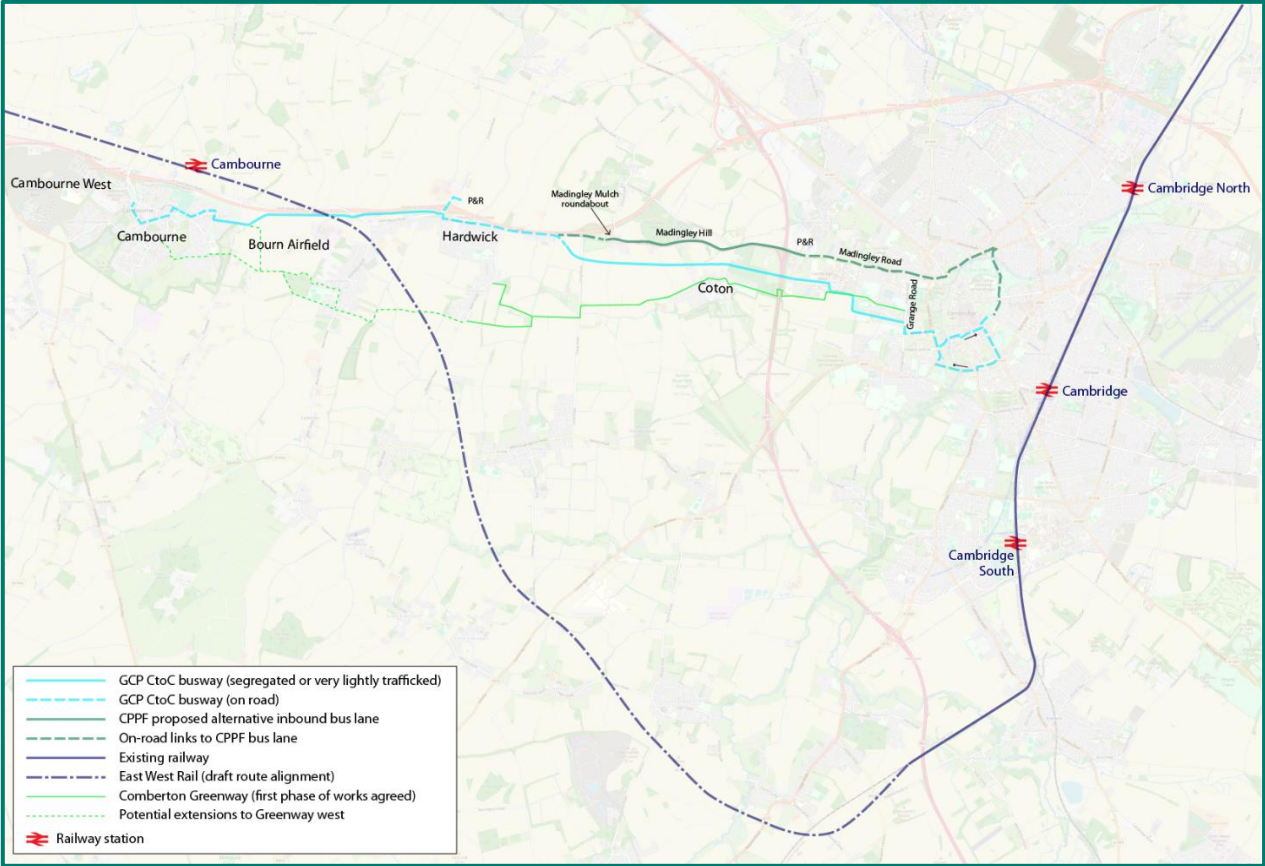


Alternative in-highway proposal for high quality Cambourne–Cambridge public transport scheme

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Contents

1	Executive Summary.....	2
2	Glossary.....	3
3	Overview	4
4	Baseline.....	10
5	Objectives	12
6	Outline of interventions considered.....	14
7	Phased delivery.....	18
8	Detail of interventions proposed.....	20
9	Inbound Flow Control	29
10	Comparison with GCP’s preferred option.....	30
11	Previous objections to an in-highway bus lane	31
12	Data analysis	33
13	Figures.....	34

First published in July 2021, then updated in June 2023, October 2024 and April 2025 to take account of policy changes, update data and links, and simplify and clarify our proposal.

1 Executive Summary

This report sets out a more cost-effective and less environmentally damaging alternative to part of the Cambourne–Cambridge (CtoC) scheme proposed by the Greater Cambridge Partnership (GCP). Instead of building a new bus-only road between St Neots Road and West Cambridge, we propose building an inbound bus lane down Madingley Hill. This would achieve almost identical benefits as the equivalent section of the CtoC scheme in terms of journey time savings for buses. In addition, the bus lane would provide journey time savings to *all* bus, coach and emergency services using Madingley Road to enter Cambridge or join the M11, whereas GCP’s busway would provide journey time savings *only* to vehicles permitted to use the busway, fitted with the appropriate guidance technology and driven by a driver trained in its use.

Our scheme would be entirely consistent with the Local Plan requirement for “Provision of high quality bus priority measures or busway on or parallel to the A1303 between its junction with the A428 and Queens Road, Cambridge.”

Our scheme more cost-efficiently meets the CtoC scheme objectives by solving the actual problems encountered by buses. The lack of congestion outbound beyond the M11 junction obviates the need to build segregated infrastructure for buses travelling out of Cambridge. The only scenario in which the busway would provide time savings over an inbound bus lane is if inbound traffic were queued all the way back to Madingley Mulch roundabout. As this would have safety implications for the A428, National Highways would be seeking mitigatory measures to reduce queuing at the A428 exit.

Our scheme fits better with changed circumstances since 2014: GCP’s budgetary constraints, owing in part to high inflation of construction costs; the likelihood of East West Rail being built, which would provide faster transport connections between Cambourne and Cambridge, including the Biomedical Campus and CB1 (which together draw a quarter of all commuters from Cambourne – see Figure 37 on p58); and significantly altered travel patterns post-COVID.

Our scheme also fits better with the local authorities’ and national strategic objectives on decarbonisation of transport, traffic reduction and modal shift, including a target central to the City Deal of reducing peak-time traffic in Cambridge by 10–15% on 2011 levels; whereas the GCP’s proposal makes sense only if traffic levels follow a business-as-usual growth trajectory over the long term.

Our scheme provides very much better value for public money. There would be large savings on land acquisition and construction costs, including not having to build a new bridge over the M11.

In short, our scheme would deliver similar social benefits at lower cost and significantly lower environmental harm than the scheme proposed by the GCP. The bus and active travel infrastructure in our scheme could be designed optimally and delivered in stages using Highways Act powers.

2 Glossary

- **Madingley Mulch roundabout** refers to the junction between the A1303, A428 and St Neots Rd by Madingley Mulch, the garden building supplier.
- **Madingley Hill** refers to the A1303 between Madingley Mulch roundabout and the M11 Junction 13.
- **Madingley Rd** refers to the A1303 between the M11 Junction 13 and Queen's Rd.
- **Hurry call** refers to a system for adapting traffic signal phasings in response to an approaching bus.

The following reports are referenced:

- **CPIER:** [Cambridge & Peterborough Independent Economic Review](#), Cambridgeshire and Peterborough Independent Economic Commission, September 2018
- **EC:** [Outline Business Case: Economic Case](#), Mott MacDonald, 17 January 2020
- **HGV:** Heavy Goods Vehicle ([legally](#), any goods vehicle over 3.5 tonnes when fully laden)
- **IA:** [Independent Audit of Key Assumptions and Constraints](#), 25 May 2021
- **LTN1/20:** [Local Transport Note 1/20: Cycle Infrastructure Design](#), July 2020
- **NPPF:** [National Planning Policy Framework](#)
- **NR:** C2C Technical Note: [Northern Route](#), Mott MacDonald, 22 May 2019
- **NTSR:** Cambourne to Cambridge Better Public Transport Project [Non-technical Summary](#) of [Outline Business Case](#), Mott MacDonald, December 2019
- **OAR:** [Outline Business Case](#) Appendix B: [Options Appraisal Report Part 2](#) & [Part 3](#), Mott MacDonald, December 2018
- **OBC:** [Outline Business Case](#), Mott MacDonald, 17 January 2020
- **OBCA:** Outline Business Case Addendum (TWA0 doc ref CtoC-21-00 rev 00)
- **QW:** C2C Technical Note: [Madingley Road 'Quick-Win' Options Outline](#), Mott MacDonald, 14 May 2019
- **RFB:** A428 Cambourne to Cambridge Option Study: [Rectory Farm Bridge Options Report](#), Atkins, 10 June 2016
- **SEN:** [Outline Business Case](#) Appendix J: [Strategic Economic Narrative & Economic Impacts Report](#), Mott MacDonald, 17 January 2020
- **SoA:** TWA0 Statement of Aims (TWA0 doc ref CtoC-4-00 rev 00)
- **SOBC:** [Strategic Outline Business Case](#), Atkins, 23 September 2016
- **TA:** Transport Assessment (TWA0 doc ref CtoC-25-00)
- **TSCSC:** [Transport Strategy and High Level Programme](#) of the [Transport Strategy for Cambridge and South Cambridgeshire](#), Cambridgeshire County Council, April 2014
- **TSM:** [C2C Topographical Survey Maps](#), Cambridgeshire County Council, 24 November 2016
- **TWAOA:** [Cambourne to Cambridge: Transport & Works Act Order application](#) (March 2023)

Other abbreviations used:

- **BCR:** Benefit-Cost Ratio of cumulative social benefits to costs over the appraisal period (60 years)
- **CtoC** and **C2C:** [Cambourne to Cambridge](#)
- **EWR:** [East West Rail](#)
- **GCP:** [Greater Cambridge Partnership](#)
- **HQPT:** High Quality Public Transport
- **NPPF:** National Planning Policy Framework
- **RIS2:** Department for Transport [Road Investment Strategy 2](#)
- **TWA:** Transport and Works Act (1992, as amended) and associated statutory instruments
- **TWAO:** Transport and Works Act Order for Cambourne to Cambridge scheme

3 Overview

3.1 Scheme Aims

In developing an alternative scheme, we have been mindful of the Scheme Aims set out by GCP in the Statement of Aims (CtoC-4-00-00) and are confident that our alternative will be similarly effective in achieving them:

1. **To relieve congestion** on the current road network, in particular on the A1303/Madingley Road
2. **To support economic growth**, by facilitating travel between new and existing homes in Cambourne and Bourn Airfield and employment site in and around Cambridge
3. **To delivery a sustainable transport system**
4. **To enhance quality of life**

3.2 Planning justification

The South Cambridgeshire Local Plan policy SS/7 sets out a requirement for:

8 (a) Significant Improvements in Public Transport, including:

- i. Provision of a segregated bus link from Cambourne to Bourn Airfield new village across the Broadway, and on through the development to the junction of the St Neots Road with Highfields Road;*
- ii. Any measures necessary to ensure that a bus journey between Caldecote / Highfields and the junction of the A428 and the A1303 is direct and unaffected by any congestion suffered by general traffic;*
- iii. Provision of high quality bus priority measures or busway on or parallel to the A1303 between its junction with the A428 and Queens Road, Cambridge;*

This policy links with Policy 21 in the TSCSC, which describes the underlying strategy for the St Neots and Cambourne to Cambridge corridor as follows:

In the short to medium term, the focus will be on providing bus priority in locations where buses currently get caught up in congestion, in particular between the A1303 and A428 and also around the A428 / A1198 Caxton Gibbet roundabout. Interchange points will be provided at strategic points along the corridor to enable trips that begin in some of the villages off the route to be able to access high quality passenger transport services.

A cycling and walking network will be provided which links into the interchanges along the corridor, but that also connects the outlying villages to employment sites, such as at Cambourne and also to secondary schools in Comberton, Cambourne and further afield in Gamlingay.

In the longer term, a busway or HQPT bus infrastructure will be introduced along the A1303 section of the corridor to completely segregate buses from other traffic. It will service a second Park & Ride site between Cambourne and the A1303, which will intercept traffic further out from Cambridge and free up more capacity at the existing Madingley Road site which would then be used principally for traffic coming off the M11.

The circumstances that justified the policy were described in the TSCSC as follows:

With no railway line along this corridor, the focus for a HQPT corridor between Cambridge and St Neots will be on bus. The basis of such a corridor is already in place, with the

Madingley Road P&R site at the Cambridge end. However, there are a number of pinch points along the route that cause congestion, especially at the A428 / A1198 Caxton Gibbet roundabout and on the A1303 between the A428 and the M11. This affects buses travelling along the route as they get snarled up in the traffic. A number of villages that are within cycling distance of Cambridge lie just off the A428 / A1303 corridor; however the main route is not conducive to cycling. There is also the potential for more traffic to be intercepted further out from Cambridge if a transport interchange was provided, such as a Park & Ride.

3.3 Changed circumstances

Much has changed since the TSCSC was adopted in 2014, most notably:

- The A14 has been upgraded to provide three lanes between the M11 and Milton interchanges, with two-lane eastbound exit ramps at the Histon and Milton interchanges. This has reduced the time and variability of journeys via the A428 and A14 to north Cambridge, including Cambridge Regional College, Cambridge Science Park, and the various other business parks. This also offers an alternative route for buses between Cambourne and Cambridge, as demonstrated by the 905 service that ran this way before GCP roadworks on Histon then Milton Road made this route less attractive. Now that those works are complete, buses could again use this route as an alternative to Madingley Road.
- The opening of Cambridge North station gives Cambourne and future Bourn Airfield residents faster and more convenient access to rail services than travelling to Cambridge station.
- From 2027, the [A428 will be dualled](#) all the way to the A1, creating a fast route from Cambourne and Bourn Airfield to employment sites in St Neots, Bedford and beyond.
- Travel patterns have changed post-COVID, leading to much reduced congestion on Madingley Hill.
- The government reconfirmed in the autumn 2024 budget its support for East West Rail to run to Cambridge. The last-published preferred alignment between Bedford and Cambridge included a station at Cambourne, which will link the expanding settlement directly to major employment sites at the Biomedical Campus (Cambridge South station, due to open in 2025), CB1 (Cambridge station), Bedford and Bletchley (for Milton Keynes).

The alternative scheme proposed here takes account of those changed circumstances:

East West Rail: In 2014, when the TSCSC was adopted, there was no plan to build a railway from Cambourne to Cambridge. The government confirmed in the autumn 2024 Budget that it continues to support building a new railway line between Oxford and Cambridge. The last-published preferred route alignment between Bedford and Cambridge included a station at Cambourne. A third non-statutory consultation starts in November 2024 in advance of a statutory consultation, which will form part of an application for a Development Consent Order. Once built, this new rail link will provide significantly faster and more reliable journey times between Cambourne and both the Biomedical Campus and CB1 business district than buses will ever be able to provide. If trips currently assigned in the GCP's transport modelling to the CtoC busway are instead assigned to East West Rail, the business case for the CtoC busway will be severely weakened.

Post-COVID travel patterns: In 2019, traffic conditions on Madingley Road between the Madingley Mulch roundabout and the M11 junction were very severely congested in the AM peak, with a 15-minute median delay on weekdays, exceeding 30 minutes about once a month (see Table 1 on p10). The situation now is very different: the median delay is less than two minutes, exceeding seven minutes less than once a month.

City access plans: All of the GCP's busway schemes depend critically on reducing congestion in Cambridge city centre, where buses experience most delays (see Figure 5 on p36). Because political support has been withdrawn from two congestion reduction plans – peak-time control points and 'smart' congestion charging – there is still no plan for reducing congestion in the city centre, and therefore bus services will continue to experience long delays and unreliability, negating the benefits of the proposed busway.

The IA conclusion included the following observation:

“There have, however, been some significant changes in the wider context, including the impact of Covid-19, the increasing importance of climate change, the government’s new bus policy, East-West Rail and the CAM scheme. These factors will have to be taken into account in the next stages of developing the C2C scheme.”

3.4 Assumptions

While the alternative proposed here would deliver mostly the same benefits as the CtoC scheme, it is important to note that:

Outbound traffic: there has never been a significant problem with congestion on Madingley Road westbound (see Figure 5 on p36 to Figure 8 on p37), so there is no meaningful benefit conferred by the outbound half of the proposed busway.

M11 bridge: there is minimal congestion on the M11 overbridge, so the justification for building a new bridge – the most expensive and disruptive component of the entire scheme – is lacking. GCP’s own study (RFB) indicates that an additional lane could be accommodated on the existing bridge, which would be a more cost-effective way to provide bus priority without reducing road capacity.

Traffic projections: GCP’s argument against building an inbound bus lane rather than a busway is that traffic levels will continue to grow, exacerbating existing congestion and creating congestion where it is not currently experienced (and was not in 2019). This is at odds with:

1. GCP’s own objective to reduce peak-hour vehicular traffic in Cambridge by 10–15% on 2011 levels by 2031, which necessarily requires a reduction in traffic entering the city.
2. The Local Transport Plan’s objective to reduce car mileage in Cambridgeshire and Peterborough by 15% by 2030.
3. NPPF guidance that advocates a “vision-led approach” to sustainable transport planning, rather than predict-and-provide:

***Vision-led approach:** an approach to transport planning based on setting outcomes for a development based on achieving well-designed, sustainable and popular places, and providing the transport solutions to deliver those outcomes as opposed to predicting future demand to provide capacity (often referred to as ‘predict and provide’).*¹

4. The potential closure of the Madingley Park & Ride when its lease from the University of Cambridge expires in 2035, which would remove up to 930 peak-time vehicle movements from Madingley Road each day.

3.5 Alternative proposed

Instead of a busway between St Neots Road and Grange Road, we propose a continuous bus lane along Madingley Hill from St Neots Road to the Madingley Park & Ride junction. Other elements of our proposal may be considered as complements or alternatives to the rest of the CtoC scheme. The interventions we propose are entirely consistent with the South Cambridgeshire Local Plan policy SS/7 (8)(a) to enable and support development of Cambourne West and Bourn Airfield (*“Provision of high quality bus priority measures or busway on or parallel to the A1303 between its junction with the A428 and Queens Road, Cambridge.”*)

There are two sections of Madingley Hill that have particular ecological and heritage sensitivities, so we propose building the bus lane in phases, initially avoiding these sections and using traffic signals to regulate

¹ [NPPF \(December 2024\) Annex 2: Glossary](#)

(‘gate’) traffic flows to minimise congestion on the sections without bus lanes. The complete bus lane would only need to be built if traffic growth is not contained.

A bus lane will provide almost identical benefits to the GCP Busway between St Neots Road and West Cambridge. It will provide faster journey times for buses heading directly to the Biomedical Campus via the M11 than GCP’s busway, which requires buses to loop back onto Madingley Road via Rose Street and two sets of traffic lights, adding minutes to the journey time. And the bus lane would provide journey time savings to *all* bus, coach and emergency services using Madingley Road to enter Cambridge or join the M11 (e.g. to reach the Biomedical Campus via Hauxton Road), whereas GCP’s busway would provide journey time savings *only* to vehicles permitted to use the busway, fitted with the appropriate guidance technology and driven by a driver trained in its use.

The only scenario in which the busway would provide time savings over an inbound bus lane is if inbound traffic were queued all the way back to Madingley Mulch roundabout (a 3km queue of up to around 450 vehicles). As this would have safety implications for the A428, the national and local highway authorities would have to implement mitigatory measures, which could include building new connections at the Girton Interchange. Any measures that reduce queuing at the A428 exit would benefit buses using either the A428 or St Neots Road.

Bus services to destinations in north Cambridge, such as the Regional College, Science Park and Cambridge North station, can use the A428/A14, which will be significantly faster than either the CtoC busway or any route via Madingley Road.

Elsewhere on the route between Cambourne and Northampton Street, we propose upgrading all traffic signals to respond ‘intelligently’ to approaching buses, and adding bus priority at the Highfield Road and Scotland Road roundabouts.

We have not proposed interventions to address delays that GCP’s CtoC scheme will not reduce, including in Cambridge city centre, where the largest delays are currently experienced (see Figure 5 on p36), and in Cambourne. Both GCP’s scheme and ours will benefit from significant end-to-end journey time savings once the bus-only link between Upper Cambourne and Broadway has been delivered as part of the Cambourne West development.

Our proposal is a variation of the ‘Low Cost option b’ in the OAR, which included a Park & Ride at Scotland Farm. The estimated cost of that option was £37.7m (in 2018 prices). Applying a 25% contingency, as applied in the OBC Financial Case to GCP’s preferred option, and inflation since 2018, the cost in 2024 prices would be £62.5m. This compares with the £192.2m cost of GCP’s preferred option, as stated in the *Estimate of Costs* (TWA0 doc ref CtoC-8-00 rev 00). The actual cost of our scheme would depend on which elements of our proposal and of GCP’s scheme are implemented.

Benefits from journey time savings with both schemes would be similar: any reduction in benefits in our scheme from not having a fully segregated route from St Neots Road is likely to be more than offset by the benefits of shorter journey times for:

- buses joining the M11 (by not having to loop back through the West Cambridge site)
- buses and coaches calling at the American Cemetery (including the City Tour service)
- unguided buses and coaches (which will not be permitted to use the guided busway), including long-distance and chartered services

The social and environmental impacts of GCP’s scheme on Coton, the Coton Orchard and woodland west and east of the M11 are significantly more negative than those of building a bus lane along Madingley Road. If Inbound Flow Control is used (see page 29), then the impacts of the bus lane can be further reduced.

Taking all this into account, the benefit-to-cost ratio (BCR) is likely to be at least three times higher than for the GCP scheme.

3.6 Relative benefits of our alternative proposal

3.6.1 *Faster delivery*

Our scheme may be delivered using the normal powers invested in the Highway and Planning Authorities, without the need for a TWAO or public inquiry. It could therefore be delivered within two years of sign-off, with some interventions being deliverable within six months.

If any new homes in Bourn Airfield are indeed dependent on the CtoC scheme, its later completion date is likely to hold up delivery of those homes. This would materially alter the local planning authority's calculation of its five-year land supply. If that resulted in planning applications having to be considered in accordance with NPPF paragraph 11(d) (the so-called 'tilted balance'), there could be considerable urgency to implement 'quick fix' mitigations to 'unlock' more housing on Bourn Airfield.

Delivery of even part of our scheme before the first 500 homes are built on Bourn Airfield would mitigate the principal area of congestion caused by additional traffic from the Cambourne sites.

3.6.2 *Faster journey times between West Cambridge and the city centre*

The OBC is not explicit about what route buses will take between Grange Rd and the city centre, though it indicates in the NTSR (p58) that buses to the Biomedical Campus would run via Silver St and Pembroke St. The slowest timetabled journey time for the U service from West Cambridge to Queens' College on Silver Street is 23 minutes at 08:27. From there to the Drummer St bus station takes several more minutes, especially when cars are queuing on Downing/Pembroke St to enter or leave the Grand Arcade car park. By comparison, the Citi 4 is timetabled to take 13 minutes to reach Drummer St at the same time of day. The time saving is in the region of fifteen minutes.

