GREATER CAMBRIDGE PARTNERSHIP

Growing and sharing prosperity

Delivering our City Deal

Report to: Greater Cambridge Partnership Executive Board 08 February 2018

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Mass Rapid Transport Strategic Options Appraisal

1. Purpose

1.1. In July 2017, the Board together with the Combined Authority Board approved the commissioning of a strategic options appraisal to investigate potential mass rapid transit solutions. This study has now been concluded, and has established that there is a strong case to develop this initiative further.

1.2. The report sets out the key findings from this study and updated the Board on the next stage to develop a Strategic Outline Business Case for a Cambridgeshire Autonomous Metro (CAM) proposal. The report also considers how the current schemes provided by the Greater Cambridge Partnership, can transition to form part of the proposed CAM network.

2. Recommendations

2.1. The Executive Board is recommended to:

a) Welcome the findings of the Cambridgeshire Mass Transit Strategic Options Assessment;
b) Agree that the findings be commended to the Combined Authority with a view to developing a Strategic Outline Business Case;
c) Agree that the Greater Cambridge Partnership builds on the Mayor's plans for the next stage of developing a CAM Metro network by ensuring GCP's current and future plans for high quality public transport corridors are consistent and readily adaptable with the emerging proposition (subject to the future business case for CAM being agreed by the Combined Authority).

3. Key issues and considerations

Scope of the Mass Rapid Transport Study

3.1. The study area included Greater Cambridge and the surrounding economic and geographic travel to work areas.

3.2. The primary purpose of the study was to evaluate and recommend the most appropriate mass transport solution in order to support the following aims:

(a) Support economic growth – recognising the critical significance of the Greater Cambridge economy for the area as well as for the UK
(b) Improve accessibility and connectivity across the City to boost economic growth and prosperity
(c) Address current congestion and delays, and build intelligent mobility within Cambridge City and the rest of the transport/infrastructure network.

3.3. It was recognised that any mass rapid solution should be underpinned by a number of key principles. It must:

(a) Deliver a high quality, high frequency, reliable service to be attractive to encourage mode shift
(b) Deliver maximum connectivity, network coverage and reliable journey times
(c) Provide sufficient capacity for future growth
(d) Be flexible to adapt for the future including the adoption of emerging technologies
(e) Represent value for money, and be affordable and deliverable.

3.4. The study was, therefore, wide ranging in its considerations. A comprehensive list of both traditional and emerging mass rapid transport modes were considered and evaluated. Importantly these were placed in the context of the region's vision for growth; the current and future transport constraints; network requirements encompassing key destination and development sites; and a range travel demand scenarios.

Key findings from the Mass Rapid Transport Study

3.5. The study (see background paper link) recognises the number of major transport schemes currently under development in the Cambridge area that will deliver significant benefits but that these solutions need to deliver seamless connectivity between the City Centre, key development sites on the City fringe and the wider corridors in the region.

3.6. The study concluded that there is a strong strategic case for mass rapid transport that could support the wider economy through:

(a) Proximity effects – which creates closer concentration of businesses, skilled workers and academics, and improves productivity as they collectively benefit from each other's innovations, ideas and creativity
(b) Expanded labour markets – through the provision of a transport network that successfully connects workers to jobs, facilitating recruitment and enables businesses to growth
(c) Direct productivity impacts – by reducing travel time and increasing the efficiency and competitiveness of businesses
(d) Transport and social factors – by connecting people with jobs, services and leisure activities. Improving quality of life by providing greater access to more affordable housing, reducing congestion, improving air quality and improved health by encouraging walking at the beginning and end of journeys.

3.7. Given the likely constraints in terms of physical constraints on the network, congestion and the anticipated growth of the area, it is unlikely that that the City Centre can accommodate significant increases in bus throughputs under the current bus configuration. Any significant increase is likely to be accompanied by increased journey times.

3.8. The study considered a long list of traditional and emerging mass transit solutions before shortlisting three options for more detailed evaluation. These included Light Rail Transit (LRT), Affordable Very Rapid Transit (AVRT), and Cambridgeshire Autonomous Metro (CAM). In the case of LRT and AVRT, the project team was able to draw upon the good work that had already been undertaken in developing these respective proposals. For clarity, each of these options are described below:

Light Rail Transit	This is a generic term for any railed vehicle lighter than a convention/traditional heavy rail solution. LRT operates on dedicated tracks and is segregated from other modes of transport. Vehicle capacity is circa 200 passengers and can operate a service frequency in excess of every ten minutes along each route
Affordability Very Rapid Transit	This consists of small rubber-tyred vehicles operating at high speed within a network of small single-bore tunnels. Vehicles operate with a capacity of approximately 40 passengers with a potential frequency in excess of 25 vehicles per hour. Services operate autonomously as a series of simple end-to-end shuttles.
Cambridge Autonomous Metro	This represents an evolution of both LRT, AVRT and Bus Rapid Transit (BRT) type solutions. It operates using bespoke rubber-tyred articulated vehicles and can achieve vehicle frequencies of every five minutes during peak periods. This solution has the ability to operate on both segregated and existing on-street infrastructure. Due to the range of potential vehicle available for this solution, this option was developed on the basis of a high-quality, tram-like vehicle with a capacity of up to 100-200 passengers.

