A10 Junctions and Dualling

Option Assessment Report

July 2020

Cambridgeshire and Peterborough Combined Authority

A10 Junctions and Dualling

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Executive summary

The A10

The A10 between Ely and Cambridge is a primary route in Cambridgeshire, used by local traffic, public transport, agricultural vehicles and long-distance traffic including

The single carriageway forms part of the direct route between London (via the M11 and A14), Cambridge and King's Lynn. The A10 provides onward connections to the Strategic Road Network (A47 and A17) and primary routes (A142, A1122 and A148) within Cambridgeshire and Norfolk. The A10 also connects with locally important east-west routes such as the A1123 between Newmarket and St. Ives. The A10 has been included in the Department for Transport's Major Road Network (MRN).

The corridor is characterised by numerous private access points and junctions (largely priority junctions and roundabouts). These junctions provide connectivity to communities such as Milton, Landbeach, Waterbeach, Stretham and Little Thetford; centres of employment such as the Cambridge Science Park and Cambridge Research Park; and the Milton Park and Ride site for Cambridge.

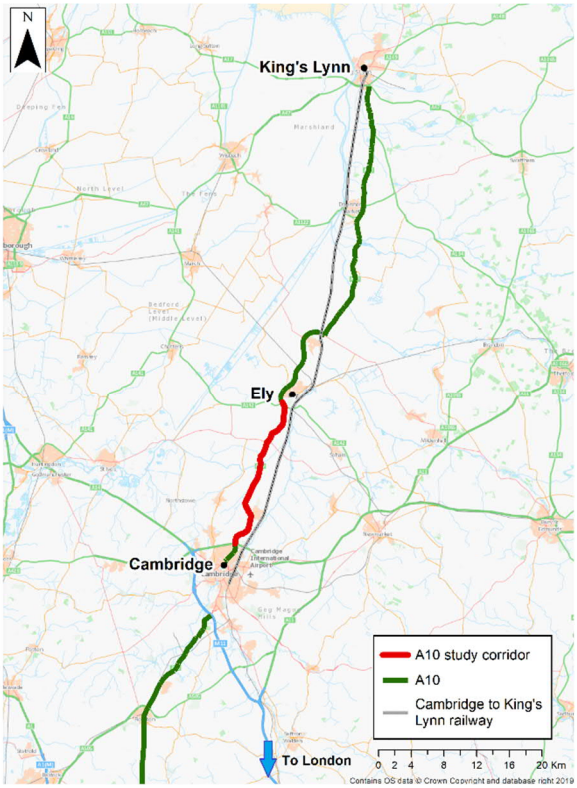


Figure 1. Study Area

Need for intervention

Cambridge is a UK economic success story, and a net contributor to the UK economy. Its nationally important knowledge-intensive industries and history of innovation and entrepreneurs provide a vibrant basis for growth across the economy. This economy extends beyond the city of Cambridge (population 125,000) along a series of key corridors, including the A10 to Ely and west Norfolk.

Economic growth has been sustained by good access to highly skilled labour markets. Housing growth before 2000 focussed on towns and villages outside Cambridge's Green Belt adding to commuter traffic on radial routes such as the A10 into Cambridge. Ely and neighbouring market towns have proved to be attractive places to live given their own character and proximity to Cambridge's leisure, retail and cultural opportunities.

Recent Local Plans and Local Transport Plans have actively sought to manage these issues with an increase in sustainable developments in and around Cambridge's fringes alongside active planning and delivery of sustainable transport policies and infrastructure. Nevertheless, the buoyant success of Cambridge's economy has meant that even this housing growth has not kept up with demand. The affordability of housing to buy or rent has continued to worsen in and around Cambridge resulting in further increases in commuting along key road (e.g. the A10) and rail (e.g. Fen Line) corridors as people seek to reduce their housing costs.

The Cambridge and Peterborough Independent Economic Review identified the region's housing crisis as a major constraint on its ability to fulfil its economic potential. The Cambridgeshire and Peterborough Combined Authority (CPCA) and its partners hold a strong ambition to double the size of the CPCA economy over the next 25 years, yet realising this true potential, needs sustained investment to remove current limits to growth. Without suitable action, some firms may seek to relocate. The issue for the UK economy is that many of these firms will take a "Cambridge or Overseas" approach when considering where to locate, if nothing is done.

The Adopted South Cambridgeshire Local Plan 2018 has allocated three locations to meet the majority of its housing need to 2031, with Waterbeach New Town on the A10 corridor initially allocated for 8,000 to 9,000 homes, but with planning applications received for up to 11,000 homes in total. Looking further ahead, the Combined Authority is developing a non-statutory strategic spatial framework for 100,000 quality new homes and more than 90,000 additional jobs, signposting how the area might grow to 2050 in a sustainable and inclusive manner. Within this spatial framework, the A10 is one of ten corridors of particular importance in terms of the Combined Authority area's connectivity and economic growth.

Cambridgeshire County Council as the local highway authority has long adopted a strong sustainable transport policy to manage and mitigate the effects of new development. Major employment growth in the City's Northern Fringe East and the first phases of homes at Waterbeach New Town can be accommodated through a further step change in multi-modal transport provision, transport trip budgets and modest junction improvements to minimise car use.

The Combined Authority, Greater Cambridge Partnership and developers are actively developing plans for a suite of multi-modal transport provision within the corridor. However, the Ely to Cambridge Transport Study (2018) concluded that potential schemes such as the Cambridgeshire Autonomous Metro, Greenways and Waterbeach station improvements will only go so far before long standing issues with the A10 corridor restrict the full delivery of Waterbeach New Town and productivity gains for the Cambridge economy. These long-standing issues include.

- Peak time congestion with consequent impacts on emissions and the productivity of workers and businesses
- Unreliable Journey times for cars, goods vehicles and local buses
- Road safety problems
- Rat-running on parallel routes such as the B1047, B1049 and B1050
- Community severance in villages alongside the A10 and these parallel routes
- Lack of parallel segregated route for cyclists.

The Combined Authority through its Local Transport Plan is planning for targeted highway improvements to provide additional capacity for essential highway trips where major population growth is expected, complementing the planned sustainable transport investment. This has resulted in the development of this Option Assessment Report (OAR) for the A10 Corridor.

Option generation and sifting

The previous Ely to Cambridge Transport Study (2018) assessed measures aimed at encouraging a shift from car use to public transport, walking and cycling. It then assessed junction improvements and a dual carriageway upgrade alongside these mode shift measures. The Study concluded that both mode shift measures and highway improvements were needed to solve the problems on the A10 Corridor, with the potential for both short and longer-term interventions. Later in 2018 Cambridgeshire County Council examined the need and form of junction improvements on the corridor in more detail, leading to a short list of junctions and designs for inclusion in a junctions package.

The Combined Authority used information from the pre-SOBC and the subsequent Junctions Assessment Report to submit two pre-SOBC proforma to England's Economic Heartland and Department for Transport in July 2019:

- Junction improvements – Major Road Network funding
- Dualling improvements – Large Local Major funding.

The Chancellor announced on 11 March 2020 that junction improvements had been identified for further development. The Combined Authority has discussed both projects with the DfT since this announcement making it clear that the purpose of this OAR is to further develop the case for junction and / or carriageway

capacity upgrades to the A10 as part of a robust approach to option assessment and appraisal. In doing so we have considered the wider package of measures already planned, and how an improved A10 could also complement the CAM and Greenways projects in development (i.e. by facilitating future extension and / or access) and climate change, biodiversity and sustainable transport policies in development or in existence.

Consequently, we have applied a proportionate option assessment approach, with increasing detail at each stage.

1. An initial 'very long list' of options was generated and informed by environmental constraints mapping and plausible engineering solutions, resulting in 78 options.

2. A review of the 'very long list' was undertaken to determine those options that are feasible, deliverable and affordable. This resulted in a 'long list' of 24 options.

3. The 'long list' options were scored and ranked by the project team using multi criteria assessment principles. This quantified how each option contributed to the project's objectives and other relevant impacts, such as safety, environment, social, alongside compatibility with public transport, walking, cycling, horse riding provision. This resulted in a 'short list' of 7 options.

The Strategic Outline Business Case appraises the 'short list' in further detail in terms of:

- Alignment with the Government's MRN objectives
- Transport impacts – using a transport model developed for the study area
- Environmental impacts
- Economic impacts
- Social impacts
- Overall value for money.

1. Introduction

1.1 Document purpose

Jacobs is working with the Cambridgeshire and Peterborough Combined Authority (CPCA) to develop the case for improvements to the A10 corridor between Cambridge and Ely that meet identified problems, realise potential opportunities and can be delivered in the short to medium term.

An Option Assessment Report (OAR) is required to describe current and future issues in the study area, the consequent need for interventions, the objectives of respective transport measures, and the option assessment history of the A10 corridor. In line with the Department for Transport's option development process (Figure 2). this document first outlines the policy context, current situation and future situation in the study area, helping to identify the need for intervention and the intervention specific objectives and geographical area of interest. It then describes the approach to generate options and sift from a very long list to develop a short list for appraisal and public consultation. The OAR should be seen as a live document with further updates as the project progresses.

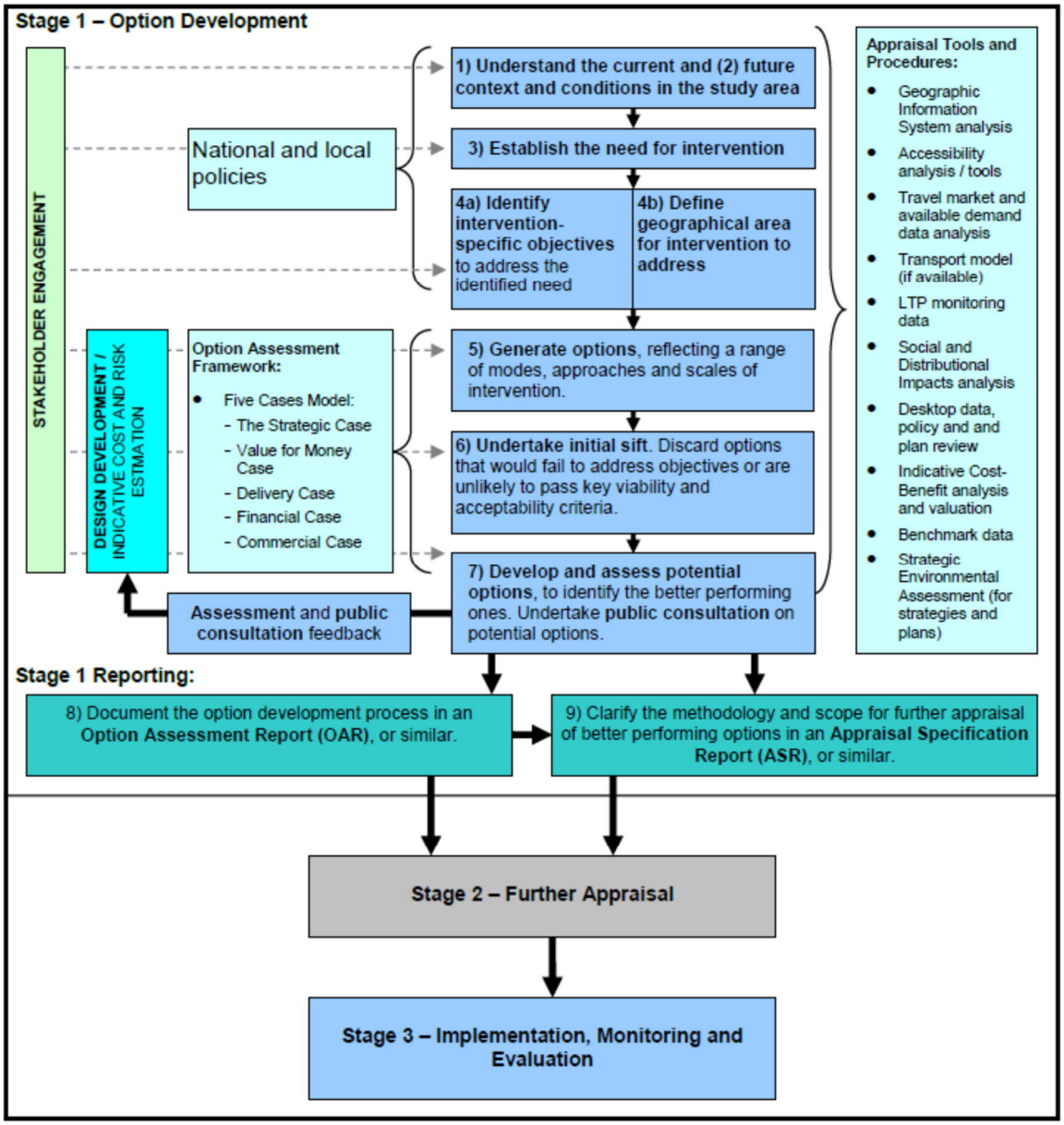


Figure 2. Option development stages

1.2 Location

Figure 3 shows the A10 corridor, with the study area highlighted in red. The A10 corridor between Cambridge and Ely is a primary route in the Greater Cambridgeshire area, used by local traffic, public transport, agricultural vehicles and long-distance traffic including freight. The single carriageway road forms part of the direct route between London (via the M11 and A14), Cambridge and King's Lynn, with the road providing onward connections to the Strategic Road Network (A47 and A17) and primary routes (A142, A1122 and A148) within Cambridgeshire and Norfolk. The route provides connectivity between local communities including Milton, Landbeach, Waterbeach, Stretham and Little Thetford, and centres of employment such as the Cambridge Science Park and Cambridge Research Park. It also connects with locally important east-west routes such as the A1123 between Fordham, Haddenham and St. Ives. Secondary B-roads (B1049 and B1050) provide additional north-south links and an alternative to the busy A10.

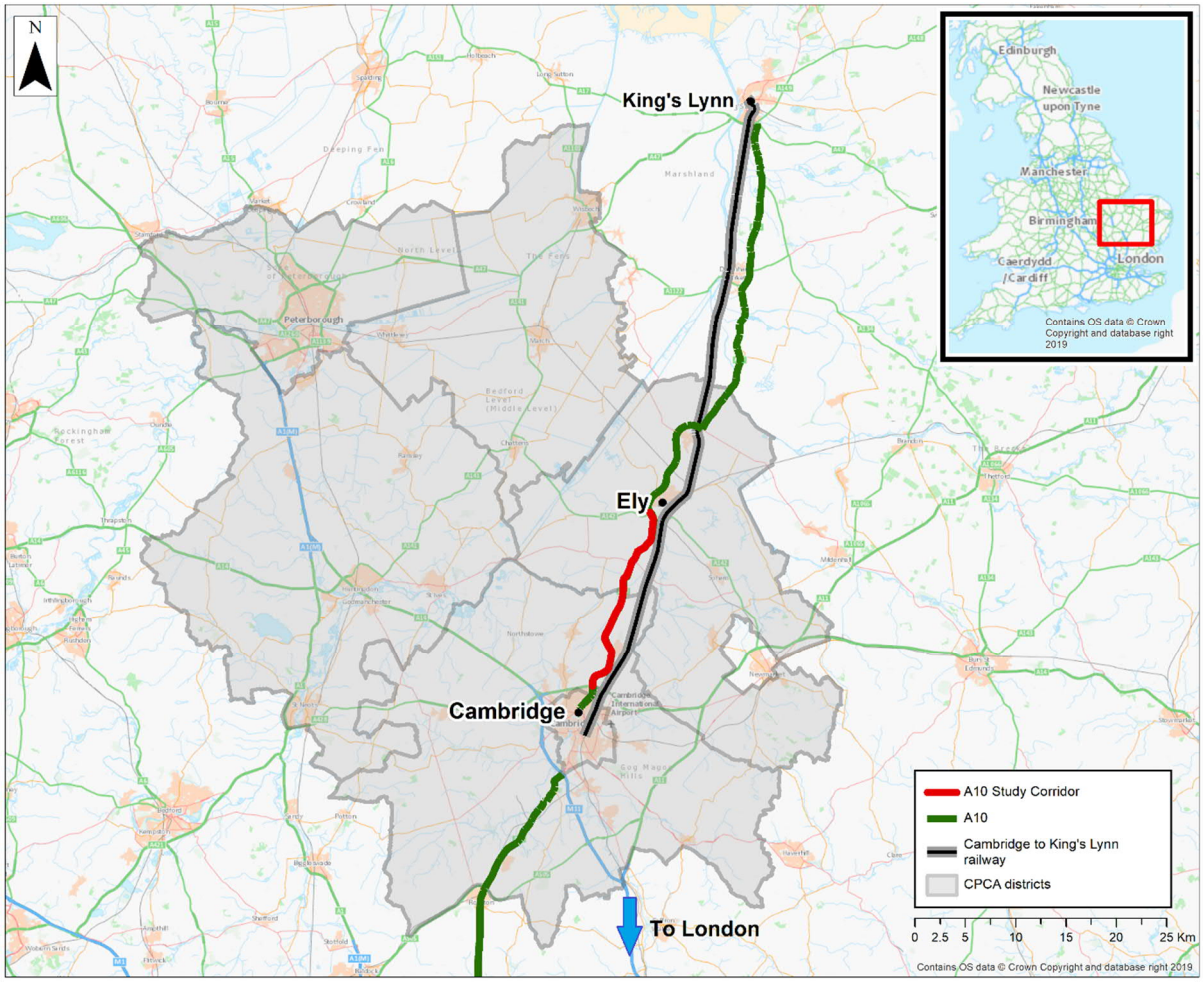


Figure 3. A10 Corridor study area

1.3 The Ely to Cambridge Transport Study

A series of interrelated studies have been undertaken within the North East Cambridge area and Cambridge – Waterbeach – Ely corridor since 2017, analysing baseline conditions, major components of growth, and the overall corridor. In 2018, Cambridgeshire County Council and its advisors developed an initial business case for the A10 corridor itself, undertaking a Preliminary Strategic Outline Business Case (SOBC) stage in order to set out the strategic case and high-level value for money and deliverability of a range of interventions.

Figure 4 presents an overview of interconnections between the three strands of the Ely to Cambridge Transport Study: Strand 1 is the options study and preliminary SOBC for the overall package of interventions in the Ely-

Cambridge study area; Strand 2 is the transport study for the development of Waterbeach New Town; and Strand 3 is the transport study for Cambridge Northern Fringe East and Cambridge Science Park.

The Ely to Cambridge Transport Study recommended a joined-up strategy across three types of measure, with this approach assessed through the preliminary SOBC:

- Policy planning and regulation – securing funding for improvements, managing demand, contributions from developers, monitor and review.
- Multi-modal quick wins – non-car measures and parking restraint, cycle measures, public transport corridor.
- Longer term highway interventions – junction improvements and carriageway capacity upgrades.

This approach enables development at Cambridge Northern Fringe East, Cambridge Science Park and the first phase of homes at Waterbeach New Town to be progressed without improvements to the A10, except for minor junction improvements which are committed through developer contributions. Any further development at Waterbeach beyond these first phases would be dependent on the A10 or alternative measures.

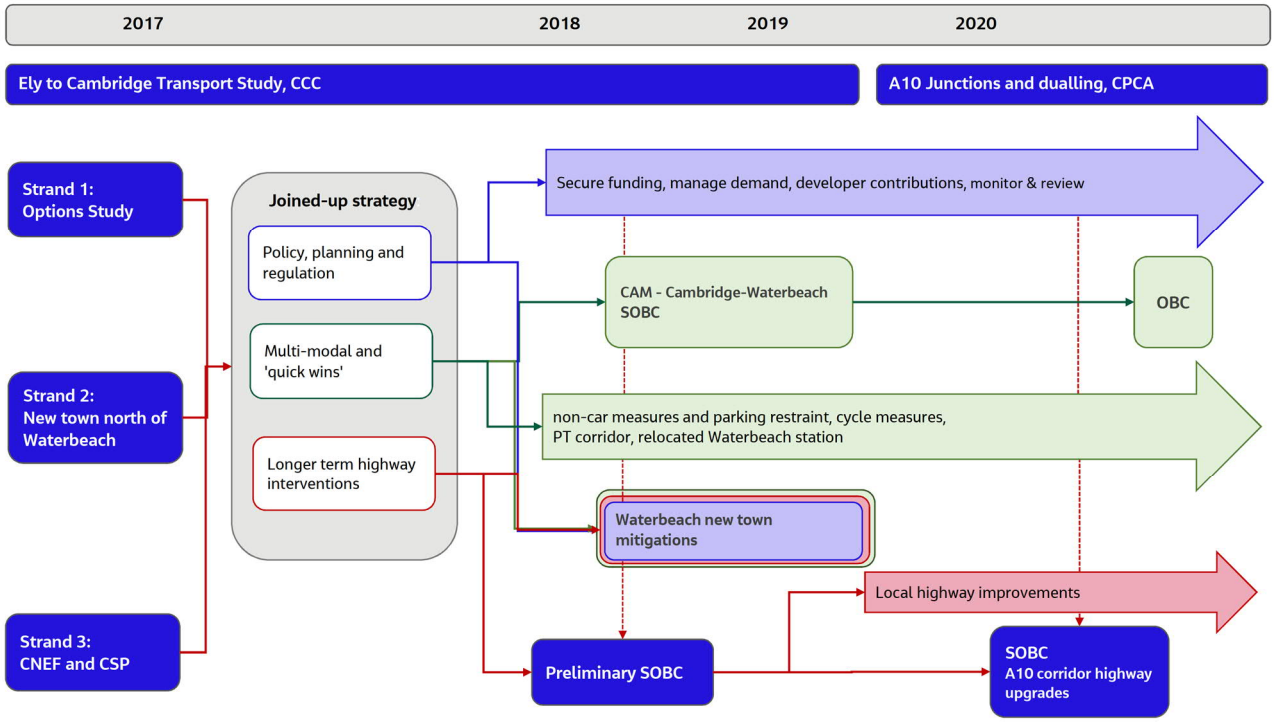


Figure 4. Joined up strategy for the A10 Corridor

1.4 Waterbeach New Town

The spatial strategy for growth at Waterbeach New Town was examined and adopted as part of the South Cambridgeshire Local Plan 2018. In addition, South Cambridgeshire District Council has prepared a Supplementary Planning Document, which was adopted in February 2019 to assist in delivering the objectives as set out in Policy SS/6: Waterbeach New Town, with this a material consideration in the planning applications that follow.[1]

The Waterbeach New Town site comprises a former military barracks and airfield (about two thirds of the site area) and agricultural land. The former military base falls under the ownership of the Ministry of Defence Infrastructure Organisation (D.I.O) and is being promoted for development by Urban & Civic (U&C). Land to the

[1] https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/waterbeach-new-town-spd/

east is held in a Trust that pulls together the individual areas and involves a joint venture led by Turnstone Estates with St John's College and Royal London Asset Management and is known as RLW Estates.

During 2017-18, South Cambridgeshire District Council received three planning applications for the development of Waterbeach New Town, totalling up to 11,000 homes:

- An outline planning application (0559/17/OL) for up to 6,500 dwellings and associated other uses and infrastructure, received in February 2017 from Urban & Civic. This was approved in September 2019.
- A full planning application (0791/18/FL) for the proposed relocation of Waterbeach railway station, received in 2018 from RLW Estates. This was approved in January 2020.
- An outline application (2075/18/OL) for up to 4,500 dwellings and associated other uses and infrastructure, received in May 2018 from RLW Estates. No decision has been made at the time of writing.

As part of the planning process South Cambridgeshire District Council and CCC have been working with the developers to agree development mitigation and trigger points arising from their respective first phases of development. In accordance with the Ely to Cambridge Transport Study findings, this has included mode shift and local highway infrastructure as presented in Table 1. Improvements to the A10 would be needed to release further housing phases.

Table 1: Waterbeach New Town Mitigations

Development	Mitigation	Trigger Points
Urban & Civic (Phase 1, 1600 dwellings)	Local Buses, Quick win junction improvements and trip budget monitoring	First homes
	Mere Way Cycle Route and Bridge over the A10	150 homes
	Link Road to new station	900 homes
	Further junction upgrades depending on monitoring results	1,600 homes
RLW (Phase 1, 800 dwellings)	Re-located Waterbeach railway station 200 Park and Ride Spaces Contribution to Cambridge to Waterbeach Greenway	200 homes

1.5 Progressing other findings of the Ely to Cambridge Transport Study

Since the publication of the Ely to Cambridge Transport Study, the Combined Authority, Greater Cambridge Partnership (GCP) and CCC have been working together and with other project partners to progress other elements.

The Combined Authority and GCP have been developing plans for the Cambridge Autonomous Metro (CAM) and Greenways. CAM is a proposed metro network that aims to connect Cambridge City Centre, key rail stations, major city fringe employment site and key "satellite" growth areas. This includes a branch from Cambridge North station to Waterbeach. Public consultation on CAM was launched on 21 February 2020, after the Secretary of State for Transport granted permission for the development of an Outline Business Case for CAM on August 2019.

The Greenways project aims to create a network of sustainable walking, cycling and equestrian routes connecting surrounding villages and towns to Cambridge within a ten-mile radius from the city. Twelve routes are currently proposed, including a route from Cambridge to Waterbeach, which was subject to consultation in 2019.

Highways England, the Combined Authority and CCC have agreed to develop a working group to examine potential issues and solutions associated with the A14/A10 Milton Interchange, separately from the scope of this project.

As previously noted, the Combined Authority and partners have funded Network Rail to develop are developing a SOBC to make the case for investment to increase the number of train paths through Ely to accommodate medium and long-term growth in freight and passenger services.

The transport planning undertaken for Waterbeach New Town and the Ely to Cambridge corridor as a whole indicates that the up front and early investment in modal shift and local highway improvements can only go so far before further highway investment is needed to unlock growth. The Combined Authority used information from the pre-SOBC and a subsequent Junctions Assessment Report undertaken by CCC to submit two pre-SOBC proforma to England's Economic Heartland and Department for Transport in July 2019:

- Junction improvements – Major Road Network funding
- Dualling improvements – Large Local Major funding.

The Chancellor announced on 11 March 2020 that junction improvements had been identified for further development. The Combined Authority has discussed both projects with the DfT since this announcement making it clear that the purpose of the SOBC is to further develop the case for junction and / or carriageway capacity upgrades to the A10 as part of a robust approach to option assessment and appraisal. In doing so it considers the wider package of measures already planned, and how an improved A10 could also complement the CAM and Greenways projects in development (i.e. by facilitating future extension and / or access) and climate change, biodiversity and sustainable transport policies in development or in existence

The SOBC and OAR set out the need for intervention and how this will further Government's, the Combined Authority's and relevant statutory stakeholders' aims and objectives (the strategic fit). It provides suggested or preferred ways forward and presents the evidence for a decision to further develop the project to an Outline Business Case (OBC).

1.6 Contents

The rest of the OAR covers the following chapters in turn:

- Section 2. Policy context
- Section 3. Current situation
- Section 4. Future situation
- Section 5. Need for intervention
- Section 6. Scheme objectives
- Section 7. Geographical area of impact
- Section 8. Option development and assessment
- Section 9. Conclusion and next steps.

1.7 Limitation Statement

The document should be read in full, with no excerpts to be representative of the findings. It has been prepared exclusively for the Cambridgeshire & Peterborough Combined Authority and key stakeholders such as Cambridgeshire County Council, Greater Cambridge Partnership, East Cambridgeshire District Council, South Cambridgeshire District Council, Cambridge City Council, Highways England and Department for Transport and no liability is accepted for any use or reliance on the report by third parties.

2. Policy context

This section provides a high-level overview of relevant national transport policy, wider national policy, regional (England's Economic Heartland), Cambridgeshire & Peterborough Combined Authority, Cambridgeshire County Council and local planning authority policies as a context for this project.

2.1 National Transport Policy

The development of strategic transport policy at a regional level, and the future delivery of transport infrastructure and behavioural change initiatives, is strongly influenced by the Department for Transport's (DfT) Transport Investment Strategy (TIS)[2]. This advocates the need to develop 'balanced growth' across the country, by 'creating a more reliable, less congested, and better-connected transport network that works for the users who rely on it; building a stronger, more balanced economy by enhancing productivity and responding to local growth priorities and supporting the creation of new housing'.

Key objectives of the TIS include:

- To create a more reliable, less congested, and better-connected transport network that works for the users who rely on it. The TIS notes UK transport systems are ageing and are facing increasing demands. In many places, the current transport network does not provide the right levels of connectivity for people and business.
- To build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities. The TIS notes the UK's national productivity lags behind other G7 countries and sees transport as one way of boosting productivity. It is also acknowledged that prosperity has not been shared evenly between different places, leaving some communities feeling left behind.
- To enhance the UK's global competitiveness by making Britain a more attractive place to trade and invest. Britain is globally renowned as a leader in Research and Innovation, and Scientific fields. Foreign investment in these areas is significant and relies upon good national and international transport links. Retaining the UK's pre-eminence in these areas will require continued investment in the transport network, enhancing "city clusters" and "international connectivity". The TIS therefore views transport as a means of attracting job-creating investment, leveraging the UK's industrial strengths and enabling it to trade with partners with a few frictions as possible.
- To support the creation of new housing. Building on the Government's Housing White Paper (see below) the TIS acknowledges parts of the UK face a significant challenge to provide the houses that people need in the places they wish to live.

Following on from the TIS, the DfT consulted on proposals to create a Major Road Network (MRN)[3] in 2017/18. Building on the work of the Rees Jeffrey Road Fund report – A Major Road Network for England. Government noted that there was strong support for the concept of the MRN and its central policy objectives to achieve the aims of the TIS.

The idea of the MRN is that it will form a middle tier of the country's busiest and most economically important local authority 'A' roads, sitting between the national Strategic Road Network (SRN) i.e. the nation's motorways and major A roads (e.g. A14, A47), and the rest of the local road network. The primary goals of the MRN align strongly with the TIS, namely:

- Reduce congestion
- Support economic growth and rebalancing
- Support housing delivery

[2] DfT (2017) Transport Investment Strategy: Moving Britain Ahead, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/624990/transport-investment-strategy-web.pdf, accessed June 2020

[3] DfT (2018) Creation of the Major Road Network: Government Response.

- Support all road users
- Support the Strategic Road Network (SRN).

The A10 between Cambridge and King's Lynn has been included in the MRN, in recognition of its role in regional connectivity and the economy. From the strategic point of view, improving the A10 will increase the resilience of the MRN. It will also help to cope with the significant long-term effects that the government-proposed Oxford-Cambridge Arc development would be expected to have on the transport market in Cambridgeshire and is consistent with the objectives of England's Economic Heartland (EEH). The A10 Junctions and Dualling scheme will help to achieve Government MRN goals by:

- Reducing congestion on the A10 and parallel routes.
- Improve connectivity between Cambridge and the Fens economic areas, and ultimately with the port of King's Lynn, helping to spread economic growth along the corridor.
- Supporting economic growth and improved productivity in the nationally important Greater Cambridge economy region by providing the infrastructure to unlocking significant housing at Waterbeach New Town, helping to address the housing demand issue that is critical for a growing economy.
- Supporting all road users, by enabling better integration of existing and new developments by walking, cycling and public transport through the dedicated provision for active modes.
- Providing a more resilient network that provides an improved connection between Cambridge and Ely, as well as providing users with alternative routes to the SRN (i.e. A11, A14 and then either A142, A1101 or A1065) for journeys between the M11 Junction 9 and East Cambridgeshire and West Norfolk.

In June 2019, the Government became the first global economy to pass a law that requires the country to achieve "net zero" greenhouse gas (GHG) emissions by 2050. Transport has been identified as an area to play a huge role in the economy reaching net zero. During the recent months the Government has been working closely with the transport sector to develop a comprehensive plan of actions; the Transport Decarbonisation Plan (TDP)[4]. The final plan is expected to be published in Autumn 2020 and will be fully considered during the next stage of this business case. At this stage, a carbon assessment has been undertaken as part of the options appraisal. At the following stage of the business case, once the preferred option has been selected and preliminary design undertaken a baseline carbon calculation will be completed. This will provide the basis against which carbon reductions can be evaluated and this would be linked into the overarching carbon management plan and CEEQUAL criteria. Longer term the project aims to implement PAS 2080.

2.2 Wider National Policy

MHCLG – Fixing our Broken Housing Market – White Paper (2017)[5]

- The White Paper recognises that housing is becoming increasingly unaffordable and as a nation we need build more homes to slow the rise in housing costs: "We need to build many more houses, of the type people want to live in, in the places they want to live. To do so requires a comprehensive approach that tackles failure at every point in the system."
- This means amongst other things providing more land for homes where people want to live (places such as Greater Cambridge), and building homes faster. "Development is about far more than just building homes. Communities need roads, rail links, schools, shops, GP surgeries, parks, playgrounds and a sustainable natural environment. Without the right infrastructure, no new community will thrive."

Whilst housing within the region's Local Plans can be delivered and successfully mitigated by policy and infrastructure measures to the mid to late 2020s (e.g. Cambridgeshire Autonomous Metro, Greenways, public transport), and developer contributions for modest highway infrastructure upgrades, it is recognised that the delivery of long-term growth up to 11,000 homes at Waterbeach New Town – a key component of South

[4] https://www.gov.uk/government/publications/creating-the-transport-decarbonisation-plan
[5] MHCLG (2017) Fixing our Broken Housing Market, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590464/Fixing_our_broken_housing_market_-_print_ready_version.pdf, accessed May 2020

Cambridgeshire's Local Plan on the A10 corridor requires a step change in capacity on the A10 through either junction or dualling upgrades. Allocations such as this within South Cambridgeshire's Local Plan are key to helping to meet Cambridge's housing need and provide the space for people to live to contribute to Cambridge's growing and nationally important economy.

BEIS – Industrial Strategy[6]

The Industrial Strategy sets out a vision for the future economy and the government strategy to boost the productivity, earning power and quality of the life of the British people. The Industrial Strategy sets out Grand Challenges to put the UK at the forefront of the industries of the future, ensuring that the UK takes advantage of major global changes, improving people's lives and the country's productivity. These include: artificial intelligence and data, ageing society, clean growth and the future of mobility.

The Industrial Strategy recognises the value of the Cambridge economy to the UK in many ways and through initiatives such as the wider Oxford – Milton Keynes – Cambridge Arc even greater growth can be achieved. Key research clusters associated with science and technology are well adept at attracting inward investment with the spin off benefits for the wider local economy in terms of job creation and benefits to society. Cambridge businesses and thought leadership is well suited to helping address the Grand Challenges.

However, other research discussed below demonstrates that the economy can only grow so much more before "growing pains" affect the ability of firms to source the local labour they need and be as productive in Cambridge as they could be in another country. Investment in infrastructure on corridors such as the A10 to expand the local labour supply through the housing unlocked is crucial to enabling Greater Cambridge to help meet the Government's aspirations for its Industrial Strategy.

BEIS – Clean Growth Strategy[7]

As noted above, Clean Growth is an integral component of the Government's Industrial Strategy. The Clean Growth Strategy sets out the actions the government is taking to put clean growth at the centre of UK modern Industrial Strategy (e.g. changing the way houses are heated, cars are powered, electricity grid is run). Clean Growth means growing our national income while cutting greenhouse gas emissions, and the strategy recognises transport is one of the sectors where we need to see the greatest progress, both through technological breakthroughs and large-scale deployment.

The intent of this project is more than just providing additional highway capacity on the A10. It is part of a wider package of measures that has first considered modal shift and sustainable transport measures, with additional highway capacity as the next step. In addition, the project provides an opportunity for Low Carbon transport infrastructure (such as a parallel walking and cycling route and potentially electric vehicle charging infrastructure as the vehicle fleet becomes increasingly electric based) to be incorporated into the design as it develops. These measures will assist the government to achieve their target of 24% reduction in UK transport emissions.

2.3 Regional

England's Economic Heartland (EEH) is a partnership of councils and local enterprise partnerships which stretches from Swindon to Cambridgeshire and from Northamptonshire to Hertfordshire. The EEH partnership covers a wider geographic area than the defined 'Oxford-Milton Keynes – Cambridge Arc' reflecting the nature of connectivity in the region.

[6] BEIS (2017) The UK's Industrial Strategy, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf, accessed May 2020

[7] BEIS (2017) Clean Growth Strategy, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf, accessed May 2020

EEH consulted on their Outline Transport Strategy[8] in 2019. This outlined that their approach to improving connectivity will be shaped by three factors:

- Local connectivity – ensuring that connectivity offers convenient, attractive and safe choices for movement and supports the underpinning principles of being active and inclusive
- Freight and logistics – the continued success and growth of our economy will be dependent upon our businesses having access to labour and access to markets
- National/international connectivity – ensuring that connections beyond the region operate as a system, one that aligns with the strategies of our neighbouring regions.

Following feedback on the Outline Transport Strategy and in response to the current Coronavirus pandemic, EEH has further developed its thinking on areas such as decarbonisation – through a reduction in single occupancy car journeys, smart digitally enabled corridors such as an east-west spine, and the need for low carbon alternative travel choices such as greenways for walking and cycling.[9]

As part of their role, EEH reviewed and endorsed where appropriate a series of Major Road Network and Large Local Majors funding bids to the DfT in summer 2019. Both the A10 Junctions and Dualling Package Pre- SOBC proformas prepared by the CPCA were endorsed by EEH, recognising the role of the A10 to the region. The A10 project has incorporated thinking on carbon, walking and cycling and digital connectivity in to initial design thinking, with this to be developed further as the design develops to Outline Business Case stage.

The Cambridge and Peterborough Local Industrial Strategy[10] is one of a family of four linked strategies covering the Oxford-Cambridge Arc, with the other strategies covering Oxfordshire, Buckinghamshire and the South East Midlands. It considers the wider economic context and identifies those priorities within each Local Industrial Strategy (LIS) which can be developed at scale across the Arc, complementing the specific Cambridgeshire and Peterborough strategic objectives which sit at the heart of the Cambridge and Peterborough LIS. The LIS also recognises the existence of 3 different sub-economies in the area: Greater Cambridge, Greater Peterborough and The Fens, with each one being unique and facing its own opportunities and challenges. Therefore, while the overall goal is the same: an inclusive, prosperous and productive economy, each sub-economy will tackle different challenges and opportunities. The LIS states that the full economic potential of the region can only be realised by identifying diverse strengths – from Peterborough's rapid growth, Cambridge's global research strengths, and The Fens' innovative micro and agricultural businesses and working to tie them together.

The LIS' development was informed by business engagement. Through this exercise it was commonly agreed that poor infrastructure is hampering growth and is set to increase as a problem over the next decade, if nothing is done. The Local Industrial Strategy maintains that sustaining and de-risking the area's full potential for economic growth relies on transforming the transport, housing and infrastructure capacity in Greater Cambridge and improving the transport system for market towns. Improving connectivity is vital if recent growth is not to stall and will contribute to addressing the Future of Mobility Grand Challenge.