Our alternative scheme assumes that bus operators will continue to want to run buses via Northampton Street, Chesterton Road and Victoria Avenue (see Figure 11 on p39). The journey time savings between Grange Road and the city centre for our scheme will more than offset journey time savings that the busway will provide between St Neots Road and Grange Road.

Outbound at peak times, journey times to the start of the CtoC busway are likely to be even slower. Because Downing/Pembroke St is one-way eastbound, buses would most likely return via Lensfield Rd, then either Trumpington St and Silver St (the route taken by the U service) or the Fen Causeway. Both these routes are typically congested at peak times.

In theory, buses using the CtoC busway could travel 840m up Grange Road to join Maddingley Road and follow the Citi 4 route into the city centre (see Figure 16 on p44). However, it may not be physically possible for buses to turn left into Grange Road because of the geometry of the proposed junction at the end of the busway. In which case, buses will be forced to take a slower route into the city centre.

3.6.3 *Faster journey time to the M11*

Since the Biomedical Campus is already the single biggest commuter destination for people living in Cambourne (see Figure 37 on p58), providing fast and reliable bus services is a priority. Our proposal facilitates this, with all operators being free to choose to run buses via the A428 or St Neots Road to the Maddingley Mulch roundabout, and then to use the bus lane to reach the M11 on-ramp.

GCP's busway will cross the M11 in line with Charles Babbage Road in West Cambridge. Buses running directly to the Cambridge Biomedical Campus via the M11 will need to either loop back through the West Cambridge site via Rose Street, or join Maddingley Road north of Coton (see Figure 15 on p43). Both options will be slower than the alternative we propose.

The detour to reach the M11 via the West Cambridges site adds approximately 1.1km or more than 2 minutes to the journey time. It also passes through two sets of traffic signals, at the Eddington Avenue crossroads and at the Park & Ride access, which will add further delay.

With GCP not proposing any interventions on Madingley Road, if buses were to leave the busway at Coton to join Madingley Road, they would encounter a delay turning out of Cambridge Road and peak-time delays along Madingley Road leading into and beyond the existing bus lane.

3.6.4 A bus lane can provide a wider range of public benefit

Because the GCP is applying to build the busway under the Transport and Works Act, it must use guidance technology, whether or not it provides a significant benefit. A considerable disbenefit is that buses and coaches will not be permitted to use the busway if the operator is not party to an access agreement, the bus is not fitted with the required guidance technology, or is not driven by someone trained in its use. This will include long-distance and chartered services, all of which could use a busway or an in-highway bus lane built using the powers of the Highways Act 1980 (provided that the associated Traffic Regulation Order permits it).

3.6.5 Lower maintenance costs

The CtoC busway creates a significantly larger quantity of new roadway and bridges to maintain than the bus lane we propose. Furthermore, it is unclear whether the road construction method proposed for the CtoC busway is suited to carrying guided vehicles, which are likely to cause rutting in a deformable surface material such as asphalt, requiring more frequent maintenance or remedial works. It is notable that the CSET2 application has opted for a continuously reinforced concrete base with an asphalt top layer.

4 Baseline

5. We have analysed weekday bus journey times along Madingley Hill and Madingley Rd during 2019 and 2024, as made available via the Smart Cambridge data API. A small proportion of data points were omitted as unreliable or exceptional, as explained in the section below on *Data analysis* (p33).

Data is not recorded for bus arrival times in Cambridge or in Cambourne, so it is only possible to show journey times inbound to Grange Road and outbound to Madingley Mulch roundabout. The analysis is in four percentiles which translate approximately to:

- 5th percentile: once a month the journey time is quicker than this
- 50th percentile: half of all journeys are faster than this, and half are slower
- 80th percentile: once a week the journey time is slower than this
- 95th percentile: once a month the journey time is slower than this

Table 1: Measured delays on bus journeys via Madingley Road

		Year	Delay in minutes		
			Median	Once a week	Once a month
AM peak inbound (to Cambridge)					
Figure 4	Citi 4 departure point in Cambourne to Madingley Mulch roundabout	2019	14.6	17.6	26.7
		2024	7.3	13.5	20.9
Figure 5	Madingley Mulch roundabout to M11 exit junction	2019	14.8	24.8	32.1
		2024	1.5	3.6	6.3
Figure 6	M11 exit junction to Eddington Avenue junction	2019	2.1	3.5	5.2
		2024	1.4	1.9	2.6
Figure 7	Eddington Avenue junction to Grange Road junction	2019	1.0	2.0	5.3
		2024	0.9	3.3	8.2
PM peak outbound (from Cambridge)					
Figure 8	Cambridge bus station to Grange Road junction	2019	10.1	19.4	37.8
		2024	5.3	10.6	24.6
Figure 9	Grange Road junction to Eddington Avenue junction	2019	1.6	3.2	7.4
		2024	1.8	3.1	6.5
Figure 10	Eddington Avenue junction to M11 exit junction	2019	3.0	5.7	10.1
		2024	1.0	1.5	2.1
Figure 11	M11 exit junction to Madingley Mulch roundabout	2019	1.2	1.8	2.6
		2024	0.8	1.3	2.0

4.1.1 Inbound journey times

Figure 1 shows that journey times from Cambourne to Madingley Mulch roundabout vary greatly at all times of day, and most significantly in the evening peak (the 2019 data shows significant anomalies in the evening peak, which may be due to temporary factors, such as the A14 upgrade). Delays on this leg are most likely due to dwell times to pick up and set down passengers, and congestion within Cambourne. Google Traffic shows some congestion around the Highfields Road roundabout, which may justify an intervention to prioritise buses here, such as signalisation and a short bus lane.

Figure 2 shows that there were severe delays inbound in 2019 owing to congestion on Madingley Hill. These have reduced sharply post-COVID, with the median delay halving from 15 minutes in 2019, and exceeding 7 minutes once a month in 2024 rather than 32 minutes in 2019.

Figure 3 shows that there is a small but consistent delay between the M11 exit junction and the east side of the Eddington Avenue junction, which is largely explained by the three sets of traffic signals on this stretch.

Figure 4 shows that from the Eddington Avenue junction to the Grange Road junction, delays exceed 3 minutes once a week and 8 minutes once a month. This is likely to be largely owing to the six sets of traffic signals on this stretch. Delays have worsened slightly since 2019. Google Traffic indicates congestion builds in the morning around the Grange Road junction. Optimisation of traffic signals may reduce this delay.

As the bus operators are likely to prefer entering Cambridge city centre from the north (see *Faster journey times between West Cambridge and the city centre* above), any time saving achieved by running through the West Cambridge site to Grange Road is likely to be negated by the time it takes to travel the 850m between the busway access and Maddingley Road (1.5 minutes @20mph plus any delays at the Adams Road and Maddingley Road junctions, the pedestrian crossing at Clarkson Road and waiting for oncoming traffic at multiple build-outs along Grange Road).

4.1.2 Outbound journey times

Figure 5 shows wide variability in journey times at all times of day to Grange Road. Since the GCP scheme proposes no interventions east of Grange Road as part of the CtoC busway scheme, these delays apply equally to both the proposed busway and our scheme.

Figure 6 shows a small delay of 3 minutes once a week and 6 minutes once a month between Grange Road and Eddington Avenue. This is largely explained by the six sets of traffic signals on this stretch. Optimisation of the signals may reduce this delay.

Figure 7 shows that there is negligible delay past the Park & Ride and over the M11. The delay could probably be eliminated by optimising the three sets of traffic signals on this stretch.

Figure 8 shows that there is negligible delay on Maddingley Hill.

4.1.3 Initial conclusions

The delays seen on Maddingley Hill during the AM peak in 2019 were so severe that a major intervention was needed to enable buses to run faster and more reliably into Cambridge. In 2024, the delays on Maddingley Hill are more modest, especially in comparison with the large variability in journey times within Cambridge and Cambourne.

This argues strongly for targeted interventions along the whole route. Our proposal focuses on an infrastructure intervention on Maddingley Hill because that is the weakest link in the route for buses accessing West Cambridge and the M11, as evidenced by the congestion seen there in 2019. A bus lane could be built out in phases to provide benefit rapidly and proportionately to the need. On Maddingley Road east of the park & ride, optimisation of signals to respond to approaching buses would reduce delays for buses.

5 Objectives

The first three of the CtoC scheme aims are essentially about mode-shifting trips from solo-occupancy cars to buses and cycling. By using road space more efficiently, capacity increases, in terms of *people* moved per hour, and congestion reduces. One bus carrying 60 passengers (a nearly full double-decker) is equivalent to 50 cars (at an average peak-time occupancy rate of 1.2 people per car). Travelling at 50mph, those cars occupy more than 2km of carriageway, or about the distance from Maddingley Mulch roundabout to the Cambridge Rd junction.

The challenge is, and always has been, how to kick-start a virtuous cycle of mode-shifting car journeys to more space-efficient alternatives, which frees up road capacity and reduces congestion.

The objectives of the study that resulted in the proposed alternative scheme presented here have been to:

1. Determine the fastest, most reliable routes for buses from west of Cambridge to the main destinations in Cambridge (see Figure 11 on p39):
 - **North** (Science Park, Cambridge North station): via A428, A14 Histon Interchange and Orchard Park busway, or A14 Milton Interchange.
 - **West** (University of Cambridge sites): via Maddingley Rd.
 - **Central** (retail, cultural and social centre): via Maddingley Rd (or via the A428, A14 Histon Interchange and Histon Rd?)
 - **South** (Biomedical Campus): via Maddingley Rd, M11, Hauxton Rd and Addenbrooke's Rd.
 - **East** (Marshall businesses and retail sites): via A428, A14 Junction 34, Horningsea Rd.
2. Reduce bus journey times and delays on those routes:
 - **West, Central:** Eliminate delays to buses on Maddingley Hill and reduce them elsewhere.
 - **North, East:** Optimise route for buses to north Cambridge via the A428.
 - **South:** Reduce delays to buses on Maddingley Hill, Hauxton Rd and Addenbrooke's Rd.
3. Be able to achieve these reductions within 6–24 months of sign-off.
4. Select bus priority schemes with positive net benefits over a reduced time frame of ten years (compared with sixty years for most infrastructure schemes, including the CtoC busway).
5. Improve the safety and convenience of cycle routes from Cambourne into west Cambridge.
6. Increase public transport capacity, speed and reliability to accommodate future growth in population and economic activity in the Cambourne–Cambridge corridor.

Pursuing this more tactical agenda will create breathing space to develop and deliver longer-term transport schemes in a coherent and cost-efficient way:

- **[East West Rail](#)**: the preferred location of Cambourne station and the alignment of the railway line were [consulted on](#) in November 2024 to January 2025 (see Figure 11 on p39). This will potentially provide a quarter-hourly, high-capacity service to Cambridge South station, serving the Biomedical Campus; Cambridge station, serving the CB1 business district and city centre; and, potentially, a Cambridge East station, serving a new business, residential and leisure/cultural hub on the site of Cambridge airport.
- **[A428 dualling to the A1](#)**: Funded as part of the current Road Investment Strategy (RIS2), the scheme to dual the A428 between the Black Cat Roundabout and Caxton Gibbet is now under construction and expected to open in 2027.
- **[Rural cycle network](#)**: The [Comberton Greenway](#) should be extended west from Hardwick to Highfields Caldecote (see Figure 27 on p51), Bourn Airfield and Cambourne. The Greenway between Hardwick and west Cambridge follows the shallow valley between Maddingley Hill and Red Meadow hills (see Figure 28 on p51), making it a more attractive alternative to the current and proposed route alongside Maddingley

Road. It avoids people having to cycle up a steep hill and being exposed to the air pollution and discomfort (especially after dark) of cycling alongside a busy road, frequented by HGVs.

- **Girton Interchange:** How and when connections between the A428, M11 and A1307 will be provided has yet to be determined. There is a clearly identified need for these connections for strategic (through) traffic, not travelling to/from Cambridge. There is also an exceptional opportunity to build a coach station and visitor transfer hub at the Girton interchange to serve tourists and other visitors to Cambridge.
- **Bus station and interchange:** It is generally recognised that the current bus stop provision in Cambridge city centre has severely limited capacity to accommodate more routes and higher frequency services. Provision for coaches, both scheduled and chartered (for tourists, schools and other groups), is wholly inadequate. Any solution is likely to require a radical reorganisation of bus routes and stops in the city centre, which will impact all services.
- **Demand management:** What type or combination of demand management measures may be implemented in Cambridge is still being debated. Even if a congestion charge is off the table, there are other options to reduce traffic and congestion in the city, including a Workplace Parking Levy, expansion of residents' parking zones across the city, and reducing parking availability in the city through planning policies.

6 Outline of interventions considered

Interventions considered include:

- Realignment of lanes within the existing carriageway
- Widening of the road, mostly within the existing highway boundary
- Installation of new traffic lights
- Implementation of smart traffic management (flow control and bus ‘hurry calls’)
- Improvements for cycling and walking
- Other complementary measures

The following package of interventions is a subset of OAR options ‘Low Cost a/b’ with some additions. The estimated construction cost was £37 million in 2018 prices. It included a Park & Ride, traffic signals at the Madingley Mulch roundabout, and an eastbound bus lane from there to the Eddington Avenue junction except over the M11, where a westbound bus lane is included instead. The package proposed here involves the construction of up to 3,157m of bus lane. These works alone are expected to cost under £10 million in 2024 prices.

In reviewing our proposal, the IA recommended (Comment A18): *“The in-highway proposal for a HQPT along the A1301 are short-term measures that are consistent with the C2C scheme objectives.”* More detailed commentary was provided at §6.3:

“... the range of measures that would improve conditions along Madingley Road for bus users as well as general traffic are worth re- considering given the recent changes in the government’s transport strategy and policy towards buses accompanied with additional funding. It is possible that the GCP shied away from considering any substantial improvements along the A1303 because of the cost implications and fearing that it would divert resources away from the preferred option. The two options are not mutually exclusive and could be considered compatible.”

6.1 Route breakdown

The route is examined inbound from St Neots Road at the Madingley Mulch roundabout to the Northampton St–Queen’s Rd roundabout in sections (see Table 2 and Figure 12).

Table 2: Breakdown of inbound bus route where the main interventions are proposed

Section	Distance now	Bus lane
From end of St Neots Road		
A To start of Madingley Road	190m	107m
B To Crome Lea Business Park /south-west corner of Madingley Wood	553m	553m
C To layby east of Madingley Windmill	931m	*931m
D To Cambridge Rd junction (from Madingley and Coton)	439m	439m
E To start of existing bus lane	390m	*390m
F To end of existing bus lane	352m	352m
G To east side of M11 entry junction	178m	*178m
H To west side of Madingley Park & Ride junction	207m	*207m
J To Northampton Street–Queens Road roundabout	2,050m	0m
Total:	5,290m	3,157m

*These sections may not be needed if Inbound Flow Control and other interventions provide sufficient bus priority, so the ultimate length of bus lane may be between 1,451m and 3,157m.

6.2 ‘Quick win’ interventions

The measures included here involve minimal construction work, beyond installing loop detectors or cameras, and which therefore could be deliverable within six months of sign-off.

In combination, these have significant potential to increase bus speeds from the end of the existing bus lane that ends at the M11, with an expected time saving of 2.6 minutes at the slowest 95th percentile. A benefit of G2 would be to increase the flow rate of traffic not joining the M11, which would increase the speed of all traffic on Maddingley Hill.

Reference	Intervention	Section
G2	Make traffic signals on Maddingley Road at the M11 exit junction responsive to congestion on the road ahead.	G
G3	Lengthen the right-turn M11 filter lane back to the traffic island (~84m).	G
H2	Configure traffic signals at P&R entrance to prioritise buses.	H
J1	Optimise traffic signals along the rest of Maddingley Rd and upgrade where necessary to be responsive to bus ‘hurry calls’.	J

6.3 In-highway inbound bus lane

The measures included here involve construction work or detailed agreement that could take up to two years from sign-off, though some elements could be delivered within a year or eighteen months.

The starting point for providing maximum priority for buses is to build a continuous bus lane from Maddingley Mulch roundabout to the Maddingley Park and Ride entrance. This could be built entirely within the boundaries of the public highway (see Figure 19 on p47), and thus without significant legal complexity.

Conventionally, bus lanes are provided nearside, and our proposal will assume this for the purposes of demonstrating deliverability. However, there may be merit in setting the bus lane in the middle of the road between Maddingley Mulch roundabout and the Cambridge Road junction. This arrangement puts the faster vehicle (a bus travelling at the speed limit, experiencing no congestion) to the right of slower vehicles (doing up to the speed limit, depending on traffic conditions), avoiding risks of undertaking. In particular, there would be no risk of a collision between a vehicle turning left, e.g. into the American Cemetery, and a bus travelling straight ahead.² If filter pockets are required or desired, it may be possible to incorporate these into the bus lane rather than widen the road further.

The difference in traffic speeds and delays between the two options is likely to be marginal. With a nearside bus lane, the absence or inclusion of filter pockets would make no difference to bus journey times. Traffic in the morning peak is predominantly inbound (see Figure 9) so eastbound traffic turning right will rarely hold up traffic for more than a few seconds while waiting for a gap in the westbound traffic. If there is a safety concern about stationary vehicles being hit from behind, then a filter pocket may need to be accommodated. However, it should be noted that a filter pocket is *not* currently provided for the right turns into most of the properties along Maddingley Road, including Coton Court and Blue Gates, opposite the American Cemetery; Woodfield House, opposite Maddingley Wood; Maddingley Mulch and the group of houses to its east. The sole exception is Crome Lea Business Park.

Further detailed design work, including Road Safety Assessments, could examine the pros and cons of the bus lane placement and whether phased delivery and Inbound Flow Control are a more suitable approach

² Buses calling at the American Cemetery would need to make this manoeuvre, but there is not expected to be a high demand to travel to the cemetery from west of Cambridge in the morning peak. The Cambridge Tour service probably carries the most trips to/from the American Cemetery. It turns around at the main entrance and would benefit from the bus lane on its return leg, as would chartered coach services. Any buses that used GCP’s proposed busway would not have an option to stop at the Cemetery.

than building a bus lane at locations where widening the road will cause greatest ecological and heritage harm.

If a continuous bus lane were built from St Neots Road at the Madingley Mulch roundabout through to the Madingley P&R junction, the journey time along that section would be 2.7 minutes. The 95th percentile journey times (the slowest 5%, or one day per month) would be 8 minutes faster than in 2024, and 38.5 minutes faster than in 2019 (see Table 3 on p35).

Reference	Intervention	Section
A1	Add smart traffic signals at Madingley Mulch roundabout that respond to approaching buses and traffic conditions.	A
A2	Add a bus lane through the centre of Madingley Mulch roundabout	A
B1	Add an eastbound bus lane between Madingley Mulch roundabout and Crome Lea Business Park junction.	B
C1	Continue the eastbound bus lane between Crome Lea Business Park junction and the layby east of Mill Farm.	C
D1	Continue the eastbound bus lane from the layby east of Mill Farm to Cambridge Rd junction.	D
D2	Add traffic signals to the Cambridge Rd junction that respond to approaching buses and traffic conditions.	D
E1	Add an eastbound bus lane between Cambridge Rd junction and the start of the existing bus lane.	E
F1	Reinstate bus lane segregation past M11 exit junction	F
G1	Reconfigure road space on Rectory Farm M11 overbridge to continue the bus lane over the bridge	G
G4	Reinstate segregation of the bus lane through the M11 exit junction	G
G5	Add smart traffic signals at the M11 entry junction to ensure that any queue in the filter lane does not block back when a bus is approaching.	G
H1	Reconfigure road space east of the M11 overbridge to Madingley P&R junction to continue the bus lane east	H
H2	Upgrade the Madingley P&R traffic signals to respond to approaching buses and traffic conditions.	H
J1	Upgrade traffic signals from Eddington Ave east to respond to approaching buses and traffic conditions.	J

6.4 Supplementary and alternative interventions

We have identified the following interventions to complement the interventions above, or which can serve as interim or alternatives measures as part of a phased implementation.

Reference	Intervention	Section
A3	Add a short nearside westbound bus lane on the south side of Madingley Mulch roundabout to take buses directly from Madingley Road to St Neots Road	A
A4	Add a bus lane to the A428 exit ramp	A
B2	Add a bus gate before the western edge of Madingley Wood, and merge the bus lane into the general traffic lane through section B. This is an alternative to C1.	B
B3	Build a second eastbound general traffic lane between Madingley Mulch roundabout and Crome Lea Business Park junction to double the queuing capacity. This is a supplement to B2.	B
E2	Create a layby at Cambridge Rd junction (to replace the one lost in D1).	E

Z1	Extend Comberton Greenway west from Hardwick to Highfields Caldecote and through the Bourn Airfield site to Cambourne.	
Z2	Reassign the hatched road space on the A428 through the Girton Interchange to create an eastbound bus lane.	
Z3	Build a bus station at Cambourne with appropriate facilities.	
Z4	Build a bus-only link between Sterling Way, Upper Cambourne, and Broadway.	
Z5	Run buses through the middle of the Bourn Airfield development rather than around the northern edge.	
Z6	Integrate bus priority measures at Highfields Rd and Scotland Rd roundabouts.	

6.5 Park & Ride

We have assumed that GCP will deliver a Park & Ride being off Scotland Road. Buses serving it could travel via St Neots Rd or the A428 to the Madingley Mulch roundabout and then take advantage of the bus priority measures we propose on Madingley Hill and Madingley Rd.

However, we do not support having a Park & Ride at Scotland Road as those who have access to a car will have a strong incentive to drive to the Park & Ride to pick up a cheaper and more frequent bus service into the city than they could catch closer to home. Services from Cambourne will therefore not see a significant increase in frequency, which is a key measure of service quality. Worse, if Cambourne buses are diverted to the Park & Ride, that will significantly increase journey times, further reducing the incentive to catch the bus from west of the Park & Ride. The priority should be to provide a bus station in Cambourne (Z3) to provide interchanging opportunities and an express stop for longer distance services. Bourn Airfield too should have high quality waiting facilities, including secure cycle parking.

East West Rail, if built to Cambridge, will abstract a significant proportion of travellers to Cambridge from Cambourne, Bourn Airfield, St Neots, Bedford and other places, as the journey time by train will be much shorter and more reliable than by bus. This further undermines the business case for having a large car park between Cambourne and Cambridge.

7 Phased delivery

One of the key advantages of building an in-highway bus lane rather than an off-line busway is that it can be built in stages, providing benefit quickly with no more infrastructure than is required at that time.

