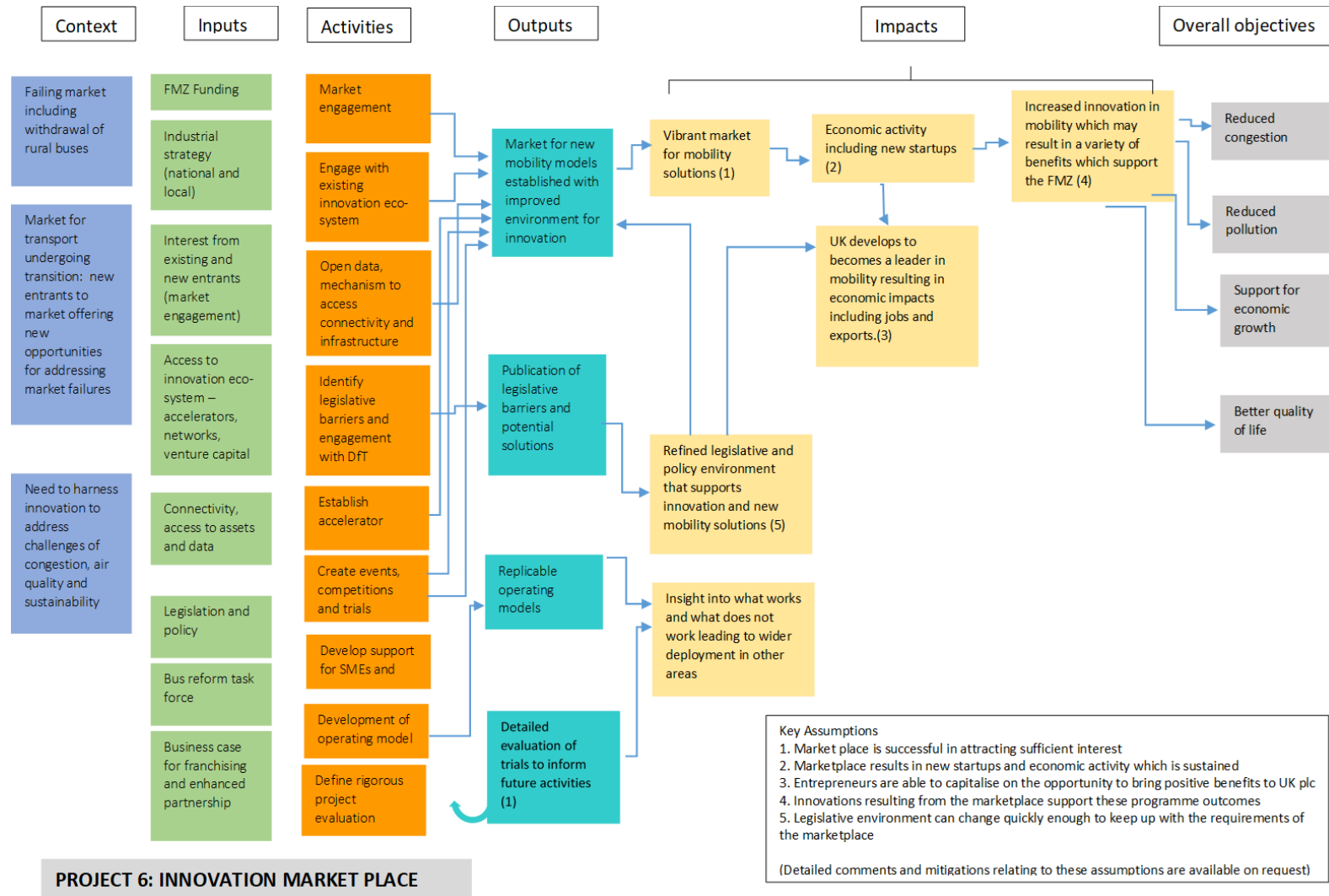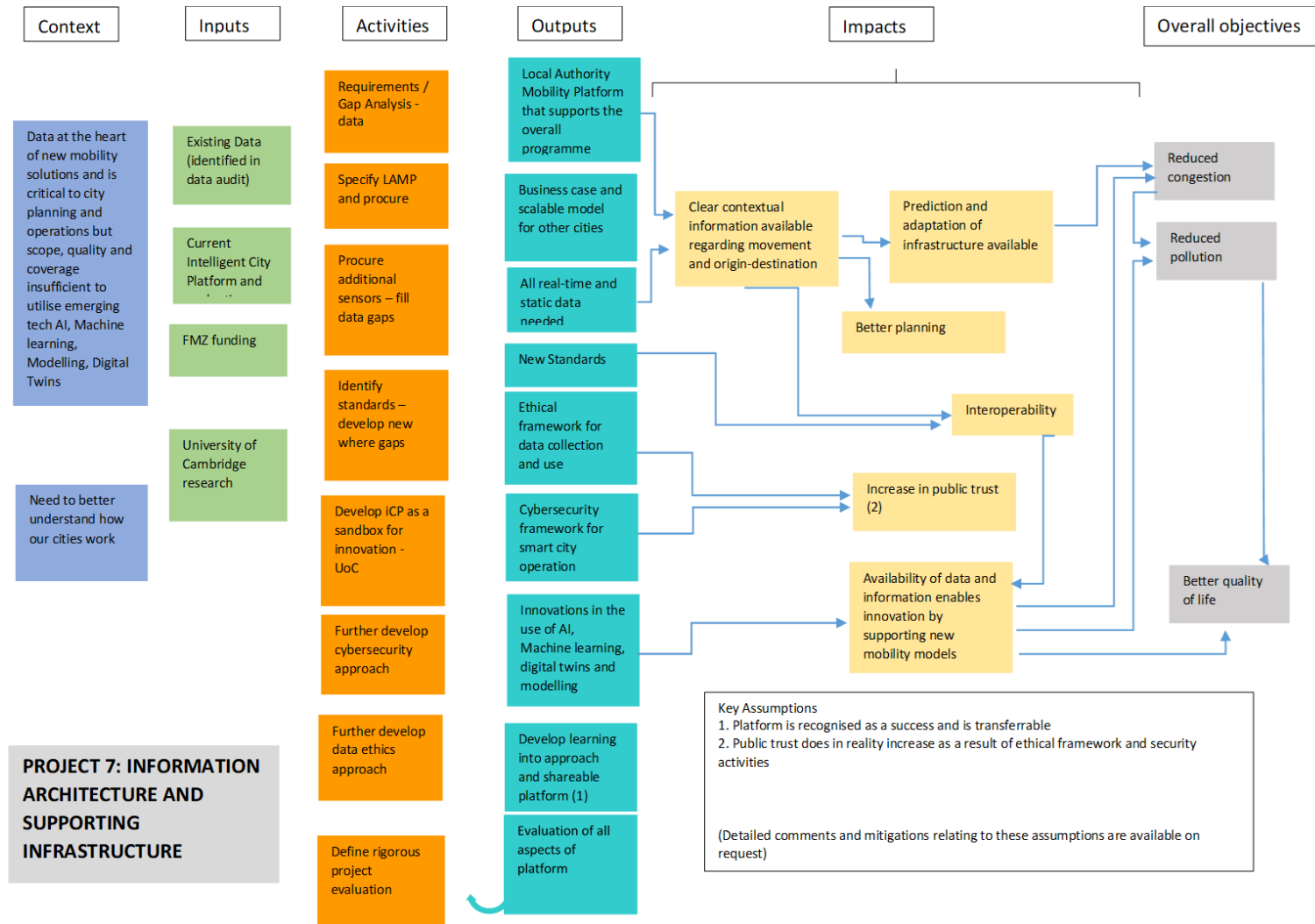
Detailed design of trials/ experiments including those based on:
- Mobility credits to support those on low incomes
- Business based subsidies
- Loyalty and rewards

Design promotions to raise awareness

Design of detailed evaluation methodology

Develop business cases and deployment models for wider rollout

Wayfinding and Information - deployment

Integrate different modes into a MaaS offering deployment

Outputs

Provide incentive packages including those based on
- Mobility credits to support those on low incomes
- Business based

Awareness raising promotions

Detailed evaluation of trials to inform future activities (1)

MaaS including better integration of booking, payments & information for

Innovation in wayfinding and improved information

Replicable deployment models and business cases

Impacts

Takeup of incentive packages (2)

Current car users: modal shift to public and sustainable transport

Current non-car users – unemployed or isolated: public and sustainable transport accessible to more people (2)

More people (especially those on low incomes or otherwise disadvantaged) can engage more easily in employment, education and leisure (3)

Businesses have a greater pool of people from which to recruit and can therefore attract staff more easily (4

Takeup of MaaS offerings

Approach can be applied to other areas

Overall objectives

Reduced private car usage

Reduced congestion

Reduced pollution

Support for economic growth

Better quality of life

Key Assumptions
1. Sample sizes sufficiently large
2. Incentives packages are sufficiently attractive for people to take advantage of them and to achieve modal shift
3. The improved access brought about by the incentives does provide more opportunities for leisure, employment or education. For example, this may not be the case if the public and sustainable transport operates at convenient times and serves appropriate places
4. Business will only be able to recruit if the incentives encourage the appropriate people to apply for jobs. This could be affected by a perception that incentives might be withdrawn so it is not worth applying.

(Detailed comments and mitigations relating to these assumptions are available on request)

Project 6 Mobility Marketplace

The primary aim of this project is to drive and support innovation to support the FMZ bid and to ensure it is sustainable in the longer term.

Context	Inputs	Activities	Outputs	Impacts	Overall objectives

Context
- Failing market including withdrawal of rural buses
- Market for transport undergoing transition: new entrants to market offering new opportunities for addressing market failures
- Need to harness innovation to address challenges of congestion, air quality and sustainability

Inputs
- FMZ Funding
- Industrial strategy (national and local)
- Interest from existing and new entrants (market engagement)
- Access to innovation eco-system – accelerators, networks, venture capital
- Connectivity, access to assets and data
- Legislation and policy
- Bus reform task force
- Business case for franchising and enhanced partnership

Activities
- Market engagement
- Engage with existing innovation eco-system
- Open data, mechanism to access connectivity and infrastructure
- Identify legislative barriers and engagement with DfT
- Establish accelerator
- Create events, competitions and trials
- Develop support for SMEs and
- Development of operating model
- Define rigorous project evaluation

Outputs
- Market for new mobility models established with improved environment for innovation
- Publication of legislative barriers and potential solutions
- Replicable operating models
- Detailed evaluation of trials to inform future activities (1)

Impacts
- Vibrant market for mobility solutions (1)
- Economic activity including new startups (2)
- UK develops to becomes a leader in mobility resulting in economic impacts including jobs and exports.(3)
- Increased innovation in mobility which may result in a variety of benefits which support the FMZ (4)
- Refined legislative and policy environment that supports innovation and new mobility solutions (5)
- Insight into what works and what does not work leading to wider deployment in other areas

Overall objectives
- Reduced congestion
- Reduced pollution
- Support for economic growth
- Better quality of life

Key Assumptions
1. Market place is successful in attracting sufficient interest
2. Marketplace results in new startups and economic activity which is sustained
3. Entrepreneurs are able to capitalise on the opportunity to bring positive benefits to UK plc
4. Innovations resulting from the marketplace support these programme outcomes
5. Legislative environment can change quickly enough to keep up with the requirements of the marketplace

(Detailed comments and mitigations relating to these assumptions are available on request)

PROJECT 6: INNOVATION MARKET PLACE

Project 7 Information architecture and supporting infrastructure

The primary aim of this project is to provide a robust data platform and capability to the whole FMZ including the projects within it.