[8] EEH (2019) Outline Transport Strategy, http://www.englandseconomicheartland.com/Documents/Agenda%20Item%205a%20Outline%20Transport%20Strategy%20Annex%20A.pdf, accessed June 2020

[9] EEH (2020), Strategic Transport Forum 19 June 2020 – Agenda Item 4 – Draft Transport Strategy, http://www.englandseconomicheartland.com/Documents/Agenda%20Item%204%20Draft%20Transport%20Strategy.pdf accessed 19 June 2020

[10] CPCA (2019) The Cambridge and Peterborough Local Industrial Strategy, https://www.gov.uk/government/publications/oxford-cambridge-arc-local-industrial-strategies/cambridgeshire-and-peterborough-local-industrial-strategy, accessed June 2020

2.4 Combined Authority and County Council policy

The Combined Authority forms the regional body responsible for devolved powers from Central Government. The Devolution Deal[11] sets out key ambitions for the Combined Authority, including:

- Doubling the size of the local economy and Gross Value Added (GVA) over 25 years;
- Accelerating house delivery to meet local and UK needs, with 72,000 new homes across the Combined Authority area by 2032[12];
- Delivering outstanding and much needed connectivity in terms of transport and digital links;
- Investing in skills, and providing the UK's most technically-skilled workforce;
- Transforming public service delivery to be much more seamless and responsive to local need;
- Boosting the region's international recognition for its knowledge-based economy, including in life sciences and information and communication technologies; and
- Improving local quality-of-life by tackling areas suffering from deprivation.

Figure 5 summarises the overarching context of CPCA policy and how its Ambition Statement has influenced the development of its Business Plan[13], strategy development and resulting suite of priority schemes to realise its ambition. This includes improvements to the A10.

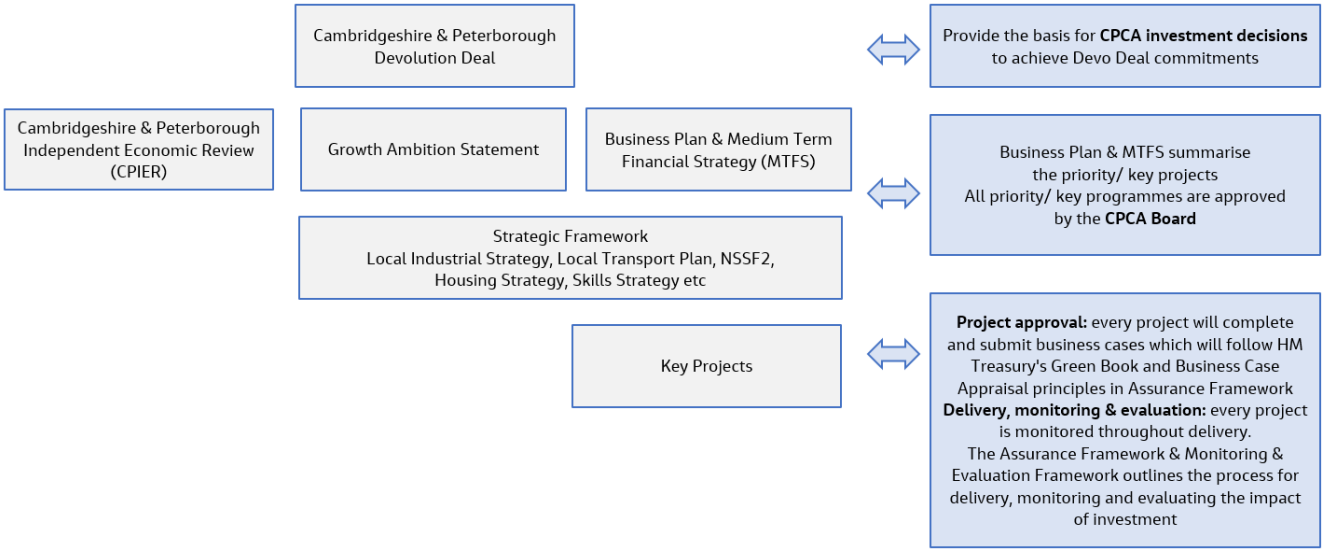


Figure 5. CPCA Policy Context

The Combined Authority has an ambitious vision to build further on the region's transformational economic success over the last two decades – termed the 'Cambridge Phenomenon'. More than 33,500 new homes and 44,000 jobs are planned by 2030, with the potential, highlighted by the National Infrastructure Commission (NIC)[14] and supported by the Government[15], for significant growth beyond this. The Combined Authority and its

[11] Multiple Authors (2017) Cambridgeshire and Peterborough Devolution Deal, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600239/Cambridgeshire_and_Peterborough_Devolution_Deal.pdf, accessed June 2020

[12] CPCA (2019) Combined Authority Business Plan 2019-2020, https://cambridgeshirepeterborough-ca.gov.uk/assets/Uploads/CPCA-Business-Plan-2019-20-dps.pdf, accessed June 2020

[13] Combined Authority Business Plan 2019-2020

[14] NIC (2017) Partnering for Prosperity: A new deal for the Cambridge-Milton Keynes-Oxford Arc, https://www.nic.org.uk/wp-content/uploads/Partnering-for-Prosperty.pdf, accessed June 2020

[15] Government response to "Partnering for Prosperity: a new deal for the Cambridge-Milton Keynes-Oxford Arc" https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/752040/Government_response_to_Partnering_for_Prosperity_a_new_deal_for_the_Cambridge-Milton__Keynes_Oxford_Arc.pdf, accessed June 2020

partners hold a strong ambition to double the size of its economy over the next 25 years, yet realising the true potential needs sustained investment to remove current limits to growth.

The Combined Authority established the Cambridgeshire and Peterborough Independent Economic Commission in June 2017 to provide a robust and independent assessment of the Combined Authority area economy and its potential for growth. A key message from its Independent Economic Review study (CPIER)[16], published in September 2018, is that its successful local economy is of national significance, but its future success will only be achieved through careful prioritisation of infrastructure projects.

The Local Industrial Strategy (LIS) is one of a family of four linked strategies covering the Oxford – Milton Keynes – Cambridge corridor that have since been developed. The LIS recognises the existence of three different sub-economies in the area: Greater Cambridge, Greater Peterborough and The Fens, with each one being unique and facing its own opportunities and challenges. Therefore, while the overall goal is the same: an inclusive, prosperous and productive economy, each sub-economy will tackle different challenges and opportunities. that have since been developed. The LIS recognises the existence of three different sub-economies in the area: Greater Cambridge, Greater Peterborough and The Fens, with each one being unique and facing its own opportunities and challenges. Therefore, while the overall goal is the same: an inclusive, prosperous and productive economy, each sub-economy will tackle different challenges and opportunities.

The LIS states that the full economic potential of the region can only be realised by identifying diverse strengths – from Peterborough's rapid growth, Cambridge's global research strengths, and The Fens' innovative micro and agricultural businesses and working to tie them together. The LIS maintains that sustaining and de-risking the area's full potential for economic growth relies on transforming the transport, housing and infrastructure capacity in Greater Cambridge and improving the transport system for market towns. Improving connectivity is vital if recent growth is not to stall and will contribute to addressing the Future of Mobility Grand Challenge set by Government.

The Combined Authority sets out through its Strategic Spatial Framework (non-statutory)[17] the imperative and its approach to accelerating housing delivery and transforming transport connectivity to unlock constraints on growth and realise the ambition to double the area's economic output. Similarly, the National Infrastructure Commission highlights the unrivalled economic potential of the Oxford – Milton Keynes - Cambridge corridor, but stress that poor transport connectivity and the slow rate of housing delivery places future growth at risk.

Greater Cambridge's transport infrastructure currently acts to constrain growth, which must be overcome if the region is to fulfil its stated ambitions for sustainable long-term growth. Cambridge's high-tech, high-skill economy also relies heavily on the productivity benefits that come from close proximity to one another (agglomeration benefits), and firms' ability to recruit workers across a wider labour market.

If Cambridge is to continue to grow, businesses within the 'Cambridge cluster' must be able to locate across a wider geography, yet still benefit from easy access to the region's innovative, skilled workforce and from close proximity to each other. Growth in 'satellite' communities at Cambourne, Bourn, Northstowe and Waterbeach, and in market towns such as Ely and Huntingdon, have the potential to spread the benefits of Cambridge's success across the wider region, tackling local deprivation and deliver tens of thousands of additional homes, but are predicated on significantly improved transport accessibility.

The Housing Strategy[18] builds on the Strategic Framework. It notes that whilst the region as a whole has a strong and growing economy, its housing markets are not providing enough new housing, and sufficient affordable housing across all tenures. Consequently, the CPCA has ambitious targets for housing delivery. These are a mix of strategic ambitions – at least 100,000 additional new homes (including at least 40% new affordable homes)

[16] Cambridgeshire and Peterborough Independent Economic Commission (2018), Cambridgeshire and Peterborough Independent Economic Review (CPIER)

[17] CPCA (2018). Cambridgeshire and Peterborough Strategic Spatial Framework (Non Statutory) Towards a Sustainable Growth Strategy to 2050. Available at: https://cambridgeshirepeterborough-ca.gov.uk/assets/Combined-Authority/Combined-Authority-Spatial-Plan.pdf accessed 15 July 2020

[18] CPCA (2018). CPCA Housing Strategy. Available at: https://cambridgeshirepeterborough-ca.gov.uk/assets/Uploads/CPCA-Housing-Strategy-Part1.pdf accessed 15 July 2020

by 2036 – and short term delivery targets of at least 2,000 new affordable homes by 2022, using £100 million of government grant, plus 500 new Council homes in a government grant ring-fenced for Cambridge City Council.

To achieve this ambition the Mayor together with the partner organisations within the Combined Authority has agreed the following strategic response:

- Accelerating housing delivery to support economic growth, which includes integrating transport and housing;
- Creating prosperous places where people want to live – such as Waterbeach New Town; and
- Expanding housing choices to meet a range of housing needs.

As part of the Cambridgeshire and Peterborough Devolution Deal, strategic transport planning powers were transferred to the Combined Authority from Cambridge County Council and Peterborough City Council. Prior to the adoption of a Local Transport Plan (LTP), the Mayor released a transport strategy statement (The Vision for Transport: The Mayor's Interim Transport Strategy Statement, May 2018) which clarified the Combined Authority's transport priorities. The document recognises the Cambridgeshire Autonomous Metro as a key priority, sketching a vision for how it will fit into the future transport network.

The document also outlines several 'Guiding Principles', which set out the broad goals for the region's transport network:

- Economic Growth & Opportunity – Cambridgeshire and Peterborough will seek to connect its workforce with well-paying and lasting jobs, particularly those in key knowledge-intensive sectors.
- Equity – Transport systems will actively address transport and infrastructure gaps across the region, especially those in badly served rural communities, helping all areas to become prosperous.
- Environmental Responsiveness & Sustainability – A network will be developed that encourages active and sustainable travel choices, such as walking, cycling and public transport. The public transport system will be based on green energy and be of high enough quality to encourage users away from the private car.
- Following devolution, the Combined Authority is the Local Transport Authority with strategic supporting powers. Its Cambridgeshire and Peterborough Local Transport Plan (LTP)[19] provides an overview of the area's aims and objectives, its strategies to address challenges and summarises the major transport schemes required to achieve their strategy.
- The LTP sets out the vision, goals and objectives which will define the strategic approach up to 2050, and the policies designed to deliver the objectives. The vision for the Cambridgeshire and Peterborough Combined Authority is "to deliver a world-class transport network for Cambridgeshire and Peterborough that supports sustainable growth and opportunity for all", and this is intended to capture the aspirations for Cambridgeshire and Peterborough's transport network, reflecting future ambition in the county. The LTP goals are intended to outline the wider implications that the Combined Authority want the transport network to achieve in Cambridgeshire and Peterborough. These are:

Cambridgeshire and Peterborough LTP Goals

- Economy: Deliver economic growth and opportunity for all our communities.
- Society: Provide an accessible transport system to ensure everyone can thrive and be healthy.

Environment: Preserve and enhance our built, natural and historic environment and implement measures to achieve net zero carbon.

[19] CPCA (2020). The Cambridgeshire and Peterborough Local Transport Plan, https://cambridgeshirepeterborough-ca.gov.uk/assets/Transport/LTP/CPCA-LTP-WEB250220.pdf, accessed 15 July 2020

Each of the ten objectives of the LTP underpin the delivery of the goals. These are shown below in Table 2.

Table 2. Cambridgeshire and Peterborough Local Transport Plan objectives

Theme	Objectives	
Economy	Housing - Support new housing and development to accommodate a growing population and workforce, and address housing affordability issues	Business and Tourism - Ensure all of our region's businesses and tourist attractions are connected sustainably to our main transport hubs, ports and airports
	Employment - Connect all new and existing communities sustainably so all residents can easily access a good job within 30 minutes by public transport, spreading the region's prosperity	Resilience - Build a transport network that is resilient and adaptive to human and environmental disruption, improving journey time reliability
Society	Safety - Embed a safe systems approach into all planning and transport operations to achieve Vision Zero – zero fatalities or serious injuries	Health and Wellbeing - Provide 'healthy streets' and high quality public realm that puts people first and promotes active lifestyles
	Accessibility - Promote social inclusion through the provision of a sustainable transport network that is affordable and accessible for all	Air Quality - Ensure transport initiatives improve air quality across the region to exceed good practice standards
Environment	Environment - Deliver a transport network that protects and enhances our natural, historic and built environments	Climate Change - Reduce emissions to 'net zero' by 2050 to minimise the impact of transport and travel on climate change

Improvements to the A10 corridor feature within the list of projects referenced in the Devolution Deal, Business Plan, CPIER, Strategic Spatial Framework, Housing Strategy and Local Transport Plan.

Cambridgeshire County Council plans to increase its commitment to dealing with environmental and climate issues by proposing a new strategic object in its business plan of 'reaching a net zero carbon target by 2050'. CCC is working with the Cambridge University Science Policy Exchange (CUSPE) to produce a solid evidence base for reducing carbon across the county as a whole. Proposed in its business plan[20], the council outlines that the objective to support reaching net zero carbon emissions for Cambridgeshire by 2050 is specifically focussed on reducing the carbon footprint of the County Council and the services it delivers to the community. This includes:

- Mitigating carbon emissions from its buildings and fleet vehicles – with a commitment to take all 69 of the buildings it currently owns or occupies off fossil fuel heating by 2023 and to replace all its fleet cars and vans with electric vehicles by 2025.
- Managing changes to infrastructure to manage the risk of significant climate change.
- Looking after Cambridgeshire's air, water and soil to ensure the future health of Cambridgeshire people, flora and fauna.
- Working with communities and businesses to reduce the overall carbon emission across the whole of Cambridgeshire.
- Leading the Cleantech and Agritech changes to demonstrate new technologies and business models that can support this change.

[20] CCC (2020) Plans to make carbon reduction one of council's top strategic objectives, https://www.cambridgeshire.gov.uk/news/plans-to-make-carbon-reduction-one-of-councils-top-strategic-objectives, accessed June 2020

Doubling Nature- A Vision for the Natural Future of Cambridgeshire & Peterborough in 2050 sets out Natural Cambridgeshire's vision that by doubling the area of rich wildlife habitats and natural green-space, Cambridgeshire and Peterborough will become a world-class environment where nature and people thrive, and businesses prosper.

'Natural Cambridgeshire' is the Local Nature Partnership for Cambridgeshire and Peterborough. In 2019, Natural Cambridgeshire released its vision for the Natural Future of Cambridgeshire and Peterborough in 2050. Whilst the region has a number of attractive areas and designated areas for wildlife, the area is also characterised by substantial swathes of farmland with relatively low biodiversity and low tree cover. As one of the driest areas of the country with limited water resources, yet also at risk of surface water and tidal flooding, the area faces significant challenges in securing a sustainable future.

To achieve this vision, Doubling Nature hope to focus efforts to enhance existing, and create new, large areas of rich wildlife habitat and more accessible green space through development, and ensure these are better connected, by:

- Ensuring new housing and work place developments incorporate high quality green and blue infrastructure providing multiple benefits for people and the environment.
- Encouraging at least 25% of existing property owners to incorporate wildlife friendly features in their gardens, buildings and land.
- Securing access to high quality natural green spaces within 300m of everyone's home.
- Enlarging two areas of existing natural fen (Great Fen & Wicken Fen Vision), as the core of a UNESCO Biosphere together with the Nene and Ouse Washes.
- Increasing tree cover and the network of woodlands, hedgerows, within and around our towns and cities, and on the clay lands of South Cambridgeshire, Huntingdonshire and west of Peterborough.
- Expanding the flower-rich grasslands on the limestone plateau west of Peterborough, and on the chalk downs at the southern fringes of Cambridge.
- Enhancing and extending the meadows of the Nene, Ouse and Cam river valleys.
- Extending wetlands either side of the Ouse and Nene Washes.
- Creating natural habitats by restoring mineral workings, including the gravel workings in the Fens.
- Ensuring that at least 90% of our richest wildlife areas are in good ecological condition.

2.5 Local planning policy

Three local planning authorities are of particular interest to the study area, namely Cambridge, South Cambridgeshire and East Cambridgeshire, with a discussion of their local plans provided in turn. It can be seen from this discussion that the delivery of housing growth at Waterbeach and improvements to the A10, whilst providing high quality sustainable transport options is central to the spatial strategy for the corridor.

The Cambridge Local Plan 2018 vision is to deliver sensitive and sustainable growth providing affordable housing and an accessible, compact city from where people can have sustainable choices about how they access work, study, leisure and other services. This vision builds on the city's reputation for design excellence, Cambridge's new development will be innovative and will promote the use of sustainable modes of transport, helping to support the transition to a more environmentally sustainable and successful low carbon economy. The plan sets out how the council will meet the important development needs that must be accommodated, but also how this special city's outstanding heritage and environmental assets are intended to be protected.

The overarching development strategy for the administrative areas of both Cambridge and South Cambridgeshire for the period to 2031 follows a broadly similar sequence for the preferred location of new development as the 2006 strategy, where the preferred approach for new development is: (first) being within the existing urban area of Cambridge; (second) being within the defined fringe sites on the edge of Cambridge;

(third) within the six small scale Green Belt sites proposed to be released from the inner Green Belt boundary; (fourth) within existing and newly identified new settlement locations at Cambourne, Northstowe, Bourn Airfield and Waterbeach; and lastly in identified villages. This approach has been endorsed by the Joint Strategic Transport and Spatial Group (JST&SPG), the member governance group set up to guide the collaborative preparation of development plans in Cambridge and South Cambridgeshire and the associated transport strategy.

The Adopted South Cambridgeshire District Council Local Plan[21] sets out the vision, objectives and development needs for South Cambridgeshire to 2031. The Local Plan has allocated three locations to meet the majority of its housing need to 2031. One of these is Waterbeach New Town on the A10 corridor initially allocated for 8,000 to 9,000 homes. Furthermore, South Cambridgeshire District Council has prepared a Supplementary Planning Document (adopted in February 2019) to assist in delivering the objectives as set out in Policy SS/6: Waterbeach New Town, with this a material consideration in the planning applications that follow.

Policy SS/6 Waterbeach New Town[22] notes in paragraph 4 that the planned allocation "will deliver an example of excellence in sustainable development and healthier living, which will make a significant contribution to the long-term development needs of the Cambridge area. It will deliver high quality public transport links to Cambridge, including a relocated railway station, to enable a high modal share of travel by means other than the car."

Paragraph 11 of Policy SS/6 describes the comprehensive movement network for the New Town, which includes:

- Significant improvements in Public Transport, including a relocated railway station, provision of park and ride site and new segregated bus link into Cambridge
- Measures to Promote Cycling and Walking, from the start of the development including a direct segregated high quality links to north Cambridge, surrounding villages and existing facilities
- Highway Improvements, including the following of relevance:
  - Primary road access from the A10;
  - Additional capacity to meet the forecast road traffic generation of the new town, particularly on the A10 and at the junction with the A14;
  - Measures to mitigate the traffic impact of the new town on surrounding villages.

Subsequent to the adoption of the Local Plan, South Cambridgeshire District Council has received planning applications from the two developers of the Waterbeach New Town site for a total of up to 11,000 homes.[23]

The Transport Strategy for Cambridge and South Cambridgeshire (2014)[24] recognises that to provide major new capacity for local car trips on interurban routes between Cambridge and surrounding towns will increase congestion in Cambridge and those towns. If this congestion is to be minimised, other modes of transport must provide the additional capacity needed. Within this document the A10 was identified as of the key scheme to cater for the demand for car trips associated with the new town at Waterbeach.

The Adopted East Cambridgeshire District Council Local Plan 2015[25] identifies the increase of out-commuting and congestion as a key issue; mentioning the A10 as one of the key roads suffering significant congestion. The Local Plan supports the tackling of these capacity issues through investment in transport infrastructure, and the provision of sustainable travel options, recognising the challenge presented by the rural nature of the district and the dispersed population. The Local Plan's vision for transport includes developing the A10 as a high quality

[21] South Cambridgeshire District Council Local Plan: https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/the-adopted-development-plan/south-cambridgeshire-local-plan-2018/
[22] https://www.scambs.gov.uk/media/12737/4-chapter-3-strategic-sites.pdf
[23] https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/waterbeach-new-town-spd/
[24] https://www.cambridgeshire.gov.uk/residents/travel-roads-and-parking/transport-plans-and-policies/cambridge-city-and-south-cambs-transport-strategy
[25] East Cambridgeshire District Council Plan: https://www.eastcambs.gov.uk/local-development-framework/east-cambridgeshire-local-plan-2015

public transport corridor, and providing better cycling and pedestrian facilities and links, including segregated cycle routes along key routes linking towns and villages.

Policy Growth 3. Infrastructure Requirements includes the following transport initiatives of relevance to this Business Case:

- Dualling of the A10 between A142 Witchford Road and A142 Angel Drove
- Improvements to the junctions of the A14/A142 and A14/A10.
- Capacity and junction improvements to the A10.
- Improved rail and bus services.
- Improvements to pedestrian and cycle networks within settlements and between settlements (including segregated cycle routes with appropriate crossings at key points where possible).

As can be seen from the above, there are ambitious growth plans across Cambridgeshire, with around 72,500 new homes expected to be built by 2031/6. The County Council has worked closely with district and neighbouring authorities to produce a Long Term Transport Strategy[26] to support these areas and keep Cambridgeshire moving. A10 capacity improvements is one of the proposals that feature in this strategy.

[26] https://www.cambridgeshire.gov.uk/residents/travel-roads-and-parking/transport-plans-and-policies/long-term-transport-strategy

3. Current situation

This section of the report sets out the socio-economic, transport and environmental context within the study area to evidence existing problems and opportunities. The key points for each issue are highlighted in "problem / opportunity" call-out boxes throughout the section, designed to draw attention to the issues the scheme assists in solving and the benefits which it can provide.

3.1 Population

Together, the six districts of Cambridgeshire and Peterborough are home to an estimated population of more than 850,000[27], 15% of which reside within the City of Cambridge. Figure 6 presents the current population estimates within each of the Combined Authority's constituent local authority districts.

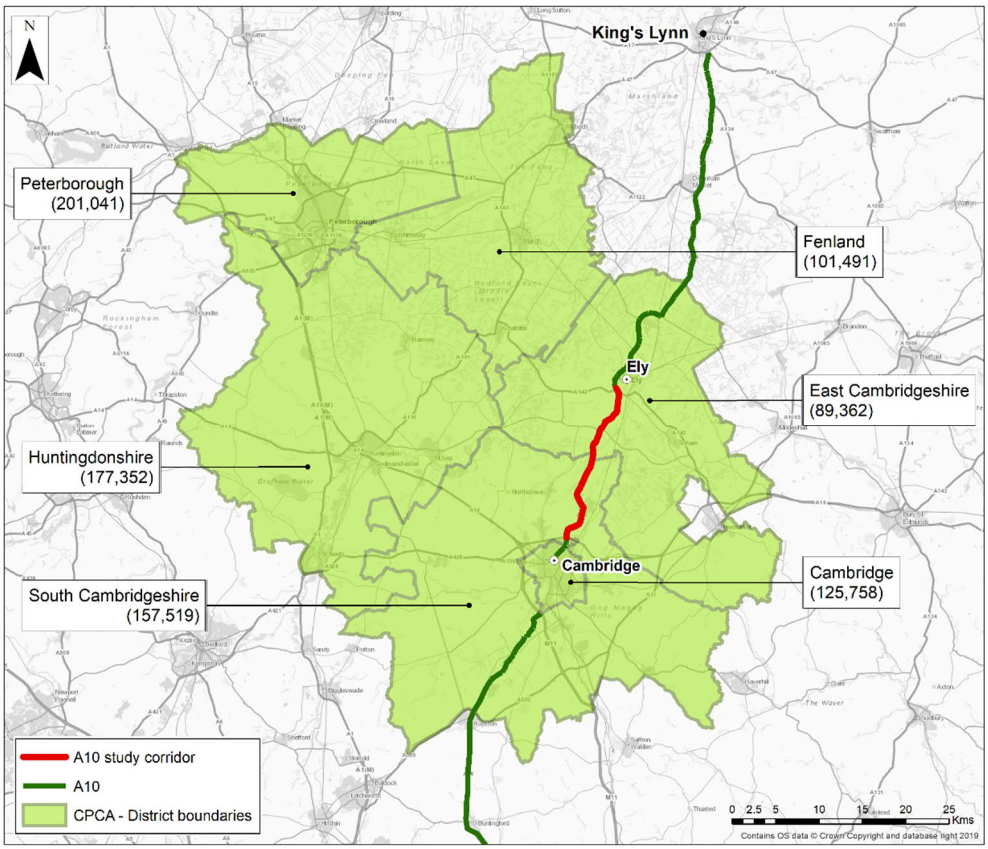


Figure 6. Population and County's district boundaries

Figure 7 presents population growth for locations along the Ely-Cambridge corridor. The northern end of the corridor has seen the highest growth since 2011, with Ely's population having grown by 5.7% from 20,438 inhabitants in 2011 to 21,624 in 2018. The population of the city of Cambridge has increased at a slower rate with an overall increase of 2% between 2011 and 2018, consistent with the constraining effect of the shortage of land within Cambridge. The population of Milton and Waterbeach decreased by around 11% between 2011 and 2013, which can be linked to the announcement of the closure of the Waterbeach Barracks military site in July 2011. The site was a Royal Air Force station from 1966 and then was used by the Royal Engineers until its closure in March 2013. The closure of this site impacted the population of Waterbeach as direct and indirect jobs were lost and people moved to other areas for employment opportunities.

[27] Cambridgeshire Insight (2018) https://cambridgeshireinsight.org.uk/population/report/view/9eb28cf5b5d045d28eeabce7819ba4f6/E47000008/, Accessed 21/05/2020

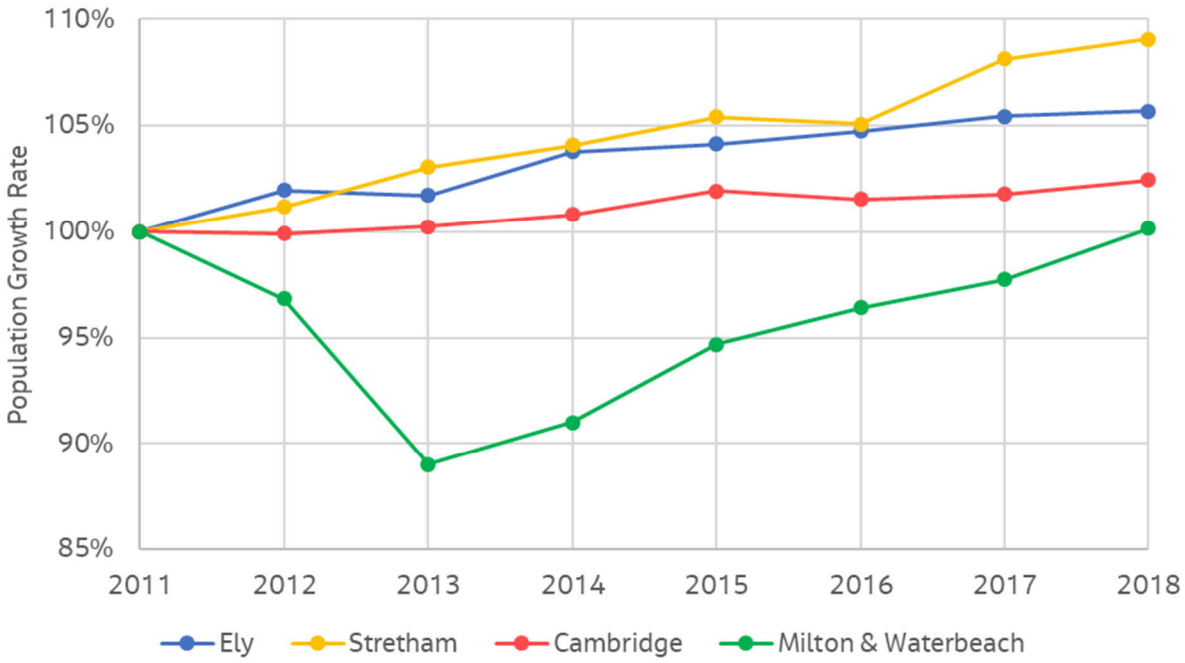


Figure 7. Population growth - index 2011=100%

3.2 Housing affordability and need

3.2.1 Affordability

The delivery of homes in the corridor has failed to keep up with increased demand from the rising population, leading to house prices rising at a faster rate than the national average. The ratio of average house prices to average earnings has more than doubled in England since 1998, making it harder for millions of people to afford their own home.

Over the last two decades, the strong economic performance of the Cambridge area has created many jobs of very high value (with GVA per head around £45,000 compared to between £22,000 and £28,000 across the rest of the county and around £25,000 across the UK as a whole). Consequently, it has attracted a large and affluent workforce. These successes have rightly been widely celebrated, but alongside its many positive impacts, growth has nonetheless contributed to a situation in which house prices have risen much faster than inflation over the past twenty or more years.

Figure 8 below illustrates an upward trend since 1995 which saw the average house price in Cambridge City climb from under £100,000 to some £500,000 in 2018, while the volume of sales fell over the same period. This is strong evidence of increasingly intense competition among a growing number of (increasingly affluent) would-be purchasers for what is effectively a fixed supply of housing, with those on lower income being priced out of the Cambridge housing market.

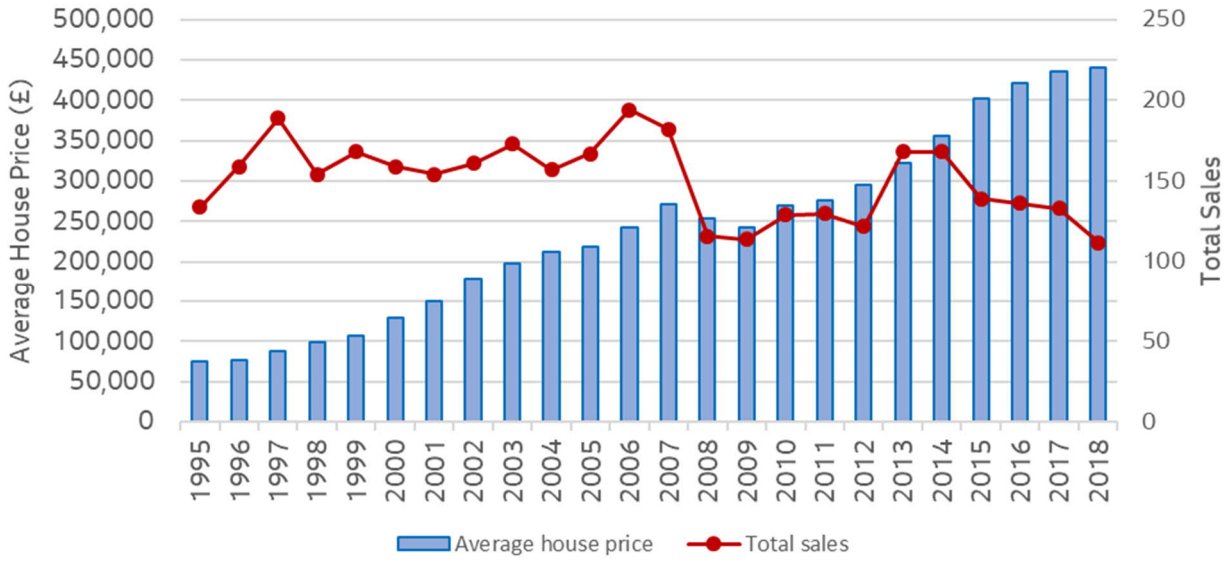


Figure 8. House prices and sales in Cambridge City, 1995-2018[28]

The availability of affordable housing may cause difficulty for employers to recruit suitably qualified employees who would need to be willing both to commute long distances, and also to locate in parts of the county which offer fewer of the conveniences such as ready access to high quality public transport, which are on offer closer to the urban core of the city of Cambridge.

Ultimately, if the cost of suitable accommodation in areas with sufficient transport connectivity and amenities becomes prohibitive within the context of the wages that businesses in Cambridge and the surrounding areas of South Cambridgeshire are able to pay, then businesses may find themselves unable to recruit appropriately qualified staff. Figure 9 illustrates housing affordability as measured by the ratio of average house prices to average earnings. Although housing affordability has declined since 1997 across all districts within the Combined Authority area, Cambridge has experienced a steeper increase during the last 5 years, where median house prices have increased from 10 to 13 times workplace-based average annual earnings. In other districts, housing affordability ratios have increased less steeply and from a lower base, particularly in Fenland and King's Lynn and West Norfolk.

[28] Source: HM Land REgistry

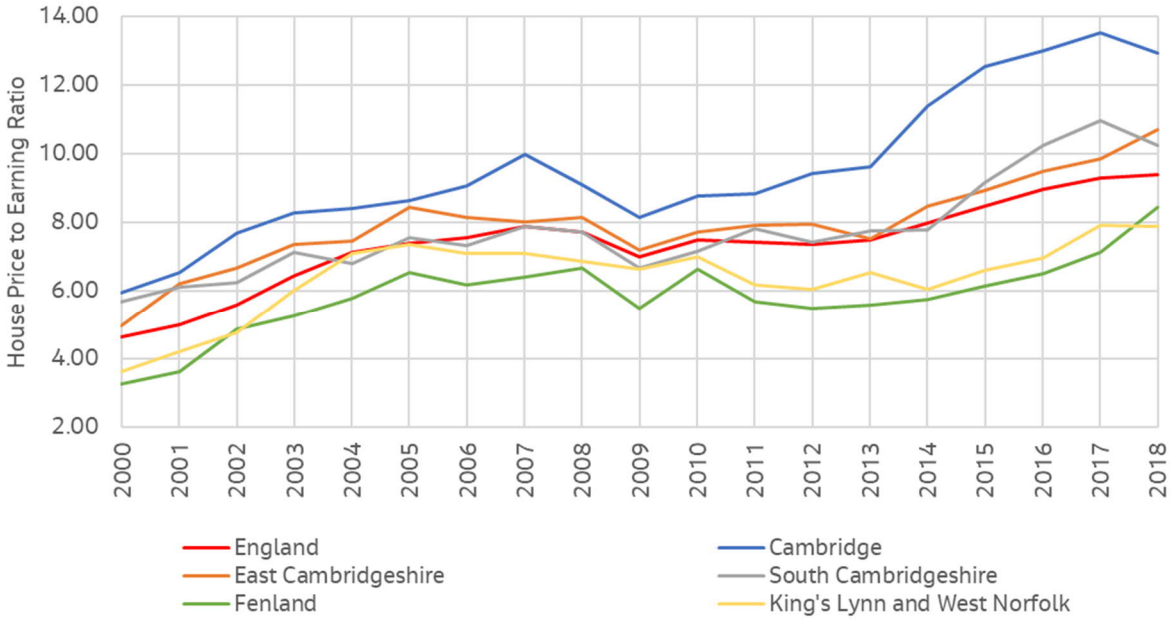


Figure 9. Housing affordability based on median house price to earnings ratio

The cost of housing in Cambridge has led to people moving further afield to afford a home, leading to increased numbers of commuters, adding pressures to the transport network, including the A10. Comparing the Travel to work pattern between available census: 2001 and 2011, the total number of people travelling from district in the north, namely East Cambridgeshire and King's Lynn and West Norfolk to Cambridge had been increased by 16% and 22%, respectively. This evidence is further detailed in section 3.6 where travel to work patterns are described.

Another indicator of housing affordability is the median rent [29]. The supply-side pressures on housing will have similar effects on rents as house prices. Table 3 shows that the proportion of income spent on rent varies widely across the area from a quarter in Peterborough to over 34% in East Cambridgeshire and 40% in Cambridge – well above the average for England.

Table 3. Private median rent as a proportion of median income (%), 2016

District	Percentage
Peterborough	25.56
Cambridge	41.36
East Cambridge	34.16
Fenland	27.27
Huntingdonshire	30.48
South Cambridgeshire	32.43
East of England	31.19
England	27.37

3.2.2 Housing need

During 2015, Peter Brett Associates objectively assessed housing need on behalf of Cambridge City Council and South Cambridgeshire District Council[30] to provide further evidence to the Strategic Housing Market Assessment (the "SHMA") developed in 2008 and last updated in 2013. This assessment provided evidence on housing need

[29] Source: ONS Housing Summary Measures 2016
[30] Cambridge and South Cambridgeshire Local Plan Examination - Objectively Assessed Housing Need: Further evidence

and housing targets, in response to questions raised by the Inspectors examining their Local Plans. The housing numbers were developed consistent with past demographic trends and adjusted for market signals in each local authority area, also to provide enough labour to support expected job growth as part of a Housing Market Area wide strategy. The assessment concluded that the objectively assessed housing needs in the study area was 19,337 dwellings for South Cambridgeshire and 14,000 for Cambridge City for the 2011 to 2031 period. Furthermore, for the same period the Councils' evidence base identified an affordable housing need of 10,402 and 5,573 dwellings for Cambridge and South Cambridge, respectively. The findings are summarised in Table 4.

Table 4. Strategic Housing Market Assessment for period 2011 - 2031

	Overall housing need	Affordable housing need	% affordable housing
Cambridge City	14,000	10,402	74%
South Cambridgeshire	19,337	5,573	29%

In November 2019, Greater Cambridge published its Trajectory and Five Year Housing Land Supply[31]. Table 5 presents annual new housing completions against targets since 2011, developed based on the SHMA and the Housing Trajectory and Five-Year Housing Land Supply reports. In order to meet their targets, Cambridge and South Cambridgeshire would need to deliver 700 and 975 dwellings respectively per year during the period 2011 to 2031. Currently, Cambridge is ahead of its cumulative target of 5,600 new homes between 2011 and 2019 with nearly 7,000 homes completed but South Cambridge is behind its target of 7,800 homes having completed 5,866 homes to date. Collectively there has been a cumulative shortfall of circa 600 homes over the past 8 years.

Table 5. Total Housing Net Completion versus target for period 2011 to 2019

	Type	2011-2012	2012-2013	2013- 2014	2014- 2015	2015- 2016	2016-2017	2017-2018	2018-2019	Cumulative
Cambridge	Market Completed	295	417	900	523	596	725	445	523	4,424
	Affordable Completed	60	56	422	197	300	458	667	345	2,505
	Total Completed	355	473	1,322	720	896	1,183	1,112	868	6,929
	Planned	700	700	700	700	700	700	700	700	5,600
South Cambridgeshire	Market Completed	525	486	481	539	550	435	557	811	4,384
	Affordable Completed	168	69	150	329	129	116	180	341	1,482
	Total Completed	693	555	631	868	679	551	737	1,152	5,866
	Planned	975	975	975	975	975	975	975	975	7,800

The identification of suitable locations for development of both residential and employment space, coupled with an effective strategy for delivery of supporting infrastructure is a key objective of the current and future Local Plans and the draft non-statutory spatial strategy developed by the Combined Authority. This objective is also in line with the Combined Authority's ambition of delivering 72,000 new homes in the combined authority area by 2032 and additional homes beyond then as stated in the Growth Ambition statement.