To that end, we propose the first phase should be a bus lane between Mill Farm layby and Cambridge Rd junction (D1), terminating at smart traffic signals (D2) that can regulate traffic flow to minimise congestion further east (this is explained below under *Inbound Flow Control*). Complementing these would be reinstating the bus lane segregation through the M11 exit junction, and smart traffic signals at:

- Madingley Mulch roundabout (A1)
- M11 exit junction (G2)
- M11 entry junction (G4)
- P&R junction (H2)
- Other signals on Madingley Road from Eddington Avenue east (J1)

The second phase would be to build a bus lane between Madingley Mulch roundabout and Crome Lea Business Park (B1), also terminating at smart traffic signals (B2) that regulate the flow of traffic past the American Cemetery, so that buses can reach the next section of bus lane with minimal delay.

It may be that this provides sufficient benefit that it is not necessary to build bus lanes on the more environmentally sensitive sections of Madingley Road, past Madingley Wood, the American Cemetery and Moor Barns Farm, or where works would be more disruptive, on and east of the M11 overbridge.

7.1 Phase 1 package

- Lengthen the right-turn M11 filter lane by 84m.
- Optimise traffic lights from the M11 exit junction to the Lady Margaret Road junction (seven in total) to be responsive to bus ‘hurry calls’.

7.2 Phase 2 package

- Reinstate segregation of the existing eastbound bus lane through the M11 exit junction.
- Build an eastbound bus lane from the layby east of Mill Farm to Cambridge Rd junction, terminating at responsive traffic signals.
- Install responsive traffic signals at the M11 entry junction.
- Install signals and bus priority measures at Highfields Rd and Scotland Rd roundabouts.

7.2.1 Complementary measures

- Build a bus station with appropriate facilities and install bus shelters with cycle parking at all main bus stops in Cambourne.
- Extend Comberton Greenway west from Hardwick to Highfields Caldecote, Bourn Airfield and Cambourne.
- Reassign hatched lane on A428 eastbound at Girton Interchange to create a 640m bus lane.
- Create a replacement layby at Cambridge Rd junction.

7.3 Phase 3 package

- Add traffic signals and insert an inbound bus lane through Madingley Mulch roundabout.
- Insert an eastbound bus lane between Madingley Mulch roundabout and Crome Lea Business Park junction, terminating at responsive traffic signals.

7.4 Phase 4 package

- Extend the existing bus lane over the M11 bridge by reallocating as carriageway the southern walkway (which is inaccessible to pedestrians).
- Continue the bus lane on to the P&R junction by reallocating lanes within the existing carriageway, halving the length of the existing filter lanes for general traffic.

7.5 Phase 5 package

- Build a second eastbound general traffic lane between Madingley Mulch roundabout and Crome Lea Business Park junction to add queuing capacity Inbound Flow Control.

or

- Continue the eastbound bus lane from Crome Lea Business Park junction to the start of the bus lane built in Phase 2.

7.6 Phase 6 package

- Extend existing bus lane backwards to start at the Cambridge Rd junction.

8 Detail of interventions proposed

8.1 Section A: Madingley Mulch roundabout

Distance	107m (190m now)
Speed limit	60mph
Illustration	Figure 12 on p40

8.1.1 Inbound bus lane

A1. Smart signal controls: Signals that response to an approaching bus ‘hurry call’ would minimise delay through the roundabout. They could also reduce incidences of blocking back by regulating inflows to match outflows. (Reviewed in QW3.1.)

A2. Bus bypass through roundabout: An inbound bus lane from St Neots Rd through the middle of the roundabout to connect with the bus lane on Madingley Road would ensure buses avoid any congestion on the roundabout, and reduce by 80 metres the distance travelled at slow speed around the roundabout.

8.1.2 Optional additions

A3. A428 exit ramp bus lane: Adding a bus lane for buses and coaches using the A428 from Cambourne, St Neots or from a Park & Ride at Scotland Rd could reduce journey times and variability. An extra lane on the off-ramp was included in GCP’s designs for a Park & Ride at the Waterworks site (see Figure 33 on p54).

At peak times, this would allow some services to fill up in Cambourne or Bourn Airfield and run non-stop to Cambridge along the A428 and Madingley Hill. Other services, running along St Neots Road, would then be more likely to have space for passengers boarding at Highfields Caldecote, Hardwick and Coton.

8.2 Section B: Madingley Mulch Roundabout to Crome Lea Business Park junction

Distance	553m
Speed limit	50mph
Filter lanes/pockets	Right turn into Crome Lea Business park
Other right turns	Madingley Mulch and houses to its east
Illustration	Figure 12 on p40

8.2.1 Inbound bus lane

B1. Bus lane: This section can easily accommodate an inbound bus lane within the public highway, which is over 20m wide (see Figure 19 on p47). The minimum recommended width for two road lanes, a bus lane and an active travel path is 14.25m⁵ (see Figure 24 on p50). Retaining the filter pocket would increase the width required to no more than 17.25m, but it is questionable whether a filter pocket is required at all (see section 6.3 on p15).

Widening the road southwards and relocating the active travel path to the north of the road may reduce the loss of hedgerow and trees, but it would be desirable to retain a footway on at least some of the south side to connect the dwellings to a crossing point, increasing the total width required to 16.25m. Narrower provision for the cycle/footway and buffer might be agreed with the Highway Authority as a departure from LTN1/20 standards, taking into account safety, the current provision and ecological impacts.

8.2.2 Inbound Flow Control

If the next section (past Madingley Wood and the American Cemetery) were not to include a bus lane, the following interventions could be deployed instead.

B2. Signal controls: Traffic signals level with the end of the bus lane would respond to bus ‘hurry calls’. The Detector loops in the general traffic lane would monitor the length of the queue leading up to the signals and the speed of traffic beyond, enabling signal timings to be tuned to optimise the flow rate in the next section (see *Inbound Flow Control* below).

At any time that the queue backs up to within 50m or so of the Madingley Mulch roundabout, the traffic management system would increase the rate at which general traffic is released into the next section until the queue stops growing. In the worst case, the signals would only hold traffic to allow a bus to join the general traffic lane. This ‘safety valve’ mode of operation would ensure there is no increased risk of queues impacting traffic exiting the A428.

B3. Additional queuing lane: A third inbound lane may be added to give general traffic two lanes, doubling the queuing space from around 88 vehicles to around 176. This would provide similar benefit to building the Section C bus lane (C1).

Though there is space within the existing highway boundary to widen the road to the south and north (see Figure 19 on p47), it is likely to be preferable to acquire some of the farmland to the north in order to widen the road only on the north side, thereby limiting the loss of hedgerow and trees and the impact on people’s homes.

8.2.3 Optional additions

B4. Outbound bus lane: A westbound nearside bus lane could be accommodated within highway land to the south of Madingley Mulch roundabout (see Figure 21 on p49). This would provide buses with a congestion-free route if and when a queue builds on the approach to the roundabout (see Figure 32 on p53). (Reviewed in QW3.1.)

8.3 Section C: Madingley Wood, American Cemetery and Mill Farm

Distance	931m
Speed limit	50mph
Filter lanes/pockets	<i>none</i>
Other right turns	Coton Court, The Lodge, Blue Gates
Illustration	Figure 12 on p41

8.3.1 Inbound bus lane

C1. Bus lane: This section can easily accommodate an inbound bus lane within the public highway, which is at least 19m wide (see Figure 19 on p47). The minimum recommended width for two road lanes, a bus lane and an active travel path is 14.25m⁵ (see Figure 24 on p50). There would be no encroachment into the Madingley Wood SSSI, nor any need to remove the hedgerow in front of the American Cemetery.

Widening the road southwards and relocating the active travel path to the north of the road would minimise indirect impacts on the Madingley Wood SSSI as there would be more flexibility in the horizontal and vertical alignment of the active travel path than for an additional road lane. It would similarly reduce the impact on the setting of the American Cemetery and Mill Farm. It would still be desirable to retain a footway on at least some of the south side to connect the dwellings opposite the American Cemetery and the public footpath to a crossing point and a westbound bus stop, increasing the width required to 16.25m. Narrower provision for the cycle/footway and buffer might be agreed with the Highway Authority as a

departure from LTN1/20 standards, taking into account safety, the current provision as well as ecological and heritage impacts.

The existing bus layby is relatively little used. It would be better located closer to the American Cemetery and could be re-provided as a bus cage in the carriageway.

8.3.2 Inbound Flow Control

As this section is the most sensitive in terms of heritage, ecology and residential property, we believe it would be sensible to consider first whether Inbound Flow Control (B2 and, optionally, B3 above) would be a more acceptable intervention than building a bus lane along this section.

8.4 Section D: Mill Farm layby to Cambridge Rd junction

Distance	439m
Speed limit	50/40mph
Filter lanes/pockets	Right turn onto Cambridge Rd (to Coton)
Other right turns	Madingley Rise
Illustration	Figure 13 on p41

8.4.1 Inbound bus lane

D1. Bus lane: This section can easily accommodate an inbound bus lane within the public highway, which is at least 19m wide (see Figure 20 on p48). The minimum recommended width for two road lanes, a bus lane and an active travel path is 14.25m⁵ (see Figure 24 on p50), reducing to 13.25m in the 40mph zone (see Figure 25 on p50). The filter lane increases the width requirement to no more than 17.25m. The layby just east of Mill Farm could be re-provided at the Cambridge Road junction (E2) to reduce the widening required.

If west of here the active travel path is relocated to the north, it would be logical to continue it on the north side.

D2. Signal controls at Cambridge Road: Traffic signals at the Cambridge Rd junction would limit the rate at which vehicles can leave Cambridge Rd from Madingley and Coton at peak times, reducing delays to traffic on Madingley Hill. The signals would also respond to bus ‘hurry calls’, prioritising inbound buses in the morning peak and outbound in the evening. The signals could operate part-time if they provide insufficient safety benefit for people walking or cycling through this junction outside of peak hours.

8.5 Section E: Cambridge Rd junction to existing bus lane

Distance	390m
Speed limit	40mph
Filter lanes/pockets	<i>none</i>
Other right turns	Meadow View
Illustration	Figure 13 on p41

8.5.1 Inbound bus lane

E1. Bus lane: A nearside bus lane could be accommodated within the public highway, which is approximately 16m wide at its narrowest point (see Figure 20 on p48). The minimum recommended width for two road lanes in a 40mph zone is 13.25m (see Figure 25 on p50). The new bus lane would connect with the existing bus lane.

If west of here the active travel path is relocated to the north, it would be logical to continue it on the north side to link into the existing shared-use path that starts approximately 50 metres east of the Cambridge Road junction. The existing crossing from the Coton side of the road may be retained, increasing the total width required to 15.25m, or instead integrated into the proposed signalisation of the Cambridge Road junction (D2).

8.5.2 Inbound Flow Control

To avoid any negative impact on Moor Barn Farm Cottages and trees in this section, we believe it would be sensible to test Inbound Flow Control for this section, using the proposed signals at the Cambridge Road junction (D2) to regulate the flow of traffic towards Cambridge.

8.5.3 Complementary measures

E2. Layby: To replace the layby lost in Section D, a new layby can be created in the redundant part of the north side of the Cambridge Rd junction. The inter-green phases of the traffic lights would give vehicles a safe window in which to leave the layby. It would therefore be safer than the existing layby, which is in a 50mph zone.

8.6 Section F: Existing bus lane to M11

Distance	352m
Speed limit	40mph
Filter lanes/pockets	<i>none</i>
Other right turns	Rectory Farm
Illustration	Figure 14 on p42

8.6.1 Inbound bus lane

F1. Reconfigure junction: Reinstate the pre-2015 arrangement where the bus lane continued past the junction with the M11 off-ramp, giving buses an uninterrupted run (see Figure 30 on p52).

Currently, a bus waiting in the bus lane is released at the same time as general traffic (see Figure 31 on p5352). Most vehicles can accelerate faster than a bus, so several vehicles can pull ahead of the bus before it reaches the merge point 85m ahead. Allowing buses to run ahead of stopped traffic allows them to take advantage of inter-green gaps in the traffic flow as the signals cycle between Madingley Rd and the M11 exit, reducing delays.

8.7 Section G: M11 (Rectory Farm) Bridge

Distance	178m
Speed limit	40mph
Filter lanes/pockets	Right turn onto M11 southbound slip
Other right turns	<i>none</i>
Illustration	Figure 14 on p42

8.7.1 Inbound bus lane

G1. Bus lane: The RFB details in Option 2 (see Figure 22 on p49) how the bridge can accommodate four 3m-wide traffic lanes in addition to the existing active travel path.

If the carriageway were widened, the estimated cost in 2016 prices was £632,000 (RFB Appendix E p5), mostly to relocate below-surface services on the south side of the bridge. The lane allocation, north to south would be (see Figure 26 on p51):

- Bi-directional active travel lane (unchanged)
- Eastbound bus lane
- Eastbound general traffic lane
- Eastbound M11 entry filter lane
- Westbound general traffic lane

Because the gain is relatively small once the filter lane is extended beyond the end of the existing bus lane (G3), we do not recommend prioritising this intervention.

8.7.2 Complementary measures

G2. Traffic signals at M11 exit: Optimise the signals to regulate the flow of traffic onto the M11 bridge to avoid blocking back from the right-turn filter lane when an eastbound bus is approaching, and to minimise delay to westbound buses.

G3. M11 exit filter lane: Extend the right-turn filter lane back to the traffic lights at the M11 exit junction. This will add 84m to the existing 66m filter lane, creating queuing space for approximately thirteen more vehicles. By overlapping the bus lane and filter lane, buses will no longer be blocked by vehicles waiting to enter the filter lane. This can be achieved quickly with paint and minimal engineering. If necessary, the end of the bus lane can be pulled back a few metres to ensure traffic can merge safely before reaching the bridge.

Note that the planning application for Bourn Airfield (S/3440/18/OL) includes a similar proposal to segregate M11-bound traffic from city-bound traffic (see Figure 34 on p55). Both options should be modelled with accurate peak-time traffic volumes to determine which benefits buses more.

G4. Reinstate segregation of bus lane through M11 exit junction: Before 2015, the bus lane was segregated from the carriageway by a raised kerb through the junction, enabling buses to proceed when other traffic was held at a red signal (see Figure 30 on p52). Despite the obvious benefit this provided buses, in 2015 the kerb was removed and the stop line extended across the bus lane (see Figure 31 on p53). The STATS19 collision data does not reveal a significant risk at this junction: the two collisions recorded in the last ten years near this junction both occurred after 2015. It is therefore unclear why this change was made.

G5. Traffic signals at M11 entry: Signals could help accelerate the flow eastbound when there are insufficient gaps in outbound traffic to prevent blocking back at the entrance to the right-turn filter lane. Signals could also respond to a ‘hurry call’ from buses that route via the M11 (e.g. to reach the Biomedical Campus), clearing the filter lane as a bus enters it. This is one of a set of interventions at this location that QW 3.4.2 assessed that could “potentially provide significant benefits to general traffic, as well as public transport vehicles.”

8.8 Section H: M11 bridge to P&R entrance

Distance	207m
Speed limit	40mph
Filter lanes/pockets	Left turn into Loverose Way and Madingley Park & Ride
Illustration	Figure 14 on p42

H1. Bus lane: East of the bridge, the road is four lanes (approximately 14m) wide. Although the time gain to buses is likely to be small, it would be possible to reallocate the space to include a nearside inbound bus lane up to the entrance to Madingley Park & Ride. The middle of the three remaining lanes could be split into an eastbound filter lane for the park & ride and a westbound filter lane for the M11. The optimal lengths of each filter lane may be determined by modelling.

H2. Responsive traffic signals: The signals at the P&R entrance could respond to a ‘hurry call’ from buses entering, leaving or passing the P&R, minimising delays. This would, for instance, clear the filter lane into the P&R when a bus is about to enter it.

[To avoid typographical ambiguity, there is no Section I.]

8.9 Section J: P&R entrance to Northampton St roundabout

Distance	2,050m
Speed limit	40/30mph
Illustration	Figure 14 on p42

8.9.1 Complementary measures

J1. Responsive traffic signals: All signals should be configured to respond to ‘hurry calls’ from approaching buses, and timings should be optimised to promote free flow along Maddingley Rd inbound in the AM peak and outbound in the PM peak.

There is a critical requirement is for easy interchanging between east–west and north–south services at or close to Maddingley Park & Ride in a way that is efficient for bus operators.

We note that the University of Cambridge consulted in 2020 on running a new service between Eddington and Milton Park & Ride via the Darwin Green Development. If Smarter Cambridge Transport’s [recommendation](#) were followed, and this new service instead ran to Cambridge North station, it could provide connections between Cambourne–Cambridge services and Cambridge North railway station, Cambridge Science Park, Cambridge Regional College, Girton College, Eddington, West Cambridge, the Fitzwilliam Museum, Cambridge Station and the Biomedical Campus.

8.10 Cycle routes

Z1. Comberton Greenway extension: The most attractive route for active travel is through the villages to the south of the A428, not along St Neots Rd and Maddingley Rd. For most people it is the more direct route; it avoids the long and relatively steep incline of Maddingley Hill travelling west (see Figure 28 on p51); it does not expose users to traffic noise, vehicle pollution and headlight glare; and it passes through attractive countryside.

With the Comberton Greenway now going ahead, the next step should be to design a continuation of that west from Hardwick to Highfields Caldecote, with the installation of an appropriate all-weather surface along the route of the Harcamlow Way bridleway (see Figure 27 on p51). An early agreement should be struck with the developer of Bourn Airfield to create an active travel path through the site, linking Highfields Caldecote with Cambourne (see Figure 29 on p52).

Retention of existing active travel path: The existing shared-use cycle/footway alongside Maddingley Road is approximately two metres wide for most of its length, reducing at pinch points. It runs along the south side of the road from St Neots Road to approximately 50 metres east of the Cambridge Road junction, where there is an informal crossing. East from here, the path continues on the north side of Maddingley Road as far as 80 metres west of the junction with Lady Margaret Road.

GCP is not proposing to widen or otherwise upgrade the active travel path west of the Eddington Avenue junction³, so the existing path would remain non-compliant with LTN1/20 design standards.

³ GCP consultation document on Maddingley Road walking and cycling project 2–30 September 2024: <https://www.greatercambridge.org.uk/asset-library/Sustainable-Transport/Active-Travel-Projects/Maddingley-Road/Maddingley-Road-2024-engagement-brochure.pdf>

The alternative scheme proposed here would provide an opportunity to improve the provision along at least some of the route, in particular to increase the separation of the active travel path from the road. Indeed, it may be argued that the Highway Authority would have a duty to do so. However, any design would need to balance transport objectives against entailed ecological and heritage harms.

Because the Comberton Greenway will provide a more attractive route to Hardwick and potentially beyond (Z1), it is not expected that the capacity of the active travel route will need expanding. It will continue to provide a route to Cambridge Road (which runs to Madingley village via the back of the American Cemetery), the front of the American Cemetery, Madingley Mulch, Crome Lea Business Park, the small number of residences along the road, and public footpaths 55/2 and 154/4.

Although LTN1/20 recommends full segregation of active travel paths, it acknowledges that, “alongside busy interurban roads with few pedestrians or building frontages, shared use might be adequate.”⁴

In a 50mph zone, Active Travel England’s “Absolute Minimum Cross-Section” for two road lanes, a bus lane and an active travel path is 14.25m⁵ (see Figure 24 on p50). In a 40mph zone, this reduces to 13.25m (see Figure 25 on p50). Constructing to these widths would likely carry significant ecological and heritage harms, in particular where the road passes Madingley Wood, the American Cemetery and Moor Barns Farm Houses. Therefore, departures from standards would need to be considered – in particular, the width and separation of the active travel path, taking into account the current provision and the very low peak flows of people walking and cycling along it.

It is likely that the optimal design for the widened road will generally entail extending it southwards, in which case the entire active travel path would be relocated to the north side of the road, with a footway retained along some sections of the south side of the road. This configuration would reduce ecological harms because the active travel route is much less constrained than an extra road lane in terms of its horizontal and vertical alignment and vertical clearance.

8.11 Girton Interchange

22. Reassign hatched carriageway on A428: Moving the general traffic lane into the offside hatched area would free up the inside lane to be used by buses and coaches (and emergency vehicles). If the lanes merge before the M11 overbridge, this would provide a 640m bus lane to bypass congestion (see Figure 40 on p60). Although congestion is not currently experienced on this part of the A428, as it was pre-COVID, this option can be held in reserve.

When it ran, the 905 bus service from Cambourne (Morrisons) to Cambridge (Drummer St) via the A428 and Kings Hedges took 25 minutes, compared with 36 minutes now for the Citi 4 service.

Were it not for the disruption to traffic caused by the GCP roadworks on Histon Rd then Milton Rd, this route would still offer a faster route into Cambridge (and, significantly, to key destinations, such as the Regional College and Science Park) than the Citi 4. Now those roadworks are completed, a bus operator is likely to see an opportunity to reinstate this, or a similar, service using the A428.

8.12 Cambourne

23. Bus station: Cambourne provides a poor experience for bus users: there is no bus station and few bus shelters. We recommend that consultation should start urgently to identify the best location for a bus station to serve express services to Cambridge and St Neots, and interconnecting local and demand-responsive services from Papworth, Elsworth, Caxton, Bourn and other villages. Facilities could include

⁴ Local Transport Note 1/20 §5.5.3

⁵ Active Travel England Route Cross-Section Tool: <https://www.gov.uk/government/publications/active-travel-england-design-assistance-tools>

shelters, cycle parking, a waiting room, toilets, refreshment kiosk, collection lockers, CCTV monitoring, helpdesk intercom, and WiFi.

24. Bus link between Sterling Way and Broadway: The bus link between Sterling Way in Great Cambourne and Broadway has been granted planning consent ([S/4594/18/RM](#)), and is due to be delivered as part of the Cambourne West development. This will in future connect with the busway through the Bourn Airfield development (see Figure 38 on p59 & Figure 39 on p59).

In the meantime, this link will reduce the travel time and mileage buses take to cover Lower, Great and Upper Cambourne (see Figure 41 on p60, which illustrates how convoluted the Citi 4 bus route is). It should therefore be delivered as quickly as possible.