C3. The economic case – Benefits from new markets and business models

There are two categories of jobs likely to be created as a result of the FMZ:

- Direct which pertain to the suppliers involved in the creation of the FMZ itself, and
- Indirect which are jobs generated in other organisations because growth is enabled by improved transport in the travel to work area

Direct
- In advance of the widespread deployment of autonomous vehicles, drivers will be required to deliver demand responsive transport
- Where our existing autonomous vehicle trials are extended as part of the FMZ, additional safety drivers will be required
- Additional operatives will be required to manage micro-mobility solutions e.g. maintaining and repositioning bikes etc.
- Some additional high tech jobs may be created as a result of the enhanced requirements for machine learning and artificial intelligence the mobility market place

Indirect
Currently there is a serious risk that transport problems will 'choke off' the growth of Cambridge jobs because prospective employees will not be able to get to work or because they will choose to relocate elsewhere, possibly outside the UK. This risk is acknowledged by the CPIER report which states that 'many high-value companies will need to relocate abroad if this area no longer meets their needs'. FMZ will provide an increased ability for companies to attract staff from a wider area than at present so it will encourage jobs growth in Cambridge which are predominantly in the technology and biotechnology sectors.

Jobs may also be created indirectly if the pilots in Project 5 find that providing mobility credits can support people back into work.

Cambridge is renowned for the vibrant and innovative startup businesses that 'spin out' of the university or choose to relocate here. The connectivity between businesses and researchers that creates the Cambridge Phenomenon is a unique and essential aspect of the cluster that has driven innovation and the development of a whole sequence of scientific breakthroughs and new products.   Whilst it is difficult to predict exactly what new products and markets will be opened up, the financial investment and the innovative environment created by the FMZ make it likely that significant business development occurs as a result.

Other areas in the UK and beyond will be able to replicate the innovations in the FMZ because the programme is tailored to:

- Small cities which due to their size cannot sustain the type of public transport solutions seen in other cities such as London
- A rural and peri-rural hinterland where residents find it hard to access jobs

The FMZ will provide replicable models and learning relevant to all small cities that meet these criteria of which there are a huge number inside and outside the UK. To demonstrate replicability we have committed to scale initially to Peterborough but will also work with cities and areas across 'England Economic Heartland' to scale. As part of the knowledge transfer element of the FMZ, each initiative will be analysed and evaluated to create a business case and operating model that can be used by other cities as a blueprint for delivery. An extensive programme of dissemination both in the UK and internationally is planned.

SECTION D – The financial case

D1. Financial case – Scheme costs

Financial Summary:

Total scheme cost (£m):	**£30.05m**
Total DfT (FMZ) funding contribution (£m):	**£22.41m**
Total public sector contribution (£m):	**£4.5m**
Total local and/or private contribution (£m):	**£3.14m**

Details of any 'contributions in kind' (e.g. operators agreeing to run a service):
Letters of support have been provided by organisations offering support in kind, along with letters of support from other notable organisations in the FMZ region who recognise the importance of this work and wish to support our application. Letters can be found in Appendix B. ***<<Commercially sensitive information removed>>***

Anticipated Overall Spend Profile

2019/20	*2020/21*	*2021/22*	*2022/23*	*Total*
2,450,500	11,866,166	10,578,666	5,151,668	30,047,000

Breakdown by Project

1. First Mile
The key components of this project and estimated costs are shown below:
> ***<<Commercially sensitive information removed>>***

The profile spend funding is as follows:
> ***<<Commercially sensitive information removed>>***

This estimate has been established through soft market testing, engaging with local transport operators and specialist operators in this field. There are a significant range of factors which will influence the cost of the DRT trial(s) including for example geographical extent; population density; overall demand and ramp-up of demand; vehicle type and operating costs; potential for vehicle reuse etc. We have assumed in the costing that we will fund the procurement of vehicles, staff, on-going maintenance, passenger acquisition and integration into the MaaS offering.

One of the key outputs of this project is to determine the extent to which DRT can be provided by the private sector, and the extent to which the public sector needs to support this financially and in other ways such as regulation to ensure its viability. Consequently, the cost estimates are quite uncertain. It maybe that the provider selected may already have vehicles which could reduce costs significantly. That said, it may be possible to adjust some elements of the scheme(s) such as geographical extent to achieve a particular budget but care needs to be taken to ensure that the population size is sufficiently high to ensure the trail remains statistically valid.

This is a priority area for the CPCA and GCP.

2. Last Mile

The key components of this project and estimated costs are shown below.
>   *<<Commercially sensitive information removed>>*

The profile spend is as follows:
>   *<<Commercially sensitive information removed>>*

This estimate has been established through soft market testing, experience of micromobility schemes and running autonomous vehicle trials.

Aspects of the costs related to micromobility are discretionary and can be controlled to some extent and therefore have a degree of certainty. Our previous experience of autonomous vehicle trials and the innovative nature of this work suggests these estimates are significantly less certain.

The Micromobility work is a priority for the CPCA and GCP.

3. Network Management

The key components of this project and estimated costs are shown below.
>   *<<Commercially sensitive information removed>>*

The profile spend is as follows:
>   *<<Commercially sensitive information removed>>*

These estimates have been established through soft market testing, operational experience of the Integrated Highways Management Centre operated by Cambridgeshire County Council and current works being undertaken by GCP. In most cases, scope can be adjusted to some extent, so these estimates have a moderate degree of certainty.

4. Ticketing and Payments

The key components of this project and estimated costs are shown below.
>   *<<Commercially sensitive information removed>>*

The profile spend of the FMZ funding is as follows:
>   *<<Commercially sensitive information removed>>*

This estimate is drawn from the report already undertaken by the Smart Cambridge programme entitled 'Greater Cambridge Partnership Integrated Ticketing Study'[28] which provides a level of rigour to the estimates. However, there are significant risks associated with ticketing solutions and this funding assumes that the public sector takes the lead in delivering an open account based ticketing environment. The operators would need to partner and there is a significant risk that they deliver their own ticketing solutions during the FMZ which aren't open and aren't interoperable with other operators or platforms.

This is a priority for the CPCA and GCP

5. Customer Experience and Incentives

The key components of this project and estimated costs are shown below.
> *<<Commercially sensitive information removed>>*

The profile spend of the FMZ funding is as follows:
> *<<Commercially sensitive information removed>>*

These estimates have been established through soft market testing and experience from current works being undertaken by GCP. In most cases, scope can be adjusted to some extent, so these estimates have a moderate degree of certainty.

The key areas for the CPCA and GCP are behavioural insights, MaaS, Mobility credits and the better information and wayfinding.

6. Mobility Market place

The key components of this project and estimated costs are shown below.
> *<<Commercially sensitive information removed>>*

The profile spend of the FMZ funding is as follows:
> *<<Commercially sensitive information removed>>*

These estimates have been established through soft market testing. Scope can be adjusted to some extent, so these estimates have a moderate degree of certainty.

7. Information architecture and supporting infrastructure

The key components of this project and estimated costs are shown below.
> *<<Commercially sensitive information removed>>*

The profile spend is as follows:

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[28] https://www.connectingcambridgeshire.co.uk/wp-content/uploads/2019/08/Greater-Cambridge-Integrated-Ticketing-Final-20190529.pdf

<<Commercially sensitive information removed>>

These estimates have been established through soft market testing and experience from current works being undertaken by GCP. In most cases, scope can be adjusted to some extent, so these estimates have a moderate degree of certainty.

This work package underpins a number of the other projects and offers significant scope for knowledge sharing and transferability to other cities. It is therefore considered a priority

Programme costs

Costs associated with evaluation and knowledge transfer are as follows:
<<Commercially sensitive information removed>>

The profile spend is as follows:
<<Commercially sensitive information removed>>

Costs associated with the core team are as follows:
<<Commercially sensitive information removed>>

The profile spend is as follows:
<<Commercially sensitive information removed>>

D2. Financial case – Risk

Key financial risks have been identified as follows:

There is a risk that suppliers and partners provide funding but their objectives do not remain aligned with those of the FMZ meaning that contributory funding fails to deliver value for money. Key mitigations include:
- Detailed discussions at the outset and during the programme to establish goal alignment
- Memoranda of understanding and contractual agreements where appropriate

There is a risk that investment is made in the 'wrong' solutions that are superseded and value for money is not provided. Key mitigations include:
- Appropriate research and early discussions with partners and suppliers to ensure the best evidence is available at the outset
- Using established governance processes and structures to ensure regular review to ensure the business case is still sufficiently robust
- Given this is a pilot programme: ensuring that failure is 'allowed' but that learning is derived *and shared* even where outcomes are not what was expected

There is a risk that costs prove to be higher than anticipated. Key mitigations include:
- Clear budgeting, profiling and financial control
- Procurement/commercial arrangements designed to ensure financial risks are appropriately shared between public and private sectors
- Clear design of scope management, value engineering and exist strategies at the outset and throughout the programme

There is a risk solutions do not prove to be financially sustainable. Key mitigations include:
- Much of the purpose of this FMZ is to establish a business case for ongoing operations so the management of this risk is inherent in the work of the programme
- Close alignment with GCP plans for revenue raising measures.

