Appendices

A428 Western Corridor Study
Cambridgeshire County Council

June 2014

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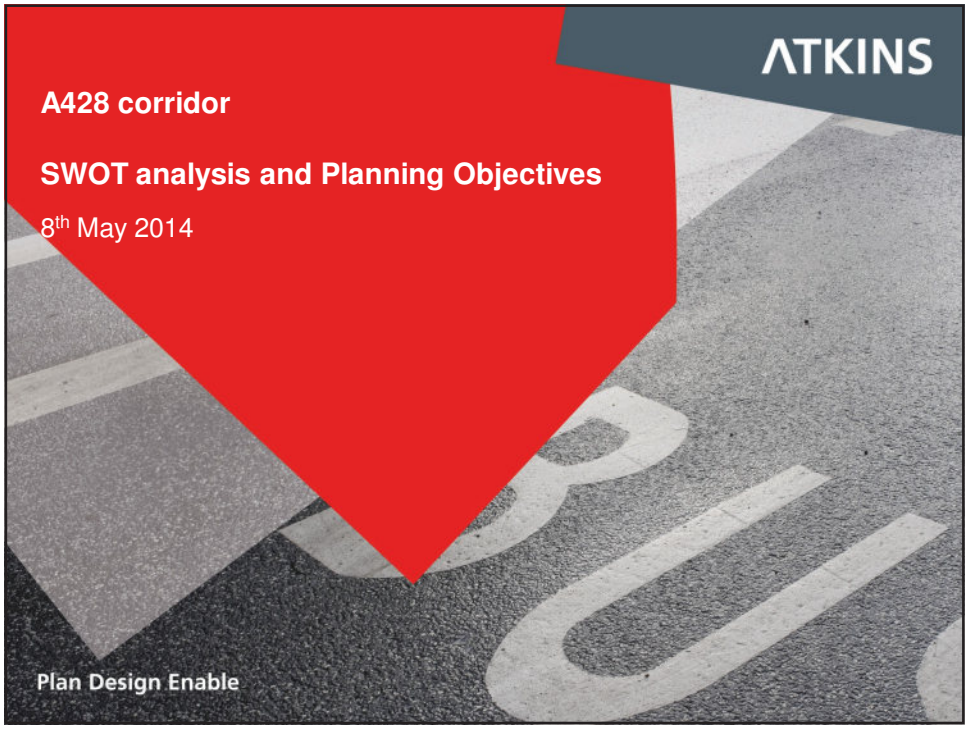
Appendix A. SWOT Analysis, Planning Objectives and Background Information

A.1. SWOT Analysis and Planning Objectives Presentation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A428 corridor
SWOT analysis and Planning Objectives
8th May 2014
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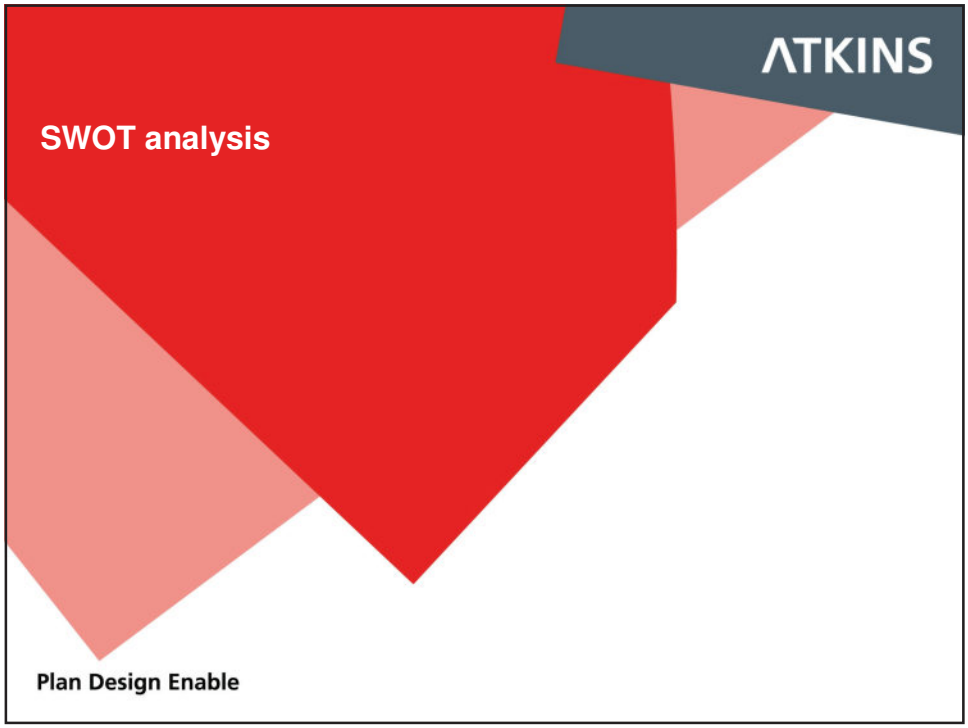
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Strengths

- Existing Park & Ride site captures up to 45% of AM peak traffic in scope.
- Dualled section of A428 provides for fast and reliable journey times.
- Direct car access to the Science Park via the A14 / CNB.
- Strong appetite for development along the corridor.
- Undeveloped employment sites at Cambourne.
- Clearly defined catchment area.
- Existing cycle provision in some sections of the corridor.

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Weaknesses

- Significant peak in eastbound A1303 traffic flow (at P&R)
- Significant journey time variability along the single carriageway sections
- Low traffic speeds in both peaks, particularly approaching / at key junctions
- During AM peak 80% of route length from A428 / A1303 junction to M11 J13 is subject to queues.
- Average delay in AM peak of 18 min between A428 / A1303 junction and Queens Road / Northampton Street. Average delay in AM peak of 10 min between St Neots and Caxton Gibbet.
- Lack of priority for bus services along the corridor
- Questionable commercial viability of bus services?
- Impact of interaction between P&R, M11 and other traffic
- P&R location (M11 vs. A428)
- Non-continuous cycle provision along the corridor.

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Opportunities

- High proportion (28% AM peak) of existing trips on A428 corridor are destined for central Cambridge (RSI) – strong customer base.
- Peak journey times Madingley Mulch-Queens Road c. 3x inter-peak
- Current/future queuing acts as incentive to use alternative mode
- Scope for options within highway boundary, particularly A1303 east of the M11 to Storeys Way.
- Potential for a range of different solutions for Cambourne and Bourn away from the A1303.
- Potential for safeguarding off-line route alignment before growth takes place.
- Potential for using the old A428 east of Caxton Gibbet for public transport and improved / safer cycle provision.
- Capitalise on current access improvements being made at Madingley P&R.
- Additional outer P&R site to capture trips from new developments and A428 demand.
- Displace some M11 and/or P&R traffic elsewhere?

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Threats

- Madingley Rise currently at saturation point in morning peak (queues would get worse on upstream sections with adverse impacts on journey times and accidents rates).
- Forecast (2031) growth in car trips on the A428 corridor to Cambridge of 45% in the morning peak hour [but little effect on Madingley Road traffic flows]
- 70% growth in the inter-peak and 50% in the evening peak with growth.
- No dominant traffic movement where Madingley Road meets Queens Road.
- Future travel patterns likely to become more diverse in terms of Cambridge destinations.
- Increase in trip attractors on Madingley Road (difficult to serve by P&R).
- Lack of PT alternative and route choice for destinations served by M11 south.
- Unknown impacts of A14 improvements.
- Physical constraints (e.g. environmental designations, heritage sites, listed buildings, bridging the M11, US military cemetery, development).
- Legal and institutional constraints (draft Local Plan, range of landowners, organised opposition, potential for non-local plan growth proposals).
- Zero opportunities for new alignments within the inner ring road.

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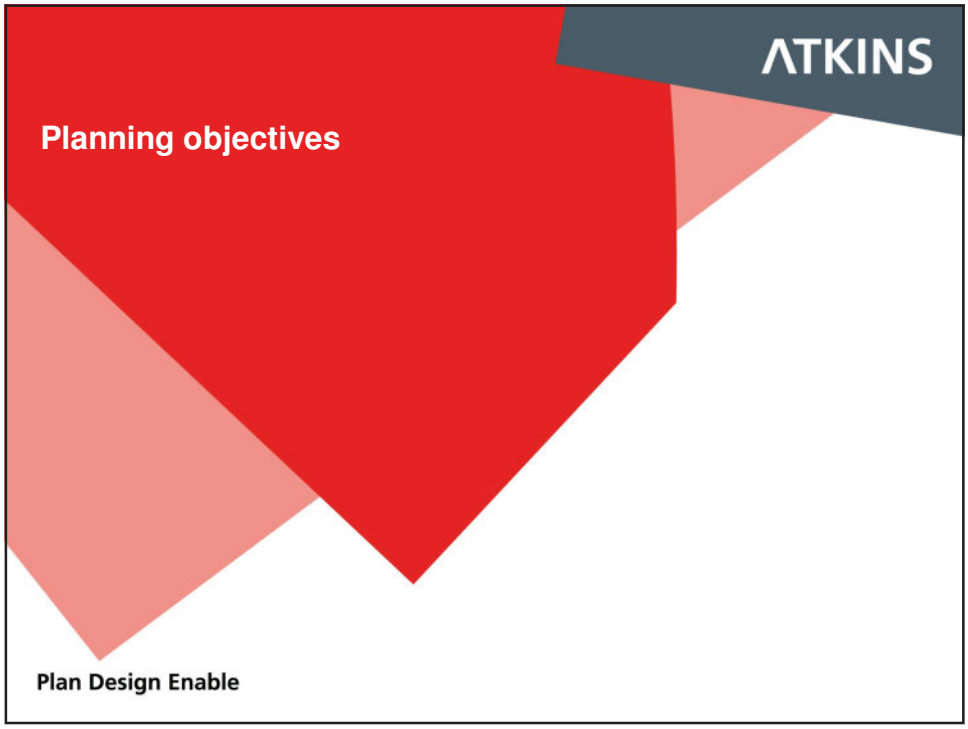

Planning objectives – What?

- A definition of the outcome the solution(s) are intended to achieve
  - Congestion free PT serving the corridor including new developments, in order to avoid an increase in current congestion levels and PT (?) journey times.

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Planning objectives – How?

A high quality public transport 'solution' which:

- Serves key current/future trip generators in the A428 corridor (west of the M11), including Cambourne and Bourn.
- Serves key current/future trip attractors in Cambridge – Cambridge City Centre and other employment sites.
- Intercept trips from new developments from the outset.
- Provides additional capacity for at least 500 passengers (c.2,000 houses) per AM peak hour. [NB: ignores growth in M11 traffic]
- Offers a level of service which will attract a mode share equivalent to 100% of growth in trips due to development and background growth:
  - A peak service frequency of no less than six buses per hour (assumes standing)
  - Quality of waiting and in-vehicle environments comparable to the Busway
  - Peak journey times no more than the equivalent journey by car (and preferably less)
  - End to end journey time reliability better than the car alternative (as yet undefined)
- Outcome: no growth in delays on the A428 corridor.

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Key challenge for the study

To achieve the objective of no additional delays/queuing on Madingley Rise, the solution(s) must:

- 're-mode' some existing car journeys; and
- attract a high share of new journeys (both from new developments and underlying growth);

and/or:

- reduce demand for travel to/from Cambridge [outside scope?];
- 're-time' some car trips away from the peak periods [outside scope?];
- re-assign some car trips onto alternative corridors [at best inconsistent with broader strategy].

...noting that there are few alternatives for A428/M11 traffic.

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A.2. Current Local Characteristics- Background Information

Social and demographic characteristics

- **Population –** At the time of the 2001 Census, the population within the study area stood at approximately 59,001 and by 2011 had grown by approximately 28% to 75,600. This growth was accompanied by an increase in households from approximately 21,500 to over 27,000 over the same period. This growth trend is likely to increase as land is allocated for development under the Local Plan.
- **Employment** – unemployment in the study area was 2.3% (2011), compared to 3% in Cambridgeshire and 3.2% in England and Wales. Employment within the study area is skewed towards highly skilled occupations and industries.
- **Car Ownership** – 85% of households own a car, and 42% own two or more cars (2011). Overall car ownership is high in comparison to the average for England (74%) and Wales (32%).
- **Deprivation** – 0.9% of the working age population claimed Job Seekers Allowance, compared to 2% across England and Wales, and 1.4% in Cambridgeshire (2011).
- **Travel to Work** – travel demand data demonstrates that the car is the dominant mode of transport. Travel to work data for the study area, shows that typically around two-thirds of journeys to work are made by car. The largest use of bus is in Comberton (6%), Hardwick and Cambridge (5% respectively). Overall, walking and cycling comprises less than 10% of journeys made to work. However there is a considerable range in cycle and walking use between the areas.

Land use and environmental characteristics

ONE PARA SUMMARY

1.16. Relevant land use and environmental characteristics are summarised below. Many of which represent physical and legal constraints to any transport intervention within the corridor.

- **Water** environment – the main water features are the River Cam, the wider flood plain and the associated network of drainage ditches, and groundwater. The attributes of these include water supply, transport and dilution of waste water, biodiversity, aesthetics, recreation, value to economy and conveyancing of flow and flood waters. The study area affected by potential improvements falls within the Environment Agency Flood Zone 3.
- **Biodiversity** (SSSI, ancient woodland, protected species habitats) – There are four Sites of Special Scientific Interest within the study area, Caldecote Meadows, Hardwick Wood, Madingley Wood, and Elsworth Wood (north east of Caxton Gibbet). Madingley Wood, Hardwick Wood Knapwell wood located directly north of Cambourne and the A428, and are classified as ancient woodlands. Additionally, Coton Countryside Reserve is classified as a Strategic Open Space a covers over 300 acres (120ha) of pasture and agricultural land, the Reserve is located near the village of Coton to the west of Cambridge.
- **Green Belt** – the draft Cambridge Local Plan 2014 provides for the continued protection of the Cambridge Green Belt, the River Cam corridor and the setting of the historic city. The need for jobs and homes has to be considered within the context of a tightly-drawn Green Belt, which aims to prevent the city merging with the ring of necklace villages. Small Green Belt releases are permitted where exceptional circumstances can be argued.
- **High quality agricultural land-use** – Agricultural land forms the greatest proportion of the land-use to the north of the A428. Much of the land in the area is some of the best and most versatile category of Grades 2 (Very Good) passing to Grade 3 (Good to moderate) in smaller sections south of the A428. The majority of the land is under intensive arable farming, typical of Grade 2 land.
- **Landscape Character** – Cambridge and its surrounding landscape are located within Bedfordshire and Cambridgeshire Claylands National Character Area (NCA) as identified by the Countryside Agency's National Character Map. The NCA is a broad, gently undulating, lowland plateau dissected by shallow river valleys that gradually widen as they approach The Fens NCA in the east.

- **Air quality** – The boundary of the Air Quality Management Area is defined by the inner ring road and some extension along radial routes. As such the A428 Corridor is outside this zone of influence.
- **Madingley American Cemetery** – Madingley American Cemetery and Memorial is situated 3 miles outside of the Cambridge city centre. It is maintained by the American Battle Monuments Commission and is Britain's only World War Two American Military Cemetery. The cemetery is on 30 acres of land donated by the University of Cambridge in 1943.
- **Barton Road Rifle Range** – is a MOD gallery range south of the A428 and to the west of the M11 near Cambridge. The range faces north and has a bridal path crossing the range.
- **Land owners** – the land on either side of the corridor is under the ownership of a number of different landowners.

Key employment areas and trip attractors

- **Cambridge City Centre** - Cambridge is the centre of a wider travel to work and housing market area. The city's area of influence, both as a sub-regional centre and a major focus for employment, includes most of Cambridgeshire, and parts of West Suffolk, Bedfordshire, Essex and North Hertfordshire. It has a prosperous and dynamic economic base in high technology, research and development and related service sector industries. Cambridge and South Cambridgeshire provide over 152,800 employee jobs (ONS: Annual Business Inquiry 2008 cited in Nomis [online], 2013), approximately 88,100 of which are based within the city boundary. Cambridge's total jobs figure is 100,000. Labour demand is higher than its available workforce, with a jobs-to-working age population ratio of 1.13 (ONS: Jobs Density 2008 cited in Nomis [online], 2013) leading to high levels of in-commuting.
- **Cambridge Biomedical Campus, Addenbrookes** – Cambridge Biomedical Campus, located at the southern edge of Cambridge, is one of the largest centres of health science and medical research in the world and the largest such centre in Europe. It is an accredited UK academic health science centres and home to Addenbrookes Hospital and the university's medical school. There are approximately 7,000 healthcare professionals and research scientists working onsite. Astra Zeneca is moving its headquarters to the Cambridge Biomedical Campus where they will employ 2,000 people. A further 13,000 new jobs are planned for the site, which will also house the relocated Papworth Hospital. The campus will eventually have a working population of around 30,000, making it one of the largest biomedical sites in the world.
- **Cambridge Science Park** – The Science Park has a concentration of science and technology related businesses, and has strong links with the nearby University of Cambridge. It is located 3 km to the north of Cambridge city centre, by junction 33 of the A14, and covers 152 acres. Over 100 companies operate onsite, employing c. 5,000 people.