The Interim Transport Measures Strategy submitted as part of the planning application for Bourn Airfield ([S/3440/18/OL](#)) states that this intervention alone will reduce journey times by 10 minutes. This will help enable an increase in the service frequency (from three to four per hour), potentially increasing bus patronage by 16%:

A	Routing Cambourne 4 Bus Service through Bourn Airfield	A section of Busway would be provided within Bourn Airfield with an eastern and western stop, allowing services from Cambourne to route through Bourn Airfield	4 (Bourn Airfield) 8 (Cambourne)	150	Bourn Airfield Cambourne	This reduces timetable journey times by approximately 10 minutes (It is noted that the connection to the Broadway is provided through the Cambourne West consent, however this still reduces corridor flows. In comparative terms to existing Cambourne Residents, Bourn Residents will have a considerably shorter journey time as a result of the direct links)
A	Increase in Frequency of the Service to 15 minutes in the Peak Hour	The connection across the Broadway considerably reduces current journey times. Support for a 15 minute frequency service would provide Cambourne and Cambourne West Residents with a just in time service	13	163	Bourn Airfield Cambourne West	Research shows a frequency elasticity of 0.5. This could equate to up to a 16% increase in patronage. (Source: Impact of Congestion on Bus Passengers)

8.13 Bourn Airfield

25. Primary bus route through the centre of the Bourn Airfield development site: The Local Plan requirement in *Policy SS/7: New Village at Bourn Airfield* is for (emphasis added):

*Provision of a segregated bus link from Cambourne to Bourn Airfield new village across the Broadway, and **on through the development** to the junction of the St Neots Road with Highfields Road.*

Yet GCP's proposed route is around the northern edge of the development site (see Figure 10 on p38). The two stops at the north-west and north-east corners are up to 1.2km from homes to be built at the south of the site, far more than the recommended 400m in transport planning guidance and in the South Cambridgeshire Local Plan for Darwin Green (emphasis added):

*3.20 A fundamental requirement for this site [Land between Huntingdon Road and Histon Road] is that it will be highly accessible and permeable to all its residents on foot, by cycle and High Quality Public Transport (HQPT), to support sustainable transport, recreation and health. Therefore **all development will be within 400m easy walking distance of a HQPT bus stop via direct, safe and convenient routes**. The route must be fully and effectively integrated with the route through the adjoining City development.*

The SPD for Bourn Airfield is slightly weaker, but nonetheless makes clear that 400m is a threshold for accessibility of bus stops:

Typical walking distances of 400m (5 mins) and 800m (10 mins) should be used to help assess whether facilities and public transport stops are within easy walking distance.

Because many homes will be far beyond 400m of the bus ‘halts’, additional bus services will need to run through the development site, either connecting with or competing with busway services, and potentially requiring long-term subsidy. This is covered in the Transport Assessment (December 2019, p102):

Additional bus service for the south of the development

10.4 To encourage people to use public transport over the private car, and in accordance with SCDC Design Guide SPD, the development is being designed to ensure that all residential properties are within 400m of a bus stop.

10.5 Details of the additional services, together with bus stop locations and bus frequency will be provided within the Travel Packs for the development.

Running all buses through the centre of the site, with appropriate infrastructure, would give all residents access to the full range of bus services without the need to run additional, potentially subsidised, services (other than perhaps a demand-responsive service for those with impaired mobility).

8.14 Highfields Caldecote and Hardwick

Z6. Bus priority at Highfields Rd and Scotland Rd roundabouts: In advance of development of Bourn Airfield, measures should be put in place to minimise delays to buses at the roundabouts with Highfields Rd and Scotland Rd. The optimal configuration should be determined by modelling various combinations of signalisation, lead-in bus lanes and central or peripheral bus bypass lanes.

9 Inbound Flow Control

The concept of Inbound Flow Control (or traffic ‘gating’ or ‘queue relocation’) works as follows:

1. Add a bus lane and, optionally, one or more general-traffic lanes to a main road into a town or city.
2. Choose the location where the equalised cost is lowest (financial costs plus net monetary equivalents of social and environmental impacts), which will typically be outside the built-up area.
3. Use traffic signals at the end of the bus lane to enable buses to insert themselves into general traffic without delay.
4. Also use those traffic signals to hold back general traffic to maintain free flow beyond the lights. This will typically entail releasing (‘metering’) traffic at the rate it is dispersing further down the road (in this case, at the M11 junction).
5. The queue will grow while the rate of arrivals at the back exceeds the rate at which traffic can disperse ahead.
6. If and when the queue extends to near the start of the bus lane, traffic is released from the front more quickly, which may lead to queuing further down the road. But if there is an Inbound Flow Control bus lane there too, buses will not be delayed.
7. Only if and when all of the Inbound Flow Control lanes are filled will buses experience delays on the sections without bus lanes. If this were to become a frequent occurrence, it would provide justification for extending or connecting the bus lanes, or adding an additional queuing lane.

With Inbound Flow Control operating at the end of the bus lanes in sections B, D and F (see Figure 12a,b,c on p40) there would be 1,344 metres in which to queue approximately 200 vehicles before there would be any impact on buses. In other words, buses would be able to overtake up to 200 vehicles. Adding a second general traffic lane before Madingley Wood (B3) would add up to another 550m queueing space for approximately another 80 vehicles.

There is no significant delay to buses after around 10:30am (see Figure 2 on p34). From the DfT manual traffic counts on Madingley Hill (see Figure 9 on p37), we can infer that the likely free flow rate is around 650 vehicles/hour. With queueing capacity for 280 vehicles, Inbound Flow Control would enable an increased inflow rate of 790 vehicles/hour – a 20% increase – over approximately two hours with no delay to buses.

Appraisal of Inbound Flow Control can and should be made more rigorous using microsimulation modelling based on accurate traffic counts at peak times. Automated counters at the following locations would provide a full picture of traffic movements:

- Just east of the Madingley Mulch junction
- Between the Cambridge Rd junction and the M11 exit junction
- On the M11 bridge
- Between the M11 entry junction and the Park & Ride junction
- Between the Park & Ride junction and the Eddington Ave junction

10 Comparison with GCP's preferred option

Focusing on the intervention proposed between St Neots Road and West Cambridge, the most significant differences are set out here:

Feature	GCP busway	CPPF alternative
Journey time from St Neots Rd to West Cambridge for guided buses	Approx. 3 minutes (5 minutes faster than current timetable)	Approx. 3 minutes (5 minutes faster than current timetable)
Journey time for unguided buses, coaches and emergency service vehicles	Delayed by at least 5.5 minutes once a week and at least 8.9 minutes once per month, based on 2024 traffic levels	No delay
Journey time to M11	Additional 2–4 minutes for buses to loop back through West Cambridge site	No additional time
Journey time to central Cambridge	Likely to be slower than now (whether via Silver Street/Fen Causeway or via Northampton Street)	As now
Journey time to north Cambridge (Science Park, Regional College, etc)	No advantage provided	Faster via A428 using proposed bus lane at the Girton Interchange (intervention Z2)
Calling at American Cemetery	No	Optional
Ecological harm	Significant loss of trees in Coton Orchard and tree belts either side of M11	Limited loss of hedgerow and, potentially, a few trees. No harm to Madingley Wood.
Landscape harm	Intrusion into south side of Madingley Hill	Potential harm to the setting of the American Cemetery
Cost (2024 prices)	£192.2m (November 2024 estimate)	Substantially less. Actual cost depends on what elements are implemented
BCR	0.5 (based on journey time savings compared with pre-COVID travel patterns, and without accounting for trip abstraction to EWR)	Higher with similar benefits and lower cost
Speed of delivery	No benefits derived until completion in 2028 (on current programme)	In phases, with benefits increasing over 6–24 months
Support new housing	Later delivery means fewer residents will benefit from faster bus journeys from move-in	Faster delivery means more new residents will benefit from faster bus journey times from move-in
Support for businesses	Access to more potential employees expanded only when busway is open	Access to wider labour pool grows over 6–24 months
Relationship with East West Rail	Complements EWR for trips to West Cambridge. Competes on trips to CB1 and Biomedical Campus.	Complements EWR by providing fast access to West Cambridge and, via A428/A14, north Cambridge sites

11 Previous objections to an in-highway bus lane

11.1 Skanska study

In 2016, the GCP commissioned Skanska to produce a study to determine if it is feasible “to provide a two way busway, a cycleway and a road within the existing highway boundary.”⁶ The most compact design assessed was 21.8m wide, comprising a 4m foot/cycleway, an 8.3m carriageway, a 1m separation strip, a 6m wide kerb-guided busway, and a 1.5m verge. The study concluded that this could not be accommodated within the boundary of the public highway, and that it would be marginally more expensive than the proposed busway (“Route 3a”).

The study was flawed on several grounds:

1. The brief assumed that buses required segregation in both directions for the entire length of Madingley Hill, even though the evidence provides no basis for requiring segregation outbound, except in the lead-in to the Madingley Mulch roundabout.
2. The design is based on DMRB for a trunk road, including 1m hard strips on the inside of each lane. These do not exist now, and there is no justification for adding them. It would also be entirely inconsistent with the road’s speed designations of 50mph and 40mph.
3. The 4m foot/cycleway is double the width of the existing path. The Comberton Greenway will provide a more attractive alternative route to Hardwick, and potentially to Highfields Caldecote, Bourn Airfield and Cambourne; the American Cemetery can be accessed from now traffic-calmed Cambridge Road, avoiding some of the hill. Therefore, the justification for widening the path alongside Madingley Road west of the Cambridge Road junction is unlikely to outweigh the ecological harms entailed.

11.2 Strategic Outline Business Case

Addressing the points made in SOBC page 79:

1. The lowest cost option (Option 1) is unlikely to offer a step change in capacity, connectivity and journey efficiency (i.e. combination of speed and reliability) in order to deliver a HQPT service on the corridor.

This assertion is both untrue and lacking evidence. As we have shown, the package of interventions we recommend will reduce delays to buses on the worst days by more than 30 minutes compared with 2019 journey times and just under 7 minutes on 2024 journey times. That gives buses a significant advantage over the private car. The advantage will also be highly visible to people driving along Madingley Hill, which is not the case with a busway over the horizon.

2. The existing Park & Ride at Madingley Road allows traffic to be intercepted from both the A1303 / Madingley Road and from the M11.

This is true, but not relevant. The proposed Park & Ride off Scotland Rd can be served by buses using either the A428 or St Neots Rd. Buses to west and south Cambridge can use the bus priority measures proposed here for Madingley Rd; buses to north Cambridge can use the bus priority measure proposed here for the A428.

That said, we do not support Park & Ride as a sustainable, long-term transport solution. It makes highly inefficient use of land to benefit only people who have access to a car. Creating the conditions for a high-frequency, reliable bus service from Cambourne, Bourn Airfield and St Neots will benefit many more people, including proportionately more young, elderly and disabled people; reduce carbon emissions substantially; and reduce congestion on the wider road network, not just in Cambridge.

⁶ [A1303 Busway Feasibility Study](#) (Skanska, February 2017)

3. In increasing bus usage this option meets some, but not all, of the strategic criteria. Critically, the TSCSC aspires to deliver a HQPT service along the corridor, with increasing levels of segregation. As a fully online option with bus priority measures on the existing highway, has a limited ability to achieve this key strategic objective.

This is incorrect. The bus lane will enable high quality transport provision to West Cambridge. Buses from Cambourne to the Science Park would use the A428 for the fastest journey times. East West Rail will serve Cambourne to the Biomedical Campus directly. Until that is open, the proposed bus lane will provide a fast and reliable journey time to M11 junction 13, from where buses can travel along the M11 to junction 11, then reach the Biomedical Campus via Hauxton Road and Addenbrooke's Road (as the X2 service does currently).

4. The restrictions of the online alignment on the A1303 also mean that bus priority provision can only be accommodated in an inbound (eastbound) direction, meaning that there is no priority for services travelling away from Cambridge.

Bus tracking data proves that there is negligible congestion outbound west of Grange Road (see Figure 6 on p36 to Figure 8 on p37), and therefore no need for bus priority, currently or in the foreseeable future. Once the Comberton–Hardwick greenway has been built, some car trips will switch to cycling, reducing inbound congestion. Once operational, EWR will attract a significant number of car trips off Maddingley Road, as people switch to the train to travel to the Biomedical Campus, CB1 and other destinations. If a demand management scheme is introduced to meet the targets set by GCP and CPCA (see **pError! Bookmark not defined.**), that will further reduce traffic on Maddingley Road.

5. This option does not provide improvements west of Maddingley Mulch as there is little congestion expected there up to 2031 based on the modelling undertaken. This means that this option is not likely to fully achieve the aspirations (set out in the TSCSC) for providing 'busway / HQPT infrastructure' that connects Cambourne West and Bourn Airfield.

This comparison is out of date. The GCP CtoC plans now propose that buses join St Neots Road through Hardwick, between west of the Scotland Road roundabout and west of Long Road. Improvements for active travel proposed for St Neots Road could also be included in our proposal.

Furthermore, the government's commitment to East West Rail with a station at Cambourne, provides the required "HQPT infrastructure".

6. This option does not extend or interfere with cycling or pedestrian provision. In not doing so it does not support the aspirations of the TSCSC, which aims to provide more direct cycling and walking routes.

Maddingley Rd is not on the most direct or flattest route for cycling from Cambourne, Bourn Airfield, Highfields Caldecote or Hardwick to west Cambridge (see Figure 28 on p51). The GCP are to build a greenway route between Coton and Hardwick (item Z1), which will provide a much more convenient and attractive route than Maddingley Road. All that is now needed is a plan to build a link between Hardwick and Highfields Caldecote, and for the developer of Bourn Airfield to build the active travel route(s) that will connect Highfields Caldecote to Cambourne.

12 Data analysis

Travel time data has been collected by in the [Smart Cambridge data hub](#), set up by the GCP. Buses fitted with GPS trackers report their position periodically. The time when a bus enters or leaves a defined zone is logged in the data hub. Two zones on Madingley Road have been used to gather data since before 2019 (see Figure 42 on p60 and Figure 43 on p61). It is the data associated with those zones which we have analysed to determine the travel time and variability of buses routed via Madingley Road.

Data was analysed across two twelve-month date ranges: January to December 2019, and January to December 2024.

A significant proportion of the data is irrelevant or obviously inaccurate, so various rules were applied to filter the data, with the following records omitted:

1. Weekends and bank holidays (weekend travel patterns are very different to weekdays)
2. Services other than the Citi 4, X5, 905, X3 and Madingley P&R services (other services are infrequent, such as the X2, or follow a different route, such as the open-top Tour service)
3. Journeys logged before 6am or after 9:30pm (services are sparse and congestion is rare outside these times)
4. The departure time at the start of the route is missing or later than the logged time at the start or end of the zone (indicating a data error)
5. The bus identifier and departure time is a duplicate of a previous record on the same day (indicating a data error)
6. The recorded time at exit from the zone is logged more than 85 seconds later when, typically, the delay is 40 seconds (indicating a possible data error)
7. Logged distance through the zone is more than 20% above or below the actual distance (indicating a data error)
8. Travel direction is reversed, e.g. the Citi 4 is recorded as “outbound” when travelling into the city (indicating a data error)
9. Travel time to a zone is impossibly quick, viz less than 20 minutes for services originating in Cambourne or beyond, or less than 5 minutes for services originating in Cambridge (indicating a data error)
10. Travel time outbound to either zone is more than 120 minutes or, in the case of the Madingley P&R service, more than 30 minutes from leaving the P&R (indicating either a data error, a bus breakdown or a major road incident)
11. Average speed through zone is greater than the speed limit on that section (indicating a data error)

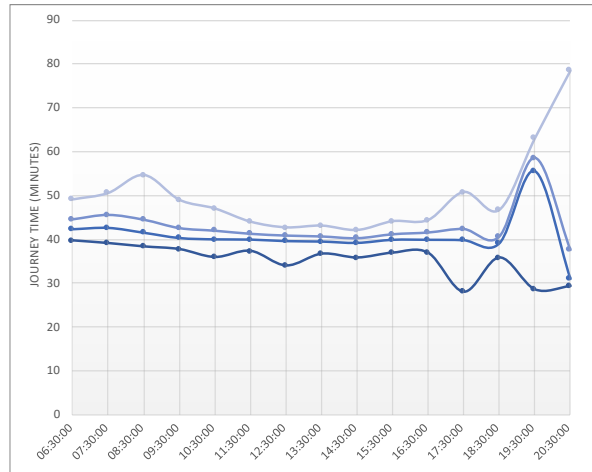
The number of records that remained to be analysed are:

	2019		2024	
	Inbound	Outbound	Inbound	Outbound
Madingley Hill	16,188	15,528	13,795	14,043
Madingley Road	30,979	27,412	30,674	29,828

13 Figures

13.1.1 Inbound journey times

2019



2024

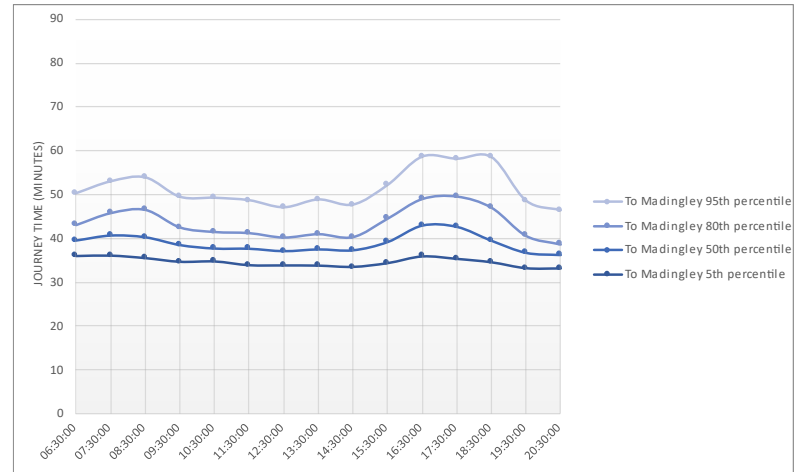


Figure 1: Citi 4 journey times from service departure point in Cambourne to east of Madingley Mulch roundabout

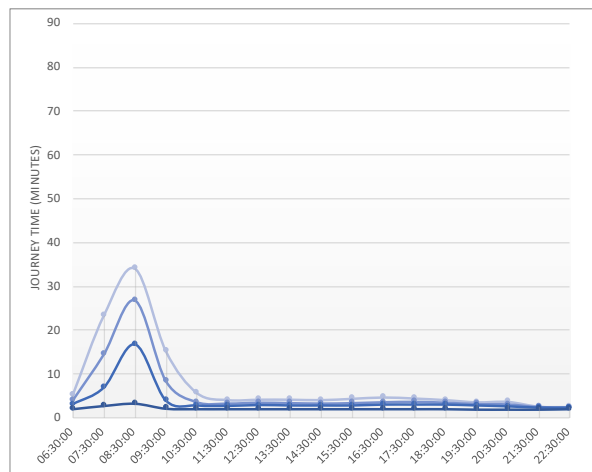
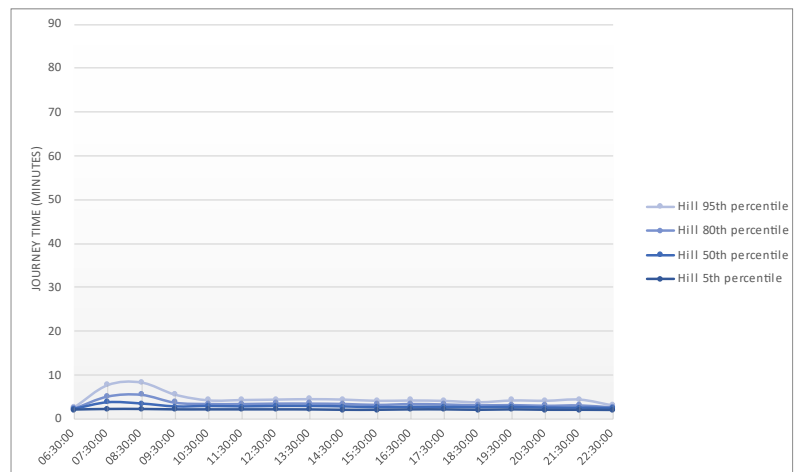


Figure 2: Journey times of Citi 4, X5/905 and X3 services from Madingley Mulch roundabout to the M11 exit junction

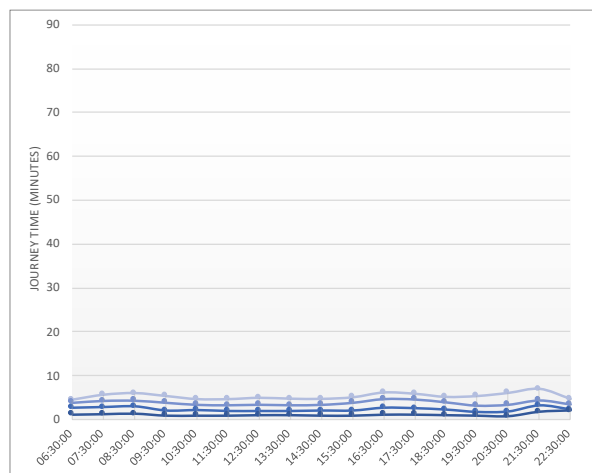
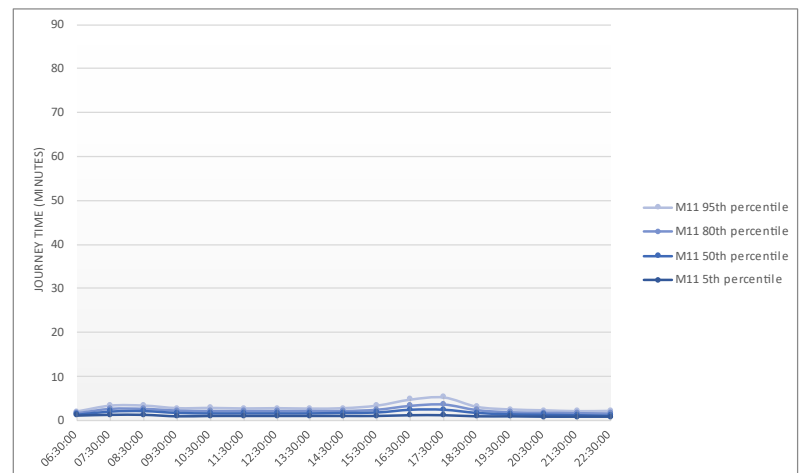
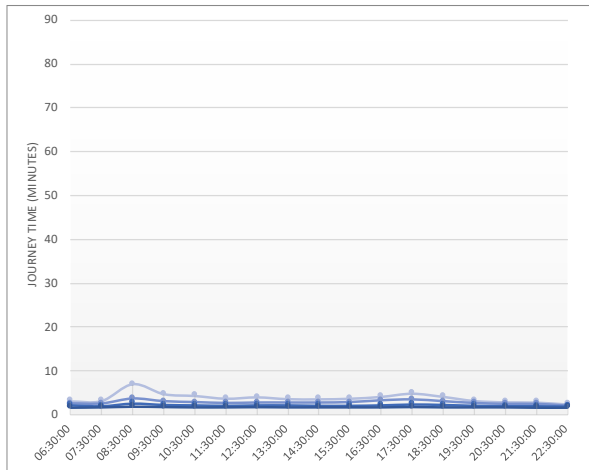


Figure 3: Journey times of Citi 4 and X5/905 services from M11 exit junction to Eddington Ave junction