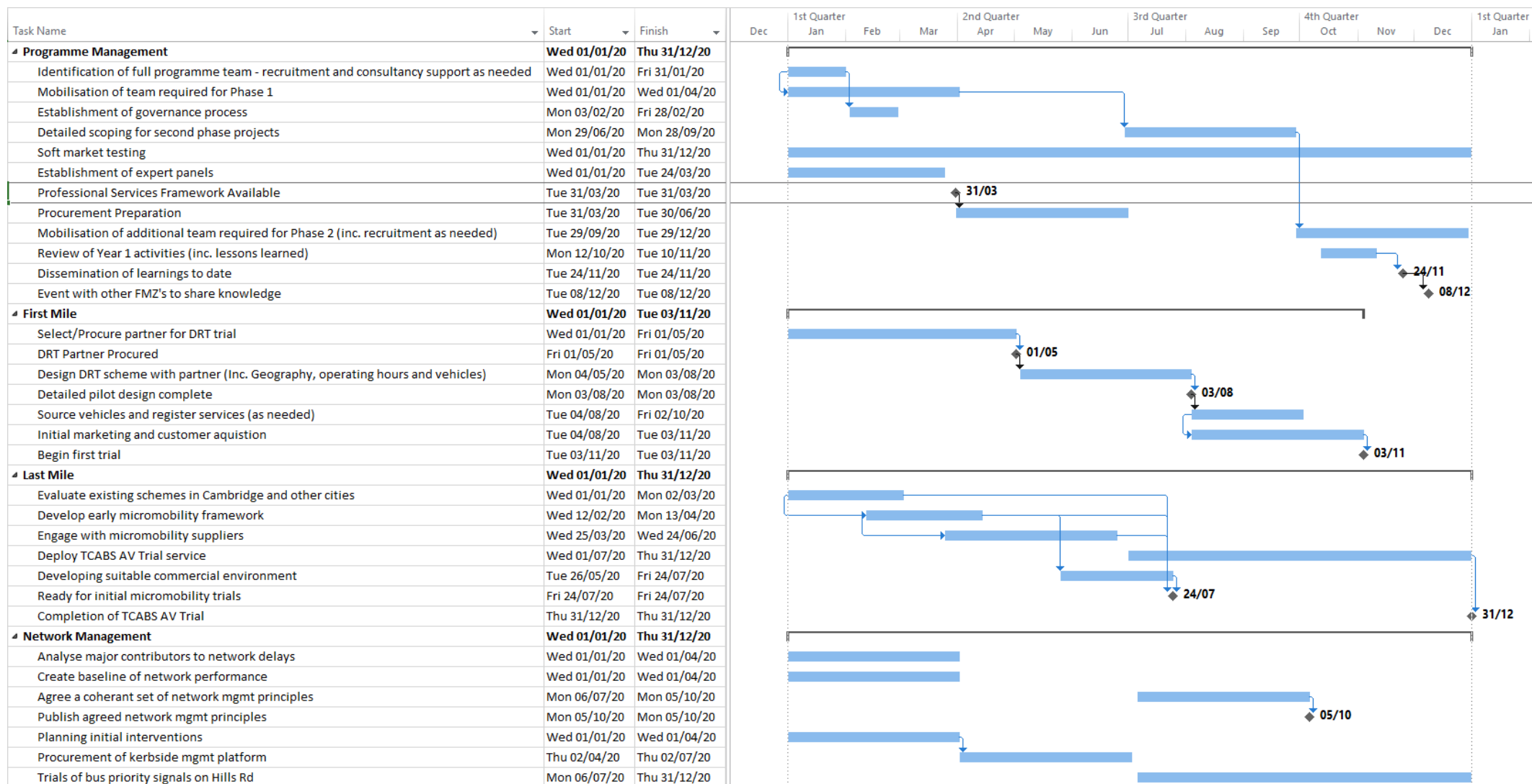# SECTION E – The management case

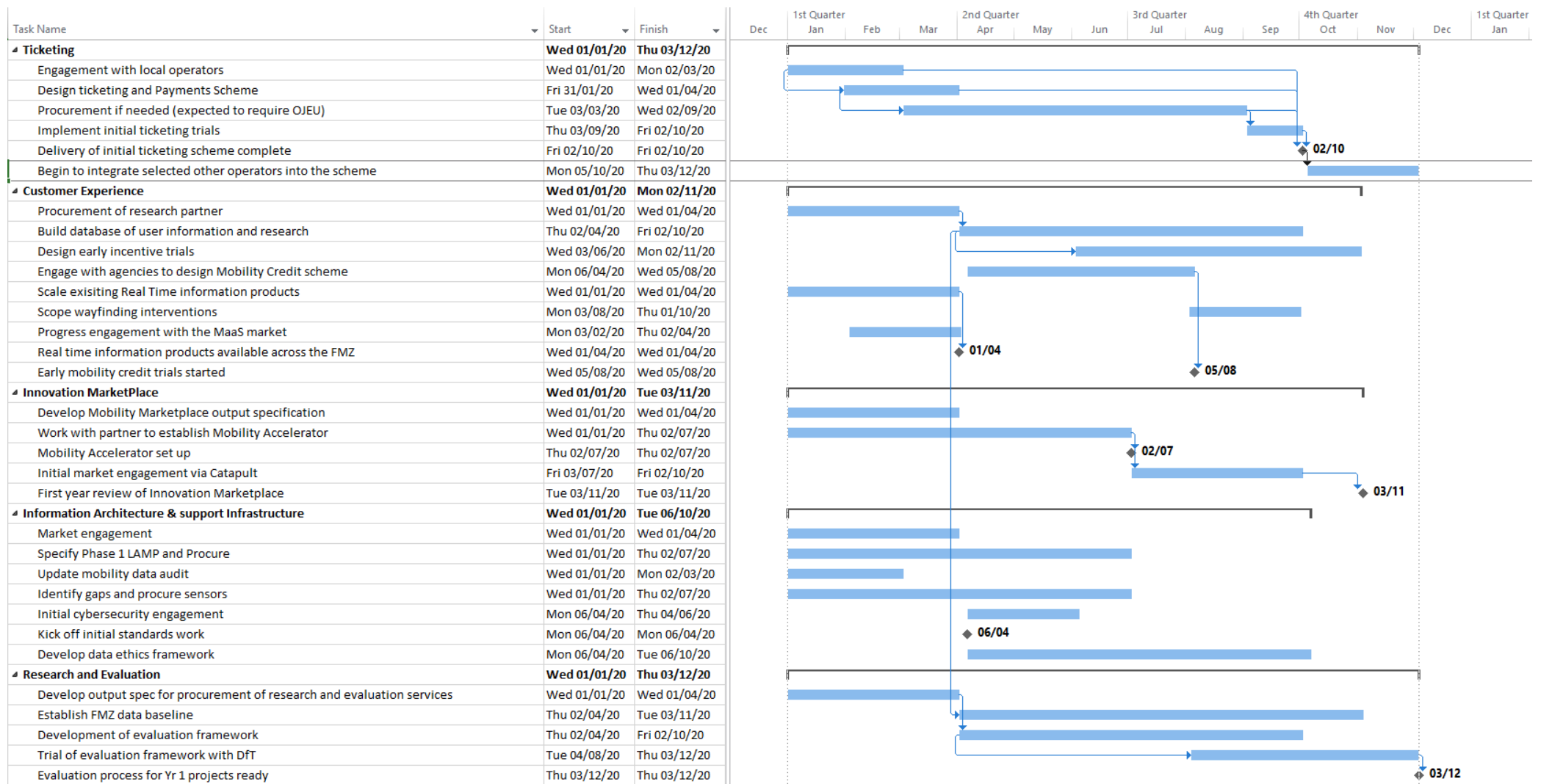## E1. Management case – Delivery and risk management

The detailed project plan for the first year of our FMZ Programme is shown below. We anticipate investing time early in the programme to identify teams and establish detailed plans and scope for the delivery of each of the projects. Milestones also include producing the evaluation methods needed to ensure that our deliveries follow our objectives and align with the DfT as set out in the strategic case. Our FMZ will develop at pace and we aim to deliver trials and research across a number of our projects within year one.

Milestones are identified in the project plan below, however key milestones to highlight for the initial twelve months include:
- Establish Future Mobility Zone Programme team and determine detailed approach
- Procurement approach agreed
- Commencement of initial first and last mile trials
- Development of evaluation framework

For the purposes of the plan, the project start date is set at January 1st 2020, however, this will be dependent on the date the funding is available.

Task Name	Start	Finish
Programme Management	**Wed 01/01/20**	**Thu 31/12/20**
Identification of full programme team - recruitment and consultancy support as needed	Wed 01/01/20	Fri 31/01/20
Mobilisation of team required for Phase 1	Wed 01/01/20	Wed 01/04/20
Establishment of governance process	Mon 03/02/20	Fri 28/02/20
Detailed scoping for second phase projects	Mon 29/06/20	Mon 28/09/20
Soft market testing	Wed 01/01/20	Thu 31/12/20
Establishment of expert panels	Wed 01/01/20	Tue 24/03/20
Professional Services Framework Available	Tue 31/03/20	Tue 31/03/20
Procurement Preparation	Tue 31/03/20	Tue 30/06/20
Mobilisation of additional team required for Phase 2 (inc. recruitment as needed)	Tue 29/09/20	Tue 29/12/20
Review of Year 1 activities (inc. lessons learned)	Mon 12/10/20	Tue 10/11/20
Dissemination of learnings to date	Tue 24/11/20	Tue 24/11/20
Event with other FMZ's to share knowledge	Tue 08/12/20	Tue 08/12/20
First Mile	**Wed 01/01/20**	**Tue 03/11/20**
Select/Procure partner for DRT trial	Wed 01/01/20	Fri 01/05/20
DRT Partner Procured	Fri 01/05/20	Fri 01/05/20
Design DRT scheme with partner (Inc. Geography, operating hours and vehicles)	Mon 04/05/20	Mon 03/08/20
Detailed pilot design complete	Mon 03/08/20	Mon 03/08/20
Source vehicles and register services (as needed)	Tue 04/08/20	Fri 02/10/20
Initial marketing and customer aquistion	Tue 04/08/20	Tue 03/11/20
Begin first trial	Tue 03/11/20	Tue 03/11/20
Last Mile	**Wed 01/01/20**	**Thu 31/12/20**
Evaluate existing schemes in Cambridge and other cities	Wed 01/01/20	Mon 02/03/20
Develop early micromobility framework	Wed 12/02/20	Mon 13/04/20
Engage with micromobility suppliers	Wed 25/03/20	Wed 24/06/20
Deploy TCABS AV Trial service	Wed 01/07/20	Thu 31/12/20
Developing suitable commercial environment	Tue 26/05/20	Fri 24/07/20
Ready for initial micromobility trials	Fri 24/07/20	Fri 24/07/20
Completion of TCABS AV Trial	Thu 31/12/20	Thu 31/12/20
Network Management	**Wed 01/01/20**	**Thu 31/12/20**
Analyse major contributors to network delays	Wed 01/01/20	Wed 01/04/20
Create baseline of network performance	Wed 01/01/20	Wed 01/04/20
Agree a coherant set of network mgmt principles	Mon 06/07/20	Mon 05/10/20
Publish agreed network mgmt principles	Mon 05/10/20	Mon 05/10/20
Planning initial interventions	Wed 01/01/20	Wed 01/04/20
Procurement of kerbside mgmt platform	Thu 02/04/20	Thu 02/07/20
Trials of bus priority signals on Hills Rd	Mon 06/07/20	Thu 31/12/20