- University of Cambridge – Cambridge is formed from a variety of institutions which include 31 constituent colleges and over 100 academic departments which are organised into six Schools. The university occupies buildings throughout the town and is a major trip attractor. Transport characteristics

A.3. Current Transport Characteristics- Background Information

Bus services

1.17. There is a lack of priority for bus services along the A428 corridor. There is a section of bus lane on the inbound lane of the A1303 east of Madingley Mulch, however, it ends before the M11 bridge.

1.18. Bus operations in the A428 corridor are primarily conducted by Stagecoach and Whippet Coaches. Stagecoach provides regular city based and P&R services during the weekday peak period, as well as a longer distance service to Oxford (X5) running half hourly between Cambridge to St Neots via Madingley Road, Bedford and Milton Keynes. Whippet Coaches provide long distance coach services and serve Cambourne.

1.19. While there are relatively frequent connections from Cambridge to Cambourne, the connections further west linking St Neots are less frequent.

1.20. Table-1 shows the timetabled services operating along and in proximity to the A428 corridor, which constitutes 22 services per hour in each direction between 08:00 and 09:00, with 20 services per hour between 17:00 and 18:00 in each direction.

Table-1 Bus services in the A428 corridor

Route No	Route	Frequency	Operator
1	Cambourne - Papworth - Fenstanton - St Ives	Hourly Monday to Saturday	Whippet Coaches
2	Cambridge - Hardwick - Toft - Caldecote - Boxworth	One per day Monday to Friday	Whippet Coaches
3	Huntingdon - Godmanchester - Papworth Everard	4 per day Monday to Saturday	Whippet Coaches
Citi 4	Cambridge - Hardwick - Cambourne	Approx. every 15mins in AM peaks, hourly off peak Every day	Stagecoach in Cambridge
UNI 4	Addenbrookes - City Centre - West Cambridge - Madingley Road Park & Ride	Every 20mins	Stagecoach
X5	Cambridge - St Neots - Bedford - Milton Keynes - Oxford	Half hourly	Stagecoach East
10	Comberton Village College - Kingston - Cambourne - Caxton	Monday to Friday One per day. School service.	Whippet Coaches
18	Cambridge - Cambourne	Hourly Monday to Saturday	Stagecoach in Cambridge
28	St Neots - Abbotsley - Gamlingay - Cambourne (- Papworth)	5 per day Monday to Saturday	Whippet Coaches
77	Madingley Road P&R – Newmarket Road P&R	Every 10mins	Stagecoach

1.21. A number of fare and ticket variants exist for the above services ranging from city based Dayrider to a Megarider which allows unlimited travel on the Stagecoach network in Cambridgeshire.

Park and Ride

1.22. Madingley Road Park and Ride contributes to the wider strategy by intercepting car users before they add to congestion in central areas. The Park and Ride site is located on the northern side of the A1303 to the east of the M11. The latest journey figures available for 2008 show a 33% increase in passenger journeys on the 2007 figure, as shown in Table-2. The increase is due, in part, to growth in concessionary travel fares.

1.23. Road side interview data from 2013 demonstrates that the existing Park & Ride site captures up to 45% of AM peak traffic in scope.

Table-2 Annual park and ride patronage

	2004	2005	2006	2007	2008
Madingley Rd/ Newmarket Rd	1,168,654	1,227,910	1,226,588	1,269,967	1,689,272

Walking and cycling

1.24. Walking is provided for in the study area by footpaths along the A1303. Signalised junctions incorporate pedestrian phases and pelican crossing are sited at key locations. The bypassed section of St Neots Road also provides footway facilities.

1.25. In the context of this study, walking also forms a key part of any public transport trip, providing a means of gaining access to the bus stop. Walking accounts for 6% of journeys to work. This figure could potentially be much higher as the car is currently used for many short distance trips.

1.26. Cycling accounts for 3% of journeys to work. Non-continuous cycle provision is provided along the corridor. Cycle facilities are provided in the form of advisory cycle lanes on certain parts of the A1303 and advanced stop lines at some junctions. The majority of Madingley Road A1303 is designated as local links for cyclists and links to villages off road, with the section between Clerk Maxwell Road and Storey's Way designated as signed primary network off road. Cycling may be discouraged by the high traffic volumes and perceived dangers from speeding vehicles along the corridor. As there is limited cycle infrastructure within the corridor, there may be a suppressed demand for cycling.

Highways

1.27. East of Caxton Gibbet the A428 is dual carriageway, bypassing the existing single carriageway section near Hardwick.

1.28. Table -3 indicates journey to work movements within Cambridgeshire, which is based on the 2001 census as the 2011 data, has not been released. The majority of journey to work movements focused on Cambridge.

Table 1. Table -3 Journey to work movements per day (2001 Census)

Ward	Cambridge	Bourn	Caldecote	Comberton	Hardwick	Huntingdon	Other	Papworth & Elsworth	St Neots	TOTAL
Cambridge	35,346	161	59	21	22	260	12,939	124	77	
Bourn	422	384	15	6	3	39	672	40	39	
Caldecote	275	18	254	12	3	8	272	8	0	
Comberton	483	14	30	255	6	7	370	7	0	
Hardwick	613	25	22	12	302	22	504	9	6	
Huntingdon	448	35	0	0	0	5,108	4,642	94	186	
Other	40,257	861	242	103	99	10,515	23,391,010	1,147	3,534	
Papworth & Elsworth	445	35	9	0	3	96	799	732	32	
St Neots	526	119	9	0	0	878	6,093	130	6,651	
TOTAL										

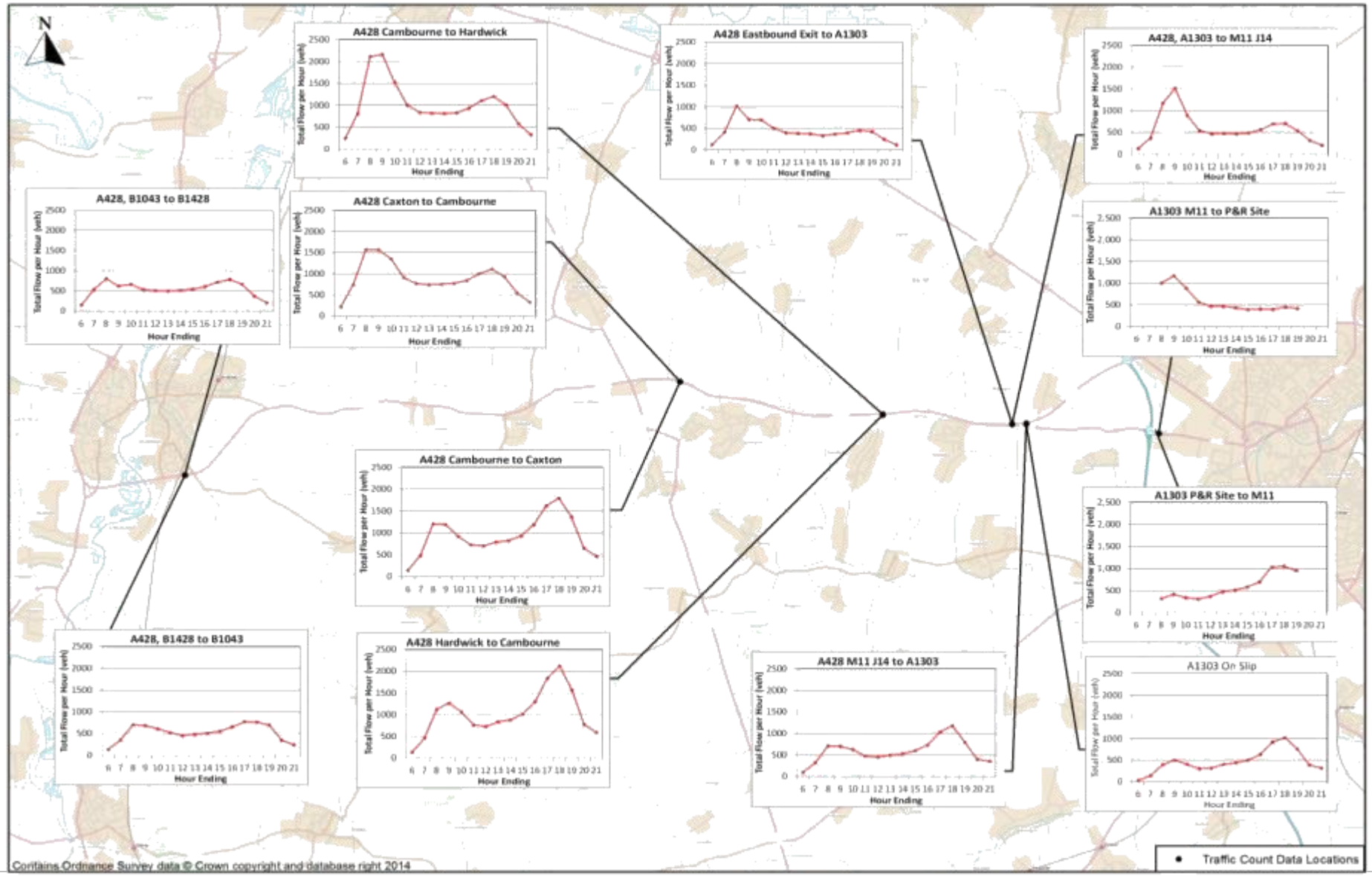
Current traffic levels

1.29. illustrates the traffic flow at a number of count locations within the corridor. Key observations from this and other data sources are as follows.

- There is a significant peak in eastbound A1303 traffic flow (at P&R) into Cambridge City Centre in the AM peak. The A1303 also experiences low traffic speeds in both peaks, particularly approaching / at key junctions.
- During the AM peak period, 80% of route length from A428 / A1303 junction to M11 J13 is subject to queues. The average delay in the AM peak is 18 min between A428 / A1303 junction and Queens Road / Northampton Street. While between St Neots and Caxton Gibbet, the average delay in AM peak is 10 min.
- Madingley Rise is currently at saturation point in morning peak (queues would get worse on upstream sections with adverse impacts on journey times and accidents rates). Such congestion also affects the reliability of road based public transport.
- Traffic data has been made available from a previous study which allows analysis of the traffic distribution at the eastern end of Madingley Road. There is no dominant traffic movement where Madingley Road meets Queens Road with approximately half of traffic going north along Chesterton Road and half south along Queen's Road.
- Those travelling to the Science Park by car can access it directly via the A14 / Cambridge Northern Bypass which provides an attractive alternative to the A1303 as a key route.
- Existing Park & Ride site east of the M11 captures up to 45% of AM peak traffic in scope, accommodating over 1000 car entries per day. However, the interaction between the P&R, M11 and other A1303 traffic can result in queuing for traffic entering the P&R.
- There is an approximate 75/25 split between A428 corridor traffic and M11 traffic.

Appendices

Figure 1. A428 corridor traffic flows, between St Neots and Cambridge



A.4. Current Problems- Background Information

Journey time variability

1.30. The dual carriageway section of A428 provides for fast and reliable journey times. However, while the A428 is a dual carriageway east of Caxton Gibbet and the A1 and A421 to the west are also dual carriageways, the A428 between Caxton Gibbet and St Neots is a single lane carriageway. This section currently experiences congestion at certain times of the day with significant journey time variability.

1.31. Journey time variability has been highlighted to be greatest in the peak traffic flow directions – towards Cambridge in the morning and towards St Neots in the evening. Time lost in queues and significant delays due to bottlenecks along the corridor can negatively impact the economy.

1.32. **Error! Reference source not found.** presents journey time variability for the A428/A1303 eastbound in the AM Peak, while **Error! Reference source not found.** 3 presents westbound journey time variability in the PM Peak. Locations of high journey time variability are:

- A428 between St Neots and Caxton Gibbet, particularly between Croxton and the B1040 – AM Peak;
- A1303 between the A428 and Queens Road, particularly the section to the west of the M11 – AM Peak;
- A1303 between Queens Road and the M11 – PM Peak; and
- A428 between B1428 and Barford Road – PM Peak.

Figure 2. Journey time variability for A428/A1303, eastbound, morning peak hour

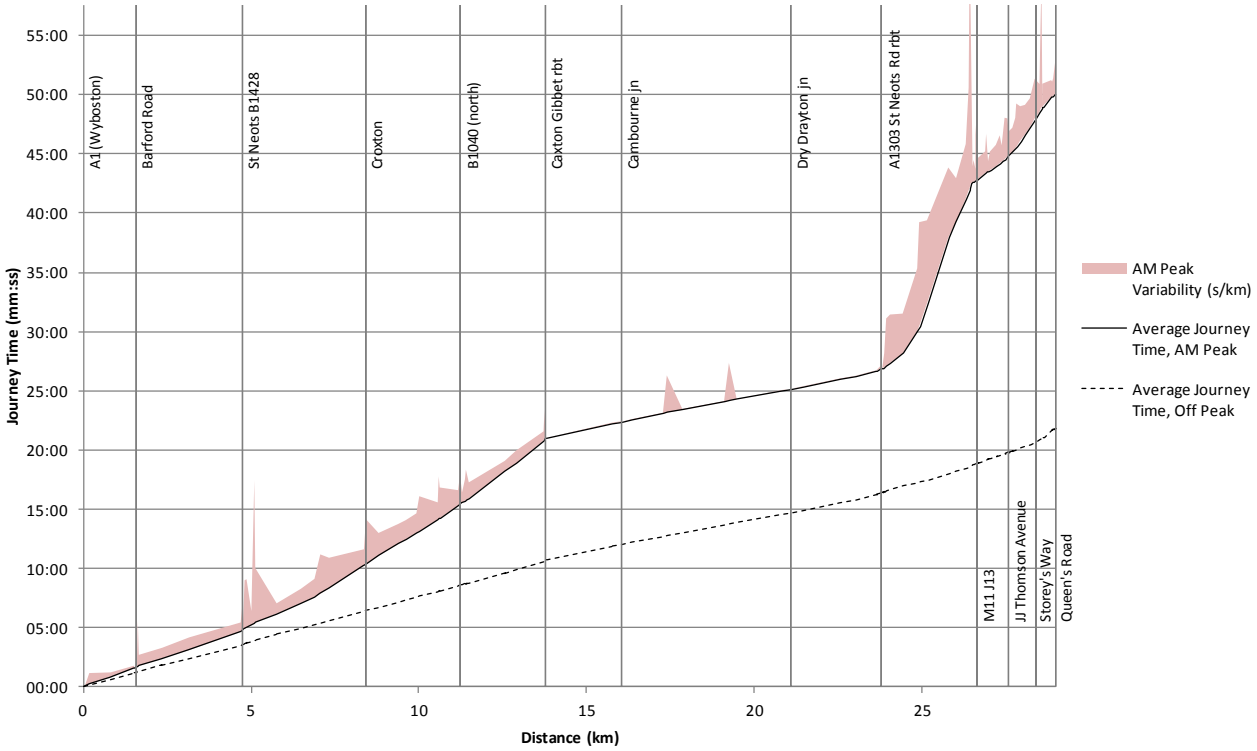
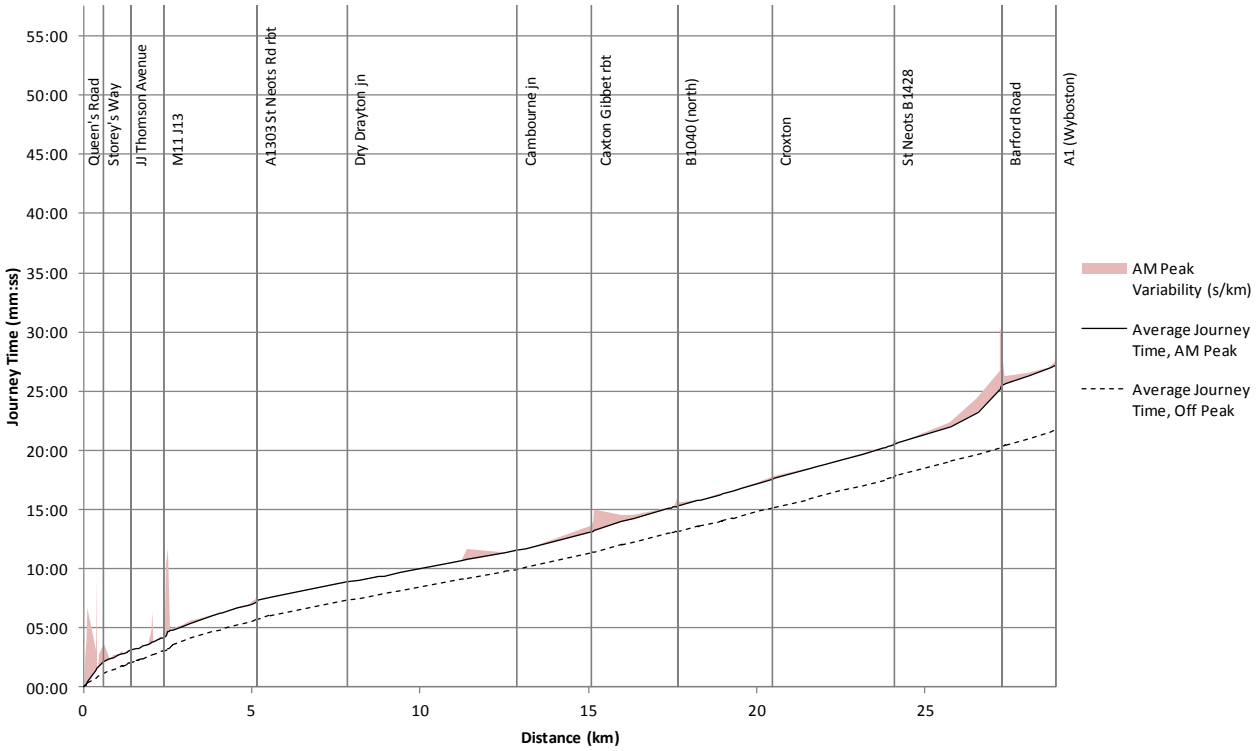