[31] Greater Cambridge Housing Trajectory and Five Year Housing Land Supply

The Adopted South Cambridgeshire Local Plan 2018 allocates significant levels of development in the study area, principally within the proposed new settlement north of Waterbeach, where there are opportunities to focus growth along with the necessary infrastructure.

As noted in Section 1.4, the Waterbeach New Town site is being progressed by two developers (Urban & Civic and RLW), reflecting the existing land ownership (former Ministry of Defence airfield and barracks / agricultural land) with their first phases of 1,600 and 800 homes respectively. The sustainable transport measures, minor junction mitigation and station relocation required as part of their respective first phases will only go so far before the A10 presents a barrier to growth. Further capacity improvements on the A10 will be required to accommodate travel demand from additional phases up to the potential site capacity of 11,000 dwellings.

The Local Plans were prepared in parallel with the Transport Strategy for Cambridge and South Cambridgeshire, which established the transport interventions that would be necessary to support growth. This includes measures to provide access to developments by walking and cycling, public transport, and to address highway impacts.

To ensure that growth is not simply accommodated at the expense of deterioration in travel conditions, development will need to be carefully planned, and supported by an appropriate strategy for transport. Therefore, as identified in previous transport studies, the housing growth in Cambridgeshire and Peterborough is subject to increasing infrastructure capacity by improving existing networks or building new links.

Problem 1 – Lack of Housing	
	Housing affordability pressures are one of the main threats to growth in the Combined Authority, particularly in Cambridge, and one of the main burdens on people's lives. Demand for housing has risen strongly, while supply, though increasing, has not been able to keep pace.

3.3 Economy and employment trends

3.3.1 Introduction

The Cambridgeshire and Peterborough Combined Authority has an ambition, set out in its devolution deal, to double GVA over 25 years. The CPIER has endorsed the ambition of doubling GVA over 25 years. This section references the findings presented in the CPIER to provide a brief overview of the Combined Authority's economy, describe the economic characteristics of the A10 corridor area, and present a brief analysis of economic and employment trends.

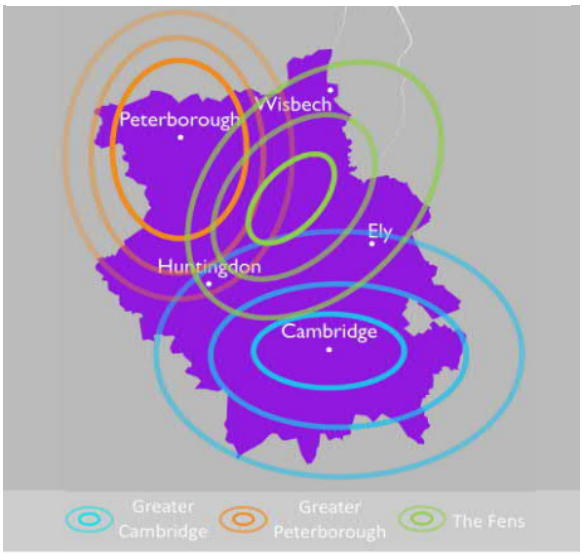
3.3.2 The Three Economies

In many ways, the Combined Authority area is a microcosm of the UK as a whole. It has a prosperous south, based around one principal city, which receives the majority of foreign investment and attracts high value companies and talent from across the world. International evidence increasingly shows that this concentration of growth leads to both high living standards and significant inequality. Further north, there is much industry and innovation, but while there are many success stories, business investment, skill levels and wages are lower. The gap in prosperity and skills between the north of the area and the south of the area is growing; women earn significantly less than men and transport congestion costs businesses millions in lost productivity. High house prices and lack of infrastructure may severely restrict the capacity of the economy to grow. High carbon emissions will increase the vulnerability of businesses and residents to possible future increases in energy prices.

The CPIER identified the CPCA economy as not a single uniform economy but three interconnected but different sub-economies ones. This is known as "the three economies": the south of the area or Greater Cambridge, the north west area or Greater Peterborough and the Fens (Figure 10).

Figure 10. The three economies areas

Source: Cambridgeshire and Peterborough Local Industrial Strategy



The "Greater Cambridge" area, which covers Cambridge, South Cambridgeshire and south parts of Huntingdonshire and East Cambridge, is prosperous and attracts many international businesses to come to the area and grow, mainly due to the University of Cambridge and research and science institutes. Skills levels and wages are high. The economy of Greater Cambridge has been performing strongest. Within the Greater Peterborough area there is much industry and potential; however, deprivation levels are higher, and many residents feel untouched by the economic success of the Greater Cambridge area. The Fens economy is supported mainly by the agricultural sector and market towns. Within these last two economies, wages are notably lower than the southern districts of Cambridge and South Cambridgeshire.

3.3.3 Strong business performance

A distinguishing feature of the area is how strongly it has grown recently. Figure 11 illustrates that economic growth has outpaced both the East of England and UK over the last decade. This has been driven primarily, but not entirely, by rapid business creation and growth in the south – Cambridge and South Cambridgeshire. This business is innovation rich – in fact Cambridge had the highest number of patent applications per 100,000 people for any city in the UK (341, more than twice the closest competitor, Coventry, with 118). It has been supported by waves of finance, with early acquisitions of companies (often by US firms) providing additional finance which could be invested in other new business. Beginning with computers and software, entrepreneurs began to branch out into other sectors with different business models, such as telecommunications, and (more recently) life sciences.

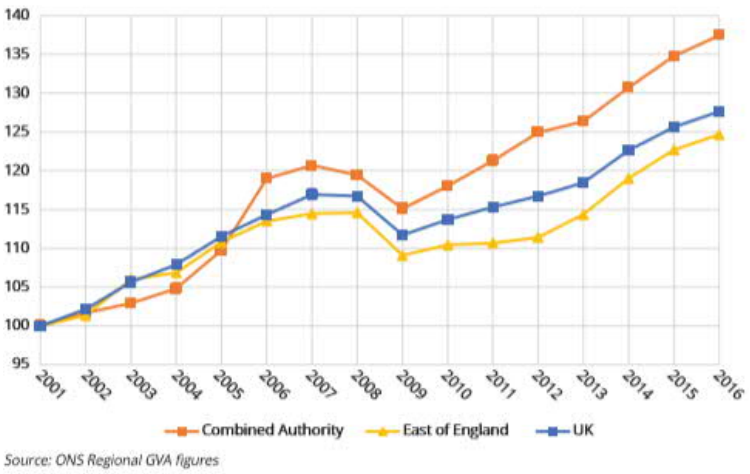


Figure 11. Change in Real Gross Value Added (GVA) - Index 2001 = 100

Source: Cambridgeshire and Peterborough Independent Economic Review

A further reason for the success of the business environment is the quality of the local labour force. In a piece of qualitative research commissioned for CPIER, PwC and Cambridge Ahead surveyed businesses to get their views on what was important to them in the area. 45% of business surveyed stated that the quality and availability of the local labour force was either very important or critically important. To understand long-term employment growth, the CPIER looked at different scenarios to assess the impact of different levels of employment growth in the area. The base case was developed in line with anticipated housing delivery as set out in the Local Plans and infrastructure being upgraded based on current trends.

Figure 12[32] is taken from this assessment and shows forecasts for two growth scenarios; the first scenario is an extrapolation of short-term recent trends (2011-2019) to longer term; the second scenario considers the effect of additional business costs that arise from high employment growth.

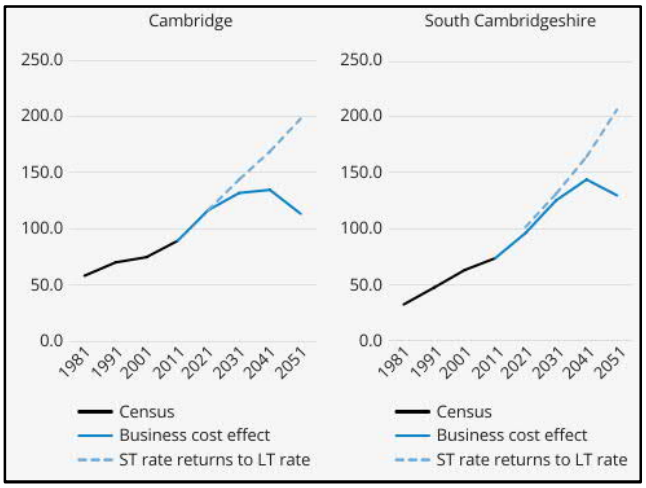


Figure 12. Employment growth scenarios

Negative side effects of high employment growth include the need to pay employees more, in order for them to afford to rent homes in the area, and lengthy commutes. When business cost effects are included in the model, employment growth is predicted to slow by 2021, and is expected to reverse beyond 2031. The CPIER concluded that, at this point businesses would start shrinking and moving away from the area, as the Cambridge area will become unsustainable for business economy. Lower value firms may leave the area hollowing out supply chains whilst high value firms would leave the UK entirely, as the unique qualities of the Cambridge area in terms of the quality of local labour and business to business relationships would no longer be as strong. The key recommendation of this assessment is to invest in infrastructure and housing above what is planned to prevent this scenario happening.

Problem 2 – Lack of Infrastructure	
	Lack of infrastructure to sustain the current growth of Cambridge is a key contributor to the likely future impact on business costs, with conditions on the A10 restricting the full build out of housing at Waterbeach New Town. Without intervention this will make it more difficult for growing firms in Cambridge to recruit and retain the people they need.

3.3.4 The A10 Corridor

The A10 corridor lies on the edge of the Greater Cambridge and the Fens economies areas. Here, three key economy sectors have been identified within the area: tourism, agricultural and technology.

Ely is a small city and the main market town in East Cambridgeshire. With its wealth of history, Ely is an important tourist destination for day trips. Ely is a compact city, with the medieval town layout still clearly evident. The city centre's economy remains relatively healthy, with a good mix of retail, commercial and leisure, although some uses are in need of updating or expansion. However, the historic fabric limits opportunities for new development in the central area; forcing developments to the 'edge of centre'. Ely has an Enterprise zone in it, located on the corridor. Due to the shortage of high-quality office jobs, residents in Ely often find their workplace in London, Cambridge or South Cambridgeshire. This results in a significant imbalance between homes and jobs, with a high number of commuters leaving Ely to work. These findings are supported in section 2.3.7, where travel to work figures from East Cambridgeshire into Cambridge had increased from Census 2001 to 2011 by 16%.

The A10 corridor lies within the south of The Fens, an area of rich farmland where farming has played a central role in its history. Due to the predominance of high-quality land, farms in the Fens are exceptionally productive and are famous for producing large quantities of vegetables, wheat, potatoes and sugar beet as well as ornamental plants such as daffodils. This activity, and the advantage of world leading research institutes, is attracting global agri-tech Innovation Hubs. These hubs act as a catalyst for the region's agri-tech cluster, showcasing relevant new research, technology and innovation to farmers, producers and processors. These hubs also assist to secure the region's future as Britain's leading bio-tech economy. Furthermore, Cambridge is home to The National Institute of Agricultural Botany (NIAB) a major international centre for plant research, crop

[32] Figure 15 – Rising business costs damage employment growth, extracted from CPIER

evaluation and agronomy. Cambridge is also home to leading agri-tech organisations, namely The Sainsbury's Laboratory, Bayer CropScience, and John Innes Centre.

Cambridge is the site of the world-leading University of Cambridge and Anglia Ruskin University, and possesses a thriving knowledge economy. As well as being a major employer in its own right, the university sector generates associated business activity of exceptionally high value through spin-off technology enterprises located at the science and business parks located to the north of the city and in South Cambridgeshire, at the Cambridge Biomedical Campus to the south of the city, and at other locations in the sub-region.

These digital and life science businesses make Cambridge a major centre for employment in the technology sector across the UK, and indeed across Europe, with major businesses such as Acorn Computers (and the related microprocessor designer ARM), Solexa, Raspberry Pi, and Darktrace having emerged there since the late 1970s, and global tech companies such as Amazon and Apple establishing a presence in the city. Cambridge also has a strong business and management sector which has grown up around the universities and technology businesses.

Over time, business clusters have emerged beyond Cambridge along the A10 corridor. Cambridge Research Park, north of Waterbeach, hosts companies from knowledge intensive industries supporting scientific and medical research as well as technology manufacturers, professional services and catering. Figure 13 below illustrates the location of key employments sites along the corridor.

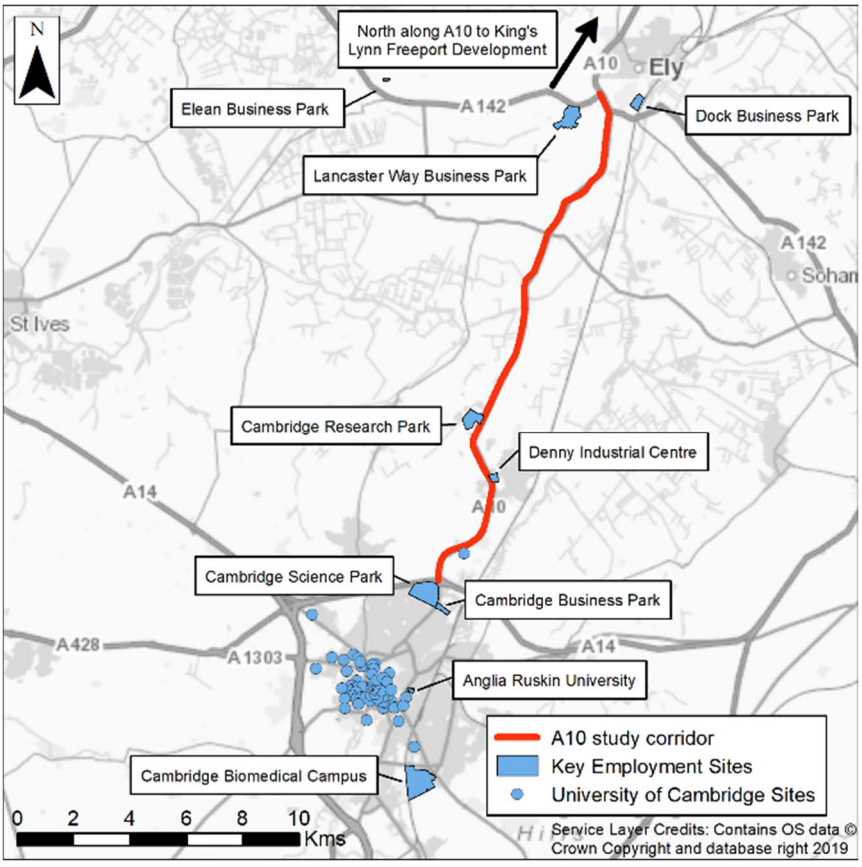


Figure 13. Location of key employment sites along the A10 corridor

Finally, the A10 corridor forms part of the direct route between London (via the M11 and A14), Cambridge and King's Lynn. King's Lynn is the economic driver for the King's Lynn and North West Norfolk area, due to its port and the economy activity around it. King's Lynn port is categorised as minor port, with cargo volumes below 1million tonnes annually. Much material traded in the port is related to agri-bulks, and recent years steel or scrap has also increased substantially. This economic importance is reflected within the King's Lynn and North West Norfolk Local Plan, where most growth will be located within or adjoining this town.

In addition to the strategic link to the King's Lynn port, the A10 is also used as a route to reach North Norfolk, where this area is known as a holiday destination with numerous holiday cottages and beaches. This tourism driven travel is likely to add pressures to travel on Thursday and Friday evenings, as well as at weekends and bank holidays.

Opportunity 2 – Spread economic growth north along the corridor to Ely and beyond
 The A10 serves both the Greater Cambridge and The Fens economies. The region has outperformed the rest of the England and there is an opportunity to spread the benefits of rapid business creation and growth experienced in Cambridge to areas along the A10 corridor including Waterbeach, Ely, the Fens and West Norfolk, where there is already established business agglomeration, through improved connectivity.
Opportunity 3 – Opportunity to benefit businesses along the A10 through improved connectivity and journey time reliability
 Opportunity to benefit businesses along the A10 through improved connectivity and journey time reliability.

3.3.5 Growth constraints within Cambridge

The detailed evidence base created for the CPIER[33] shows that Cambridgeshire has specialism in knowledge-intensive business. These businesses have a focus on the creation of new knowledge (research) and the commercialisation of it at their centre. If a knowledge intensive company is forced to move away from the sphere of clustering activity, it is likely to relocate to another cluster, rather than stay in the local area. For some of these knowledge intensive sectors, Cambridge is the only viable cluster in the UK and therefore these businesses would be more likely to move abroad than to relocate to another part of the UK. As part of the CPIER, a qualitative survey was undertaken by PwC and Cambridge Ahead to understand the views, issues and concerns of businesses within the Combined Authority area. Results from the qualitative survey show that a high proportion of the business would move activity abroad to elsewhere in Europe if they are unable to grow at their current locations.

It is also believed that companies may be deterred from setting up in the area if they do not believe suitable housing will be available for the workers they require. 45% of the business surveyed for the CPIER stated that the quality and availability of the local labour force was either very important or critically important. One respondent to the qualitative survey commented:

"It is definitely an attractive location, but access to affordable housing and extended commuting times need to be addressed or talented people will have to go elsewhere."

Another commented similarly:

"Cambridge is very attractive but very few new staff can afford to live there, which makes it potentially unsustainable in the longer term."

In total, 44.5% of respondents described 'Affordable housing for employees' as a moderately significant or very significant limitation on company growth.

[33] CPIER (2018) https://www.cpier.org.uk/media/1649/cpier_interimreport_v11_08052018_low.pdf Accessed June 2020

Problem 3 – Labour Supply	
	The Combined Authority wishes to double the economy and productivity over the next 25 years. However, housing issues are likely to constrain future growth and productivity if nothing is done. Companies are experiencing difficulties in hiring and retaining talent due to the high cost of living in areas within a reasonable commuting time to Cambridge. There is evidence that foreign firms and knowledge-intensive businesses are mainly interested in Cambridge as their UK base, and in some cases, Cambridge is their Europe base. Therefore, there is a risk of these foreign companies leaving the country for other European cities if they are not able to grow within this area., with a consequent negative economic impact on UK plc.

3.4 Education and skills attainment

Residents of the Combined Authority area tend to reach a higher level of education than the rest of the UK, with approximately 30% of the population holding Level 4 qualifications and above, compared to the England average of 27%[34]. However, levels of educational attainment vary widely across the Combined Authority. Most of those with Level 4 qualifications live in Cambridge and South Cambridgeshire, where 47% and 40% of the population over 16 respectively hold Level 4 qualifications and above. Conversely, in Fenland 31% of the working population hold no qualifications.

The Cambridgeshire and Peterborough Local Transport Plan seeks to support and ensure that residents across the region have access to educational opportunities, providing transport opportunities and ensuring individuals have access to jobs for which they are appropriately qualified. This will allow wider and more effective contribution to the local economy. As CPIER noted, local businesses value having quality local labour easily accessible.

The Combined Authority's skills strategy supports a local skills system that is world-class in matching the needs of employers, learners and communities. The principles of the strategy include simplifying access to skills support for employers and learners and tailoring interventions to appropriate geographies, sectors and learners through the development of the Progression and Apprenticeship Market Place, the new University of Peterborough and Adult Education Budget (AEB). The strategic priorities are ensuring local provision that is matched to industry need, making sure people are work-ready, raising aspirations, and influencing choices.

3.5 Indices of multiple deprivation

There are wide disparities between life outcomes across different parts of Cambridgeshire. Fenland and East Cambridgeshire, for example, lag well behind the Cambridge city average for incomes, and have higher levels of deprivation than most other parts of the county, as illustrated in Figure 14. Local policy seeks to ensure that these areas can share in the success of the activity clustered in and around Cambridge.

[34] Source: Highest level of qualification by age (ONS, 2011)

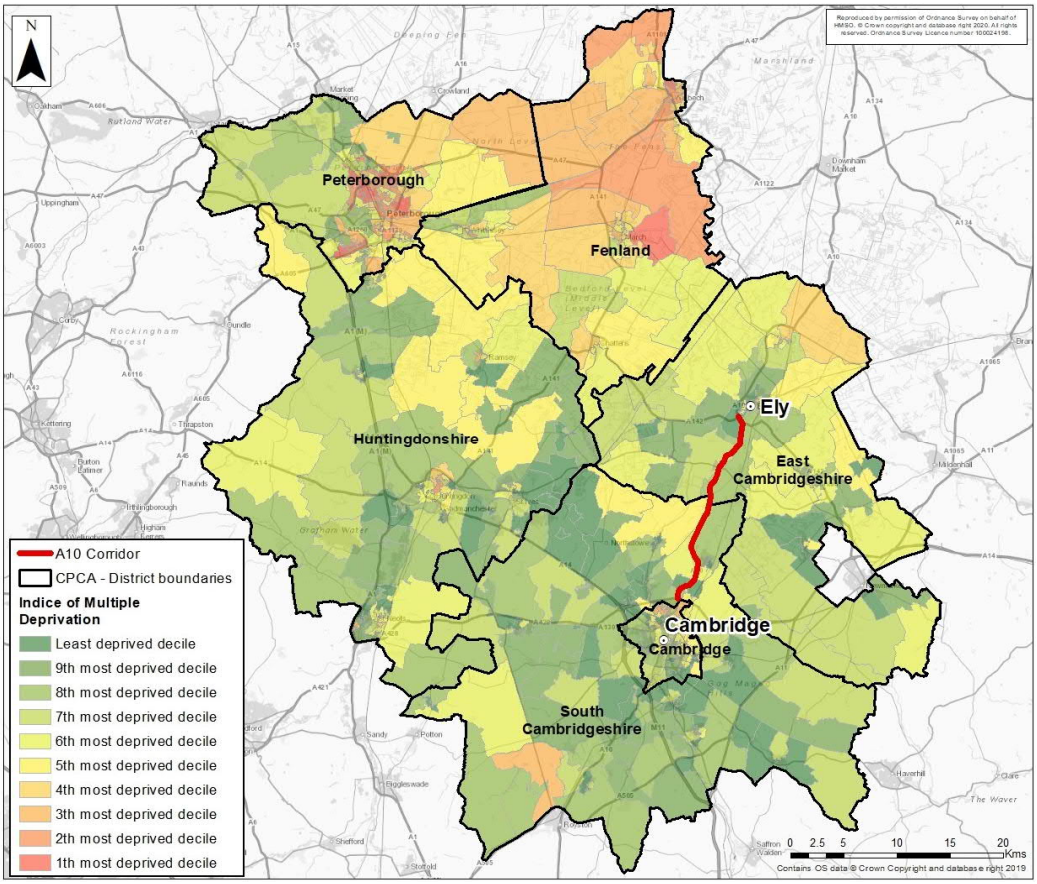


Figure 14. Indices of Multiple Deprivation across Cambridgeshire & Peterborough

3.6 Car ownership and travel to work

The travel to work catchment for Cambridge has increased markedly, such that it is now not uncommon for workers to commute to Cambridge from towns and villages around Norfolk, Suffolk, Hertfordshire, Essex, and even the north of London. At the same time, there is continued growth in commuting from the surrounding districts of Cambridgeshire which have always supplied the city with workers.

The trend in the level of commuting has been assessed by comparing census travel to work between the most recent census years, 2001 and 2011. These provided the most recent available detailed breakdowns of commuter travel by location and mode. To enable comparison between the two datasets, the data was extracted at local authority district level, selecting as destination or place to work, Cambridge, and as origin or location of usual residence those districts that are likely to use the A10 to travel to work: East Cambridgeshire and King's Lynn and West Norfolk. South Cambridgeshire has not been included because it covers all corridors into Cambridge and not just the A10.

Table 6 below shows an increase in the total number of people that travel to work to Cambridge of 1,072 between 2001 and 2011. This involved a 16% increase in commuters for East Cambridgeshire and a 22% increase in commuters from King's Lynn and West Norfolk. By method of travel or mode share, the greater increase related to the use of train from both districts, but a more substantial change in commuters from East Cambridgeshire. Single occupancy vehicle usage from East Cambridgeshire also increased albeit at a lower level of growth than rail, both in absolute and percentage terms. Car use declined from King's Lynn and West Norfolk, reflected in the mode shift to rail.

Table 6. Cambridge commuter inflow through A10. Source: Census 2001 and 2011 Travel to Work

	Origin: East Cambridgeshire				Origin: King's Lynn and West Norfolk			
Method of travel to work	2001	2011	Variance	% Variance	2001	2011	Variance	% Variance
Train	420	1,173	753	179%	134	247	113	84%
Bus, minibus or coach	401	315	-86	-21%	0	3	3	-
Driving a car or van	4,761	5,078	317	7%	245	222	-23	-9%
Passenger in a car or van	425	368	-57	-13%	20	13	-7	-35%
Other method of travel to work	218	272	54	25%	9	14	5	56%
Total	6,225	7,206	981	16%	408	499	91	22%

The output of this analysis reflects a trend towards more and longer-distance commuting from districts north of the study area to Cambridge, with greater use of rail, and for medium distance journeys from East Cambridgeshire at least, an increase in highway users. This has led to increased pressure on the A10, the radial highway of Cambridge and public transport connections into Cambridge, leading to increases in journey times, reductions in journey time reliability, and increases in crowding.

These issues not only lead to frustration and delay for those travelling in the affected areas but at the extreme could lead to an inability to efficiently deliver employees to their places of work that may also threaten the county's otherwise strong prospects for growth.

In addition to the above, an analysis of the Census 2011 travel to work data at MSOA level has been carried out to understand the commuting inflow through A10 to Cambridge and the surrounding ring area of South Cambridgeshire. Using MSOAs has allowed a better understanding and accuracy of the likely use of the A10 section by commuters from the north, by excluding from the analysis areas such as Soham or Newmarket that are not likely to have a lot of commuters using the A10 to get to Cambridge. Table 7 summarises by mode the estimated numbers of people commuting along the A10 to Cambridge and surrounding areas in South Cambridgeshire.

Table 7. Commuters inflow through A10 (Source: Census 2011 Travel to Work at MSOAs level)

Method of travel to work	East Cambridgeshire	King's Lynn and West Norfolk area	Total
Train	1,140	260	1,400
Bus, minibus or coach	159	3	162
Driving a car or van	3,865	366	4,231
Passenger in a car or van	288	19	307
Other method of travel to work	163	16	179
Total	5,615	664	6,279

Figure 15 summarises the method of travel to work or mode share. Car accounts for a high proportion of the mode share, followed by train with a 22% share, mainly due to the high train frequency between key settlements in East Cambridgeshire and Cambridge. Other public transport (bus, minibus or coach) has a minimal share of 3%.

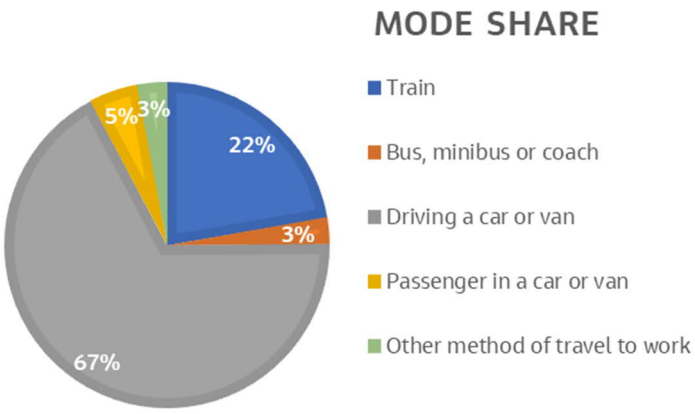


Figure 15. Mode share through A10 (Source: Census 2011 Travel to Work at MSOAs level)

3.7 Climate Change and Environment

As noted in Section 2.4, the Cambridgeshire and Peterborough Local Transport Plan (LTP) includes an environmental goal to achieve its overall vision. This goal seeks to preserve and enhance our built, natural and historic environment and implement measures to achieve net zero carbon. Building on this goal, it includes specific environment and climate objectives, namely:

- Climate Change - Reduce emissions to 'net zero' by 2050 to minimise the impact of transport and travel on climate change
- Environment - Deliver a transport network that protects and enhances our natural, historic and built environments

A summary of climate change and carbon issues and opportunities below is then followed by a summary of environmental issues and opportunities.

3.7.1 Climate Change and Carbon

The LTP notes that road transport is the highest contributor of carbon dioxide emissions of any sector in the region. The Combined Authority launched an independent Climate Change Commission in June 2020. The Mayor appointed Julia King, Baroness Brown of Cambridge, as the chairman of the commission. The commission will conduct analysis, identify challenges and opportunities and make recommendations on how the region can mitigate climate change and adapt to its impact and look at what actions are necessary to reduce carbon emissions to zero by 2050.[35]

The LTP's journey to net zero carbon emissions by 2050 is supported by guided principles, namely:

- integrating spatial planning and reducing the need to travel;
- providing attractive alternatives to driving – 'mode shift';
- preparing for the future of mobility;
- greening our transport infrastructure;
- supporting social mobility and access to opportunity for all; and
- protecting and increasing biodiversity.

[35] https://cambridgeshirepeterborough-ca.gov.uk/news/starting-gun-fired-on-regions-own-climate-change-strategy-to-eradicate-emissions-by-2050/, accessed 15 July 2020

In parallel to the A10 project, project partners are progressing a range of initiatives to encourage and embed low / zero carbon transport. As both these and the A10 scheme develops there may be an opportunity to provide integration.

- The Cambridge Autonomous Metro (CAM) will be an expansive metro-style network using electric rubber-tyred vehicles that connects regional settlements, major city fringe employment sites and key satellite growth areas across the region. The proposed network includes a section to link Waterbeach New Town with Cambridge, assisting to reduce the traffic pressure on the A10. An OBC is under development taking on board public consultation for the City Tunnel Section and surface sections completed in April 2020.
- Waterbeach station relocation to be closer to the new town north of Waterbeach and rail-based park and ride (200 spaces).
- Local bus services planned for Waterbeach New Town, to ensure appropriate bus priority and ease of access to the New Town and surrounding trip attractors.
- "Greenways": commuter cycle routes from surrounding towns and villages within a ten-mile radius. In particular, there is a proposed 8 km Waterbeach greenway route to enable cyclists, walkers and equestrians to travel sustainably from Waterbeach into Cambridge. This route was assessed as a number one priority due to its high cost benefit and its strategic fit with Waterbeach development, among others. In February 2020, after public consultation, the Executive Board took the decision to proceed with the Waterbeach Greenway and approved an outline budget of £8 million.
- Continued policy support for the introduction of the necessary parking and charging infrastructure to support electric vehicle use on a wider scale.

Doubling Nature Policy[36]

'Natural Cambridgeshire' is the Local Nature Partnership for Cambridgeshire and Peterborough. In 2019, Natural Cambridgeshire released its vision for the Natural Future of Cambridgeshire and Peterborough in 2050. Whilst the region has a number of attractive areas and designated areas for wildlife, the area is also characterised by substantial swathes of farmland with relatively low biodiversity and low tree cover. As one of the driest areas of the country with limited water resources, yet also at risk of surface water and tidal flooding, the area faces significant challenges in securing a sustainable future.

'Doubling Nature - A Vision for the Natural Future of Cambridgeshire & Peterborough in 2050' sets out Natural Cambridgeshire's vision that by doubling the area of rich wildlife habitats and natural green-space, Cambridgeshire and Peterborough will become a world-class environment where nature and people thrive, and businesses prosper.

A partnership delivery plan is being developed to achieve the ambition of doubling nature and natural green space across Cambridgeshire and Peterborough.

Cambridgeshire's Local Flood Risk Management Strategy 2015 – 2020[37]

This sets out the roles and responsibilities of flood risk management partners within the County, highlighting the position of the County Council as the Lead Local Flood Authority under the Flood and Water Management Act 2010. There are 5 key objectives within the strategy:

- Understanding flood risk in Cambridgeshire;
- Managing the likelihood and impact of flooding;
- Helping Cambridgeshire's citizens to understand and manage their own risk;
- Ensuring appropriate development in Cambridgeshire; and

[36] Doubling Nature - A Vision for the Natural Future of Cambridgeshire & Peterborough in 2050', Natural Cambridgeshire, 2019
[37] Multiple Authors (2015) Cambridgeshire's Local Flood Risk Management Strategy 2015 – 2020, https://www.cambridgeshire.gov.uk/asset-library/cambridgeshirestrategyforfloodriskv1.pdf, accessed June 2020

- Improving flood prediction, warning and post flood recovery.

Through these key objectives, the strategy aims to coordinate, minimise and manage the impacts of flooding within Cambridgeshire. The strategy also explains the various funding avenues for flood risk management activities and emphasises the need for local partnership and contributions in delivering local flood schemes.

3.7.2 Environmental constraints

The existing A10 between Cambridge and Ely passes through typically flat open countryside consisting of mainly agricultural land with some small settlements and isolated properties along the route. There are designated sites for heritage for example, associated with the Roman period and nature conservation particularly around the River Great Ouse. Noise from traffic on A10 has also led to the designation of a number of Noise Important Areas.

In developing the options, we have identified environmental constraints as shown in the constraints plan (see SOBC - Appendix A). We anticipate that A10 options would impact few designated nature conservation sites. For options that would involve widening the existing A10 key considerations include private and commercial properties which may be affected by noise, loss of land, changes to access or even potentially demolition. For options that would involve a new road away from the existing A10 key considerations include loss of land, visual effects and effects on biodiversity. These are summarised in the table below with further detail for specific constraints in the text that follows and the Environmental Report that accompanies the Business Case (see SOBC - Appendix B).

As the scheme develops at OBC stage, environmental assessment will become more detailed with site surveys and modelling for flooding and noise being undertaken. Our design priorities will include:

- Reducing the loss of land as far as practical.
- Avoiding designated sites where practical.
- Ensuring that the design of the road fits within the landscapes through which it passes.
- Seeking to reduce the number of households affected by noise including avoiding road widening within Noise Important Areas as far as practical.
- Including measures to reduce the changes on flood risk.
- Protecting and enhancing protected species.
- Incorporating measures into the design to reduce the environmental effects including habitat creation to achieve the objective of: Biodiversity Net Gain. This could include consideration of a green corridor or off-site habitat creation.
- Integration of proposals to help achieve the objective of Net Carbon Zero. This could include measures such as innovative use of materials, sustainable and active travel, potential off-setting and wider carbon initiatives.

An environmental impact assessment will be completed to support an application for consent to build the scheme. This could include a Habitats Regulation Assessment, Water Framework Directive Assessment, noise modelling and flood modelling.

Table 8. Identified environmental constraints most relevant to the options

Potential design components	Key constraints									
	Loss of land for residential & commercial property	Loss of agricultural land	Flood risk	Noise to properties	Cultural heritage assets	Buried Archaeology	County designated Wildlife sites	Internationally designated nature conservation sites	Protected species	Tree loss
Junction upgrades	✓			✓	✓	✓			✓	✓
Widening the existing A10	✓		✓	✓	✓	✓	✓	✓	✓	✓
New road away from existing A10		✓	✓	✓		✓	✓	✓	✓	

Further Details for specific key constraints:

- Flood Risk: The proposed scheme could be at risk of flooding and / increasing flood risk elsewhere. There are areas of flood zones 2 (1 in 1,000 annual probability of river flooding) and 3 (1 in 100 or greater annual probability of river flooding) either side of the existing A10.
- Noise to properties: Noise Important Areas (NIA) identify areas where residential properties are affected by road noise. This can be due to factors such as the presence of junctions or congestion during peak hours. There are a number of NIA along the existing A10.
- Cultural heritage assets: These are considered to be irreplaceable buildings, monuments, and/or settlements that contribute to a nation's society, knowledge and/or culture. There are listed buildings and scheduled monuments alongside the existing A10.
- Buried Archaeology: Buried archaeology is either known or unknown archaeology. There is known archaeology alongside the existing A10 and a risk of unknown archaeology for all options.
- County designated wildlife sites: Wildlife sites which are of importance and value at a county level. This includes the River Great Ouse which would be crossed by all the road improvement options.
- Internationally designated nature conservation sites: Important European habitats and species designated through the through the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora 92/43/EEC. There are transient and resident harbour seals in the River Great Ouse which are protected by European legislation.
- Protected species: Plants and animal species such as bats, water voles, great crested newts and badgers which along with their habitats are protected by various legislation. There are likely to be protected species affected by all options.

The following problems and opportunities are relevant to the environment.

Problem 4 – Climate Change and Environmental Quality	
	The Cambridgeshire and Peterborough Local Transport Plan sets out its ambition to reduce emissions to 'net zero' by 2050 to minimise the impact of transport and travel on climate change. Any solution for the A10 will need to proactively consider how it addresses this issue. Whilst the region has a number of attractive areas and designated areas for wildlife, the area is also characterised by substantial swathes of farmland with relatively low biodiversity and low tree cover. As one of the driest areas of the country with limited water resources, yet also at risk of surface water and tidal flooding, the area faces significant challenges in securing a sustainable future.
Opportunity 4 – Enhance environment through increasing biodiversity and by mitigating carbon impacts	
	Solutions for the A10 provide an excellent opportunity to increase the amount of land managed for nature through a combination of habitat corridors, habitat parcels and wetland. This will be explored in further detail at Outline Business Case stage as the solution definition matures. Carbon impacts may be mitigated through additional emphasis on sustainable transport and compensatory measures as the scheme design develops. This could include: ▪ Potential interfaces with the Greenways Programme (to be determined), providing segregated, dedicated routes for Non-Motorised Users. ▪ Potential interfaces with the electric battery powered Cambridgeshire Autonomous Metro (CAM) and local public transport (to be determined). ▪ Cater for and encourage uptake of Electric Vehicles through potential incorporation of charge-points and dynamic charging. ▪ Low carbon materials. ▪ Potential off-setting.

3.8 Transport and movement context

As Section 3.3.2 noted the Greater Cambridge economy and to a lesser extent the Fens economy are of great relevance to transport connectivity within the study area. Cambridgeshire is relatively well served by public transport infrastructure. These links ensure that key employment zones can be readily reached by those living across the county, as well as by those living in Cambridge and its vicinity. Figure 16 shows the railway and main road connections in the study area.

