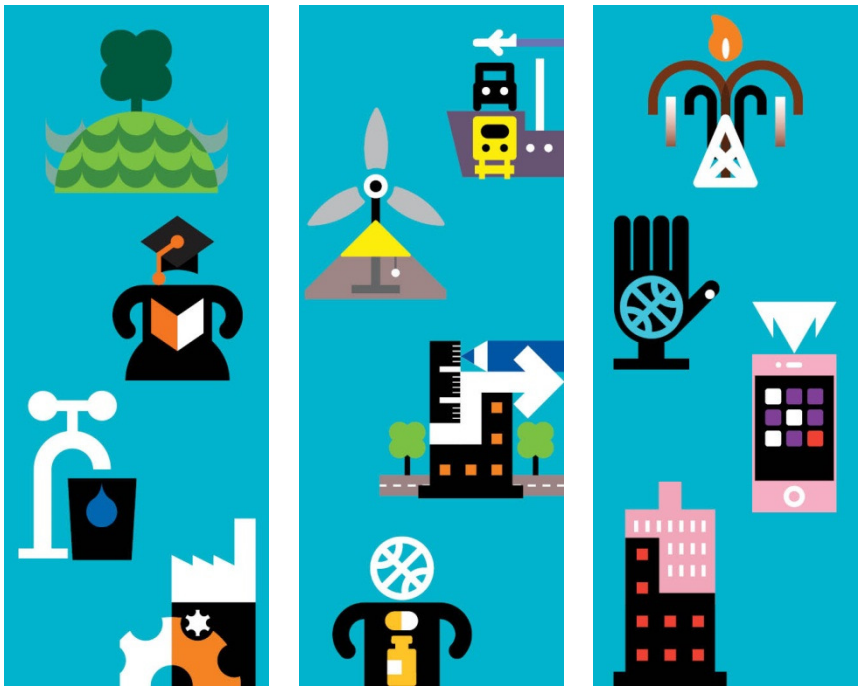

Strategic Economic Appraisal of A428-A1303 Bus Scheme

Wider Economic Benefits

August 2016

Cambridgeshire County Council

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Mott MacDonald, Fourth floor, 9 Portland Street, Manchester M1 3BE, United Kingdom
T +44 (0)161 638 0885 **W** www.mottmac.com

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Draft Report	19.07.16	M Ferrari	J Crockett	S Cox	Draft Report Final
Final Report	02.08.16	M Ferrari	J Crockett	S Cox	Final Report

Contents

Executive Summary

Appointment and study purpose

Mott MacDonald was appointed in April 2016 to provide a strategic economic appraisal of the A428-A1303 Cambourne to Cambridge bus scheme, which forms part of the infrastructure investment within the Greater Cambridge City Deal (GCCD). The results, alongside the conventional transport appraisal being prepared in parallel, will be used to inform the recommendation to the City Deal Board of a preferred option for the scheme for further consultation and full business case assessment.

Cambridge Phenomenon – a UK success story

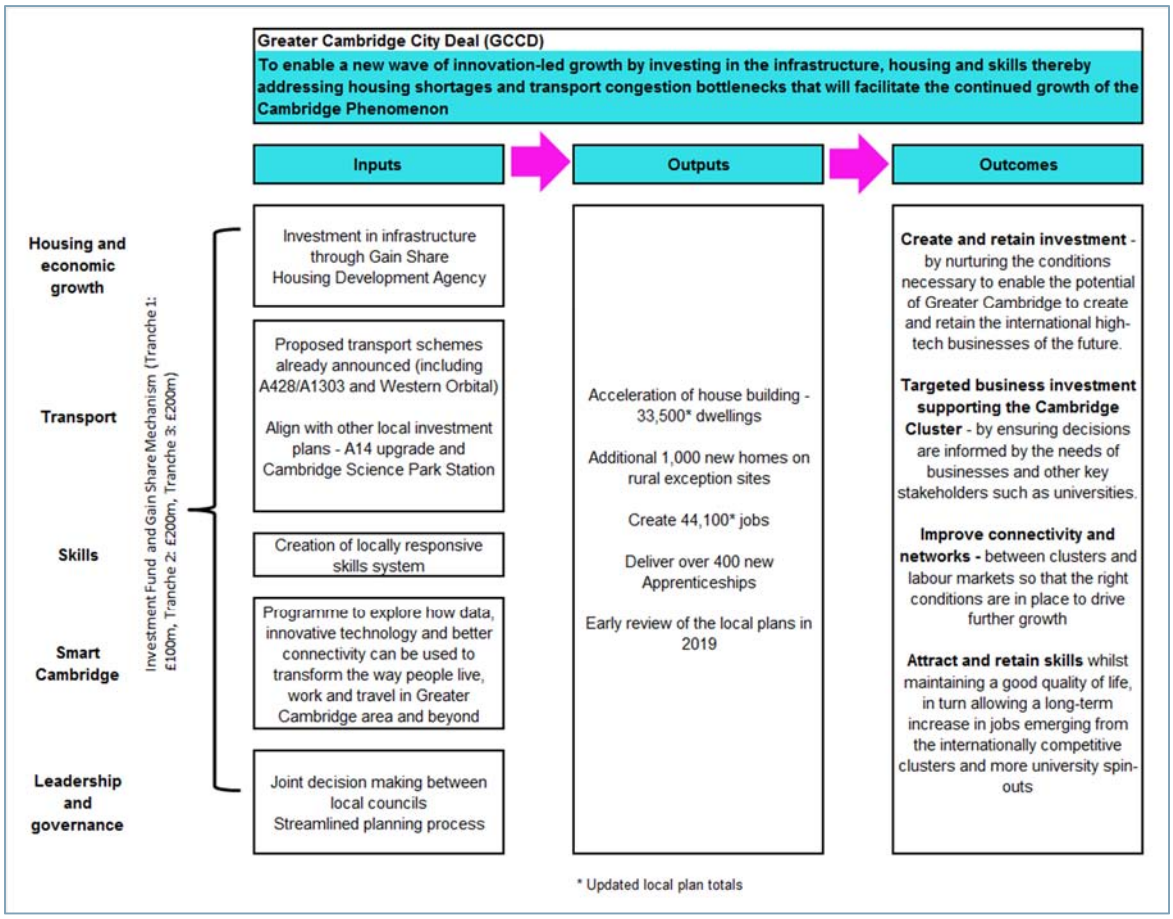
Cambridge is one of the UK's most successful cities where economic success, high quality of life and quality of place are inextricably linked. The thriving hi-tech and biotech industry, which has developed since the 1960s and is known as the Cambridge Phenomenon, accounts for 17.3% of employment[1] and boasts one of the highest concentration of Nobel prizewinners in the world. **Cambridge is one of the UK's fastest-growing and most productive cities and integral to the UK's long term economic plan which seeks to improve productivity and international competitiveness. It helps the UK economy to compete on the international stage, attracting high calibre knowledge-based individuals to fill gaps and increase economic growth.**

Greater Cambridge City Deal

The GCCD is a deal with government that will enable a new wave of innovation-led growth by investing in infrastructure, housing and skills (using local and national monies) thereby addressing housing shortages and high congestion levels. Greater Cambridge will look to prioritise and invest in projects that deliver the greatest economic impact (jobs and housing) over 15-20 years. The GCCD will support delivery of the growth levels identified in the Local Plans.

[1] Using EEFM data, baseline forecast 2014. Relates to Greater Cambridge core high-tech and biotech industry as can be best defined in the data encompassing telecoms, computer related activity, research & development and business services.

Figure E.1: GCCD – Logic map



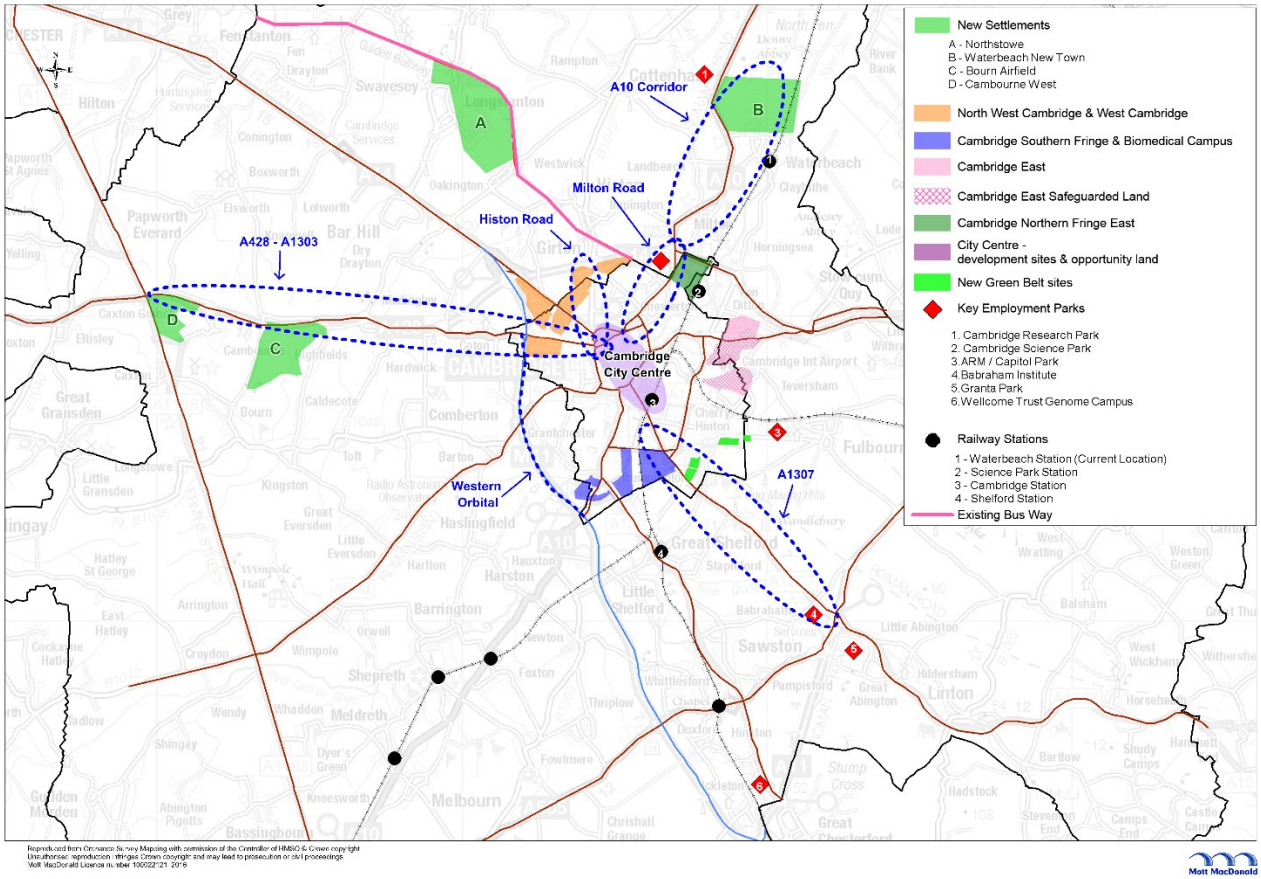
Source: Mott MacDonald

The A428-A1303 scheme directly links to the strategic objectives of the GCCD (see logic map above) by providing faster and reliable journey times that will improve connectivity and networks, help create and retain investment, and attract and retain skills by linking employment and housing areas more closely. It seeks to improve connectivity from East to West along the corridor, thereby growing the size of the available labour market to existing and potential businesses, and the opportunities available to current and future residents. Ultimately the scheme directly contributes to the overall jobs and housing targets given it is part of a coherent package of GCCD infrastructure schemes identified as needed to ensure the next wave of innovation-led growth in Greater Cambridge.

What is the scale of growth and where will it occur?

A significant level of development is planned in Greater Cambridge over the local planning period which should provide more than enough employment space to underpin the growth targets. Furthermore, there is a very good pipeline of employment space post 2031 demonstrating that investments in transport infrastructure are critical to ensure high congestion levels and poor reliability issues are addressed (thereby facilitating the growth potential).

Figure E.2: Key developments map and GCCD transport schemes[2]



Source: Mott MacDonald

[2] Please note site layouts are indicative and not precisely mapped.

How does this scheme support GCCD growth and strategic objectives?

The A428-A1303 scheme clearly contributes towards GCCD growth and strategic objectives by addressing congestion and removing these bottlenecks on growth by linking key employment and housing sites together, and with the city centre, and through improving the quality of life and perceptions of the area. The Cambridge Cluster's success is founded upon these close networks and the area's quality of life. Failure to provide additional capacity and ensure the efficient movement of people and goods risks fundamentally compromising growth potential.

The 'Segregated' and 'Hybrid' options[3] for the bus scheme, based on a qualitative appraisal comparing the transport benefits to GCCD strategic objectives, are identified as likely to deliver the most benefits in terms of supporting business investment and growth and labour market mobility. However, the **Segregated route (Option 3) delivers against the longer term strategic aims of Greater Cambridge in terms of promoting a positive image and perceptions and investment in capacity for post 2031 growth.** The City Deal growth targets relate to 2031, but at the heart of the Deal is also long term investment to improve connectivity and networks that will support waves of innovation led growth which will continue beyond this period. Given these considerations the **maximum level of growth attributed to the scheme is attributed to the Segregated Option given it will provide the greater stimulus via transport benefits and investment in long term capacity to support the GCCD objectives**.

Significant economic benefits

This study, based on land utilisation analysis, estimates that the total attributable proportion of remaining B-use jobs to be created over 2016-2031 to the Segregated scheme is in the region of 800 jobs and housing in the region of 900 dwellings (Table E.1). These jobs at a Greater Cambridge level will generate £22.6m of GVA per annum, equivalent to £679.3m of GVA over a 30-year time

[3] Please see Section 1 for more background on the options Mott MacDonald was commissioned to examine.

horizon. This is a significant level of economic benefit based on the strong linkages between development sites and the scheme, especially in the case of Bourn Airfield and Cambourne and the strategic objective of the scheme to improve West to East connectivity to Cambridge and other cluster sites. This also reflects the analysis undertaken as part of the earlier prioritisation work (TEAR work)[4]. Clearly, the scheme directly contributes towards the employment and housing growth targets within the City Deal.

Table E.1: Indirect Wider Economic Benefits (£Ms in 2010 discounted values and prices) over 30-year period

Benefit	Option		
	Low - On highway (Option 1)	Medium – Hybrid (Option 4)	High – Segregated (Option 3)
GVA benefits – Greater Cambridge level (£s in discounted 2010 factor prices)			
Direct jobs	189	606	786
Direct GVA per annum	5.2	17.5	22.6
TOTAL GVA	**155.7**	**526.2**	**679.3**
GVA benefits – UK level (£s in discounted 2010 factor prices)			
Land utilisation – net additional jobs to the UK	38.4	129.7	167.5
Move to more productive jobs within the UK	7.0	23.7	30.6
TOTAL GVA	**45.4**	**153.4**	**198.1**
Welfare benefits – UK level (£s in discounted 2010 market prices)			
Reduction in spatial inequalities	0.28	0.93	1.21
Alleviation of unemployment	0.06	0.22	0.28
Option and non-use values	0.00	29.76	29.76
TOTAL WELFARE	**0.33**	**30.92**	**31.25**

Source: Mott MacDonald

The indirect WEBs for the three options have also been calculated at a UK level, also detailed in Table E.1. These relate to GVA benefits from the analysis above that are considered net additional to the UK and several welfare benefits.

Although at both levels of analysis the benefits are highest under the Segregated Option they are also very significant under the Hybrid Option, compared to the lower cost alternative of on-highway measures.

[4] Economic Prioritisation of the Greater Cambridge City Deal, A Transport Economic Assessment Report (TEAR) for Cambridgeshire County Council, SQW & Cambridge Econometrics, December 2014

Recommendation

The higher cost options represent a longer term investment in the capacity of the area to accommodate the growth anticipated up to 2031 and thereby directly support planned development. These indicative figures are considered conservative since no growth attribution is made to the scheme post 2031 despite considerable development being planned along the corridor.

The recommendation of this study is that given the GCCD is ultimately about providing long term investment that supports jobs and housing growth that the selection of a preferred option must seriously consider these wider indirect WEBs alongside the economic benefits identified in the conventional transport appraisal.

1 Introduction

1.1 Introduction and scope

Mott MacDonald was appointed by Cambridgeshire County Council (CCC) to undertake a strategic economic appraisal of two bus schemes, the A428-A1303 Cambridge to Cambourne and the Western Orbital bus links, which form part of the proposed infrastructure investment within the Greater Cambridge City Deal (GCCD). This has involved assessing the relationship between the transport infrastructure provision and the GCCD growth ambitions and objectives. The analysis, alongside the conventional transport appraisal being prepared in parallel by Atkins Ltd, will be used by CCC to inform the recommendation to the City Deal Board of a 'Preferred Option' for each scheme for further consultation and full business case assessment.

Importantly, the transport schemes assessed are part of a wider package of investment measures (both transport and non-transport) planned under the GCCD which collectively aim to enable a new wave of innovation-led growth and deliver economic growth (measured by 44,100 jobs and 33,500 houses up to 2031[5]). The "backbone of the proposed strategy is a transport network to link areas of population and employment within [Greater Cambridge]"[6] which addresses congestion and public transport capacity issues to help stimulate further economic growth. Indirect wider economic benefits, over and above those captured in conventional transport appraisal, are therefore critical to understand for each scheme and its option variants so that decision makers can compare options in terms of how they support economic growth ambitions and spatial planning objectives. This study aims to assess these indirect wider economic benefits for each scheme variant in a manner which allows them to sit alongside the conventional business case being prepared (as explained below).

[5] Note these figures differ to the original GCCD figures of 45,000 jobs and 33,480 houses and reflect the up to date Local Plan totals (the original figures were based on the figures from the draft plans).

[6] Greater Cambridge City Deal, UK Government, Page 3

Box 1: Wider economic benefits of transport investment – theory and practical limitations

The economic case for the scheme will include cost-benefit analysis based on the impacts of the scheme in terms of user benefits (from transport journey savings), changes in the externalities associated with car use (e.g. emissions and accidents), and changes in operating costs and revenue to the public and private sector. When set against a scheme's projected capital and operating expenditure, these result in an overall Benefit-Cost Ratio (BCR). User-benefits are the principal impacts of a transport improvement and form the core of an economic appraisal but there is wide agreement that they fail to capture the full impact of major projects. Since the mid-2000s, this analysis has been augmented within the Department for Transport's (DfT's) Transport Analysis Guidance (TAG) with recommendations for the assessment of **direct** Wider Economic Benefits (WEBs) – so called direct as they stem from the user benefits identified in the transport appraisal. However, there is still not direct guidance to capture 'indirect' WEBs which relate to how schemes support investment and employment growth at both a local and UK level.

It is worth highlighting the two principal sources of wider economic benefits stemming from transport investment:

- **Productivity effects** – higher productivity gains accruing to firms and workers from the economic benefits of scale and density. High density leads to intense interaction between firms due to increased competition and through developing deep pools of knowledge and skills embodied in the local labour force. Transport is a necessary ingredient to securing these benefits by improving the interactions between firms who can reach wider markers, gain scale economies and develop specialist skills and also by enabling cities to specialise and develop sector specific advantages. Transport also supports productivity by transporting workers into concentrated and productive centres of activity. Clearly in Cambridge transport has contributed significantly to the 'Cambridge Phenomenon' by supporting close and interconnected networks. These are captured in the direct WEBs assessment in the DfT's TAG.
- **Investment and employment effects** – transport alters the patterns of private sector investment and consequent employment. Better transport generally makes a place more attractive for investment. Additionality is important here – would the investment have taken place without the transport investment in any case (either in the location or elsewhere in the UK)? In the case of Cambridge many of the investments, given the sectoral activity, are more likely to be internationally mobile and are attracted by the efficient functioning of the Cambridge Cluster. Therefore GCCD action to ensure the cluster remains efficient is critical to such investment. This study looks to capture these additional indirect WEBs which are not captured in TAG at both the study area level (Greater Cambridge) and at a UK level.

Clearly there is a relationship between transport investment and the process of both economic (jobs) and housing growth, but identifying the extent of causality and assessing against conventional metrics (creation of new jobs and the construction of new houses) is very difficult and uncertain. This is the case in Cambridge where lots of investment is planned and other policy measures, particularly land use and planning policy, are shaping the level and location of investment and therefore transport is just one policy measure amongst a wider package. Despite this, the study attempts, through combining modelling techniques used on other studies and building on best practice guidelines in relation to economic impact and transport modelling, to bridge the uncertainties and assess the relative scale of the indirect wider economic benefits under each of the scheme options.

Source: Mott MacDonald, including using 'Transport investment and economic performance: implications for project appraisal', Venables, Laird and Overman, 2014

This study, tailored to the GCCD strategic context, principally examines the indirect wider economic impacts at the Greater Cambridge and UK level deriving from:

- **Land utilisation changes -** linked to the schemes and their options through closely examining the type of transport benefits that will emerge and comparing with the strategic planning framework (i.e. major development sites bringing about land use changes). The economic impacts from land utilisation relate to residential dwellings, jobs and the associated Gross Value Added (GVA)[7]. These benefits are presented as the strategic economic impacts at the Greater Cambridge level.