Task Name	Start	Finish
Ticketing	**Wed 01/01/20**	**Thu 03/12/20**
Engagement with local operators	Wed 01/01/20	Mon 02/03/20
Design ticketing and Payments Scheme	Fri 31/01/20	Wed 01/04/20
Procurement if needed (expected to require OJEU)	Tue 03/03/20	Wed 02/09/20
Implement initial ticketing trials	Thu 03/09/20	Fri 02/10/20
Delivery of initial ticketing scheme complete	Fri 02/10/20	Fri 02/10/20
Begin to integrate selected other operators into the scheme	Mon 05/10/20	Thu 03/12/20
Customer Experience	**Wed 01/01/20**	**Mon 02/11/20**
Procurement of research partner	Wed 01/01/20	Wed 01/04/20
Build database of user information and research	Thu 02/04/20	Fri 02/10/20
Design early incentive trials	Wed 03/06/20	Mon 02/11/20
Engage with agencies to design Mobility Credit scheme	Mon 06/04/20	Wed 05/08/20
Scale exisiting Real Time information products	Wed 01/01/20	Wed 01/04/20
Scope wayfinding interventions	Mon 03/08/20	Thu 01/10/20
Progress engagement with the MaaS market	Mon 03/02/20	Thu 02/04/20
Real time information products available across the FMZ	Wed 01/04/20	Wed 01/04/20
Early mobility credit trials started	Wed 05/08/20	Wed 05/08/20
Innovation MarketPlace	**Wed 01/01/20**	**Tue 03/11/20**
Develop Mobility Marketplace output specification	Wed 01/01/20	Wed 01/04/20
Work with partner to establish Mobility Accelerator	Wed 01/01/20	Thu 02/07/20
Mobility Accelerator set up	Thu 02/07/20	Thu 02/07/20
Initial market engagement via Catapult	Fri 03/07/20	Fri 02/10/20
First year review of Innovation Marketplace	Tue 03/11/20	Tue 03/11/20
Information Architecture & support Infrastructure	**Wed 01/01/20**	**Tue 06/10/20**
Market engagement	Wed 01/01/20	Wed 01/04/20
Specify Phase 1 LAMP and Procure	Wed 01/01/20	Thu 02/07/20
Update mobility data audit	Wed 01/01/20	Mon 02/03/20
Identify gaps and procure sensors	Wed 01/01/20	Thu 02/07/20
Initial cybersecurity engagement	Mon 06/04/20	Thu 04/06/20
Kick off initial standards work	Mon 06/04/20	Mon 06/04/20
Develop data ethics framework	Mon 06/04/20	Tue 06/10/20
Research and Evaluation	**Wed 01/01/20**	**Thu 03/12/20**
Develop output spec for procurement of research and evaluation services	Wed 01/01/20	Wed 01/04/20
Establish FMZ data baseline	Thu 02/04/20	Tue 03/11/20
Development of evaluation framework	Thu 02/04/20	Fri 02/10/20
Trial of evaluation framework with DfT	Tue 04/08/20	Thu 03/12/20
Evaluation process for Yr 1 projects ready	Thu 03/12/20	Thu 03/12/20

The key milestones for years two, three and four of the programme can be found in the table below.

Milestones	Year 2	Year 3	Year 4
Programme Management	**Year 2**	**Year 3**	**Year 4**
Programme risk reviews undertaken	*	*	*
Governance approach reviewed and redesigned if needed	*		
Review of FMZ delivery and outputs with DfT	*	*	*
Evaluate and Review all FMZ trials for redesign and implentation as needed			
Disseminate learnings as agreed with partners, DfT and other FMZ areas			
Project ❶ First Mile	**Year 2**	**Year 3**	**Year 4**
Increased patronage for DRT service through customer acquistion and marketing	*	*	*
First phase trial of DRT completed and ready for review and evaluation	*		
Deploy revised trial (geography/vehicles etc) based on first phase learning		*	
Scalable business and operational models available			*
Project ❷ Last Mile	**Year 2**	**Year 3**	**Year 4**
First phase trial of micromobility completed and ready for review and evaluation	*		
Deploy revised trial (geography/vehicle etc) based on first phase learning	*	*	
Scalable business and operational models available			*
Extended CCAV3 trial to serve the wider CBC campus		*	*
Procured parter to run 2nd AV trial focusing on geography outside CBC	*		
Vehicles deployed and second AV trial operational	*	*	
Scalable business and operational models available			*
Project ❸ Network Management	**Year 2**	**Year 3**	**Year 4**
LAMP and Infrastructure (VMS, Kerb etc.) have been integrated	*		
Links with Highways England have been established	*		
GLOSA implemented within FMZ area		*	
Connected Car Messaging implemented (Yr3) and reviewed (Yr4) within the FMZ area		*	*
TRO's have been digitised for Cambridgeshire and Peterborough	*		
Deploy Smart Parking sensor network and consumer app	*		
Blue Badge and Coach parking management implemented	*		
Delivery management measures implemented		*	
Incremental changes to solutions based on analysis of, and reponses to, implementations			*
Project ❹ Ticketing and Payments	**Year 2**	**Year 3**	**Year 4**
Ticketing and Payment platform deployed	*		
Number of operators using platform has been increased		*	
Project ❺ Customer Experience	**Year 2**	**Year 3**	**Year 4**
Initial MaaS deployment has been rolled out	*		
MaaS deployment has been scaled to wider geography		*	
Scalable business and operational models available			*
First phase of mobility credits completed for review and evaluation	*		
Deploy second phase of mobility credits based on first phase learning		*	*
Scalable business and operational models available			*
Backend development of payment platform to create mechanism for business subsidies complete	*		
Mechanism for business subsidies has been scaled across wider geography			*
Wayfinding solutions implemented at CBC and the Central Station	*		
Wayfinding solution implemented at Drummer St Bus Station		*	
Wayfinding solution implemented at Cambridge North Station			*
Project ❻ Mobility Marketplace	**Year 2**	**Year 3**	**Year 4**
Engaged with SME market	*	*	*
Pilots conducted with assistance of Mobility Accelerator	*	*	
Project ❼ Information Architecture	**Year 2**	**Year 3**	**Year 4**
LAMP has been established and is in operational use	*		
Development of FMZ standards is in progress	*	*	*
Cybersecurity protocols have been reviewed across the FMZ programme	*	*	*
Evaluation and Feedback	**Year 2**	**Year 3**	**Year 4**
Evaluation of FMZ projects (process/impact) is in progress	*	*	*
Dissemination activities	*	*	*

As with all innovative programmes, an element of risk is expected. We have determined a number of mitigating actions for short and long term risks that we have identified at this stage. The Risk Register will be reviewed and updated monthly in accordance with our governance plans as set out in the Management Case, therefore risks are likely to be added or removed throughout the programme.

Description of risk	Likelihood 1=VLow - 5=Vhigh	S=Short Term M = Medium Term L= Long-Term	Management of risk - Mitigation
Strategic			
Lengthy procurement processes cause signifciant delays in the delivery of projects and incompleted outcomes	3	S	- Use of existing frameworks where possible to reduce timescales - Use of existing procurement specialists to advise on most efficient routes - Use of specialists where required to ensure successful outcomes where procurements are required
Unable to recruit appropriate staff with relevant skills, impacting the quality of projects/outcomes	1	S	- Identify suitable consultancy/agency staff, proffesional services contract
Existing legislation is a barrier to delivery leading to an inability to deliver the complete scope/outcomes	2	M	- Work with DfT on legislative changes needed to enable use cases
Key operators don't engage in the 'FMZ' meaning we cannot integrate with current operators	1	S	- Work closely with existing providers to ensure barriers to delivery are removed where possible
Solutions trialled may not have a strong enough business case to be independently sustainable	2	L	- Ensure that the purpose of each scheme is well documented in advance - Engage with stakeholders including potential commercial partners early ensuring their buy-in and ability to offer expertise to improve sustainability of trials
Public Sector delivery partners are unable to support project delivery because of competing priorities	3	M	- Engage with partner organsiations at a senior officer and member level to ensure partner buy-in - Create a Governance structure that unlocks barriers to delivery
Project 1 First Mile			
User acquisition - unable to recruit enough users to the pilot deployment to test the full deployment model	2	M	- Deliver a programme of community engagement and marketing for the project - Ensure robust scheme planning process in place to identify optimised area for deployment
Lack of engagement from key partners meaning we are unable to integrate with operators/campus owners	1	S	- Engage Campus stakeholders and key operators to ensure that FMZ programmes will support their plans for transport solutions and can be integrated/complementary to schemes they may already have planned
Project 2 Last Mile			
Legislation is a barrier to deployment of micro mobility solutions not allowing operation on road or pavement	2	M	- Review legislative status of all solutions as part of the project work (feeds into Project 7) - Engage DfT for support in areas of uncertainty - Produce coverage maps for each FMZ project to show road ownership (Eg Private/Adopted)
Micro mobility market doesn't enagage with the FMZ	3	S	- Robust market engagement through partners such as the Catapult - Creating an environment which reduces the friction to deployment
Operational model of deployment creates conflict with local residents and politicians e.g. hazards on pavements/roads/damage to quality of public realm	2	M	- Work with residents and providers to find an operational model that delivers value for companies and users
Unable to identify a suitable location for a second trial	1	M	- Work with colleages to identify opportunities and overcome barriers to delivery.
Delays in technology readiness lead to delays in deployment and therefore delivery	3	S	- Close liason with the market to ensure robust planning
Project 3 Network Management			
Differing operation priorities between local authority teams create a barrier to delivery and adoption of operational models	3	M	- Governance (see Section E2)
Unable to enage key partners - businesses etc in the pilot schemes impacting on delivery	1	S	- Enagage all key partners at an early stage and involve them in project development - Design projects so outputs and outcomes can be modelled without key stakeholder buy-in
Project 4 Ticketing & Payment			
Unable to get agreement between key operators as to the design of an integrated ticketing soloution	2	S	- Get agreed buy-in/Support from partners in advance - Detail project plans and mitigation strategies in partnership to ensure both parties are aligned
Key operator develops their own ticketing scheme meaning funding is not needed to develop the back office capability but doesn't deliver necessary functions to deliver the full FMZ requirements	3	S	- Work closely with operators and ensure that and scheme that comes forward has open standards and is interoperable