2019



2024

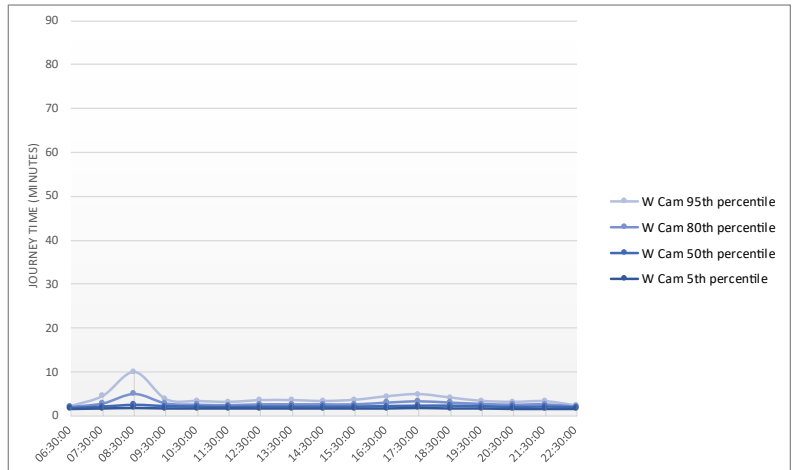


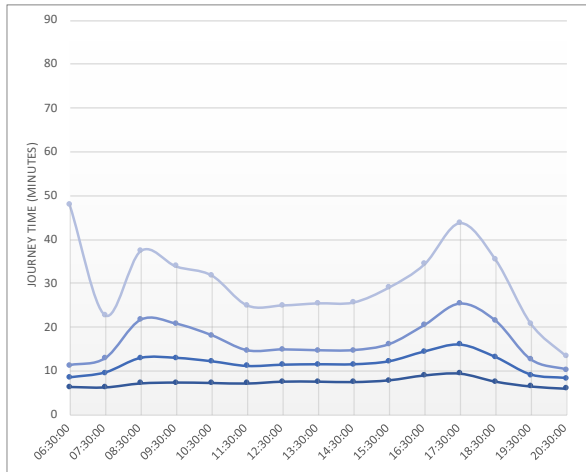
Figure 4: Journey times of Citi 4, X5/905 and P&R services from Eddington Ave junction to Grange Road junction

Table 3: Measured and best possible journey times and bus speeds inbound along Madingley Road

	Fastest possible			Slowest 95th percentile				Continuous bus lane	
				2019		2024		Speed (mph)	Time (mins)
	Distance (m)	Speed (mph)	Time (mins)	Speed (mph)	Time (mins)	Speed (mph)	Time (mins)		
Section A around roundabout	190			2.5	2.8	10.4	0.7		
Section A through roundabout	107	20	0.2					20.0	0.2
Section B.1	190	50	0.1	2.5	2.8	10.4	0.7	50.0	0.1
Section B.2 (tracking zone start)	363	50	0.3	2.5	5.4	10.4	1.3	50.0	0.3
Section C (American Cemetery)	931	50	0.7	2.5	13.9	10.4	3.3	50.0	0.7
Section D.1	318	50	0.2	2.5	4.8	10.4	1.1	50.0	0.2
Section D.2 (40mph zone start)	121	40	0.1	2.5	1.8	10.4	0.4	40.0	0.1
Section E (Moor Barns Farm)	390	40	0.4	2.5	5.8	10.4	1.4	40.0	0.4
Section F.1 (existing bus lane)	220	40	0.2	30.4	0.3	33.6	0.2	40.0	0.2
Section F.2 (tracking zone end)	132	40	0.1	30.4	0.2	33.6	0.1	40.0	0.1
Section G (M11 bridge)	178	40	0.2	2.5	2.7	10.4	0.6	40.0	0.2
Section H	207	40	0.2	11.0	0.7	11.0	0.7	40.0	0.2
Total	3157.0		2.7		41.2		10.7		2.7
<i>Through timing zone</i>	<i>2475.0</i>		<i>1.9</i>		<i>32.0</i>		<i>7.8</i>		<i>1.9</i>
Delay relative to fastest possible			0.0		38.5		8.0		0.0
Time saving relative to 2019			38.5						38.5
Time saving relative to 2024			8.0						8.0

13.1.2 Outbound journey times

2019



2024

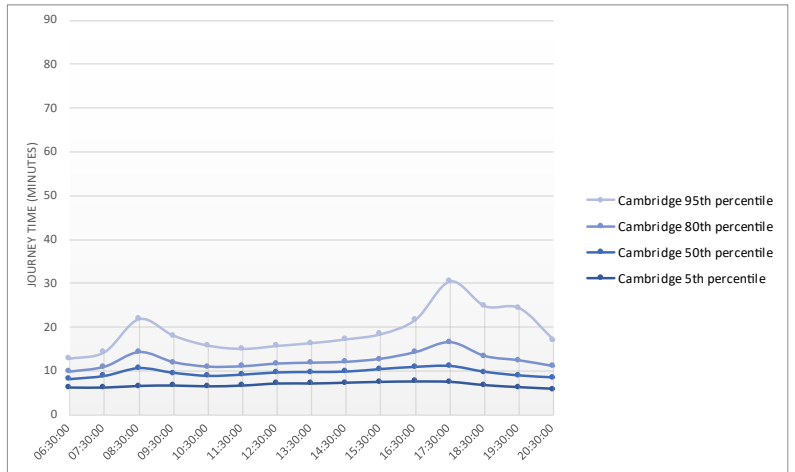


Figure 5: Journey times of Citi 4, X5/905 and P&R services from departure point in Cambridge to Grange Road junction

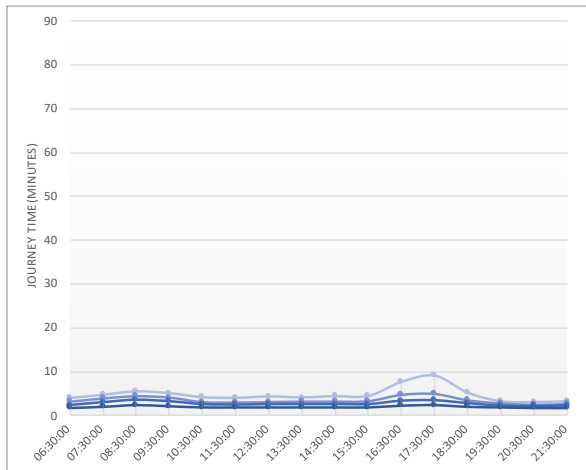
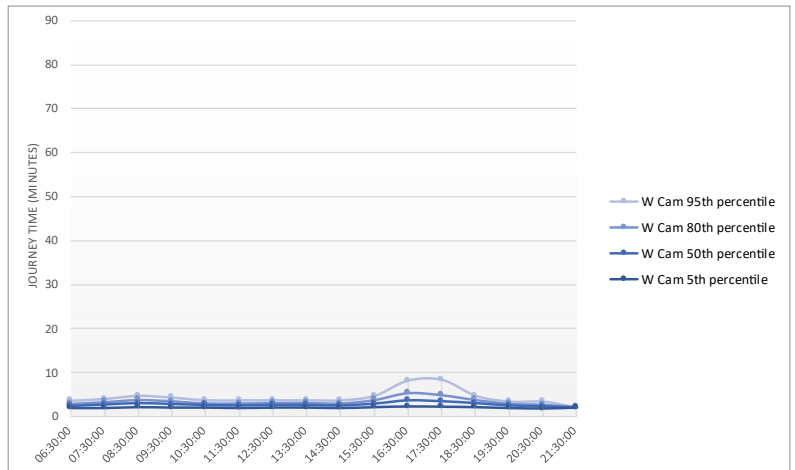
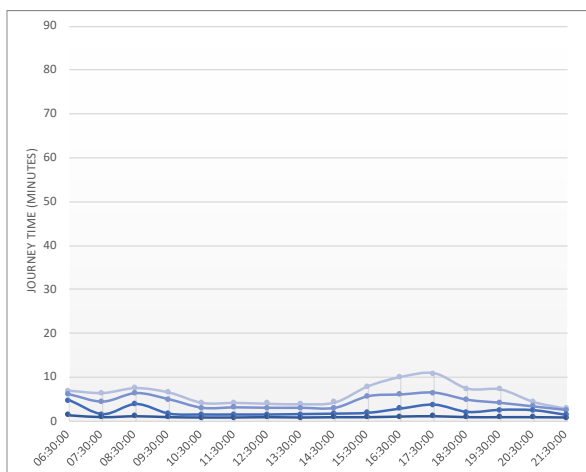


Figure 6: Journey times of Citi 4, X5/905 and P&R services from Grange Rd junction to Eddington Ave junction

2019



2024

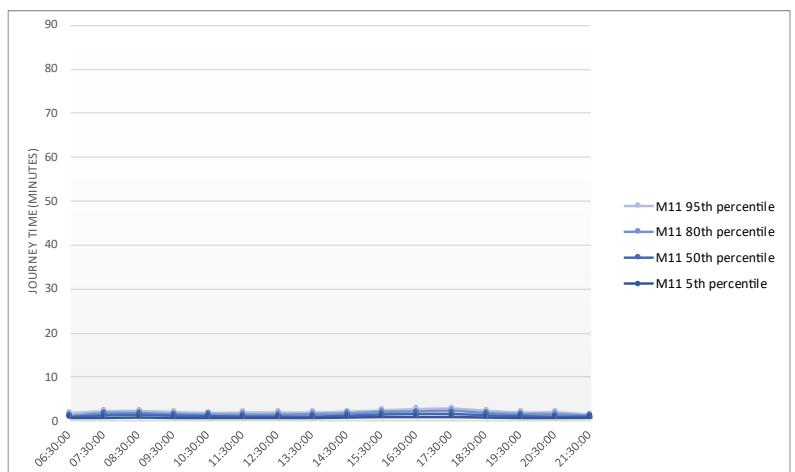


Figure 7: Journey times of Citi 4 and X5/905 from Eddington Ave junction to M11 exit junction

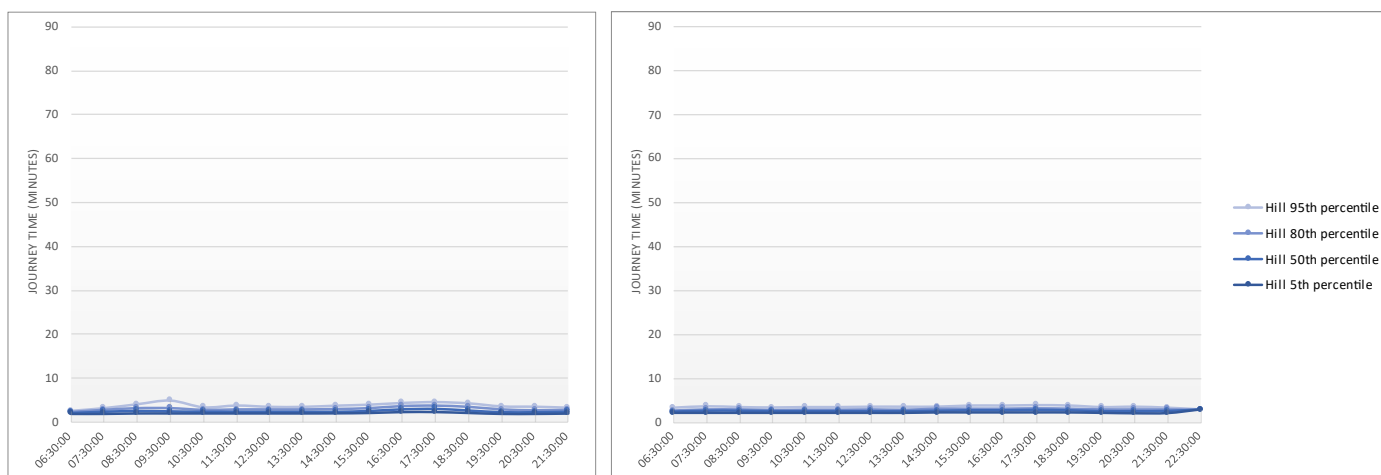


Figure 8: Journey times of Citi 4, X5/905 and X3 services from M11 exit junction to Madingley Mulch roundabout

13.1.3 Traffic volumes

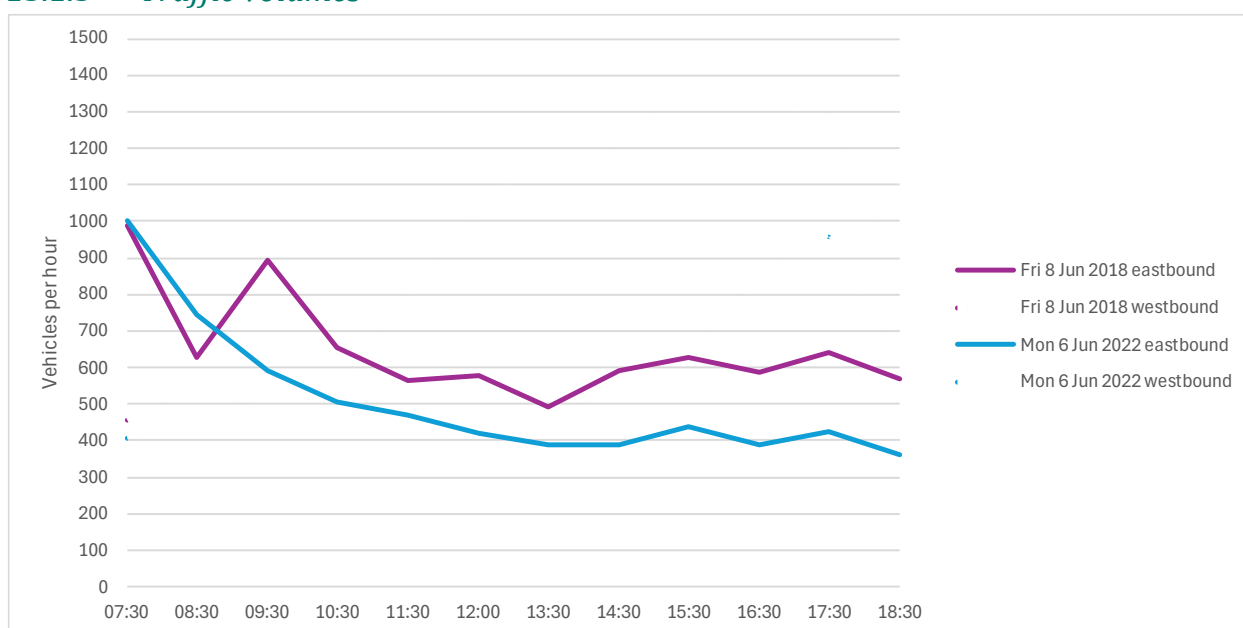


Figure 9: Department for Transport manual traffic counts on Madingley Hill in 2018 and 2022

13.1.4 Route alignments

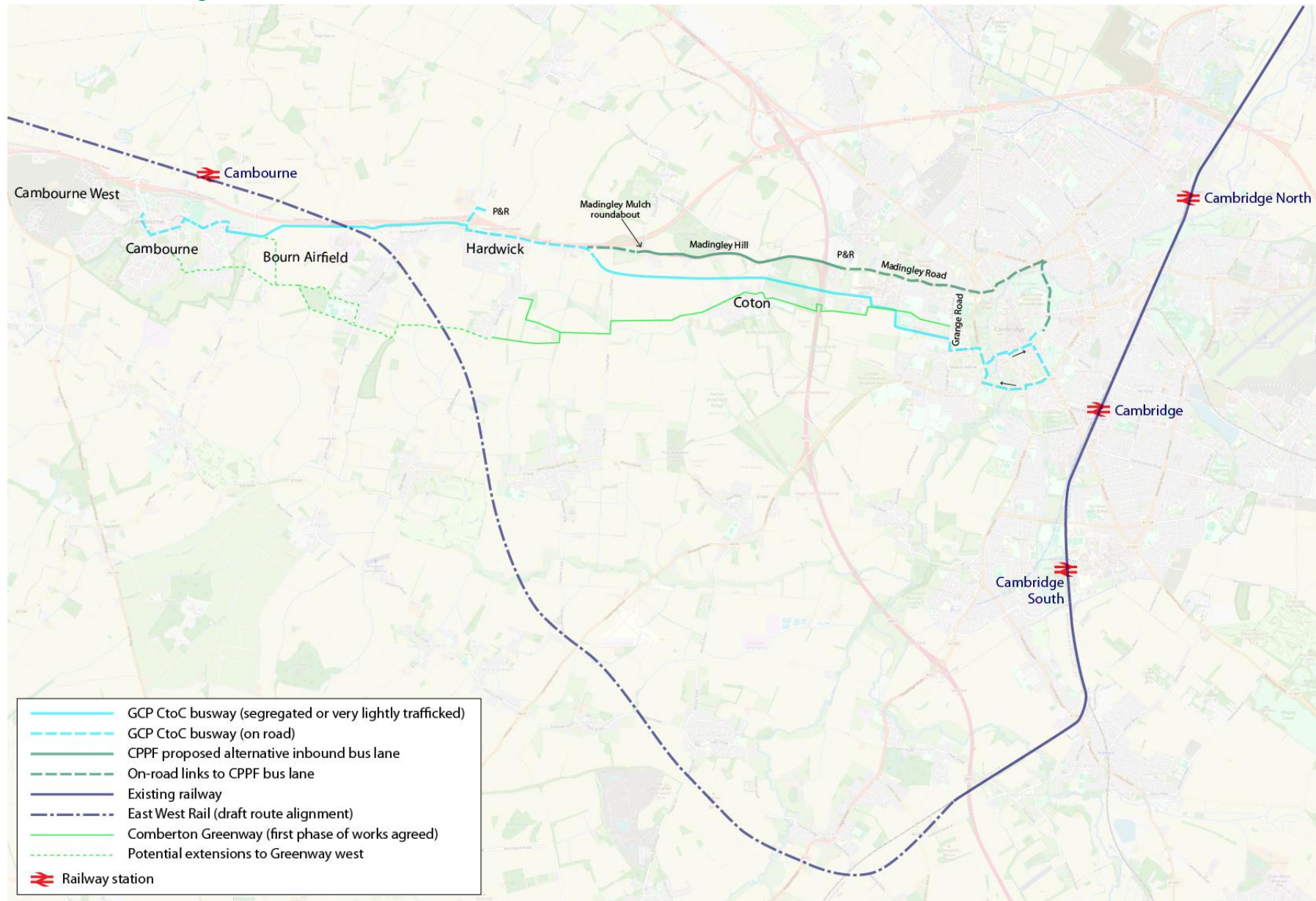


Figure 10: GCP proposed alignment for the CtoC busway (from Proposed Site Sections), Cambridge PPF proposed alternative, and proposed alignment for EWR

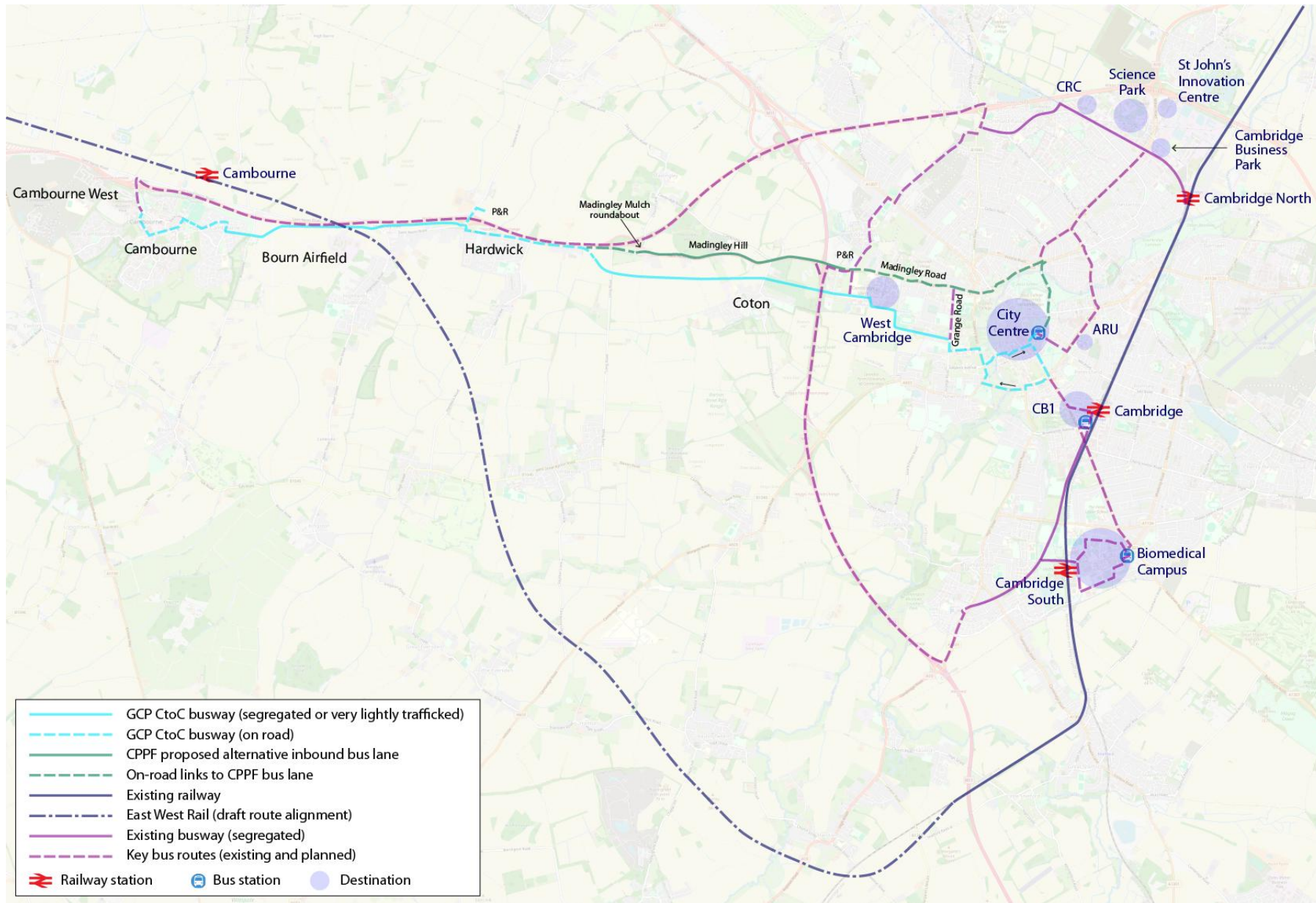


Figure 11: Map of key destinations and potential routes by bus and rail to reach them from Cambourne

13.1.5 Alternative scheme annotated plans

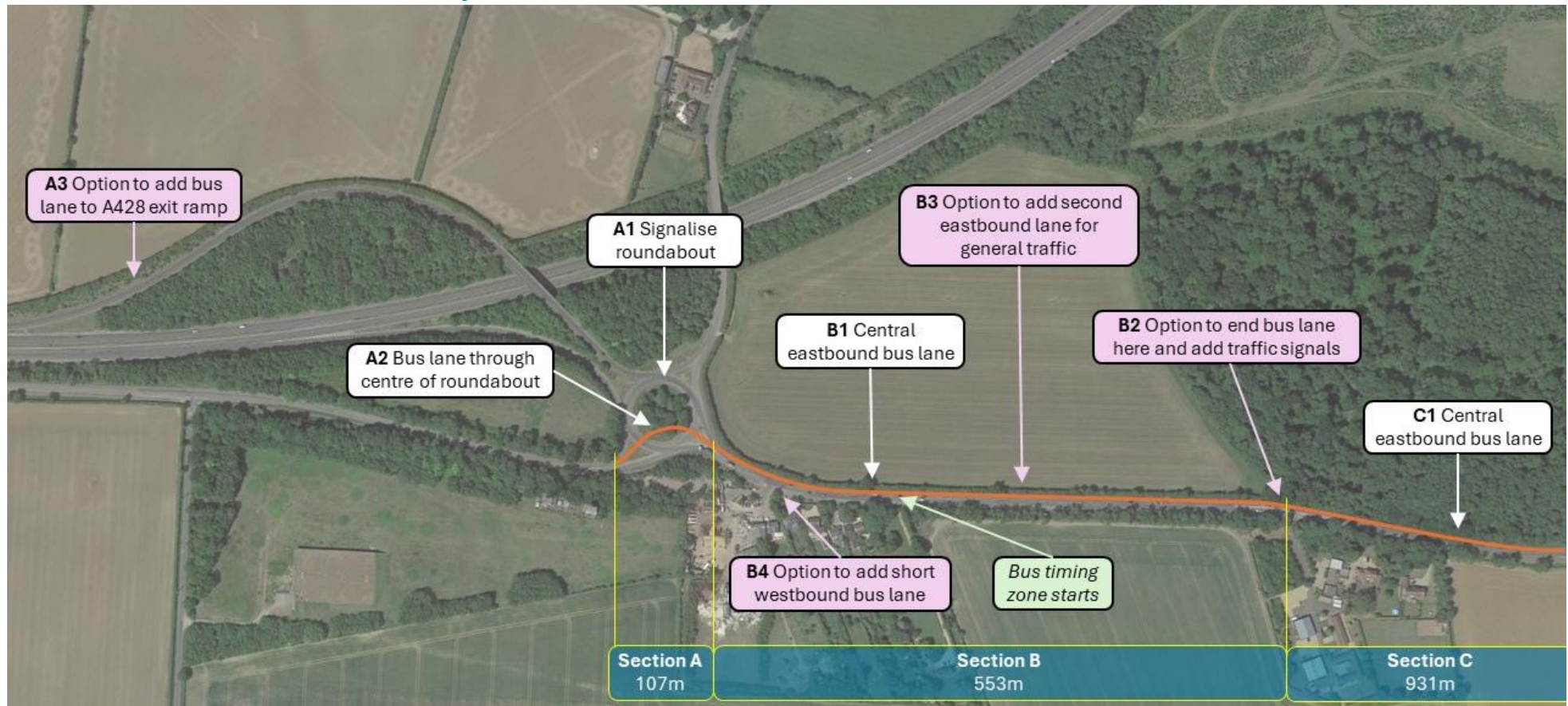


Figure 12: Annotated map of proposed interventions on Madingley Rd (continued east on next pages). Satellite image ©2024 Airbus, Maxar Technologies; map data ©2024 Google.