Using this analysis, the following impacts are then considered at a UK level which are considered compliant to feed into the economic case of the transport business case being prepared separately:

- **Land utilisation changes** – where some of the jobs and associated GVA are net additional to the UK, i.e. the attraction of the internationally mobile knowledge-based employees.
- **Access to more productive jobs** – the benefits derived from those jobs created in Greater Cambridge which support existing UK residents to access more productive jobs than they may currently hold.
- **Reductions in spatial inequalities and structural unemployment –** the welfare benefits associated with any jobs in areas with high levels of deprivation and reductions in long term structural unemployment. These benefits are largely only applicable to schemes that have direct welfare reduction goals and objectives though any scheme that supports employment growth and labour mobility will have some effect on improving access to employment for disadvantaged groups. This can be via either residents directly accessing the jobs unlocked through the scheme(s), or through existing employees in the GCCD transferring to these new jobs, freeing up opportunities for those in the deprived areas/areas of long term unemployment.
- **Option and non-use values[8]** – the benefits relating to the values residents place on having access to opportunities due to the schemes (option values) and that they may place on a public transport service even if they never intend to use it (non-use values).

For reference, we then consider the UK level impacts with respect to the economic case in the HM Treasury Green Book for business case development.

This report presents the findings of the strategic economic appraisal of the A428-A1303 scheme against three different options.

A further report will then be produced by Mott MacDonald for the Western Orbital scheme.

1.2 The A428-A1303 scheme description

The A428-A1303 Cambourne to Cambridge corridor scheme is a series of linked enhancements, which seeks to reduce public transport journey times and costs, helping to provide an attractive alternative to car

[7] GVA is the local counterpart of Gross Domestic Product and a recognised measure of economic production

[8] TAG Unit A4.1 on 'Social Impact Appraisal' covers option and on-use values. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427096/TAG_Unit_A4.1_-_Social_Impact_Appraisal_November2014.pdf [Accessed: 7/7/16].

travel, and, where possible, improve cycling links as well. Appraising individual components of the scheme is a part of this study, including options covering:

- Different alignments, including both on and off-line sections. The offline sections could be operated using guided bus technology capable of upgrading in future years to other forms of rapid transit;
- Park & Ride (P&R) provision to increase its catchment; and,
- Priority measures to reduce delays at junctions and online using new bus lane provision.

The A428 and A1303 are key routes into the city from the west but the stretch between Cambourne and Cambridge is often heavily congested during peak periods, particularly east of Madingley Mulch.

Mott MacDonald were asked to provide this economic appraisal of three main variants as summarised below (alongside the option they relate to in the Atkins work):

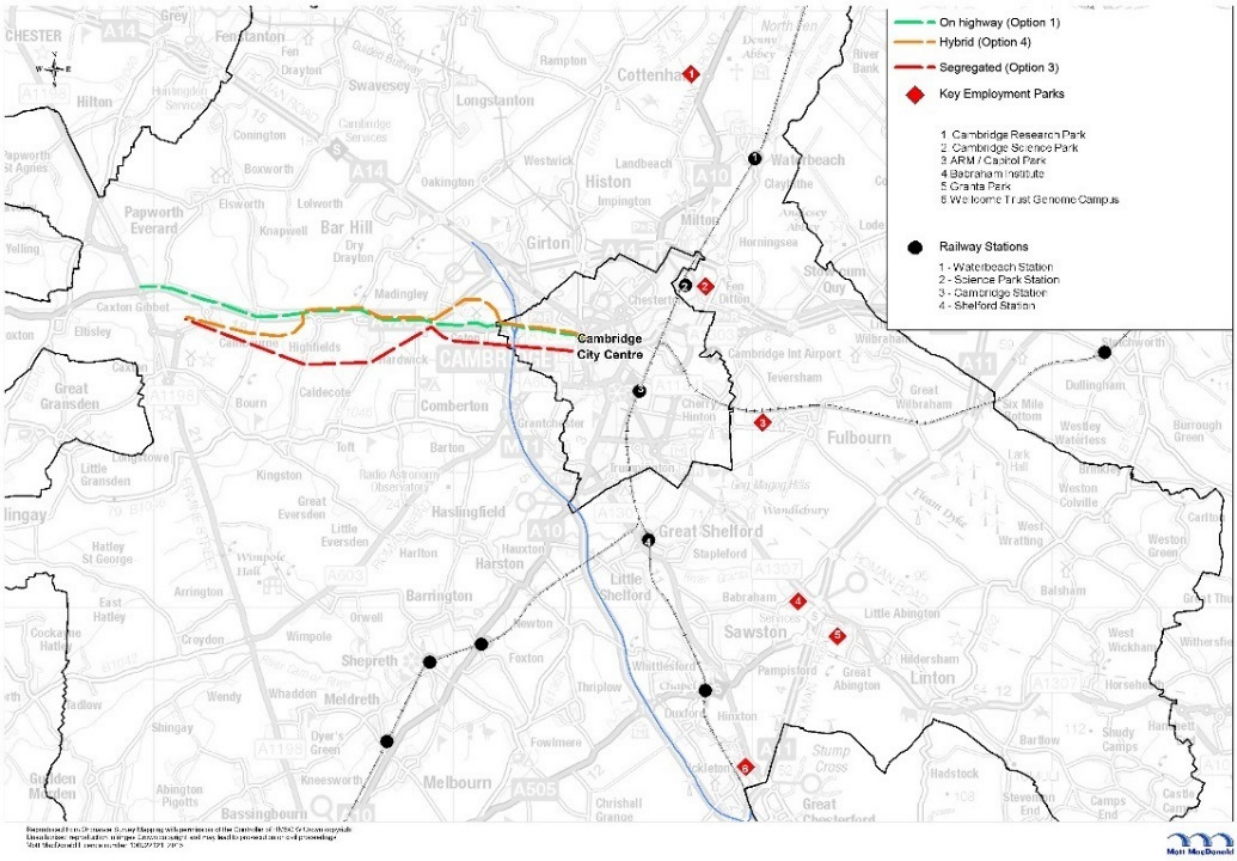
Table 1.1: A428-A1303 Bus Scheme – scheme variants

Variant	Description
On highway measures (Low option and Atkins Option 1)	• On highway bus priority schemes, comprising bus lanes and priority at traffic signals
Hybrid measures (Medium option and Atkins Option 4)	• Hybrid schemes of bus priority (as per 'On highway measures') and segregated, e.g. using new busway infrastructure, running where most feasible (from 'Segregated')
Segregated (High option and Atkins Option 3)	• Wholly segregated running using new busway infrastructure

Source: Mott MacDonald

The indicative routes of the various options are shown Figure 1.1 below, which are not a precise illustration of the exact alignments as these are liable to change during more detailed design phases. The full business case being provided by Atkins describes the options in full.

Figure 1.1: Context map - A428-A1303 Scheme Map



Source: Mott MacDonald

1.3 Report structure

The remainder of this document is structured as follows:

- Section 2: Strategic growth context – an assessment of how the scheme directly links to the long term growth ambitions of Greater Cambridge, as set out in the GCCD and spatial planning documents.
- Section 3: Land utilisation analysis – an assessment of spatial development planned in Greater Cambridge and how the GCCD packages, and specifically this scheme, enables or assists such development.
- Section 4: Option appraisal – key results of the growth attribution analysis that combines analysis of the transport benefits with the land utilisation analysis to understand the level of growth the scheme can be considered to directly support.
- Section 5: Key findings – summarises the key conclusions regarding the wider economic benefits of the scheme options.

2 Strategic growth context

2.1 Introduction

This section summarises the importance of the Cambridge Cluster to the UK economy and the long term growth ambitions of the study as set out in spatial planning and the GCCD. This includes understanding how the A428-A1303 public transport scheme is directly related to the GCCD aims and objectives through logic mapping. This analysis is at a strategic level and the following section sets out the links between the scheme and major development sites in Greater Cambridge.

2.2 Cambridge Phenomenon – a UK success story

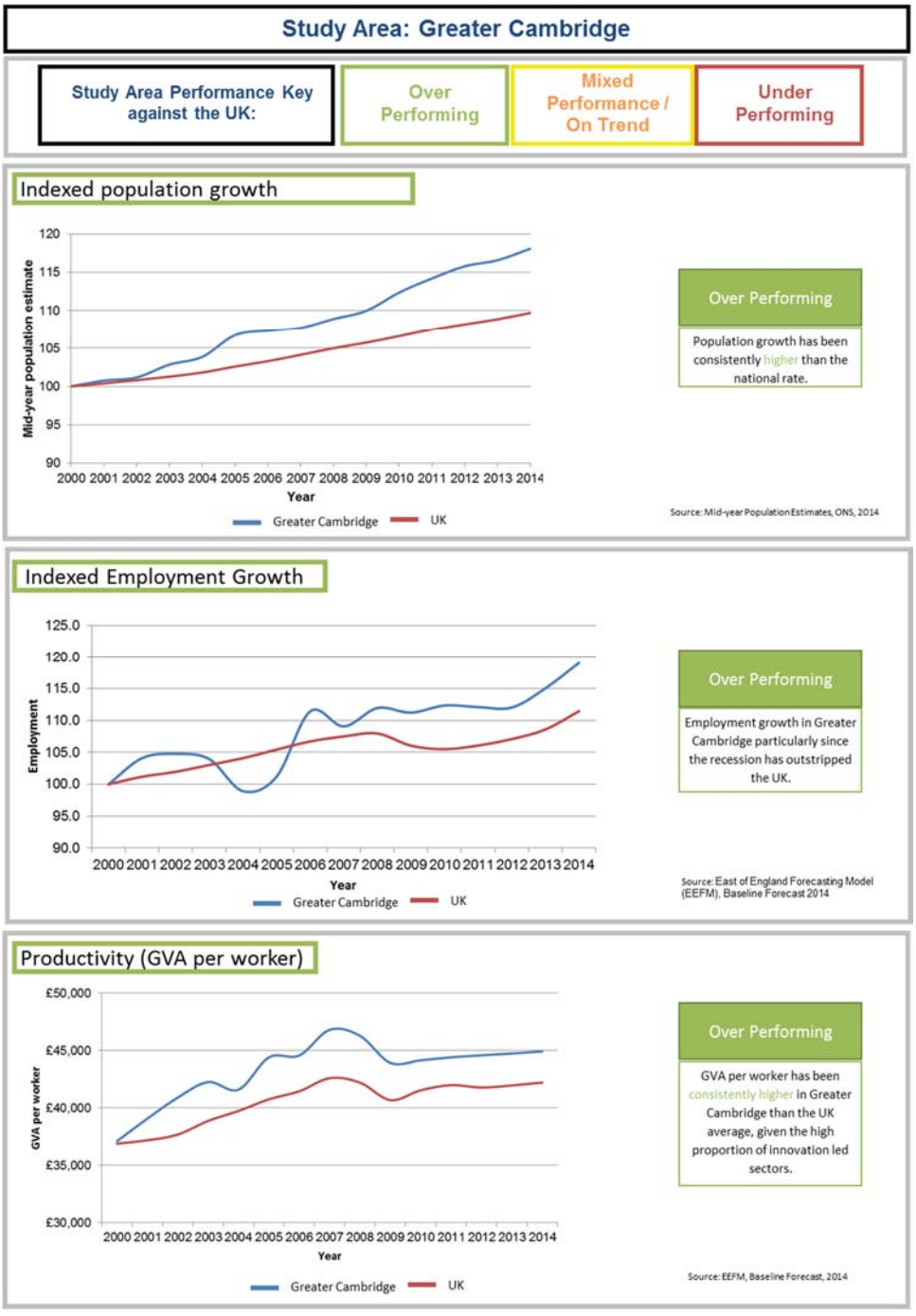
The UK's long term economic plan, besides focusing on reducing the public deficit, looks at delivering supply side reforms, including investment in infrastructure, necessary to improve long-term productivity growth. Britain was forecast *(pre-BREXIT)* by the Organisation for Economic Co-operation and Development (OECD) to be the fastest growing major advanced economy this year[9]. However the outlook for the global economy has worsened and in advanced economies there are growing concerns about productivity growth, high debt levels and deflationary risks. The UK is not immune to global slowdowns and shocks which reinforces the importance of long term supply side investments and ensuring the growth of competitive and sustainable economic activity (namely innovation led sectors).

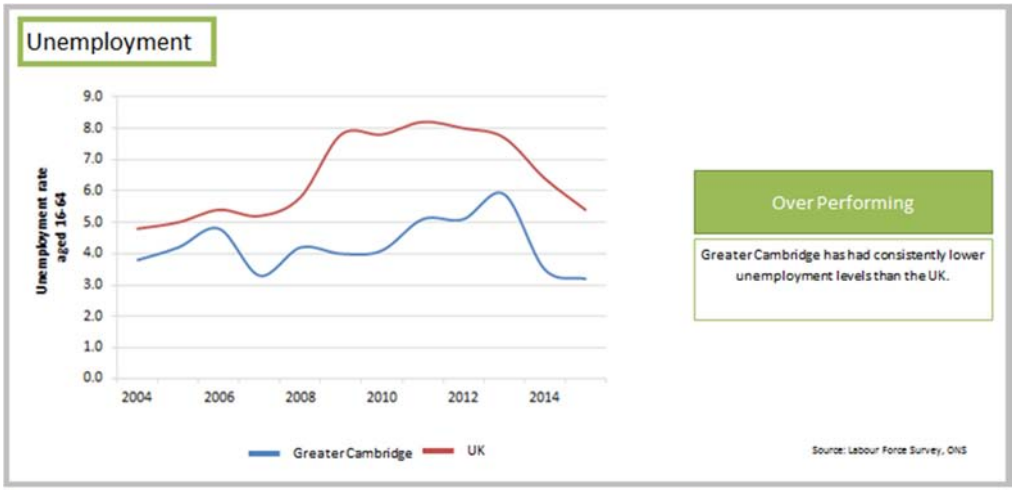
Cambridge is one of the UK's most successful cities where economic success, high quality of life and quality of place are inextricably linked. The thriving hi-tech and biotech industry, which has developed since the 1960s and is known as the Cambridge Phenomenon, accounts for 17.3% of employment[10] and boasts one of the highest concentration of Nobel prizewinners in the world. **Cambridge is one of the UK's fastest-growing and most productive cities and integral to the UK's long term economic plan which seeks to improve productivity and international competitiveness. It helps the UK to compete globally, attracting high value jobs and net economic growth through internationally mobile employees in knowledge-based industries**. As shown in the data dashboard below, the area overachieves in all key economic areas where green represents relative over-performance, yellow represents mixed/on-trend performance and red represents under-performance.

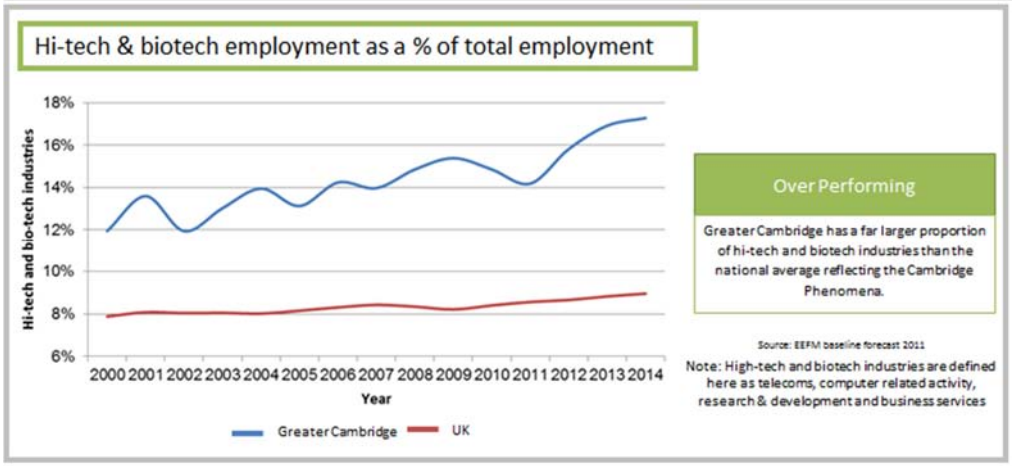
[9] Budget 2016, HM Treasury, March 2016

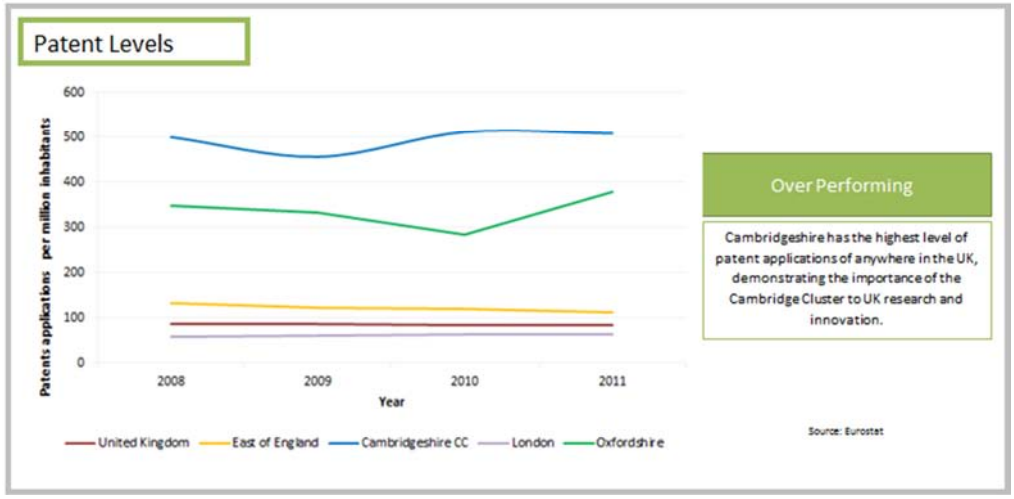
[10] Using EEFM data, baseline forecast 2014. Relates to Greater Cambridge core high-tech and biotech industry as can be best defined in the data encompassing telecoms, computer related activity, research & development and business services.

Figure 2.1: Greater Cambridge – data dashboard




Unemployment
Unemployment rate aged 16-64
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2004
2006
2008
2010
2012
2014
Greater Cambridge
UK
Over Performing
Greater Cambridge has had consistently lower unemployment levels than the UK.
Source: Labour Force Survey, ONS


Hi-tech & biotech employment as a % of total employment
Hi-tech and bio-tech industries
18%
16%
14%
12%
10%
8%
6%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
Year
Greater Cambridge
UK
Over Performing
Greater Cambridge has a far larger proportion of hi-tech and biotech industries than the national average reflecting the Cambridge Phenomena.
Source: EEFM baseline forecast 2011
Note: High-tech and biotech industries are defined here as telecoms, computer related activity, research & development and business services


Patent Levels
Patents applications per million inhabitants
600
500
400
300
200
100
0
2008
2009
2010
2011
Year
United Kingdom
East of England
Cambridgeshire CC
London
Oxfordshire
Over Performing
Cambridgeshire has the highest level of patent applications of anywhere in the UK, demonstrating the importance of the Cambridge Cluster to UK research and innovation.
Source: Eurostat

Despite this economic success, Cambridge faces supply side threats to its economic growth, as evidenced by increasing congestion and rising house prices, both directly influenced by a lack of supply. The Cambridge Cluster's success is founded upon the connectedness across the city and its surrounds that has allowed overlapping networks to develop and facilitated a culture of cooperation and cross-fertilisation between entrepreneurs, businesses and academia. The infrastructure of the area needs to keep up with the area's [potential] pace of growth and the opportunities that exist in order to continue growing an advanced economy and competing on the international stage.