Description of risk	Likelihood 1=VLow - 5=Vhigh	S=Short Term M = Medium Term L= Long-Term	Management of risk - Mitigation
Project 5 Customer Experience & Incentives			
Withdrawal of credits at the end of the pilot phase may impact travellers significantly	1	L	- Work with DWP, Benefits Service/Job Centre to carefully design the scheme in a way that addresses this risk - Agree a reasonable period to withdraw credits if no longer supported. Use this to dictate the last date that mobility credits can be given out reducing the potential impact on travellers when the pilot ends
Integration with third parties including Government for assignment of credits as a new service, may cause delays	3	M	- Engage with partners at DWP, Benefits Service and JobCentre to understand what processes are currently in place to provide support and how mobility credits could be made available
Unable to get operators to agree to be part of a MaaS trial causing a barrier to deployment	3	M	- Early engagement with operators and using FMZ funding to de-risk the scheme - Robust evaluation through the project to identify any perverse outcomes
Difficulties in developing wayfinding schemes and better information due to land ownership issues	2	M	- Early engagement and use of the County Council barrier busting team who help with issues such as wayleaves etc
Project 6 Mobility MarketPlace			
Lack of market engagement/new entrants and innovation in the mobility marketplace	2	S	- Test the market at an early stage phase of the project - Ensure that the marketplace offers companies support that they require - Remain engaged with potential users of the marketplace to evaluate its on-going effectiveness
Unable to attract business as the environment is difficult for new entrants to deploy into due to organisational or infrastructure issues	2	M	- Work with collegues to make assets available - Work with the barrier busting team to reduce barriers to employment - Ensure that data is made open
Project 7 Information architecture & supporting infrastructure			
A lack of interoperabiity creates issues with creating a federated data architecture	3	M	- Ensure procurment specifes open stndards etc
Obtaining data sharing agreements between partners/citizens may be difficult	3	M	- Work with DfT to understand how other FMZ's are approaching this - Engage with partners/academic institutes to understand work in this area
Platforms and sensors are new innovations and may not perform or be as reliable as expected	3	M	- Record lessons learned to inform others of findings - Work with other partners/suppliers to identify and mitigate possible reliability issues in advance
Issues with security leave the data architecture and mobility solutions open to attack, damaging reputation and slowing delivery	2	M	- Work with the University of Cambridge and private companies to ensure that cybersecurity is built into all schemes.
The use of cameras to collect granular and ANPR data a cause of concern to some residents, reducing the volume of data collected and causing a signficant barrier to deploying innovations in network management	1	M	- Delpyment of data guardian to ensure transparency and member oversight - Engagement with the ODI to ensure that we are acting in an open and transparent way
Evaluation			
Evaluation framework isn't robust enough impacting scaling and dissemination of business cases and models	1	L	- Ensure the scope is defined and aligned with DfT requirements for evaluation of the programme - Design evaluation framework to support dissemination to other cities nationally & internationally
If we have to use surveys to get data from those participating in the FMZ there is a risk that they feel 'over-surveyed' becoming disengaged from the process leading to more negative feedback than is truly reflective	1	S	- Only use surveys if no other means can be agreed (this will be determined in the evaluation scoping) - Align the Evaluation of all projects carefully to avoid asking for input too often or for individual projects - Produce clear evaluation criteria with a definition of the purpose for each
Randomisation of sample sizes and scale may cause political concerns as they could appear to be unequal across constituencies	2	S	- Engage with politicans for the areas within the FMZ geography to explain the reasons for the randomisation - Explain the learning to be gained from this method and why it is more beneficial than others in this scenario
The size of the sample required to achieve robust evaluations may be larger than we are able to cover with the funding provided	2	M	- determine the scale of the impact we are measuring during the evaluation scoping and determine the optimal size of the sample as early as possible - Provide realistic options and funds for evaluating the impact of schemes
Dissemination			
Inadequate data, business cases and operational models to usefully disseminate to other cities	1	L	- Ensure that all projects consider scalability and produce outputs that support the development of the market and add value to the UK ecenomy

E2. Management case – Governance

Do you have governance processes in place to deliver the scheme?

<mark>**Yes**</mark>   No

With a programme of work as extensive and collaborative as the FMZ, we recognise that a functional governance system will be of utmost importance. To that end, we propose to use a system of governance that has been proven to work, and can be adapted to accommodate the FMZ. Each project will have a project manager responsible for day to day management of all schemes within that project. Using a modified version of an existing template, the project managers will provide highlight reports on a monthly basis. Reports will be reviewed by the FMZ Delivery Board, led by Rachel Stopard (Chief Executive of the GCP) as the Delivery Senior Responsible Owner for the FMZ Programme.

The FMZ Delivery Board will review the scope, delivery, risks and budget of the projects in addition to the integration between them. The FMZ Delivery Board will also serve as the escalation point for projects within the programme.

The close collaboration between the GCP and the Combined Authority on the delivery of the CAM scheme means that a fully functional Programme Board for the CAM already exists. With representatives from both the CPCA, CCC and GCP this board offers the ideal forum in which to discuss the FMZ within the context of the CAM initiative, with all the relevant parties. The board already meets monthly, and will be extended to include review of the FMZ which will be delivering schemes in support of the CAM (by delivering travellers from further away, into the core network). The FMZ Delivery Board will provide the CAM & FMZ Programme Board with an update on progress, any deviations from agreed plans and any potential risks as shown in the diagram below. The CAM & FMZ Programme Board will also review the impact and integration of the FMZ schemes with any other ongoing CPCA initiatives. By utilising a board that is already established, we will ensure that the FMZ aligns with all the relevant programmes, ensuring maximum value both to FMZ, but also to CAM.

As per section E3, we are expecting to receive more detailed information from DfT with regard to monitoring of the programme once the winners have been announced. In the meantime, we are making a provision to report progress on a regular basis, through a separate governance review. We will work to incorporate the information needed for DfT with the highlight reports that we will produce for our internal work, this will ensure that we are not duplicating effort or bureaucracy unnecessarily. Through our DfT governance, we would also hope to access guidance on procurement procedures and integration with the other Future Mobility Zones to exchange knowledge and experiences.

All levels discussed above will be providing oversight by Officers. Reporting and escalation to the political sphere will be to the GCP Executive Board using the quarterly report to provide progress updates, and to the CPCA Transport & Infrastructure Committee, where updates regarding the FMZ as part of the CAM initiative will be reported.

GCP Executive Board

Progress updates via regular **Quarterly** report

CPCA Transport & Infrastructure Committee

Reporting on FMZ as a part of the CAM initiative

Political Oversight and Escalation

CAM & FMZ Programme Board

Monthly programme update and review of impact on CPCA transport initiatives

Officer/Delivery oversight and Escalation

DfT FMZ Governance

Monthly; reviewing funding commitments, knowledge transfer and procurement expertise

FMZ Delivery Board

Monthly Review of Scope, Delivery, Risks, Budget and integration with other schemes

| First Mile | Network Management | Ticketing & Payment | Customer Experience and Incentives | Innovation Market Place | Supporting Architecture | Last Mile |

FMZ Projects
Monthly Reporting via highlight reports & PM attendance at the FMZ Programme Board

E3. Management case – Monitoring

A monitoring report should be prepared following the completion of each year of the scheme. The Department will work with successful bidders on the exact format of the report to ensure a consistent approach.

Do you agree, in principle, to undertake monitoring for each project in the FMZ scheme?

Yes   No

E4. Management case – Evaluation

Evaluation Framework

Overview and principles

We plan to put in place a rigorous evaluation process that will measure the impact of the schemes on travel behaviours and, where possible, economy, sustainability, and well-being. This will include both process evaluation and impact evaluation for the purposes of learning what works in Greater Cambridge, and adjusting future provision accordingly, and for sharing that learning more widely.

This will help develop business cases and templates that will be shared with other cities.

Process evaluation - overview

We will commission an independent process evaluation which will consider whether project and programme outputs have been achieved, and whether this has been achieved within intended timescale and budget. It

will identify lessons learned that can be incorporated into future projects in this place, or in other cities. There may be merit in joining up process evaluations across FMZ cities, or identifying common metrics, so that more generalised conclusions can be drawn. This will help in ensuring that any emerging lessons learned are relevant and transferrable to other future projects. It will also provide contextual information to the impact evaluation – if impacts are not what was expected, there may be something in the process evaluation which offers an explanation as to why that might be. Perhaps a particular project element was delivered badly, or not as expected. For that reason, it may be that we choose to appoint one evaluator to cover both process and impact evaluations.

Where possible and appropriate, we will align with the City Deal Gateway process already in place for the GCP programme. In general we would expect the approach to include scrutiny of project management and budget documentation (planned compared to outturn), interviews with programme staff at multiple levels, and delivery partners amongst other methods.

Priorities for impact evaluation

We will elaborate full monitoring & evaluation plans when we have a fixed programme of work, but the principles of our approach are as follows:
- We will focus on one or two priority outcomes of interest per project, and try to really understand them well rather than spending a lot of resource collecting and presenting data for every listed outcome and impact in the logic chain.
- Wherever possible, we aim to use a counterfactual evaluation so that we can draw credible conclusions on causal impact.
- We aim to include one or more Randomised Control Trial (RCT) approaches where possible.
- Depending on the projects selected for funding, where we can we aim to develop collaborative monitoring and evaluation approaches with other FMZ cities. This gives greater flexibility in options for good evaluation. For example where baseline conditions are similar, and projects are rolled out differently in different places, or at different times, there may be scope to learn by comparison which approach works better. At minimum, we believe that establishing some common metrics for before/after across cities will allow us to make the best use of any insights gained, and may give greater flexibility in research design.

Priorities for impact evaluation will be learning about the impacts on individual travel behaviours and their consequences. Primarily: what does or does not work to get people out of their cars and onto public transport, particularly for commuting trips.
Each project has a slightly different focus and although they are all focused at the same overarching programme objectives, there are different focuses. Each project will be evaluated from a process perspective – to learn lessons about how to successfully deliver projects. But from an impact perspective we will concentrate on the one or two key impacts that we think will be most easy to isolate and find meaningful causal impacts.

We set out below which outcomes will be the focus for which project but, at programme level direct outcomes are expected to be:
- changes in individual travel behaviours – whether people change the mode they use, the amount of time they spend travelling;
- improvements in prevailing network conditions – number of cars on the road, average road speeds etc.;

Indirect outcomes and longer term impacts are also of interest:

- What are the environmental impacts associated with any reduction in use of private car (e.g. noise and air quality locally, and carbon globally)
- Does health and/or wellbeing outcomes improve as people move away from car use?
- For those on the margins of the labour market (out of work, or in insecure employment): can removing barriers to transport help them get into work (or do other contributing factors to unemployment continue to present a barrier to work)?
- For those already in work: do decisions change as a result of more or better transport options? Do they work different hours? Does a change in access to job locations mean they are able to take different (better?) work or study options than they would otherwise have accepted? There is some evidence locally that young people make constrained decisions about Further Education because of their lack of transport access to colleges.
- Do businesses have improved staff retention rates? Do they have larger labour search areas and does this have any knock-on impact on business performance?

In general, we will be more focused on the immediate direct outputs than the longer term outcomes. This is because there is less uncertainty about the longer term outcomes, and in many cases those indirect outcomes can be reasonably derived as estimates. For example: there is already plenty of evidence about the health benefits of walking and cycling, but less evidence about how to persuade people to walk and cycle. Hence, that will be the focus of our evaluation. Where we can we will monitor those indirect impacts (e.g. through regular air quality monitoring, or aggregate level health impacts e.g. asthma rates in a neighbourhood) but we will not spend a lot of resource trying to attribute observed air quality changes to the outcomes of the FMZ projects. These are complex and usually an area level aggregate. There will be many other contributing factors to those headline indicators which are outside of the scope of the FMZ programme, some of which may be more important determinants of the overall outcome, especially when in the piloting stage of small scale interventions. That will make it very difficult to reliably isolate the specific impacts of FMZ. Rather, we will focus our energy on getting robust causal impact estimates of the extent to which the FMZ has changed travel behaviours. We can then translate these into estimates of environmental or health impacts using standard assumptions.

The exception to this will be when we have individual level data on an indirect outcome. The most obvious example is mobility credits where we are testing whether subsidising travel for individuals who are unemployed can help them to get into employment they would not otherwise have been able to access. It may be possible to do likewise for individual health outcomes associated with the shift to walking and cycling, but that will depend on our ability to collect individual level health data, which we will explore during the evaluation scoping phase.