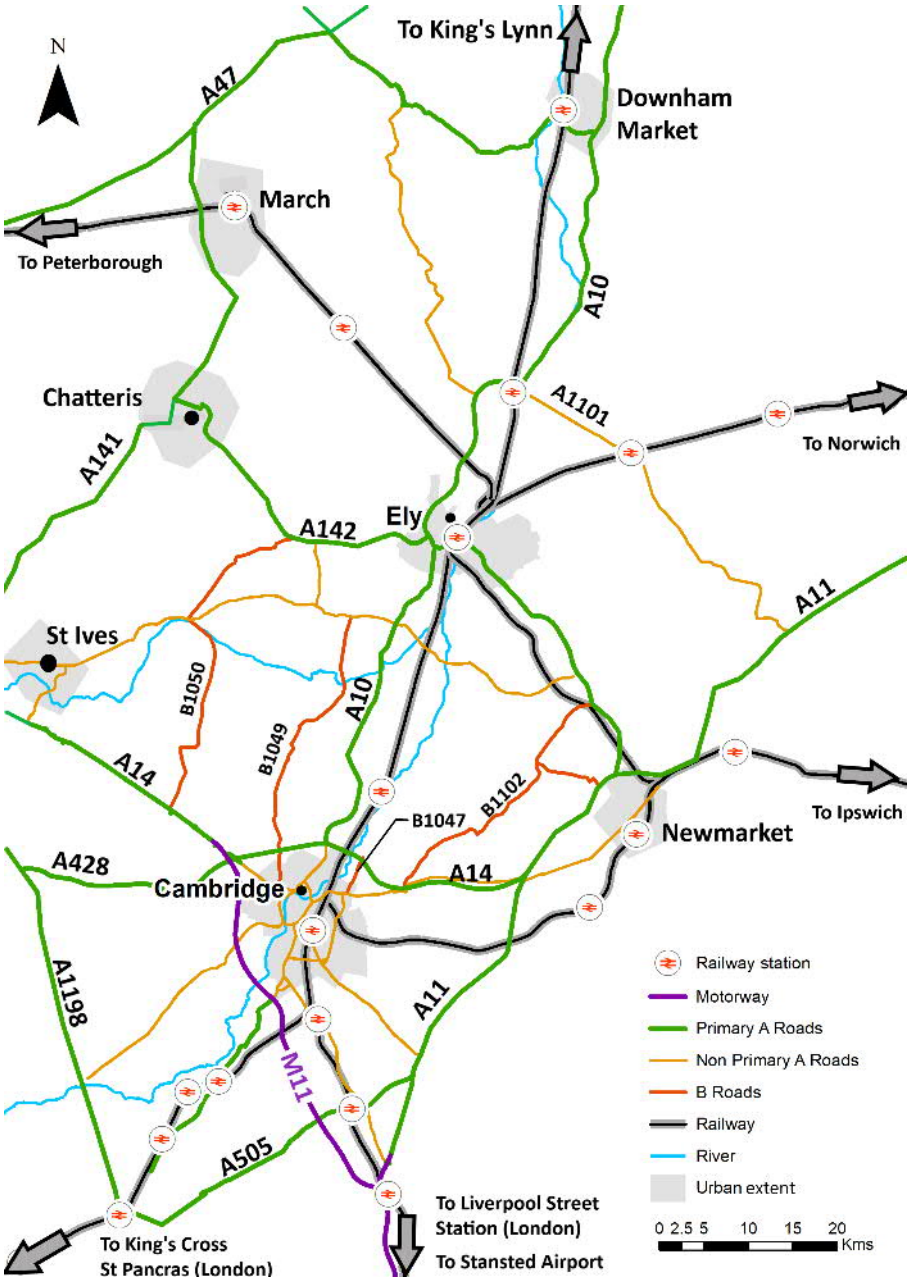


Figure 16. Strategic Network

It should be noted the data presented in the remainder of this section is the correct information up to early 2020, due to the COVID disruption this data may change during and post the COVID Disruption (e.g. bus and rail timetables and services).

3.8.1 Rail network

Rail routes and connections north/south provide good national links to the north and south with these less satisfactory for east-west journeys. Capacity constraints at Ely junction affect the ability to increase services on many routes.

Cambridge railway station has direct links to key regional destinations Peterborough, Kings Lynn, Norwich, Ipswich, Stevenage, Newmarket, Ely, March and Stansted Airport, as well as frequent services to London

Liverpool Street and London Kings Cross, and an hourly service to Birmingham. Cambridge railway station is the busiest in the East of England and was used by 11.98 million passengers in 2018/19; an increase of 450,000 passengers on the previous year. Railway stations along the A10 are among the busiest of the nineteen across the county: Cambridge, Ely and Cambridge North are among the top five busiest in Cambridgeshire, while Waterbeach is in the top ten[38].

Cambridge North station, located approximately 3 km to the north east of the city centre, opened in May 2017. As well as serving local residents it gives access from across the county and beyond to employment opportunities at Cambridge Science Park, and the Cambridge Business Park, both of which are nearby. The station is accessible by people cycling and walking and includes parking for 1,000 cycles. There are 450 parking spaces, supporting park and ride journeys from across the surrounding area. In 2018/19 813,000 passengers used the station up from 489,000 in 2017/18.

Waterbeach station is only served by trains between London, Cambridge, Ely and King's Lynn. A small decline in patronage was reported between 2017/18 and 2018/19 with a fall of 22,000 passengers to 408,000.

Ely Station, some 25km north of Cambridge, is served by direct trains to regional destinations including Cambridge, Stansted Airport, London, Ipswich, Norwich, King's Lynn, Peterborough, Leicester, Birmingham, Nottingham, Sheffield, Manchester and Liverpool. It also provides interchange between regional and local rail routes. The ORR data shows an increase in passengers from 2.28 million in 2017/18 to 2.39 million in 2018/19.

In summary Cambridge North and other rail industry trends have resulted in an increase in rail usage in the study area, with growth at all stations except for a modest decrease in usage at Waterbeach.

3.8.2 Bus services

Figure 17 and Table 9 presents an overview of the bus routes that operate along parts of the A10 between Ely and Cambridge. Overall, services are irregular with some routes only operating once a day. There are currently no coach services along the A10.

The key bus service for the entire corridor is X9/9/9B, which is a commercially operated route provided by Stagecoach on an hourly basis. Waterbeach village is a key local market, and the overall route has undergone several changes in recent years which underlines its relative marginality in viability terms due to the sparse rural areas it serves.[39]

The B1049 runs parallel to the A10 to the west through the villages of Histon, Cottenham and Wilburton. It is served by route 110 between Ely, Cottenham and Impington which is operated by the Big Green Bus Company. The B1049 is also served by route Citi 8 hourly between Cottenham, Histon, Impington and Cambridge which is operated by Stagecoach. This service runs every hour terminating at Cottenham with one service from March in the morning and one returning in the evening.

Bus services are heavily impacted by congestion along the A10 between Ely town centre and Cambridge Drummer Street bus station. The impact of congestion along the A10 is reflected in the variation in bus journey times between the peak and off-peak periods. During the morning peak, the bus journey between Ely and Cambridge may take around 1 hour 20 minutes, whereas in the off-peak period it can be expected to take 45 minutes. More recently, COVID 19 has also impacted the frequency and capacity of bus services.

[38] Source: Office of Rail and Road statistics, 2019
[39] Peter Brett Associates (2018). Waterbeach Barracks and Airfield - Transport Assessment Addendum, p21

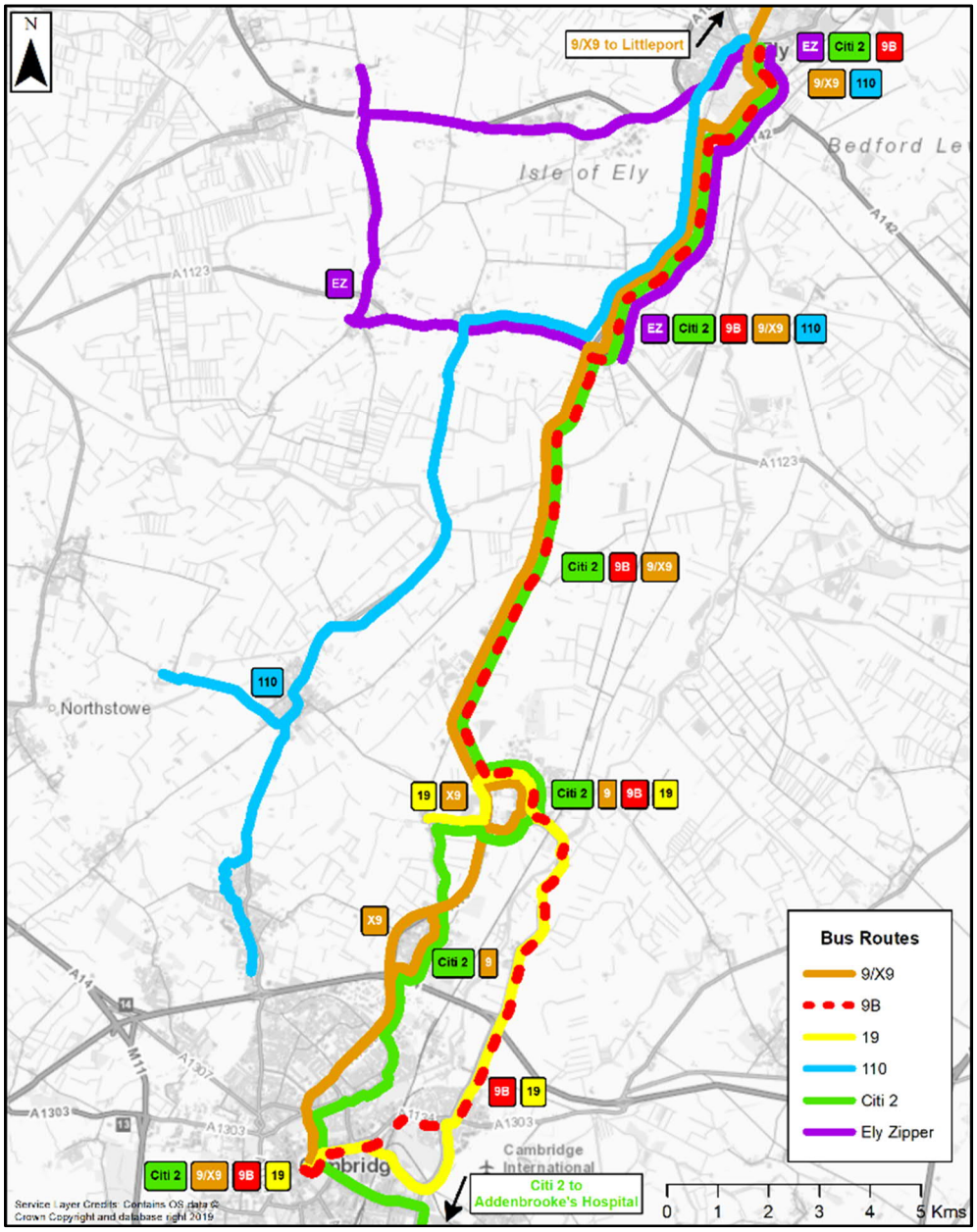


Figure 17. Overview of the bus routes that serves the A10 study corridor

Table 9. Bus routes serving A10

Route	Origin/Destination	Operator	Frequency
9	Cambridge Bus Station to Littleport	Stagecoach	Hourly services between approx. 9am to 7pm. Two early morning services
Ely Zipper	Witcham, Haddenham, Wilburton, Ely	Dews Coaches	11 services
X9	Littleport to Cambridge, Drummer St Bus Station	Stagecoach	Weekdays- Ely to Cambridge- 3 morning and 1 evening service Cambridge to Ely- 3 early evening services Saturday- 1 morning service

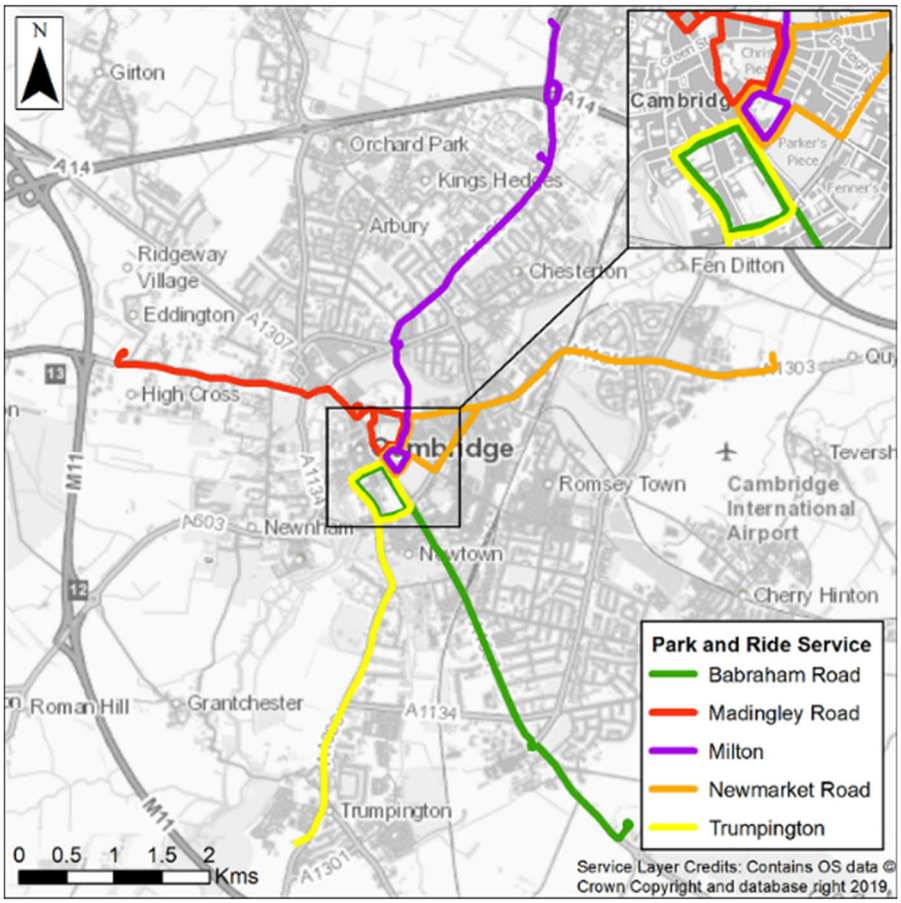
Route	Origin/Destination	Operator	Frequency
Citi 2	Cambridge, Milton, Landbeach, Waterbeach, Stretham, Ely	Stagecoach	1 early morning service between Ely and Cambridge. 1 morning service between Waterbeach to Cambridge
19	Landbeach to Cambridge	Stagecoach	1 morning service
110	Ely, Cottenham, Impington	Big Green Bus Company	1 midday service
9B	Cambridge Bus Station to Ely Market Street Stop A	Stagecoach	1 evening service with only one direction from Cambridge to Ely, from Monday to Friday

The Cambridgeshire Guided Busway opened in 2011. It includes a mix of on road sections in central Cambridge and established settlements such as St Ives and Huntingdon, with dedicated guideway sections. A 10-minute frequency service is provided between Cambridge station and St Ives from circa 7am to 8pm made up of alternate Cambridge to Huntingdon and Trumpington Park and Ride to St Ives services. One bus an hour also serves Cambridge North station in each direction. The service connects key service and employment centres such as Addenbrooke's Hospital, Cambridge Science Park, Cambridge Regional College with Cambridge station, as well as also serving the planned new town of Northstowe. Whilst no services along the A10 corridor itself use the Guided Busway, it is an important means of providing commuters and business travellers to the Cambridge Science Park with a high quality alternative to the private car.

3.8.3 Park and Ride

Figure 18 presents the park and ride services in the study area. A park and ride service operates from Milton, based just north of the A10/A14/Milton Road Interchange. The bus service travels into central Cambridge via Milton Road, A1134, Victoria Avenue, Emmanuel Road, St Andrews Street, Park Terrace, East Road then back to the car park via Milton Road. The car park has 792 spaces of which four have electric vehicle charging infrastructure. Covered cycle parking is also provided. A footbridge over the A10 connects Milton with the Park and Ride site at Butt Lane, although cyclists need to dismount. The bus takes 15-20 minutes to get to Cambridge City Centre, and it operates every 10 minutes Monday to Saturday, with the first bus departing Milton P&R at 06:21 and the last departure from Cambridge City Centre is at 20:39. On Sundays, the service operates every 15 minutes, which begin at 09:00 with the final service returning from Central Cambridge at 18:35. Current charges comprise a return ticket to Cambridge for £2.60 and free parking.

Figure 18. Park and Ride routes

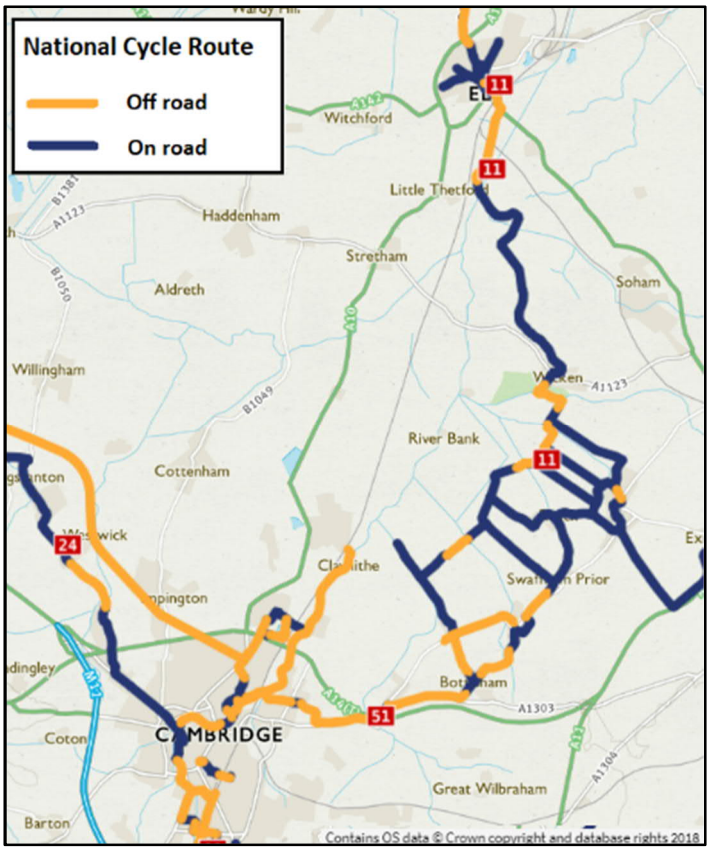


3.8.4 Walking and cycling

The A10 corridor has some intermittent pedestrian infrastructure with this mainly found in the bypassed sections (such as in Milton village) and where there is residential ribbon development. Starting in the south of the corridor, a continuous footway is provided on the High Street through Milton village. This connects to Cowley Road in the north of Cambridge with a bridge over the A14. In the north of Milton, a narrow footway is found on the eastern side of Ely Road and the A10 from where Ely Road meets the bypass to provide connectivity to Waterbeach. There is then a footway on both sides of the A10 north of its junction with Waterbeach Road for approximately 400 metres, after which the footway is only on the eastern side of the carriageway. This remains until the start of the national speed limit section north of Waterbeach. There is a narrow footway on the eastern side of the carriageway through Chittering with some small breaks. Narrow footways are also found on the southern approach to the A10/A1123 Stretham Roundabout. A narrow footway resumes on the east side of the A10 at Little Thetford, continuing into Ely via Cambridge Road.

The 2018 AADF records show a total of 11 pedal cycle counts daily average on the A10 in both ways, reflecting the lack of dedicated cycling infrastructure along the A10 itself. As an alternative, National Cycle Network Route 11 provides traffic-free cycling routes between Waterbeach and Cambridge and between Barway and Ely. When complete, Route 11 will connect Cambridge and Ely via Waterbeach. At present it is possible to cycle between Cambridge and Ely on the National Cycle Network by taking a section of Route 51 between Bottisham and Burwell. The distance between Cambridge and Ely along this route is approximately 22.3 miles, compared with 14.4 miles distance along the A10. The National Cycle Routes are presented in Figure 19.

Figure 19. National Cycle Network routes[40]



3.8.5 Future plans for sustainable transport

Alongside this existing provision, the Combined Authority, Greater Cambridge Partnership and Cambridgeshire County Council are progressing plans for investment in public transport (Cambridgeshire Autonomous Metro), walking and cycling (Greenways), in addition to sustainable transport provision for the Waterbeach New Town being progressed by its developers. Section 2.4.6 provides details of these various initiatives.

3.8.6 Highway

Highway connectivity across the county is underpinned by a network of strategically important roads, many linking the city of Cambridge to important locations nearby – the M11 to Stansted Airport and London, the A14 to Huntingdon and Newmarket, the A10 to Ely and Royston and the A428 to St Neots for the A1 and A421.

The M11, A14 and A428 form part of the national Strategic Road Network managed by Highways England. Other than a section of the A428 between St Neots (A1) and Caxton Gibbet (A1198) these are all dual carriageway standard.

The A10 and A142/A141 form part of the Government's proposed Major Road Network (MRN). The broad principle of this new tier of road is to raise the standards of economically and regionally important roads in England that will join seamlessly with and complement the existing SRN (including roads such as the M11, A14 and A47).

[40] Source: Sustrans

The A10 between Cambridge and Ely forms part of the direct route between London (via the M11 and A14), Cambridge and King's Lynn. The A10 provides onward connections to the Strategic Road Network (A47 and A17) and primary routes (A142, A1122 and A148) within Cambridgeshire and Norfolk. The A10 also connects with locally important east-west routes such as the A1123 between Newmarket and St. Ives.

The A10 is a single carriageway road between Milton and Ely. The corridor is characterised by numerous private access points (for farms and private property) and junctions (largely priority junctions and roundabouts). These features have potential to cause delays when through-traffic is unable to overtake vehicles waiting to turn into side roads or slow-moving agricultural vehicles using the A10 as part of farming activities. Figure 20 illustrates an example.

Figure 20. Tractor slowing down traffic on A10 (photo taken during a site visit in early 2020)

The A10's junctions provide connectivity to communities such as Milton, Landbeach, Waterbeach, Stretham and Little Thetford; centres of employment such as the Cambridge Science Park and Cambridge Research Park; and the Milton Park and Ride site for Cambridge. At present, junctions such as Stretham, Denny End Road and Milton Park and Ride experiences long traffic queues during peak times as result of the junctions approaching their design capacity. During the pre-SOBC an analysis of the junction performance[41] along the A10 identified this situation will get worst in future years, due to the increase in the traffic demand.

The A142 runs in a broadly north-westerly direction from the A14 at Newmarket to Ely. The A142 Ely Southern Bypass opened in 2018 following DfT funding and allows east-west traffic to bypass a previous bottleneck associated with the level crossing at Ely station. The A142 shares a 500 metre section of the A10 between Angel Drove and Witchford Road roundabouts. The A142 then bypasses Witchford, Sutton, Mepal and Chatteris before joining the A141 for onward connection to March and the A47 at Guyhirn. The A142 experiences heavy congestion eastbound into Ely during the morning and evening peaks from Chatteris.

The A1123 is a cross-country route connecting Newmarket, Soham and Fordham with Wilburton, Haddenham, St Ives and Huntingdon. It intersects the A10 at Stretham with a roundabout to the west of the main village. The

[41] Ely to Cambridge Transport Study, A10 Junction Assessment Report (October 2018)

road is a single carriageway, surrounded by open fields along most of its length. This route provides a shorter but slower alternative to the A14 further south.

Parallel to the A10 are a series of secondary and unclassified roads, providing alternatives to the A10 for journeys between A14/Cambridge and the A1123 or A142 to the west of the A10. To the west the B1050 runs between the A14 at Bar Hill and the A1123 at Earith with onward connection to the A142 at Chatteris via the B1050 or at Sutton via the B1381.

The B1049 runs between the A14 Histon Interchange and the A1123 at Wilburton with onward connection to the A142 at Witcham via the A1123 and the 2-mile long A1421.

The unclassified Clayhithe Road runs parallel to the A10 between the A14 at Fen Ditton (where it becomes the B1047 for onward connection to Cambridge) and Waterbeach via Horningsea. The Fenland environment east of the river Cam has resulted in few roads, with only the B1102 providing an alternative for journeys between Cambridge and the Fordham/Soham via the A10 and A1123.

3.9 Road performance

3.9.1 Vehicle mix on the A10

DfT Annual Average Daily Flow (AADF) data for 2014 to 2018 has been analysed for two permanent count sites, near Chittering (representing the northern section between A1123 and A142) and near Stretham (representing the southern section between A14 and A1123). The results are presented in Table 10.

The vehicle mix on the A10 is in line with the national average[42] across all road types for the same period. However, comparing against 'A' roads only, the A10 carries a higher proportion of HGVs, between 7% and 9% compared with a national average of 5%. This reflects the importance of the route for freight and agricultural vehicles. A specific ANPR survey could be carried out at the next stage of the project to capture more accurate data to further assess the use and impact of agricultural vehicles along this route.

Table 10. Vehicle mix on the A10

Road name	Start Junction Road Name	End Junction Road Name	Direction of Travel	Two wheeled motor vehicles	Cars and taxis	Buses and coaches	LGVs	All HGVs	All Motor vehicles
A10	A1123 Stretham	A142 Ely	North	0%	78%	0%	11%	9%	100%
			South	1%	80%	1%	11%	8%	100%
			Both	1%	79%	1%	11%	9%	100%
	A14 (T) Milton	A1123 Stretham	North	2%	75%	0%	15%	8%	100%
			South	2%	77%	1%	13%	7%	100%
			Both	2%	76%	0%	14%	8%	100%
			TOTAL	1%	78%	0%	12%	8%	100%

[42] Road Traffic Estimates in Great Britain in 2018

3.9.2 Traffic demand

Available DfT AADF data for 2018 has been illustrated in Figure 21. This reflects the average two-way flow over the full calendar year.

Flows are higher on the A10 north of the A1123 at Stretham with this road providing connectivity to parallel B roads to the A10 to the south. Higher flows of 20,000 vehicles are experienced on the short section of the A10 between the A10/A142 Angel Drove and A10/A142 Witchford Roundabouts where east-west and north-south traffic mixes. It should be noted that there is no DfT data for the section of the A10 between Milton and Waterbeach.

Figure 22 presents the modelled traffic volumes along roads in the study area for 2018 AM and PM peak periods. The plots demonstrate the high demand under the baseline scenario of the A10 based on outputs from the A10 Ely to Cambridge Model (A10E2C).

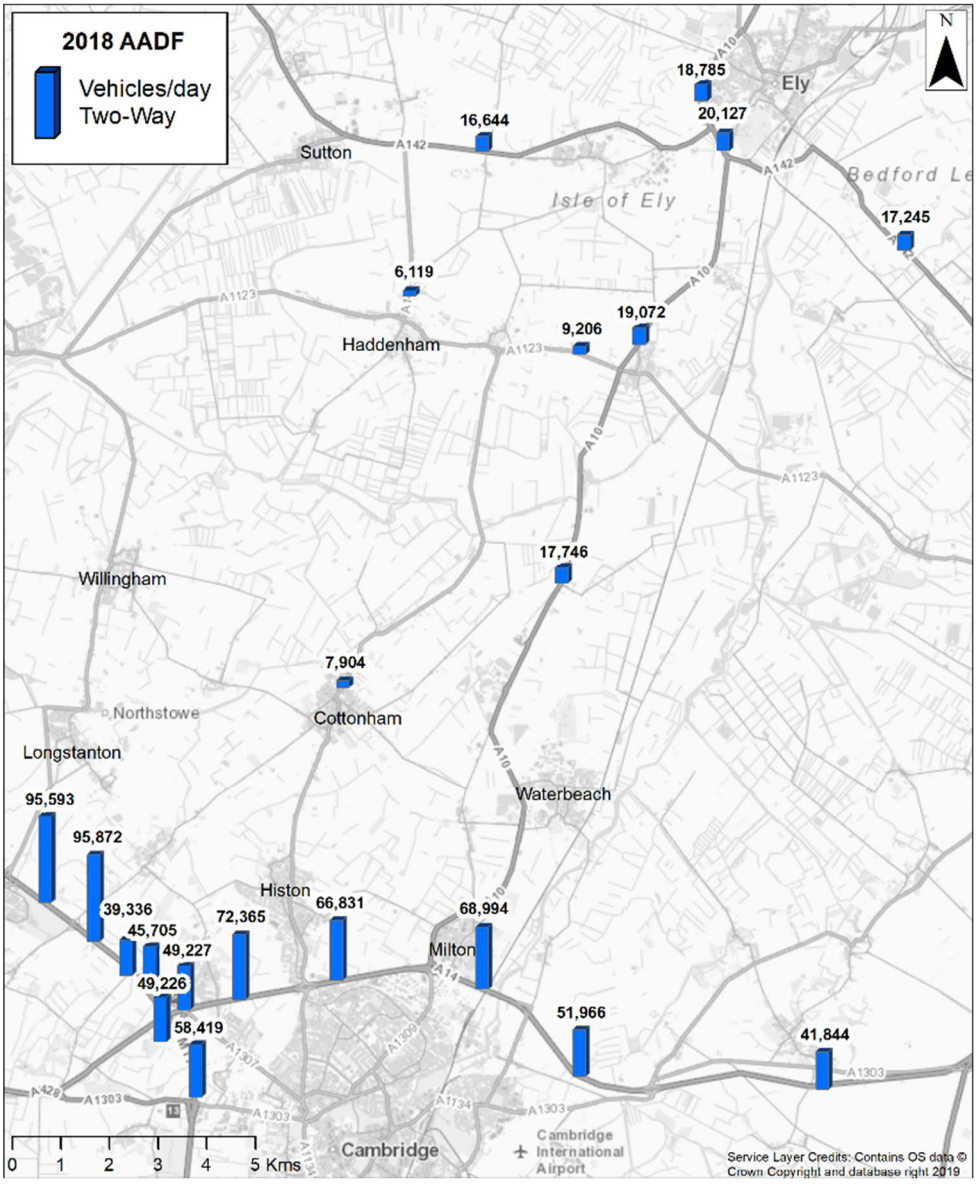


Figure 21. Annual Average Daily Flows 2018 (Source: DfT)

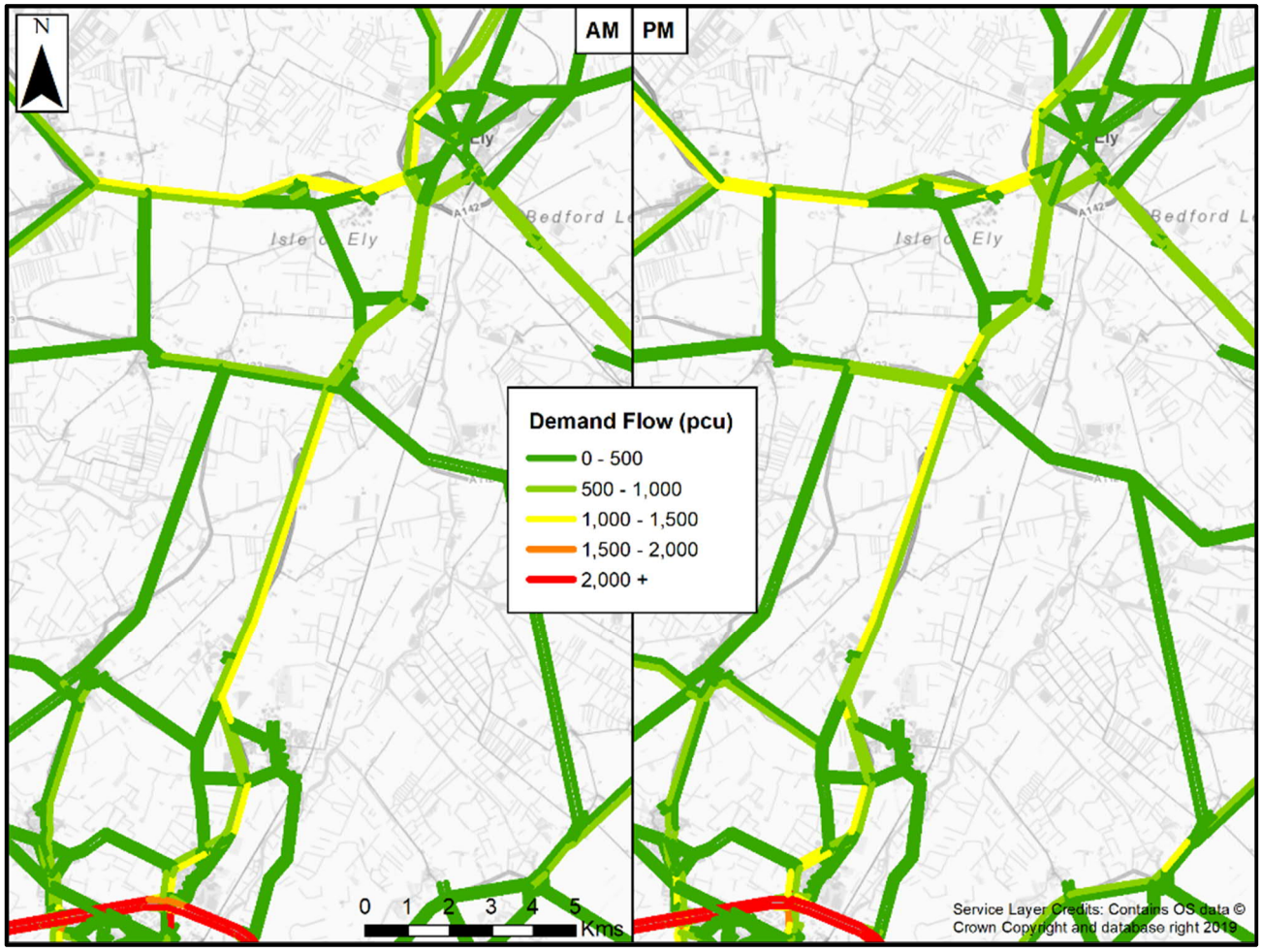


Figure 22: Weekday AM and PM demand 2018. Source: A10E2C Model.

3.9.3 Travel delays along the A10 and at key junctions

Estimated travel time data from Google Maps has been used to assess the current impact of congestion and delay along the A10 corridor. Hourly average travel times for a journey along the A10, between the A14 junction at Milton Interchange and A142 Angel Drove junction at Ely, were reviewed for the 12-hour period between 07:00 and 19:00. Figure 23 presents the findings for an average weekday and a Saturday.

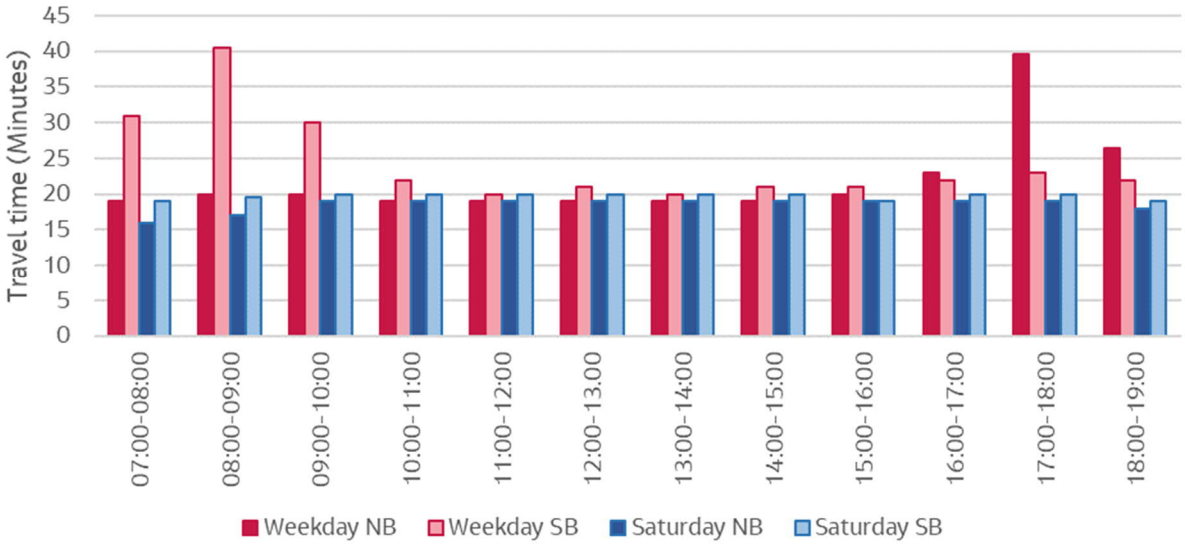


Figure 23. Congestion and delay along the A10 corridor[43]

The data shows significant increases in delays in the southbound direction during weekday between 7am and 10am and in the northbound direction between 5pm and 7pm, consistent with commuter demand into and out of Cambridge.

To provide context for the analysis of junction delay, Figure 24 illustrates key junctions on the A10 between Cambridge and Ely which were analysed by Cambridgeshire County Council and its advisors in 2018 following the Preliminary SOBC. At present, most of these junctions perform near or over their design capacity, leading to traffic queues and traffic congestion on the A10 and its connecting roads.

A summary of the do minimum baseline for 2021 is presented below in Table 11. Junctions are considered to be over-capacity if Ratio of flow to capacity (RFC) is at or over 85% or the Degree of Saturation (DoS) is at or over 90%.

The key issues and features for each of the junctions are then described, with reference to observed site visits from the A10 Junction Assessment report produced by Mott MacDonald in 2018.[44]

[43] Source: Google Maps travel time information accessed February 2020
[44] Mott MacDonald (2018): Ely To Cambridge Transport Study – A10 Junction Assessment Report

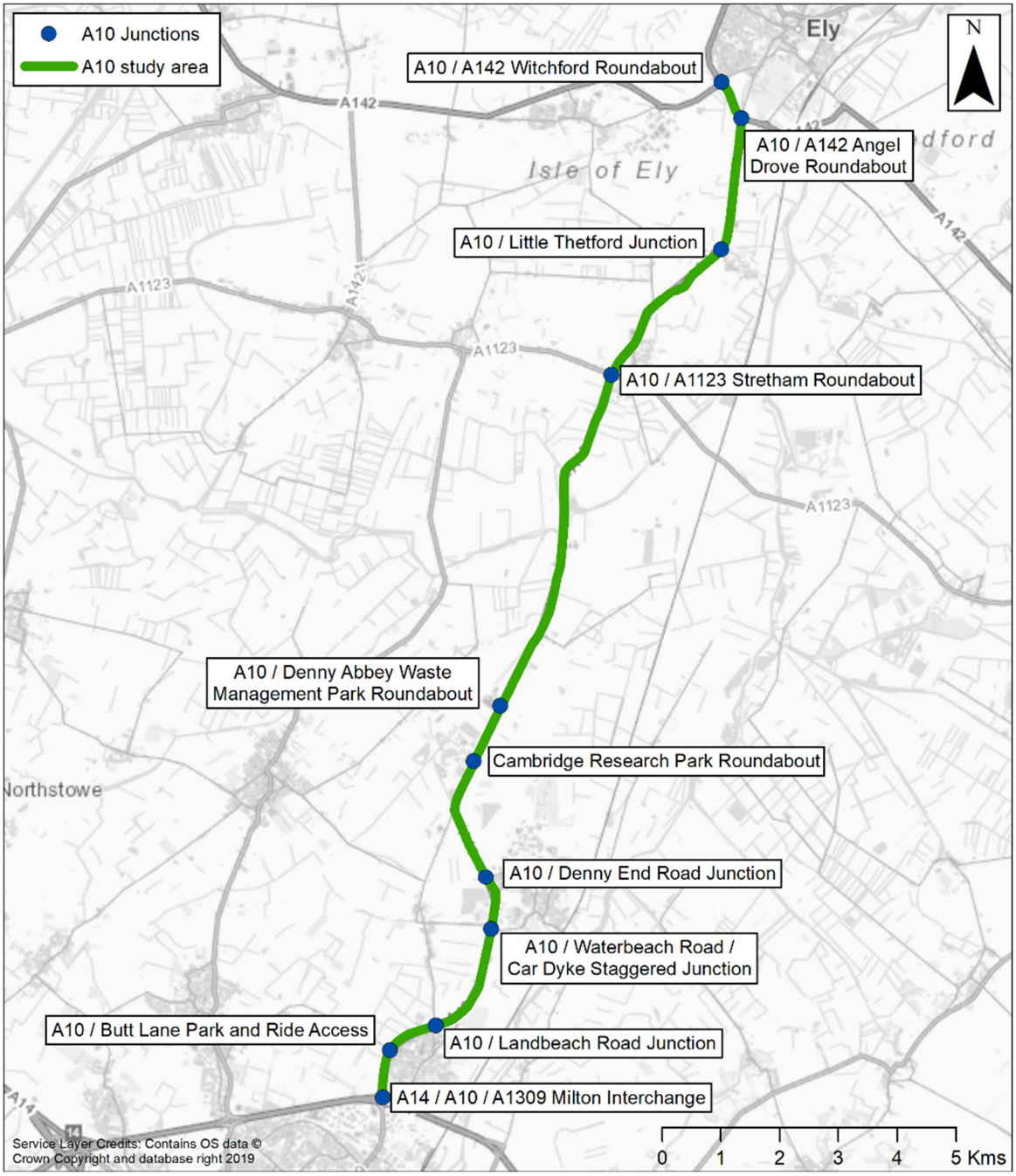


Figure 24. Key junctions along the A10

Table 11. Baseline Junction Performance. Source: Mott MacDonald

A10 Junction	Ratio of Flow to Capacity or Degree of Saturation	
	AM 2021	PM 2021
A14/A10/A1309 Milton Interchange	123.0	115.1
Butt Lane / Park and Ride	77.4	82.2
A10 / Landbeach Road / Humphries Way	49.4	29.2
A10 / Waterbeach Road / Car Dyke	35.4	44.3
Denny End Road	94.5	81.3
Cambridge Research Park	99.4	92.7
Waste Treatment Site	100	99
A10/A1123 Stretham Roundabout	99.8	97.5
A10 / Little Thetford	Not assessed - no available data	
A10/A142 Angel Drove Roundabout	94.2	99.1
A10/A142 Witchford Roundabout	100	100

A14/A10/A1309 Milton Interchange: the Milton Interchange is a major traffic interchange located to the north of Cambridge. The junction is a large grade-separated gyratory over the east-west running A14, with signal control for four of the five intersection conflict points, and intelligent traffic system technology used to help manage queues on Cambridge Road from Milton. The junction suffers significant delays and queues due to a combination of insufficient circulatory capacity, blocking back from traffic signals and single or short two-lane exits. The junction has been identified for further investigation outside the scope of this study, subject to a collaborative working group between HE, CCC, GCP and CPCA for future consideration as a standalone scheme.