2.3 Greater Cambridge City Deal

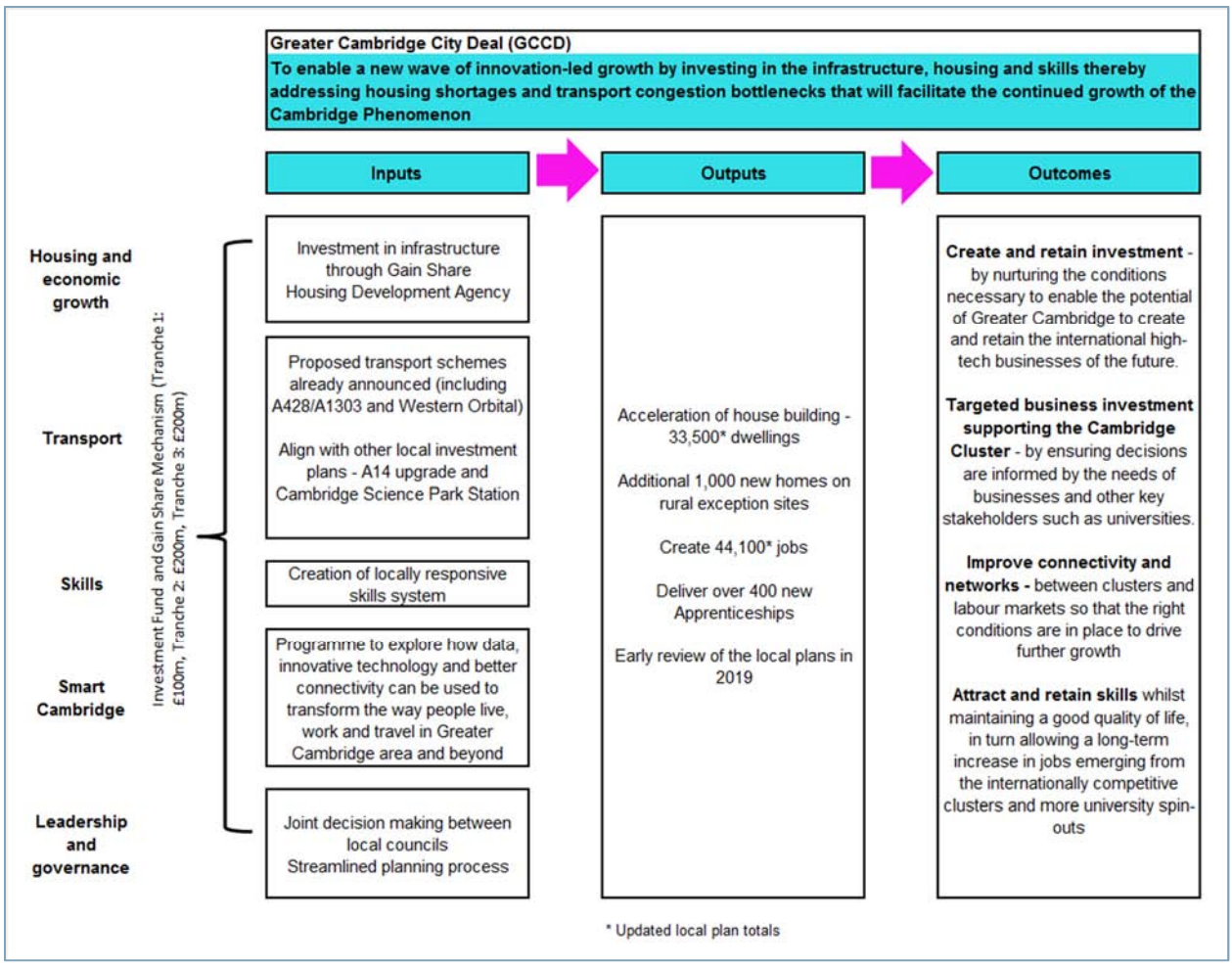
The GCCD aims to enable a new wave of innovation-led growth by investing in the infrastructure, housing and skills thereby addressing housing shortages and transport congestion bottlenecks that will facilitate the continued growth of the Cambridge Phenomenon. The City Deal will deliver the sustainable growth that is identified in the two local plans*:

- 44,100 jobs.
- 33,500 dwellings.

** Please note: The original figures and those stated in the City Deal document with government are 45,000 jobs and 33,480 homes, which were the figures in the draft Local Plans at the time. Given the amendments to the Local Plans, currently in submission, these figures now stand at 44,100 jobs and 33,500 new dwellings.*

The key aspects and commitments for the GCCD are summarised in the Logic Map below which links the overarching aim of City Deal across the various intervention areas, their inputs and the anticipated outputs and outcomes.

Figure 2.2: Greater Cambridge City Deal Logic Map



Source: Mott MacDonald

As part of the assurance framework Greater Cambridge authorities will prioritise projects that deliver against the following four strategic objectives of the GCCD (which can be thought of as the ultimate outcomes of the GCCD – see the Logic Map above):

- **Create and retain investment** to nurture the conditions necessary to enable the potential of Greater Cambridge to create and retain the international high-tech businesses of the future.
- **Targeted business investment supporting the Cambridge Cluster** to the needs of the Greater Cambridge economy by ensuring those decisions are informed by the needs of businesses and other key stakeholders such as the universities.
- **Improve connectivity and networks** between clusters and labour markets so that the right conditions are in place to drive further growth.

- **Attract and retain skills** by investing in transport and housing whilst maintaining a good quality of life, in turn allowing a long-term increase in jobs emerging from the internationally competitive clusters and more university spin-outs.

2.4 Growth targets – delivering continued growth

The growth targets within the GCCD come from the Local Plans[11] submitted in 2014 which set out the planning frameworks to guide the future development of Greater Cambridge over 2011-2031 and are expected to be adopted in 2017.

Various documents informed the strategies[12] which provided the basis for the population, employment, and housing growth targets. To give a broad indication of development needs in 2031, an indicative population figure was determined for each district, reflecting the region around which it would appear that the various population projections and forecasts for Cambridgeshire and Peterborough (the housing market area) tended to converge. The dwelling numbers were then determined by running the population figures through the East of England Forecasting Model (EEFM) and the employment figures derived by comparing forecasts from EEFM alongside the Local Economy Forecasting Model (LEFM).

Overall the total jobs growth over the planning period was established as 44,100 jobs and 33,500 dwellings in Greater Cambridge, based on population growth of 65,000 people. This translates in business floorspace terms to a net demand for 213,200m^2 of additional floorspace to accommodate approximately 20,460 B-use jobs. Considering the stock of employment land only (not considering the quality or suitability), particularly in South Cambridgeshire, demonstrates that Greater Cambridge has the land availability to support the targets of both this planning period and further growth post 2031.

Table 2.1: Cambridge and South Cambridgeshire - development levels 2011-2031

	Development levels					
		Housing	Employment			
	Population change (persons)	Dwellings	Total jobs	B-use jobs	Additional net B-use floorspace	Employment land supply
Cambridge	27,000	14,000	22,100	8,800	70,200 m^2	24.5 ha
South Cambridgeshire	38,000	19,500*	22,000	11,800-12,000	143,000m^2	125.9 ha
Greater Cambridge	65,000	33,500	44,100	20,600	213,200m^2	150.4 ha

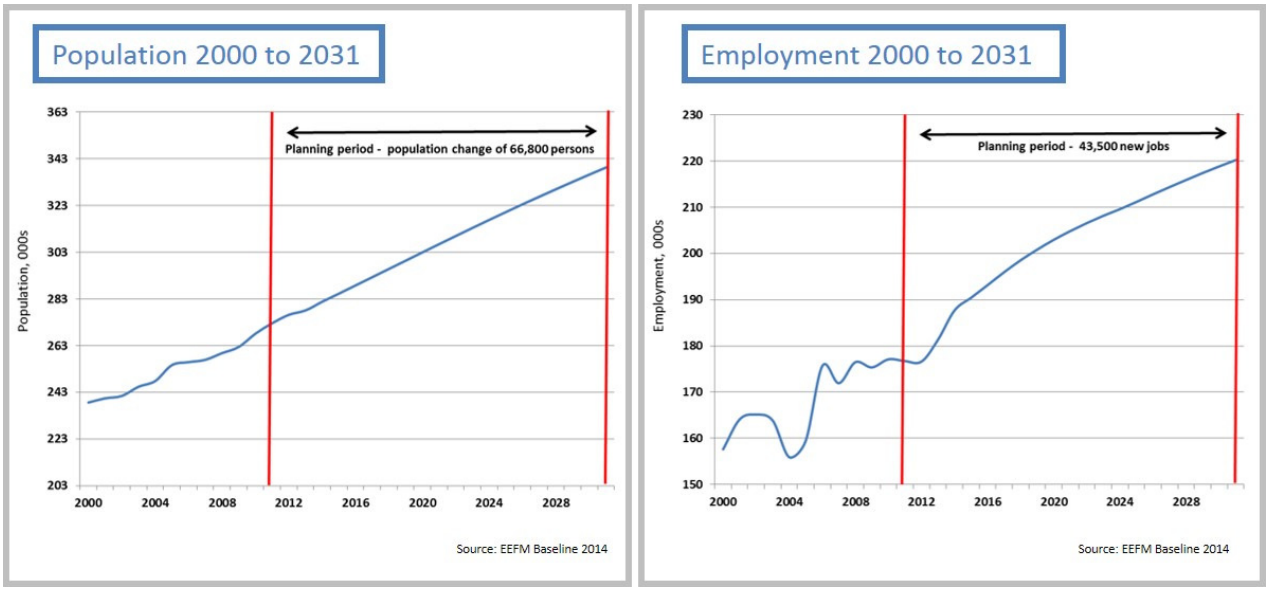
[11] Cambridge Local Plan 2014 and South Cambridgeshire Local Plan 2014, Proposed Submissions, July 2013. These plans are in submission stage, still undergoing g examination and are not yet adopted.

[12] Strategic Housing Market Assessment (SHMA) for the Cambridge housing sub-region, 2013, Land Availability Assessment (SHLAA), August 2013, Employment Land Review Update, and Review of Selective Management Employment Policies, SQW with Savills, July 2012 and South Cambridgeshire & Cambridge City Employment Land Review Update, Addendum 2013. The projections within the SHLAA are informed from the following technical paper - Population, Housing and Employment Forecasts Technical Report, Cambridgeshire County Council Research and Performance Team, April 2013

Source: Cambridge Local Plan and South Cambridgeshire Local Plan and Employment Land Review update, 2012. Employment Land Review Update, 2012, p.7. Cambridge and South Cambridgeshire Local Plan Examination Matter 4 Statement Appendix 5, October 2014. * The housing figure for South Cambridgeshire following inspection has been modified by the council to 19,500 from 19,000 and is currently in consultation.

Figure 2.3 below sets out the overall rate of population and employment growth from the EEFM model, which is broadly similar to that of the Local Plans and illustrates that the targets incorporate substantial growth over 2011-2031.

Figure 2.3: Greater Cambridge – Population and employment growth 2011/2031, EEFM



Source: East of England Forecasting Model, Baseline Forecast, 2014. Please note the EEFM total change figures are slightly different to the 44,100 new jobs and 66,800 persons but broadly in line.

Employment growth over the planning period (2011-2031) is at 1.1% per annum compared to 0.9% and 0.7% in the East of England and the UK. This level of growth is ambitious but is broadly in line with the jobs growth of 42,100 achieved between 1991 and 2011, which represented a period of significant growth in the high-tech clusters[13]. It also recognises the growth potential of Cambridge in terms of accommodating incoming new firms and expansions of firms already located in the area. This growth is important to Cambridge, East Anglia and the UK overall.

Achieving these job targets will depend principally on the following factors:

- **Economic demand and markets** – ultimately the biggest variable will be changes to the economy at a national or international level that will result in a different growth rate(s). This study assumes that the prevailing macro-economic conditions are supportive to continued local growth in Greater Cambridge.

[13] As set out in Joint Matter 4 – Employment & Retail, Joint Matter Statement, Cambridge City Council and South Cambridgeshire District Council, October 2014.

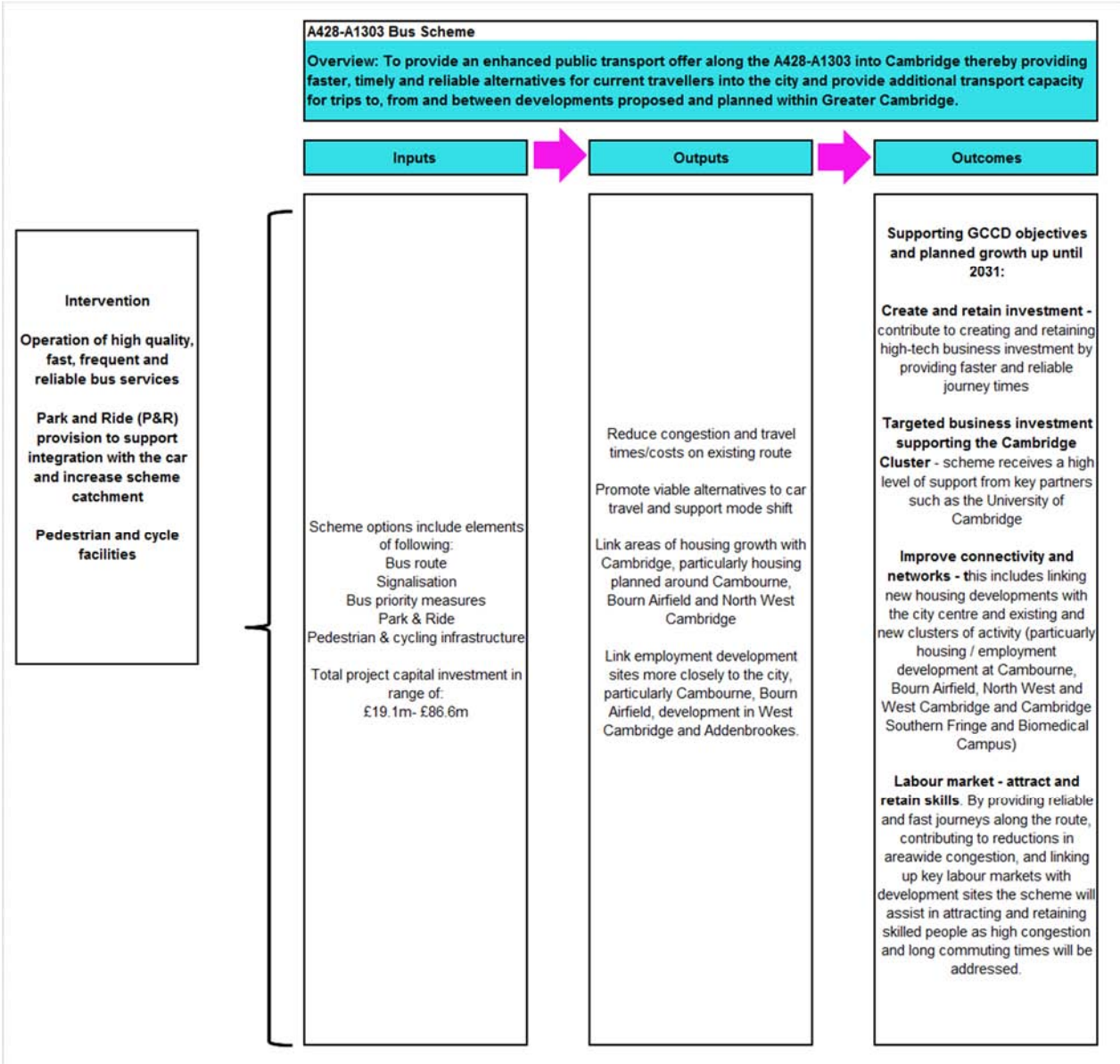
- **Supply side investment and reform** - particularly infrastructure and housing investment and adequate skills provision. To support the growth ambitions the supply side of the economy must be working effectively so that both sufficient skilled labour is available and able to access the jobs.
- **Land availability** – ensuring land is available to accommodate these jobs to continue to support the growth of the Greater Cambridge economy. As highlighted above the quantity of land exists but it is also the type – the policy of selective management of the Cambridge Cluster has been discontinued in the Local Plans to ensure that land can accommodate other complementary research and development uses.

The Councils under the GCCD have committed to undertaking a joint review of the submitted Local Plans in 2019 to ensure that the plans are flexible enough to deal with changing circumstances. This will include understanding the latest economic forecasts for the area and the potential to accommodate further growth. The following section considers the spatial plans in further detail and the pipeline of development to support the jobs targets.

2.5 Greater Cambridge City Deal – scheme contribution

The A428-A1303 Cambridge to Cambourne scheme aims to provide a congestion free public transport corridor along the A428-A1303 into Cambridge, thereby providing faster, timelier, and more reliable alternatives for current travellers into the city, while also providing additional transport capacity for trips from developments proposed and planned within Greater Cambridge. Figure 2.4 below presents a logic map of the scheme to demonstrate how the infrastructure investment directly links to supporting GCCD objectives and planned growth. The links between the scheme and the development sites is set out in detail in the following section.

Figure 2.4: A428-A1303 Cambridge to Cambourne logic map



Source: Mott MacDonald

2.6 Summary

- The Greater Cambridge economy competes on a global stage and is a gateway for high-tech investment into the UK. Its continued expansion is integral to the UK's long term economy plan which seeks to improve productivity and international competitiveness.
- On a range of economic indicators Greater Cambridge performs well and outperforms the national economy. Building on this position to deliver further growth and reinforce Cambridge's position as a

global city with a strong, future-oriented economy is important. Policy is in place to support this and public transport enhancements are integral to continuing this successful economic narrative through the provision of additional capacity in a sustainable manner.

- The spatial growth targets envisage employment in Greater Cambridge to increase by 44,100 jobs by 2031 supported by 33,500 houses, which is based on the expected population increase and in line with long term economic trends.
- The GCCD is a deal with government that will enable a new wave of innovation-led growth by investing in the infrastructure, housing, and skills (using local and national monies) thereby addressing housing shortages and high congestion levels, enabling the growth. Greater Cambridge will look to prioritise and invest in projects that deliver the greatest economic impact over 15-20 years. The GCCD will support delivery of the growth levels identified in the Local Plans.
- The A428-A1303 scheme directly links to the strategic objectives of the GCCD by providing faster and reliable journey times that will improve connectivity and networks, help create and retain investment, and attract and retain skills by linking employment and housing areas more closely. It seeks to improve connectivity, growing the size of the available labour market to existing and potential businesses, and the opportunities available to current and future residents. Ultimately the scheme directly contributes to the overall jobs and housing targets given it is part of a coherent package of GCCD infrastructure schemes identified as needed to ensure the next wave of innovation-led growth in Greater Cambridge.
- Employment and housing land is allocated and available for development but ensuring it is brought forward and contributes to the growth trajectory will be partly linked to the level of connectivity, and reliability/certainty of travel times, between places of residence and places of employment. This scheme is part of a package of measures to ensure this point is addressed.

3 Land utilisation analysis

3.1 Introduction

This section provides analysis of the key development sites that will accommodate housing and employment growth within Greater Cambridge and a qualitative assessment of the level of linkages between these sites and the A428-A1303 bus scheme. The key developments have been identified from an extensive review of the Local Plans and supporting documentation and detailed consultation with the planners at both district councils. This analysis is used alongside the scenario and option modelling in the following section to understand spatially how the scheme contributes to the GCCD growth targets.

3.2 Key developments – where growth will be accommodated

There is substantial housing and employment development planned across Greater Cambridge, identified for areas in a way which will promote and support economic growth in sustainable and accessible locations. The preferred sequential approach, both in Cambridge and South Cambridgeshire, to new development can be described as:

1. being within the existing urban area of Cambridge;
2. being within the defined fringe sites on the edge of Cambridge;
3. within the small-scale Green Belt sites proposed to be released from the inner Green Belt boundary;
4. within existing and newly identified settlement locations at Cambourne, Northstowe, Bourn Airfield and Waterbeach; and lastly,
5. in identified villages.

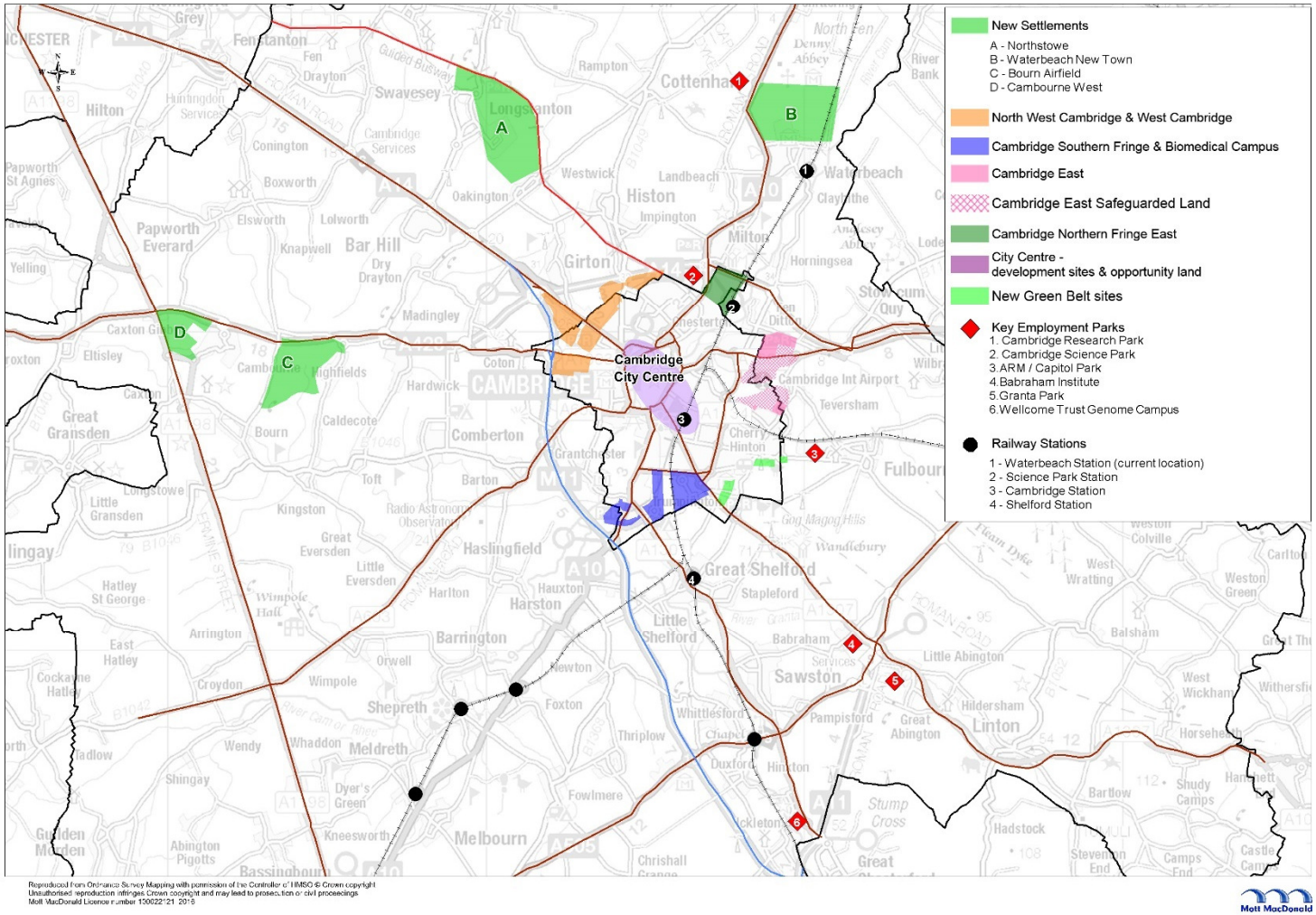
In terms of market demand, as summarised in the existing Transport Economic Assessment Report (TEAR) work[14] there are three main market areas which are faring quite differently:

- The central area – around the station and the city centre, is the most buoyant part of the employment-related market, and demand for sites and premises have consistently outstripped supply.
- Elsewhere in the city – particularly to the south at Cambridge Biomedical Campus, the northern fringe and west Cambridge. Most of these sites have planning restrictions (in terms of more restrictive Use Class designations) but in general demand is strong, based on key attractors (Addenbrooke's, Cambridge Science Park, etc.). The main exception to date has been the West Cambridge site, which is perceived as being somewhat more remote from the railway station and city centre.
- Science and business parks in the surrounding area of south Cambridgeshire, such as Cambridge Research Park and Granta Park. In these areas demand has picked up since the recession but, with substantial employment land still remaining, can be regarded as significantly more cyclical than alternatives in and on the edge of the city.