Figure 3. Journey Time Variability for A428/A1303, westbound, evening peak hour



A1303 congestion

1.33. Madingley Rise is currently at saturation point in morning peak. Greater than 80% of the length of Madingley Rise is travelling below 20mph between 07:45 and 09:00. While greater than 80% of traffic on Madingley Road is travelling below 20mph between 08:15 and 08:45.

Road safety

1.34. A summary of accidents for the period from January 2009 to December 2013 along the A428/A1303 Corridor is shown in Table-4 classified as slight, serious or fatal dependent upon the nature of any injuries sustained.

1.35. 189 accidents were recorded along the corridor with concentrations along the A1303 from Madingley to M11, and on the A428 from Caxton Gibbet to Eltisley. The majority of accidents involved motorised vehicles, with five accidents involving pedal cycles.

1.36. While the majority of recorded accidents were slight in nature, there have been a number of serious and fatal incidents. Many accidents occurred at or near to junctions along the corridor and involved a number of common factors, such as driving too fast, too close or failing to judge the path or speed of other road users.

Table-4 Location of accidents recorded on the A428 Corridor 2009-2013

Section	Slight	Serious	Fatal	Total	Involved Pedal Cycles
A428 St Neots Bypass	9	2	0	11	0
A428 St Neots to Croxton	8	2	0	10	1
A428 Croxton to Eltisley	5	0	1	6	0
A428 Eltisley to Caxton Gibbet	27	10	0	37	1
A428 Caxton Gibbet to Cambourne	16	2	1	19	0
A428 Cambourne to Hardwick	6	3	1	10	0
A428 Hardwick to Madingley	11	3	0	14	0

Section	Slight	Serious	Fatal	Total	Involved Pedal Cycles
A1303 Madingley to M11	22	6	2	30	0
A1303 M11 to Queens Road	19	4	0	23	2
St Neots Road Caxton Gibbet to Cambourne	2	1	0	3	0
St Neots Road Cambourne to Childerly Gate	10	1	0	11	0
St Neots Road Childerly Gate to Hardwick	2	1	0	3	0
St Neots Road Hardwick to Madingley	11	1	0	12	1

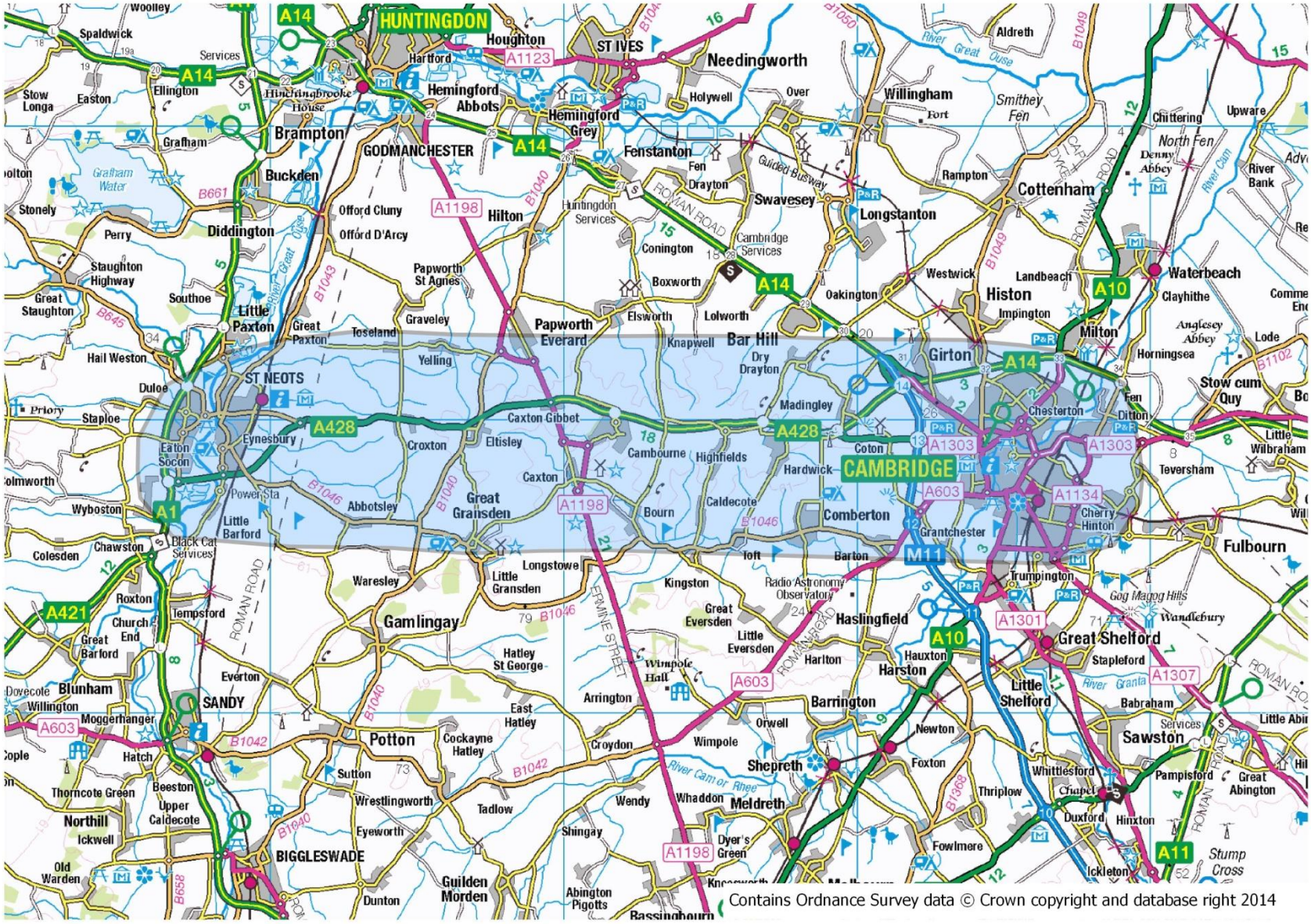
Figure 4.

A.5. SWOT Analysis Table

SWOT Analysis

Strengths	Weaknesses
• Existing Park & Ride site captures up to 45% of AM peak traffic in scope. • Dualled section of A428 provides for fast and reliable journey times. • Direct car access to the Science Park via the A14 / CNB. • Strong appetite for development along the corridor. • Undeveloped employment sites at Cambourne. • Clearly defined catchment area. • Existing cycle provision in some sections of the corridor.	• Significant peak in eastbound A1303 traffic flow (at P&R) • Significant journey time variability along the single carriageway sections • Low traffic speeds in both peaks, particularly approaching / at key junctions • During AM peak 80% of route length from A428 / A1303 junction to M11 J13 is subject to queues. • Average delay in AM peak of 18 min between A428 / A1303 junction and Queens Road / Northampton Street. Average delay in AM peak of 10 min between St Neots and Caxton Gibbet. • Lack of priority for bus services along the corridor • Questionable commercial viability of bus services? • Impact of interaction between P&R, M11 and other traffic • P&R location (M11 vs. A428) • Non-continuous cycle provision along the corridor.
Opportunities	**Threats**
• High proportion (28% AM peak) of existing trips on A428 corridor are destined for central Cambridge (RSI) – strong customer base. • Peak journey times Madingley Mulch-Queens Road c. 3x inter-peak • Current/future queuing acts as incentive to use alternative mode • Scope for options within highway boundary, particularly A1303 east of the M11 to Storeys Way. • Potential for a range of different solutions for Cambourne and Bourn away from the A1303. • Potential for safeguarding off-line route alignment before growth takes place. • Potential for using the old A428 east of Caxton Gibbet for public transport and improved / safer cycle provision. • Capitalise on current access improvements being made at Madingley P&R. • Additional outer P&R site to capture trips from new developments and A428 demand. • Displace some M11 and/or P&R traffic elsewhere?	• Madingley Rise currently at saturation point in morning peak (queues would get worse on upstream sections with adverse impacts on journey times and accidents rates). • Forecast (2031) growth in car trips on the A428 corridor to Cambridge of 45% in the morning peak hour [but little effect on Madingley Road traffic flows] • 70% growth in the inter-peak and 50% in the evening peak with growth. • No dominant traffic movement where Madingley Road meets Queens Road. • Future travel patterns likely to become more diverse in terms of Cambridge destinations. • Increase in trip attractors on Madingley Road (difficult to serve by P&R). • Lack of PT alternative and route choice for destinations served by M11 south. • Unknown impacts of A14 improvements. • Physical constraints (e.g. environmental designations, heritage sites, listed buildings, bridging the M11, US military cemetery, development). • Legal and institutional constraints (draft Local Plan, range of landowners, organised opposition, potential for non-local plan growth proposals). • Zero opportunities for new alignments within the inner ring road

A.6. Area of Interest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River Bank
Cottenham
Rampton
Swavesey
Longstanton
Fenstanton
Fen Drayton
Guided Busway
Huntingdon Services
Cambridge Services
Conington
Boxworth
Elsworth
Lolworth
Knapwell
Bar Hill
Dry Drayton
Oakington
Westwick
Landbeach
Histon
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Girton
Milton
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Eaton Socon
Colmworth
Wyboston
Chawston
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Church End
Great Barford
Everton
SANDY
Blunham
Willington
Dovecote
Moggerhanger
Hatch
Thorncote Green
Beeston
Upper Caldecote
Northill
Ickwell
Old Warden
BIGGLESWADE
Potton
Sutton
Wrestlingworth
Eyeworth
Tadlow
Cockayne Hatley
East Hatley
Hatley St George
Arrington
Croydon
Wimpole
Wimpole Hall
Orwell
Shepreth
Meldreth
Whaddon
Wendy
Shingay
Dyer's Green
Guilden Morden
Dunton
Abington Pigotts
Bassingbourn
Foxton
Barrington
Harston
Haslingfield
Great Eversden
Little Eversden
Harlton
Hauxton
Radio Astronomy Observatory
Kingston
Trumpington
Cherry Hinton
Grantchester
Fulbourn
Gog Magog Hills
Wandlebury
Great Shelford
Stapleford
Little Shelford
Babraham
Sawston
Newton
Whittlesford
Pampisford
Great Abington
Little Abington
Thriplow
Duxford
Hinxton
Fowlmere
Ickleton
Stump Cross
Teversham
Little Wilbraham
Waterbeach
A14
A1
A10
A11
A421
A428
A603
A1198
A1123
A1303
A1134
A1301
A1307
M11
B1040
B1042
B1046
B1043
B1049
B661
B645
B1102
B1368
B658
ROMAN ROAD
ERMINE STREET
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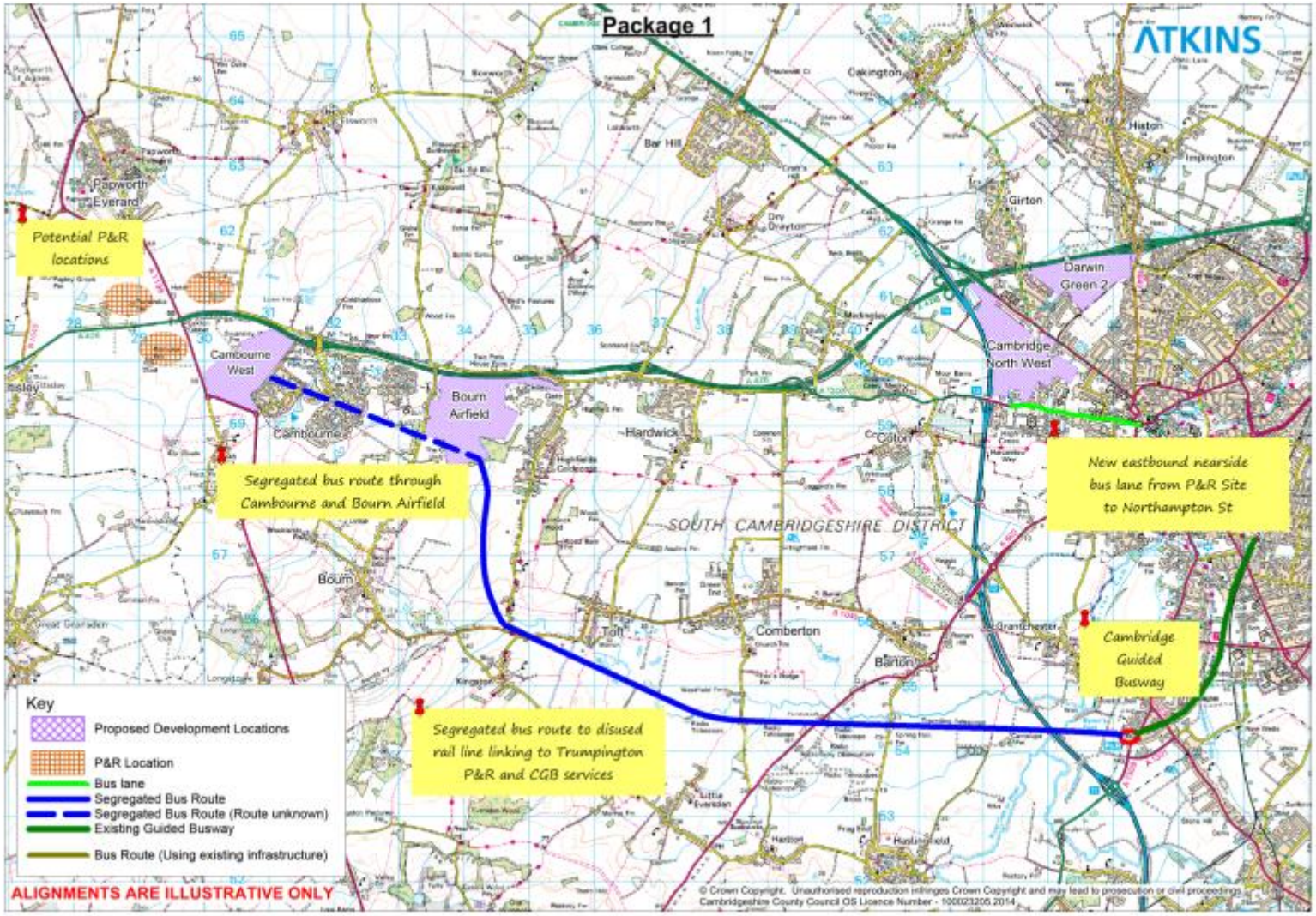
Appendix B. Options Development