A10 / Butt Lane / Milton Park and Ride Access are two signal-controlled junctions spaced 150 metres apart. The southern junction provides access to just the Milton Park and Ride site, with no right turn from the north. The northern junction allows all movements with an access to the Park and Ride site off Butt Lane. The performance of this junction is highly influenced by the Milton Interchange junction and reflects the pattern of commuting traffic. The Milton Park and Ride junction and to a lesser extent Butt Lane are also experiencing delays. The delays are mainly experienced by southbound traffic on the A10 during the AM peak. During the PM peak, queues are experienced by A10 northbound traffic on the approach to the Park and Ride junction.

A10 / Landbeach / Humphries Way is a staggered crossroads junction with central separation islands providing protection to right turning traffic on the A10. The large junction footprint provides for free-flow movement for the A10 arms, good visibility, and two-stage right turning movements from both side-arms. No issues were noted either from the site visit or in the modelling.

A10 / Waterbeach Road / Car Dyke provides access to the southern end of Waterbeach village and Landbeach. This is a wide, staggered priority cross roads junction with central separation islands providing protection to right turning traffic on the A10, as well as access to a restaurant. No capacity issues were observed at the site visit or noted in the modelling.

A10/Denny End Road; is a signal-controlled junction with two-lane northbound and southbound approaches. Denny End Road, which forms the eastern arm of the junction leads to the northern side of Waterbeach Village and has a single approach lane to the junction. Queues develop on all approaches during peak periods and the

capacity is limited due to space constraints on all entry arms. The developer Urban & Civic is proposing a quick win junction improvement on occupation of 150 homes at Waterbeach New Town, but a further upgrade is needed to solve longer-term issues.

Cambridge Research Park Roundabout was built to accommodate the Cambridge Research Park, which lies to the west of the A10. The northbound A10 arm diverges to provide a dedicated slip-lane to allow traffic to enter the Research Park and bypass the roundabout circulatory area. Two lane entries are present on both A10 arms of the roundabout, but the corresponding exit lanes are single lane only. Due to lack of arrow markings on the roundabout entry arms, drivers use both circulatory lanes for ahead movements but then must quickly merge for the single lane exit, which raises safety concerns and also constrains capacity. The junction is forecast to be operating at capacity at 2021 in the AM peak.

A10/ Denny Abbey Waste Management Park Roundabout is a roundabout junction which serves the entrance to the waste treatment site that lies to the west of the A10. It is also used for U-turns for vehicles to safely access Denny Abbey and the Farmland Museum. It is forecast to be operating at capacity in 2021 at peak times.

A10/A1123 Stretham Roundabout is a four-arm roundabout located at the junction of the A10 and A1123 Wilburton Road, lying just to the west of Stretham village. With a relatively tight circulatory area, all approaches are currently single-lane, flaring to provide two short entry lanes at the roundabout. All roundabout exits are single-lane only. There are significant delays experienced by northbound A10 Traffic, which queues on the approach to this junction during the build up to the PM peak. This junction is highly constrained due to the proximity of private residential properties. The developer Urban & Civic is proposing a small scheme to widen the northern approach on occupation of 500 homes at Waterbeach New Town.

A10 / Little Thetford Junction is a crossroads junction under priority control with high approach speeds on the A10. To the east, The Wytches leads to the village of Little Thetford. To the west, Red Fen Road leads to the village of Witchford. This junction has been identified for future assessment.

A10/A142 Angel Drove Roundabout is a compact four arm roundabout situated to the south of Ely. The configuration of the roundabout is non-typical with skewed approach arms and a tight circulatory area. All approaches are currently single-lane, flaring to provide two short roundabout approach entry lanes at the roundabout. All roundabout exits are single-lane only. The A10 arms are on the south and west sides of intersection. The eastern arm forms the A142 Angel Drove connecting to the south side of Ely and the northern arm, Cambridge Road, leads to the centre of Ely. The A10 suffers from long queues and delays on the northbound approach to this junction during the PM peak period. Queues have also been observed to block back to the junction from the A10/Witchford Road roundabout. Due to their proximity, the performance of both the A10/A142 Angel Drove and A10/A142 Witchford Road roundabouts are jointly influenced by each other.

A10/A142 Witchford is a four-arm roundabout located to the west of Ely. The A10 comprises the south-eastern and north-western arms. The southwestern Witchford Road arm of the junction forms the A142, while the north-eastern Witchford Road arm leads to Ely centre. The south western A142 arm flares on the approach to the junction to provide two short entry lanes to the roundabout. The south eastern A10 arm also flares on the approach to provide a nearside ahead and left lane and an offside right turn lane. The north eastern Witchford Road and north western A10 arms provide a single lane entry to the roundabout. All roundabout exits are single lane. The A10 suffers from long queues and delays on the approach from the south-east during the evening. Some queuing also happens on the A142 south-western entry arm. An interim fix is being progressed to support the growth of the Enterprise Zone at Lancaster Way, however there will be a need to provide segregated cycling, walking and horse riding facilities as well as a permanent congestion solution.

The impact of all of these junction issues on the wider network is clear from outputs from the 2018 modelled baseline scenario for both the AM and PM Peak (Figure 25). Significant delays are experienced in the direction of commuting travel to/from Cambridge, with significant southbound delays, south of Stretham, with this reversed on the northbound approach to the Stretham Roundabout in the evening peak. Notable delays are also clear at

the Denny End Junction in both peaks and the northbound approach to the Angel Drove Roundabout in the evening peak. The impact of congestion on the A10 also has a knock-on impact on parallel routes, with the B1049 experiencing significant delays in the evening peak on the approach to the A1123 at Wilburton.

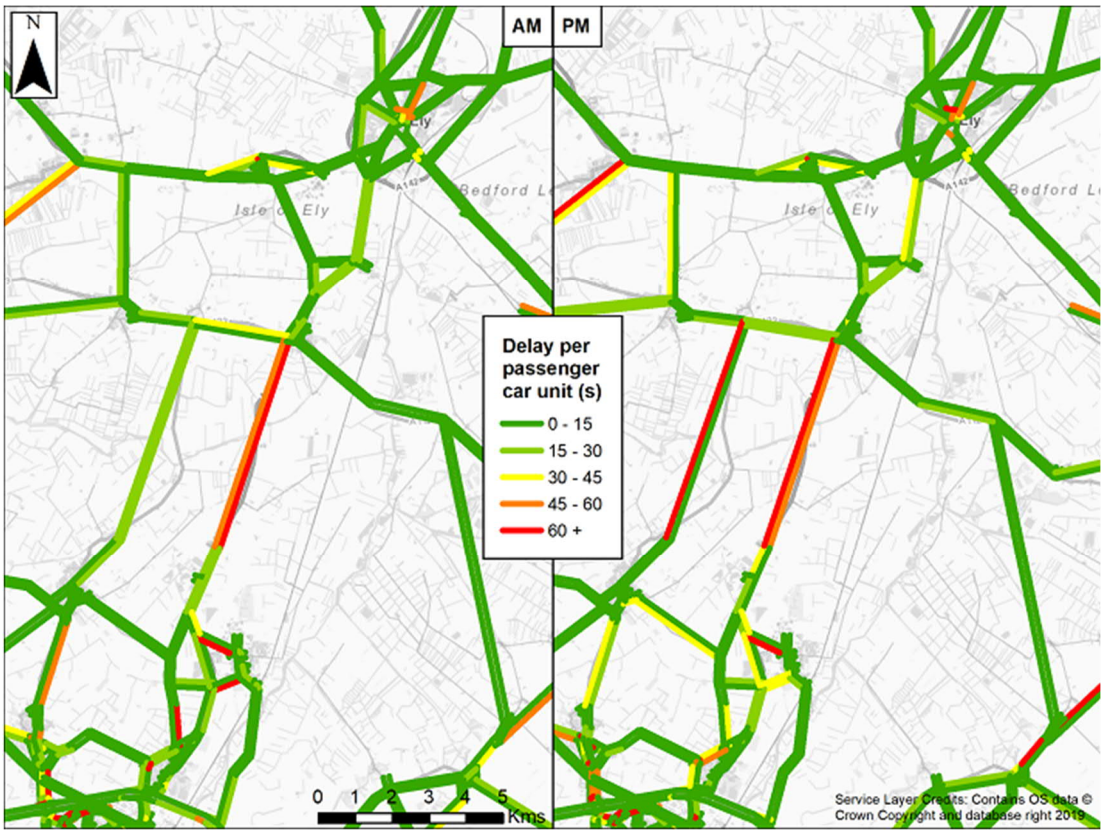


Figure 25: Weekday AM and PM delays 2018. Source: A10 Ely to Cambridge Model (A10E2C)

3.9.4 Journey quality

The variability in journey times along the A10 at different times of day provides evidence of unreliable journey time which can affect traveller stress and have a negative impact on journey quality[45] for drivers. The nature of the A10 as a single carriageway road where through-traffic is unable to overtake vehicles waiting to turn into side roads or slow-moving agricultural vehicles has potential to exacerbate the negative impact on driver experience.

3.10 Road safety

3.10.1 Collision data analysis

An analysis of road traffic collisions along the A10 and alternative routes has been undertaken using DfT STATS19 data covering the five year period between January 2014 and December 2018. The distribution of collisions is presented in .

Between 2014 and 2018 there were in total 110 collisions along the A10 between Ely and Cambridge, four of which involved fatalities (4%), 25 resulted in serious injuries (23%) and 81 resulted in slight injuries (74%). shows how these were distributed along the corridor. Collisions resulting in serious and slight accidents are distributed along the A10, clustering around junctions and access points to the route. Across the wider area

[45] TAG Unit A4.1 Social Impacts Appraisal, DfT, May 2020

there were 16 fatal collisions during the same period, including on road such as the A142 between Newmarket and Ely and the A1123 west of Stretham.

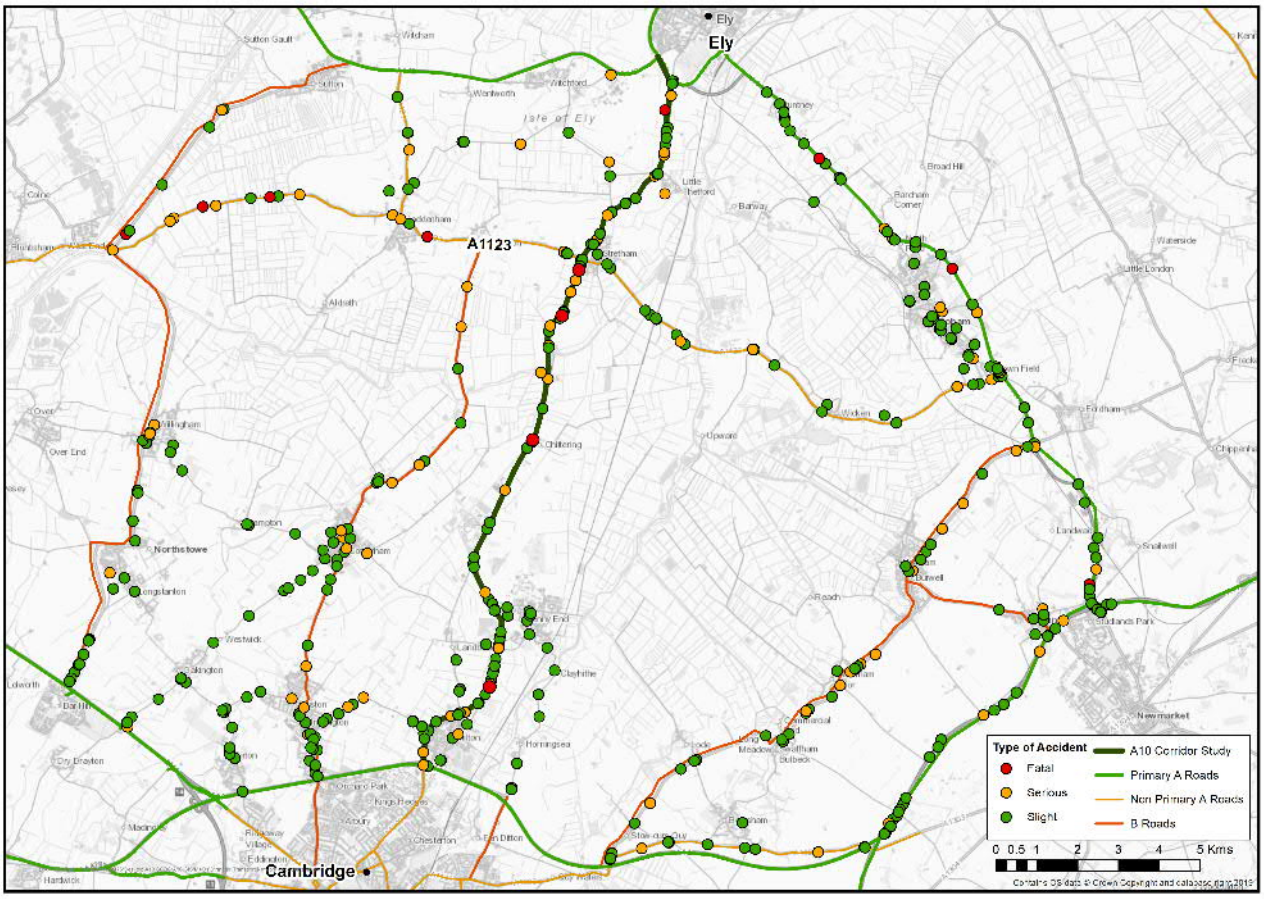


Figure 26: Collisions resulting in a personal injury accident along the A10 corridor, 2014-2018

It has been reported that the villages along the parallel roads experience negative impacts due to the volume of vehicles using these roads as rat runs. This has been reported most particularly on the B1047 Clayhithe Road but also the B1049 through Cottenham. The number of collisions observed at the east of A10, Clayhithe Road/Horningsea Road, reflects this road safety issue. This single carriageway route has seen 12 accidents over the five years, mostly around junctions and access points. Furthermore, to the west of the A10, via Milton Road, there were 11 accidents recorded with 2 of them being categorised as serious.

A comparison of the accident rates in the study area against the national average has been undertaken. This has been based on the measure of total accidents per billion vehicle miles.

Table 12. Accidents per billion vehicle miles – by section of the A10

Region	Vehicle Miles 2014-2018 (Billions)	Total accidents 2014-2018	Accidents per billion vehicle miles
A10 North of A1123	0.290	31	107
A10 South of A1123	0.111	79	710
A roads Great Britain	719.5	305,396	424
A roads East of England	87.7	24,554	280

The average accident rate along the whole route between Ely and Cambridge is lower than both the national and regional average for all 'A' roads. However, this hides an imbalance in safety between the sections north and south of the A1123. The southern section between Cambridge and Stretham has a higher accident rate than the national and regional average, and one nearly seven times higher than the northern section to the A142 Angel Drove Roundabout. Most of the collisions have taken place between Waterbeach and Cambridge, with nearly 50% of all accidents registered between the Milton Interchange and the Angel Drove Roundabout. Also, it is worth noting that the four fatal accidents that occurred during this period happened on the southern section of the A10 corridor, with three of these on the rural section between Chittering and Stretham.

Problem 5 – Transport	
	▪ Current and future congestion, resulting in slow journey times, impacting on business productivity and commuters' quality of life. ▪ Unreliable journey times at all times of the day both for private vehicles and public transport, caused by combination of side roads, incidents, HGVs, agricultural vehicles and tourist traffic. ▪ Diversion of traffic to the parallel B1049, B1050 and the network of unclassified roads that connect these with the A10. ▪ Community severance and environmental impacts, both along the A10, parallel B roads and unclassified roads. ▪ No segregated, dedicated cycle route between Cambridge, Waterbeach & Ely. ▪ All of the above contribute to safety issues on the A10, parallel B roads and unclassified roads.

4. Future situation

4.1 Introduction

This section describes at a high level the expected growth in population in the study area, the expected change in land use in terms of housing and employment from both Local Plans and long-term spatial planning, the likely baseline investment in transport included within traffic models, and what this all means for traffic growth. This section then concludes with an assessment of the impacts of this future situation on the A10 corridor, without any intervention.

4.2 Population growth context

ONS population projections estimate that the population of the Cambridgeshire and Peterborough Combined Authority area will grow an average of 11% relative to 2016 observed data. Table 13 outlines the ONS 2016-based sub-national population projections by local authority area and the combined authority. The predicted population growth is expected to correspond with an increase in commuting trips within the study area, as a result of large population increases in districts such as East Cambridgeshire, South Cambridgeshire and Fenland, connected with workplaces in Cambridge city. Of relevance is the fact that a large proportion of the development taking place in Greater Cambridge will be concentrated in sites close to or impacting the A10 corridor.

Table 13. ONS Population Projections (2016-based estimates)[46]

Area	Observed 2016	Forecast change 2016-2041	% change	Projected 2041
Cambridge City	125,000	3,000	2.40%	128,000
East Cambridgeshire	88,000	11,000	12.50%	99,000
Fenland	100,000	13,000	13.00%	113,000
Huntingdonshire	176,000	20,000	11.36%	196,000
Peterborough	197,000	30,000	15.23%	227,000
South Cambridgeshire	156,000	18,000	11.54%	174,000
Combined Authority	842,000	95,000	11.28%	937,000

4.3 Land use and planning context

The study area is covered by three local planning authorities, namely Cambridge City Council, South Cambridgeshire District Council and East Cambridgeshire District Council with their own Local Plans.

Figure 27 below sets out, in broad terms, strategic development sites in existing Local Plans with this collated in the Cambridgeshire and Peterborough Strategic Spatial Framework (non-statutory).

[46] Subnational population projections for England: 2016-based. Source: ONS https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/subnationalpopulationprojectionsforengland/2016based

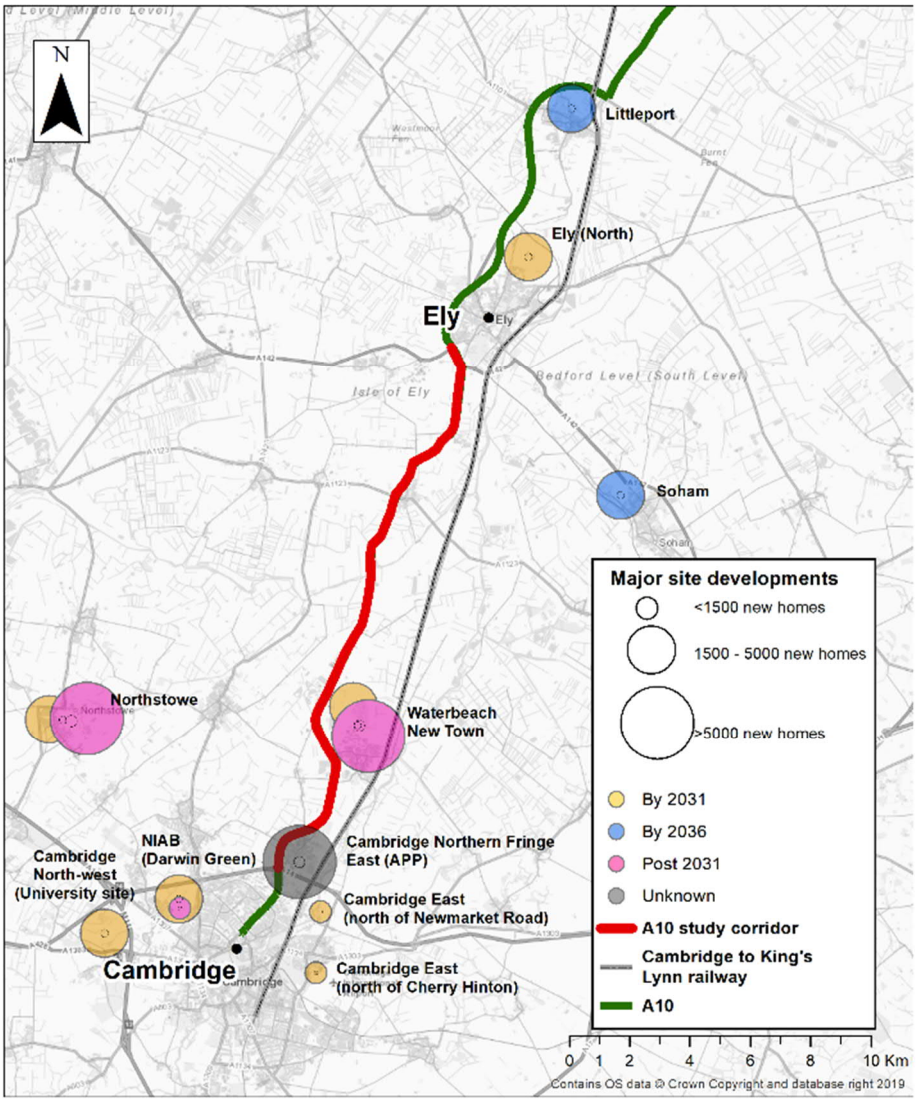


Figure 27. Major site developments within the study area

The project team have liaised with Cambridgeshire County Council officers to understand which of these developments are dependent on improvements to the A10.

4.3.1 Dependent Development

Waterbeach New Town, located on the A10 corridor approximately six miles north of Cambridge, is largely a mixed-use development of a former MOD site. The New Town is being delivered by two separate developers – Urban & Civic, and RLW reflecting the different land owners.

During 2017-18, South Cambridgeshire District Council received three planning applications for the development of Waterbeach New Town, totalling up to 11,000 homes:

- An outline planning application (0559/17/OL) for up to 6,500 dwellings and associated other uses and infrastructure, received in February 2017 from Urban & Civic. This was approved in September 2019.
- A full planning application (0791/18/FL) for the proposed relocation of Waterbeach railway station, received in 2018 from RLW Estates. This was approved in January 2020.

- An outline application (2075/18/OL) for up to 4,500 dwellings and associated other uses and infrastructure, received in May 2018 from RLW Estates. No decision has been made at the time of writing.

Cambridgeshire County Council and South Cambridgeshire District Council have been working with the two developers to agree development mitigation and trigger points arising from their respective first phases of development. This includes mode shift and local highway infrastructure as presented in Table 19.

Table 14: Waterbeach New Town Mitigations

Development	Mitigation	Trigger Points
Urban & Civic (Phase 1, 1600 dwellings)	Local Buses, Quick win junction improvements and trip budget monitoring	First homes
	Mere Way Cycle Route and Bridge over the A10	150 homes
	Link Road to new station	900 homes
	Further junction upgrades depending on monitoring results	1,600 homes
RLW (Phase 1, 800 dwellings)	Re-located Waterbeach railway station 200 Park and Ride Spaces Contribution to Cambridge to Waterbeach Greenway	200 homes

Any further development on top of the first 1,600 homes by Urban & Civic and 800 homes by RLW will be dependent on the increase of the network capacity on the A10, with a potential capacity to deliver a total of 11,000 homes at this site. Together with expansion of the Cambridge Research Park, it is expected to generate up to 5,800 new jobs.

4.3.2 Complementary Development

Clusters of high-tech employment on sites in the Cambridge Northern Fringe currently support many jobs for the sub-region and create significant economic value. Consequently, there is a clear incentive to facilitate further growth at these sites.

Cambridge Northern Fringe East (CNFE) and Cambridge Science Park (CSP) forms the area to the north of Cambridge, immediately south of the junction A14/A10 and the Milton Interchange, and adjacent to Cambridge North Station. Significant growth is expected within the Northern Fringe, with an estimated 36,000 additional jobs by 2031 under the City Deal. Redevelopment of the 36-acre Chesterton Sidings, known as the CB4 development and at an early planning stage, is expected to include 121,000 sq. m of office floorspace and residential or student accommodation[47].

In March 2019, Government announced £193m of Housing Infrastructure Funding to help facilitate the move of the sewage treatment works to make space for a new city district on the northern fringe. This new quarter could provide more than 5,000 residential units, as well as one million sq. ft. of office, with significant retail, leisure and community space.[48]

Both the Cambridge Science Park and Cambridge Business Park are comparatively low-density in nature, and site densification could deliver significant additional office space. One of the policy imperatives for CSP and CNFE development delivery is to not increase the number of car trips. Therefore, there is no development at this location dependent on improvements to the A10.

[47] Source: Cambridge North
[48] https://www.uandiplc.com/news-and-views/chancellor-s-investment-set-to-unlock-new-low-carbon-quarter-for-cambridge/, accessed 15 July 2020

Ely North is located on the A10 corridor approximately 17 miles north of Cambridge. It is expected to include 3,000 additional homes as part of an urban extension of the town.

4.3.3 Growth will bring major opportunities

These developments should enable existing businesses to expand, both by offering physical floorspace for expansion and by providing residential space for new employees to live in, and by the same token should attract other businesses in related sectors who are likely to see benefits in joining a tightly agglomerated economic cluster offering a ready pool of experienced labour to take up new opportunities as they become available. Furthermore, this development will help to address the pressing issue of constrained housing supply and rising prices in Cambridge. However, growth at Waterbeach will lead to increased demand for north-south travel along the A10 and the road, public transport, pedestrian and cycle routes around it.

4.4 Long term growth

CPCA has committed to double the size of the economy in terms of Gross Value Added (GVA) over 25 years[49]. It has committed to realising 100,000 extra homes and 90,000 new jobs across the region by 2036 in phase 1 of its Strategic Spatial Framework, through commitments in existing Local Plans. The non-statutory spatial framework includes the following as potential "building blocks" of a vision for future growth during phase 2 of the framework, covering the period from 2036 to 2050:

- "Embracing positively the need to build new homes, create jobs, and improve infrastructure – offering attractive homes, jobs and a high quality of life in a range of distinctive communities.
- Accommodate growth by providing new homes in sustainable locations, close to main centres of employment and along key dedicated public transport routes."

Figure 28 identifies the strategic corridors within the Combined Authority where future growth is likely to have the greatest impact. The A10 corridor between Cambridge and King's Lynn is one of these strategic corridors and its successful operation will be of key importance to the Combined Authority's longer-term growth ambitions.

[49] Cambridgeshire and Peterborough Combined Authority Growth Ambition Statement: https://cambridgeshirepeterborough-ca.gov.uk/assets/Uploads/GROWTH-AMBITION-STATEMENT-.pdf

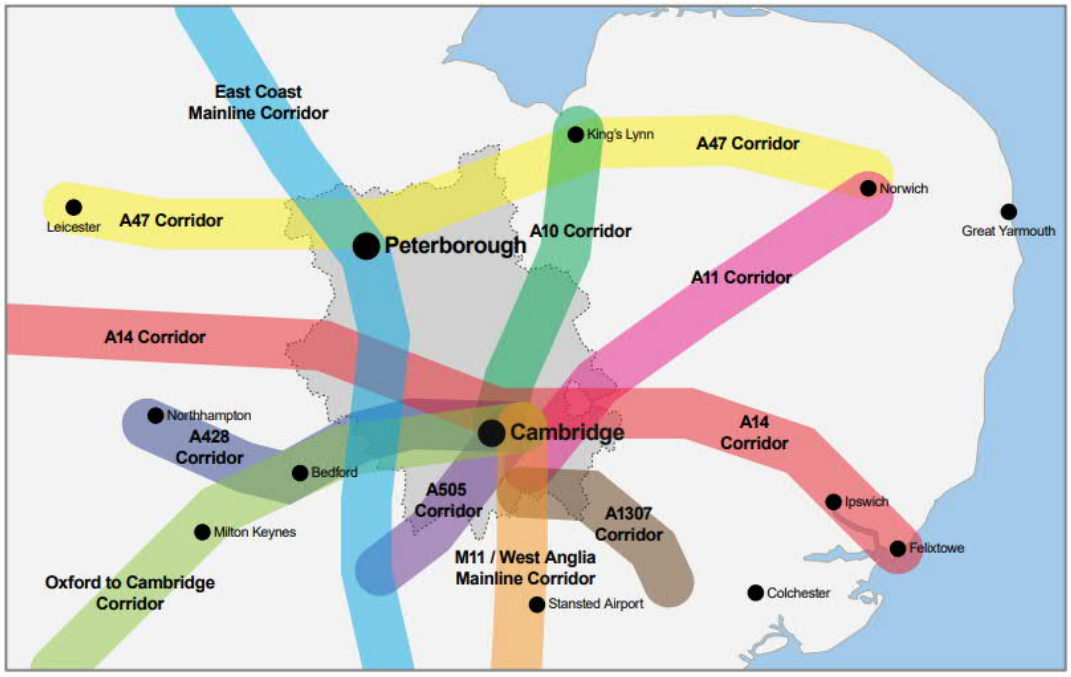


Figure 28. Strategic corridors within CPCA[50]

Opportunity 1 – Realising new sustainable housing opportunities	
	▪ Opportunity to unlock further homes at the former MOD site north of Waterbeach up to its site limit of 11,000 homes. ▪ Complements proposals for Ely North, a 3,000 home urban extension of the town. ▪ Support CPCA's non-statutory spatial framework (non-statutory) aspiration for 100,000 homes to be delivered in the region by 2036 and helping establish the area's future growth needs and ambitions beyond that to 2050.

4.5 Future infrastructure changes

The business case is based on a consideration of the do minimum scenario for 2028 and 2043, incorporating anticipated infrastructure changes compared to the 2018 model base. The forecast models include schemes that have now been completed as of 2019/2020, as well as planned improvements. The principal strategic projects are:

- A428 Black Cat to Caxton Gibbet dualling scheme;
- A14 Improvement Scheme as of Design Freeze 3;
- A142 Ely Southern Bypass; and
- Northstowe Phase 2 – link road to Bar Hill known as Southern Access Road (West).

In addition, the do minimum scenario includes a combination of mode shift and junction improvements to help deliver the early phases of Waterbeach sustainably:

[50] Source: Cambridgeshire and Peterborough Strategic Spatial Framework (Non Statutory)

- Waterbeach station relocation to be closer to the new town north of Waterbeach
- New bus and rail-based park and ride at the new town north of Waterbeach to remove car trips from the southern section of the A10
- New high-quality segregated bus provision (route TBC) between the new town north of Waterbeach and Cambridge
- New or improved walking / cycling routes between Ely, Waterbeach and Cambridge
- Extension of A10 Southbound Flare at the A14 / A10 Milton Interchange
- A10 Capacity Enhancements between Butt Lane and Milton Park and Ride (works to widen the southbound single lane south of Butt Lane)
- A10 / Denny End Road junction localised widening
- A10 / Cambridge Research Park roundabout access enhancements
- A10 / A1123 Stretham Roundabout (northbound approach widening).

4.6 Expected growth

The Economic Case in the SOBC and supporting Forecasting Report (SOBC - Appendix F4) describes the assumptions behind forecast model development. This notes the impact of planned local growth in the Greater Cambridge area, which outstrips that expected by the National Trip End Model. This higher traffic growth expectation is a consequence of the population growth, land use and infrastructure changes described in the previous sections.

The resulting growth in total trips in the total A10E2C Model highway matrix is shown below in Table 15 for the model base year (2018), scheme opening year (2028) and design year (2043 – i.e.15 years after opening). This is a consequence of the population growth, land use and infrastructure changes described in the previous sections.

Table 15. Traffic growth between 2018, 2028 and 2043 Do Minimum Scenarios

Time period	2018	2028	2043
AM peak hour total	104,240	125,840	154,660
% Change relative to 2018	-	21%	48%
IP peak hour total	78,360	98,007	129,668
% Change relative to 2018	-	25%	65%
PM peak hour total	113,716	137,778	170,185
% Change relative to 2018	-	21%	50%

The model suggests that the study area will experience the highest increase in the number of trips during the interpeak period, with a change of 25% and 65%, for year 2018 and 2043 respectively. The traffic growth along the A10 during the AM and PM peak hours are expected to be consistent in the scheme opening year and the design year.

4.7 Impacts on the A10 Corridor and parallel routes

As detailed in the section before, the number of journeys made each day in Cambridgeshire will significantly grow over the coming years as a result of the anticipated population and job growth and the scale of committed

and proposed development within the study area. Consequently, there will also be a significant increase in travel demand on the A10 and surrounding routes.

It is anticipated that will be an increase in local trips, as even with high quality sustainable transport provision the Waterbeach development adds many more trips with a local origin or destination at the expense of longer-distance trips through the area. This reflects the greater availability of alternative routes, but also leads to increase in traffic along less suitable routes or indeed increasing pressure on other strategic network links, such as A142, A1123 and B1049, and also on local routes namely Clayhithe Road and Ely Road (Milton).

In addition to the direct impacts on A10 users, there would also be impacts on those already living and working in Cambridge, notably those close to some of the routes running parallel to the A10 who would see traffic and journey times increase as traffic is displaced from the A10 by new traffic from the developments. Other effects, such as the increase in journey times on the A10, might actually undermine the prospects of the new developments themselves by reducing the accessibility of the sites and thereby making them relatively less attractive places to expand or set up businesses.

Figure 29 presents forecast demand flows for weekday AM and PM periods in 2028 with Figure 30 illustrating the forecast delays under the do minimum scenario. The figures demonstrate a significant increase in demand across the network and corresponding increase in delays relative to 2018. Delays would be exacerbated in 2043 due to the traffic growth presented in Table 15.

Similarly, Figure 31 presents forecast flows and Figure 32 presents delays forecast in 2043 without additional improvement to the A10. The figures demonstrate a significant increase in demand across the network and corresponding increase in delays relative to 2018.