Evaluation timescales

We would begin an evaluation scoping exercise immediately on securing FMZ funding, and it would run in parallel with project definition. This is in line with the principles of good evaluation established by the What Works Centre for Local Economic Growth. An important principle of robust evaluation is starting early, and designing projects with evaluation in mind from the outset.

- In terms of expected impact timescales, we would expect to be able to detect causal impact on the following outcomes during the pilot timescales: we would expect travel behaviours to change immediately or in the short term for individuals.
- We would expect to be able to see shifts in overall mode share for the areas being targeted by the pilot projects e.g. for all employees on Cambridge Biomedical Campus
- Aggregate indicators for an area level may also be detectable quickly depending on the size of the area and how many individuals from that area experienced the intervention. For projects such as

DRT, where whole neighbourhoods benefit, area aggregate impacts should be identifiable in the short term.

- Health and wellbeing impacts that follow from mode shift, as well as personal employment status impacts may be felt immediately or in the short term, but our ability to identify them will depend on whether we can access individualised health data – for very good reasons relating to data privacy this may be difficult but we will explore the possibility (see data collection section below).

There are other effects we would not expect to make any reliable causal inference during the pilot period. These are largely on indirect impacts, outcomes and on aggregate level impacts. For example:

- Area aggregate effects will not be detectable during the pilot period. Where interventions are targeted at individuals, e.g. provision of free bikes or mobility credits, the aggregated impacts will depend on the proportion of people in a given area that receive it but are unlikely to be detectable during the lifecycle of the FMZ pilot period.
- The impact of the pilot programmes on overall mode share or congestion in the CPCA area, or even at the Greater Cambridge level are not likely to be identifiable.
- Impacts on area level health and environmental outcomes are not likely to be directly observable in the time period (although we can make inference on this: for example if we can identify how many cars have been taken off the road we can make an estimate of the air quality impacts this could have had – this is slightly different to directly measuring changing air quality in a neighbourhood and making a causal inference that the change has been caused by our specific project when there will have been other contributing factors).
- Business level and wider economic impacts (such as changing TTWA) are longer term and more indirect, and will be mediated by many other factors. We will not be able to reliably identify them during the timeframes of the FMZ pilot.

For many of these longer term and indirect impacts and outcomes, it will be worth considering whether baseline data can be collected now to allow longer term impact evaluation at a later stage, or whether by collaborating with other cities these conclusions can be drawn more reliably even in the short term. We will investigate this as part of an evaluation scoping phase.

Establishing a counterfactual

Our focus for the evaluation will be in identifying causal impact. This means that we need to compare outcomes before/after in the people or areas where we intervene, and use a counterfactual approach to subtract 'what would have happened anyway'. This allows us to isolate the impact of our project(s) over and above any background factors that are driving changes by controlling for 'selection on observables'.

We have identified one or two cases in which we think a Randomised Control Trial (RCT) may be possible, which will give us the highest possible level of robustness and which (implemented well) can control even for bias arising from selection on unobservables. RCTs score the maximum of SMS5 in the What Works Centre for Local Economic Growth (WWCLEG) standards of evidence. In other cases, we think identifying a 'similar on paper' control group of people or neighbourhoods will be the most appropriate approach. This would score 'SMS 3' on the WWCLEG standard of evidence, the basic threshold for identifying causal impact.

Data collection

In order to properly evaluate impacts we will need to collect data on travel behaviours before and after the projects are rolled out. Options for doing so include:

- carrying out a wide-scale longitudinal travel diary survey exercise to collect individualised travel data (and possibly also health and wellbeing data) or
- using an app to collect baseline individualised travel data (and possibly also health and wellbeing data); or
- using a digital twin to create a modelled (hypothetical) counterfactual scenario.

Either the longitudinal survey or the app also have the potential to collect data on individual wellbeing, health and labour market outcomes. However the impact on these outcomes will be less direct and therefore harder to identify in smaller sample sizes. If they can't be collected at individual level it is unlikely that we would be able to observe impacts at neighbourhood/aggregate level given the scale and timescale of the pilots. This is an area where collaborating across FMZ funded projects (with other cities) might allow a richer dataset and allow us to draw more reliable conclusions collectively than we could draw individually due to sample size.

For traffic and network information, Cambridge has the advantage of a long 'before' period, because a city-wide ANPR survey was carried out in 2017. GCP is in the process of exploring options for road pricing or other demand management scheme. If taken forward in a form that required ANPR enforcement it would mean 'live' data could be collected and monitored. In other cases, bespoke ANPR surveys could be repeated.

Environmental impacts and prevailing traffic data can be based on direct 'real' before/after measurements e.g. noise and air quality monitoring; or estimated using assumptions based on identified travel behavioural impacts. These would be collected anyway and can be included as before/after monitoring in any evaluation, but the extent to which we would be able to attribute causal impact to network level changes for pilot projects over the timescale will be limited.

Where we are interested in business outcomes, options for collecting data are:
- primary collection through longitudinal business surveys
- using secondary data sources such as the Annual Respondents Database microdata or MINT. Again, collaborating with other cities may allow a more meaningful conclusions to be drawn if it is possible to standardise an approach.

Whatever data approach taken, we would aim to begin collecting new baseline data immediately that funding is secured and well before project roll-out to ensure a suitably long baseline period. This will allow us to make more reliable conclusions about suitable comparators – because we can compare whether their behaviours followed a similar trend over time until the point of the intervention, not just whether they look similar at a snapshot 'before' point in time. Demonstrating comparable 'back trends' is a key method of establishing trust in the selected counterfactual groups or areas.

Project-level evaluation approach

We have set out our preliminary ideas for evaluation design by project, below. What is actually feasible for each project in evaluation terms will depend on the details of project design, numbers of participants, availability of data and, where matching is intended the ability to identify good matches in the data. We would iterate final evaluation plans with WWCLEG, the Behavioural Insight Team and the Department for Transport.

Project 1 - First Mile

Learning objectives: Our primary interest is in learning whether provision of first mile services feeding into the core network can support people living in poorly served areas to switch from car to public transport. The outcome of most interest and short term impact is likely to be individual travel behaviours, and then the

secondary impacts associated with them. Depending on sample size and contextual data collected, it may be possible to identify whether, within those communities DRT particularly helps with groups traditionally not well served by public transport such as shift workers or those making linked trips (e.g. home – school run – shopping – work). However, the latter point is probably best considered through project 5 where individual impacts are more directly observable

Evaluation approach: There may be scope in principle to randomise roll-out of Demand Responsive Transit (DRT) to some individuals within the service area and not others during a pilot phase, however this is likely to be politically difficult. More likely, a matched counterfactual group could be identified of similar individuals living in similar areas where DRT has not been introduced. Or, a quasi-experimental approach may be possible where the counterfactual group is identified amongst areas that are likely to be next in line for roll-out of DRT. This could achieve SMS Level 3 or 4 depending on approach selected.

If DRT systems are also implemented to serve last mile connections on campus employment sites. As well as looking at changes to individual travel behaviours it may possible to consider impacts on businesses; depending on sample size and subject to the caveats above. For example: considering whether DRT improves employee retention, or expands the effective labour catchment area of a given campus.

Resources and funding: We would appoint independent evaluators to carry out this evaluation, and funding for this has been incorporated into our financial proposal.

Project 2 - Last Mile

Evaluation/learning objectives: Primarily we are interested in learning whether providing last mile options can support people who currently drive (to campus sites in particular) to switch to public transport. The outcomes of interest will be individual travel behaviours and the secondary impacts associated with them. As with first mile, it may be possible to identify impacts on specific groups of interest, and on business outcomes in the areas served e.g. employee retention and labour market catchment over the longer term.

Evaluation approach: It is not feasible to randomise the placement of on-demand bikes and scooters, or of autonomous vehicles. Counterfactual evaluation of impacts on individual travel behaviours should be possible by identifying a matched control group of individual people. It may also be possible to look at business impacts, with the caveats above.

Resources and funding: We would appoint independent evaluators to carry out this evaluation, and funding for this has been incorporated into our financial proposal.

Project 3 - Network Management

Evaluation/learning objectives: This is primarily an enabling investment and takes place at network level. We expect that it will not be possible to identify a causal link between better network management and individual transport behaviours. The focus here will be on understanding technical and management lessons, and on identifying whether there is evidence that the network in general runs more smoothly. Outcomes of interest here will be primarily around road speeds and congestion metrics.

Evaluation approach: A counterfactual evaluation will be difficult here. We will explore whether we can 'match' the city centre of Cambridge with places with similar prevailing traffic patterns. It may be possible to compare with other FMZ funding recipients who do not pursue network management, or other cities with ANPR monitoring data. But this may be too complex; in which case we will focus on collecting robust before/after monitoring data of traffic levels using ANPR surveys.

Resources and funding: For before/after collection and monitoring of traffic data, this would probably be the responsibility of the in house team. If a cross-city comparison were to be undertaken we assume this would happen in the programme level evaluation. Process evaluation would be the responsibility of the independent evaluator, and funding for this has been incorporated into our financial proposal.

Project 4: Ticketing & Payment

Evaluation/learning objectives: Primarily we are interested in learning technical lessons here about how integrated payment and ticketing can be delivered. In terms of impact, there is evidence to suggest that integrated ticketing can support an increase in public transport patronage and if it can be achieved at marginal cost/effort we will consider whether we can incorporate this in the process evaluation (see below), but it is not the primary focus of the impact evaluation. However, this is an area where we may want to consider collecting public and customer perception and satisfaction data to support both process and impact evaluation.

Evaluation approach: It is likely that integrated ticketing and payment facility will be rolled out to the general public at the same time, making identifying an untreated counterfactual group difficult. In which case, we will concentrate on before/after monitoring of travel behaviours through the routes identified above. If there is any sort of phased or pilot roll out this might offer the opportunity to identify a randomised or matched control group. Or there may be quasi-experimental approaches where non-treated groups are used as the counterfactual for treated groups for the duration of the pilot.

Resources and funding: We would appoint independent evaluators to carry out this evaluation, and funding for this has been incorporated into our financial proposal.

Project 5: Customer experience, behaviours and incentives (including mobility credits)

Evaluation/learning objectives: Here we are fundamentally trying to understand, at individual level, how we can influence people to change their behaviours. The focus will be on understanding how people react to different measures we hypothesise will make them choose public transport, walking or cycling over car. We are also interested in the extent to which subsidising the cost of transport can support unemployed people into work, and whether we can learn anything about the way in which this is rolled out that changes its effectiveness (i.e. can we avoid a 'benefits trap' effect)?

Evaluation approach: Specific evaluation plans will depend on the interventions tested and piloted. We think here there is likely to be most potential to identify opportunities for Randomised Control Trials to give high quality evidence that can be disseminated to others as to which behavioural interventions can really change behaviours. For this specific set of interventions it may be worth supplementing the general data collection (above) with some detailed surveys on people's anticipation of what would encourage them to switch from car travel with their actual changes in behaviour, to better understand the link between stated and revealed preference. These interventions may also be the most likely place to collect objective health outcomes data (subjective assessment of health could be collected through whichever overarching data collection method is selected).