Figure 1 – Illustration of CAM vehicle

3.9. Each option was assessed against seven transport and six deliverability risks as outlined below.

Transport Benefits	Deliverability Risks
Network coverage	Technical feasibility
Route flexibility	Technology
Frequency of service	Value for money
Journey time / reliability	Affordability
Number of interchanges	Powers / consents / legislation
Accessibility	Stakeholder / public acceptability
Perceived quality	

3.10. It should be noted that this evaluation framework was developed purely to enable an effective comparison of options. It is recognised that there are a wider range of additional factors which must be considered during the subsequent development of the mass rapid transit proposal and that existing conclusions must continue to be reviewed as the proposal gains definition. Once individual routes emerge this will demand detailed consideration of environmental impacts.

3.11. The outcome of this evaluation was that CAM offered the best overall solution without any significant dis-benefits. Importantly it offered the greatest route flexibility through its ability operate on both segregated and existing on-street infrastructure. As a result it had the potential to offer the greatest service coverage across all radial corridors. Perceived quality was also a major consideration and it was concluded that higher specification vehicles, as shown in Figure 1, would offer provide an excellent passenger experience especially along segregated routes.

3.12. Whilst CAM performed well on many of the transport benefits described above, it excelled when assessed against a range of deliverability risks. Of all the options considered, CAM is the most likely to achieve value for money and an operating surplus. This greatly increases the deliverability of the mass transit proposal and is most likely to achieve private sector investment.

3.13. The flexibility of CAM to operate on both segregated and existing on-street infrastructure also has further practical benefits in its implementation. Importantly, it enables the incremental provision of a segregated network to match growth requirements.

3.14. There are no technical feasibility issues with CAM although there are recognisable challenges, as there would be with the other options, in tunnelling and the provision of underground station. From a technology perspective CAM can use technology that is readily available and can transition from driver operated to autonomous technology as this matures.

Costs and funding

3.15. The capital costs of implementing the CAM proposal is estimated to be in the region of £1.5-£1.7bn. This includes scheme development and design, implementation, project management, risk and (in accordance with the Treasury's Green Book) optimum bias.

3.16. Costs have been benchmarked from publically available data for similar transport schemes in the UK with due consideration of the scheme characteristics such as route length, tunnelling length, number of stations and number of vehicles. However, a significant expenditure relates to tunnelling, the extent of which will require greater development.

3.17. Whilst these capital costs are very significant there are a number of potential funding solutions which will be explored during the subsequent development of the scheme. What is clear is that central Government is increasingly looking for means through which major infrastructure can be (part or fully) funded from private sector and/or local contributions. It is too early to speculate on what the preferred funding model might be but it could include, amongst others, Land Value Capture, Community Infrastructure Levy and Business Rate Supplement.

Impact on existing Schemes

3.18. Existing schemes, such as Cambourne to Cambridge and the Cambridge South East Corridor Transport Study, create the opportunity to transition in the future to provide key parts of the CAM infrastructure. The SDG integrated network proposition is predicated on these planned interventions being part of the solution.

3.19. Discussions are currently being undertaken with our legal advisors as to the most appropriate way of transitioning the existing schemes and subsequently procuring the necessary approvals/ orders. The implications will be dealt with in future reports in respect of the individual schemes, subject to the Combined Authority progressing the detailed feasibility work for CAM. At this time it is not envisaged that this will delay the current programmes, but could potentially assist with early delivery of parts of a CAM network.

Deliverability of the Cambridgeshire Autonomous Metro

3.20. Based on the findings from the initial study it is recommended that the CAM proposal be commended to the Combined Authority be carried forward for further development with a view to developing a Strategic Outline Business Case. This proposal should:

(a) Provide significant transport benefits to Greater Cambridge and the surrounding areas
(b) Offer the best value for money case despite its high capital costs
(c) Be deliverable in the practical sense, both in terms of technical and technological feasibility
(d) Run at a commercial surplus during operation which should ensure its long term viability.

Next steps and milestones in the delivery of a mass rapid transport solution

3.21. Whilst the existing study has concluded that CAM represents the best overall mass transport solution for the area, significant further work is required to develop the proposal and make a robust case for investment. Therefore, the next stages of the project will be to develop a Strategic Outline Business Case. The Combined Authority's Outline Scope for the next phase of work is shown at **Appendix 1**.

3.22. An outline delivery programme for this proposal is provided below. However, it must be recognised that the project is at a very preliminary stage in its development and any delivery timetable must be considered indicative only. Also, the outline programme relates to the City core element and it may be possible to bring forward the delivery of some of the wider routes if these can be incorporated into schemes which are already under development, as outlined in sections 3.18 and 3.19.

Activity	Completion
Strategic Outline Business Case Options Appraisal report	Late 2018
Outline Business Case Public Consultation	2019
Full Business Case	2020
Statutory Consents	2021
Design (City core)	2022
Construction (City core)	2026

3.23. At this stage it is not possible to provide a completion date for the overall CAM network. However, it is anticipated that the network will be developed in phases, focusing on the City core and those corridors with the greatest need.

3.24. The Strategic Outline Business Case will also effectively create an overarching strategy for the implementation of mass rapid transit for Greater Cambridge and the surrounding economic and geographic travel to work areas. Specific governance and delivery arrangements will be developed jointly with the Combined Authority as part of ongoing wider transport governance discussions.

4. Implications

4.1. Financial and other resources

There are no financial implications at this stage.

4.2. Legal

None at this stage

4.3 Staffing

Not applicable at this stage

Background papers

Mass Rapid Transit Options Appraisal Report	https://www.greatercambridge.org.uk/futureinvestmentstrategy/

List of appendices

Appendix 1	The Combined Authority's Outline Scope for the next phase of work