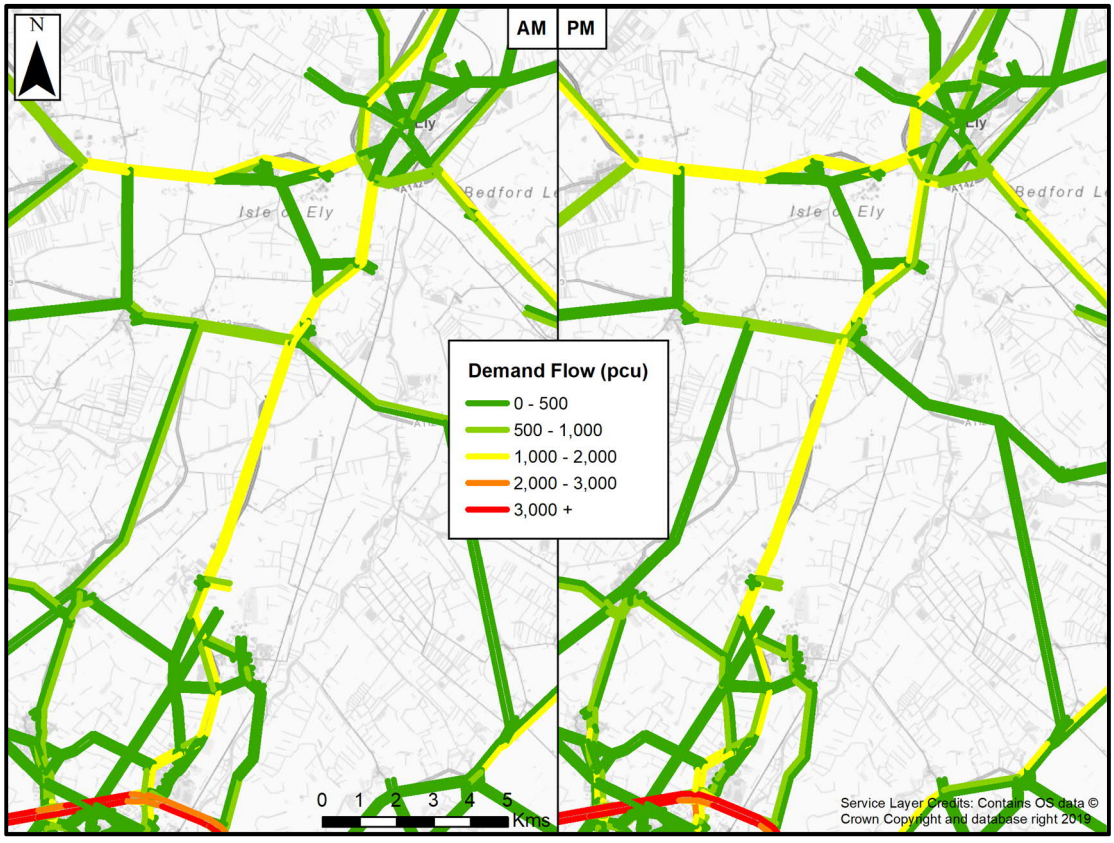


Figure 29. Weekday AM and PM demand flow 2028 DM. Source: A10 Ely to Cambridge Model (A10E2C)

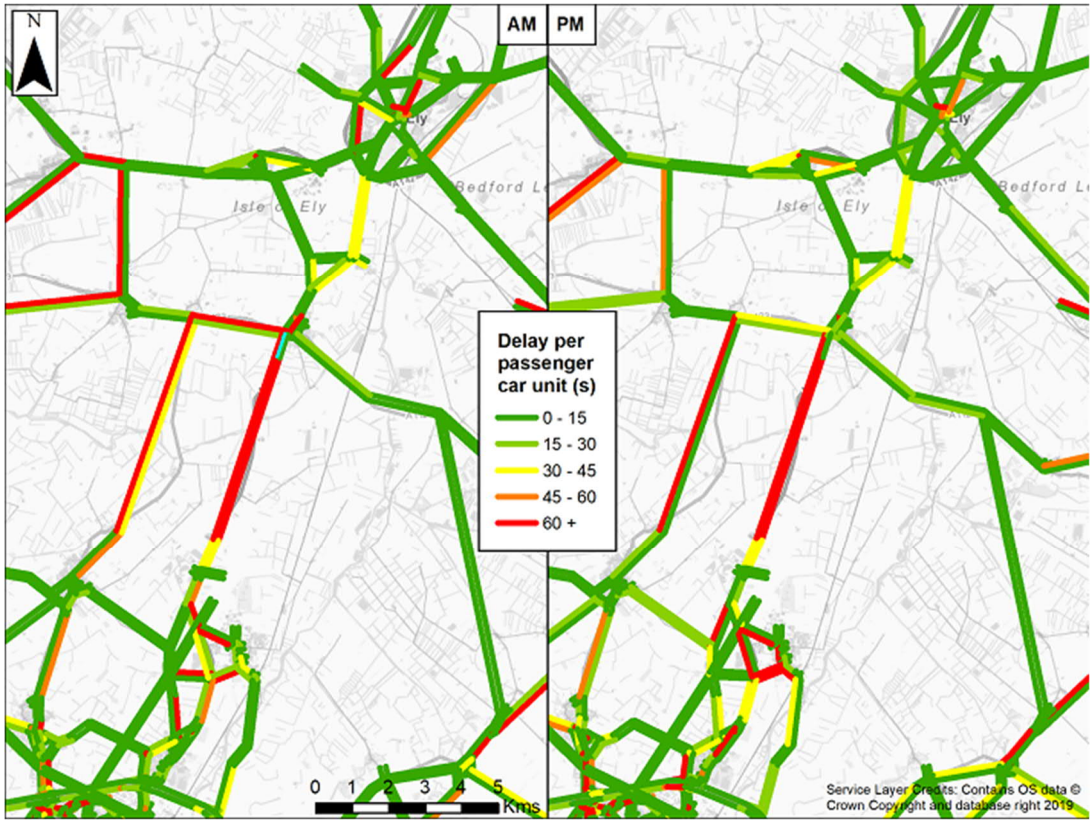


Figure 30. AM and PM total delays 2028 DM. Source: A10 Ely to Cambridge Model (A10E2C)

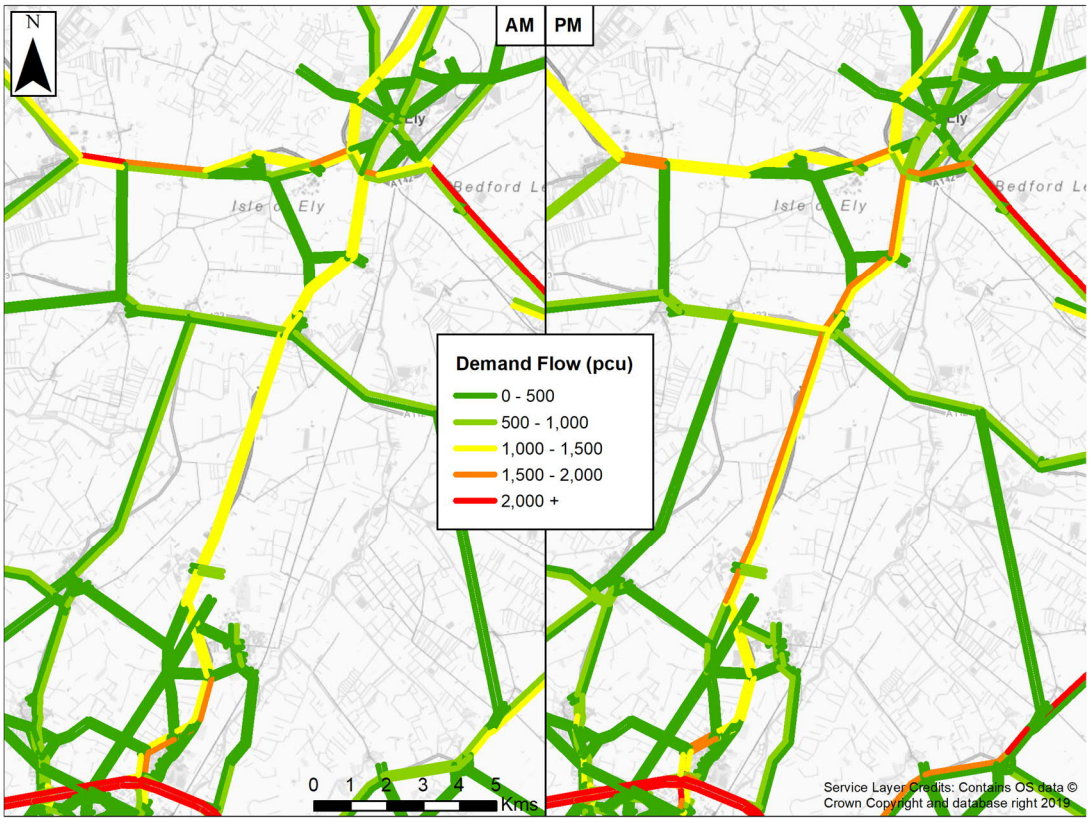


Figure 31. Weekday AM and PM demand flows 2043

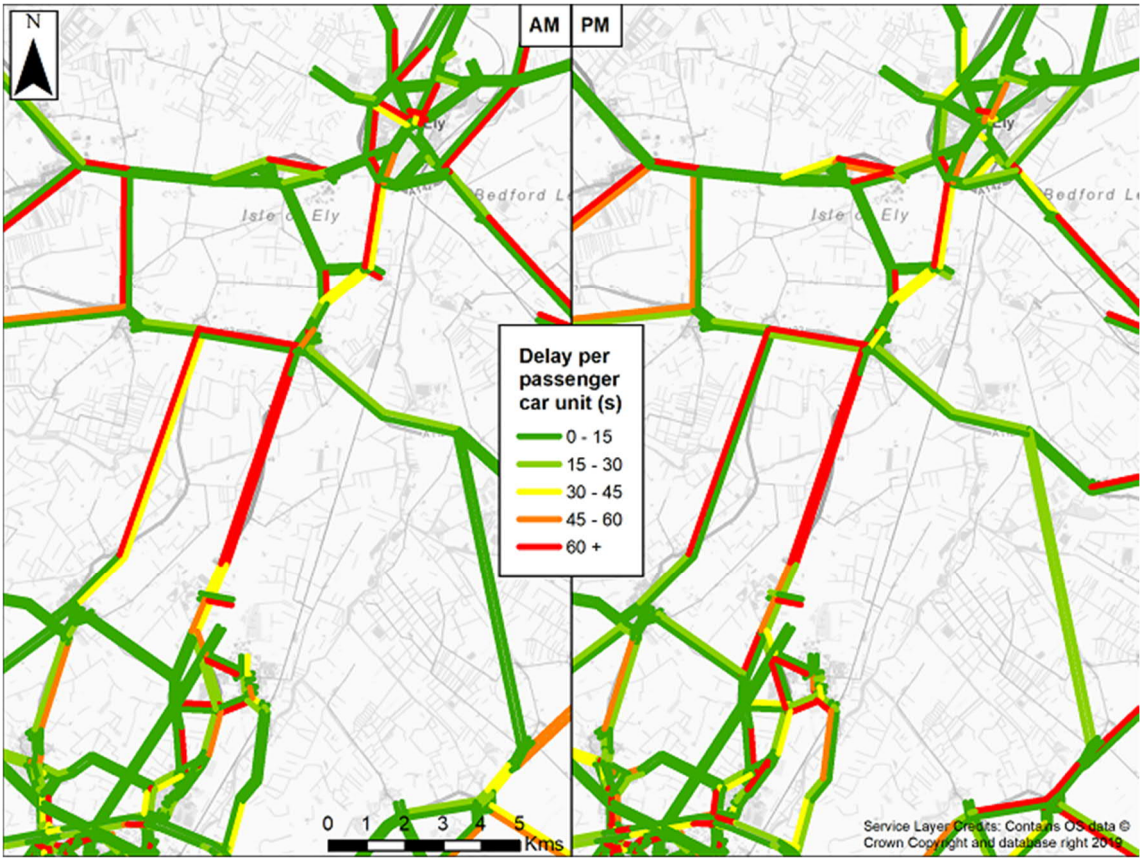


Figure 32. Weekday AM and PM delays 2043

5. Need for intervention

This section summarises the current and future land use and transport-related problems, issues and opportunities identified along the route and surrounding communities. This is derived from the preceding analysis of the existing and future situation.

5.1 Problems and opportunities

Problem 1 – Lack of Housing
 Housing affordability pressures are one of the main threats to growth in the Combined Authority, particularly in Cambridge, and one of the main burdens on people's lives. Demand for housing has risen strongly, while supply, though increasing, has not been able to keep pace.
Opportunity 1 – Realising new sustainable housing opportunities
 Opportunity to unlock further homes at the former MOD site north of Waterbeach up to its site limit of 11,000 homes Support proposals for Ely North, a 3,000 home urban extension of the town Support CPCA's non-statutory spatial framework (non-statutory) aspiration for 100,000 homes to be delivered in the region by 2036 and helping establish the area's future growth needs and ambitions beyond that to 2050.

Problem 2 – Lack of Infrastructure
 Lack of infrastructure to sustain the current growth of Cambridge is a key contributor to the likely future impact on business costs, with conditions on the A10 restricting the full build out of housing at Waterbeach New Town. Without intervention this will make it more difficult for growing firms in Cambridge to recruit and retain the people they need.
Opportunity 2 – Spread economic growth north along the corridor to Ely and beyond
 The A10 serves both the Greater Cambridge and The Fens economies. The region has outperformed the rest of the England and there is an opportunity to spread the benefits of rapid business creation and growth experienced in Cambridge to areas along the A10 corridor including Waterbeach, Ely, the Fens and West Norfolk, where there is already established business agglomeration, through improved connectivity.

Problem 3 – Labour Supply
 The Combined Authority wishes to double the economy and productivity over the next 25 years. However, housing issues are likely to constrain future growth and productivity if nothing is done. Companies are experiencing difficulties in hiring and retaining talent due to the high cost of living in areas within a reasonable commuting time to Cambridge. There is evidence that foreign firms and knowledge-intensive businesses are mainly interested in Cambridge as their UK base, and in some cases, Cambridge is their Europe base. Therefore, there is a risk of these foreign companies leaving the country for other European cities if they are not able to grow within this area, with a consequent negative economic impact on UK plc.

Opportunity 3 – Opportunity to benefit businesses along the A10 through improved connectivity and journey time reliability
 Opportunity to benefit businesses along the A10 through improved connectivity and journey time reliability.

Problem 4 – Climate Change and Environmental Quality
 The Cambridgeshire and Peterborough Local Transport Plan sets out its ambition to reduce emissions to 'net zero' by 2050 to minimise the impact of transport and travel on climate change. Any solution for the A10 will need to proactively consider how it addresses this issue. Whilst the region has a number of attractive areas and designated areas for wildlife, the area is also characterised by substantial swathes of farmland with relatively low biodiversity and low tree cover. As one of the driest areas of the country with limited water resources, yet also at risk of surface water and tidal flooding, the area faces significant challenges in securing a sustainable future.
Opportunity 4 – Enhance environment through increasing biodiversity and by mitigating carbon impacts
 Solutions for the A10 provide an excellent opportunity to increase the amount of land managed for nature through a combination of habitat corridors, habitat parcels and wetland. This will be explored in further detail at Outline Business Case stage as the solution definition matures. Carbon impacts may be mitigated through additional emphasis on sustainable transport and compensatory measures as the scheme design develops. This could include: ▪ Potential interfaces with the Greenways Programme (to be determined), providing segregated, dedicated routes for Non-Motorised Users (NMUs). ▪ Potential interfaces with the electric battery powered Cambridgeshire Autonomous Metro (CAM) and local public transport (to be determined). ▪ Cater for and encourage uptake of Electric Vehicles through potential incorporation of charge-points and dynamic charging. ▪ Low carbon materials. ▪ Potential off-setting.

Problem 5 – Transport
 ▪ Current and future congestion, resulting in slow journey times, impacting on business productivity and commuters' quality of life. ▪ Unreliable journey times at all times of the day both for private vehicles and public transport, caused by combination of side roads, incidents, HGVs, agricultural vehicles and tourist traffic. ▪ Diversion of traffic to the parallel B1049, B1050 and the network of unclassified roads that connect these with the A10. ▪ Community severance and environmental impacts, both along the A10, parallel B roads and unclassified roads. ▪ Lack of segregated, dedicated cycle route between Cambridge, Waterbeach & Ely. ▪ All of the above contribute to safety on the A10, parallel B roads and unclassified roads.

Opportunity 5 - Transport	
	▪ Improved connectivity to the Strategic Road Network via A14 Milton Interchange ▪ Reduced congestion for public transport services ▪ Improved road safety for all road users ▪ Contribute to meeting Local Transport Plan objective of providing residents accessibility to a place of good employment opportunities within 30 minutes travel time ▪ Potential interfaces with the Greenways Programme (to be determined), providing segregated, dedicated routes for NMUs ▪ Improved conditions for people walking, cycling or horse riding in the local area including rural villages along parallel routes ▪ Potential interfaces with the Cambridgeshire Autonomous Metro (to be determined) ▪ Cater for and encourage uptake of Electric Vehicles through potential incorporation of charge-points and dynamic charging.

5.2 Impact of doing nothing

Impacts on movement and accessibility

Future population growth and development will inevitably impact travel across the local area and between Cambridge and Ely. Some sections of the A10 already experience significant delays and poor journey time reliability; modelling shows that delays are anticipated to increase in the future. This will impact not only those who travel along the A10 but also those making local journeys through and across the study area.

The major developments proposed along the A10, and in particular Waterbeach New Town, would further exacerbate existing and future problems for travel on key routes in the county if implemented without the supporting transport infrastructure and modal shift.

Impacts on economic growth and prosperity

The CPIER identified Cambridgeshire and Peterborough's housing crisis as a major constraint on the region's ability to fulfil its economic potential. The lack of infrastructure is a barrier to housing delivery. With insufficient homes to meet demand, housing becomes ever less affordable.

The 'Cambridge Futures' study, widely cited in CPIER, modelled the economic impact that this increase in prices will have should current trends continue. This study found that the increased cost of living, driven through higher housing costs, could cause employment growth to slow beyond 2021 and decline beyond 2031. Key impacts on businesses include needing to pay employees more to afford housing costs, lengthy commutes or even the inability to attract the quality of local labour on which many firms see as very important or critically important to their presence in the area. If nothing is done businesses may start shrinking and moving away from the area. This will affect all types of companies. Lower value companies may relocate elsewhere in the UK thus hollowing out supply chains, whilst high value companies are likely to relocate abroad as they cannot be in Cambridge which results in a net loss for UK plc and irrecoverable damage to key knowledge and research and development business sectors.

Additionally, forecast levels of congestion, and associated journey time variability and unreliability, has the potential for far reaching economic implications. The declining performance of the primary road network such as the A10 would result in productivity losses for businesses, through impacts on their labour supply and potential for business-to-business activity.

The A10 also forms an inter-urban route used by freight (e.g. to and from King's Lynn port, as well as between the Greater Cambridge and The Fens economies). Congestion on these routes will impede the efficient movements of goods. The delays experienced by freight traffic will generate productivity losses to businesses at a regional level.

In the long term, the viability of North East Cambridge as a hub for economically important businesses would be compromised with the risk that businesses seek to relocate outside of the area and potentially outside of the UK. CPIER summarises the stark challenge as "a failure to invest in the development of infrastructure in and around Cambridge is the single biggest endogenous risk to growth facing the area".[51]

Impacts on society

Transport, particularly in terms of accessibility, is increasingly recognised as having a significant role to play in both the creation and alleviation of societal barriers. Increased traffic volumes on the A10 may also exacerbate severance and affect sustainable travel, hindering movement by non-motorised modes and access to goods and services. It could also have negative implications for emergency vehicle access and response time. In addition to the direct time costs created by congestion, there is evidence of welfare disbenefits associated with deteriorating travel conditions (e.g. frustration and annoyance). Resultant welfare disbenefits of transport-related problems would negatively impact quality of life and well-being.

Impacts on the environment

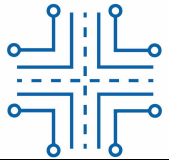
Increases in congestion and reduction in travel speeds along the A10 will result in negative impacts both on air quality along the route and on carbon and NO_2 emissions. Communities along the A10 and alternative routes will suffer a worsening of noise and air quality.

[51] Cambridgeshire and Peterborough Independent Economic Review, p. 79.

6. Scheme objectives

The scheme objectives have been defined with reference to the problems and opportunities presented in Chapter 5, and refined through examination of objectives set out in key transport policy documents for the county – notably the Transport Strategy for Cambridge and South Cambridge, the Cambridgeshire and Peterborough Local Transport Plan, and the Cambridgeshire Long Term Transport Strategy. Table 16 presents these agreed objectives.

Table 16. Scheme objectives

Theme	Objectives
1. Housing 	1.1. Provide infrastructure needed to realise sustainable housing opportunities associated with existing Local Plans 1.2. Provide the opportunity to unlock thousands of new homes between Cambridge and Ely as part of the CPCA's emerging non-statutory spatial plan by 2050.
2. Productivity 	2.1. Increase productivity of the nationally important CPCA economy (including science, technology, agriculture) through improved connectivity to labour, suppliers and markets
3. Environment 	3.1. As part of a wider package for the Corridor contribute to the achievement of CPCA's LTP Net Zero by 2050 policy objective. 3.2. Enhance biodiversity in line with the CPCA's emerging 'doubling nature' policy aims by 2050 (100% increase in land managed for nature in km^2).
4. Quality of life 	4.1. Improve the quality of life for residents in local communities by reducing the community severance and environmental impacts of traffic on the built environment
5. Sustainable and Active Travel 	5.1. Encourage sustainable travel by improving the comfort, reliability, capacity and / or speed of alternative transport services (including rail, CAM, buses, walking, cycling and horse riding) along the A10 corridor
6. Network performance and safety 	6.1. Reduce the risk of collisions along the A10 and on parallel 'B' / unclassified roads in local communities relative to 2018 levels 6.2. Reduce congestion and improving journey time reliability along the A10, sustaining these benefits for the long-term.

These objectives align with the identified problems and opportunities as shown in Table 17 and Table 18.

Table 17 Problems vs objectives

Scheme Objectives ✓ - Low Fit ✓✓ - Medium Fit ✓✓✓ - High Fit	Problems								
	Lack of Housing	Labour supply	Lack of infrastructure to sustain growth	Climate Change and Environment Quality	Congestion	Unreliable journeys	Inappropriate use of B roads	Community severance & environmental impacts	Safety
1.1 Provide infrastructure needed to realise sustainable housing opportunities associated with existing Local Plans	✓✓✓	✓✓	✓✓✓		✓✓✓		✓✓	✓✓	✓✓
1.2. Provide the opportunity to unlock thousands of new homes between Cambridge and Ely as part of the CPCA's emerging non-statutory spatial plan by 2050	✓✓✓	✓✓	✓✓✓		✓✓✓		✓✓	✓✓	✓✓
2.1. Increase productivity of the nationally important CPCA economy (including science, technology, agriculture) through improved connectivity to labour, suppliers and markets	✓✓	✓✓	✓✓		✓✓✓	✓✓✓			
3.1. As part of a wider package for the Corridor contribute to the achievement of CPCA's LTP Net Zero by 2050 policy objective.	✓		✓✓	✓✓✓	✓✓				
3.2. Enhance biodiversity in line with the CPCA's emerging 'doubling nature' policy aims by 2050 (100% increase in land managed for nature in km^2)				✓✓✓				✓	
4.1. Improve the quality of life for residents in local communities by reducing the community severance and environmental impacts of traffic on the built environment			✓✓	✓			✓✓	✓✓✓	✓✓
5.1. Encourage sustainable travel by improving the comfort, reliability, capacity and / or speed of alternative transport services (including rail, CAM, buses, walking, cycling and horse riding) along the A10 corridor	✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓	✓✓	✓✓
6.1. Reduce the risk of collisions along the A10 and on parallel 'B' / unclassified roads in local communities relative to 2018 levels					✓✓	✓	✓✓	✓	✓✓✓
6.2. Reduce congestion and improving journey time reliability along the A10, sustaining these benefits for the long-term.			✓✓	✓✓	✓✓✓	✓✓	✓✓	✓✓	✓✓

Table 18 Opportunities vs objectives

Scheme Objectives ✓ - Low Fit ✓✓ - Medium Fit ✓✓✓ - High Fit	Opportunities											
	New sustainable housing	Productivity of existing firms	Spread economic growth	Double nature and mitigate carbon	Improve connectivity to the SRN	Reduce congestion for PT	Improve accessibility to good employment	Segregated, dedicated routes for NMUs	Improve road safety for all users	Improve conditions for walking, cycling and horse riding	CAM Interfaces	Potential EV Charge points and Dynamic Charging
1.1 Provide infrastructure needed to realise sustainable housing opportunities associated with existing Local Plans	✓✓✓	✓✓	✓	✓	✓✓	✓✓	✓✓	✓	✓	✓	✓✓	
1.2. Provide the opportunity to unlock thousands of new homes between Cambridge and Ely as part of the CPCA's emerging non-statutory spatial plan by 2050	✓✓✓	✓✓	✓	✓	✓✓	✓✓	✓✓	✓	✓	✓	✓✓	
2.1. Increase productivity of the nationally important CPCA economy (including science, technology, agriculture) through improved connectivity to labour, suppliers and markets	✓✓	✓✓✓	✓✓✓		✓✓✓	✓✓	✓✓	✓	✓	✓	✓✓	
3.1. As part of a wider package for the Corridor contribute to the achievement of CPCA's LTP Net Zero by 2050 policy objective.				✓✓✓		✓		✓✓✓	✓	✓✓✓	✓✓✓	✓✓✓
3.2. Enhance biodiversity in line with the CPCA's emerging 'doubling nature' policy aims by 2050 (100% increase in land managed for nature in km^2)				✓✓✓				✓		✓		
4.1. Improve the quality of life for residents in local communities by reducing the community severance and environmental impacts of traffic on the built environment				✓			✓	✓	✓✓	✓✓✓		
5.1. Encourage sustainable travel by improving the comfort, reliability, capacity and / or speed of alternative transport services (including rail, CAM, buses, walking, cycling and horse riding) along the A10 corridor		✓	✓	✓		✓✓✓	✓✓✓	✓✓✓	✓	✓✓✓	✓✓✓	✓
6.1. Reduce the risk of collisions along the A10 and on parallel 'B' / unclassified roads in local communities relative to 2018 levels					✓			✓	✓✓✓	✓	✓	
6.2. Reduce congestion and improving journey time reliability along the A10, sustaining these benefits for the long-term.						✓	✓✓	✓	✓	✓✓	✓	

6.1 Strategic Fit

The objectives have been mapped in terms of their alignment with relevant local and regional policy, national policy, and finally their fit with the problems and opportunities identified in the Need for Intervention. Figure 33 demonstrates how the scheme objectives fit with LTP objectives and Figure 34 demonstrates how the scheme objectives fit with wider policy objectives.

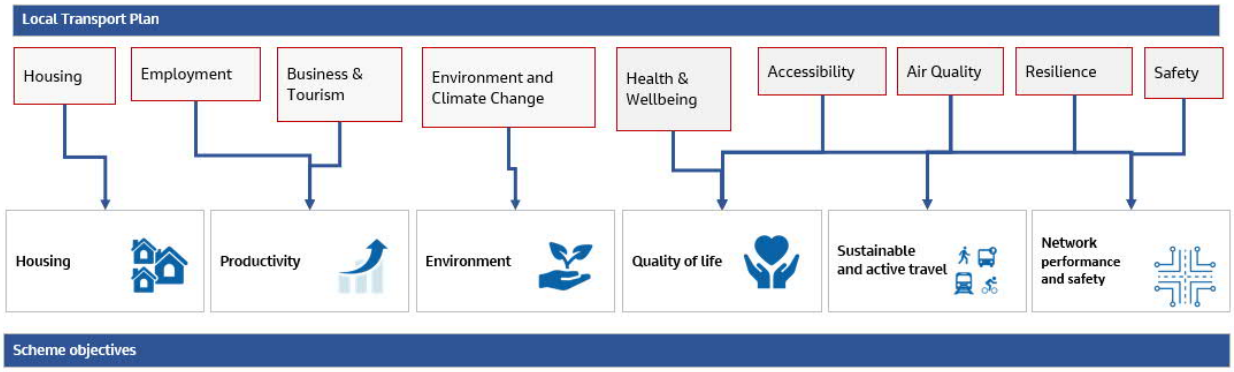


Figure 33. Fit with LTP objectives

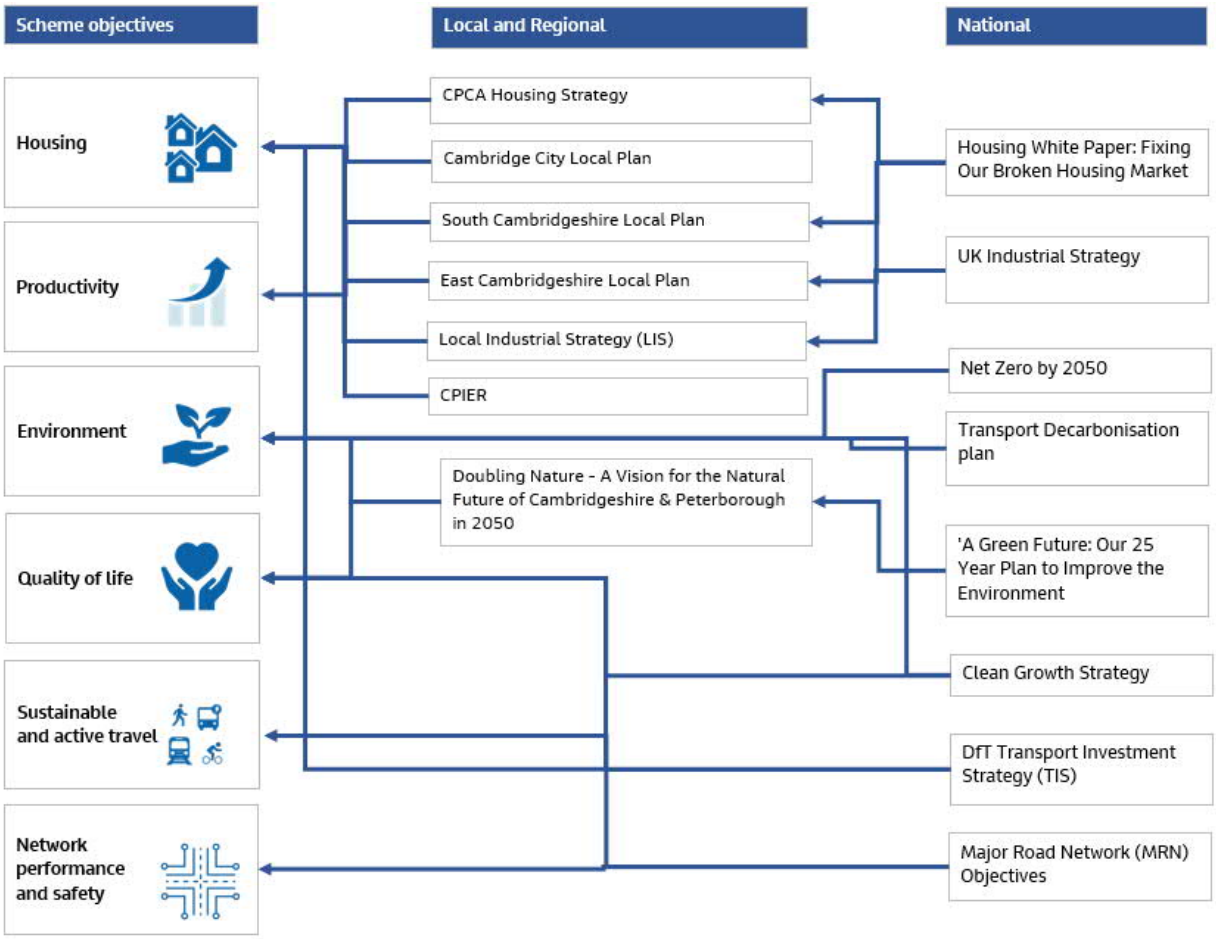


Figure 34 Fit with wider policy objectives and strategy

6.2 Measures for success

The transport improvements of the intervention options will result in a range of measurable impacts on traffic and travel conditions. Impacts and measurable indicators relevant to improving conditions on the A10 could include:

- Delivery of identified housing for CPCA measured by the number of homes/jobs delivered/occupied.
- Reduced congestion on the A10 and improved journey time reliability for north-south traffic movements measured by traffic volume and relative difference in peak/off-peak journey times.
- Enhanced connectivity reflected by absolute journey time improvements on key routes compared against the 2043 do minimum situation.
- Improved/sustained air quality and reduced traffic noise on the A10 and near residential areas.
- Enhanced biodiversity by measuring the area of land that is managed for nature.
- Increased accessibility to alternative transport modes as measured by the change in mode share of sustainable and active travel modes.
- Reduced carbon emissions. A carbon assessment has been undertaken as part of the options appraisal. Once the preferred option has been selected and preliminary design undertaken a baseline carbon calculation will be completed. This will provide the basis against which carbon reductions can be evaluated and this would be linked into the overarching carbon management plan and CEEQUAL criteria. Longer term the project would be looking to implement PAS 2080, a global standard for managing infrastructure carbon.

7. Geographical Area for the Intervention

7.1 Option Assessment and Transport Modelling

In generating and assessing options it has been important for the project team and stakeholders to understand the geographical influence and impact of the A10 options.

Appraisal of the Option Short list makes use of existing models, including the A10 Ely to Cambridge model (A10E2C) and the Cambridge Sub-Regional Model (CSRM), version 2.

The A10E2C model was developed by Atkins on behalf of the Cambridgeshire and Peterborough Combined Authority. It is a bespoke model, developed from the multi-modal strategic CSRM2, specifically for the purposes of appraisal of potential highway improvements on the A10 and cognisant of the requirements of TAG in this regard. The model has a 2018 base year, and its core study area was determined through "preliminary testing" of a "significant development to the A10 corridor" through the 2018 pre-Strategic Outline Business Case work.

The resulting area of impact is shown below in Figure 35, which extends west as far as the B1050 and B1381 and east as far as Newmarket and the A142.

Figure 35. A10 study – area of impact

7.2 Housing Growth

From a growth perspective the area of impact in terms of dependent development has been determined through liaison with Cambridgeshire County Council officers and the Combined Authority.

Waterbeach New Town, located on the A10 corridor approximately six miles north of Cambridge, is a mixed-use development of a former MOD site. The New Town is being delivered by two separate developers – Urban & Civic, and RLW.

Cambridgeshire County Council and South Cambridgeshire District Council have been working with the two developers to agree development mitigation and trigger points arising from their respective first phases of development. This includes mode shift and local highway infrastructure as presented in Table 19.

Table 19. Waterbeach New Town Mitigations

Development	Mitigation	Trigger Points
Urban & Civic (Phase 1, 1600 dwellings)	Local Buses, Quick win junction improvements and trip budget monitoring	First homes
	Mere Way Cycle Route and Bridge over the A10	150 homes
	Link Road to new station	900 homes
	Further junction upgrades depending on monitoring results	1,600 homes
RLW (Phase 1, 800 dwellings)	Re-located Waterbeach railway station 200 Park and Ride Spaces Contribution to Cambridge to Waterbeach Greenway	200 homes

Other developments in the area at Cambridge Northern Fringe East, Cambridge Science Park and Ely North are considered not dependent on the A10 scheme.

8. Option development and assessment

8.1 Introduction

The project's option assessment process has followed DfT's Transport Analysis Guidance (TAG)'s option development process included within The Transport Appraisal Process, May 2018.

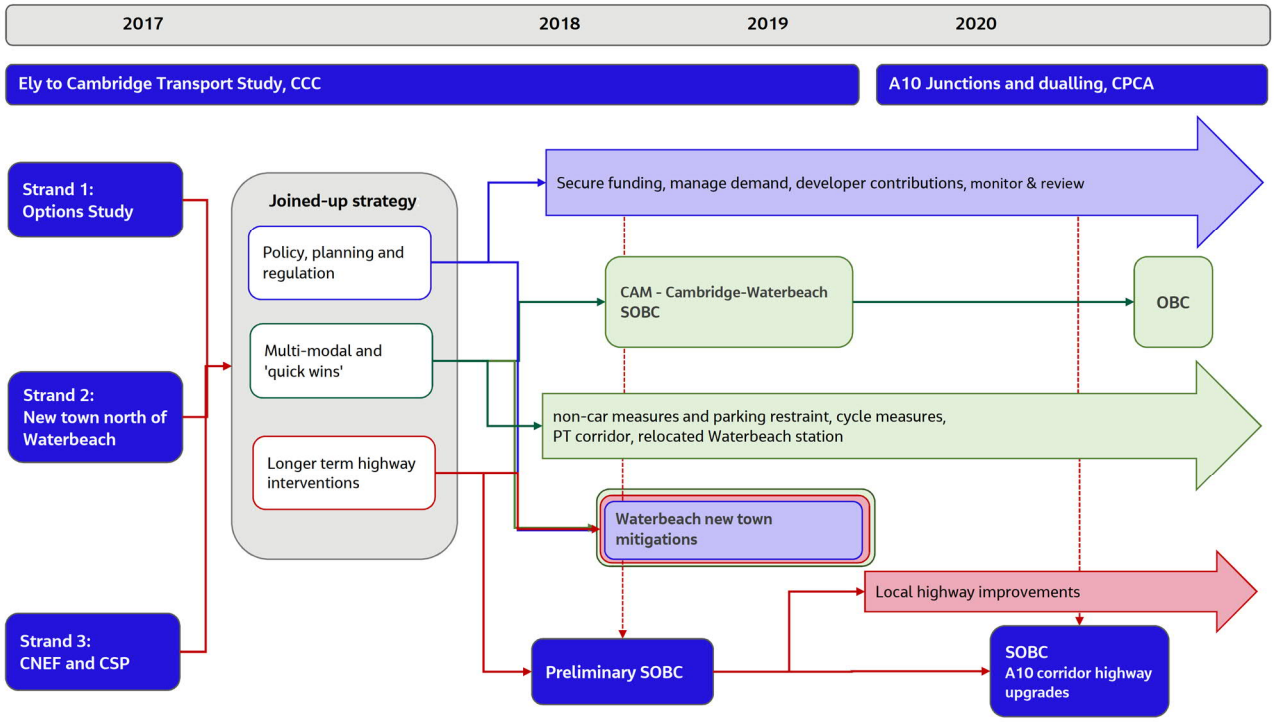
The option assessment process in 2020 has been an inclusive exercise building on previous work undertaken in 2017 / 2018 at the preliminary SOBC stage. Through a structured option generation and sifting process, the option assessment has ultimately identified a shortlist of options for more detailed modelling, forecasting and TAG appraisal, with this reported in the SOBC. Each study is now described in turn.

8.2 The Ely to Cambridge Transport Study 2018

A series of interrelated studies have been undertaken within the North East Cambridge area and Cambridge – Waterbeach – Ely corridor since 2017, analysing baseline conditions, major components of growth, and the overall corridor. In 2018, Cambridgeshire County Council and its advisors developed an initial business case for the A10 corridor itself, undertaking a Preliminary Strategic Outline Business Case (SOBC) stage in order to set out the strategic case and high-level value for money and deliverability of a range of interventions.

Figure 36 presents an overview of interconnections between the three strands of the Ely to Cambridge Transport Study: Strand 1 is the options study and SOBC for the overall package of interventions in the Ely-Cambridge study area; Strand 2 is the transport study for the development of the new town north of Waterbeach; Strand 3 is the transport study for Cambridge North East Fringe (CNEF) and Cambridge Science Park (CSF).

Figure 36. Joined up strategy for the A10 corridor



The Ely to Cambridge options study recommended a joined-up strategy across three types of measure:

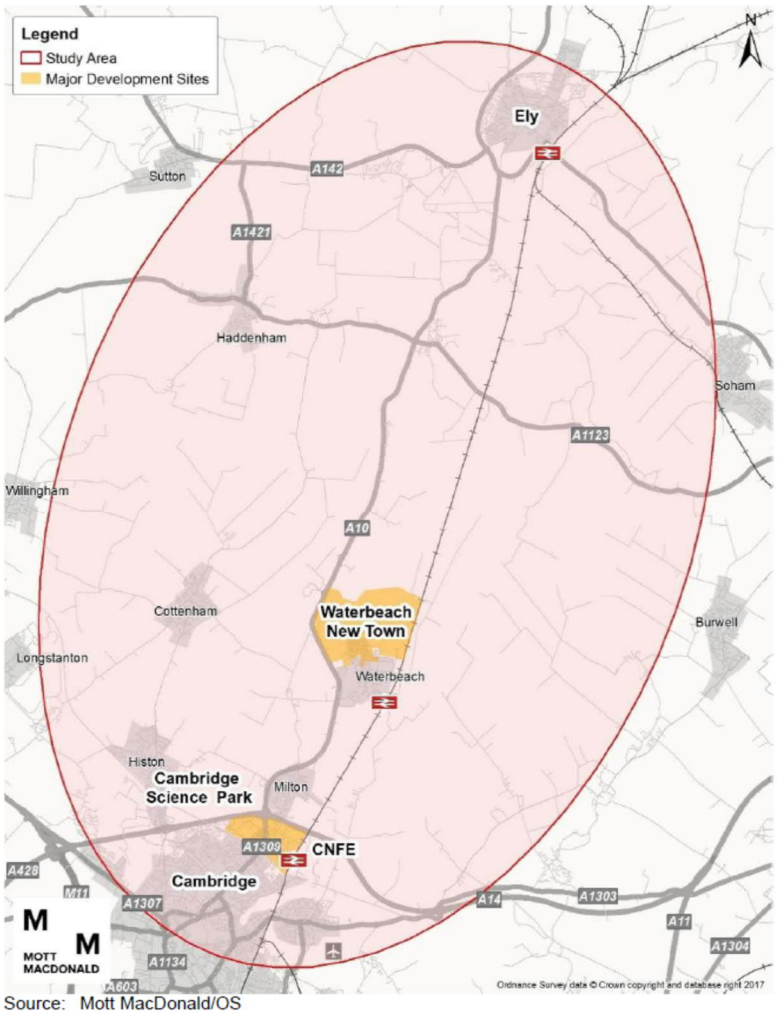
- Policy planning and regulation – securing funding for improvements, managing demand, contributions from developers, monitor & review.
- Multi-modal quick wins – non-car measures and parking restraint, cycle measures, public transport corridor.

- Longer term highway interventions – junction improvements and carriageway capacity upgrades.

8.3 Preliminary-SOBC option development 2018

The Preliminary SOBC undertaken by Mott MacDonald for Cambridgeshire County Council in 2018 provided an initial evidence base covering the current situation, future issues and opportunities and strategic context. It established the need for improvements, developed a set of scheme objectives and identified appropriate transport packages that can be implemented within its defined Ely to Cambridge Corridor study area as shown below.