B.1. Option Maps


Package 1
ATKINS
Potential P&R locations
Segregated bus route through Cambourne and Bourn Airfield
Segregated bus route to disused rail line linking to Trumpington P&R and CGB services
New eastbound nearside bus lane from P&R Site to Northampton St
Cambridge Guided Busway
Papworth Everard
Cambourne West
Cambourne
Bourn Airfield
Bourn
Hardwick
Caldecote
Cambridge North West
Darwin Green 2
Girton
Histon
Impington
Cottenham
Dry Drayton
Bar Hill
Comberton
Toft
Barton
Grantchester
SOUTH CAMBRIDGESHIRE DISTRICT
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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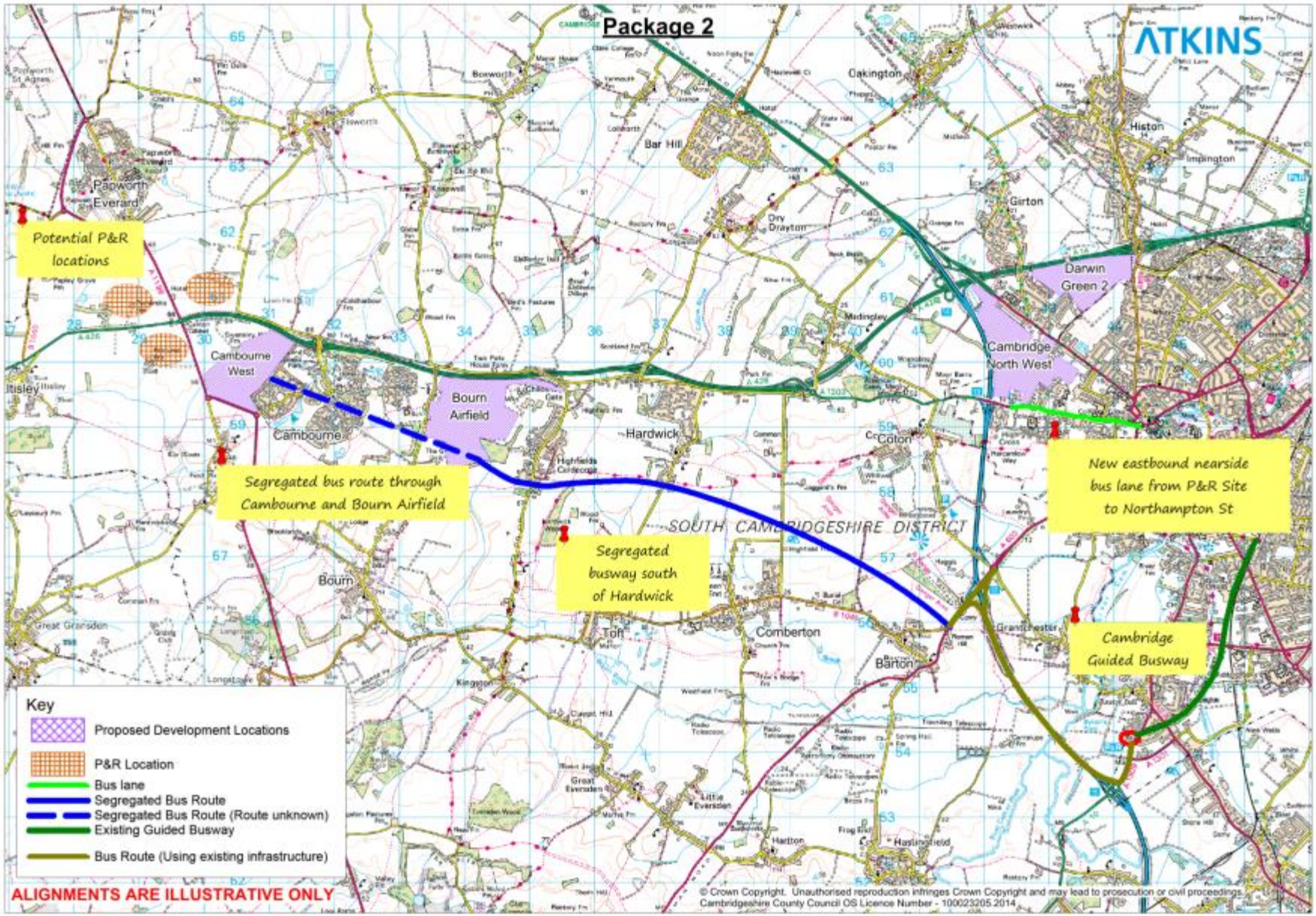
Package 2
ATKINS
Potential P&R locations
Segregated bus route through Cambourne and Bourn Airfield
Segregated busway south of Hardwick
New eastbound nearside bus lane from P&R Site to Northampton St
Cambridge Guided Busway
Papworth Everard
Cambourne West
Cambourne
Bourn Airfield
Bourn
Hardwick
Coton
Bar Hill
Dry Drayton
Girton
Oakington
Histon
Impington
Darwin Green 2
Cambridge North West
Madingley
Comberton
Toft
Barton
Grantchester
Hauxton
Harlton
Haslingfield
Great Eversden
Little Eversden
Kingston
Longstowe
Great Gransden
Itisley
SOUTH CAMBRIDGESHIRE DISTRICT
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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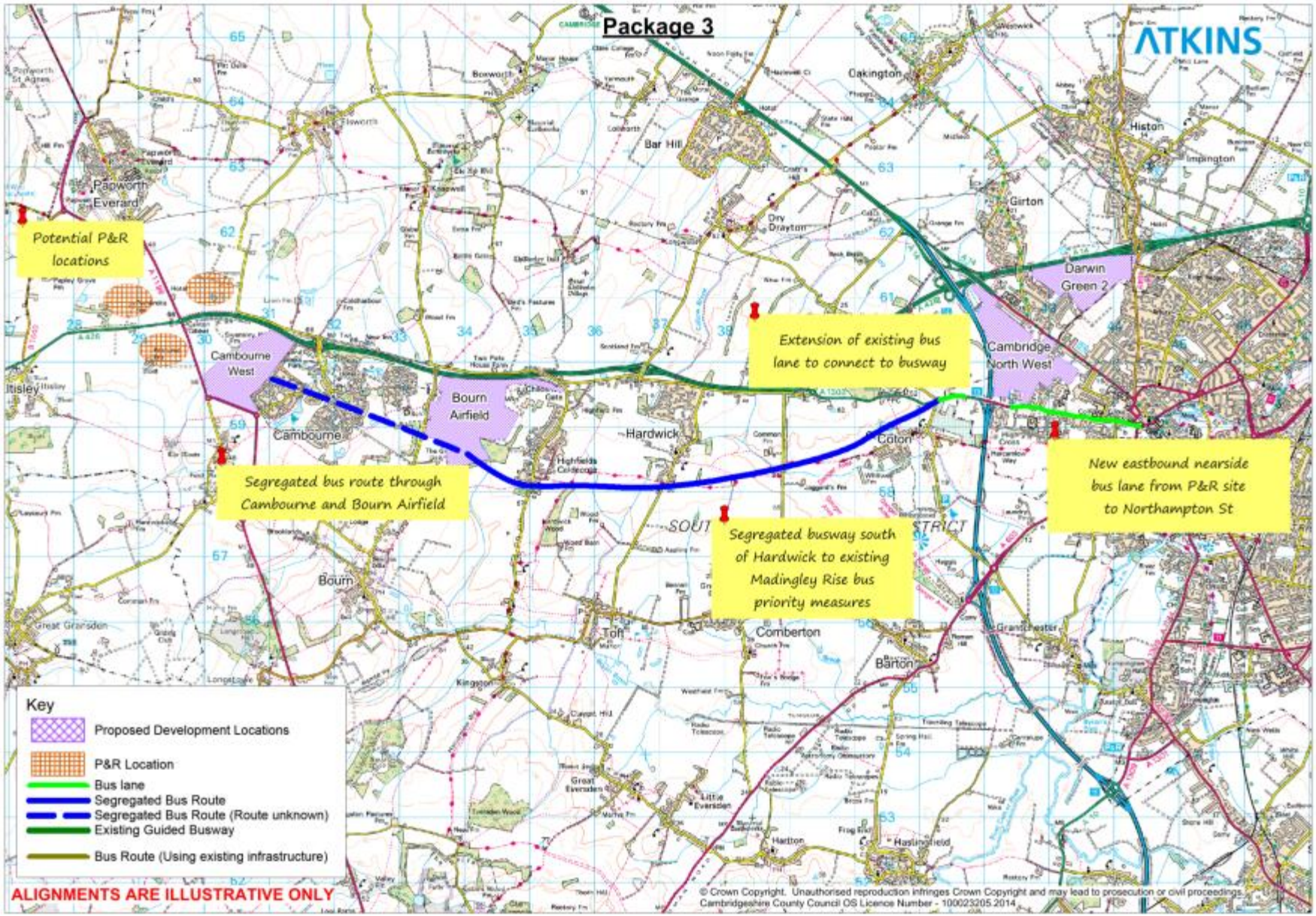
Package 3
ATKINS
Potential P&R locations
Extension of existing bus lane to connect to busway
New eastbound nearside bus lane from P&R site to Northampton St
Segregated bus route through Cambourne and Bourn Airfield
Segregated busway south of Hardwick to existing Madingley Rise bus priority measures
Papworth Everard
Cambourne West
Cambourne
Bourn Airfield
Bourn
Hardwick
Coton
Cambridge North West
Darwin Green 2
Girton
Oakington
Histon
Impington
Dry Drayton
Bar Hill
Comberton
Toft
Barton
Grantchester
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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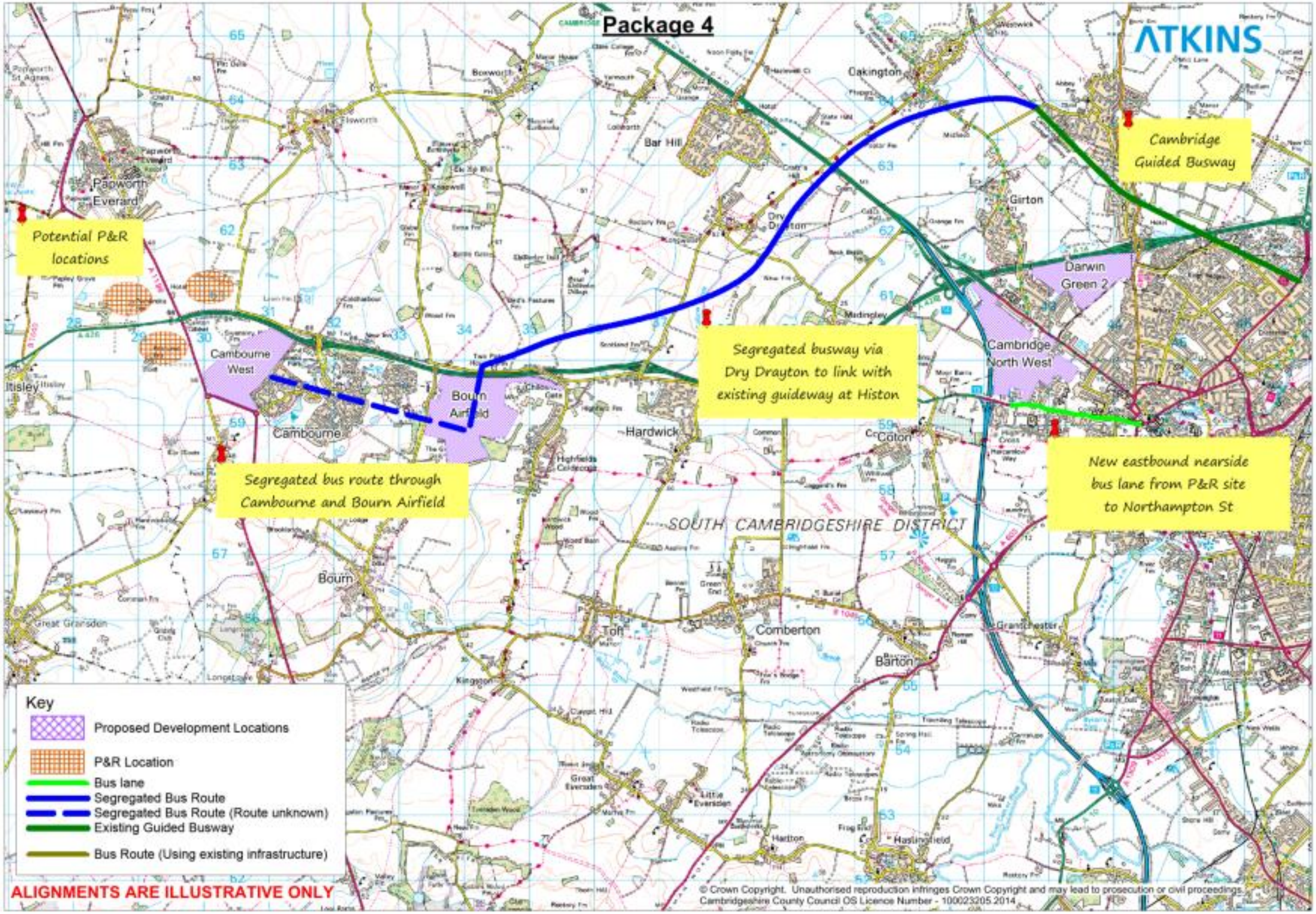
Package 4
ATKINS
Cambridge Guided Busway
Potential P&R locations
Segregated busway via Dry Drayton to link with existing guideway at Histon
Segregated bus route through Cambourne and Bourn Airfield
New eastbound nearside bus lane from P&R site to Northampton St
Cambourne West
Bourn Airfield
Darwin Green 2
Cambridge North West
SOUTH CAMBRIDGESHIRE DISTRICT
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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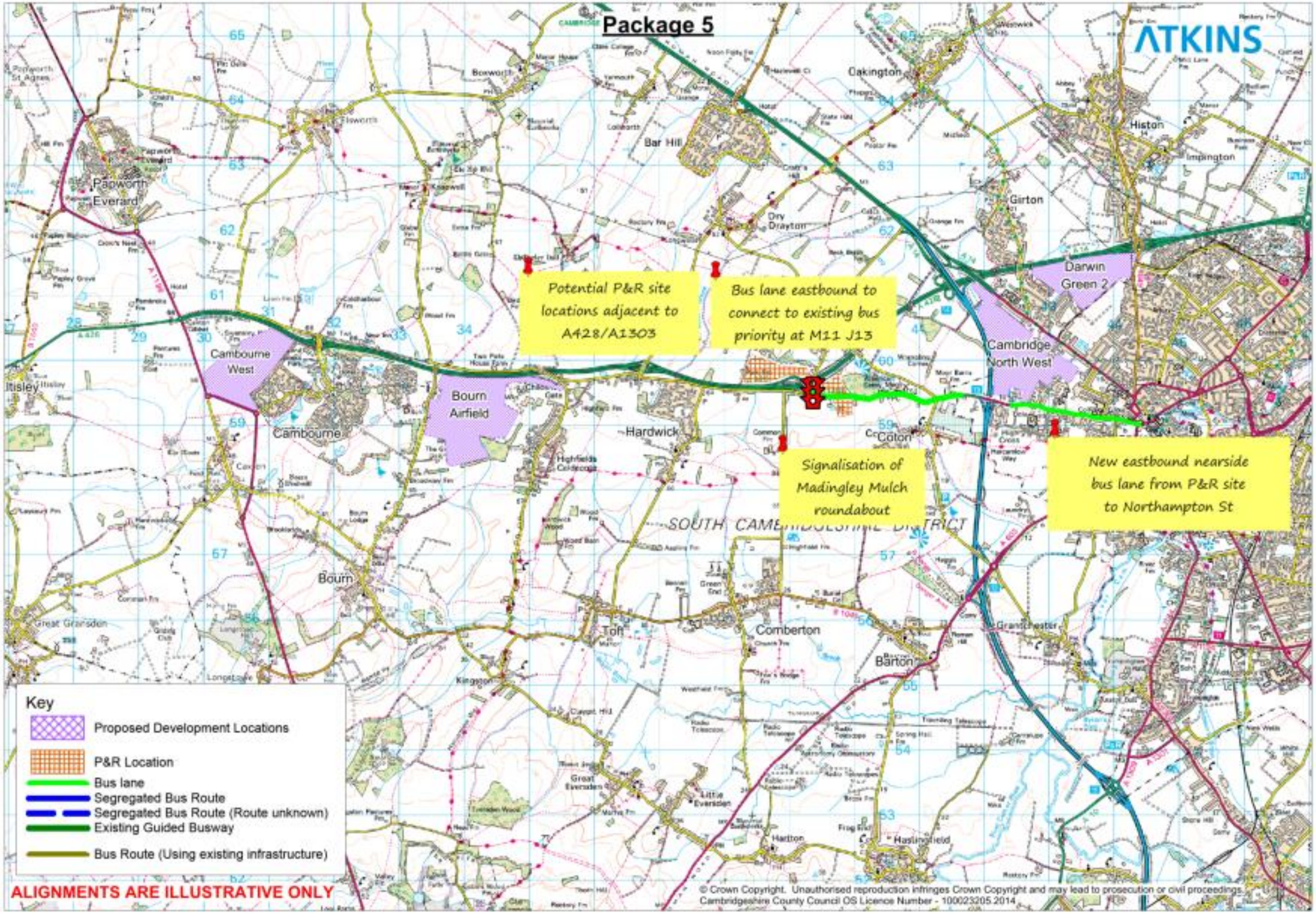
Package 5
ATKINS
Potential P&R site locations adjacent to A428/A1303
Bus lane eastbound to connect to existing bus priority at M11 J13
Signalisation of Madingley Mulch roundabout
New eastbound nearside bus lane from P&R site to Northampton St
Darwin Green 2
Cambridge North West
Cambourne West
Bourn Airfield
Cambourne
Hardwick
Coton
Girton
Histon
Impington
Oakington
Bar Hill
Dry Drayton
Papworth Everard
Bourn
Toft
Comberton
Barton
Grantchester
SOUTH CAMBRIDGESHIRE DISTRICT
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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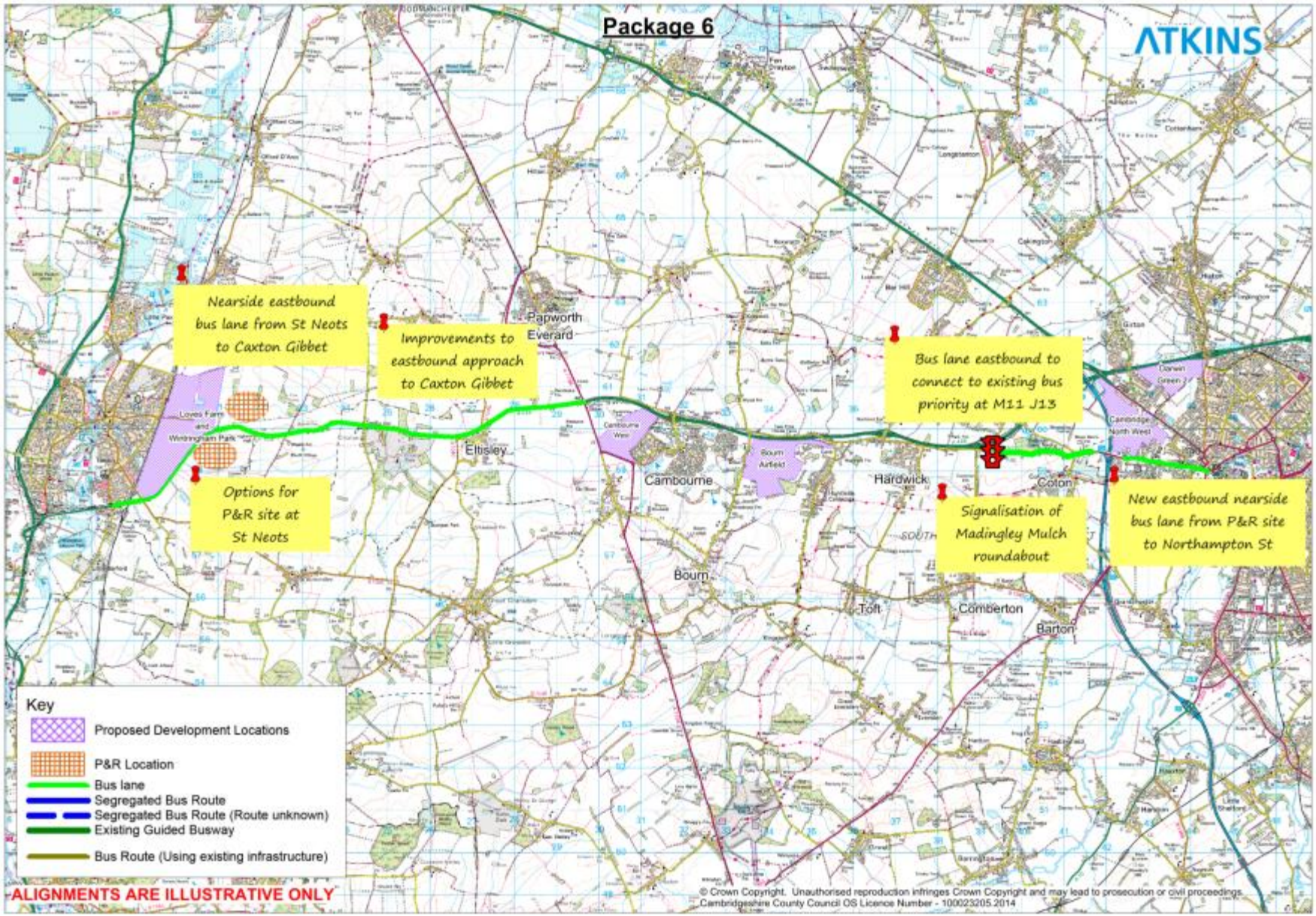
Package 6
ATKINS
Nearside eastbound bus lane from St Neots to Caxton Gibbet
Improvements to eastbound approach to Caxton Gibbet
Bus lane eastbound to connect to existing bus priority at M11 J13
Options for P&R site at St Neots
Signalisation of Madingley Mulch roundabout
New eastbound nearside bus lane from P&R site to Northampton St
Papworth Everard
Eltisley
Cambourne
Hardwick
Coton
Bourn
Toft
Comberton
Barton
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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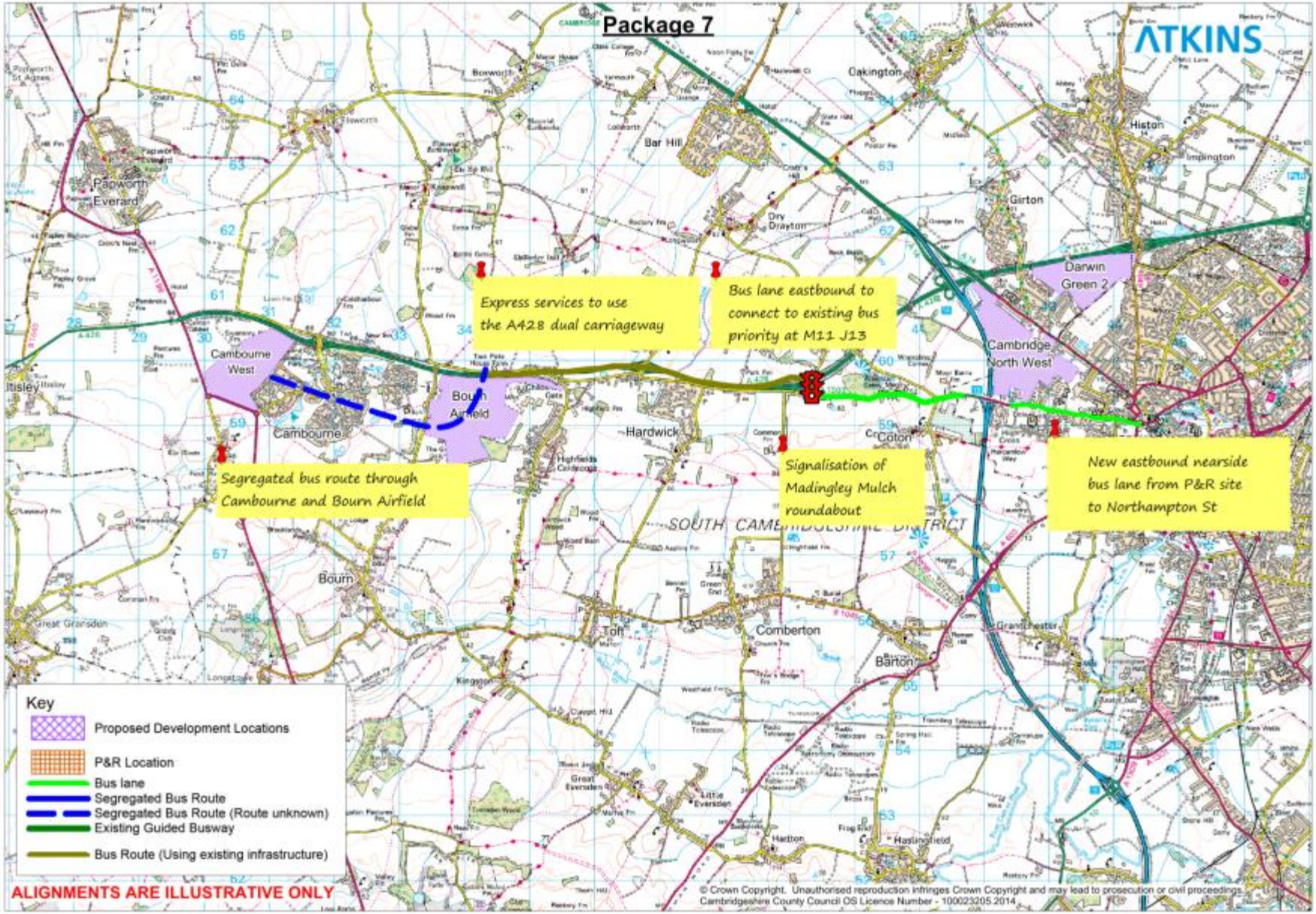
Package 7
ATKINS
Express services to use the A428 dual carriageway
Bus lane eastbound to connect to existing bus priority at M11 J13
Segregated bus route through Cambourne and Bourn Airfield
Signalisation of Madingley Mulch roundabout
New eastbound nearside bus lane from P&R site to Northampton St
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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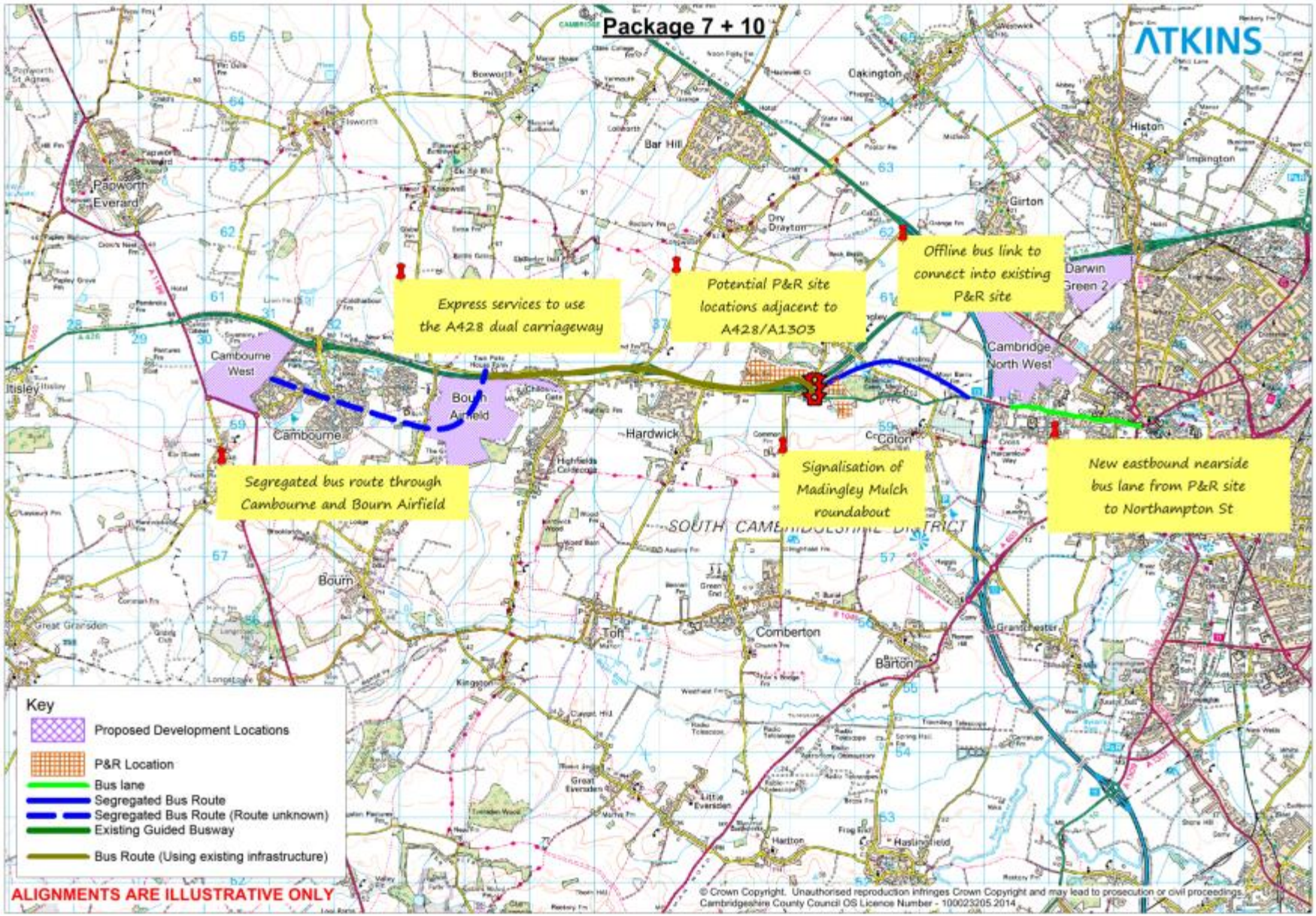
Papworth Everard
Cambourne West
Cambourne
Bourn Airfield
Bar Hill
Oakington
Histon
Impington
Girton
Dry Drayton
Darwin Green 2
Cambridge North West
Hardwick
Coton
Bourn
Toft
Comberton
Barton
Grantchester
Great Eversden
Little Eversden
Hartford
Haslingfield