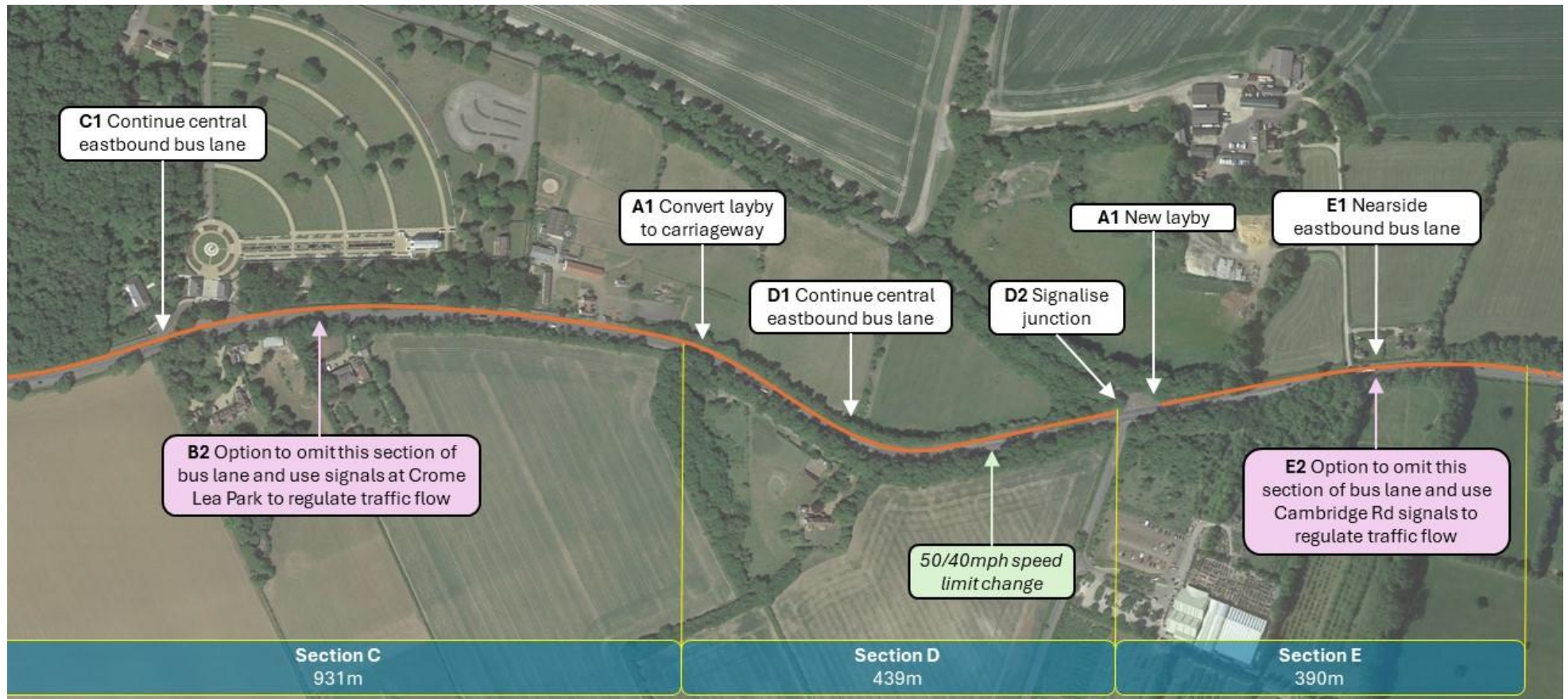


Figure 13: Annotated map of proposed interventions on Madingley Rd (continued east on next page and west on previous page). Satellite image ©2024 Airbus, Maxar Technologies; map data ©2024 Google.

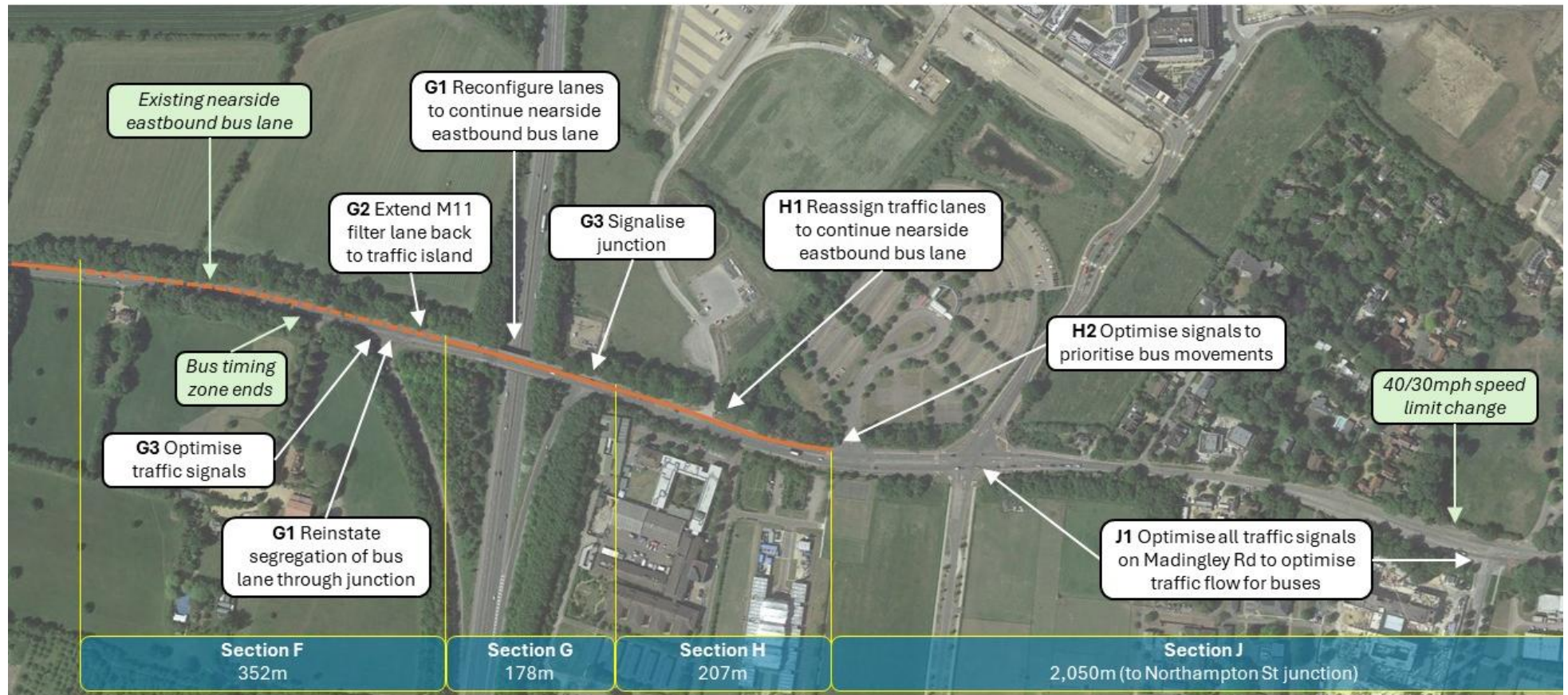


Figure 14: Annotated map of proposed interventions on Madingley Rd (continued west on previous pages). Satellite image ©2024 Airbus, Maxar Technologies; map data ©2024 Google.

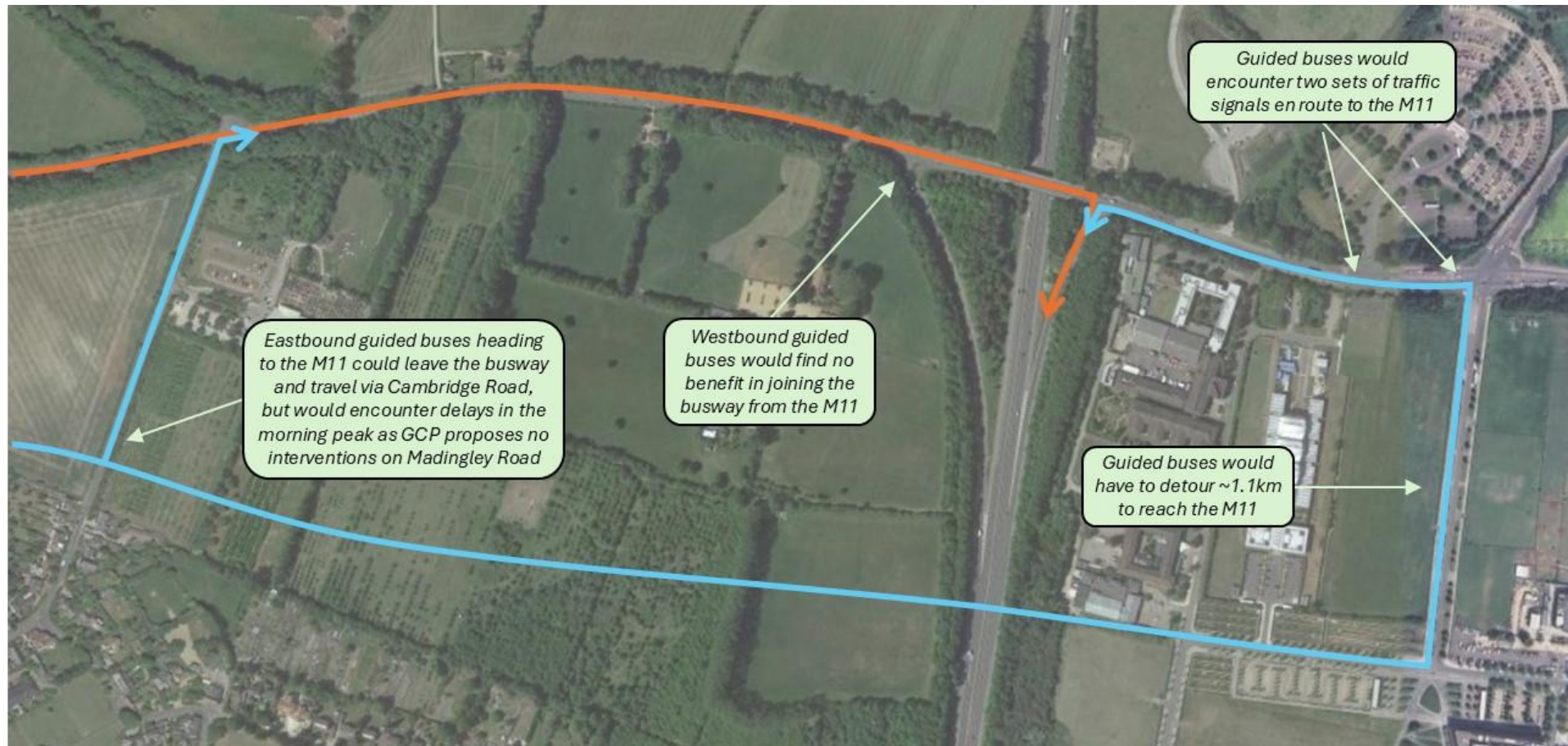


Figure 15: Available routes to the M11 from Maddingley Road and from GCP's proposed busway (e.g. for direct bus services to the Biomedical Campus). Satellite image ©2024 Airbus, Maxar Technologies; map data ©2024 Google.

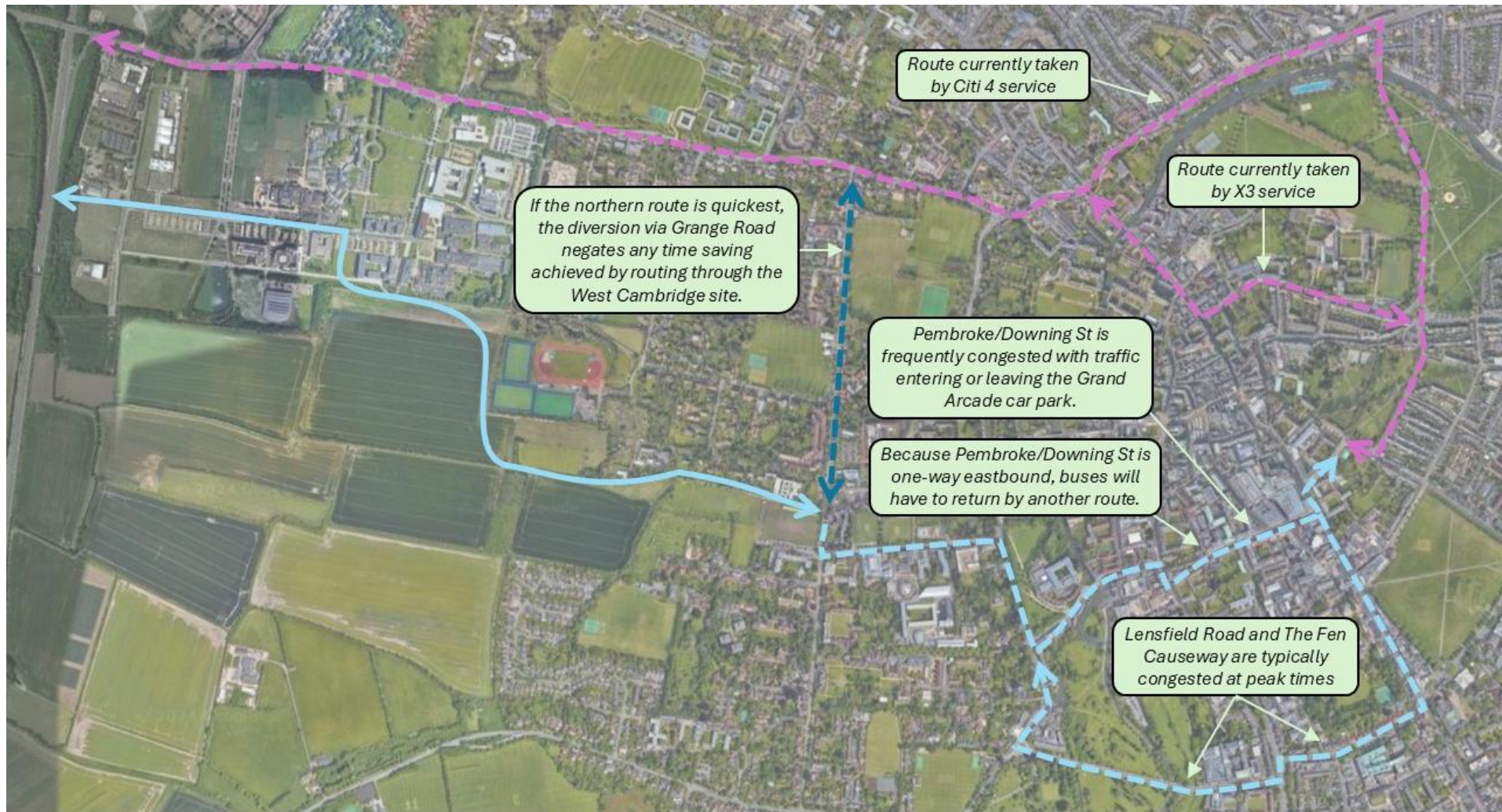


Figure 16: Current and potential bus routes to/from the city centre. Satellite image ©2024 Airbus, Maxar Technologies; map data ©2024 Google.

13.1.6 Traffic data

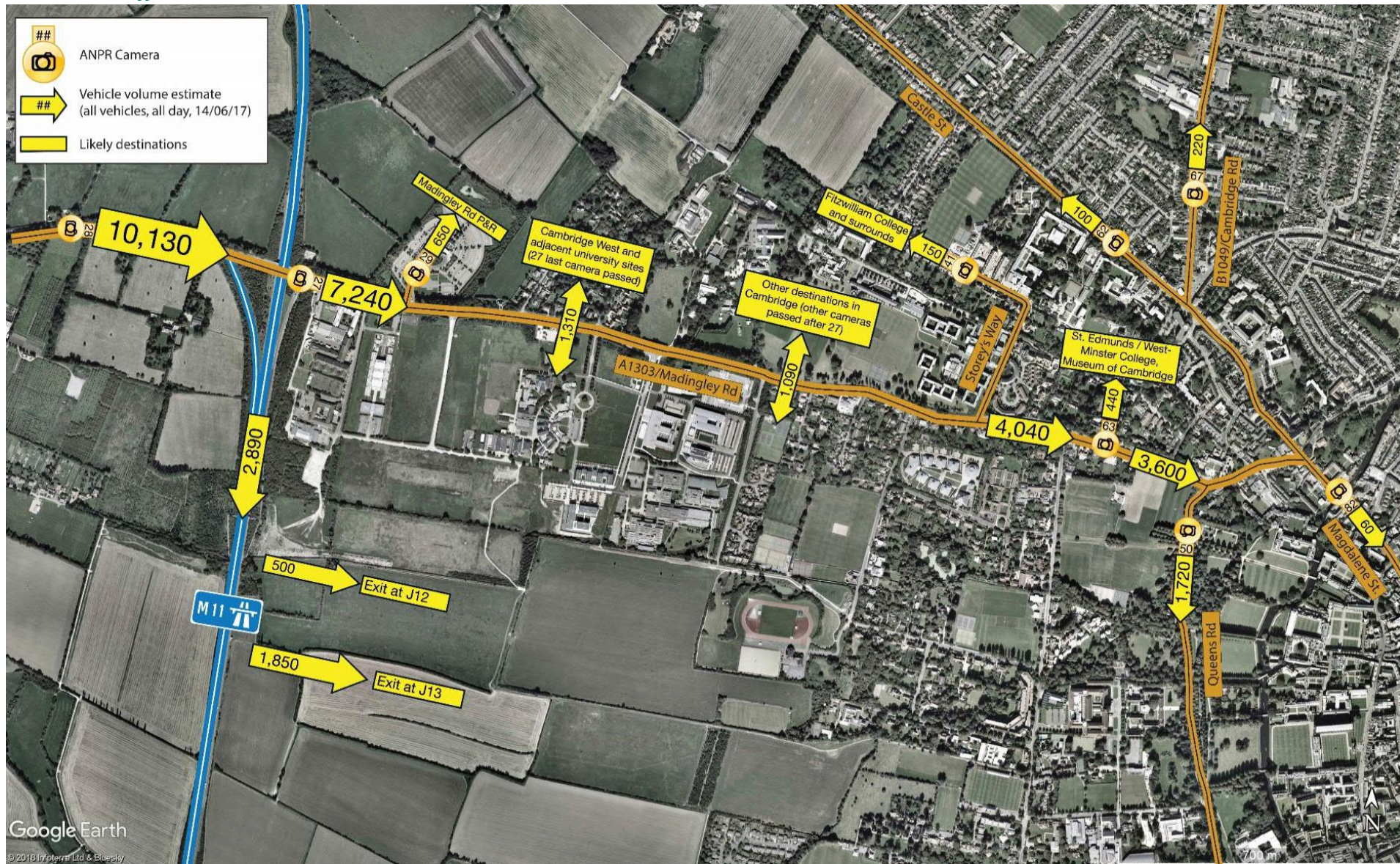


Figure 17: Whole-day (14 June 2017) traffic flow inbound on Madingley Rd and joining the M11 at Junction 13 (from NR page 21).