Figure 3.1 below provides a comprehensive map of the key development sites categorised into six key areas including New Settlements, North West Cambridge and West Cambridge, Cambridge Southern Fringe and Biomedical Campus, Cambridge East, City Centre developments and existing employment locations. The transport investments under the GCCD have been mapped on top of these developments with the A428-A1303 scheme highlighted in Figure 3.2.

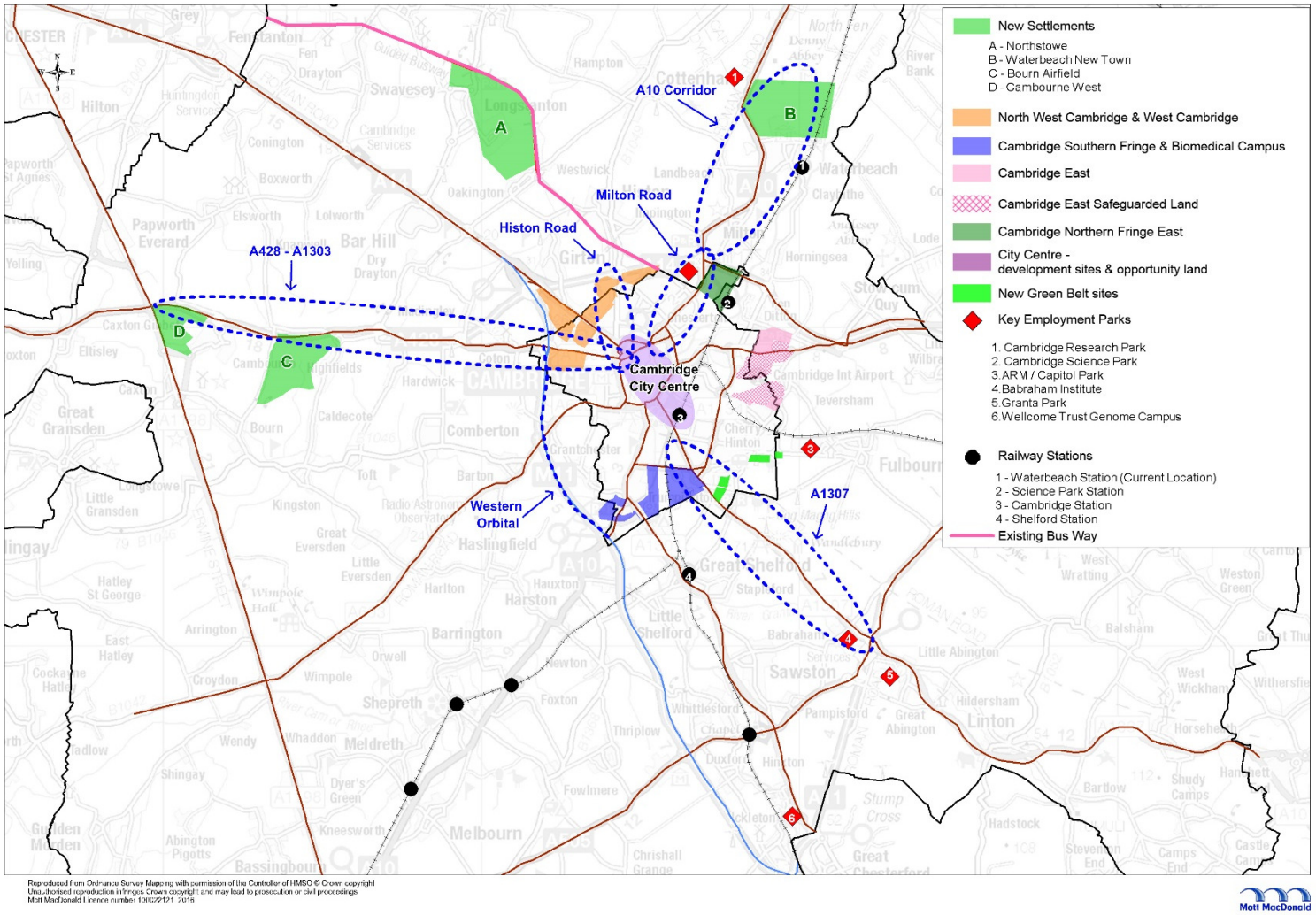
[14] Economic Prioritisation of the Greater Cambridge City Deal, A Transport Economic Assessment Report (TEAR) for Cambridgeshire County Council, SQW & Cambridge Econometrics, December 2014

Figure 3.1: Key developments – map



Source: Mott MacDonald

Figure 3.2: Key developments and transport schemes under GCCD including A428-A1303



Source: Mott MacDonald

Table 3.1 below provides a summary of the constituent sites within these six key areas of focus alongside indicative housing and jobs figures.

Given the level of development within Greater Cambridge the latest details of these sites are continually changing and the employment figures should be regarded as an **indicative number rather than precise calculation**. They have been produced to provide an indication of the spatial distribution of growth across Greater Cambridge up to 2031 which sits alongside the B-use employment growth targets from the Local Plans. This has enabled an assessment of how the scheme is ultimately linked to the GCCD growth targets via supporting key developments that will contribute to the overall housing and jobs figures. Under 3.2.1 further information is provided as to how these housing and job figures are estimated.

Overall, the total housing and B-use job creation from these development sites over the planning period 2011-2031 is in the range of 22,900 houses and 28,600 jobs. The housing figure is lower than the Local Plan total (33,500 houses) as it excludes windfall sites, rural sites, and actual completions. The B-use employment figure is higher than the B-use jobs target of 20,600 jobs, which even if allowing for any over estimates in the job figures, demonstrates that there is enough employment land and sites available to reach the Local Plan growth totals (and therefore GCCD targets). Furthermore, there is a considerable amount of development in the pipeline post 2031, especially at the new settlements such as Northstowe, Cambourne and Bourn Airfield and sites such as West Cambridge and Northern Fringe East, which demonstrates that the land capacity exists to continue supporting the growth of high-tech businesses and the Cambridge Cluster.

Importantly, these job figures relate to B-use jobs only and do not include some of the academic and research led jobs aligned to the university that fall into other categories such as D2. This has been excluded from the analysis as the land use modelling looks specifically at B-use jobs created over the planning period which is strategically planned for in terms of land supply. This means that the approach used in the attribution analysis (following chapter) is cautious since it is likely to underestimate the scale of jobs associated with the scheme. This is certainly the case for major new settlements where substantial town centre jobs will be created and for some of the university / research led sites where substantial educational related uses will be created or intensified. Nevertheless using B-use jobs only enables a conservative and realistic approach to estimating the degree of jobs supported and builds on accepted best practice techniques for employment land assessment. Modelling whole economy effects would require more time and resources and could potentially considered as part of any full business case preparation.

Table 3.1: Key development sites across Greater Cambridge

			Housing and indicative B-use jobs estimates			
			Houses		B-use jobs	
Major Area	Sites	Description	2016-31	Post 2031	2011-31	Post 2031
New settlements	Northstowe	The new town of Northstowe will provide homes for around 25,000 people over the next three decades. The Northstowe Area Action Plan (AAP) identifies the site for 20 hectares of employment land, including around 5 ha of b1c/b2/b8 at the northern end of the town. Based on the Phase 1 and Phase 2 planning applications total B-use job creation is estimated at approximately 2,000 jobs. The total employment profile of the settlement is anticipated to be in the range of 9,500 jobs which means total B-use employment (including Phase 1, Phase 2 and Phase 3) could be in the range of 4,000-4,500 jobs.	3400	6600	2000	TBC but considerable
	Waterbeach	Land north of Waterbeach is allocated in the Local Plan (submitted in March 2014) for the creation of a sustainable new town. The new town will provide 8,000 to 9,000 dwellings and employment, retail, sports and leisure, community, and education uses. The submitted Local Plan envisages the quantity of employment land would be determined through production of an area action plan. Given the location next to the Cambridge Research Park and that most of the housing is anticipated in the trajectory after 2031, the number of B-use jobs anticipated by 2031 may be low.	2100	7000	100	TBC
	Bourn Airfield	Bourn Airfield is allocated in the Local Plan (submitted in March 2014) is allocated for a new village of approximately 3500 dwellings. The Submitted Local Plan policy states that an Area Action Plan will consider how the former ThyssenKrupp site (9ha site) and other employment uses can be integrated with the new village. For this exercise a cautious approach has been adopted which assumes that 1,000 B use jobs are likely to be created in total given a greater mix of employment uses are likely to be sought. The employment development is assumed to take place at the same pace as the housing trajectory (40% over planning period and 60% post 2031)	1400	2100	400	600
	Cambourne West	Continued rural extension of Cambourne, which includes 500 remaining dwellings uncompleted and 1200 planned for. Therefore, the total trajectory to 2031 uses the Local Plan total. A Planning application has been submitted for a larger site than that included in the submitted Local Plan. This is for 2,350 dwellings, excluding land on the existing business park, which could itself accommodate around 200 dwellings. The application has been amended to include around 30,625m² of B1 employment space which alongside other employment space development in and around this site will take total B use job creation to around 1,900 jobs of which 1,500 are assumed to be created by 2031.	1700	TBC	1500	400
North West Cambridge and	North West Cambridge (University site,	The development at North West Cambridge, between Madingley Road and Huntingdon Road, will predominantly be for the long-term needs of Cambridge University. This will include key worker housing for University staff, student housing and new faculty buildings	5600	0	1800	0

			Housing and indicative B-use jobs estimates			
			Houses		B-use jobs	
Major Area	Sites	Description	2016-31	Post 2031	2011-31	Post 2031
West Cambridge	NIAB and NIAB2)	and research facilities and also market housing. The development is anticipated to support around 4,400 jobs in total, of which 3,700 will be in labs/offices and workshops (based on a 100,000m² floorspace of which 60,000m² will be academic space (D1) and 40,000m² commercial space (B1b)). The Environmental Statement accompanying the Outline Planning Application estimates that the 100,000m² of floorspace will create around 3,700 jobs. For simplicity it has been assumed 50% of these will be B-use jobs. The dwelling figures includes the NIAB and Darwin Green sites.				
	West Cambridge	This site is being promoted by the University of Cambridge and in the Cambridge Local Plan for densification for commercial and academic uses. The University has submitted a planning application for 383,300m² of floorspace, of which 170,000m2 will be commercial space. The University's assumptions regarding jobs growth is that the development will create around 10,000 net additional jobs (allowing for deadweight) of which around 7,300 will be B use jobs. The assumption is that much this can come forward pre 2031, however, this analysis cautiously assumes that 50% comes forward before 2031.	0	0	3600	3600
Cambridge Southern Fringe and Biomedical Campus	Trumpington Meadows	Housing site	800	0	0	0
	Glebe Farm	Housing site	100	0	0	0
	Clay Farm	Housing site	1500	0	0	0
	Addenbrooke's	The bio-medical campus for biomedical and biotech research and development is anticipated (as stated in the Environmental Statement) to create in the range of 10,000 jobs of which many will be clinical research jobs. Around 3,600 of these will be B use jobs.	0	0	3900	0
	Bell School	Housing site	300	0	0	0
Cambridge East	Cambridge East	Major area of safeguarded land but currently housing planned on the site only.	2600	0	0	0
New Green Belt Sites	Fulborn road	Planning permission is granted for 25,000m² of B1 R&D space on the site in Cambridge whilst a 4.3ha site (approximately 14,100m² of floorspace) in South Cambridgeshire is proposed as a new employment location in the submitted local plan. These floorspaces have informed the jobs estimate and this growth is assumed to come forward before 2031.	0	0	2400	0
	Worts Causeway	Housing site	400	0	0	0
Cambridge Northern Fringe	Cambridge Northern Fringe	The Submitted Local Plans both identify Cambridge Northern Fringe East for a mixed use employment led development, that will be subject to an Area Action Plan. Issues and options consultation was completed in 2015, and further evidence is being prepared,	0	Unknown	1600	8900

			Housing and indicative B-use jobs estimates			
			Houses		B-use jobs	
Major Area	Sites	Description	2016-31	Post 2031	2011-31	Post 2031
East	East	including consideration through the A10 Corridor Transport Study. Early indications are that the site could provide 0-630 dwellings and 162,000-338,000m² of offices/research and 5.8-7.1 ha of industrial/storage (smaller figures used for job estimates). Given the unknowns 15% of the employment associated within these floorspaces in assumed to come forward up to 2031 with the rest post 2031				
Research Parks	Granta Park	Detailed planning permission (S/1052/13) was granted in October 2013 for the redevelopment of the TWI buildings comprising new buildings totalling 21,771m² along with the phased demolition of existing buildings on the site of 12,877m². Completed in 2015. Granta Park Phase 1 has several buildings yet to be completed, totalling around 10,000m². In December 2015 Granta Park Phase 2 (zone 2) was granted outline Planning Permission 32,490m sq. floor space (net) B1b. In addition, full planning permission granted on Phase 2 (zone 1) for 20,252m² (net) B1b) building, application anticipates will deliver 895 jobs. Given the scale of development some job creation is assumed to occur post 2031.	0	0	2500	1,100
	Babraham Institute	Babraham Research Campus provides start up and grow on space for Biotech companies, including labs and office space. Based on the remaining space and information accompanying the planning applications 900 B use jobs has been used here.	0	0	900	0
	Hinxton Welcome Trust Genome Campus	Existing employment park. Based on the remaining space and information accompanying the planning applications 700 B use jobs has been used here.	0	0	700	0
	Cambridge Research Park	Remaining undeveloped plots within the existing business park. Estimated that the remaining build out will create around 2,500 jobs and will link closely with the new town at Waterbeach.	0	0	2500	0
	Cambridge Science Park	The Cambridge Science Park is currently developed at low densities in some areas, and the early stages are 40 years old and ready for re-development. Higher densities could be achieved within the Science Park without destroying its essential character, and this would help ease the supply constraints for high tech firms in the Cambridge area. Policy E/1 of the Submission Local Plan for South Cambridge supports “appropriate proposals for employment development and redevelopment on Cambridge Science Park”. Estimates provided suggested there is scope for an additional 60,000 sqm on the Science Park, and at least 12,500 sqm on St John’s Innovation Park, without affected the quality of the environment provided by both schemes. However, this would depend on a range of factors, such as buildings becoming available for redevelopment. Based on current planning applications it is estimated that total job creation will be in the	0	0	1,900	500

Major Area	Sites	Description	Housing and indicative B-use jobs estimates			
			Houses		B-use jobs	
			2016-31	Post 2031	2011-31	Post 2031
		range of 2,300 jobs but not all of these are likely to be created pre 2031 and there could be further consolidation increasing total jobs figure reported here post 2031.For this exercise it is assumed that 80% of those jobs created on current permissions will come forward by 2031.				
City Centre	City centre	Station Area remains the major development site which is almost complete and will deliver in the range of 14,300m² of net additional commercial space (36% of the total commercial development). Given the transport modelling for the Local Plan process proportioned 9,500 of total jobs growth (22,100 in Cambridge) to the city centre, assuming the same proportion of B-use jobs this would translate into around 3,800 jobs but allowance has been made for displacement (25%) putting total B-use jobs growth at around 2,800 jobs.	2900	0	2800	Unknown
		TOTAL	**22,900**	**17,100**	**28,600**	**15,100**

Source: Mott MacDonald. Please note all figures rounded to the nearest 100 and totals therefore may not sum.

3.2.1 Note on employment and housing estimates

The indicative employment figures have been estimated where needed using Mott MacDonald's in-house Transparent Economic Assessment Model (TEAM) which calculates gross employment figures based on combining land use information (fed into the model) with land use assumptions (the key one being employment land densities).

The following information has been obtained from examining planning documents and applications and extensive consultation with local planners and developers:

- Housing
  - Housing trajectories within the Local Plans and Annual Monitoring Reports.
- Employment
  - B-use site sizes or net floorspace footprints.
  - Gross jobs to be created on site (where known). For many of the sites figures have been using employment densities based on previous planning applications or in line with the Employment Land Review (ELR) assumptions.
  - Timescale of job creation – particularly over planning period (2011-31) and post 2031. In many cases the employment build out is unknown therefore assumptions have been made either aligned to the housing build out (if there is one) or the most likely scenario.

Please note that the estimates represent as full a picture as possible given the level of unknowns regarding these sites – particularly the new settlements where the options for development are adapting continually.

3.3 Key linkages – developments and the scheme

The GCCD infrastructure investment, including this scheme, aims to enable a new wave of innovation led growth through addressing congestion and other transport bottlenecks. Given that the road network is already under huge pressure, and public transport is also close to capacity, particularly during peak periods but also throughout much of the day, transport investment is very likely to stimulate economic and housing growth. This will be through the following channels[15]:

- Directly unlocking major housing and / or employment sites that may not otherwise come forward by providing opportunities to travel.
- Providing an important link between employment and housing development sites.
- Enhancing the functionality of the city centre and its surrounds, recognising the centre as the main entertainment and service centre for a much wider area, e.g. through the provision of greater capacity and efficiency.
- Improving perceptions of Cambridge as a place to do business and enjoy a good quality of life, promoting inward investment from business and helping to attract and retain a highly skilled workforce.

[15] This follows the channels identified in the previous study – Economic Prioritisation of the Greater Cambridge City Deal, A Transport Economic Assessment Report (TEAR) for Cambridgeshire County Council, SQW & Cambridge Econometrics, December 2014.

Table 3.2 assesses the contribution of the A428-A1303 scheme to each of these four areas based on the objectives of the scheme and mapping of the development sites.

Table 3.2: A428-A1303 – key linkages to development sites

Key channel	GCCD Strategic objectives (contributes towards)	Description – summary
Directly unlocking major housing and/ or employment sites	• Improving connectivity and networks • Creating and retaining investment	• The major development areas identified are well established and arguably may proceed in some form if the minimum investment options were pursued but the infrastructure within the GCCD will greatly enhance the prospects and feasibility of the development planned. • This is especially the case for Cambourne and Bourn Airfield where policies in the Transport Strategy for Cambridge and South Cambridgeshire, and the submitted Local Plans, require high quality segregated bus priority measures on the corridor. These have been identified as mitigation requirements in order that these developments could go ahead. Without such measures the development strategy for some development sites may have been different.
Linking employment and housing development sites	• Improving connectivity and networks • Creating and retaining investment	• The City Deal aims to enhance the functionality of the Cambridge area as a whole. • The A428-A1303 scheme will directly link the following key areas which are accommodating significant housing and employment growth - the new settlements to the West (Cambourne West and Bourn Airfield) and Cambridge and North West and West Cambridge both between each other and with Cambridge. All these areas will accommodate substantial employment and housing growth. • Additionally, if the Western Orbital scheme also goes ahead it will significantly enhance access to Addenbrooke's and links to the north to Cambridge Northern Fringe East. • These areas will be better linked because the scheme will enable faster and reliable journey times to and from these sites.
Enhancing the functionality of the city centre and its surrounds	• Improving connectivity and networks • Creating and retaining investment	• The main radial routes all converge on the city centre and the existing guided bus has already improved north south links (e.g. between Cambridge Science Park and Addenbrooke's). Links to the West via this scheme would significantly improve access between the city centre and Cambourne West, Bourn Airfield and North West and West Cambridge. • Measures, such as under this scheme, will improve the capacity and reliability of movement across and around the city centre, particularly as it encompasses public transport. This will improve the efficient functioning of the whole Greater Cambridge area by linking housing sites to employment sites, and both to city centre services.
Improving perceptions of Cambridge	• Labour market – attract and retain skills • Creating and retaining investment	• Common concern among residents, businesses and visitors is traffic congestion and the uncertainty and delays that this causes. This affects the confidence of all parties. • This scheme will promote faster and more reliable journeys along a key corridor from the West into Cambridge. If economic growth results in congestion and a decline in the quality of life, Cambridge will become less attractive and firms will begin to look elsewhere to locate and grow (typically looking outside the UK rather than elsewhere in the country).