Figure 37. Ely to Cambridge Transport Study Area. Source Mott MacDonald



Source: Mott MacDonald/OS

8.3.1 Option Generation

The Preliminary SOBC study assessed progressively greater levels of transport investment, initially testing in isolation measures aimed at encouraging a shift from car use to public transport, walking, and cycling. It then tested these in conjunction first with junction improvements along the A10, and finally with the implementation of dual carriageway standards on the South, North, and full A10 corridor between Ely and Cambridge. The options are summarised below and displayed graphically in Figure A1 to A5 in Appendix A:

1) DS1 'Mode shift': A package of measures to encourage mode shift. These include:
   a) New or improved walking/cycling routes between Ely, Waterbeach and Cambridge.
   b) New high-quality segregated public transport provision (route TBC) between Waterbeach development and Cambridge.

c) New park and ride sites at Waterbeach development, to remove car trips from southern section of A10.

d) Existing Waterbeach railway station relocated closer to Waterbeach development.

2) DS2 'Junction+': DS1 + improvements to increase capacity at ten junctions on the A10 between Ely and Cambridge. These were as follows:

a) Improved capacity on the slip roads joining the roundabout and from Cambridge Road at the A14/A10 Milton Interchange.

b) Increased capacity for vehicles travelling northbound on the A10 at the Milton Park and Ride southern access, whilst keeping the left slip to access the P&R site.

c) Increased capacity on the southern A10 at the Butt Lane junction for flow travelling northbound, and on the Butt Lane arm, with left turns only still being implemented.

d) Improved capacity on Landbeach Road and Humphries Way junctions on the A10.

e) Increased capacity on Car Dyke Road and Waterbeach Road junctions on the A10.

f) Increased capacity from the site and on the southern A10 arm at the southern access to the Waterbeach Development.

g) Increased capacity on Green End at the junction with the A10.

h) Increased capacity on the site access arm at the northern access to the Waterbeach development.

i) Increased capacity at the A10 / A1123 roundabout in Stretham.

j) Increased capacity at the A10 / A142 Angel Drove roundabout at Ely.

3) DS3 'North-dual': incorporating mode shift and junction capacity improvements from DS1 and DS2 plus a dual carriageway route, on an alignment to be determined, between the new town north of Waterbeach and Ely.

4) DS4 'South-dual': incorporating mode shift and junction capacity improvements from DS1 and DS2 plus a dual carriageway route, on an alignment to be determined, between the new town north of Waterbeach and A14 at the Milton Interchange.

5) DS5 'Full dual': incorporating mode shift and junction capacity improvements from DS1 and DS2 plus a dual carriageway route, on an alignment to be determined, between Ely and A14 at the Milton Interchange.

8.3.2 Option assessment

The Study analysed each of the option packages through a range of indicators, using Cambridgeshire County Council's Cambridge Sub-Regional Model (CSRM2) and bespoke option appraisal methodology. These were as follows:

- Performance against three key model performance indicators, namely car mode share, journey time and parallel route traffic level for a 2031 model horizon year.
- Multi-criteria assessment using Mott MacDonald's Investment Sifting and Evaluation Tool (INSET) decision support toolkit based on Green Book compliant multi-criteria decision analysis and DfT's early assessment and sifting tool – EAST.
- Cost Benefit analysis using outputs from the CSRM2 model runs for each option alongside scheme costing.

8.3.3 Model Performance Indicators

Table 20 summarises, for the above three key modelling performance indicators, the level of improvement delivered by each Do Something mitigation package when compared to:

- The Future-Base Do-Minimum case (the 'without development' scenario).
- The Combined-Scenario Do-Minimum case (the unmitigated 'with development' scenario).

Table 20. Improvement over Future-Base and Combined-Scenario Do-Minimums in both peak hours. Source: Mott MacDonald

Indicator	DS1. Mode Shift	DS2. Junction +	DS3. North Dual	DS4. South Dual	DS5. Full Dual
Car Mode Share (corridor)	✓✓	✓✓	✓✓	✓✓	✓✓
Parallel Route Traffic Levels	××	××	××	✓×	✓×
Journey Time	××	×✓	✓✓	✓✓	✓✓

8.3.4 Multi-Criteria Assessment

Table 21 shows that from the results of the multi-criteria assessment that the South Dual option scored the highest overall, given its strong scoring in both strategic and transport outcomes and its relative cost compared to the other dualling options.

Table 21. Pre SOBC - Final INSET Scores by Package Option. Source: Mott MacDonald

Package	Strategic Theme	Transport Theme	Cost Theme	Total Score
DS1. Modal Shift	1.00	0.93	-0.20	0.58
DS2. Junction Plus	1.00	1.33	-0.40	0.64
DS3. North Dual	1.13	1.93	-0.80	0.76
DS4. South Dual	1.67	2.20	-0.60	1.09
DS5. Full Dual	1.40	2.20	-1.00	0.87

Out of the non-dualling options, both the modal shift (DS1) and junction plus (DS2) options delivered modest strategic and transport benefits at relatively low cost. The Junctions Plus option (DS2) performed slightly better given that its highway impacts are more beneficial, despite its slightly higher cost.

Overall the dualling options all scored higher than the non-dualling options as they are able to unlock significant benefits from both a strategic perspective and from a highway perspective.

The study suggested that benefits could be gained by first undertaking comparatively low-cost packages which are likely to have shorter implementation programmes as well as lower costs, together with effective measures to encourage mode shift. Higher cost packages which generate significant benefits could then be adopted subsequently in line with the scale and pace of development.

8.3.5 Cost Benefit Analysis

The following tables shows the economic case for each of the options. The present value of benefits was limited to transport economic efficiency (journey time and vehicle operating costs), greenhouse gas and indirect tax revenue impacts.

Table 22. Pre SOBC – Benefit Cost Ratios (2010 prices, discounted to 2010). Source: Mott MacDonald

Category	DS1 Value (£000)	DS2 Value (£000)	DS3 Value (£000)	DS4 Value (£000)	DS5 Value (£000)
Present Value of Benefits (PVB)	208,371	435,414	710,419	539,865	759,487
Present Value of Costs (PVC)	82,856	122,376	222,947	166,856	267,482
Net Present Value (NPV)	125,515	313,038	487,472	373,009	492,005
Benefit Cost Ratio (BCR)	2.52	3.56	3.19	3.24	2.84

8.3.6 Conclusions of the Pre-SOBC

The assessment showed that mode-shift options without highway improvements would provide some additional travel capacity and benefits but would not significantly improve the identified issues of congestion and traffic displacement. A key finding was that highway improvements would be necessary to address all of the problems identified.

The Study therefore concluded by recommending a joined-up strategy across three types of measure:

- Policy planning and regulation – securing funding for improvements, managing demand, contributions from developers, monitor & review.
- Multi-modal quick wins – non-car measures and parking restraint, cycle measures, public transport corridor.
- Longer term highway interventions – junction improvements and carriageway capacity upgrades.

Separate workstreams then emerged to take each of these forward as standalone projects, whilst being cognisant of any interfaces. As noted in Section 1.5 these multi-modal (non-highway) solutions are now being progressed through other workstreams.

8.4 A10 Junction Assessment Report 2018

On behalf of Cambridgeshire County Council, Mott MacDonald produced a junction assessment report for the A10 Ely to Cambridge, building on the Pre-SOBC. The study was used to identify achievable quick-win improvements for junctions on the A10 between Cambridge and Ely and to assess both the economic value of implementing these in advance of a future dualling scheme and the scale of local development which could be released within that time-frame.

The junction study gives some background to the choice of junctions included in this document. The Table 23 below provides the priority levels for the 11 junctions within the study area.

- Priority 1 – Top priority junctions for improvement, where solutions outside the highway boundary should be explored if necessary.
- Priority 2 – Mid-priority junctions, where all possible improvements within the highway boundary should be explored.
- Priority 3 – Lower-priority junctions, where improvements within the highway boundary are desirable if possible.

Table 23. A10 junctions included within Junction Assessment Report 2018 study scope

A10 Junction	Junction Type	Priority Level
Milton Interchange	Grade separated signalised roundabout	1
Butt Lane/Park and Ride	Staggered junction, signal controlled	1
Landbeach Road	Staggered priority junction	2
Waterbeach Road/Car Dyke	Staggered priority junction	2
Denny End Road	Signal controlled	1
Cambridge Research Park roundabout	Uncontrolled roundabout	2
Waste Treatment Site	Uncontrolled roundabout	2
A1123 Stretham Roundabout	Uncontrolled roundabout	2
Little Thetford Junction	Priority junction	3
A142 Angel Drove	Uncontrolled roundabout	1
A142 Witchford Road	Uncontrolled roundabout	1

As can be seen five of the junctions have priority level 1, and three junctions have priority level 2. In the following table, junctions with priority levels 1 and 2 show the modelled performance of the existing layouts (the 'Do Minimum' tests) in the 2021 opening year and 2031 design year, and whether improvement schemes are therefore needed in each case. Junctions are considered to be over-capacity if:

- Ratio-of-flow-to-capacity (RFC) is at or over 85%.
- Degree of Saturation (DoS) is at or over 90%.

Values are shown in red in Table 24 if they meet these criteria.

Table 24. Junction-level growth factors derived from Cambridge Sub-Regional Model (CSRM2) outputs. Source: Mott MacDonald

A10 Junction	RFC/DoS				Design Needed?
	2021		2031		
	AM	PM	AM	PM	
Milton Interchange	123.0	115.1	126.7	115.5	Yes
Butt Lane/Park and Ride	77.4	82.2	89.2	93.8	Yes
Landbeach Road	49.4	29.2	36.1	51.9	No
Waterbeach Road/Car Dyke	35.4	44.3	48.4	53.8	No
Denny End Road	94.5	81.3	110.9	97.0	Yes
Cambridge Research Park	99.4	92.7	100	97.9	Yes
Waste Treatment Site	100	99	100	100	Yes
A1123 Stretham Roundabout	99.8	97.5	100	100	Yes
Little Thetford Junction	No traffic count data available				N/A
A142 Angel Drove	94.2	99.1	99.6	100	Yes
A142 Witchford Road	100	100	100	100	Yes

This work resulted in the selection of eight junctions to form the Junctions option within the MRN application described below and ultimately one of the shortlisted options for the SOBC.

8.5 MRN Application Pre-SOBC Proforma 2019

The Combined Authority submitted proformas for both the junctions package identified above and a dual carriageway concept to the Department for Transport's National Roads Fund in July 2019. These proformas covered progress of the scheme (up until its submission in July 2019), which encompasses the problems and objectives, value of money of each proposed option, the indicative cost of the scheme per option, and the management case expressing a timeline for delivery. All options returned high value-for-money indicative BCRs, but only the three dualling options show transport performance improvements against the 'without development' DM when measured across key metrics.

The Chancellor announced on 11 March 2020 that junction improvements had been identified for further development. The Combined Authority has discussed both projects with the DfT since this announcement making it clear that the purpose of this SOBC is to further develop the case for junction and / or carriageway capacity upgrades to the A10 as part of a robust approach to option assessment and appraisal. The next section describes the work undertaken to move from a very long list of plausible dual carriageway concepts to a short list for assessment and appraisal alongside the junctions package described.

8.6 2020 SOBC

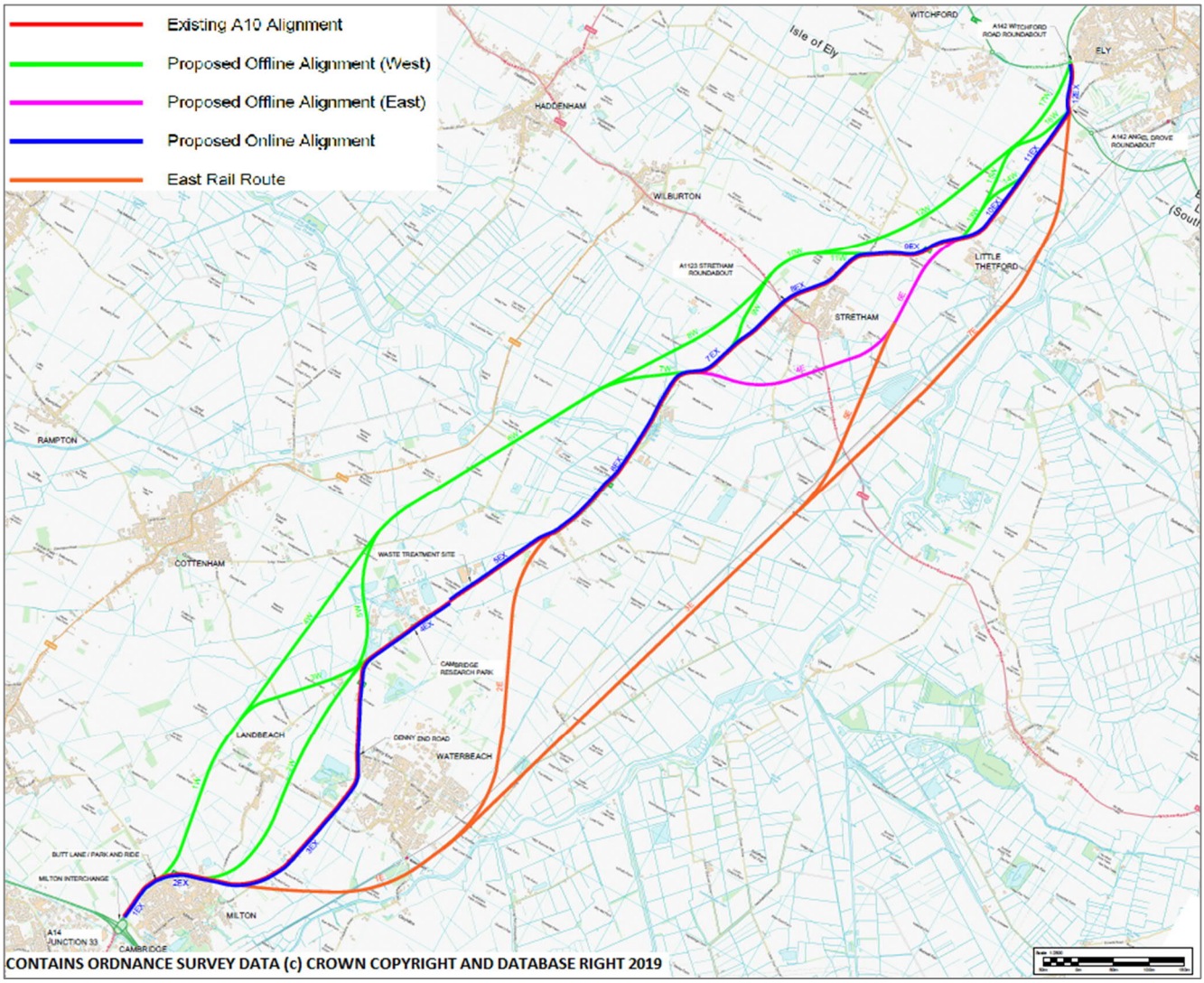
We have followed the DfT's Option Development Process to identify and assess options to improve the A10 corridor between the north of Cambridge and Ely. The following stages are described in turn:

- Very Long List – 78 options.
- Long List – 24 options.
- Short List – 7 options.

8.6.1 Development of a 'Very Long List'

As previously noted the pre-SOBC did not define specific alignments for its assessment of the various dualling options. A 'very long list' of 78 alignment options was generated by identifying plausible engineering alignments through the study area. The options consisted of combinations of the route segments presented in Figure 38.

Figure 38. Longlist segment alignments



An initial sift was undertaken on the 'very long list' by assigning Red-Amber-Green scores to each option against deliverability and feasibility criteria. The initial sift rationale is presented in Appendix B. Any option that scored 'Red' against one or more criteria was excluded at that point. This provided a preliminary long list of 20 alignment options. A further four options representing dualling the northern section of the route were added for completeness and continuity from Pre-SOBC work, enabling full dualling, southern dualling and northern dualling to be considered. This resulted in a long list of 24 options to take through the full sift using Multi-Criteria Assessment.

8.6.2 Multi-criteria assessment (MCA)

A bespoke Multi-Criteria Assessment (MCA) tool was developed to apply and record the option sifting process. The MCA was applied to a long list of options that included a reference case 'Do Minimum' scenario of committed policy and sustainable transport measures and a package of short-term junction improvements without any carriageway upgrade.

The MCA was undertaken in two stages:

1. First, all options were scored on a scale of -3 to +3 on their ability to meet the scheme objectives discussed in Section 6; total scores were calculated across objective themes, so that the Environment and Network performance themes with two objectives each were represented by average scores. Options scoring poorly for impact against scheme objectives were discarded after this stage.

2. Remaining options were scored on a scale of -3 to +3 against 'other criteria', namely: feasibility, deliverability, safety, environmental impact, social impact, affordability, compatibility with public transport provision, compatibility with provision for non-motorised users, and compatibility with a short-term package of junction improvements.

The methodology and scoring rationale was approved by the CPCA at a workshop on 11 March 2020. It was agreed that no 'other criteria' would be scored more highly than any other. A series of multi-disciplinary internal team workshops were held to score the long list of options, based on available information, including findings from the Preliminary SOBC study. The resulting scores and shortlist were presented to CPCA and approved at a virtual workshop on 1 May 2020.

8.6.3 Scoring rationale – scheme objectives

Table 25 presents the rationale applied for scoring options against the scheme objectives.

Table 25. Scoring rationales for scheme objectives

Theme	Objectives	Scoring rationale
Theme 1 - Housing	Provide infrastructure needed to realise sustainable housing opportunities associated with existing Local Plans	The majority of options all scored equally highly due to their ability to open up the area for development. Only partial dual (northern section) options scored 1 as they didn't adequately address the growth at Waterbeach. This would lead to a high demand of traffic on upgraded junctions, so in reality it would be unlikely for the full capacity to be realised.
	Provide the opportunity to unlock thousands of new homes between Cambridge and Ely as part of the CPCA's emerging non-statutory spatial plan by 2050.	All options scored equally; the planning status of additional development is weaker than for that stated in the local plans. Furthermore, specifics of size and intended location are unknown, so it is not possible to differentiate between the options.
Theme 2 - Productivity	Increase productivity of the nationally important CPCA economy (including science, technology, agriculture) through improved connectivity to labour, suppliers and markets	All full-dualling options offered peak journey time savings >5 minutes across all modes, so these scored equally. Partial dualling with junction improvements scored lower. Junction+ achieves lower journey time savings Full (and south dual) provide adequate road access to Cambridge Science Park.
Theme 3 - Environment	As part of a wider package for the Corridor contribute to the achievement of CCC's Draft Net Zero Cambridgeshire by 2050 policy objective	In the Pre-SOBC assessment all highway interventions had generated a small mode shift towards car. Dualling options would be expected to have a mode significant increase in carbon compared with a junctions-only package. Pre-mitigation this scored negative. At this stage it is not possible to differentiate between the full dualling options. It was considered that partial dualling without junctions would score lower due to reduced impact on congestion. Both south dualling and full dualling scored the same (-2). Northern dual options scored -3, because it would direct more traffic on to

Theme	Objectives	Scoring rationale
		junctions in the Waterbeach area exacerbating congestion.
	Enhance biodiversity in line with the CPCA's emerging 'doubling nature' policy aims by 2050 (100% increase in land managed for nature in km^2)	Junction-only interventions offer little opportunity to increase biodiversity due to their smaller footprint. Dualling offers the opportunity to include substantial landscaping as part of the design scope. In real terms, Land given to ecology would be over and above the scheme itself. All options might therefore score the same for doubling nature, except for the ease of provision of mitigation: potentially easier and more straightforward for offline sections. This may be easier to incorporate in land take for design, rather than obtaining land perceived to be remote for the scheme, which online dualling would necessitate.
Theme 4 - Quality of Life	Improve the quality of life for residents in local communities by reducing the community severance and environmental impacts of traffic on the built environment	Dualling offers greater traffic reduction than a junction only package at Cottenham Rd and Horningsea Rd. All options decrease traffic on Twenty Pence Rd but increase traffic on Green End. Online dualling may increase severance in communities along the A10. There are several noise important areas along the existing A10; offline options that take traffic away would benefit those areas, so these scored more highly.
Theme 5 - Sustainable and active travel	Encourage sustainable travel by improving the comfort, reliability, capacity and / or speed of alternative transport services (including rail, CAM, buses, walking, cycling and horse riding) along the A10 corridor	Full (and south) dual improved bus journey time reliability more than junctions or north dual options. Dualling options offer greater scope to improve active travel provision (if included in design scope). There is a challenge to any online route - e.g. improving cycle route easier offline than online. Options score similarly.
Theme 6 - Network performance and safety	Reduce the risk of collisions along the A10 and on parallel 'B' / unclassified roads in local communities relative to 2018 levels	Junction improvement should provide an efficient way to reduce collision clusters close to junctions while dualling options likely to have more traffic reduction impact for parallel routes. Options 7J and 7L scored lower due to inferior geometry and a longer route. Partial dualling and junctions only score lower due to reduced effect due to shorter length of improvements; compared to the national average, road safety south of the A1123 is very poor.
	Reduce congestion and improving journey time reliability along the A10, sustaining these benefits for the long-term	The Pre-SOBC assessment found that all highway interventions are able to significantly reduce the level of delay across the network; dualling options have the more significant reduction in journey times and can be expected to be better at sustaining the benefits for the long term. Options 7J and 7L appear to be a longer, curved route.

8.6.4 Scoring rationales – other criteria

Table 26 presents the scoring rationale for the remaining criteria.

Table 26. Scoring rationales for other criteria

Other criteria	Scoring rationale
Feasibility	The assumption for the purposes of scoring, is that public opinion will in the main be against taking green land for offline options, so the more online the section the higher the score. Scores reduced where residential property might be directly impacted by an option.
Deliverability	Junctions are easiest to deliver due to scale. Offline solutions are easier to construct as no interface with live traffic and can have multiple construction fronts.
Safety	Similar to deliverability, interface with live traffic construction increases safety risk of construction. Any option would be designed for ease and safety of operation and maintenance.
Environmental impacts	Pre-mitigation it is assumed that there would be a greater negative environmental impact for offline options - breaking new ground, and more extensive use of new construction materials. Mitigation opportunities exist for all options, and more detailed analysis of the short list will identify these at that stage.
Social impacts	Offline option scores higher for lesser community severance. All online dualling options likely to be similar.
Affordability	Maintenance costs are similar for all dualling options. Offline will increase land costs, though some online requires property purchase so a general consideration.
Compatibility with public transport provision	Junctions will accommodate existing public transport options but the opportunity to link in with new solutions is reduced. Offline has greatest potential for linking in with new solutions, with existing buses running on the old A10 as it is. Online dualling offers a reduced scope for integration of new services/ provision.
Compatibility with provision for NMU	Junctions can only provide better facilities over a limited length of the network which may not be sufficient to make a significant impact. Fewer constraints exist for offline solutions to build quality infrastructure. Online solutions though, where constrained could link in with existing provision, or be provided within the corridor, not necessarily on the existing road corridor.
Compatibility with a short-term junctions-only package	An offline solution would see junction improvements benefit only a reclassified A10. The more online a dualling option, the greater the compatibility between dualling and interim junction improvements.

8.6.5 Long list scores summary

Table 27 presents the total and combined scores against the scheme objectives and other assessment criteria for all 24 long list options. Shortlisted options are highlighted in green. A summary of the scoring for all long list options can be found in Appendix C.

Table 27: Overview of long-list scoring

	Option descriptions				Scores				Outcome	
Category	Long list option ref	Junction improvements?	Dualling between A14 and CRP (S)	Dualling between CRP and Ely (N)	Offline sections route description	Scheme objectives subtotal	Other criteria subtotal	Total score	Rank	Shortlist?	Short list option ref
Full length dualling	8F	×	✓	✓	Between A14 and CRP (west) + same as for 5B	17	16	33	1	Yes	A
Full length dualling	8H	×	✓	✓	Between A14 and CRP (west) + same as for 5D	17	16	33	1	See Note[52]	
Full length dualling	8I	×	✓	✓	Between A14 and CRP (west) + same as for 5E	17	16	33	1	See Note	
Full length dualling	8J	×	✓	✓	Between A14 and CRP (west) + same as for 5F	17	16	33	1	See Note	
Full length dualling	8L	×	✓	✓	Between A14 and CRP (west) + same as for 6B	17	15	32	5	Yes	B
Full length dualling	8N	×	✓	✓	Between A14 and CRP (west) + same as for 6D	17	15	32	5	See note	
Full length dualling	1	×	✓	✓	Entire length to west of current A10 alignment	18	13	31	7	Yes	D
Full length dualling	5B	×	✓	✓	2 sections: Stretham (west) and Little Thetford (west) only	15	15	30	8	Yes	E
Full length dualling	5D	×	✓	✓	2 sections: Stretham (West) and Little Thetford (West) to A142 Witchford roundabout	15	15	30	8	See Note	
Full length dualling	5E	×	✓	✓	Single section west of both Stretham and Little Thetford	15	15	30	8	See Note	
Full length dualling	5F	×	✓	✓	Single section west of both Stretham and Little Thetford to A142 Witchford roundabout	15	15	30	8	See Note	
South dual	10B	✓	✓	×	Between A14 and CRP (west)	13	17	30	8	Yes	C
South dual	10A	✓	✓	×	None	13	15	28	13	Yes	F

[52] where more than one option with very similar layouts (in terms of model network) achieved equally high scores, a judgement was made to include only one in the shortlist

		Option descriptions				Scores				Outcome	
Category	Long list option ref	Junction improvements?	Dualling between A14 and CRP (S)	Dualling between CRP and Ely (N)	Offline sections route description	Scheme objectives subtotal	Other criteria subtotal	Total score	Rank	Shortlist?	Short list option ref
Full length dualling	6B	×	✓	✓	2 sections: Stretham (east) and Little Thetford (west)	15	12	27	14		
Full length dualling	6D	×	✓	✓	2 sections: Stretham (east) and Little Thetford (west) to A142 Witchford roundabout	15	12	27	14		
Junctions only	12	✓	×	×	N/A	10	16	26	16	Yes (as low cost option)	G
Full length dualling	7J	×	✓	✓	3 sections: Between Milton and south of Stretham (west), Stretham (east), Little Thetford (west)	15	11	26	16		
Full length dualling	7L	×	✓	✓	3 sections: Between Milton and south of Stretham (west), Stretham (east), Little Thetford (west) to A142 Witchford roundabout	15	11	26	16		
South dual	10E	×	✓	×	Between A14 and CRP (west)	8	17	25	19		
North dual	14	✓	×	✓	Same as per best option of either 7J or 7L	9	16	25	19		
North dual	16	×	×	✓	Same as per best option of either 7J or 7L	8	16	24	21		
South dual	10D	×	✓	×	None	8	14	22	22		
North dual	13	✓	×	✓	Same as per best 5X or 6X option	7	14	21	23		
North dual	15	×	×	✓	Same as per best 5X or 6X option	6	14	20	24		

It should be noted that there were a number of instances where more than one option with very similar layouts achieved equally high scores. In these cases, a judgement was made as to whether the differences between them were significant in terms of the network to be modelled and in those cases to include only one in the shortlist instead of shortlisting both. This was a consequence of the very long list options having been defined at a more nuanced level of detail than would typically be required at this stage in the design process. These nuances in design have not been discarded but will be explored further during subsequent design phases.

8.6.6 Shortlist

As a result of the long list assessment, seven options were taken forward for further appraisal. These included the package of junction improvements identified in the A10 Junction Assessment Report and six distinct dualling options that scored highest overall in the MCA. The options were relabelled by initials A to G, as presented in Table 28, with the alignments presented in Appendix D.

Table 28. Shortlisted options

Short List Reference	Long List Reference	Description
A	8F	Full-length dualling, offline between A14 and Cambridge Research Park, mainly online along the rest of the corridor except for pinchpoints, with bypass to the west of Stretham
B	8L	Full-length dualling, offline between A14 and Cambridge Research Park, mainly online along the rest of the corridor except for pinchpoints, with bypass to the east of Stretham
C	10B	Southern section dualling offline: Offline dualling between A14 and Cambridge Research Park, with junction upgrades along the rest of the corridor
D	1	Full-length dualling, completely offline alignment running to the west of Milton and Stretham
E	5B	Full-length dualling, maximising the extent of online dualling except for pinchpoints with bypass to the west of Stretham
F	10A	Southern section dualling online: Online dualling between A14 and Cambridge Research Park, with junction upgrades along the rest of the corridor
G	12	Junction Improvements only

9. Conclusion and Next Steps

The OAR has provided a comprehensive overview of the project background, policy context, existing and future situation. These aspects have influenced the need for intervention and the scheme objectives. The OAR has then collated the Ely to Cambridge Transport Study work completed by Cambridgeshire County Council and supplemented this with details of the option assessment work undertaken by Jacobs and the Combined Authority in 2020. This recent work has involved Cambridgeshire County Council as an important stakeholder in the development and sifting of the scheme options to a short list for appraisal through the SOBC.

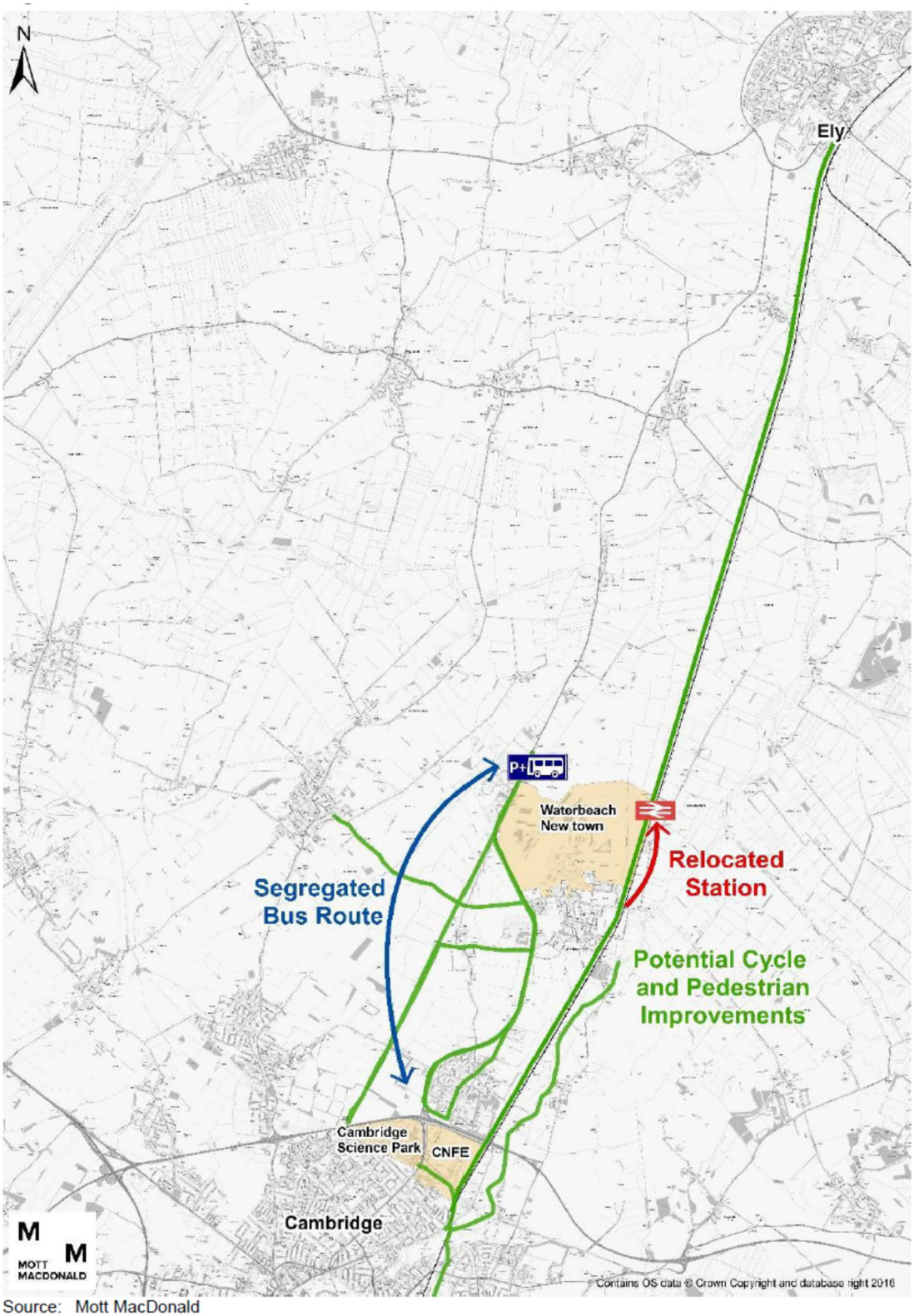
The SOBC presents a summary of the performance of each of the options in terms of their value for money and strategic fit, and the recommendations for the options to take forward for further assessment. This will also be influenced by the results of a non-statutory virtual public exhibition undertaken for three weeks in summer 2020, concluding on 14 July.

The OAR will remain a live document and will be updated as the OBC develops to record the findings of the SOBC, stakeholder and public feedback and further option development and assessment prior to the development of the Outline Business Case.

Appendix A. Preliminary SOBC Options

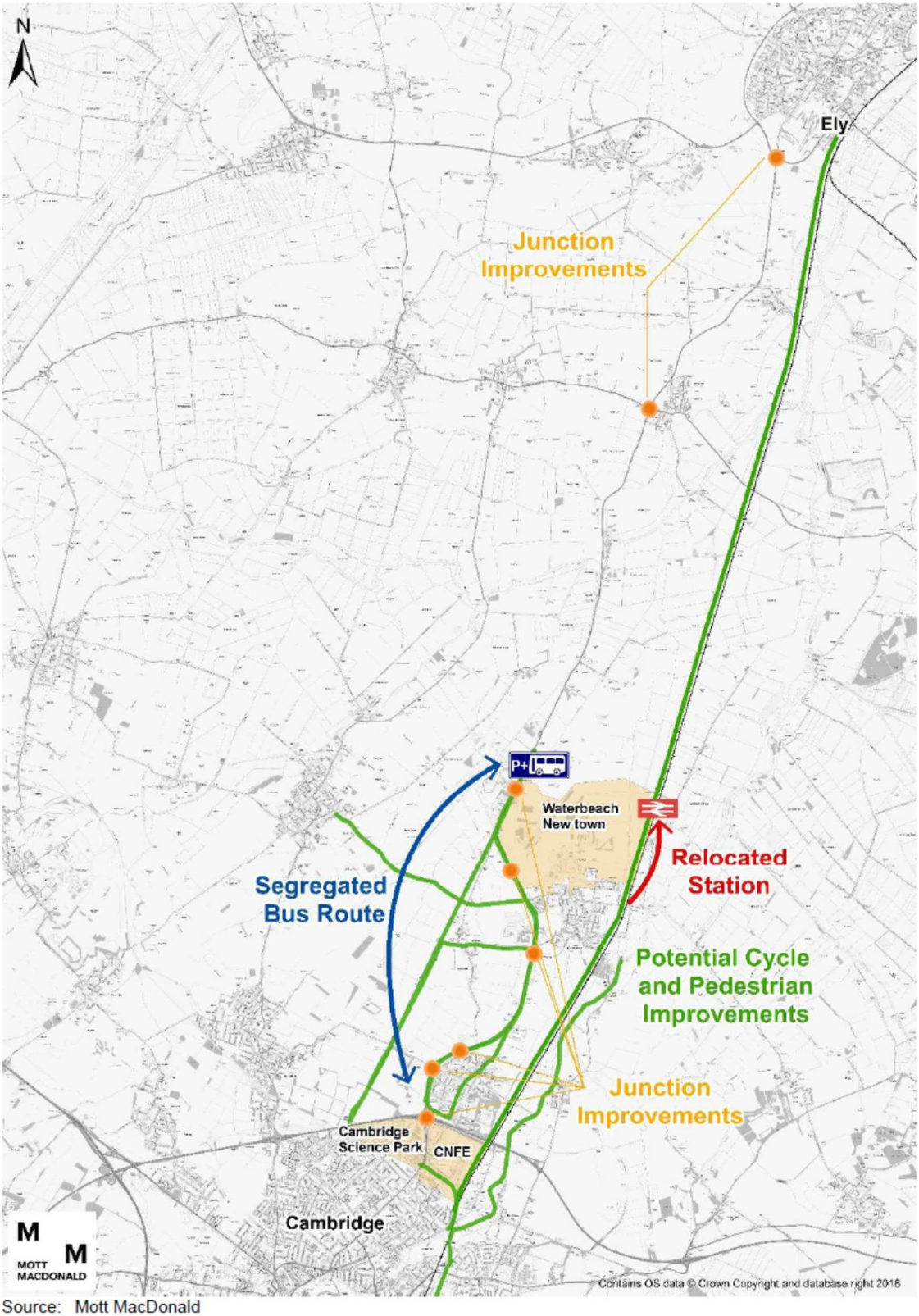
All maps are reproduced from pages 31 to 35 of the Ely to Cambridge Transport Study Pre-SOBC developed by Mott MacDonald (2018).