We will work with the WWCLEG, the Behavioural Insights Team and the Centre for Diet and Activity Research (CEDAR) to identify the interventions which have most potential for impact and to be robustly evaluated.

Some examples of potential for RCTs might be: free bikes or cargo bikes could be provided to a randomly selected treatment group. MaaS apps could be provided to car drivers at random, tailored travel information, or public transport pricing incentives/subsidies/gamification could be likewise be randomly provided. Or, minor differences in the way information and services were provided could be likewise trialled.

Mobility credits for the unemployed is another area for exploration under this project. Can we design a credit that helps people into work and, when it does, what is the appropriate period to continue the subsidy after they are in work? We could randomise a benefit extension period to test whether a longer taper period increases employment duration.

Resources and funding: We would appoint independent evaluators to carry out this evaluation, and funding for this has been incorporated into our financial proposal.

Project 6: Innovation Marketplace

Evaluation/learning objectives: From an impact perspective the primary outcome of interest is whether businesses are supported to form or grow in a way they would not otherwise have done by stimulating demand through the FMZ. We would not expect to identify any direct impacts on travel behaviours arising from this project.

Evaluation approach: the impact of the future mobility accelerator on the business ecosystem could be tested by monitoring the number of businesses in the mobility sector before/after (potentially compared to a matched control area if one can be identified). The impacts of the accelerator on business outcomes can be achieved either by identifying similar businesses through business databases or by using unsuccessful applicants as the control group.

Resources and funding: We would appoint independent evaluators to carry out this evaluation, and funding for this has been incorporated into our financial proposal.

Project 7: Information architecture and supporting infrastructure

Evaluation/learning objectives: We would not expect to identify any direct impacts on travel behaviours arising from this project: it is an enabling project on which other projects depend but which will not directly deliver changes in travel behaviours.

Accordingly the evaluation focus here will be on process evaluation.

Partnerships

To carry out process and impact evaluation, we will work with:
- The What Works Centre for Local Economic Growth (WWCLEG), potentially also with the Behavioural Insights Team
- Measuring health impacts in conjunction with the Centre for Diet and Activity Research (CEDAR)
- Work with the Connected Places Catapult on delivering an evaluation framework

- University of Cambridge will establish a 'Future Mobility Task Force' at the University of Cambridge which will work with GCP to pursue the triple bottom line of exploiting 'New Mobility' options, delivering excellent public transport services, and improving community health and welfare.

SECTION F – The commercial case

F1. Commercial Case

Our **market engagement** has ranged across a number of different types of suppliers and market operators including:

- Established transport (bus and train) providers
- Providers of other local mobility services – car share, bike hire etc.
- Emerging transport providers (often looking to enter the market) and micromobility operators
- Specialist supporting service providers
- Consultancy and academic research organisations
- Organisations and consortia that cut across multiple categories

In particular, we have engaged with our key public transport operators including Stagecoach and Ascendal and their eco-system of providers. We have also worked with our network of providers, networks and organisations who are working in the mobility space. This has included BSI, Connected Places Catapult, the University of Cambridge and providers of new mobility solutions.

If successful we would conduct a deeper market engagement exercise which would be carried out in partnership with BSI and the Catapult.

In terms of our **sourcing approach**, we have started to develop a set of principles including:

- Consortia: as the mobility marketplace develops, collaborations and consortia are being formed and reformed as suppliers recognise for the need for a range of existing and new capabilities. In general, we are pleased to engage with such consortia since we want to take advantage of these emerging relationships. An example of this is the 'Urban Mobility Partnership a collaboration between Stagecoach, Enterprise, Brompton, Liftshare and others to provide a more tailored and responsive transport experience.

- Innovation: Cambridge startups are part of the unique business 'ecosystem' that exists in the area, often linking academic innovation with commercial opportunities. We have plans to encourage the application of this talent to local mobility challenges.

- Gap funding: it is clear that public transport provision in parts of the Cambridge Travel for Work area is currently insufficient to persuade enough people out of their cars. However, this does not imply that the public sector needs to fund all public transport in these areas. The FMZ programme will explore different business models and identify the gap between the costs and what the private sector is prepared to fund so that the public sector only funds what is necessary. The sourcing strategy will reflect requiring bidders to identify their contribution and what financial contribution the relevant local authorities will need to make.

- Sustainable: all deployments must demonstrate that they are working toward a business case that is financially sustainable. If subsidy is required a route to revenue support must be identified. This will ensure the long term success of the FMZ and protect customers who may come to rely on services.

- Academic rigour in both research and evaluation: without high-quality, internationally renowned research and evaluation, the full benefit of the FMZ will not be realised, and knowledge transfer and adoption by other regions will diminished.

- Knowledge transfer and intellectual property: all sourcing and procurement must result in outputs that can be used across other FMZ programmes and authorities.

- Utilise existing arrangements to ensure that rapid progress is made: there is a risk that procurement processes could inhibit progress at the start of the FMZ programme. We have a number of existing arrangements that could be used 'as is' or extended to ensure this does not happen.

- Collaborate in procurements with other FMZs where appropriate to minimise costs and reduce timescales.

Our procurement approach

Our approach will be to use procurement to drive innovation by taking an 'outcome specification' approach and helping to seed a market for new products. There are a number of routes to procurement that will ensure that we both meet regulations, reduce unnecessary bureaucracy but ensure we deliver innovation;

If a suitable framework agreement is available then this will be our preferred route to market. Tenders will be invited from all suppliers on the framework agreement, or relevant Lot within the framework if it is broken down by Lots. In particular, we are well advanced in procuring a wide ranging Professional Services contract which we believe will meet most if not all of the consultancy needs of the FMZ programme via lots which will cover a diverse scope including smart cities and future mobility.

If there are many suppliers the procurement team will carry out a capability assessment before inviting bids by providing brief details of the requirement and asking suppliers if they consider they have the capability and capacity to carry out the work and whether they wish to bid if the requirement is advertised.
If a suitable framework agreement isn't available then we will advertise the contract opportunity as follows:

- Under £2,000 – Obtain best value
- Under £25K – 3 quotes
- Under £100K – use the RFQ process
- Over £100K – we will work with our procurement team on the best way to expedite Procurement but ensure that we are meeting EU procurement regulations

Where schemes are first of a kind and there is only one supplier we can use exemption regulations.

The nature of the schemes proposed will necessitate us taking a different approach to procurement and we propose using two further mechanisms:

- Innovation partnerships - Innovation partnerships have been introduced as part of the PCR 2015 reforms. They are intended to overcome the current discontinuity between ideas developed in a PCP contract, based on a research and development procurement, and full scale deployment of the developed solution with a commercial contract. Since innovation partnerships have not yet been widely used in the UK and other EU states, there is limited experience on which to draw. However, we have already started to explore this procurement route and there appears to be close alignment with the desired commercial approach for the FMZ. In particular, we would use procurement pilots which if successful could be scaled to full schemes without the need for a further procurement process.

- SBRI - The Small Business Research Initiative (SBRI) is a well-established process to connect public sector challenges with innovative ideas from industry, supporting companies to generate economic growth and enabling improvement in achieving government objectives.

Due to the collaborative work of the Smart Cambridge and Connecting Cambridgeshire programmes, we have strong relationships with a rich and active 'ecosystem' of technology organisations, and this is often underpinned by world leading and internationally renowned research by the University of Cambridge.

SECTION G – Additionality

G1. Additionality

Significant investment in transport has already been made, is underway or is being planned including:

- TCF - This funding is being used to deliver schemes improving connectivity in the north of county. This will support movement toward the FMZ but will not deliver schemes within the defined FMZ area
- GCP - one of a number of 'City Deals' agreed by central government in 2013. It is worth up to £500 million in funding to 2030 for transport infrastructure to boost economic growth. £100m of government funding has been made available for transport improvements until 2020. A further fund of up to £400m will be available if initial investments are successful in supporting economic growth. Government funding is being matched with local funding, for example through Section 106 agreements with developers, and we are exploring private funding opportunities. Delivery of initial schemes is already complete and is delivering benefits to travellers with a large number of schemes scheduled to be delivered over the next 5 years.

- CAM Metro – the CPCA are investing significant funding into developing this scheme which will provide a high-quality, fast and reliable transport network that will transform transport connectivity across the Greater Cambridge region. The vision for the project is an expansive metro network that seamlessly connects Cambridge city centre, key rail stations (Cambridge, Cambridge North and future Cambridge South), major city fringe employment sites and key 'satellite' growth areas, both within Cambridge and the wider region. CAM will operate entirely segregated from traffic through Central Cambridge through an underground tunnel, ensuring fast and reliable services unaffected by traffic congestion. Services will be provided by electric, low-floor 'trackless metro' vehicles.

The investments detailed above are all being delivered by CPCA and GCP and contribute to the Core Network provision as shown in the FMZ Programme diagram in the Strategic Case.

Past investments including the Cambridgeshire Guided Busway also provide very valuable assets which are already being used to support new innovations including autonomous vehicles.

These existing CPCA and GCP schemes focus on providing high quality public transport (HQPT) and cycling infrastructure to reduce congestion and enable growth in both jobs and housing. Given the substantial levels of modal shift required, the provision of such infrastructure alone is necessary but not sufficient. Different types of transport services need to be made available to extend the range of options available to travellers so that public and sustainable transport become more attractive options. Understanding what encourages travellers to adopt more sustainable modes of transport will encourage the behaviour changes required to achieve modal shift.

The FMZ funding envisages new schemes that build upon the foundations of past, current and planned initiatives, and provide a substantial opportunity to maximise the return on those investments by developing new transport modes, models and services to create a truly future facing transport system. The schemes identified in this document will also use data, digital infrastructure and systems in an integrated way to transform the customer experience for all, especially those on low incomes and/or excluded from jobs and educational opportunities in Greater Cambridge by a current lack of access.

Additionality will be extended by the transferability of the schemes to other parts of the CPCA area, with the data and supporting digital infrastructure facilitating CPCA work across the area. We will look to both accept and transfer knowledge to other UK and international cities.

A significant area of focus for knowledge transfer will be the Oxford – Cambridge arc. We envisage extending our close working relationship with the 'England Economic Heartland' (EEH) sub-national body as they develop their transport strategy for the corridor. Being amongst the UK's most productive, successful and fast growing cities, Cambridge, Milton Keynes and Oxford host a highly skilled labour force, cutting edge research facilities and technology clusters which compete on the world stage, so it is essential that this vital workforce can engage in employment and educational opportunities across the whole arc.

The FMZ schemes laid out in this proposal including a delivery of robust first/last mile services, will improve and expand travel choices for people via new and improved transport interventions. Delivering these initiatives regionally will facilitate a step change in how more people can move seamlessly on reliable, clean and affordable transport systems.