Source: Mott MacDonald

3.4 Summary

- A significant level of development is planned in Greater Cambridge which will provide more than enough B-use employment space to achieve the B-use jobs target of 20,600.
- There is a good supply of employment space post 2031, providing key constraints on major sites can be addressed (such as Cambridge Northern Fringe East). This demonstrates that investments in transport infrastructure are critical to ensure high congestion levels and poor reliability issues are addressed, enabling the next wave of innovation led growth.
- The A428-A1303 scheme clearly contributes towards removing these bottlenecks on growth by linking key employment and housing sites together, and with the city centre, and through improving the quality of life and perceptions of the area. The Cambridge Cluster's success is founded upon these close networks and the area's quality of life.
- The next section, using these employment and housing figures identified at a spatial level, looks to differentiate the impacts of the scheme options on the GCCD growth targets helping to ensure the long term strategic economic outlook is considered when identifying a 'preferred option'.

4 Option appraisal – modelling and results

4.1 Introduction

This section sets out the potential scale of indirect Wider Economic Benefits (WEBs) which can be directly attributed to the on highway measures (Option 1), hybrid (Option 4) and segregated route (Option 3) based on combining the findings from the strategic context review and the land utilisation analysis with Atkins' transport modelling outputs.

This section is structured as follows:

- **Qualitative option appraisal** – appraisal of each option based on assessing how the scheme option is likely to impact on GCCD strategic objectives from both transport benefits and economic development perspectives. From this the best performing option is determined.
- **Transport modelling outputs –** analysis of the relative impact of the three options through quantified assessment of the Atkins transport modelling outputs. This provides a range of multipliers to estimate how growth will differ against the best performing option.
- **Land utilisation benefits** - quantitative analysis of the maximum likely scale of economic benefits that can be directly attributed to the scheme and thereby the highest scoring option based on the land utilisation analysis. This builds on the existing TEAR work to examine attribution levels across those development sites most impacted by the scheme and wider city centre development. These benefits are at a Greater Cambridge level for all options, based on the transport modelling multipliers.
- **Indirect WEBs** – assessment of the indirect WEBs aligned to the land utilisation analysis at a UK level, which are considered compliant to feed into the strategic case of the transport business case being prepared separately, these relate to:
  - **Land utilisation benefits** – considering the proportion of the jobs, or labour supply, which are likely to be net additional to the UK, through the attraction of internationally mobile knowledge-based employees, quantified as GVA.
  - **Access to more productive jobs** – the benefits derived from those jobs created in Greater Cambridge that are either considered net additional to the UK economy or support existing UK residents to access more productive jobs than they may currently hold, quantified as GVA.
  - **Reduction in spatial inequalities and structural unemployment** - the welfare benefits associated with any jobs in areas with high levels of deprivation and reductions in long term structural unemployment. These benefits are largely only applicable to schemes that have direct welfare reduction goals and objectives though any scheme that supports employment growth and labour mobility will have some effect on improving access to employment for disadvantaged groups. This can be via either residents directly accessing the jobs unlocked through the scheme(s), or through existing employees in the GCCD transferring to these new jobs, freeing up opportunities for those in the deprived areas/areas of long term unemployment.

  We separately consider how the GVA benefits should be transformed for reporting in the economic case of the HM Treasury's Green Book five stage approach to business cases. This aims to avoid double counting with outputs from the conventional DfT TAG appraisal, which aim to proxy indirect WEBs through user benefits.

- **Option and non-use values**[16] – additionally the welfare benefits relating to the values residents place on having access to opportunities due to the schemes (option values) and that they may place on a public transport service even if they never intend to use it (non-use values).

To avoid overlap with the benefits estimates by Atkins Ltd for the core transport appraisal, this analysis does not consider agglomeration impacts.

4.2 Qualitative option appraisal

4.2.1 How will the scheme support economic performance?

The A428-A1303 scheme is part of a proposed transport network that will form the 'backbone' of the GCCD strategy by providing new or greatly enhanced links between areas of population and employment growth within Greater Cambridge, thereby addressing congestion and public transport issues to help stimulate further economic growth[17]. There are several key routes by which the transport scheme will contribute towards this, namely:

- By supporting **business investment and growth** – better connectivity and capacity for the future (through lower congestion and investment in long term infrastructure) enhance the investment prospects of the corridor area and is likely to result in quicker development along the corridor at the key growth sites.
- By supporting **labour market mobility** – journey time savings along the strategic corridor will improve labour market mobility as journeys to work become more efficient. This will improve the connectivity between key employment sites and labour markets. Ultimately this benefits both the workforce, who can access more opportunities, and employers, who can access a wider labour market.
- By contributing to the **positive image and perceptions of Greater Cambridge –**high quality and efficient infrastructure promotes a positive image of Greater Cambridge as a place to live, invest and do business. Helping to tackle congestion, by promoting alternatives to the private car, contributes to a higher quality of life through reduced severance, improved air quality and reductions in road safety concerns etc. These help to sustain and improve attributes that have played a crucial role in the city's success to date.
- By contributing towards **future development and growth –** the land utilisation analysis has shown that beyond the Local Plan period (2031) significant development is still planned which is likely to only increase as time progresses, especially as Greater Cambridge has the quantum of employment land supply, and the demand therefore, to support further growth. Options that could provide higher capacity in the future and which provide possible upgrades for the future (such as a rapid transit system) will represent an investment for longer term economic growth. In practice there may be scope for both further accelerated development through infrastructure investment prior to 2031 and/or an increased rate of growth post-2031.

[16] TAG Unit A4.1 on 'Social Impact Appraisal' covers option and on-use values. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427096/TAG_Unit_A4.1_-_Social_Impact_Appraisal_November2014.pdf [Accessed: 7/7/16].

[17] GCCD, UK Government, p.3

4.2.2 Key transport benefits

Given these linkages between transport and economic growth, the starting point for the qualitative appraisal is to understand in more detail how each option will contribute towards addressing congestion and capacity issues. Table 4.1 below provides a relative comparison of the key transport benefits against a number of key factors that are likely to address transport bottlenecks and directly influence economic growth:

- **Connectivity** – improvements to connectivity not just along the A428-A1303 corridor but across GCCD by reducing journey times and therefore congestion levels. This is both in terms of connectivity to jobs and opportunities and employers' connectivity to labour markets.
- **Reliability** – extent to which journeys will be more reliable because of the transport intervention.
- **Sustainable transport** – the extent to which each option promotes a mode shift towards public transport, freeing up highway capacity (reducing congestion or supporting access for others) and reducing the externalities associated with car use.
- **Quality** – the extent to which each option promotes perceptions of quality.

These have been based on analysis of Atkins transport modelling and the benefits set out in the Multi Criteria Appraisal Framework Table (MCAF) provided by Atkins. This, at a fine level of spatial detail[18], looks at journey times and costs between locations by mode of travel, journey purpose and time period under a Do Minimum (DM) scenario and three Do Something (DS) scenarios (on highway, hybrid and segregated options).

Table 4.1: Key transport benefits by 2031 compared to the Do Minimum

Benefit	Option 3 - Segregated	Option 4 - Hybrid	Option 1 - On highway
Connectivity to jobs and opportunities	• **Significant** reductions in travel times and costs for residents of Cambourne and those accessing P&R sites • Across the whole area this option has the **greatest** level of mode shift, which frees up highway capacity for use by others and/or reductions for existing users	• **Significant** reductions in travel times and costs for residents of Cambourne, Bourn Airfield, Hardwick and those accessing P&R sites • Across the whole area this option has the **second greatest** level of mode shift which frees up highway capacity for use by others and/or reductions for existing users	• **Some** reductions in travel times and costs for residents of Cambourne, Bourn Airfield, Hardwick and those accessing P&R sites, but mitigated by online alignment • Across the whole area this option has the **lowest** level of demand which frees up least highway capacity for use by others and/or reductions for existing users
Employers' connectivity to labour markets	• **Greatest** increase in labour market accessibility, primarily focussed on city centre	• **Second greatest** increase in labour market accessibility, including sites along the A1303 (NW Cambridge and W Cambridge sites) and the city centre	• **Lowest** increase in labour market accessibility due to longer journey times to city centre, but greater benefit along the A1303 (NW Cambridge and W

[18] Transport modelling of the options has been undertaken in the Cambridge Sub-Regional Model (CSRM), comprised of 325 individual zones, and detailed representation of the transport networks connecting those zones within the Greater Cambridge area.

Benefit	Option 3 - Segregated	Option 4 - Hybrid	Option 1 - On highway
			Cambridge sites) than the 'High' option
Reliability	• Offline segregated alignment will promote **highest** levels of reliability	• Mix of offline and online, partially segregated, alignment will promote **second highest** levels of reliability	• Online alignment will promote **lowest** levels of reliability, with potential for being caught in highway congestion
Sustainable transport (mode shift)	• **Greatest** mode shift will do most to contribute to improved quality of life by reducing car-kms	• **Second greatest** mode shift will contribute to improved quality of life by reducing car-kms	• **Lowest** mode shift will make some contribution to improved quality of life
Quality	• Offline alignment will promote **highest** levels of perceptions of quality, due to presence of fixed infrastructure for the entire length	• Mix of offline and online alignment will promote **second highest** levels of perceptions of quality, due to presence of some fixed infrastructure	• Offline alignment will promote **lowest** levels of perceptions of quality, due to lack of fixed infrastructure
Key:	• High	• Medium	• Low

Source: Mott MacDonald

Due to a combination of alignment and P&R provision, **the 'High' option is observed to provide the greatest impact**. This is because it attracts the highest number of public transport users as a result of its comparative time and cost savings to existing and potential users. In particular, its alignment and P&R provision help to minimise access and egress times to get to and from the new services. **The hybrid alternative, whilst being outperformed by the 'High' alternative, does provide a large proportion of its benefits, especially in comparison to the 'Low' alternative**.

4.2.3 GCCD Strategic objectives

The appraisal against transport benefits is very important but is not the full picture as this work is focused on understanding the strategic economic case for all the scheme options. To do this Table 4.2 below appraises each option against the GCCD strategic objectives in relative terms (high, medium, low) to understand how they can be regarded to support the next wave of innovation lead growth against the key channels identified earlier (business investment and growth, labour market mobility, positive image and perceptions and future development growth (post 2031)).

Table 4.2: Strategic objectives and links to options

Strategic objectives		Option 3 - Segregated	Option 4 - Hybrid	Option 1 - On highway
Create and retain investment to nurture the conditions necessary to enable the potential of Greater Cambridge to create and retain the international high-tech businesses of the future.	• **Business investment and growth** - promoting connectivity of Greater Cambridge as a whole and the Western fringes, influencing current and future investment decisions.	Scheme demand, congestion savings and connectivity impacts are the highest of the three options. In particular it, improves connectivity to the City Centre	Scheme demand, congestion saving and connectivity impacts lower than Option 3.	Scheme demand, congestion savings and connectivity impacts are lowest of the three options.
	• **Labour market mobility –** improving efficiencies of journeys to work and connections between housing and employment sites	Journeys to work will be most efficient. It will provide the quickest access from major housing growth areas (Bourn Airfield and Cambourne) into Cambridge City Centre, surrounding fringe sites and ongoing journeys.	Journeys to work will be more efficient than Option 1, but less efficient than Option 3	Journeys to work will be less efficient than under Options 3 or 4, with lower reductions in travel times and costs
	• **Positive image and perceptions –** promoting a positive image of Greater Cambridge / enhancing quality of life attributes.	High quality bus route that is fully segregated with new fixed infrastructure will promote the most positive image of the transport network.	Anticipated to still be high quality but only partially segregated with the consequent lack of fixed infrastructure for portions of the route reducing positive image relative to Option 3.	Unlikely to promote positive image of a modern and vibrant city investing for the future
	• **Future development and growth (post 2031) –** provide sustainable investment that takes account of both planned and unplanned growth post 2031 by also providing the possibility of upgrading to a rapid transit system.	This option will provide the biggest increase in future capacity for further housing and development planned in settlements and fringe sites. Its segregated nature means it could more easily be upgraded to a rapid transit system in the future which will help future proof the corridor for any further unplanned development. This is especially the case for the Madingley Mulch roundabout to Cambridge area which will become congested quicker than the Cambourne to Madingley Mulch roundabout area.	Not wholly segregated, and therefore more difficult, relative to Option 3, to upgrade to rapid transit system in the future. However, the segregated route from Madingley Mulch roundabout to Cambridge is arguably more important to future proofing than the Cambourne to Madingley Mulch roundabout given further capacity exists on the later stretch.	Existing highway measures which will not provide new infrastructure that could be readily upgraded to provide further capacity.
Targeted business investment supporting the Cambridge Cluster to the needs of the	• **Business investment and growth** - promoting and supporting the investment decisions of key stakeholders such as the universities and R&D	Will provide the support to the developments in and around the university but the 'cluster' will	Will provide the support to the developments in and around the university but the 'cluster' will	Will provide the support to the developments in and around the university but the

Strategic objectives		Option 3 - Segregated	Option 4 - Hybrid	Option 1 - On highway
Greater Cambridge economy by ensuring those decisions are informed by the needs of businesses and other key stakeholders such as the universities.	decisions that form the cluster.	only be truly supported by enhanced linkages to other routes providing the enhanced connectivity across key sites.	only be truly supported by enhanced linkages to other routes providing the enhanced connectivity across key sites.	'cluster' will only be truly supported by enhanced linkages to other routes providing the enhanced connectivity across key sites. Connectivity, measured by the lower reductions in travel times and costs, will be lower under this option.
	• **Labour market mobility –** improving efficiencies of journeys to work and connections between housing and employment sites	As above, will link housing and cluster sites but will also rely on linking to all the schemes within GCCD.	As above, will link housing and cluster sites but will also rely on linking to all the schemes within GCCD.	Whilst it connects several cluster sites, the increased travel times and costs relative to Options 3 and 4, and lack of dedicated infrastructure will not 'unlock' investment to the same extent.
	• **Positive image and perceptions -** promoting a positive image of Greater Cambridge / enhancing quality of life attributes.	High quality transport investment which promotes positive image of the area and attracts companies / individuals who might go outside of the UK otherwise.	High quality transport investment which will help promote image of the area but less so than the segregated option 3.	Unlikely to promote image of the area and attract companies / individuals who might go outside of the UK otherwise, as it does not represent a 'step change' in provision.
	• **Future development and growth (post 2031) –** provide sustainable investment that takes account of likely growth post 2031.	Directly supporting needs of key stakeholders who have long term growth plans via investment that can be more readily upgraded to provide additional capacity.	Provides further scope than wholly on highway measures in Option 1 to be upgraded for additional capacity in the future.	Provides least scope to upgrade in the future, with little scope for expanding capacity.
Improve connectivity and networks between clusters and labour markets so that the right conditions are in place to drive further growth.	• **Business investment and growth** - promoting connectivity of Greater Cambridge as a whole and the Western fringes, influencing current and future investment decisions.	By attracting highest scheme demand, and helping to reduce congestion for other travellers, the option does most to improve connectivity between growth clusters and labour markets.	Also attracts significant scheme demand, helping to reduce congestion for other travellers; however, this is to a slightly lesser extent than Option 3.	Attracts lowest scheme demand and least decongestion, diminishing the potential connectivity gains relative to Options 3 and 4.
	• **Labour market mobility –** improving efficiencies of journeys to work and connections between housing and employment sites	Promotes greatest efficiencies in journeys to work through reductions in existing travel times and costs, whilst also permitting the largest gains in	Promotes similar efficiencies in journeys to work as Option 3 through reductions in existing travel times and costs, whilst also permitting the largest gains	The lowest efficiencies in travel times and costs, producing lower gains than Options 3 and 4 in connectivity between

Strategic objectives		Option 3 - Segregated	Option 4 - Hybrid	Option 1 - On highway
		access to opportunities for residents and labour markets for businesses.	in access to opportunities for residents and labour markets for businesses.	clusters and labour markets.
	• **Positive image and perceptions -** promoting a positive image of Greater Cambridge / enhancing quality of life attributes.	Fixed, segregated, infrastructure gives residents and businesses the confidence to make long-term decisions.	Some segregated infrastructure gives residents and businesses the confidence to make long-term decisions, but not to the same extent as Option 3.	Lack of tangible dedicated infrastructure, gives businesses and residents less confidence than they can base future decisions around the scheme.
	• **Future development and growth (post 2031) –** provide sustainable investment that takes account of likely growth post 2031.	This option provides the most ready means of adding further capacity for further post-2031 growth, supporting more sustainable travel patterns and growth.	Partially segregated nature means that scale of costs and upgrade to cater for further post-2031 growth will be higher, supporting more sustainable travel patterns and growth.	Most difficult to upgrade for future growth, with limited scope for adding significant further capacity through on-highway services.
Attract and retain skills by investing in transport and housing whilst maintaining a good quality of life, in turn allowing a long-term increase in jobs emerging from the internationally competitive clusters and more university spin-outs.	• **Labour market mobility –** improving efficiencies of journeys to work and connections between housing and employment sites	Highest scheme demand and decongestion enable the greatest gains in quality of life and accessibility, promoting Greater Cambridge as a hub to live and work.	Whilst lower than Option 3, the levels of scheme demand and decongestion support significant gains in quality of life and accessibility, promoting Greater Cambridge as a hub to live and work.	Scheme demand and decongestion are significantly lower than Options 3 and 4, so whilst there are benefits from some mode shift to more sustainable modes, these are correspondingly lower.
	• **Image / perceptions -** promoting a positive image of Greater Cambridge / enhancing quality of life attributes.	As above but also very likely to promote the area to those looking to settle and work in Greater Cambridge	As above	As above
	• **Key:**	High	Medium	Low

Source: Mott MacDonald

4.2.4 Summary

Given the qualitative option appraisal the 'Segregated' and 'Hybrid' options are identified as likely to deliver the most benefits in terms of supporting business investment and growth and labour market mobility. However, the **Segregated route (Option 3) delivers against the longer term strategic aims of Greater Cambridge in terms of promoting a positive image and perceptions and investment in capacity for post 2031 growth**. Indeed, the developments along the A428 corridor, Bourn Airfield and Cambourne, will continue to grow beyond 2031. The City Deal growth targets relate to 2031, but at the heart of the Deal is also long term investment to improve connectivity and networks that will support waves of innovation led growth which will continue beyond this period.

Given these considerations the **maximum level of growth attributed to the scheme is attributed to the Segregated Option given it will provide the greater stimulus via transport benefits and investment in long term capacity to support the GCCD objectives**.

4.3 Transport modelling outputs

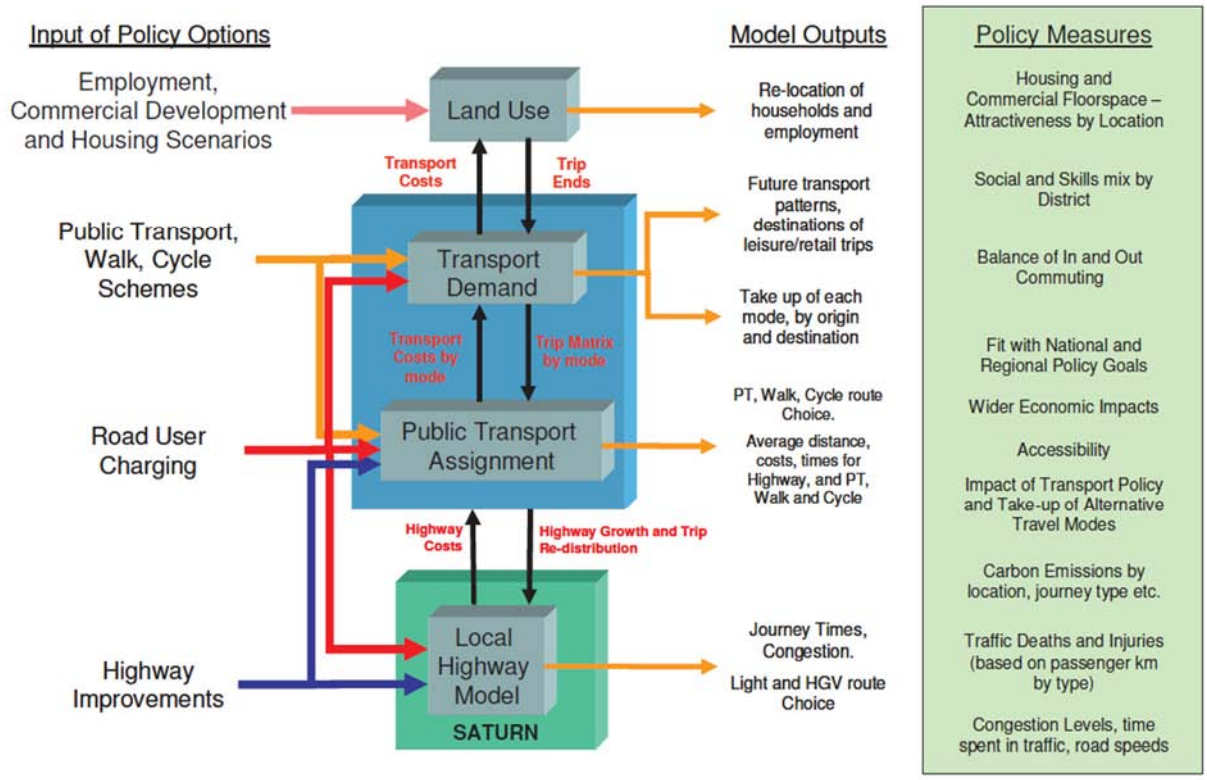
Having identified the maximum level of growth which can be unlocked through the scheme, the relative impact of the three options on these totals is considered through a quantified assessment using outputs provided by Atkins Ltd from the Cambridge Sub-Regional Model (CSRM). The CSRM modelling tool is designed to test a range of schemes and policy measures, with the framework's principal inputs and outputs illustrated in Figure 4.1.