Package 7 + 10
ATKINS
Express services to use the A428 dual carriageway
Potential P&R site locations adjacent to A428/A1303
Offline bus link to connect into existing P&R site
Segregated bus route through Cambourne and Bourn Airfield
Signalisation of Madingley Mulch roundabout
New eastbound nearside bus lane from P&R site to Northampton St
Cambourne West
Cambourne
Bourn Airfield
Hardwick
Coton
Cambridge North West
Darwin Green 2
Papworth Everard
Bar Hill
Oakington
Girton
Histon
Impington
Bourn
Toft
Comberton
Barton
Grantchester
Great Eversden
Little Eversden
Hardwick
Haslingfield
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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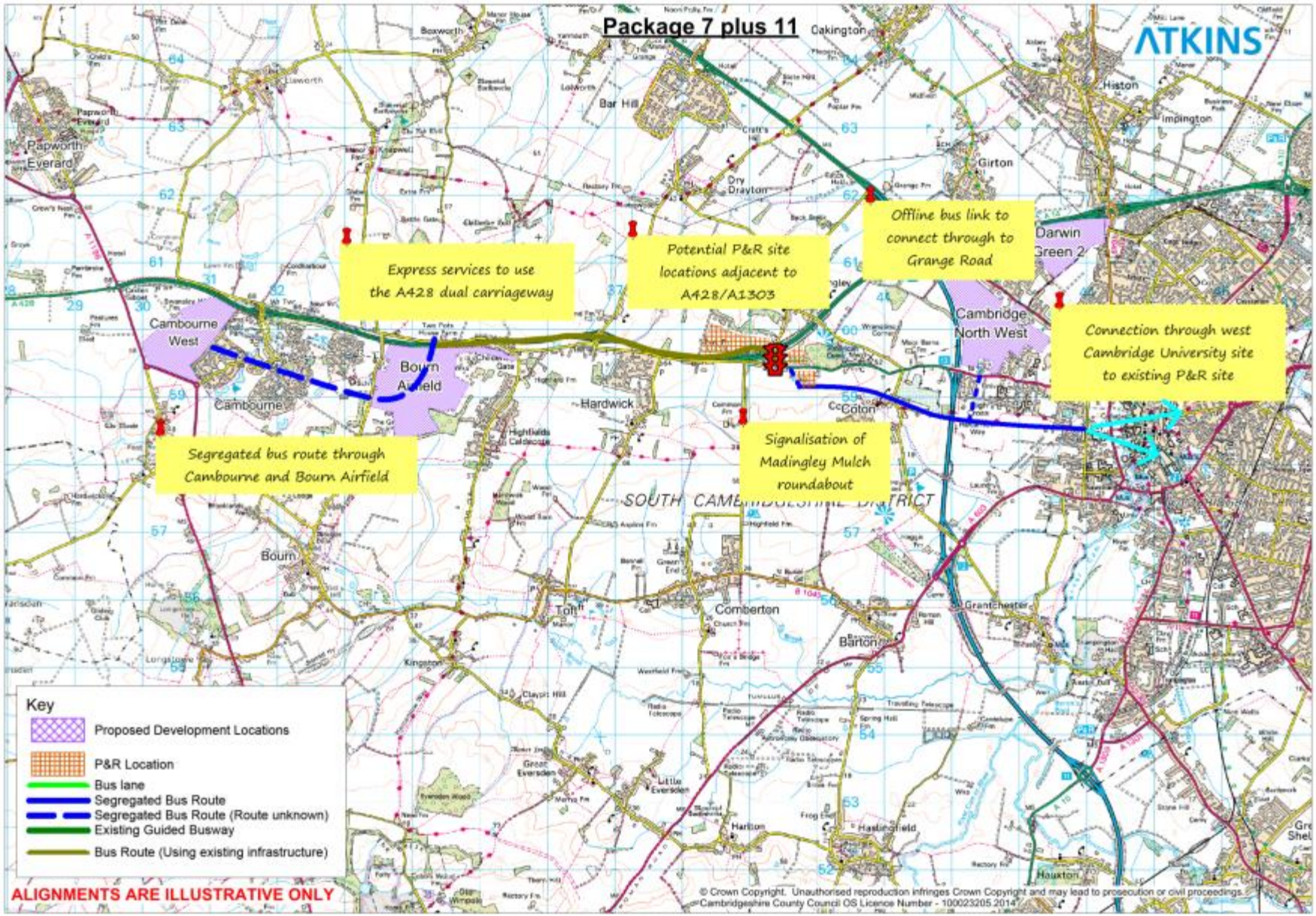
Package 7 plus 11
ATKINS
Express services to use the A428 dual carriageway
Potential P&R site locations adjacent to A428/A1303
Offline bus link to connect through to Grange Road
Connection through west Cambridge University site to existing P&R site
Segregated bus route through Cambourne and Bourn Airfield
Signalisation of Madingley Mulch roundabout
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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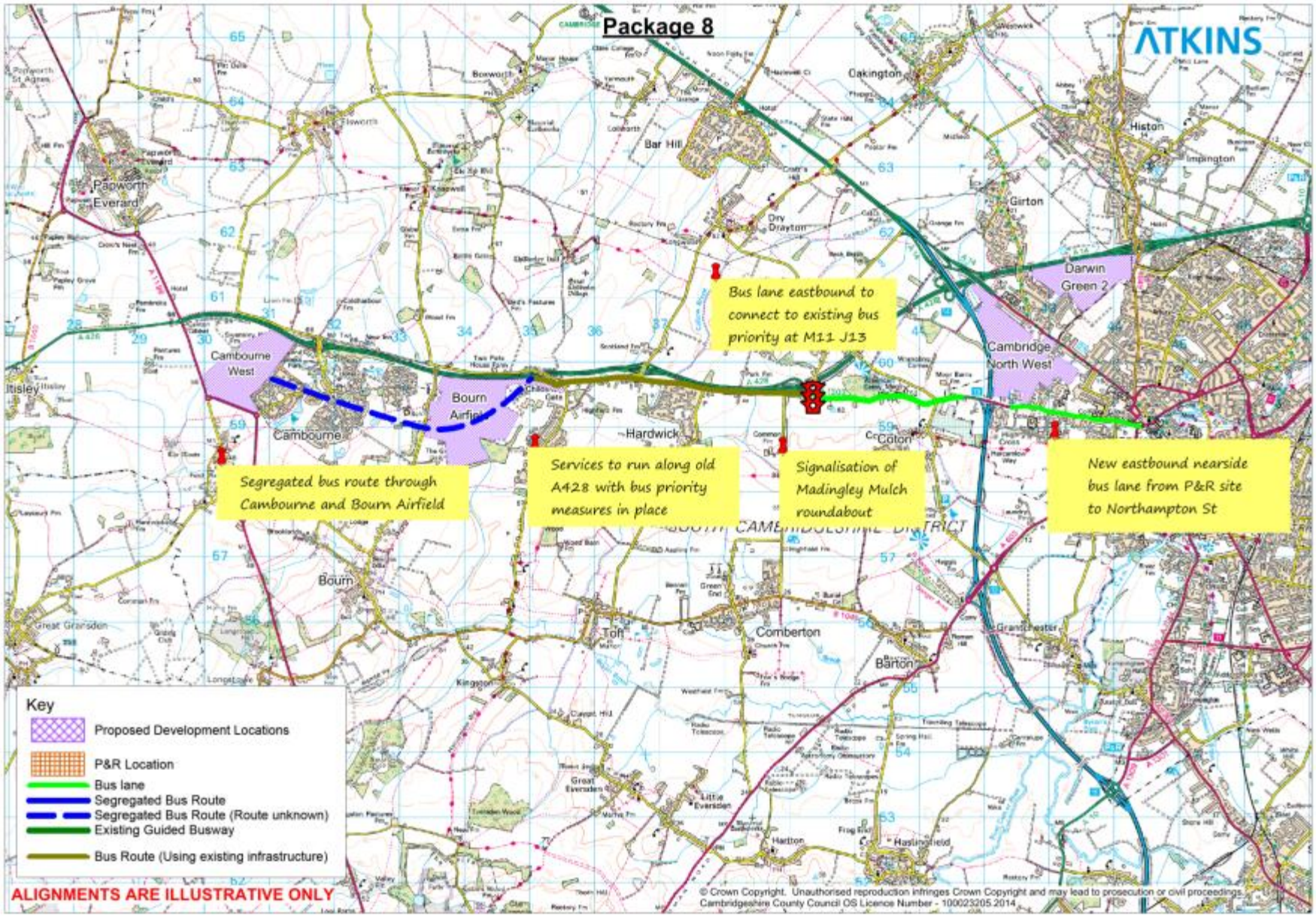
Papworth Everard
Cambourne West
Cambourne
Bourn Airfield
Bourn
Hardwick
Coton
Cambridge North West
Darwin Green 2
Girton
Huston
Impington
Oakington
Boxworth
Bar Hill
Dry Drayton
Comberton
Toft
Barton
Grantchester
Harlton
Haslingfield
Hauxton
Little Eversden
Great Eversden