Section H – Declarations
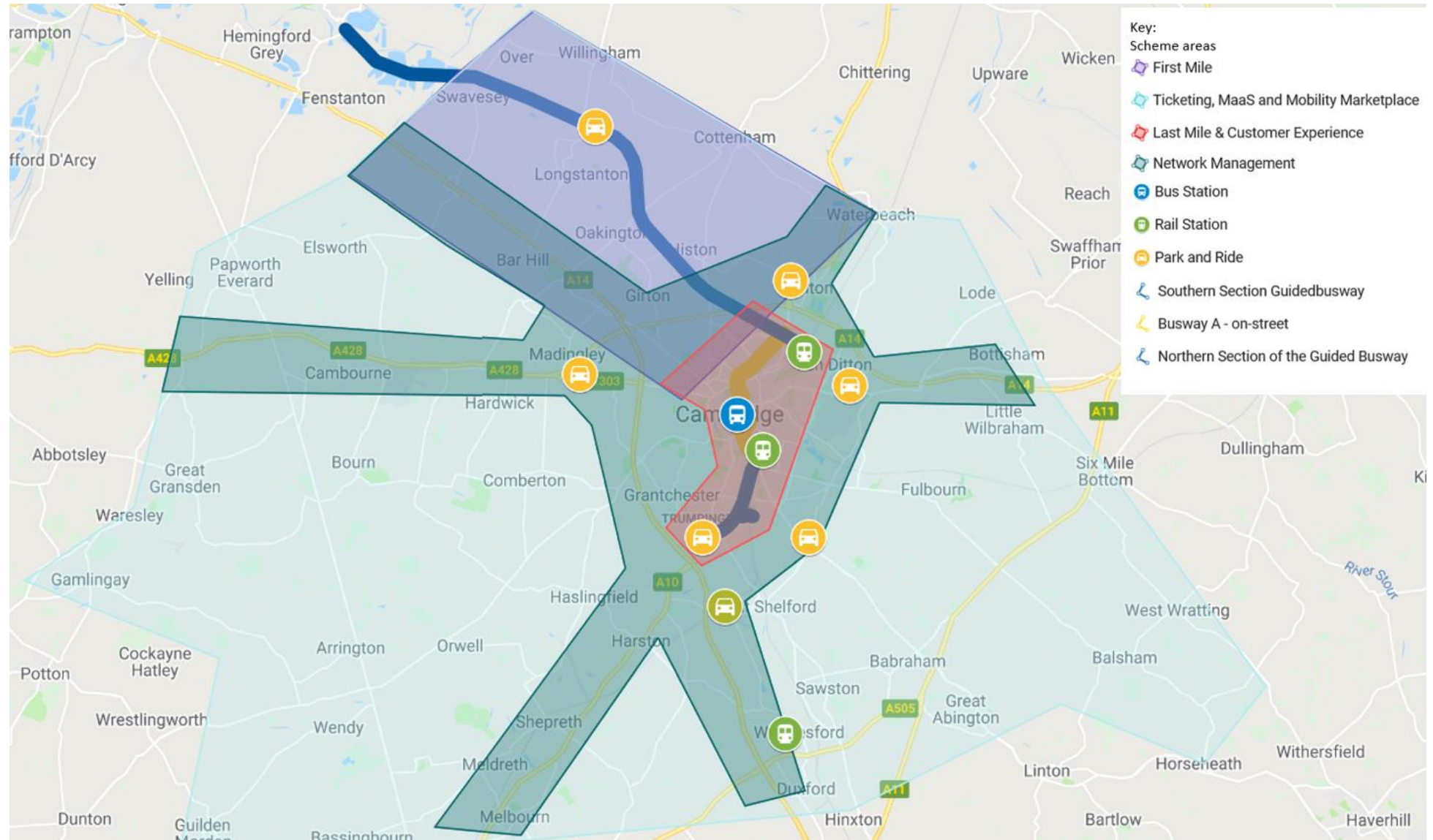
H1 – Senior Responsible Owners Declaration

H1. Senior Responsible Owners Declaration	
As Senior Responsible Owners for the Future Mobility Zone for Greater Cambridge we hereby submit this request for approval to DfT on behalf of the Cambridgeshire and Peterborough Combined Authority & the Greater Cambridge Partnership and confirm that we have the necessary authority to do so. We confirm that the Cambridgeshire and Peterborough Combined Authority and the Greater Cambridge Partnership will have all the necessary statutory powers in place to ensure the planned timescales in the application can be realised.	
Name: Paul Raynes	Signed:
Position: Director of Strategy and Delivery, Cambridgeshire and Peterborough Combined Authority	
Name: Rachel Stopard	Signed:
Position: Chief Executive, Greater Cambridge Partnership	

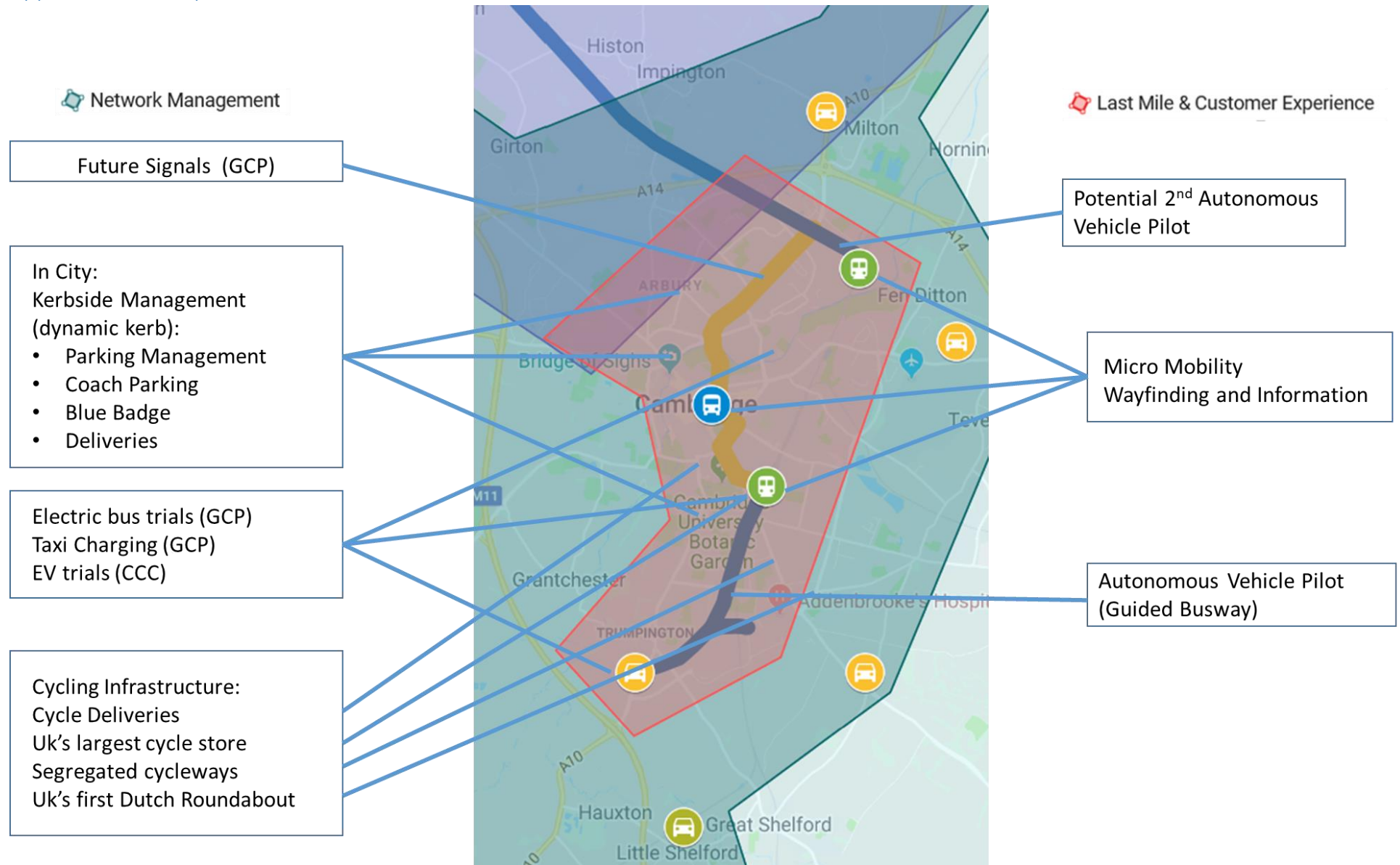## H2 – Section 151 and Section 73 Officers Declaration

H2. Section 151 and Section 73 Officers Declaration
As Section 151 Officer for Cambridgeshire County Council (the accountable body for the Greater Cambridge Partnership) and Section 73 Officer for the Cambridgeshire and Peterborough Combined Authority, we declare that the scheme cost estimates quoted in this bid are accurate to the best of our knowledge and that the Cambridgeshire and Peterborough Combined Authority and the Greater Cambridge Partnership   • have allocated sufficient budget to deliver this scheme on the basis of its proposed funding contribution;   • accept responsibility for meeting any costs over and above the DfT contribution requested, including potential cost overruns and the underwriting of any funding contributions expected from third parties;   • accept responsibility for meeting any ongoing revenue and capital requirements in relation to the scheme;   • accept that no further increase in DfT funding will be considered beyond the maximum contribution requested and that no DfT funding will be provided after 2022/23;   • Confirm that the authority has the necessary governance and assurance arrangements in place and the authority can provide, if required, evidence of a stakeholder analysis and communications plan in place.

Name: Jon Alsop	Signed:
Position: Section 73 Officer Cambridgeshire & Peterborough Combined Authority	
Name: Chris Malyon	Signed:
Position: Section 151 Officer Cambridgeshire County Council (Greater Cambridge Partnership)	

Appendices

Appendix A1 – Map of FMZ area

Key:
Scheme areas
- First Mile
- Ticketing, MaaS and Mobility Marketplace
- Last Mile & Customer Experience
- Network Management
- Bus Station
- Rail Station
- Park and Ride
- Southern Section Guidedbusway
- Busway A - on-street
- Northern Section of the Guided Busway

Appendix A2 – Map of FMZ: Central Core

Network Management

Future Signals (GCP)

In City:
Kerbside Management
(dynamic kerb):
- Parking Management
- Coach Parking
- Blue Badge
- Deliveries

Electric bus trials (GCP)
Taxi Charging (GCP)
EV trials (CCC)

Cycling Infrastructure:
Cycle Deliveries
Uk's largest cycle store
Segregated cycleways
Uk's first Dutch Roundabout

Last Mile & Customer Experience

Potential 2nd Autonomous Vehicle Pilot

Micro Mobility
Wayfinding and Information

Autonomous Vehicle Pilot
(Guided Busway)

Appendix B – Letters of Support

Organisation
Stagecoach
Ascendal
RDM
Telensa
Greater Anglia
AppyWay
Cambridge University Health Partners
Mobike
AstraZeneca
University of Cambridge
Connected Places Catapult
BSI
Cambridge Science Park
Urban Mobility Partnership
Uber
ARM
What Works Group
Cambridge Ahead
Cambridge Network
Cambridge Wireless