Figure 18: Traffic congestion at 8:05am on a typical Thursday (©2024 Google, Airbus, Maxar Technologies)

13.1.7 Highway boundaries



Figure 19: Highway boundary from Madingley Mulch roundabout to Cambridge Rd junction – Sections B-D (from TSM © Crown)



Figure 20: Highway boundary between Mill Farm and Madingley Rd Park & Ride – Sections D–H (from TSM © Crown)

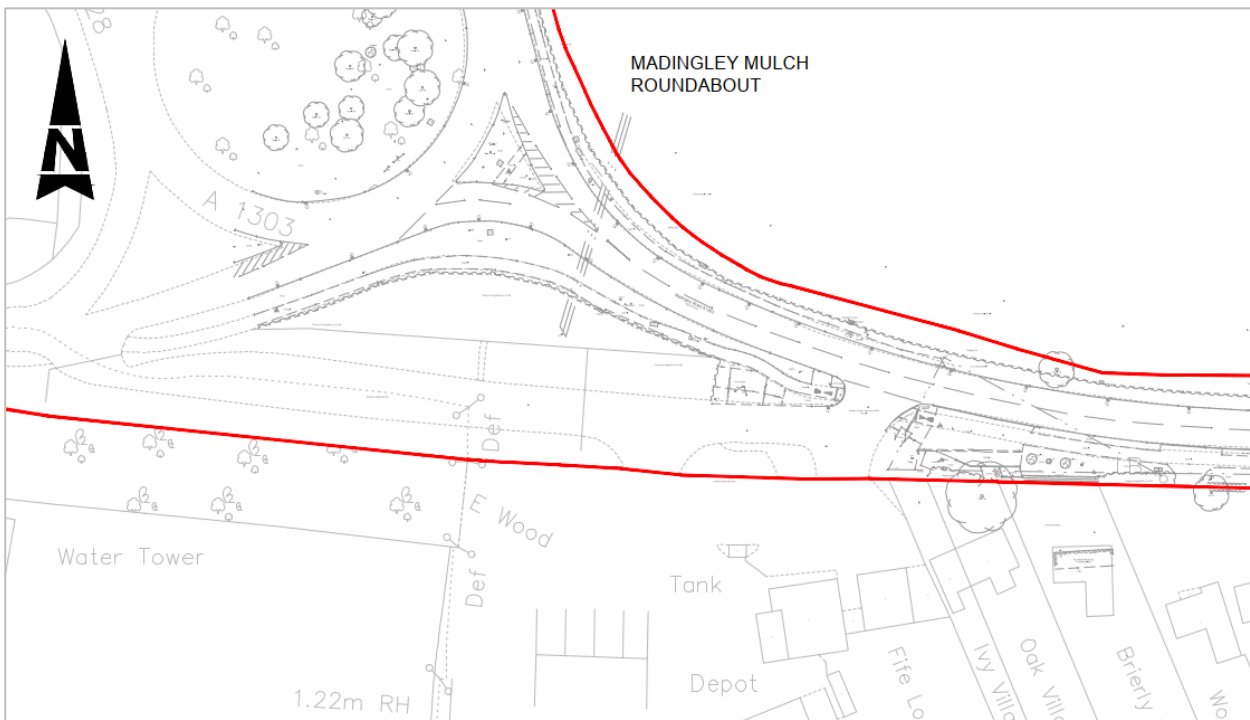


Figure 21: Highway boundary south of Madingley Mulch roundabout – Section A (from TSM © Crown)

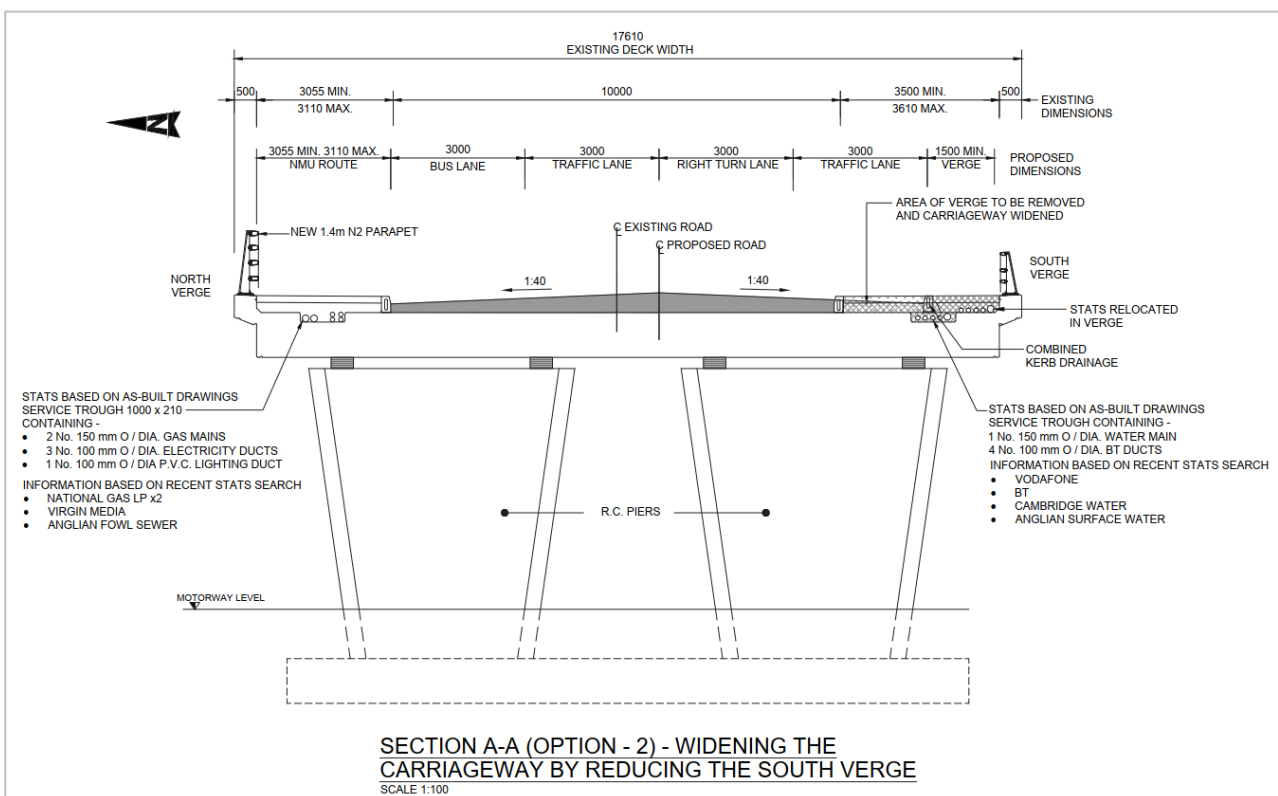


Figure 22: Four-lane configuration of M11 "Rectory Farm" bridge (from RFB page 33 © 2016 Atkins Ltd)

13.1.8 Scheme cross-sections

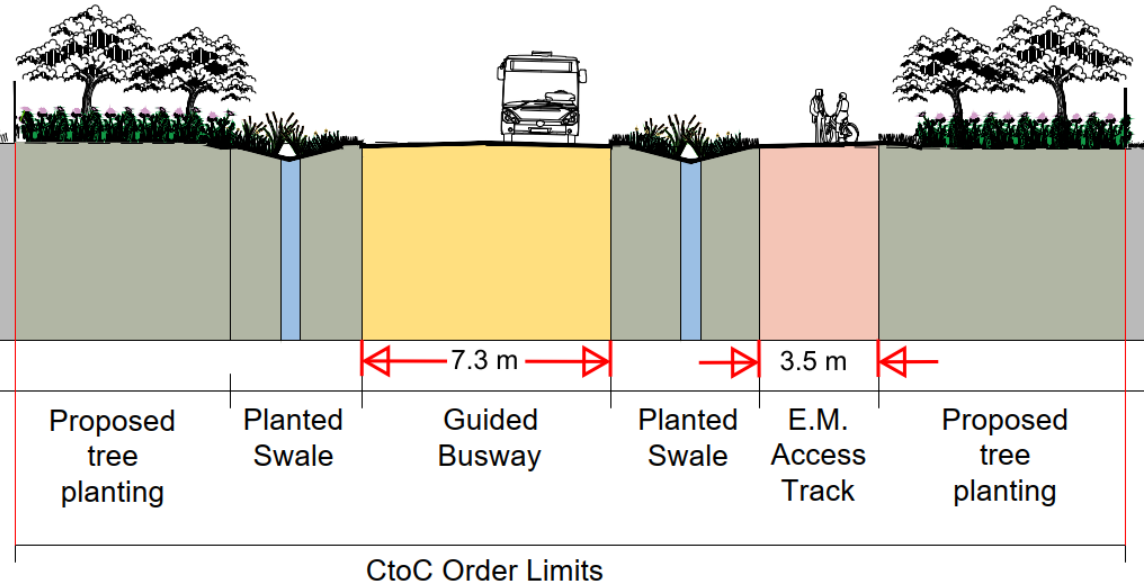


Figure 23: Cross-section of busway through Coton Orchard. Source Proposed Site Sections (CtoC-16-DP5)

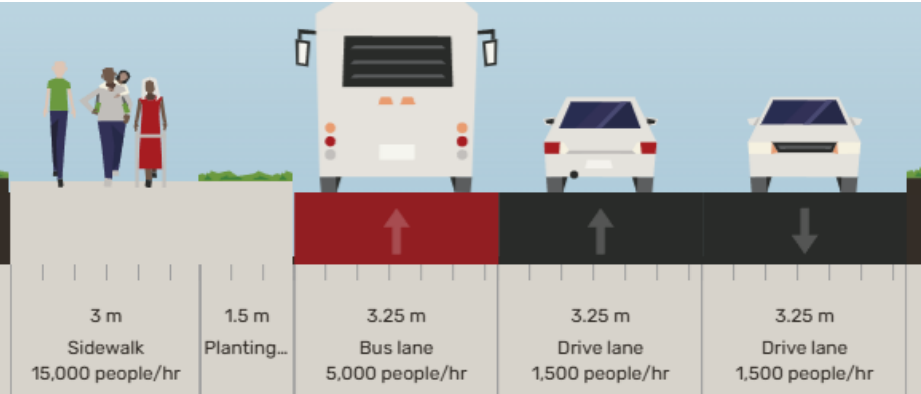


Figure 24: Active Travel England's recommended "absolute minimum" cross-section for 50mph road speed (total width 14.25m). View is looking east along Madingley Hill with a nearside bus lane.

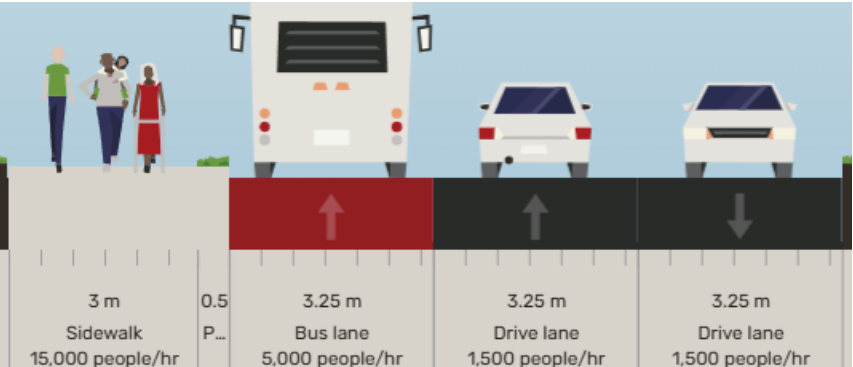


Figure 25: Active Travel England's recommended "absolute minimum" cross-section for 40mph road speed (total width 13.25m). View is looking east along Madingley Hill with a nearside bus lane.

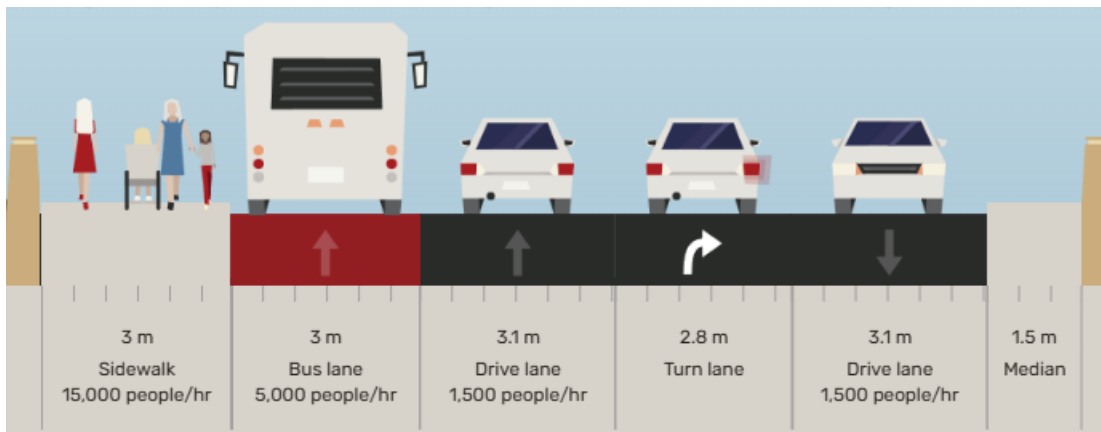


Figure 26: Potential cross-section looking east of Rectory Farm bridge with additional eastbound bus lane (total width: 16.5m – see Figure 22)

13.1.9 Active travel

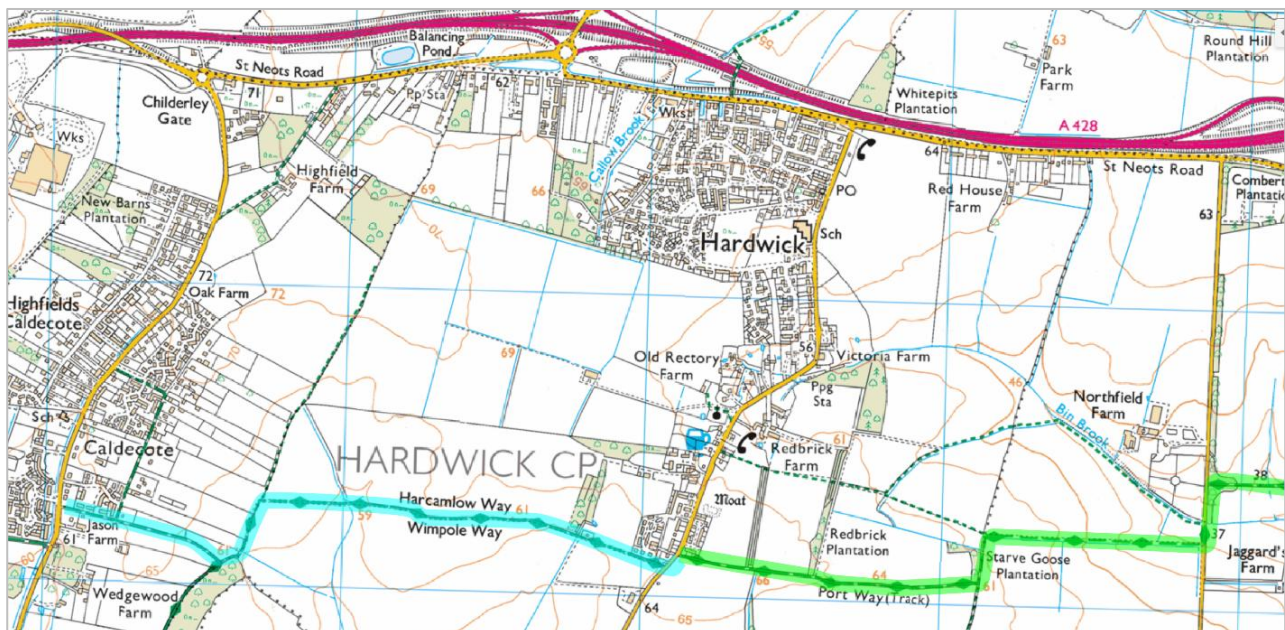


Figure 27: The Comberton Greenway (green) could be extended (blue) via the Harcamlow Way bridleway to Highfields Caldecote (shown here on the Ordnance Survey map)



Figure 28: Topographical view of Cambourne to Cambridge showing elevation in colours, Comberton Greenway route (solid green), potential extensions of Greenway (dashed green), GCP bus route with adjacent active travel path (cyan)

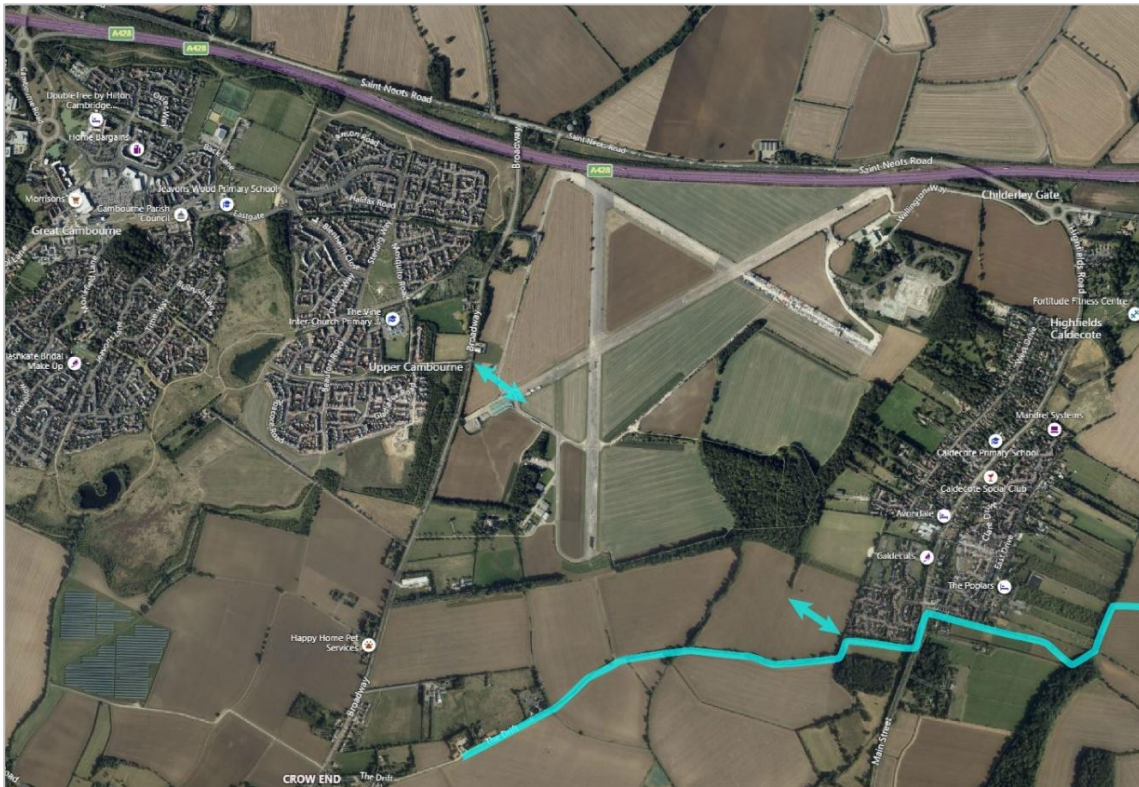


Figure 29: Indicative connection points for an active travel route through the Bourn Airfield development, connecting Cambourne to Highfields Caldecote and a westward extension of the Comberton Greenway, as shown in Figure 27 (Ordnance Survey imagery)

13.1.10 Madingley Road



Figure 30: M11 exit junction with Madingley Rd in 2014 (© 2014 Google)



Figure 31: Current M11 exit junction with Madingley Rd (© 2020 Edward Leigh)

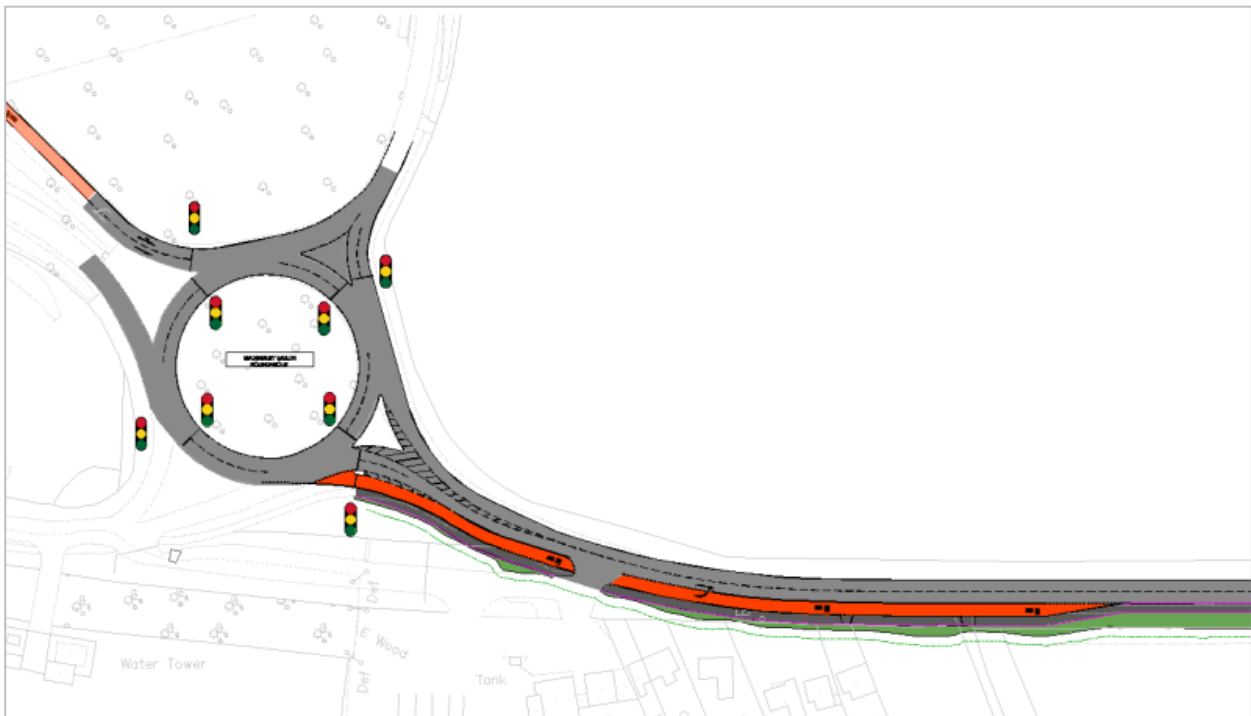


Figure 32: Westbound bus lane into Madingley Mulch roundabout (from QW 3.1/Mott MacDonald)