Package 8
ATKINS
Bus lane eastbound to connect to existing bus priority at M11 J13
Segregated bus route through Cambourne and Bourn Airfield
Services to run along old A428 with bus priority measures in place
Signalisation of Madingley Mulch roundabout
New eastbound nearside bus lane from P&R site to Northampton St
Cambourne West
Bourn Airfield
Cambourne
Hardwick
Coton
Darwin Green 2
Cambridge North West
Oakington
Histon
Impington
Girton
Dry Drayton
Bar Hill
Papworth Everard
Bourn
Toft
Comberton
Barton
Grantchester
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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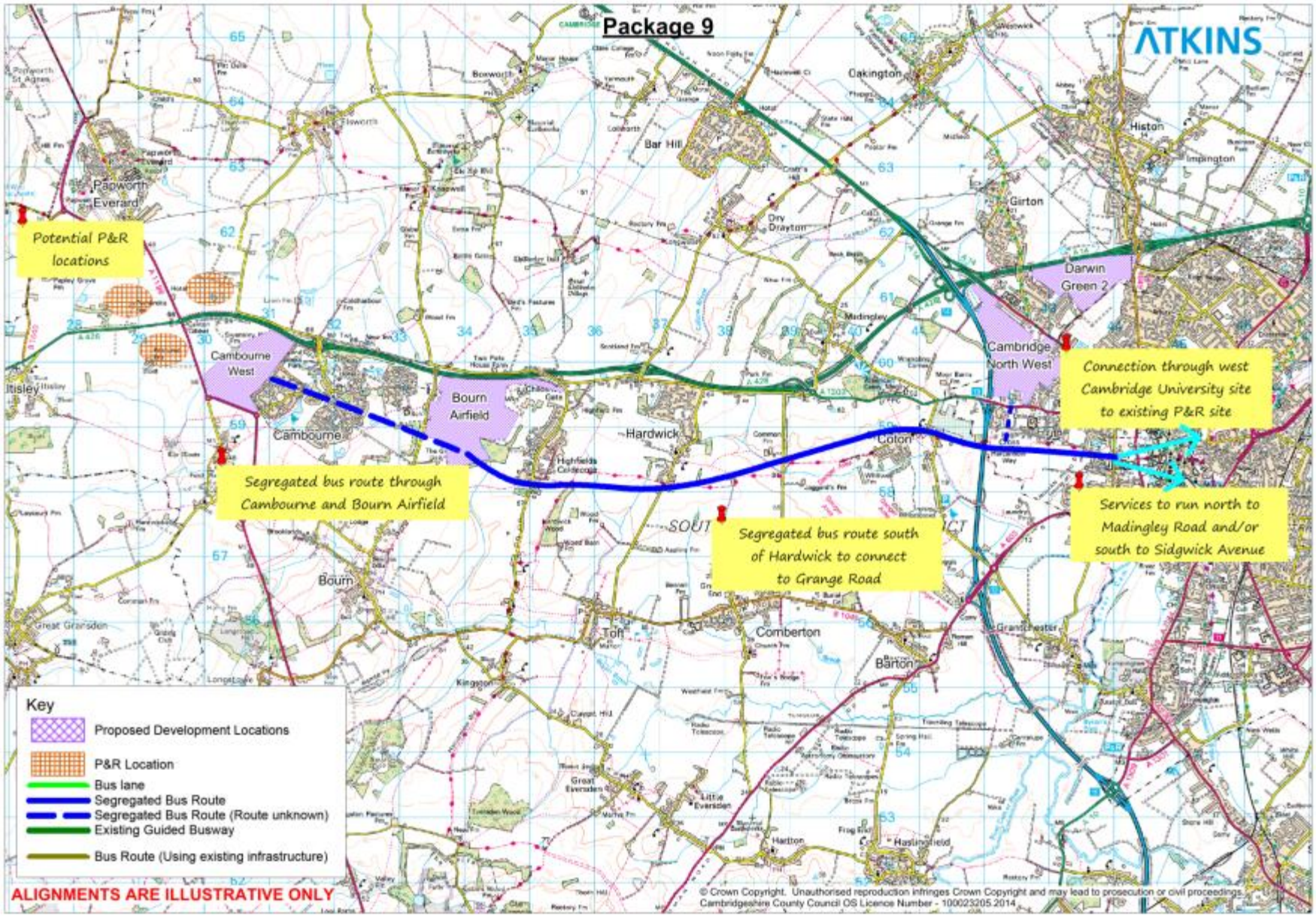
Package 9
ATKINS
Potential P&R locations
Segregated bus route through Cambourne and Bourn Airfield
Segregated bus route south of Hardwick to connect to Grange Road
Connection through west Cambridge University site to existing P&R site
Services to run north to Madingley Road and/or south to Sidgwick Avenue
Papworth Everard
Cambourne West
Cambourne
Bourn Airfield
Bourn
Hardwick
Coton
Bar Hill
Oakington
Histon
Girton
Dry Drayton
Darwin Green 2
Cambridge North West
Madingley
Comberton
Toft
Barton
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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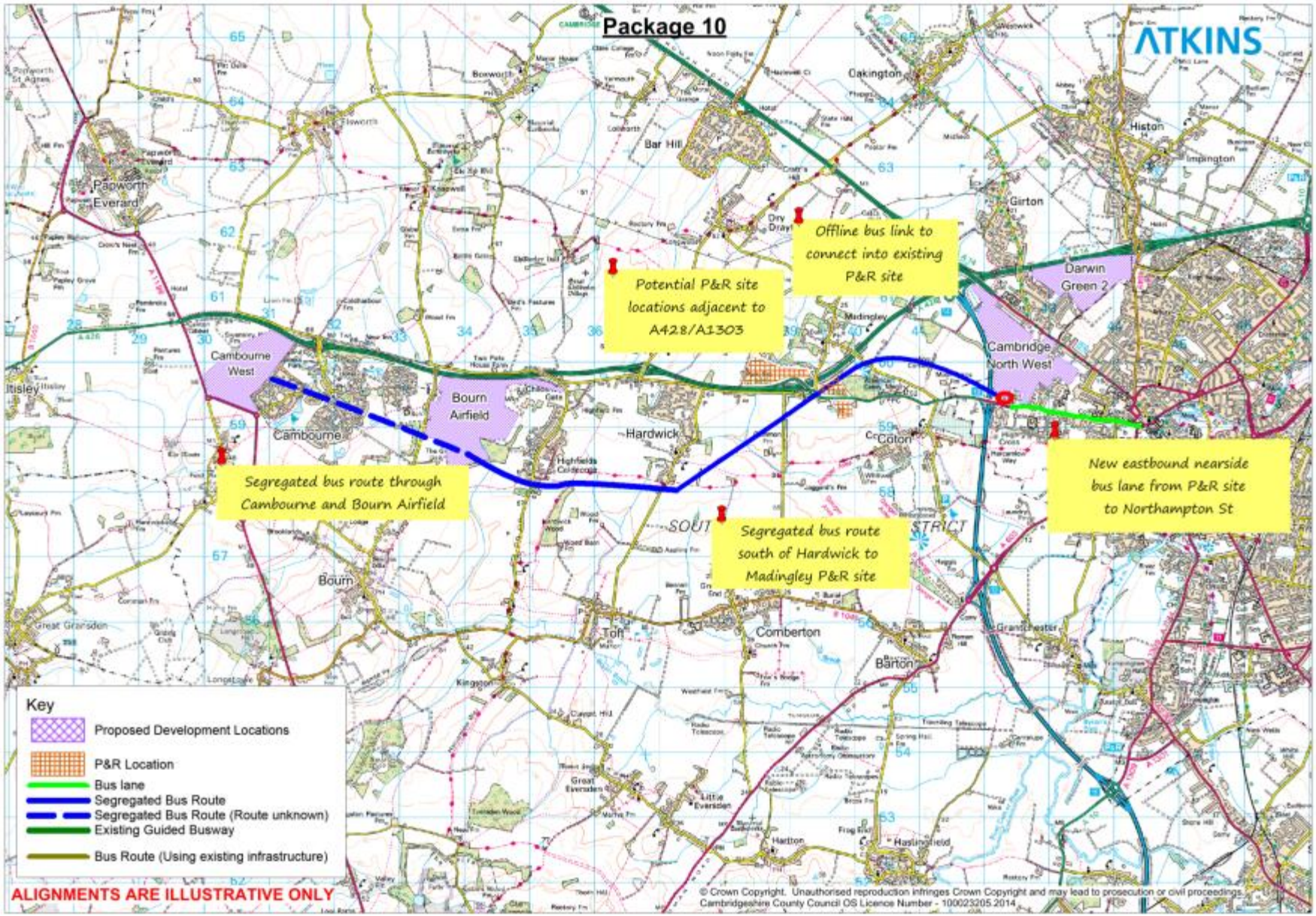
Package 10
ATKINS
Offline bus link to connect into existing P&R site
Potential P&R site locations adjacent to A428/A1303
Segregated bus route through Cambourne and Bourn Airfield
Segregated bus route south of Hardwick to Madingley P&R site
New eastbound nearside bus lane from P&R site to Northampton St
Cambourne West
Bourn Airfield
Cambourne
Hardwick
Coton
Darwin Green 2
Cambridge North West
Girton
Oakington
Histon
Impington
Papworth Everard
Bar Hill
Bourn
Toft
Comberton
Barton
Grantchester
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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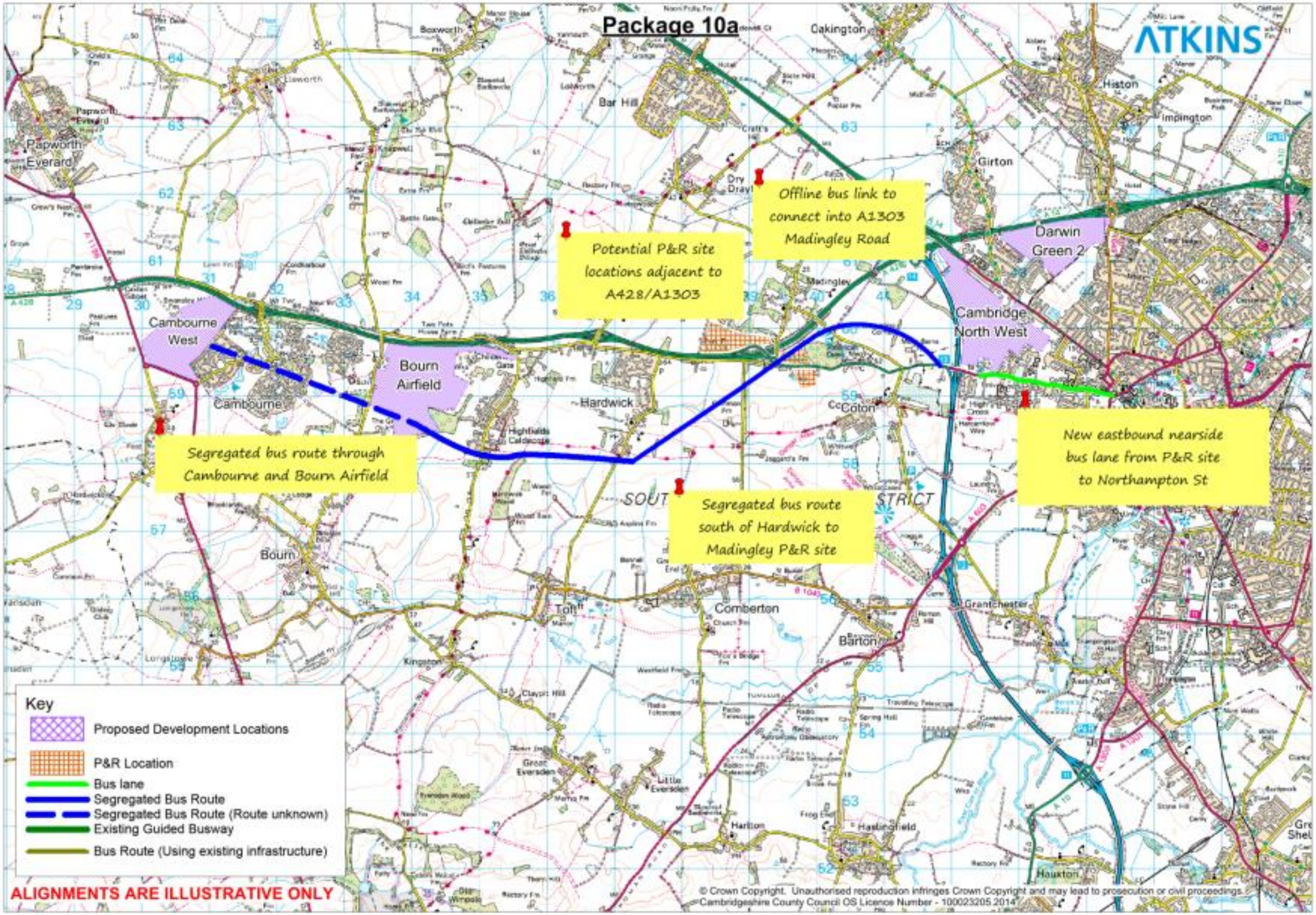
Package 10a
ATKINS
Offline bus link to connect into A1303 Madingley Road
Potential P&R site locations adjacent to A428/A1303
Segregated bus route through Cambourne and Bourn Airfield
Segregated bus route south of Hardwick to Madingley P&R site
New eastbound nearside bus lane from P&R site to Northampton St
Cambourne West
Bourn Airfield
Darwin Green 2
Cambridge North West
Key
Proposed Development Locations
P&R Location
Bus lane
Segregated Bus Route
Segregated Bus Route (Route unknown)
Existing Guided Busway
Bus Route (Using existing infrastructure)
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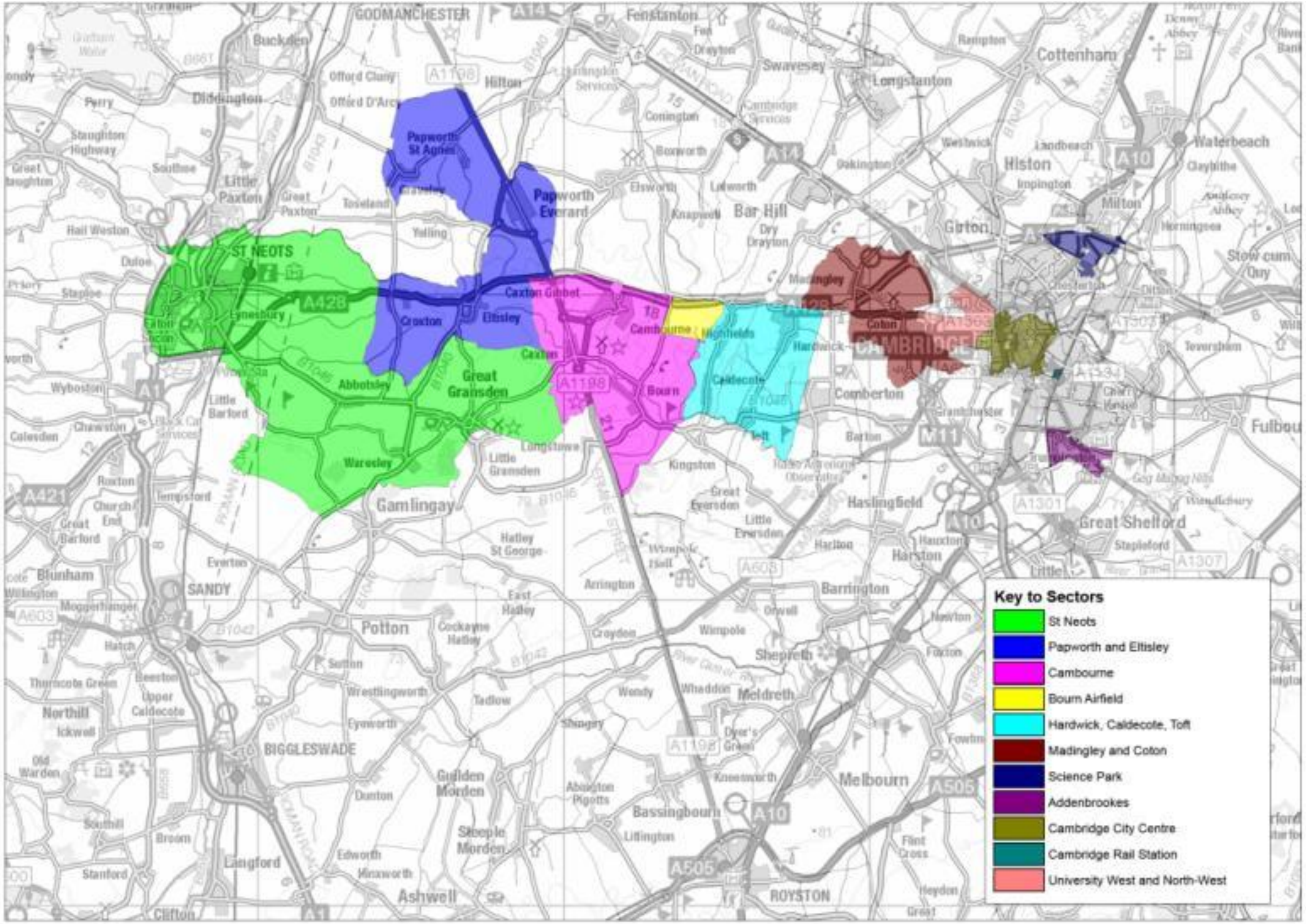
B.2. Sector Map