For the A428-A1303 scheme, Atkins Ltd have undertaken CSRM runs for 2021 and 2031, covering five options, inclusive of Options 1, 3 and 4 described in this Report. The analysis of indirect WEBs in this Report makes direct use of these outputs for both public transport, capturing the impact on users of the scheme, and highways, capturing the decongestion benefits from mode shift to the A428-A1303 scheme. The CSRM work by Atkins Ltd is based on a consistent set of development proposals to those within the Local Plan(s), and assesses the impact on travel times and costs of the different options in comparison to a Do Minimum scenario[19].

By comparing the aggregate results for each option, across all zone pairs and market segments, a complete picture of their impact on travel times and costs, and thereby congestion and capacity in Greater Cambridge, is provided. Following standard transport modelling practice, times and costs of travel are combined into a single time unit, with the latter converted into minutes by dividing the monetary value through by a Value of Time (VoT). This value is known as the Generalised Cost (GC) of travel, albeit it is measured in minutes.

[19] The Do Minimum scenario contains a small number of committed schemes which are either under construction or for which funding has been allocated.

Figure 4.1: CSRM Policy Modelling Framework



Source: CSRM Model Development Report (WSP and Atkins Ltd)

Public Transport Demand

The three options are forecast to grow annual public transport demand by between 25,000 to 250,000 trips per annum, for the 'Low' to 'Segregated' options. This equates to approximately 30 to 250 unique individuals availing themselves of the service each day for commuting to work. The resulting decongestion also facilitates non-users to access a greater range of employment opportunities.

Option Performance

To calculate the additional indirect wider economic benefits that can be used to inform the selection of scheme options, the analysis combines the land utilisation and growth attribution below for the highest performing option (the segregated route) with the CSRM modelling outputs.

The assessment has taken outputs from the CSRM tests by Atkins Ltd and combined these for:

- All zone-to-zone pairs within CSRM;
- Different journey purposes;

- All main modes of travel[20]; and
- Time periods.

These processes have been undertaken for two future years (2021 and 2031).

To produce the aggregate results, the demand weighted GC from all individual segments is taken. These show the relative reductions in GC, for all model zones[21], for the three DS options compared to the DM (fixed to 100), with the final outputs shown in Table 4.7 below. As would be expected, reductions in GC are greatest for public transport users who have the direct impact on times and costs, and the magnitude of the highway impact is low due to the scheme only impacting on a proportion of all demand in the CSRM area.

Table 4.3: Changes in travel times and costs by option

	Year	
Option	2021	2031
Public Transport		
Do Minimum	100.00	100.00
Option 1 – On highway	98.07	99.45
Option 4 – Hybrid	96.35	97.67
Option 3 - Segregated	95.89	97.11
Highway		
Do Minimum	100.00	100.00
Option 1 – On highway	99.92	99.84
Option 4 – Hybrid	99.96	99.82
Option 3 - Segregated	99.84	99.70
TOTAL (Public Transport + Highway – demand weighted)		
Do Minimum	100.00	100.00
Option 1 – On highway	99.90	99.79
Option 4 – Hybrid	99.40	99.31
Option 3 - Segregated	99.20	99.11

Source: Mott MacDonald analysis of Atkins Ltd CSRM modelling outputs

The results show **the greatest impact is attributed to Option3, with a 4.1% reduction in the costs of public transport travel, and a corresponding 0.8% reduction in the costs of travel across all modes, in 2021 relative to the DM**. Detailed interrogation of the zone pairs with the largest changes in GC shows

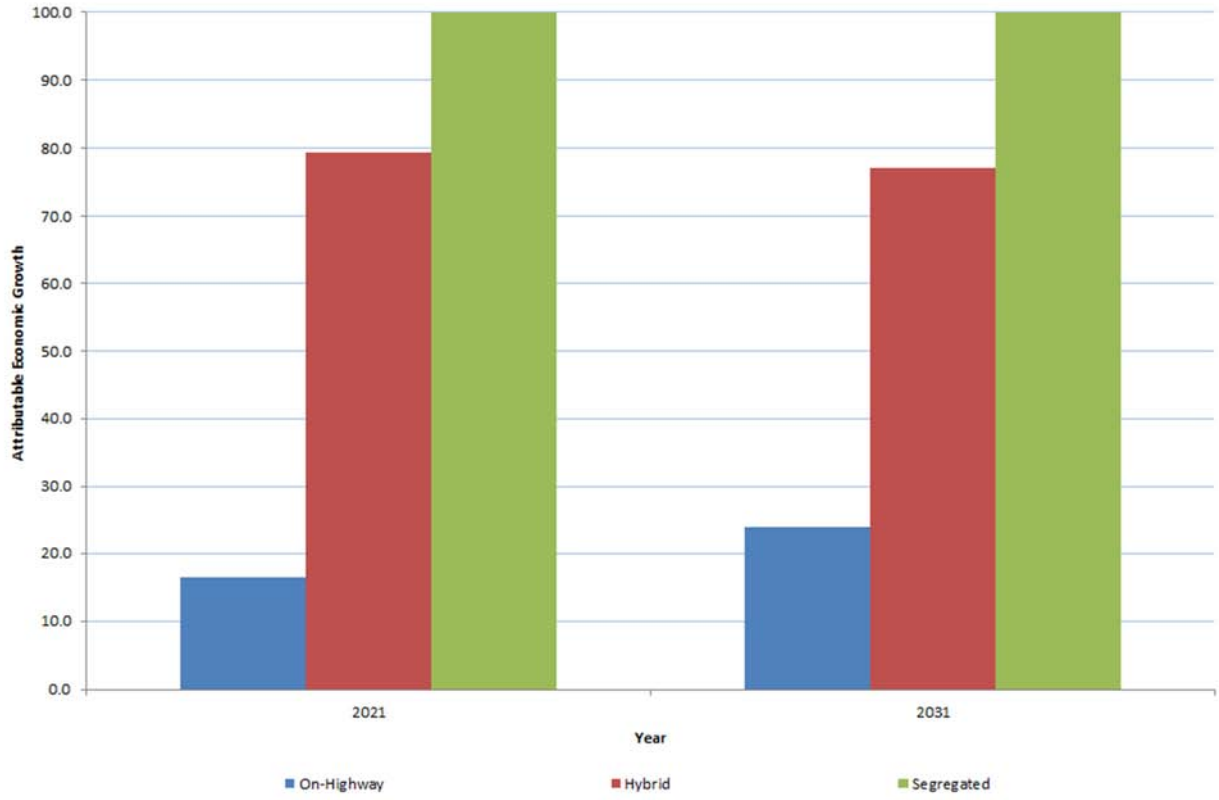
[20] The impacts on walking and cycling have not been included in the analysis. The underlying assumption is that any abstraction of demand for walking and cycling by the scheme is offset by increases in its use as an access and/or egress mode from the enhanced public transport corridor.

[21] Outputs from CSRM are inclusive of all travel demand wholly within Greater Cambridge and to/from all other areas of Great Britain. As a result, net impacts of local schemes can, in the aggregate level, appear small. Proportional impacts in the immediate vicinity of the scheme are much greater.

which sites are most/least affected by the scheme, and thus where development is likeliest to be most/least constrained.

These multipliers are then combined with the attributed jobs from Section 4.4. The results of this are shown in Figure 4.2.

Figure 4.2: A428-A1303 Options – Attributable Economic Growth Index



Source: Mott MacDonald

4.4 Land utilisation benefits – growth attribution

The following analysis attributes a level of the total growth planned for the area to the highest performing option (the segregated option) based on reviewing the earlier TEAR work and the land utilisation analysis in Section 3.

Box 2: Economic Prioritisation of the Greater Cambridge City Deal – A Transport Economic Assessment Report (TEAR)

The TEAR work undertaken in 2014 provided a prioritisation of the transport schemes in the GCCD based on their economic impact. This work examined the likely housing and employment that could be attributed to the schemes based on how critical each transport scheme was to a housing or employment development. It also considered the indirect impacts of the scheme in terms of how the scheme contributed to better functionality of the city and its surrounds. This resulted in a prioritised list of the schemes based on their economic impact including the A428-A1303 scheme (which was broken down into its constituent elements[22]). Overall the A428-A1303 scheme scored highly given it was deemed critical to several developments (see below).

Source: Mott MacDonald using Economic Prioritisation of the Greater Cambridge City Deal, A Transport Economic Assessment Report (TEAR) for Cambridgeshire County Council, SQW & Cambridge Econometrics, December 2014

4.4.1 Growth Plans and TEAR work

To recap, total jobs growth over the planning period (2011-2031) for Greater Cambridge is 44,100 jobs of which 46.5% (20,600) are B-use jobs (office, industrial and warehousing uses). The principle sectors driving jobs growth in Greater Cambridge are professional services, manufacturing and education which underpin the high-tech cluster. Given many these will be B-use jobs and such uses are strategically planned for the growth attribution focuses on these.

As set out in Section 3 the land utilisation analysis identified around 28,600 B-use jobs being created on those major development sites identified, which is higher than the target but lower than the jobs total calculated in the TEAR work of 41,900 jobs that used a similar list of developments. Broadly speaking the quantum of jobs identified in these two 'bottom up' approaches are similar once accounting for the fact that the TEAR work included retail and town centre type jobs whereas this study has focused solely on allocated employment land predominantly for B1, B2 and B8 uses. As set out in Section 3 the calculation of B-use jobs on each site is an indication of the likely spatial distribution rather than precise jobs figures since there are so many unknowns relating to phasing and likely employment densities; hence, the bottom up approach always tends to result in a higher jobs figure than the B-use target.

Table 4.4: Local Plan targets and comparison of our analysis versus TEAR work.

	Local Plan (GCCD) target	Our analysis	TEAR work
B-use jobs	20,600	28,600 (on developments)	41,940 (on developments, included non B use)
Total jobs	44,100	44,100	49,360 (Local Plan total at the time)
Dwellings	33,500	22,900 (on developments)	10,125 (on developments)

[22] Madingley bus priority, A428 to M11 segregated bus route/ A428 corridor Park & Ride and Bourn Airfield/Cambourne Busway and Bourn Airfield/Cambourne Busway.

Source: Mott MacDonald, TEAR work

The housing figures are quite different between this work and the TEAR work, which had much less housing development identified on a site by site basis presumably as the housing trajectories supporting the emerging Local Plans at the time were less known. This work is based on the outstanding housing figures within the Local Plan trajectories left to deliver and can therefore be considered fully aligned to the 33,500 housing growth target[23].

4.4.2 A428-A1303 Scheme, development sites and growth attribution

The estimate of B-use job creation by development site is crucial to this analysis as it provides an indication of the likely distribution of the B-use jobs target of 20,600 across Greater Cambridge by 2031. To undertake the growth attribution analysis all estimates of jobs growth on the individual sites up to 2031 have been scaled to the overall growth target of 20,600. This is deemed necessary to ensure that the analysis does not simply overestimate jobs creation on a site by site basis and that it directly relates to the GCCD growth targets. The attribution analysis also considers the likely impact of the scheme on city centre jobs growth which has the same level of jobs unscaled and scaled as the estimate has not been based on estimating employment levels on development sites (for a full explanation see Table 3.1 in Section 3). The following table presents the B-use jobs and associated housing (where applicable) across the key sites most relevant to the A428-A1303 scheme.

Table 4.5: Key developments in and along the A428-A1303 corridor

Site	Major area	B-use jobs 2011-2031		B-use jobs 2016-2031		Houses 2016-2031 (remaining dwellings)
		Not scaled	Scaled	Not scaled	Scaled	2011-2031
Bourn Airfield	New settlement	400	275	400	275	1,360
Cambourne	New settlement	1,500	1,033	1,500	1,033	1,699
North West Cambridge	North West Cambridge and West Cambridge	1,843	1,269	1,843	1,269	5,632
West Cambridge	North West Cambridge and West Cambridge	3,648	2,512	3,648	2,512	0
City centre sites	City centre	2,837	2,837	1,419	1,419	2,857
	Total	**10,227**	**7,926**	**8,809**	**6,508**	**11,548**

Source: Mott MacDonald

Overall it is estimated that 25% of the total B-use jobs Local Plan target (20,500 jobs), and 26% of the housing target (33,500), is anticipated to be created on these sites (excluding the city centre) over 2011-2031 and none of this development has yet occurred. Furthermore although not detailed above there is

[23] Differences between 23,000 and 33,500 houses relates to dwellings on windfall sites, rural sites and actual completions.

significant growth (housing or employment or both) anticipated post 2031 at all these sites except North West Cambridge.

To inform the growth attribution analysis, Table 4.5 summarises:

- The findings of the TEAR work which also undertook a qualitative assessment to link the A428 with the schemes identified above.
- The key evidence linking the development sites with the A428-A1303 in more detail. This relates to information gathered from the Local Plans, other planning documents (Area Action Plans, planning applications), the Transport Strategy for Cambridge & South Cambridgeshire, discussions with officers and consultation undertaken as part of the scheme.
- The key linkages determined which are then used for the growth attribution scenarios below.

Figure 4.1 provides an inset map of the relevant developments along the A428-A1303 corridor.

Table 4.6: Development sites and evidence of linkages to A428-A1303 scheme

	TEAR work	Key evidence	Summary - what level of growth attribution?
Bourn Airfield – mixed use	• Assigned 80% of the employment from these two sites to the transport scheme. • Identified the core scheme elements (segregated bus route from A428 to M11) **as critical and that the development was unlikely to go ahead without it.** • Identified the remaining aspects (such as cycle routes) as important to enable the development to go forward in a sustainable manner.	• AAP not yet developed. • Developer for housing has set out clearly that they will pay contributions towards off-site infrastructure including: reducing queuing at the M11 junction and this scheme (bus priority measures on the Madingley Road and measures to make it easy for cyclists to cycle from Bourn Airfield to the centre of Cambridge). • Full planning application not yet submitted for housing development but entered consultation / scoping stage. • Prospects for former employment site being developed are likely to be significantly enhanced by the housing development proceeding in a sustainable manner (by being supported by the transport scheme). • Housing growth on the site premised on providing a sustainable location for serving Cambridge – hence the need for high quality and rapid public transport measures. • Discussions are still ongoing about the route alignment through the site so for this purpose it is assumed that all options directly serve the site.	• Scheme of strong importance to both Bourn Airfield and Cambourne developments given: – Improve journeys of new residents in and out of Cambridge (if not working at the development). – Improve access to jobs at Bourn Airfield from Cambridge. – Improve business trips from Bourn Airfield into city centre. • Overall assumption is that up a high proportion of the growth of these sites can be attributed to the scheme given it will improve the prospects of these employment sites given demand has been lower in this area (evidenced by Cambourne Business Park) and the housing will serve the demand required to support ongoing development of the Cambridge cluster.
Cambourne – mixed use		• The submitted Local Plan allocates a site for 1,200 new homes and 8.1 hecatares of employment land, including part of the land on the existing business park. A planning application has been submitted for 2,350 dwellings and 6.25 ha of employment land not including the existing business park vacant land. If this applicated is approved the level of development at Cambourne West would therefore increase. • Infrastructure such as that proposed is likely to boost the offer if it strengthens links to Cambridge given market demand has been low due to a preference towards locating in and closer to Cambridge. • Housing growth on the site premised on providing a sustainable location for serving Cambridge. • Discussions are still ongoing about the route alignment through the site so for this purpose it is assumed that all options directly serve the site.	
North West Cambridge – mixed use	• No housing numbers assigned in TEAR work. • Assigned 60% of the employment contribution from the development to this transport scheme combined with Western Orbital	University site: • Planning permission granted – development will proceed as and when the University can show a clear need for the land to be released. • Development is focused on bringing universities and companies further together and thereby strengthening the 'Cambridge Phenomenon'. In	The scheme is judged to support the North West Cambridge scheme **but no direct attribution is made** given the following: • No options directly serve the development and the scheme is driven by the University expansion plans.

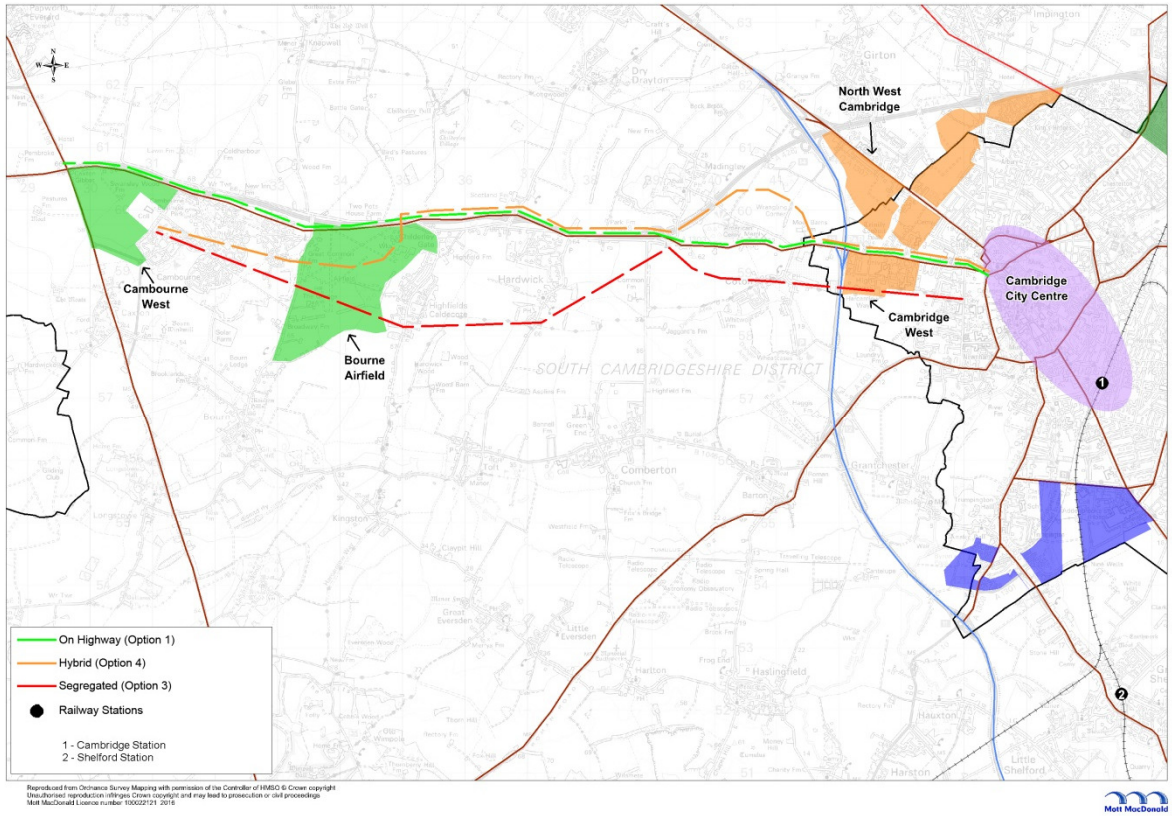
	TEAR work	Key evidence	Summary - what level of growth attribution?
	and city centre improvements. • Identified that the **scheme was important** to enable the development to go forward in a sustainable manner.	order to take advantage of these links the University needs to undertake physical expansion (or these jobs could be lost to outside the UK). The scheme will support the use of sustainable transport but none of the options directly serve the development. • AAP Policy NW11: Sustainable transport[24]: – Development will be planned with the transport system to reduce the need to travel – with emphasis on foot, cycling and bus. – As mixed-use most daily trips should be met by foot and cycling. – Sustainable travel to be used for linking the development to key destinations in Cambridge and to the wider network. • Housing sites to north of University site (NIAB and Darwin Green): – Planning permission granted on NIAB/Darwin Green 1 in Cambridge, NIAB2/Darwin Green 2 identified in the adopted South Cambridgeshire LDF, with a small extension proposed in the Submitted Local Plan.	• The housing developments will be less influenced by the scheme given planning permission is in place and the scheme would not directly service these sites.
West Cambridge – employment site	• Assigned 60% of the employment contribution from the development to the transport scheme and identified that the **scheme was important** to enable the development to go forward in a sustainable manner.	• Outline planning permission submitted June 2016. • Development focused on strengthening the Cambridge cluster in physical sciences and technology. This will rely strongly on linking effectively with the city and the other key cluster sites (particularly those to the North). • The development will link effectively with the housing growth along the A428-A1303 corridor (Bourn Airfield and Cambourne) which could serve the development.	• Overall assumption is that a **medium proportion of growth** can be directly attributed from the West Cambridge site given the scheme will improve access to the city centre and other cluster sites (via onward connections) and links to housing growth sites. • However the West Cambridge site is fundamentally driven by the University's expansion plans and links with business to commercialise R&D – which is what will attract bushiness to locate in the area.
City Centre	• Assigned 40% of city centre developments to GCCD schemes as a whole of which 4% was assigned to the A428. • Note this demonstrates the importance of this scheme being viewed as a part of the package of GCCD transport schemes.	• This scheme is clearly supportive of city centre growth since it will provide a fast and sustainable transport route from key areas of housing growth into the city centre thereby linking housing and employment sites. • It will link the Western fringe sites more effectively to the other key cluster sites. This will depend on all the GCCD schemes coming forward – thus providing a package of schemes.	• A **medium growth attribution** is assigned to support for city centre jobs given the scheme will promote linkages between housing and employment sites in the city centre and support access for the city centre to the Western Fringe sites (especially promoting collaborative R&D with the university developments). • **No attribution is made for dwellings** as these are further from the scheme and the

[24] North West Cambridge Area Action Plan, adopted October 2009

TEAR work	Key evidence	Summary - what level of growth attribution?
		impact is likely to be biggest in terms of supporting housing along the corridor.