Figure A1. DS1. Mode-Shift Option



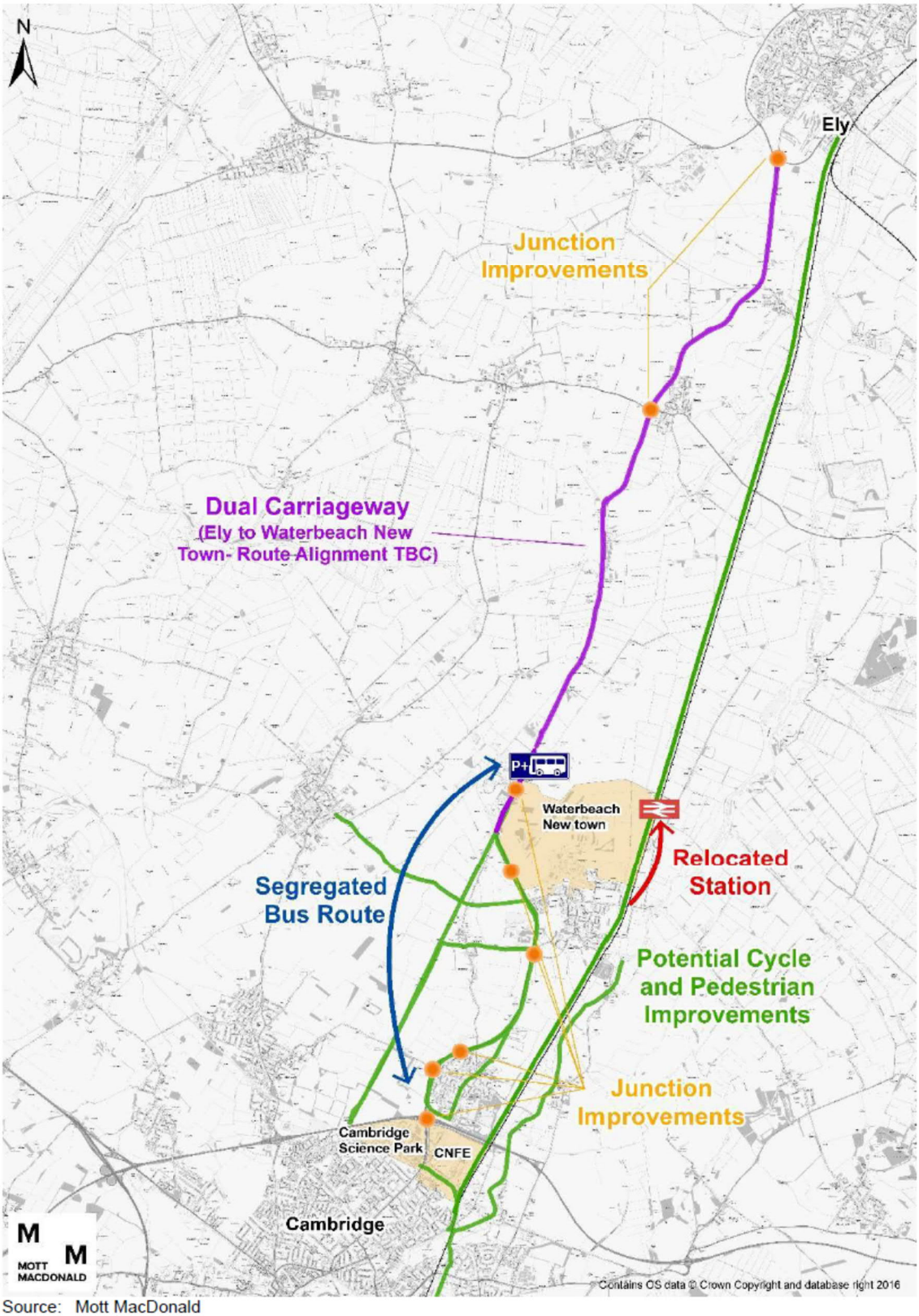
Source: Mott MacDonald

Figure A2. DS2. Junction + Option



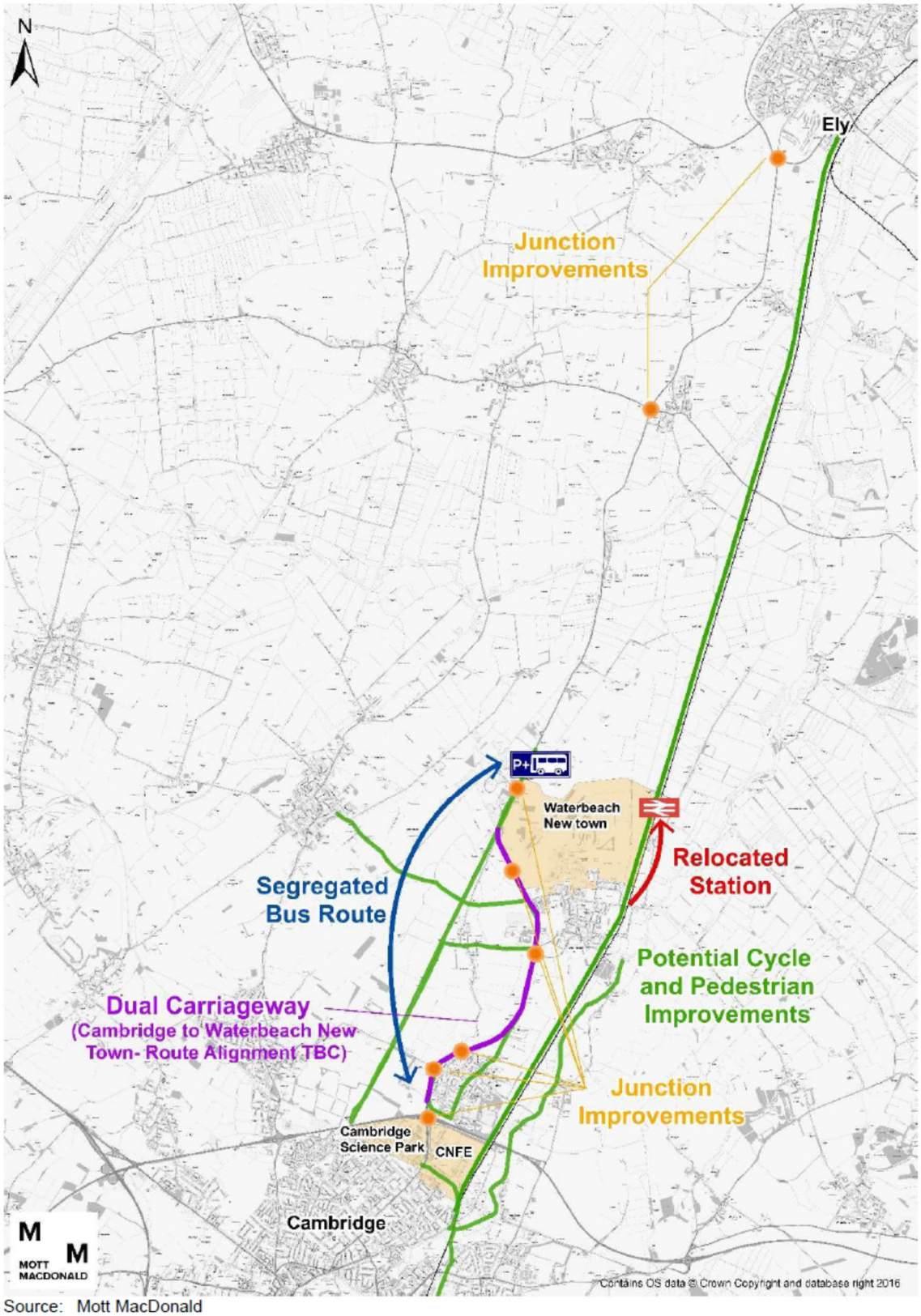
Source: Mott MacDonald

Figure A3. DS3: North Dual Option



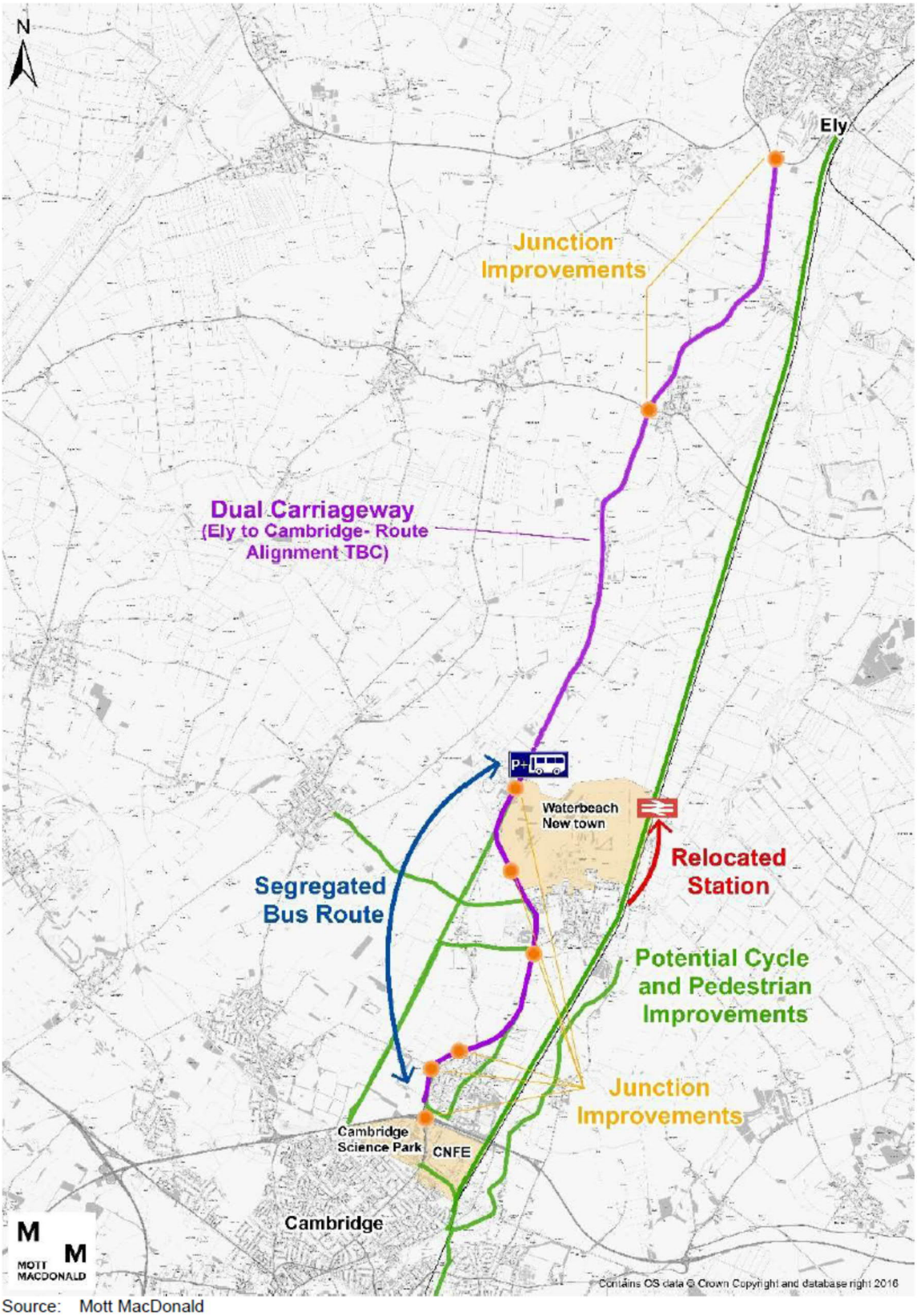
Source: Mott MacDonald

Figure A4. DS4: South Dual Option



Source: Mott MacDonald

Figure A5. DS5: Full Dual Option



Source: Mott MacDonald

Appendix B. Initial sift

A PDF output from the ‘very long list’ initial sift is enclosed on the following page.

Ref	Descriptor	Constituent Elements	Comments	Filter to exclude a section/s from the long list	Feasibility	Deliverability	Affordability
01	Full offline West	1EX-1W-4W-6W-8W-10W-12W-17W	1EX -Use of online from Milton Interchange to Park and Ride - Constrained by Landfill Site 4W, 6W, 8W - Passes through flood plain		Amber - Some environmental objection, flood plains	Green - Construction in green field site	Amber - Full construction of new dual carriageway
02	Full offline East	1EX-2EX-1E-3E-7E-12EX	1EX, 2EX - Use of online from Milton Interchange 1E - Bridge over rail required 3E-7E - Located within flood plain between rail and river - Discount due to Engineering difficulty / cost	Y - 1E, 3E and 7E - Discount these elements as 1E would need to pass over Rail Corridor then 3E and 7E would be located within flood plain between rail and River Great Ouse	Red - Multiple Rail crossings, flood plains, and River	Amber - Greenfield site, but largely in flood plain would affect construction duration	Red - Expensive construction requirements
3	Online widening to dual - Full	1EX-2EX-3EX-4EX-5EX-6EX-7EX-8EX-9EX-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
4A	Online widening to dual - Partial (Little Thetford)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-8EX-9EX-13W-14W-11EX-12EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
4B	Online widening to dual - Partial (Little Thetford)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-8EX-9EX-13W-15W-16W-12EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
4C	Online widening to dual - Partial (Little Thetford)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-8EX-9EX-13W-15W-17W	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. Bypasses A142 Angel Drove Rbt	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
5A	Online widening to dual - Partial (Stretham West)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	Y - 10EX - Impacts a number of property in Little Thetford	Amber - Objection and environmental at Little Thetford and Waterbeach Road	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
5B	Online widening to dual - Partial (Stretham West)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-14W-11EX-12EX	5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
5C	Online widening to dual - Partial (Stretham West)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-15W-16W-12EX	5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	15W-16W would not be combined, lower cost solution would be 14W-11EX-12EX	Amber - Objection and environmental at Little Thetford	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs. Increased link costs vs 14W-11EX-12EX
5D	Online widening to dual - Partial (Stretham West)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-15W-17W	5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. Bypasses A142 Angel Drove Rbt		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
5E	Online widening to dual - Partial (Stretham West)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-9W-10W-12W-16W-12EX	5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
5f	Online widening to dual - Partial (Stretham West)	1EX-2EX-3EX-4EX-5EX-6EX-7EX-9W-10W-12W-17W	5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. Bypasses A142 Angel Drove Rbt		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
6A	Online widening to dual - Partial (Stretham East)	1EX-2EX-3EX-4EX-5EX-6EX-4E-6E-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	Y - 10EX - Impacts a number of properties in Little Thetford	Amber - Objection and environmental at Little Thetford	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
6B	Online widening to dual - Partial (Stretham East)	1EX-2EX-3EX-4EX-5EX-6EX-4E-6E-13W-14W-11EX-12EX	5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
6C	Online widening to dual - Partial (Stretham East)	1EX-2EX-3EX-4EX-5EX-6EX-4E-6E-13W-15W-16W-12EX	5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	15W-16W would not be combined, lower cost solution would be 14W-11EX-12EX	Green	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs. Increased link costs vs 14W-11EX-12EX
6D	Online widening to dual - Partial (Stretham East)	1EX-2EX-3EX-4EX-5EX-6EX-4E-6E-13W-15W-17W	5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. Bypasses A142 Angel Drove Rbt		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
7A	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-8EX-9EX-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
7B	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-8EX-9EX-13W-14W-11EX-12EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
7C	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-8EX-9EX-13W-15W-16W-12EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
7D	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-8EX-9EX-13W-15W-17W	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain Bypasses A142 Angel Drove Rbt	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
7E	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-9W-10W-11W-9EX-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 7W- 7EX-9W - would not be combined, lower cost solution would use 8W	Red - Objection and Environmental at Stretham and Waterbeach Road	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs

Ref	Descriptor	Constituent Elements	Comments	Filter to exclude a section/s from the long list	Feasibility	Deliverability	Affordability
7F	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-9W-10W-11W-9EX-13W-14W-11EX-12EX	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 7W- 7EX-9W - would not be combined, lower cost solution would use 8W	Amber - Objection and Environmental at Waterbeach Road	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
7G	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-9W-10W-11W-9EX-13W-15W-16W-12EX	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 7W- 7EX-9W - would not be combined, lower cost solution would use 8W	Amber - Objection and Environmental at Waterbeach Road	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
7H	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-9W-10W-11W-9EX-13W-15W-17W	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain Bypasses A142 Angel Drove Rbt	Y - 7W- 7EX-9W - would not be combined, lower cost solution would use 8W	Amber - Objection and Environmental at Waterbeach Road	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
7I	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-9W-10W-12W-16W-12EX	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 7W- 7EX-9W - would not be combined, lower cost solution would use 8W	Amber - Objection and Environmental at Waterbeach Road	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
7J	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-7EX-9W-10W-12W-17w	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain Bypasses A142 Angel Drove Rbt	Y - 7W- 7EX-9W - would not be combined, lower cost solution would use 8W	Amber - Objection and Environmental at Waterbeach Road	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
7I	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-4E-6E-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 10EX - Impacts a number of properties in Little Thetford	Amber - Objection and environmental at Little Thetford	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
7J	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-4E-6E-13W-14W-11EX-12EX	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
7K	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-4E-6E-13W-15W-16W-12EX	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	15W-16W would not be combined, lower cost solution would be 14W-11EX-12EX	Green	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs. Increased link costs vs 14W-11EX-12EX
7L	Online widening to dual - Partial (Waterbeach West)	1EX-2EX-3EX-5W-6W-7W-4E-6E-13W-15W-17W	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain Bypasses A142 Angel Drove Rbt		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
8A	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-8EX-9EX-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
8B	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-8EX-9EX-13W-14W-11EX-12EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
8C	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-8EX-9EX-13W-15W-16W-12EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
8D	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-8EX-9EX-13W-15W-17W	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure Bypasses A142 Angel Drove Rbt	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
8E	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-10EX-11EX-12EX	5EX - Alignment affects listed structure	Y - 10EX - Impacts a number of properties in Little Thetford	Amber - Objection and environmental at Little Thetford	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
8F	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-14W-11EX-12EX	5EX - Alignment affects listed structure		Green	Amber - Online dualling - interface with live highway	Green
8G	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-15W-16W-12EX	5EX - Alignment affects listed structure	15W-16W would not be combined, lower cost solution would be 14W-11EX-12EX	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 14W-11EX-12EX
8H	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-15W-17W	5EX - Alignment affects listed structure Bypasses A142 Angel Drove Rbt		Green	Amber - Online dualling - interface with live highway	Green
8I	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-9W-10W-12W-16W-12EX	5EX - Alignment affects listed structure		Green	Amber - Online dualling - interface with live highway	Green
8J	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-7EX-9W-10W-12W-17W	5EX - Alignment affects listed structure Bypasses A142 Angel Drove Rbt		Green	Amber - Online dualling - interface with live highway	Green
8K	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-4E-6E-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 5EX - Alignment affects listed structure	Y - 10EX - Impacts a number of properties in Little Thetford	Amber - Objection and environmental at Little Thetford	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
8L	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-4E-6E-13W-14W-11EX-12EX	5EX - Alignment affects listed structure		Green	Amber - Online dualling - interface with live highway	Green
8M	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-4E-6E-13W-15W-16W-12EX	5EX - Alignment affects listed structure	15W-16W would not be combined, lower cost solution would be 14W-11EX-12EX	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 14W-11EX-12EX
8N	Online widening to dual - Partial (Milton West)	1EX-2EX-2W-4EX-5EX-6EX-4E-6E-13W-15W-17W	5EX - Alignment affects listed structure Bypasses A142 Angel Drove Rbt		Green	Amber - Online dualling - interface with live highway	Green
9A	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-8EX-9EX-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
9B	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-8EX-9EX-13W-14W-11EX-12EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
9C	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-8EX-9EX-13W-15W-16W-12EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
9D	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-8EX-9EX-13W-15W-17W	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure Bypasses A142 Angel Drove Rbt	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs

Ref	Descriptor	Constituent Elements	Comments	Filter to exclude a section/s from the long list	Feasibility	Deliverability	Affordability
9E	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-10EX-11EX-12EX	5EX - Alignment affects listed structure	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9F	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-14W-11EX-12EX	5EX - Alignment affects listed structure	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9G	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-15W-16W-12EX	5EX - Alignment affects listed structure	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9H	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-9W-10W-11W-9EX-13W-15W-17W	5EX - Alignment affects listed structure Bypasses A142 Angel Drove Rbt	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9I	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-9W-10W-12W-16W-12EX	5EX - Alignment affects listed structure	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9J	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-7EX-9W-10W-12W-17W	5EX - Alignment affects listed structure Bypasses A142 Angel Drove Rbt	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9K	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-4E-6E-10EX-11EX-12EX	10EX - Pinch point to north of Bedwell Hey Lane too narrow for dualling corridor. Affects approximately 6 properties. 5EX - Alignment affects listed structure	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9L	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-4E-6E-13W-14W-11EX-12EX	5EX - Alignment affects listed structure	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9M	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-4E-6E-13W-15W-16W-12EX	5EX - Alignment affects listed structure	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
9N	Online widening to dual - Partial (Butt Lane)	1EX-1W-3W-4EX-5EX-6EX-4E-6E-13W-15W-17W	5EX - Alignment affects listed structure Bypasses A142 Angel Drove Rbt	Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
10A	Dual to Waterbeach + Junctions to North	1EX-2EX-3EX-4EX + Waste treatment Site + A123 Stretham Roundabout + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
10B	Dual to Waterbeach + Junctions to North	1EX-2EX-2W + Waste treatment Site + A123 Stretham Roundabout + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout			Green	Amber - Online dualling - interface with live highway	Green
10C	Dual to Waterbeach + Junctions to North	1EX-2EX-1W-3W + Waste treatment Site + A123 Stretham Roundabout + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout		Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
10D	Dual to Waterbeach	1EX-2EX-3EX-4EX	3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.		Green	Amber - Online dualling - interface with live highway	Amber - Housing Purchase Costs
10E	Dual to Waterbeach	1EX-2EX-2W			Green	Amber - Online dualling - interface with live highway	Green - Low cost
10F	Dual to Waterbeach	1EX-2EX-1W-3W		Y - 1W-3W - Passes through properties, If offline connects to south of Waterbeach, it would be more sensible to use 2W	Green	Amber - Online dualling - interface with live highway	Red - Increased link costs vs 2W
11A	Dual to Stretham + Junctions to North	1EX-2EX-3EX-4EX-5EX-6EX-7EX-8EX + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11B	Dual to Stretham + Junctions to North	1EX-2EX-2W- 4EX-5EX-6EX-7EX-8EX + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11C	Dual to Stretham + Junctions to North	1EX-1W-3W- 4EX-5EX-6EX-7EX-8EX + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11D	Dual to Stretham + Junctions to North	1EX-2EX-3EX-5W-6W-7W-7EX- 8EX + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11E	Dual to Stretham + Junctions to North	1EX-2EX-2W-5W-6W-7W-7EX- 8EX + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11F	Dual to Stretham + Junctions to North	1EX-1W-4W-5W-6W-7W-7EX- 8EX + A142 Angel Drove Roundabout + A142 Witchford Road Roundabout	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11G	Dual to Stretham	1EX-2EX-3EX-4EX-5EX-6EX-7EX-8EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected.	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11H	Dual to Stretham	1EX-2EX-2W- 4EX-5EX-6EX-7EX-8EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11I	Dual to Stretham	1EX-1W-3W- 4EX-5EX-6EX-7EX-8EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 5EX - Alignment affects listed structure	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11J	Dual to Stretham	1EX-2EX-3EX-5W-6W-7W-7EX- 8EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 3EX - Pinch point at Waterbeach Road. 2 properties affected. Pinch point North of Ely Road. 3 properties affected. 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs

Ref	Descriptor	Constituent Elements	Comments	Filter to exclude a section/s from the long list	Feasibility	Deliverability	Affordability
11K	Dual to Stretham	1EX-2EX-2W-5W-6W-7W-7EX- 8EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
11L	Dual to Stretham	1EX-1W-4W-5W-6W-7W-7EX- 8EX	8EX - Pinch points through village of Stretham. North of Mill Way affects approximately 10 properties. South of Mill Way affects 1 property. South of A1123 Wilburton Road affects approximately 35 properties + petrol station 6W - Passes through flood plain	Y - 8EX - Impact on properties & businesses through Stretham undesirable on cost and community impact	Red - Objection and Environmental at Stretham	Amber - Online dualling - interface with live highway	Red - Housing Purchase Costs
12	Online Improvements (Junctions)	Milton Interchange + Butt Lane + Denny End Road + Cambridge Research park + Waste Treatment Site + A1123 Stretham Roundabout + A142 Angel Drove + A142 Witchford Roundabout			Green	Amber - interface with live highway	Green

Appendix C. Full MCA scoring

A PDF output from the MCA workbook is enclosed on the following page.

A10 Cambridge to Ely improvements MCA

Version 3.1

		12		6	
		Junctions only	Full length dualling options		
		Online Improvements (Junctions)	DM + Full bypass between Cambridge & Ely (Witchford Road rdbt), + mode shift package	DM + Maximum online dualling plus mode shift package	
Option		12	1	5B	
Description		Milton Interchange + Butt Lane + Denny End Road + Cambridge Research park + Waste Treatment Site + A1123 Stretham Roundabout + A142 Angel Drove + A142 Witchford Roundabout	Full offline West	Short bypasses to West of Stretham and Little Thetford	
% Online Dualling			0	90%	
Objective themes	Objectives	Impact scores for individual objectives			Scoring rationale
Theme 1 - Housing	•Provide infrastructure needed to realise sustainable housing opportunities associated with existing Local Plans	3	3	3	The majority of options all score equally highly due to their ability to open up the area for development. The north partial dualling options without junctions are the only ones not to score '3' as the junction improvements are integral to facilitating the development.
Theme 1 - Housing	•Provide the opportunity to unlock thousands of new homes between Cambridge and Ely as part of the CPCA's emerging non-statutory spatial plan by 2050.	1	1	1	All options score equally; the planning status of additional development is weaker than for that stated in the local plans. Furthermore, specifics of size and intended location are unknown, so it is not possible to differentiate between the options.
Theme 2 - Productivity	•Increase productivity of the nationally important CPCA economy (including science, technology, agriculture) through improved connectivity to labour, suppliers and markets	1	3	3	All full-dualling options offer peak journey time savings >5 minutes across all modes, so these score equally. Partial dualling with junctions score lower. Junction+ achieves lower journey time savings. Full (and south dual) provide adequate road access to CSP
Theme 3 - Environment	•As part of a wider package for the Corridor contribute to the achievement of CCC's Draft Net Zero Cambridgeshire by 2050 policy objective	-1	-2	-2	Pre-SOBC: All highway interventions generated a small mode shift towards car. Dualling options would be expected to have a mode significant increase in carbon compared with junctions+. Pre-mitigation scores negative. At this stage it is not possible to differentiate between the full dualling options. Considered that partial dualling without junctions score lower due to reduced impact on congestion.
Theme 3 - Environment	•Enhance biodiversity in line with the CPCA's emerging 'doubling nature' policy aims by 2050 (100% increase in land managed for nature in km2)	0	2	1	Junction-only interventions offer little opportunity to increase biodiversity due to their smaller footprint. Dualling offers the opportunity to include substantial landscaping as part of the design scope. In real terms, Land given to ecology would be over and above the scheme itself. All options might therefore score the same for doubling nature, except for the ease of provision of mitigation: potentially easier and more straightforward for offline sections. May be easier to incorporate in land take for design, rather than obtaining land perceived to be remote for the scheme, which online dualling would necessitate.
Theme 4 - Quality of Life	•Improve the quality of life for residents in local communities by reducing the community severance and environmental impacts of traffic on the built environment	2	2	1	Dualling offers greater traffic reduction than junctions+ at Cottenham Rd and Horningsea Rd. All options decrease traffic on Twenty Pence Rd but increase traffic on Green End Online dualling may increase severance in communities along the A10. There are several noise important areas along the existing A10; offline options that take traffic away would benefit those areas so these score more highly.
Theme 5 - Sustainable and active travel	•Encourage sustainable travel by improving the comfort, reliability, capacity and / or speed of alternative transport services (including rail, CAM, buses, walking, cycling and horse riding) along the A10 corridor	1	3	2	Full (and south) dual improved bus journey time reliability more than junctions+ (or north dual). Dualling options offer greater scope to improve active travel provision (if included in design scope). Challenge to online route - eg improving cycle route easier offline than online. Options score similarly.
Theme 6 - Network performance	•Reduce the risk of collisions along the A10 and on parallel 'B' / unclassified roads in local communities relative to 2018 levels	1	3	3	Junction improvement should provide an efficient way to reduce collision clusters close to junctions while dualling options likely to have more traffic reduction impact for parallel routes. 7J and 7L score lower due to poor geometry and a longer route. Partial dualling and junctions only socre lower due to reduced effect due to shorter length of improvements.
Theme 6 - Network performance incl. road safety	•Reduce congestion and improving journey time reliability along the A10, sustaining these benefits for the long-term	2	3	3	Pre-SOBC found that all highway interventions are able to significantly reduce the level of delay across the network; dualling options have the more significant reduction in journey times and can be expected to be better at sustaining the benefits for the long term. 7J and &L appear to be a longer, curved route.
Total across all individual objectives		10	18	15	
Average across all individual objectives		1.1	2.0	1.7	
Objective themes		Impact scores by theme			
Theme 1 - Housing		2	2	2	
Theme 2 - Productivity		1	3	3	
Theme 3 - Environment		-1	0	-1	
Theme 4 - Quality of Life		2	2	1	
Theme 5 - Sustainable and active travel		1	3	2	
Theme 6 - Network performance		2	3	3	
Total across all themes		7.0	13.0	10.5	
Average score across themes		1.2	2.2	1.8	
Long List sift RAG scores- for information					Scoring rationale
Feasibility		Green	Amber - Some environmental objection, flood plains	Green	RAG from longlisting exercise
Deliverability		Amber - interface with live highway	Green - Construction in green field site	Amber - Online dualling - interface with live highway	RAG from longlisting exercise
Affordability		Green	Amber - Full construction of new dual carriageway	Amber - Housing Purchase Costs	RAG from longlisting exercise
Other criteria	Details to consider	-3 to +3			Scoring rationale
Feasibility	consider planning constraints, public acceptability	3	2	2	Assumption, for the purposes of scoring, is that public opinion will in the main be against taking green land for offline options, so the more online the section the higher the score. Scores reduced where residential property might be directly impacted by an option.
Deliverability	Engineering buildability	3	2	2	Junctions easiest to deliver due to scale, offline easier to construct as no interface with live traffic and can have multiple construction fronts.
Safety	Safety of workers during construction, operation and maintenance is the differentiator	2	3	2	Similar to constructability, interface with live traffic construction increases safety risk of construction. Any option would be designed for ease and safety of operation and maintenance.
Environmental impacts	Preliminary judgement of WebTAG environmental impact criteria in addition to the environmental scheme objective - noise, air quality, etc	-2	-1	-2	Pre mitigation assume greater negative environmental impact for offline options - breaking new ground, and more extensive use of new construction materials. Mitigation opportunities exist for all options, and more detailed analysis of the short list will identify these
Social impacts	Preliminary judgement of WebTAG social impact criteria in addition to the quality of life scheme objective - public transport accessibility, journey quality, personal affordability of travel	1	3	2	Offline option scores higher for lesser community severance. All online dualling options likely to be similar.
Affordability	How expensive the option would be to construct and maintain	3	1	2	Maintenance costs similar for all dualling options. Offline will increase land costs, though some online requires property purchase so a general consideration.
Compatibility with public transport provision	facilitates a wider public transport network, CAM extensions, possible savings from joint delivery	2	3	2	Junctions will accommodate existing public transport options but opportuinity to link in with new solutions reduced. Offline has greatest potential for linking in with new solutions, with existing buses running on the old A10 as is. Online dualling offers lesser scope for new integration.
Compatibility with provision for NMU	facilitates opportunities to improve walking, cycling and equestrian routes, possible savings from joint delivery	1	3	2	Junctions can provide better facilities over a limited length which may not be sufficient to make an impact. Fewer constraints offline to build quality infrastructure. Online though, where constrained could link in with existing provision, or be provided within the corridor, not necessarily in the road.
Compatibility with a short-term junctions-only package		3	-3	3	An offline solution would see junctions improvement benefit only a reclassified A10. The more online a dualling option, the greater the compatibility.
Subtotal		16	13	15	
Total score		26	31	30	
Total score Averaged scores for themes		23	26	26	

	Any	5D	5E	5f	6B	6D	7J	7L	8F	8H	8I	8J	8L	8N
			4			5		1	3					
	Other full-length dualling options		like 5B											
Option	Any	5D	5E	5f	6B	6D	7J	7L	8F	8H	8I	8J	8L	8N
Description	Expect to score within the same ranges as full online/ offline	As 5B to Little Thetford then offline to Witchford roundabout (bypass Angel Drove)	As 5B but single longer offline section (no online section beterrn Stretham and Little Thetford)	As 5B to Stretham then single offline section (W) to Witchfor roundabout (bypass Angel Drove)	All online between Cambridge and south of Stretham - combination online/offline to Ely	All online between Cambridge and south of Stretham - combination online/offline to Ely	Online from Cambridge to north of Waterbeach then online/offline mix to the north	Online from Cambridge to north of Waterbeach then bypass (W) to south of Stretham then as 6D	Online to Milton, bypass to CRP (W), then as 5B	Online to Milton, bypass to CRP (W) then as 5D	Online to Milton, bypass to CRP (W) then as 5E	Online to Milton, bypass to CRP (W) then as 5F	Online to Milton, bypass to CRP (W) then as 6B	Online to Milton, bypass to CRP (W) then as 6D
Theme 1 - Housing	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Theme 1 - Housing	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Theme 2 - Productivity	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Theme 3 - Environment	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Theme 3 - Environment	1 or 2	1	1	1	1	1	2	2	2	2	2	2	2	2
Theme 4 - Quality of Life	1 or 2	1	1	1	1	1	2	2	2	2	2	2	2	2
Theme 5 - Sustainable and active travel	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Theme 6 - Network performance	3	3	3	3	3	3	2	2	3	3	3	3	3	3
Theme 6 - Network performance incl. road safety	3	3	3	3	3	3	2	2	3	3	3	3	3	3
Total across all individual objectives	12 or 13	15	15	15	15	15	15	15	17	17	17	17	17	17
Theme 1 - Housing	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Theme 2 - Productivity	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Theme 3 - Environment	-2	-0.5	-0.5	-0.5	-0.5	-0.5	0	0	0	0	0	0	0	0
Theme 4 - Quality of Life	1 or 2	1	1	1	1	1	2	2	2	2	2	2	2	2
Theme 5 - Sustainable and active travel	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Theme 6 - Network performance	3	3	3	3	3	3	2	2	3	3	3	3	3	3
Total across all themes	7	10.5	10.5	10.5	10.5	10.5	11	11	12	12	12	12	12	12
Average score across themes	1.4	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.0	2.0	2.0	2.0	2.0
Feasibility (RAG)		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Deliverability (RAG)		Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway	Amber - Online dualling - interface with live highway
Affordability (RAG)		Amber - Housing Purchase Costs	Amber - Housing Purchase Costs	Amber - Housing Purchase Costs	Amber - Housing Purchase Costs	Amber - Housing Purchase Costs	Amber - Housing Purchase Costs	Amber - Housing Purchase Costs	Green	Green	Green	Green	Green	Green
Feasibility		3	3	3	2	2	1	1	2	2	2	2	2	2
Deliverability		1	1	1	1	1	1	1	2	2	2	2	2	2
Safety		1	1	1	1	1	2	2	1	1	1	1	1	1
Environmental impacts		-1	-1	-1	-3	-3	-3	-3	-2	-2	-2	-2	-3	-3
Social impacts		2	2	2	2	2	2	2	3	3	3	3	3	3
Affordability		2	2	2	2	2	1	1	2	2	2	2	2	2
Compatibility with public transport provision		2	2	2	2	2	1	1	2	2	2	2	2	2
Compatibility with provision for NMU		2	2	2	2	2	3	3	3	3	3	3	3	3
Compatibility with a short-term junctions-only package		3	3	3	3	3	3	3	3	3	3	3	3	3
Subtotal		15	15	15	12	12	11	11	16	16	16	16	15	15
Total score		30	30	30	27	27	26	26	33	33	33	33	32	32
Total score Averaged scores for themes		25.5	25.5	25.5	22.5	22.5	22	22	28	28	28	28	27	27

	10A	10B	10D	10E	13	14	15	16
	Next set of options to score							
	Southern dual only as far as Cambridge research park				Dual the northern section only (from CRP to Ely)			
	All online, with junction improvements further north	Mostly offline, with junction improvements further north	All online, no junction improvements	Mostly offline, no junction improvements	A mostly online option + improve junctions to the south	A mostly offline option + improve junctions to the south	A mostly online option (no improvements to other junctions)	A mostly offline option (no improvements to other junctions)
Option	10A	10B	10D	10E	13	14	15	16
Description	Online as far as Cambridge Research Park + improve 4 key junctions to the north	As 8F as far as CRP, junction improvements to the north	Online as far as Cambridge Research Park and no junction improvements	As 8F as far as CRP, no junction improvements	Based on best 5X or 6X option?	Based on 7J/7L but would have to connect south of CRP	Based on best 5X or 6X option?	Based on 7J/7L but would have to connect south of CRP
Theme 1 - Housing	3	3	1	1	1	1	1	1
Theme 1 - Housing	1	1	1	1	1	1	1	1
Theme 2 - Productivity	2	2	1	1	1	1	0	0
Theme 3 - Environment	-2	-2	-2	-2	-3	-3	-3	-3
Theme 3 - Environment	1	1	1	1	1	2	1	2
Theme 4 - Quality of Life	1	1	1	1	1	2	1	2
Theme 5 - Sustainable and active travel	2	2	1	1	1	1	1	1
Theme 6 - Network performance	2	2	1	1	1	1	1	1
Theme 6 - Network performance incl. road safety	3	3	3	3	3	3	3	3
Total across all individual objectives	13	13	8	8	7	9	6	8
Theme 1 - Housing	2	2	1	1	1	1	1	1
Theme 2 - Productivity	2	2	1	1	1	1	0	0
Theme 3 - Environment	-0.5	-0.5	-0.5	-0.5	-1	-0.5	-1	-0.5
Theme 4 - Quality of Life	1	1	1	1	1	2	1	2
Theme 5 - Sustainable and active travel	2	2	1	1	1	1	1	1
Theme 6 - Network performance	2.5	2.5	2	2	2	2	2	2
Total across all themes	9	9	5.5	5.5	5	6.5	4	5.5
Average score across themes	1.5	1.5	0.9	0.9	0.8	1.1	0.7	0.9
Feasibility (RAG)	Green	Green	Green	Green	Not assessed as part of the longlisting.			
Deliverability (RAG)	Amber - Online dualling - interface with live highway	Amber - interface with live highway	Amber - Online dualling - interface with live highway	Amber - - interface with live highway				
Affordability (RAG)	Amber - Housing Purchase Costs	Green	Amber - Housing Purchase Costs	Green - Low cost				
Feasibility	3	3	2	2	3	2	3	2
Deliverability	2	2	2	3	2	3	2	3
Safety	1	2	1	2	1	2	1	2
Environmental impacts	-2	-3	-2	-3	-2	-3	-2	-3
Social impacts	1	2	1	2	1	2	1	2
Affordability	3	3	3	3	3	3	3	3
Compatibility with public transport provision	2	2	2	2	1	1	1	1
Compatibility with provision for NMU	2	3	2	3	2	3	2	3
Compatibility with a short-term junctions-only package	3	3	3	3	3	3	3	3
Subtotal	15	17	14	17	14	16	14	16
Total score	28	30	22	25	21	25	20	24
Total score Averaged scores for themes	24	26	19.5	22.5	19	22.5	18	21.5

Appendix D. Short List Options

Maps are provided for the following options. It should be noted that road and junction alignments are purely indicative at this stage. Intermediate junctions for new route options are yet to be established.

Option A. Full length dual carriageway involving mainly widening of the existing A10. New bypass sections at three locations: west of Denny End between north Milton and Cardyke; west of Stretham; and west of Little Thetford.

Option B. Full length dual carriageway involving mainly widening of the existing A10. New bypass sections at three locations: west of Denny End between north Milton and Cardyke; east of Stretham; and west of Little Thetford.

Option C. Dual carriageway between Milton and Cambridge Research Park with a new route to the west between north Milton and Cardyke. The section north to Ely remains a single carriageway, with improvements at four junctions: i. A10 / Denny Abbey Waste Management Park Roundabout; ii. A10 / A1123 Stretham Roundabout; iii. A10 / A142 Angel Drove Roundabout; iv. A10 / A142 Witchford Roundabout.

Option D. Full length dual carriageway with a new route to the west of the A10 between Butt Lane Park & Ride and Ely.

Option E. Full length dual carriageway involving mainly widening of the existing A10 except for western bypasses of Stretham and Little Thetford.

Option F. Dual carriageway between Milton and Cambridge Research Park involving widening of the existing A10. The section north to Ely remains a single carriageway with improvements at four junctions: i. A10 / Denny Abbey Waste Management Park Roundabout; ii. A10 / A1123 Stretham Roundabout; iii. A10 / A142 Angel Drove Roundabout; and iv. A10 / A142 Witchford Roundabout.

Option G. The A10 remains a single carriageway with improvements at seven junctions:

i. iA10 / Butt Lane Park and Ride Access
ii. A10 / Denny End Road Roundabout
iii. A10 / Cambridge Research Park Roundabout
iv. A10 / Denny Abbey Waste Management Park Roundabout
v. A10 / A1123 Stretham Roundabout
vi. A10 / A142 Angel Drove Roundabout
vii. viii. A10 / A142 Witchford Roundabout.