Key to Sectors
St Neots
Papworth and Eltisley
Cambourne
Bourn Airfield
Hardwick, Caldecote, Toft
Madingley and Coton
Science Park
Addenbrookes
Cambridge City Centre
Cambridge Rail Station
University West and North-West

B.3. Option Sifting Summary Table

	No.	Assessment Criteria	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	5.1	5.2	5.3	6.1	6.2	6.3	7a.1	7a.2	7a.3	7b.1	7b.2	7b.3		8
Planning objectives	1	Congestion free PT serving the corridor (including new developments) in order to avoid an increase in current congestion levels and PT journey times	1	2	2	3	3	2	3	3	4	4	4	3	4	4	5	5	1	2	2	3	3	3	3	3	4	4	4	4	4	4	3	3	3		0
	2	Serves key current/future trip generators in the A428 corridor (west of the M11), including Cambourne and Bourn.	1	2	3	3	4	1	2	3	3	4	4	1	2	3	3	4	1	2	3	3	4	3	3	3	5	5	5	4	4	4	4	4	4		3
	3	Serves key current/future trip attractors in Cambridge - Cambridge City Centre and other	3	3	3	4	4	2	2	2	3	3	3	2	2	2	2	3	3	3	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2		3
	4	Intercept all pt trips in scope including non-car available.	2	3	3	3	3	2	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3	3	3	3	5	5	5	3	3	3	3	3	3		0
	5	End to end journey time reliability better than the car alternative (as yet	1	2	3	3	4	1	2	3	3	4	4	1	2	3	3	4	1	2	3	3	4	2	2	2	3	3	3	2	2	2	1	1	1		3
	6	Engineering feasibility	3	3	2	3	2	4	3	2	3	2	2	4	4	3	4	2	4	3	2	3	2	2	2	2	1	1	1	2	2	2	2	2	2		3
	7	Environment impacts	3	2	1	2	1	3	2	1	2	1	1	3	2	2	1	0	3	2	1	2	1	3	4	3	2	3	2	4	5	4	4	5	4		4
	8	Stakeholder/public acceptance	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5	5	5		3
	9	Bus service commercial viability	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5	1	1	1	3	3	3	2	2			0
	10	Social and distributional impacts	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	2	2	2	5	5	5	3	3	3	4	4	4		3
	11	Cost	4	3	2	3	1	3	2	1	2	0	0	4	4	3	3	1	3	3	1	2	1	4	4	3	0	0	0	4	4	4	4	4	4		4
	12	GHG	2	3	2	4	3	1	2	1	3	2	2	1	2	3	4	3	2	3	2	4	3	3	3	3	5	5	5	4	4	4	4	4	4		0
		Total	29	32	30	37	34	29	31	29	36	33	33	32	36	37	39	36	31	34	31	38	36	36	37	35	37	38	37	40	41	40	38	39	36		26

1 = little/no impact; 3 = moderate impact; 5 = large impact

RAG	Definition:	Cost:
4 or 5	Likely to meet the objective and have a beneficial impact	£ 0-20 million
2 or 3	Likely to achieve some of the objective and have a moderate impact	££ 21-50million
0 or 1	Likely not to achieve the objective and will have little beneficial impact	£££ 50-100million

B.4. Option Descriptions

Option 1

A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. Southern busway route via the old Bedford to Cambridge Rail Line to Trumpington Park and Ride site. The distance between Cambourne and the Trumpington P&R site via this route would be **15.9km**. This would then connect to the existing Cambridgeshire Guided Busway to ultimately serve the rail station and City Centre areas. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre (**2.0km**). This scheme is forecast to offer an average journey time saving of between 4 and 5 minutes per person.

- Distance from Cambourne to Trumpington P&R via new busway = 15.9km
- Length of Madingley Road bus lane improvement (inbound only) = 2.0km
- Average journey time saving per person is between 4 and 5 minutes

Option 2

A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. Central busway route south of Hardwick to connect to M11 J12. On-road service along the M11 to J11 to link to Trumpington Park and Ride site. The distance up to this point would be **11.4km**. This would then connect to the existing Cambridgeshire Guided Busway to ultimately serve the rail station and City Centre areas. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre (**2.0km**). This scheme is forecast to offer an average journey time saving of between 2 and 5 minutes per person.

- Distance from Cambourne to Trumpington P&R via new busway = 11.4km
- Length of Madingley Road bus lane improvement (inbound only) = 2.0km
- Average journey time saving per person is between 2 and 5 minutes

Option 3

A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. Central busway route south of Hardwick and north of Coton, (**10.9km**) to connect to the existing bus priority measures (which would be extended westwards) immediately west of the existing Madingley Road Park and Ride site. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre (**2.0km**). This scheme is forecast to offer an average journey time saving of between 2 and 4 minutes per person.

- Distance from Cambourne to busway junction with A1303 via new busway = 10.9km
- Length of Madingley Road bus lane improvement (inbound only) = 2.0km
- Average journey time saving per person is between 2 and 4 minutes

Option 4

A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. Northern busway route east of Dry Drayton, sharing the existing Dry Drayton over-bridge of the A14. Passing between Oakington and Girton to connect to the existing Cambridgeshire Guided Busway west of Histon to serve the Cambridge Science Park area. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre (**2.0km**). The distance from Cambourne West to Cambridge Science Park would be **19.0 km.** This scheme is forecast to offer an average journey time saving of up to 1 minute per person.

- Distance from Cambourne to Cambridge Science Park via new busway = 19.0km
- Length of Madingley Road bus lane improvement (inbound only) = 2.0km

- Average journey time saving per person is up to 1 minute

Option 5

A Park and Ride site located at near the A428/A1303 junction (Madingley Mulch roundabout) would feed into an online nearside eastbound bus lane along Madingley Rise to connect to the existing bus priority measures immediately west of the existing Madingley Road Park and Ride site. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre. Signalisation of Madingley Mulch roundabout to manage traffic congestion. The overall distance of these 2 bus lanes would be **4.4 km.** This scheme is forecast to offer an average journey time saving of between 3 and 10 minutes per person.

- Length of bus lane improvement (inbound only) = 4.4km
- Average journey time saving per person is between 3 and 10 minutes

Option 6

A Park and Ride site located to the east of St Neots. An eastbound nearside bus lane along the A428 allied to highway and bus priority improvements on the approach to Caxton Gibbet. A nearside eastbound bus lane along Madingley Rise to connect to the existing bus priority measures immediately west of the existing Madingley Road Park and Ride site. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre. Signalisation of Madingley Mulch roundabout to manage traffic congestion. The distance of both the bus lanes is **16.6** km. This scheme is forecast to offer an average journey time saving of between 4 and 9 minutes per person.

- Length of bus lane improvement (inbound only) = 16.6km
- Average journey time saving per person is between 4 and 9 minutes

Option 7

A bus service would run on a segregated route through Cambourne and Bourn Airfield before joining the A428 (it is assumed that this junction onto the A428 would be provided as part of the Bourn Airfield development) through to the A428/A1303 junction (Madingley Mulch roundabout) which would be signalised to provide bus priority. An online nearside eastbound bus lane would be provided along both Madingley Rise and Madingley Road, utilising the existing bus priority measures at M11 J13 and would provide bus priority into Cambridge. The distance of the bus route from Cambourne West via Bourn Airfield to the A428 **and** the 2 bus lanes is **8.9 km.** This scheme is forecast to offer an average journey time saving of 6 minutes per person.

- Length of improvements through Cambourne/Bourn Airfield = 4.5km
- Length of bus lane improvements (inbound only) = 4.4km
- Average journey time saving per person is 6 minutes

Option 8

A bus service would run on a segregated route through Cambourne and Bourn Airfield (**4.5 km**) before joining St Neots Road through to the A428/A1303 junction (Madingley Mulch roundabout) which would be signalised to provide bus priority. An online nearside eastbound bus lane would be provided along both Madingley Rise and Madingley Road, utilising the existing bus priority measures at M11 J13 to provide bus priority in to Cambridge (**4.4km**). This scheme is forecast to offer an average journey time saving of 4 minutes per person.

- Length of improvements through Cambourne/Bourn Airfield = 4.5km
- Length of bus lane improvements (inbound only) = 4.4km
- Average journey time saving per person is 4 minutes

Option 9

Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. An offline busway would run south of Hardwick and north of Coton, continuing over the M11 on approximately the alignment of the Coton Footpath. An on-road connection can be provided through the West Cambridge University site to access the existing Park and Ride Site on Madingley Road. The busway would continue south of the West Cambridge University site to connect to Grange Road. Services could then run on road either north to Madingley Road or south to Sidgwick Avenue to access the City Centre. The distance between Cambourne West and the West Cambridge University site is **15.6 km.** This scheme is forecast to offer an average journey time saving of between 2 and 4 minutes per person.