Source: Mott MacDonald

Figure 4.3: Development sites along the A428-A1303 Corridor



Source: Mott MacDonald

Table 4.6, using the analysis above, provides the following **attribution levels** to the development sites up to 2031 for the **highest scoring option in the qualitative appraisal – the Segregated route (Option 3).** This provides an **indicative assessment** of the likely scale of economic growth that could be attributed to the highest scoring scheme option given the evidence reviewed in the qualitative appraisal (using the findings of the strategic review), the growth trajectory of Greater Cambridge and specific site detail examined above. In summary the following attribution rates are made (as shown in Table 4.6):

- For Bourn Airfield and Cambourne a high attribution level of 30% is assumed for the employment growth on site given demand in this area has been lower and the scheme will provide a boost to connectivity and commitment to developing East to West connectivity. For housing an even higher 50% attribution level is assumed as sustainable development will require effective connections to Cambridge and onward to other key sites within the Cambridge cluster. Although developer interest is established in this area this study backs up the findings from the TEAR work in recognising that providing a direct public transport route from the area to the city centre will make it more attractive to developers and to end occupiers.
- For West Cambridge the jobs attribution is much lower at 10% as this site will benefit in terms of labour market connectivity (people living along the corridor working in the development) but the investment prospects of the site are less likely to be driven by an enhanced busway and pivot around the University's development. The provision of modern public transport will improve the site's connectivity but the main driver for its development is University-related and linked to demand with the bus service being a supporting measure.
- For city centre sites no attribution is made to housing as most housing developed in the city will be serving other nearby city centre employment sites but a 10% attribution is made to city centre jobs since the scheme's core objective is to improve East to West connectivity and the onward connections to cluster sites (i.e. linking with the other planned GCCD schemes).

With the exception of the city centre sites the attribution levels are significantly lower than those used in the TEAR work – this implies that overall the analysis has been relatively conservative about the linkages between the scheme and development. Furthermore the B use jobs estimates for the sites have been conservative and scaled to the B-use employment totals. This cautious approach is deemed appropriate given the level of unknowns and the experience of the team attributing growth to public transport schemes elsewhere.

Table 4.7: Growth attribution levels by site for Segregated route (Option 3)

		B-use jobs attribution			Housing attribution		
		Total B-use jobs 2016-2031 (scaled)	Segregated (Option 3) - attribution rates	Jobs attributed	Housing	Segregated (Option 3) - attribution rates	Dwellings attributed
Bourn Airfield	New settlement	275	30%	83	1,360	30%	408
Cambourne	New settlement	1,033	30%	310	1,699	30%	510
West Cambridge	West Cambridge	2,512	10%	251	-	-	-
City centre sites	City centre	1,419	10%	142	2,857	0%	-
	Total	**5,239**		**786**	**5,916**		**918**

Source: Mott MacDonald

In summary, the total attributable jobs of remaining B-use jobs to be created over 2016-2031 to the Segregated scheme are estimated as 786 whilst the total level of attributable housing is estimated as 918 dwellings. This is a significant level of attribution but is based on the strong linkages between development sites and the scheme, especially in the case of Bourn Airfield and Cambourne and the strategic objective of the scheme to improve East to West connectivity to Cambridge and other cluster sites. This also reflects the analysis undertaken as part of the TEAR work though we have worked at a finer grained level as part of this study.

4.4.3 Land utilisation benefits – option comparison

The following table summarises the overall jobs attribution to all three options based on the attribution levels identified above for the segregated route and combining with the multipliers identified in transport modelling (Section 4.3). The Gross Value Added (GVA) associated with these jobs at a Greater Cambridge level is also displayed, based on using a GVA per worker figure of £46,448[25], in terms of:

- GVA benefits per annum once all jobs are achieved
- Net Present Value of all GVA benefits over a 30 year period[26]
- A high sector multiplier, reflecting the GVA per worker differential by sector, of 1.39.

Clearly the economic benefits to Greater Cambridge are highest under the High (Segregated) scheme but are also substantial under the Medium (Hybrid) route whilst the Low (on highway) option delivers much lower economic benefits. Values are discounted to the present year using standard DfT TAG assumptions.

[25] EEFM Baseline Forecast, 2014

[26] A 30-year time horizon has been used with an average duration of GVA benefits of 13 years. Although commercial buildings would last longer than 30 years the new businesses locating within them (on the back of the rail scheme) are likely to move on sooner than this and therefore this time horizon is a reasonable assumption. An average discount rate of 3.5% has been used in line with HM Treasury Guidelines.

Table 4.8: Strategic benefits – Greater Cambridge level (discounted values in 2010 prices over 30 year period; factor prices)

	Segregated (Option 3)	Hybrid (Option 4)	On highway (Option 1)
Jobs	786	606	189
GVA, £m (average per annum)	22.6	17.5	5.2
GVA, £m NPV, over 30 years	679.3	526.2	115.6

Source: Mott MacDonald

4.5 Indirect Wider Economic Benefits (WEBs)

The new jobs created as part of the GCCD will either be additional to existing employment at a national level or will have displaced employment from elsewhere. The picture is not black or white, and a degree of judgment is required to proportion out the impact between these two outcomes.

4.5.1 Labour supply benefits – net additionality to the UK

We have assumed 15% of the jobs growth is net additional to the UK economy. This reflects the nature of the Cambridge Phenomenon, which, to a significant extent, competes on an international stage, as opposed to nationally within the UK or regionally within the Eastern Region. Coupled with this net additional growth is the knowledge that the types of jobs at stake to the UK economy are higher value in nature, i.e. professional, technical and scientific services. This is perhaps a conservative assumption given approximately 17% of total jobs are within high value high-tech and biotech employment[27].

To estimate the economic impact of the net additional jobs, we consider:

- Jobs attributable to the option, and the proportion which are net additional;
- Current average 2016 Greater Cambridge GVA per worker of £46,448 in 2010 prices[28];
- Anticipated real terms growth in wages relative to the RPI, and thereby GVA per worker, from 2016 onwards, capped at 2031. This averages approximately 2% per annum; and
- Standard discount rates from TAG of 3.5% per annum for the first 30 years of the scheme; and
- A high sector multiplier, reflecting the GVA per worker differential by sector, of 1.39.

Table 4.9**Error! Reference source not found.** shows the estimated GVA impact from the net additional jobs to the UK for the three options. For the purposes of this assessment, we consider the impacts over 30 years to 2046 which is standard practice in relation to the duration of business activities. This differs from TAG, which typically considers a 60 year period for the impacts of a transport scheme.

[27] See section 2.

[28] Using the figure from the latest EEFM forecast for Greater Cambridge and East.

Table 4.9: UK benefits from land utilisation/labour supply over 30 year period – net additional UK jobs (in 2010 discounted values and factor prices)

Option	Discounted Value (£Ms)
Option 1 – On highway	38.38
Option 4 – Hybrid	129.7
Option 3 - Segregated	167.5

Source: Mott MacDonald

4.5.2 Move to more productive jobs – movement within the UK

When considering displaced employment within the UK it is important to consider where this may come from. The calculation of the net economic impact involves comparison of the GVA per worker in Greater Cambridge relative to average levels in the East region, using estimates from the ONS. Higher/lower GVA rates imply changes in wages for employees and tax revenue to HM Treasury.

To estimate the economic impact of the move to more productive jobs, we consider:

- Jobs attributable to the option, and the proportion which are displaced from elsewhere;
- Current average 2016 Greater Cambridge GVA per worker of £46,448 in 2010 prices, and the equivalent East region value of £43,675;
- Anticipated real terms growth in wages relative to the RPI, and thereby GVA per worker, from 2016 onwards, capped at 2031. This averages approximately 2% per annum; and
- Standard discount rates from TAG of 3.5% per annum for the first 30 years of the scheme.

The high sector multiplier, applied to net additional jobs to the UK is not applied for this indirect WEB.

Table 4.10 shows the estimated impact from a move to more productive jobs for the three options.

Table 4.10: UK benefits from move to more productive jobs over 30 year period – displaced from East region (in 2010 discounted values and factor prices)

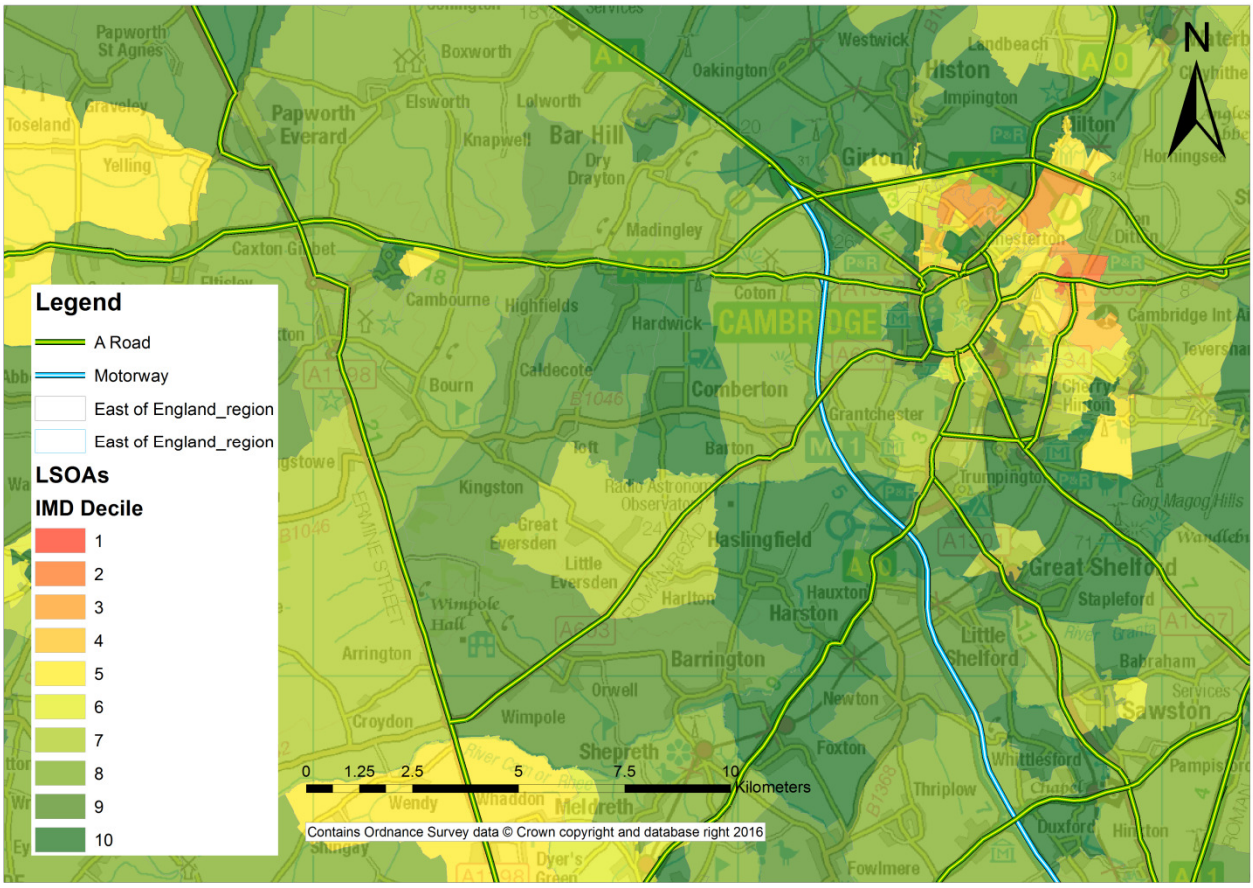
Option	Discounted Value (£Ms)
Option 1 – On highway	7.0
Option 4 – Hybrid	23.7
Option 3 - Segregated	30.6

Source: Mott MacDonald

4.5.3 Reduction in spatial inequalities

Where the schemes provide new opportunities in areas (Census Output Areas) with high levels of deprivation then there is a direct benefit to Government from the resulting job creation. The assessment is made with reference to the Indices of Multiple Deprivation (IMD), with 2015 English rankings by decile shown in Figure 4.4, and considers the jobs created in the fifth (1st and 2nd deciles) and fourth quintiles (3rd and 4th deciles). These quintiles are defined as areas of 'high' or 'relatively high' deprivation.

Figure 4.4: 2015 English Index of Multiple Deprivation



Source: Department for Communities and Local Government, 2015 Index of Multiple Deprivation (IMD)

Whilst Figure 4.4 shows that the areas in the bottom two quintiles are mainly in the north and east of the Cambridge city boundary, and improvements in public transport, and consequent decongestion will have an effect on accessibility to opportunities for these areas via:

- General highway decongestion; and
- Enabling employees who currently 'out compete' residents of the deprived areas for available opportunities to access new opportunities [on and around the A428-A1303 scheme] freeing up those jobs for others.

For each job created in these areas, the Government is willing-to-pay £45,135[29], in 2010 values and prices, for each net additional job that a scheme is able to deliver. This value is assumed to apply across the full appraisal period and is adjusted for the scheme's assumed year of opening, projected income

[29] See: Calculating cost per job. Best Practice Note 15, English Partnerships 2003. The initial value of £27,800 in this document is adjusted to the value used in the appraisal for (a) a 2010 price and value base; (b) conversion to market prices, as Government perceives benefits in factor prices and all entries to the appraisal need to be in a consistent set of units; (c) changes in income between 2003 and 2016.

growth over time, and discounted to reflect the preference for current consumption over that at a future moment in time.

The estimated benefits in Table 4.11 from reducing spatial inequalities are estimated by considering:

- Jobs attributable to the option;
- Changes in GDP per worker; and
- The proportion of Lower Super Output Areas (LSOAs) within Greater Cambridge which fall in the bottom two quintiles.

Table 4.11: Welfare benefits from reductions in spatial inequalities over 30 year period (in 2010 values and market prices)

Option	Discounted Value (£Ms)
Option 1 – On highway	0.28
Option 4 – Hybrid	0.93
Option 3 - Segregated	1.21

Source: Mott MacDonald

4.5.4 Alleviating Unemployment

Alleviating unemployment, along with reducing spatial inequalities, is a primary aim of regeneration policies. This calculation assesses whether these new jobs will firstly reduce levels of unemployment in areas with above average current levels, and, if they do, what will be the welfare benefit from reducing unemployment.

Current levels of unemployment in Greater Cambridge were estimated at a ward level using NOMIS Claimant Count data and the International Labour Organisation (ILO) definition, which is the official measure used by ONS and is measured in the UK by the Annual Population Survey (APS).

In this section ILO estimates for Cambridge and South Cambridgeshire are used (given sub-district data does not exist) that are based on uplifting the Claimant Count measure for the two districts by the district uplift factor observed in the EEFM. The EEFM ILO data for Greater Cambridge has been used given it provides a consistent rate over 2000-2015 and avoids the fluctuations in the APS data. The EEFM forecast for ILO unemployment was also analysed to provide an indication of what might happen to unemployment over time in areas with historically higher levels of unemployment in Greater Cambridge.

The estimated benefits in Table 4.12 from reductions in long-term structural unemployment are estimated by considering:

- Jobs attributable to the option;
- 2016 Greater Cambridge GVA per worker in 2010 prices;
- Changes in GDP per worker;
- Productivity of a new entrant to the labour market (69%);
- The ‘reservation wage’, which is the welfare benefit of creating employment as a proportion of the wage under conditions of involuntary unemployment;

- The proportion of Greater Cambridge wards in 2016 with ILO measure unemployment of greater than 5%; and
- An assumed trend for unemployment such that no ward will have unemployment greater than 5% by 2031.

Table 4.12: Welfare benefits from alleviating unemployment over 30 year period (in 2010 values and market prices)

Option	Discounted Value (£Ms)
Option 1 – On highway	0.06
Option 4 – Hybrid	0.22
Option 3 - Segregated	0.28

Source: Mott MacDonald

4.6 Option and non-use values

Option values are the values residents place on having access to opportunities – both social and economic (e.g. jobs) - in case they need to use them at some point in the future. Thus they reflect the value that someone in an affected community may place on having access to the Cambridge job market, not because they currently work there, but because they may wish to have the choice of working there at some point in the future.

The non-use values represent the value a household may place on a transport service even if they never intend to use it (e.g. they may wish the service to be available for other people to use). Option values are always additional to transport user benefits in an appraisal, whilst only some non-use values (those with an altruistic motive) are additional to transport user benefits.

The DfT provides guidance on their incorporation into appraisal[30]. Option and non-use values are only relevant in the context of services that provide viable commuting options to important centres of employment, which is likely to be a key feature of the A428 where fixed infrastructure alternatives to the car do not currently exist. The provision of 'fixed infrastructure' is a critical consideration for option and non-use values as they are predicated on the consumer being able to make life choices in the knowledge that an alternative will be available for a substantial time into the future. We therefore assume that they apply to the 'Medium' and 'High' options only.

The available guidance indicates that it is households that lie within a stop/station catchment area that hold option values, and if the number of such households exceeds 1,000 then the option and non-use value impact is expected to be large. The P&R element of the options represents an important material consideration in this impact, with the potential that it could significantly expand the schemes' catchments.

The calculation of the option and non-use value is based on the assumption that they provide a 'step change' in bus service provision for access to employment. This is considered unlikely to be the case for the 'low' option, and we therefore exclude a value for this benefit.

[30] See: TAG Unit A4.1 Social Impact Appraisal, DfT.

The DfT's TAG Databook[31] provides recommended values per household per annum, combining for option and non-use, of:

- £129 for 'bus'; and
- £249 for 'rail'.

These values are in 2010 values and prices, and would need to be discounted in the same manner as other benefits considered in this Note. Values do not differ depending on the level of service, i.e. frequency, providing they are deemed to offer a viable alternative, a half hourly frequency with total In-Vehicle Time (IVT) of 60 minutes or less.

For each scheme where option and non-use values are considered to be of relevance, a catchment must be defined to estimate the number of affected households, both now and in the future as additional housing development comes forward. In the case of the A428 and Western Orbital schemes this is complicated by the P&R provision, which would be likely to extend such catchments beyond that of a conventional bus service.

The assessment of the catchments was made with reference to indicative stop/station locations, based on GIS analysis of existing household's locations and the developments proposed in the Local Plan(s), and the following assumptions around catchments:

- 500m for stops/stations with no P&R provision; and
- 5km for P&R provision.

Once catchments have been created around each stop/station, a single merged zone is created to identify the affected quantum of households. Households east of the M11 motorway are excluded from our analysis due to the assumption that severance effects would prevent use of P&R facilities to the west.

Table 4.13: Welfare benefits from option and non-use values over 30 year period (in 2010 values and market prices)

Option	Discounted Value (£Ms)
Option 1 – On highway	-
Option 4 – Hybrid	15.72
Option 3 - Segregated	15.72

Source: Mott MacDonald

4.7 Economic Case Outputs

For comparison with the concurrent economic case being produced by Atkins Ltd, the UK GVA values for land utilisation/labour supply and move to more productive jobs require further transformations to ensure they are in consistent units (market prices), are over a 60 year period, and isolate the additional tax revenue only. This avoids double counting due to time and cost savings within the conventional TAG

[31] See: https://www.gov.uk/government/publications/webtag-tag-data-book-december-2015

appraisal proxying[32] the GVA benefits discussed previously. Table 4.14 summarises the welfare benefits only, at a UK level over the 60 year period.

Table 4.14: UK Indirect Wider Economic Benefits (£Ms in 2010 discounted values and market prices) over 60 year period

Benefit	Option		
	Low - On highway (Option 1)	Medium – Hybrid (Option 4)	High – Segregated (Option 3)
Welfare benefits – UK level (£s in discounted 2010 market prices)			
Land utilisation – net additional jobs to the UK	13.4	45.3	58.5
Move to more productive jobs within the UK	4.2	13.9	18.0
Reduction in spatial inequalities	0.5	1.5	1.9
Alleviation of unemployment	0.1	0.2	0.3
Option and non-use values	0.0	29.8	29.8
TOTAL	**18.1**	**90.7**	**108.5**

Source: Mott MacDonald

4.8 Summary

- The qualitative assessment of each option against the GCCD strategic objectives demonstrates that the segregated option (Option 3) is likely to have the highest impact on growth.
- Using the CSRM outputs the transport analysis shows that the greatest impact is attributed to Option 3, with a 4.1% reduction in the costs of public transport travel, and a corresponding 0.8% reduction in the costs of travel across all modes, in 2021 relative to the Do Minimum.
- At a Greater Cambridge level, through combining the land utilisation and transport analysis, the study estimates that 786 jobs can be deemed directly attributable to the highest performing scheme (the segregated option) compared to 606 and 189 jobs under the medium (hybrid) and low (on highway) options. These figures and the corresponding GVA figures are summarised below in Table 4.15.