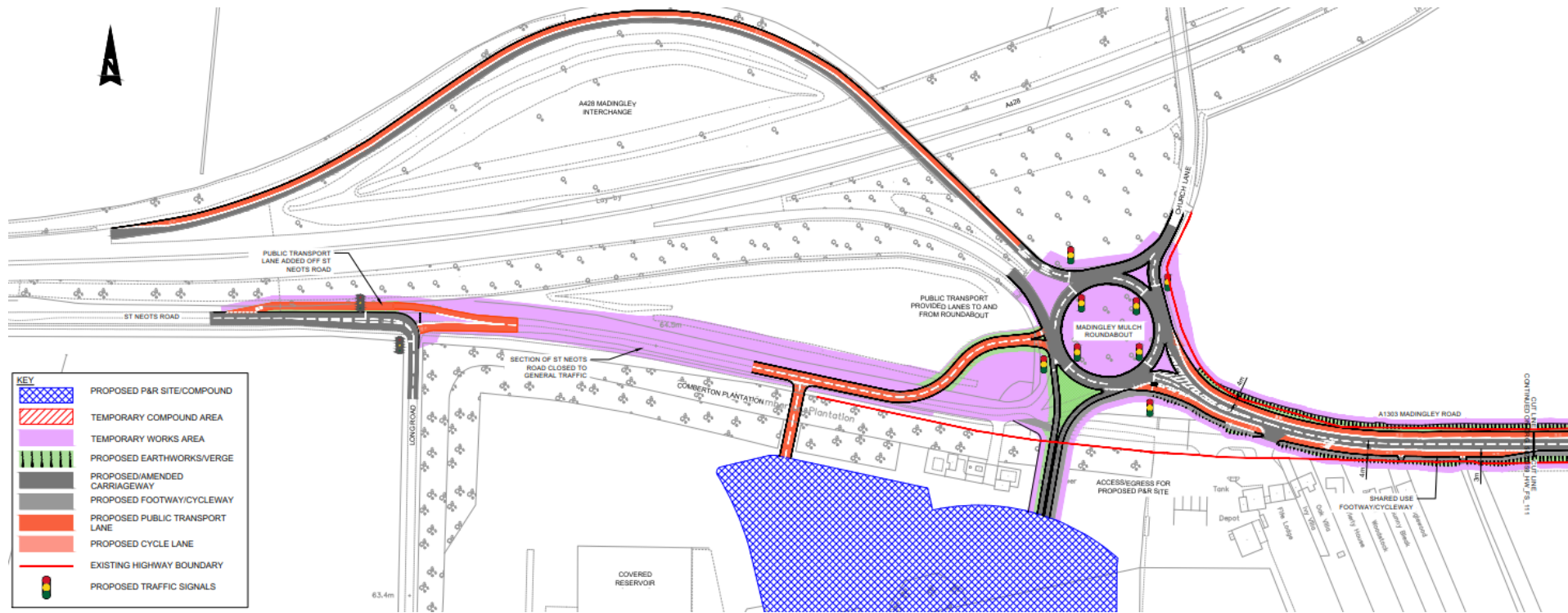


Figure 33: Bus lane added to A428 eastbound exit ramp and bus lanes added to western end of Madingley Road, as illustrated for GCP option "Low Cost A + Waterworks" in Options Appraisal Report Part 2 (2018)

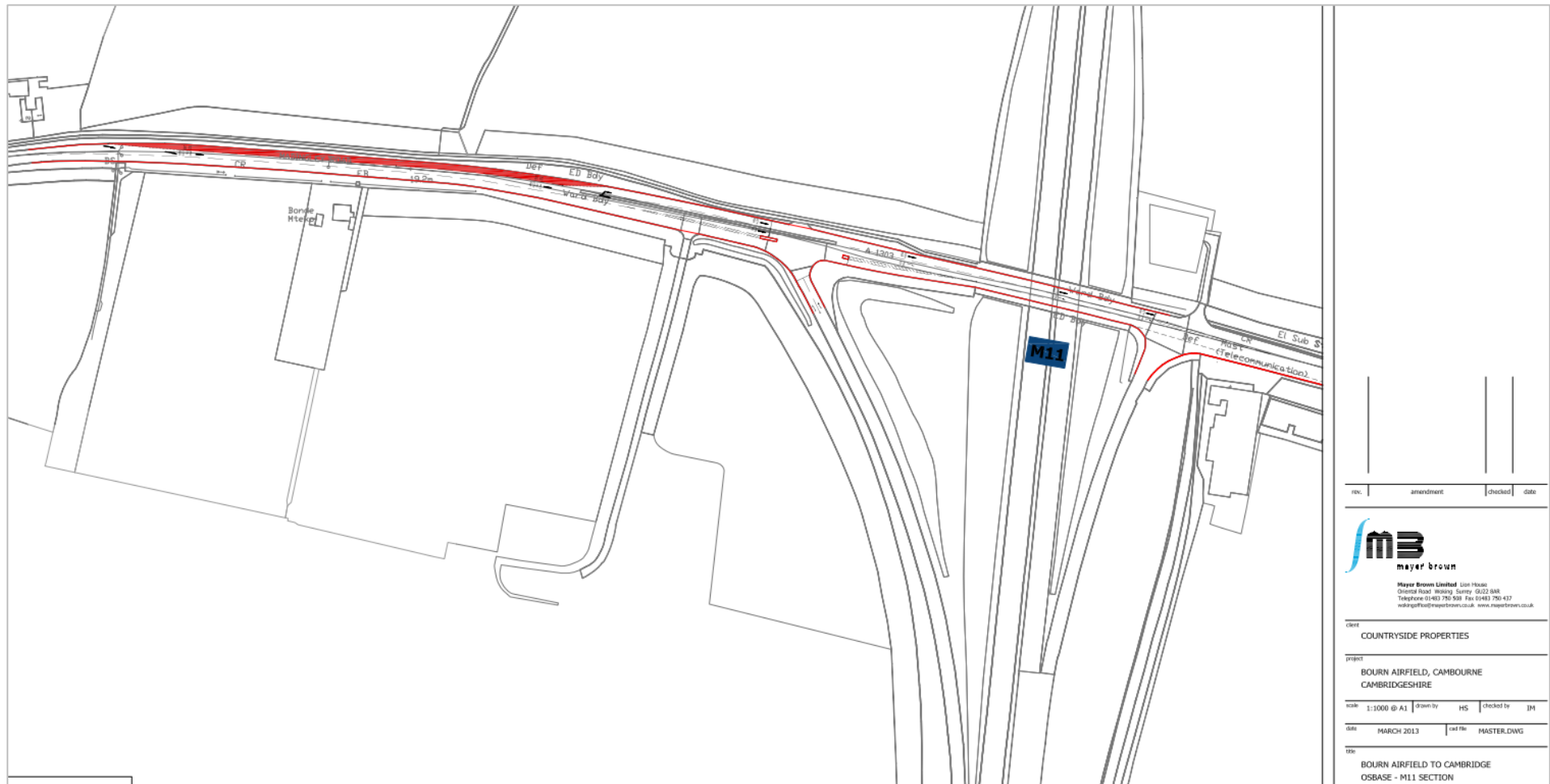


Figure 34: Changes proposed to A1303 at M11 junction as part of Bourn Airfield planning application (S/3440/18/OL)

13.1.11 Cambourne and Bourn Airfield

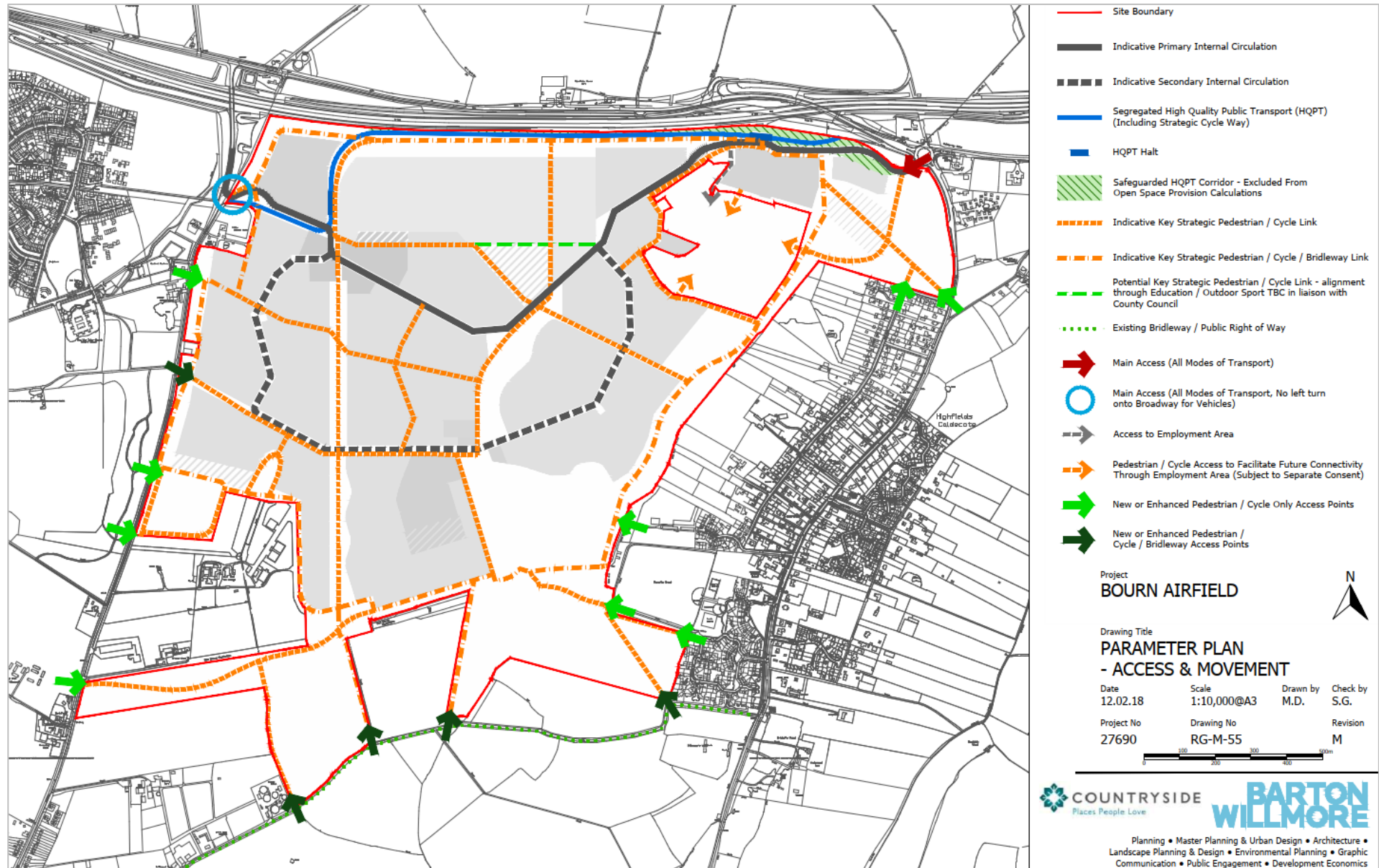


Figure 35: Proposed active travel routes through the Bourn Airfield site proposed in the outline planning application (S/3440/18/OL)



Figure 36: Illustrative masterplan from outline application for Bourn Airfield (S/3440/18/OL) showing how much of the development is within 400m (as the crow flies) of the two 'halts' on the busway as proposed by GCP. 400m is the recommended maximum walking distance to a bus stop. Some homes will be at least 1.2km walking distance from their nearest busway 'halt'.



Figure 37: 2021 Census data on travel to work from Cambourne: of the 2,339 people who commuted out of Cambourne, the largest flow was 372 people (16%) to the Biomedical Campus area; the second largest flow was 210 (9%) to west and central Cambridge.

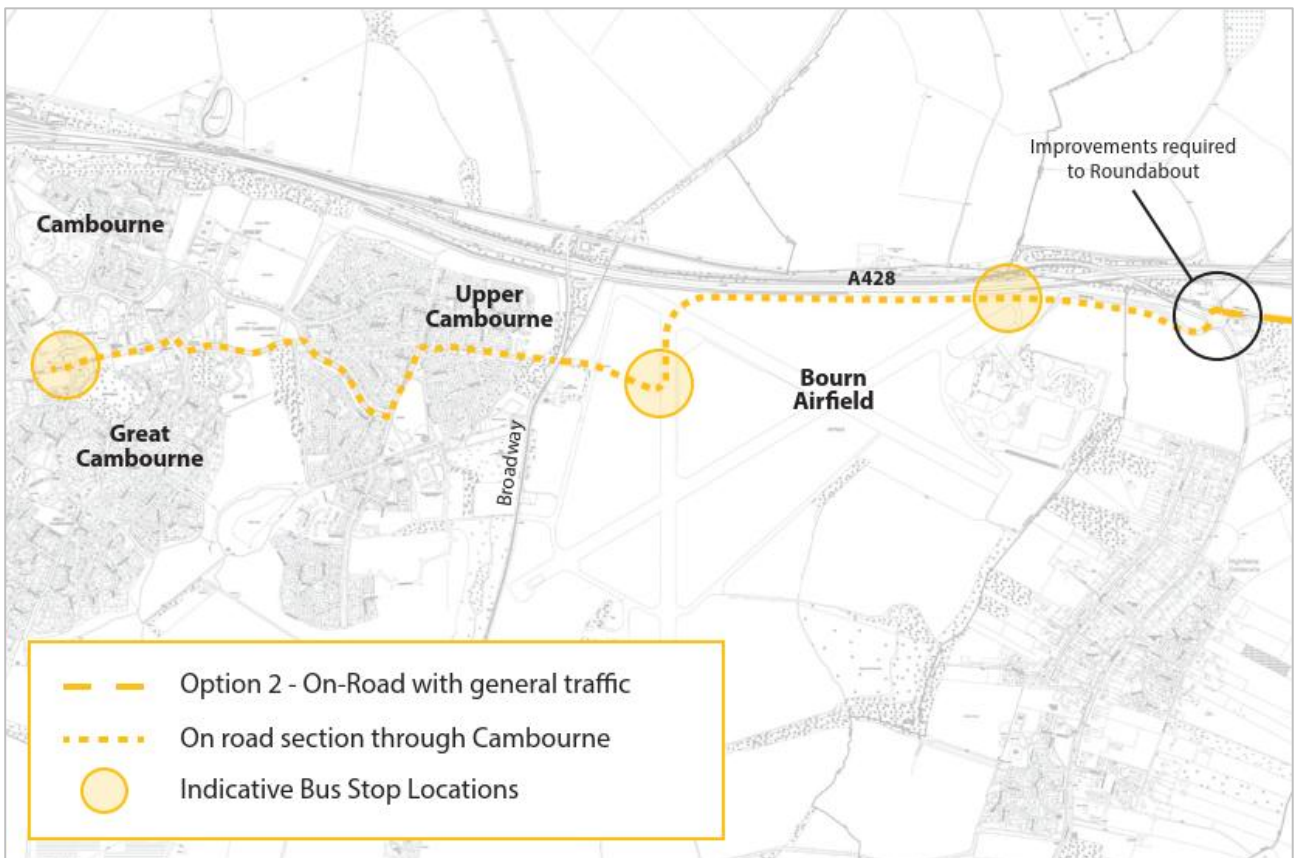


Figure 38: Indicative bus route as part of CtoC Busway (from NTS page 38)



Figure 39: Technical drawing showing junction on Broadway with Bourn Airfield western access point (from OAR Part 3, page 70)

13.1.12 A428

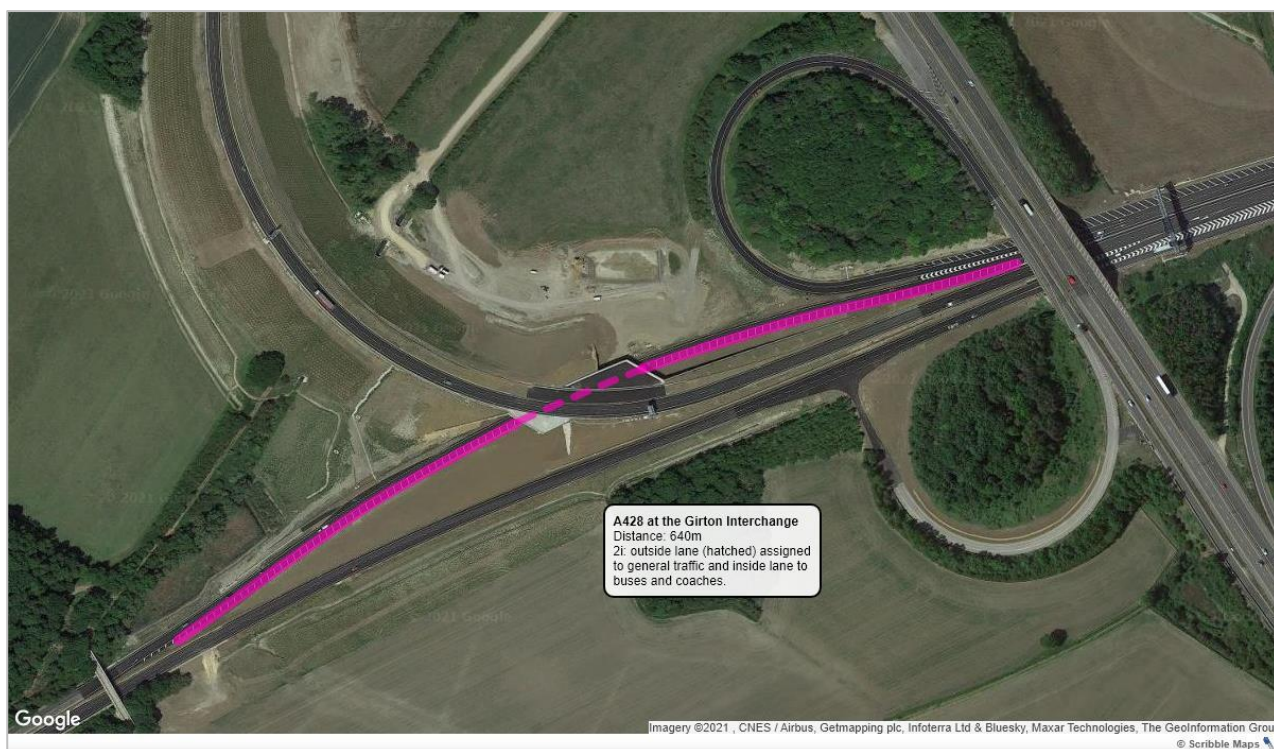


Figure 40: Reassignment of hatched outside lane on A428 at the Girtton Interchange to create a 640m long bus and coach lane

13.1.13 Bus route and tracking zones

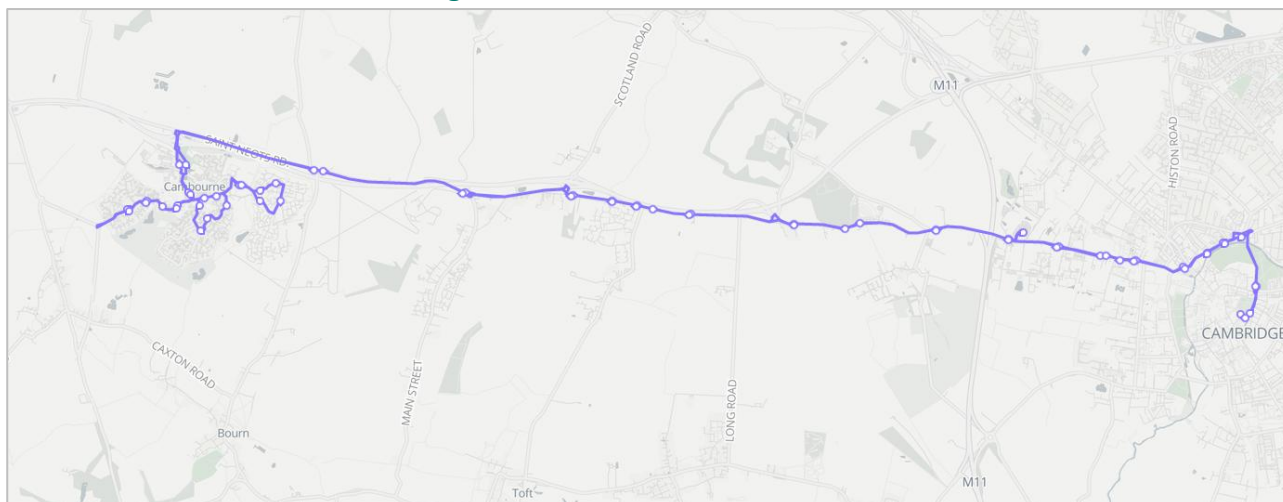


Figure 41: Citi 4 bus route from Cambourne to Cambridge

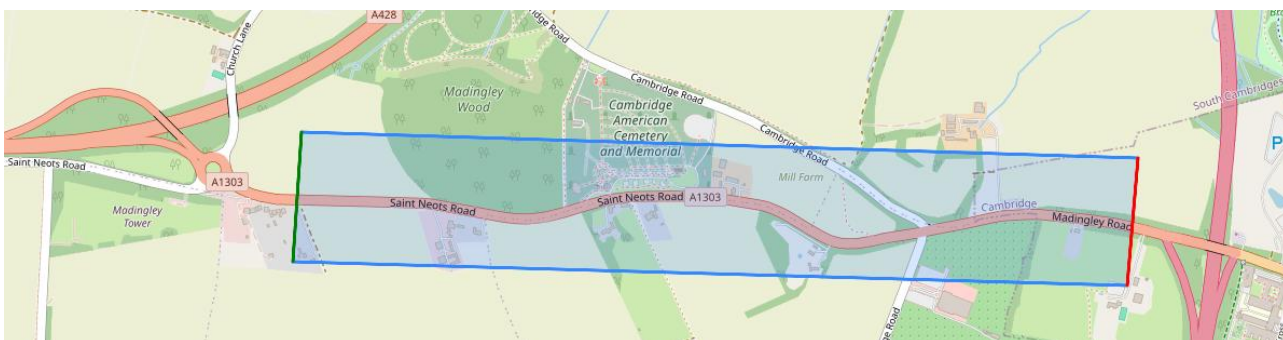


Figure 42: Madingley Road Outer zone used to monitor bus travel times on Madingley Road west of the M11 (Madingley Hill)

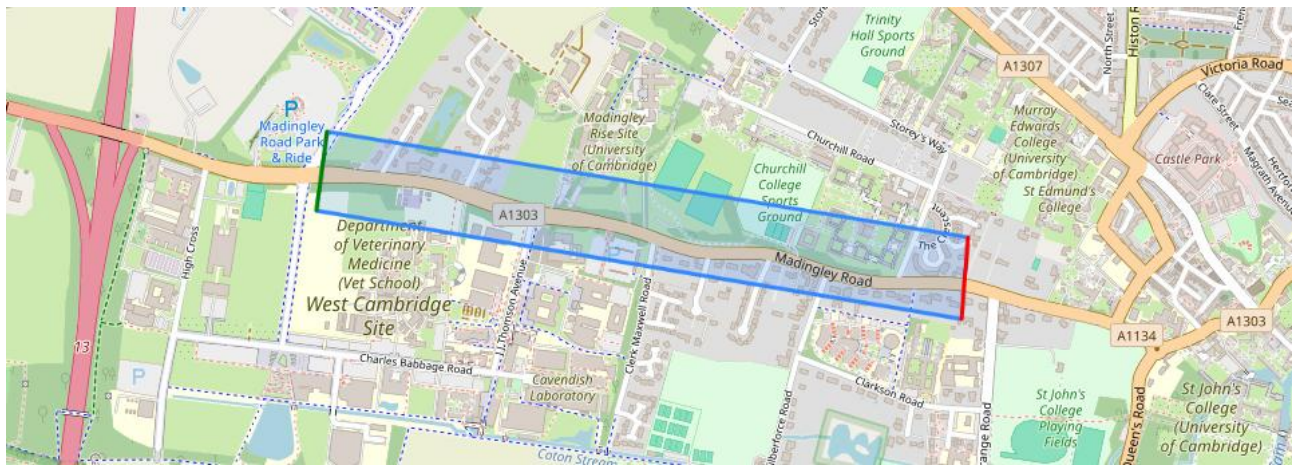


Figure 43: Madingley Road zone used to monitor bus travel times on Madingley Road east of the M11