[32] To ensure TAG compliance, we have applied the guidance in TAG Unit A2.1 to our GVA benefits to estimate the additional tax revenue only from labour supply impacts and a move to more productive jobs. We have therefore assumed that the user benefits estimated by Atkins Ltd successfully reflect the GVA benefits.

Table 4.15: Indirect Wider Economic Benefits (£Ms in 2010 discounted values and prices) over 30 year period

Benefit	Option		
	Low - On highway (Option 1)	Medium – Hybrid (Option 4)	High – Segregated (Option 3)
GVA benefits – Greater Cambridge level (£s in discounted 2010 factor prices)			
Direct jobs	189	606	786
Direct GVA per annum	5.2	17.5	22.6
TOTAL GVA	**155.7**	**526.2**	**679.3**
GVA benefits – UK level (£s in discounted 2010 factor prices)			
Land utilisation – net additional jobs to the UK	38.4	129.7	167.5
Move to more productive jobs within the UK	7.0	23.7	30.6
TOTAL GVA	**45.4**	**153.4**	**198.1**
Welfare benefits – UK level (£s in discounted 2010 market prices)			
Reduction in spatial inequalities	0.28	0.93	1.21
Alleviation of unemployment	0.06	0.22	0.28
Option and non-use values	0.00	29.76	29.76
TOTAL WELFARE	**0.33**	**30.92**	**31.25**

Source: Mott MacDonald

- Using the assessment at the Greater Cambridge level the indirect WEBs at a UK level that can be used in the economic case of the transport analysis are also summarised in Table 4.14. In summary:
  - The high (segregated option) is deemed to have the highest level of indirect WEBs, at £108.5m over a 60 year period, given the higher level of transport benefits driving the highest jobs attribution level.
  - The medium (hybrid option) compared to the low (on highway option) has a relatively high level of indirect WEBs also, at £90.7 compared to £18.1m over a 60 year period.
- These impacts are considered conservative given the analysis:
  - Specifically considers B-use jobs only and in the case of Greater Cambridge a great deal of research and education type jobs (which also fuel the economy) will also be supported by the scheme. Furthermore the underlying job estimates are conservative as total employment by site is scaled to the B-use jobs targets within the submitted Local Plans (to be consistent with the City Deal growth targets) rather than using the absolute numbers by site (from the bottom up estimates).
  - The assessment assumes that only 15% of the B-use jobs directly attributed will be net additional to the UK economy when given the activities of the Cambridge cluster this could be higher.
  - The assessment is concerned with attributing growth up to 2031 given these are the timescales of the Local Plans and the GCCD. There is substantial development planned post 2031 along the East-West corridor which will also be at least partially dependent on implementing an effective public transport route (this informs the qualitative analysis but not the quantified benefits).

5 Conclusions

5.1 Introduction and study purpose

Mott MacDonald was appointed by CCC to undertake a strategic economic appraisal of the Cambourne to Cambridge bus scheme, the A428-A1303, which form part of the proposed infrastructure investment within the GCCD. The analysis, alongside the conventional transport appraisal being prepared in parallel by Atkins Ltd, will be used by CCC to inform the recommendation to the City Deal Board of a 'Preferred Option' for each scheme for further consultation and full business case assessment.

5.2 Strategic growth context

5.2.1 Cambridge Phenomenon – a UK success story

Cambridge is one of the UK's most successful cities where economic success, high quality of life and quality of place are inextricably linked. The thriving hi-tech and biotech industry, which has developed since the 1960s and is known as the Cambridge Phenomenon, accounts for 17.3% of employment[33] and boasts one of the highest concentration of Nobel prizewinners in the world. **Cambridge is one of the UK's fastest-growing and most productive cities and integral to the UK's long term economic plan which seeks to improve productivity and international competitiveness**.

Despite this economic success, Cambridge faces supply side threats to its economic growth, as evidenced by increasing congestion and rising house prices, both directly influenced by a lack of supply. The Cambridge Cluster's success is founded upon the connectedness across the city and its surrounds that has allowed overlapping networks to develop and facilitated a culture of cooperation and cross-fertilisation between entrepreneurs, businesses, and academia. The infrastructure of the area must keep up with the area's [potential] pace of growth and the opportunities that exist to continue growing an advanced economy and competing on the international stage.

5.2.2 Greater Cambridge City Deal and scheme contribution

The GCCD aims to enable a new wave of innovation-led growth by investing in the infrastructure, housing and skills thereby addressing housing shortages and transport congestion bottlenecks that will facilitate the continued growth of the Cambridge Phenomenon. The City Deal will deliver the sustainable growth that is identified in the two local plans:

- 44,100 jobs.
- 33,500 dwellings.

As part of the assurance framework Greater Cambridge authorities will prioritise projects that deliver against the following four strategic objectives of the GCCD:

- **Create and retain investment** to nurture the conditions necessary to enable the potential of Greater Cambridge to create and retain the international high-tech businesses of the future.

[33] Using EEFM data, baseline forecast 2014. Relates to Greater Cambridge core high-tech and biotech industry as can be best defined in the data encompassing telecoms, computer related activity, research & development and business services.

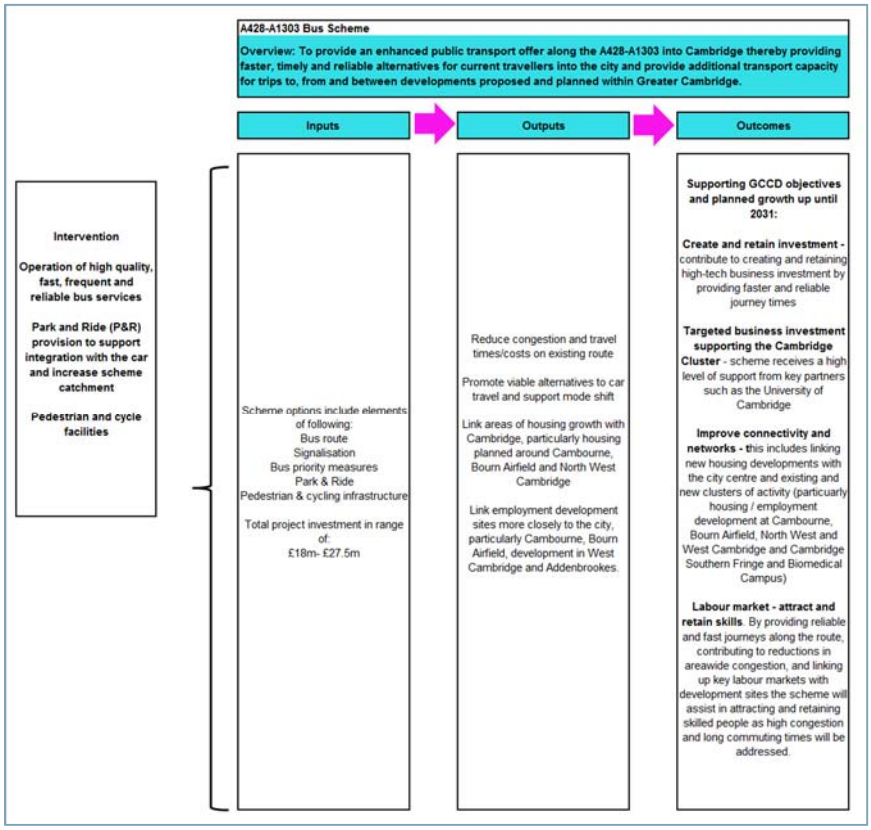
- **Targeted business investment supporting the Cambridge Cluster** to the needs of the Greater Cambridge economy by ensuring those decisions are informed by the needs of businesses and other key stakeholders such as the universities.
- **Improve connectivity and networks** between clusters and labour markets so that the right conditions are in place to drive further growth.
- **Attract and retain skills** by investing in transport and housing whilst maintaining a good quality of life, in turn allowing a long-term increase in jobs emerging from the internationally competitive clusters and more university spin-outs.

Employment and housing land is allocated and available for development but ensuring it is brought forward and contributes to the growth trajectory will be partly linked to the level of connectivity, and reliability/certainty of travel times, between places of residence and places of employment. The A428-A1303 scheme is part of a package of measures to ensure this point is addressed.

The scheme directly links to the strategic objectives of the GCCD by providing faster and reliable journey times that will improve connectivity and networks, help create and retain investment, and attract and retain skills by linking employment and housing areas more closely. In particular, it seeks to improve connectivity, growing the size of the available labour market to existing and potential businesses, and the opportunities available to current and future residents. Ultimately the scheme directly contributes to the overall jobs and housing targets given it is part of a coherent package of GCCD infrastructure schemes identified as needed to ensure the next wave of innovation-led growth in Greater Cambridge.

Figure 5.1 below presents a logic map of the scheme to demonstrate how the infrastructure investment directly links to supporting GCCD objectives and planned growth.

Figure 5.1: A428-A1303 Cambridge to Cambourne Logic Map



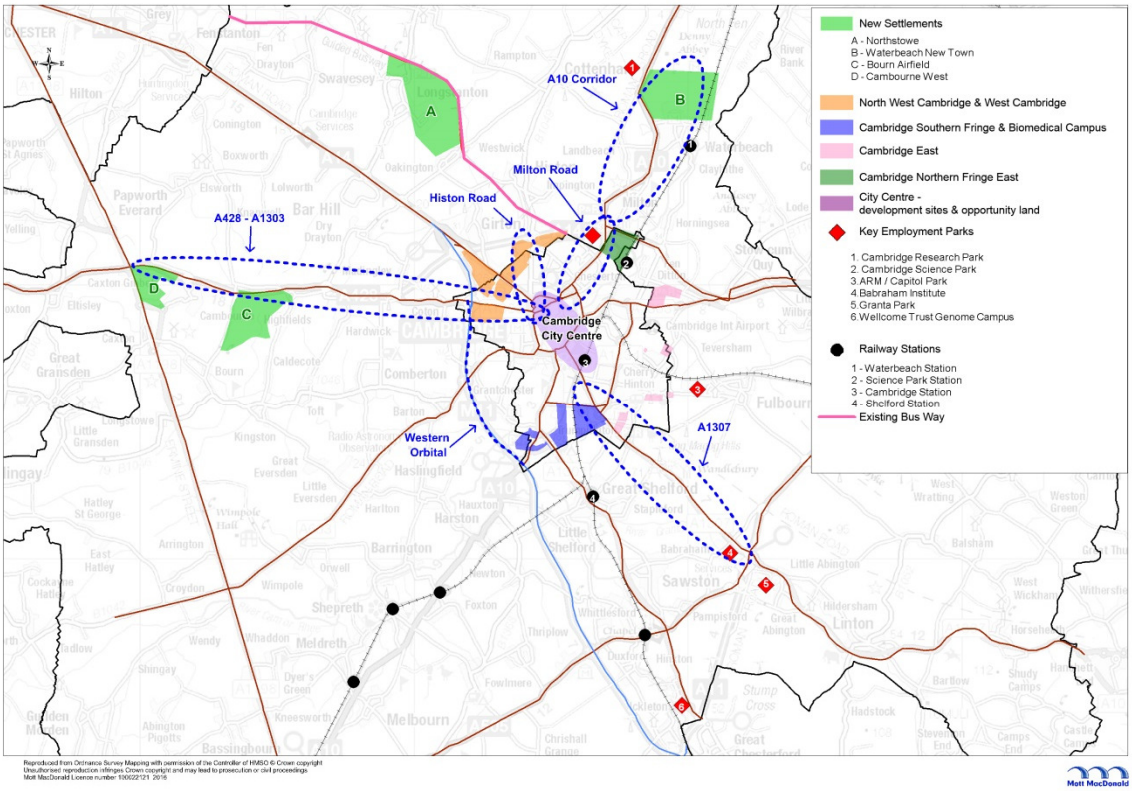
Source: Mott MacDonald

5.3 Key developments – where growth will be accommodated?

A significant level of development is planned in Greater Cambridge over the local planning period which should provide more than enough employment space to underpin the growth targets. Furthermore, there is a very good pipeline of employment space post 2031 demonstrating that investments in transport infrastructure are critical to ensure high congestion levels and poor reliability issues are addressed (thereby facilitating the growth potential).

Overall, the total housing and B-use job creation from the development sites identified below over the remaining planning period 2011-2031 is in the range of 22,900 houses and 28,600 jobs. The B-use employment figure is higher than the B-use jobs target of 20,600 jobs, which even if allowing for any over estimates in the job figures, demonstrates that there is enough employment land and sites available to reach the Local Plan growth totals (and therefore GCCD targets). Furthermore, there is a considerable amount of development in the pipeline post 2031, especially at the new settlements such as Northstowe and sites such as West Cambridge and Northern Fringe East, which demonstrates that the land capacity exists to continue supporting the growth of high-tech businesses and the Cambridge Cluster.

Figure 5.2: Key developments map and GCCD transport schemes



Source: Mott MacDonald

5.4 Qualitative option appraisal

The A428-A1303 scheme is part of a proposed transport network that will form the 'backbone' of the GCCD strategy by providing new or greatly enhanced links between areas of population and employment growth within Greater Cambridge, thereby addressing congestion and public transport issues to help stimulate further economic growth[34]. The qualitative appraisal assessed each option in terms of:

- Key transport benefits – to understand how each option will contribute towards addressing congestion and capacity issues.
- Contribution to GCCD strategic objectives – as shown in Section 4, Table 4.2.

Given the qualitative option appraisal the 'Segregated' and 'Hybrid' options are identified as likely to deliver the most benefits in terms of supporting business investment and growth and labour market mobility. The **Segregated route (Option 3) delivers against the longer term strategic aims of Greater Cambridge**

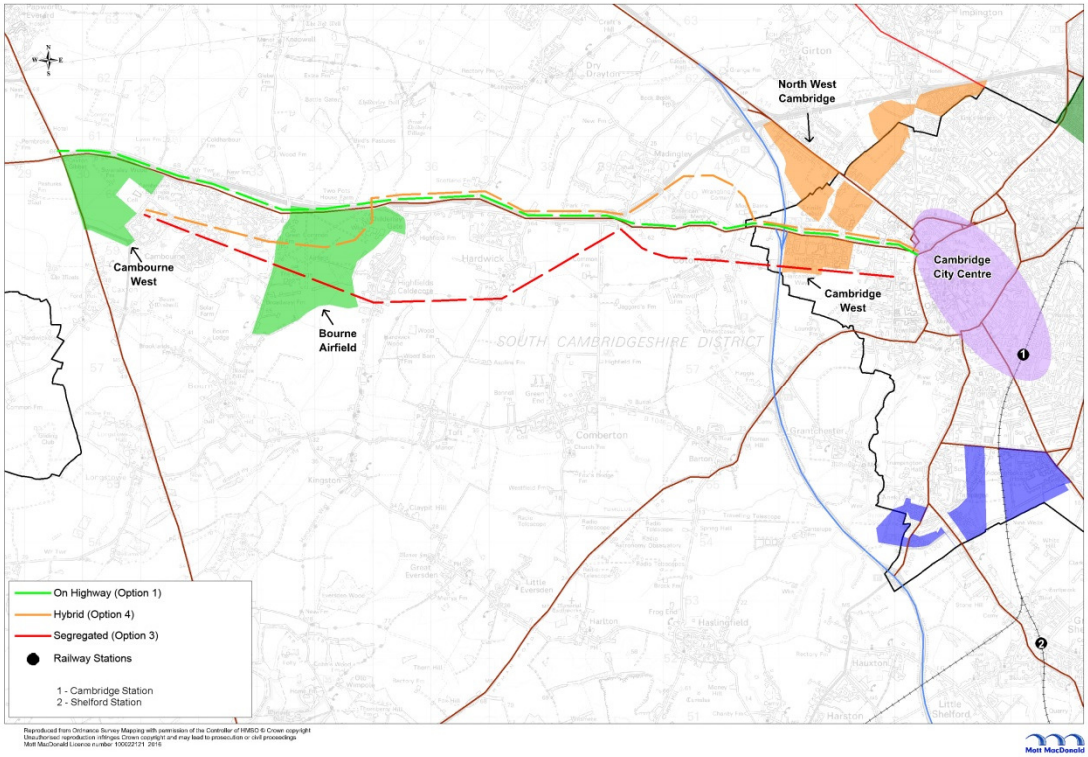
[34] GCCD, UK Government, p.3

in terms of promoting a positive image and perceptions and investment in capacity for post 2031 growth. The City Deal growth targets relate to 2031, but at the heart of the Deal is also long term investment to improve connectivity and networks that will support waves of innovation led growth which will continue beyond this period. Given these considerations the **maximum level of growth attributed to the scheme is attributed to the Segregated Option given it will provide the greater stimulus via transport benefits and investment in long term capacity to support the GCCD objectives**.

5.5 Land utilisation – growth attribution

This study using the land utilisation analysis undertaken provides attribution levels to those development sites along the Cambourne to Cambridge Corridor (Figure 5.3 below) over the remaining planning period (2016-2031) for highest scoring **option in the qualitative appraisal – the Segregated route (Option 3).**

Figure 5.3: Development sites along the A428-A1303 Corridor



Source: Mott MacDonald

This provides an **indicative assessment** of the likely scale of economic growth that could be attributed to the highest scoring scheme option given the evidence reviewed in the qualitative appraisal (using the findings of the strategic review), the growth trajectory of Greater Cambridge and site details examined.

Table 5.1: Growth attribution levels by site for the Segregated Route (Option 3)

		B-use jobs attribution			Housing attribution		
		Total B-use jobs 2016-2031 (scaled)	Segregated (Option 3) - attribution rates	Jobs attributed	Housing	Segregated (Option 3) - attribution rates	Dwellings attributed
Bourn Airfield	New settlement	275	30%	83	1,360	30%	408
Cambourne	New settlement	1,033	30%	310	1,699	30%	510
West Cambridge	West Cambridge	2,512	10%	251	-	-	-
City centre sites	City centre	1,419	10%	142	2,857	0%	-
	Total	**5,239**		**786**	**5,916**		**918**

Source: Mott MacDonald

In summary, the total attributable jobs of remaining B-use jobs to be created over 2016-2031 to the Segregated scheme are estimated as 793 whilst the total level of attributable housing is estimated as 918 dwellings. These jobs at a Greater Cambridge level will generate £22.6m of GVA per annum, equivalent to £679.3m of GVA over a 30-year time horizon (see Table 5.2). This is a significant level of economic benefits for Greater Cambridge and is based on the strong linkages between development sites and the scheme, especially in the case of Bourn Airfield and Cambourne and the strategic objective of the scheme to improve East to West connectivity to Cambridge and other cluster sites. This also reflects the analysis undertaken as part of the TEAR work though we have worked at a finer grained level as part of this study.

5.6 Quantification of indirect WEBs and option comparison

The indirect WEBs for the three options, based on the land utilisation and transport analysis, are summarised at the Greater Cambridge and UK level below in Table 5.2.

Table 5.2: Indirect Wider Economic Benefits (£Ms in 2010 discounted values and prices) over 30 year period

Benefit	Option		
	Low - On highway (Option 1)	Medium – Hybrid (Option 4)	High – Segregated (Option 3)
GVA benefits – Greater Cambridge level (£s in discounted 2010 factor prices)			
Direct jobs	189	606	786
Direct GVA per annum	5.2	17.5	22.6
TOTAL GVA	**155.7**	**526.2**	**679.3**
GVA benefits – UK level (£s in discounted 2010 factor prices)			
Land utilisation – net additional jobs to the UK	38.4	129.7	167.5
Move to more productive jobs within the UK	7.0	23.7	30.6
TOTAL GVA	**45.4**	**153.4**	**198.1**
Welfare benefits – UK level (£s in discounted 2010 market prices)			
Reduction in spatial inequalities	0.28	0.93	1.21
Alleviation of unemployment	0.06	0.22	0.28
Option and non-use values	0.00	29.76	29.76
TOTAL WELFARE	**0.33**	**30.92**	**31.25**

Source: Mott MacDonald

Clearly the at the UK level the High/ Segregated option delivers the largest wider economic GVA benefits at £198.1m compared to £153.4m and £45.4m under the Medium (Hybrid) and Low (on highway) options. Furthermore, these differentials are magnified when further welfare benefits are included and/or the impacts are considered solely at the Greater Cambridge level.

This is driven by the qualitative analysis and land utilisation analysis which assumes that the high option delivers a step change in bus service provision to access employment opportunities and underpin business investment. This provides the greatest stimulus to improved connectivity which will link effectively with the other GCCD schemes providing greater connection across the Cambridge Cluster. The option also clearly supports post-2031 growth opportunities which are substantial along the corridor and reinforces the high quality of life attributes that contribute to Greater Cambridge's success. However, what is also clear is that the Medium/ Hybrid option also delivers significant economic benefits above the Low/ on highway option and it should be investigated when using this evidence alongside the conventional transport appraisal if this option could be designed so that it delivers the same quality of bus provision and connectivity (even if not entirely segregated).