- Distance from Cambourne to West Cambridge University Site via new busway = 15.6km
- Average journey time saving per person is between 2 and 4 minutes

Option 10

A segregated bus route would run through/around Cambourne and Bourn Airfield with stops at each. Central busway route south of Hardwick then heading north to a Park and Ride site located at near the A428/A1303 junction. An offline busway then continues north crossing Cambridge Road and the M11 to connect in to the existing Park and Ride site on Madingley Road. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre. The distance between Cambourne West and Cambridge North West is **12.3 km.** This scheme is forecast to offer an average journey time saving of between 4 and 7 minutes per person.

- Distance from Cambourne to Cambridge North West via new busway = 12.3km
- Average journey time saving per person is between 4 and 7 minutes

Option 11

A Park and Ride site located at near the A428/A1303 junction would feed into an offline busway running between Coton and Madingley Rise, across the M11 and south of the West Cambridge University site to connect to Grange Road. A connection can be provided through the West Cambridge University site to access the existing Park and Ride Site on Madingley Road. Services could then run either north via Madingley Road or south via Sidgwick Avenue to access the City Centre. The distance between Coton and the West Cambridge University Site is **4.7km**. This scheme is forecast to offer an average journey time saving of between 3 and 8 minutes per person.

- Distance from Coton to West Cambridge University Site via new busway = 4.7km
- Average journey time saving per person is between 3 and 8 minutes

Option 12

A new single carriageway highway link would connect the A428/A1303 junction with M11 Junction 12, routing to the west of Coton and connecting on the alignment of the existing overbridge from M11 Junction 12 to Coton. There is the option to close M11 Junction 13.

Option 7 plus 11

A bus service would run on a segregated route through Cambourne and Bourn Airfield before joining the A428 (it is assumed that this junction onto the A428 would be provided as part of the Bourn Airfield development) through to the A428/A1303 junction (Madingley Mulch roundabout) which would be signalised to provide bus priority. A Park and Ride site located at near the A428/A1303 junction would feed into an offline busway running between Coton and Madingley Rise, across the M11 and south of the West

Cambridge University site to connect to Grange Road. A connection can be provided through the West Cambridge University site to access the existing Park and Ride Site on Madingley Road. Services could then run either north via Madingley Road or south via Sidgwick Avenue to access the City Centre. The distance between Coton and the West Cambridge University Site is **4.7km** with the length of improvement through Cambourne and Bourne Airfield being **4.5km**.

- Length of improvements through Cambourne/Bourn Airfield = 4.5km
- Distance from Coton to West Cambridge University Site via new busway = 4.7km

Appendix C. Engineering and Modelling Input

C.1. Engineering Input

Cost Information

£1.02 million + 15%=> Per km of New Route

£0.832 million + 15%=> Per km of Single Lane Widening

£0.937 million + 15%=> Per km of Bus Priority Facilities

Park and Ride => £3.2 million

Signalised Roundabout =>£4.9 million

Timescale Information

Existing Cambridge Guided Bus= 25km over 3 years= 8.3km/year

(A40 Daff Y Nant) Minor Structure= 8 weeks (2 months)

Major Structure= 6 months

(M96 Thorley) M11 Bridge= 11 months

Minor Junction= 12 weeks (3 months)

(A1 Blackcat Roundabout) Major Junction= 7 months

New Signals= 12 weeks (3 months)

Signalised Roundabout= 16 weeks (4 months)

Information produced using Highways Agency Area 8 Website. (Not taking into account stats.)

Package 1	**Methodology**
Cost	Developer Land: [(3.7x1.02)+(3.7x0.937)]x1.15 = £8.33million Offline Route: [(13.15x1.02)+(13.15x0.937)]x1.15 = £29.6million Madingley: [(2.1x0.832)x(2.1x0.937)]x1.15 = £4.3million Park and Ride = £3.2million M11 Bridge = £22million to £45million **Estimated Cost = £90.43 million**
Land Take	Offline Route: 18.5mx13.15km = 234,275 m2 Madingley: 2.1kmx8m =16,800 m2 Park and Ride: 80,000 m2

	Estimated Land Take 341,000m^2
Timescale	**Max** Offline Route: 24months Major and minor structures/junctions (concurrent working): 10months **Min** Concurrent offline route, structures and junctions: 24months **Estimated Maximum Timescale: 35 months** **Estimated Concurrent Methods Timescale: 24months**

Package 2	**Methodology**
Cost	Developer Land = £8.33million Offline Route: [(8.46x1.02)+(8.46x0.937)]x1.15 = £19.04million Madingley = £4.3million Park and Ride = £3.2million **Estimated Cost = £34.87million**
Land Take	Offline Route: 18.5mx8.46km =156,510 m2 Madingley: 16,800 m2 Park and Ride: 80,000 m2 **Estimated Land Take = 254,000m^2**
Timescale	**Max** Offline Route: 18months Minor and major junctions/structures (concurrent working): 14months **Min** Concurrent offline route, structures and junctions: 14months **Estimated Maximum Timescale: 32 months** **Estimated Concurrent Methods Timescale: 14months**

Package 3	Methodology
Cost	Developer Land = £8.33 million Offline Route: [(8.31x1.02)+(8.31x0.938)]x1.15 = £18.7million Madingley: 4.3+(0.41x1.769)x1.15 = £5.11million Park and Ride: £3.2million **Estimated Cost = £35.34million**
Land Take	Offline route: 8.31kmx18.5m = 153,736m2 Madingley: 16,888m2 Park and Ride: 80,000m2 **Estimated Land Take = 237,000m^2**
Timescale	**Max** Offline route: 9months Minor structures: 4months Major junctions: 21 months Minor junctions: 3 months **Min** Concurrent offline, structures and junctions: 21months **Estimated Maximum Timescale: 37 months** **Estimated Concurrent Methods Timescale: 21months**

Package 4	Methodology
Cost	Developer Land: [(4.85x1.02)+(4.85x0.937)]x1.15 = £10.9million New Junction over A428 = £15million to £23million Offline Route: [(10.1x1.02)+(10.1x0.937)]x1.15 = £22.73million Madingley: £4.3million Park and Ride: £ 3.2million Estimated Cost = **£64.13million**

Land Take	Offline Route: 18.5mx10.1km = 186,850m2 Madingley: 16,8000m2 Park and Ride: 80,000m2 **Estimated Lane Take = 284,000m^2**
Times **scale**	**Max** Offline built concurrent with: Minor structures: 14months Minor junctions: 9 months Major junctions: 14 months **Min** Offline and minor structures built concurrent with: Major junction: 14months Minor junction: 9months **Estimated Maximum Timescale: 37 months** **Estimated Concurrent Methods Timescale: 23months**

Package 5	**Methodology**
Cost	Park and Ride: £7million Widening: [(4.8x0.832)+(4.8x0.937)] x1.15 = £9.8million Signalised Roundabout:: £4.9million **Estimated Cost = £21.7million**
Land Take	Park and Ride: 120,000m2 Widening: 8mx4.8km = 38,400m2 **Estimated Land Take = 160,000m^2**
Timescale	**Max** Major junction: 7 months Signalised Roundabout: 3 months Online route with upgrade of existing junctions: 9months

	Min Signalisation of roundabout with new major junction: 7months Online route with upgrade of existing junctions: 9months **Estimated Maximum Timescale: 19 months** **Estimated Concurrent Methods Timescale: 16months**

Package 6	**Methodology**
Cost	Single Lane Widening: [(12.03x0.832) + (12.03x0.937)]x1.15 = £24.5million Double Lane Widening: [(1.4x2)+(0.937x0.832)]x1.15 = £5.7million Park and Ride: £3.2million Signalised Roundabout: £4.9million **Estimated Costs = £38.3million**
Land Take	Single Lane Widening: 8mx12.03km = 96,240m2 Double Lane Widening: 28kmx8m = 22,400m2 Park and Ride = 80,000m2 **Estimated Land Take = 200,000m^2**
Timescale	**Max** New Signalised roundabout : 3 months Upgrade Existing Junction: 12 months Major Highway Caxton Gibbet: 7 months Structures: 12 months **Min** Concurrent construction with: Upgrade of existing junction:12months Structures: 12months **Estimated Maximum Timescale: 34 months** **Estimated Concurrent Methods Timescale: 24months**

Package 7	Methodology
Cost	Signalised Roundabout: £4.9million Widening Madingley: £9.8million Developer Land: [(4.2x1.02)+(4.2x0.937)]x1.15 = £9.45 million New Junction A428: £15million to 23million **Estimated Cost = £47.15million**
Land Take	Madingley Widening: 38,400m2 **Estimated Land Take = 40,000m^2**
Timescale	**Max** New signalised roundabout : 3 months New bridge: 6months Offline and online: 9months **Min** New signalised roundabout: 3months New bridge: 6months Concurrent construction of offline and online: 4months **Estimated Maximum Timescale: 18 months** **Estimated Concurrent Methods Timescale: 13 months**

Package 8	Methodology
Cost	Developer Land: [(4.3x1.02)+(4.3x0.937)]x1.15 = £9.7million Widening Madingley: £9.8million Signalisation of Roundabout: £4.9million Bus Priority along old A428: (4.6x0.937)x1.15 = £5million **Estimated Cost = £29.4million**
Land Take	Madingley Widening: 38.400m2 **Estimated Land Take = 40,000m^2**

Timescale	**Max** New signal roundabout: 4 months Minor junction: 3 months New signals: 3 months Upgrade existing junction: 3 months Offline and online route: 9months Restricted working: 4months **Min** New signalised roundabout: 4months New signals: 3months Upgrade existing junction: 3months Concurrent workingof offline, online and minor junctions: 5months **Estimated Maximum Timescale: 26 months** **Estimated Concurrent Methods Timescale: 15 months**

Package 9	**Methodology**
Cost	Developer Land: £8.33million Offline Route:[(10.9x1.02)+(10.9x0.937)]x1.15 = £24.53million Park and Ride: £3.2million M11 Bridge: £22 million to 45million **Estimated Cost = £81.06million**
Land Take	Offline Route: 18.5x10.9 = 201,650m2 Park and Ride: 80,000m2 **Estimated Land Take = 282,000m^2**
Timescale	**Max** Concurrent construction of offline with: Major and minor structures/junctions: 28 months New Bridge: 11 months **Min**

	Concurrent construction of offline with: New bridge with major junctions: 11months Minor junction: 3months Minor structures: 8months **Estimated Maximum Timescale: 39 months** **Estimated Concurrent Methods Timescale: 22 months**

Package 10	**Methodology**
Cost	Developer Land: £8.33million Offline Route: [(9.5x1.02)+(9.5x0.937)]x1.15 = £21.4million Park and Ride: £7million M11 Bridge: £22million to 45million **Estimated Cost = £81.73million**
Land Take	Offline Route: 18.5x9.5 = 175,750 m2 Park and Ride: 120,000m2 **Estimated Land Take = 296,000m^2**
Timescale	**Max** Concurrent construction of offline and online with: Major and minor structures/junctions: 28 months New Bridge: 11 months **Min** Concurrent construction of offline and online with: New M11 bridge and major junctions: 11months Minor junctions: 6months Minor structures: 8months **Estimated Maximum Timescale: 39 months** **Estimated Concurrent Methods Timescale: 25 months**

Package 11	Methodology
Cost	Park and Ride: £7million Offline Route: [(4.92x1.02)+(4.92x0.937)]x1.15 = £11.1million Optional Route:[(1x1.02)+(1x0.937)]x1.15 = £2.25million M11 Bridge: £22million to 45million **Estimated Cost = £65.35million**
Land Take	Park and Ride: 120,000m2 Offline Route: 4.92x18.5 = 91,020m2 Optional Route: 18,500m2 **Estimated Lane Take = 230,000m^2**
Timescale	**Max** Concurrent construction of offline with: Major junctions: 21 months New Bridge: 11 months **Min** Concurrent construction and phasing of work: Major junctions: 11months New bridge: 11months **Estimated Maximum Timescale: 32 months** **Estimated Concurrent Methods Timescale: 22 months**

Package 12	Methodology
Cost	Offline Route: 3x1.02x1.15 = £3.6million Junction Upgrades: £1million Closing Slip Roads: £16.6million **Estimated Cost = £21.2million**

Land Take	16.5mx3km = 49,500m2 **Estimated Land Take = 50,000m^2**
Timescale	**Max** Offline Route: 4.5months Major and minor junctions: 8month Minor structure: 1month Closure of slips: 8months **Min** Concurrent construction of route with: Major and minor junctions: 8month Minor structure: 1month Closure of slips: 8months **Estimated Maximum Timescale: 21.5months** **Estimated Concurrent Methods Timescale: 15months**

C.2. Modelling Input

Table C-1 Forecast Demand in Scope by 2031 per Option

Option Number	1	2	3	4	5	6	7	8	9	10	11
AM Peak Period Demand in Scope (3 hours)	4,400	5,200	6,100	4,800	1,800	3,100	2,600	3,800	6,100	3,400	2,400
PM Peak Period Demand in Scope (3 hours)	3,800	4,700	7,000	4,000	900	2,300	2,100	4,200	7,000	3,400	2,700
AM + PM Demand in Scope (6 hours)	8,200	9,900	13,100	8,800	2,700	5,400	4,700	8,000	13,100	6,800	5,100

Table C-14 Forecast Indicative Mode Share in 2031 per Option

Option Number	1	2	3	4	5	6	7	8	9	10	11
Indicative Mode Share (AM Peak Period – 3 hours)	28%	25%	23%	24%	46%	30%	40%	32%	23%	34%	44%
Indicative Mode Share (PM Peak Period – 3 hours)	13%	12%	16%	11%	25%	17%	31%	22%	16%	26%	31%

Table C-2 2031 Average Forecast Journey Time Savings and Demand Benefits per Option

Metric	Optn 1	Optn 2	Optn 3	Optn 4	Optn 5	Optn 6	Optn 7	Optn 8	Optn 9	Optn 10	Optn 11
2031 Average User Demand Weighted DM Journey Time - AM (mins per person)	33	50	35	32	32	36	33	32	34	31	31
2031 Average User Demand Weighted DS Journey Time - AM (mins per person)	28	45	33	31	22	27	27	28	30	25	23
2031 AM Average Journey Time Benefit Per Person (mins)	**5**	**5**	**2**	**1**	**10**	**9**	**6**	**4**	**4**	**7**	**8**
2031 Average User Demand Weighted DM Journey Time - PM (mins per person)	42	38	24	-	24	25	25	21	23	24	26
2031 Average User Demand Weighted DS Journey Time - PM (mins per person)	37	36	20	-	22	21	19	17	21	21	22

Metric	Optn 1	Optn 2	Optn 3	Optn 4	Optn 5	Optn 6	Optn 7	Optn 8	Optn 9	Optn 10	Optn 11
2031 PM Average Journey Time Benefit Per Person (mins)	**4**	**2**	**4**	**-**	**3**	**4**	**6**	**4**	**2**	**4**	**4**
2031 Indicative PT Demand Receiving Benefit AM 3 hours (person demand)	360	120	680	780	780	680	750	780	670	810	910
2031 Indicative PT Demand Receiving Benefit PM 3 hours (person demand)	30	40	<10	-	210	150	320	40	190	510	740
Person Hour Saving - AM	30	11	27	11	130	103	78	57	41	92	124
Person Hour Saving - PM	2	1	<1	-	9	9	34	3	7	30	43
Person Hour Saving - AM plus PM	***32***	***12***	***27***	***11***	***139***	***111***	***112***	***59***	***47***	***122***	***167***

Appendix D. Options Appraisal

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A428 Corridor Study – Options Appraisal

Meeting #3

13 June 2014

Plan Design Enable

Agenda

1. Introductions
2. Review of progress to date
3. Appraisal methodology – demand analysis, modelling, AST
4. Recommendations
5. Next steps
6. AOB

Progress review

- SWOT analysis
- Identified problems and challenges
- Confirmed planning objectives
- Identified options
- Initial sift (meeting 2)
- Agreed options for assessment
- Defined 11 packages & link road in more detail
- Assessed packages

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Demand Forecasts: What does the model do?

- Cambridge Sub Region Model (CSRM) is a Land use/Transport Interaction model
- The land use model helps predicts the take up of residential dwellings and commercial floorspace
- The transport demand model examines mode, travel time and the destination choice
- The assignment model (highway separate from PT) routes trips through the network on minimum cost routes
- Taking complex relationships, places them in a framework that iterates to high level of convergence

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Demand Forecasts: What does the model tell us?

- Model covers a wider area than just A428
- Forecasts are based on 2031 with appropriate S.Cambs and Cambridge City Local Plan Allocations
- A14 Upgrade from 2021 (tolled HSB)
- Notable large developments:
  - Cambridge NW & Darwin Green
  - Bourn Airfield and Cambourne West
  - St Neots

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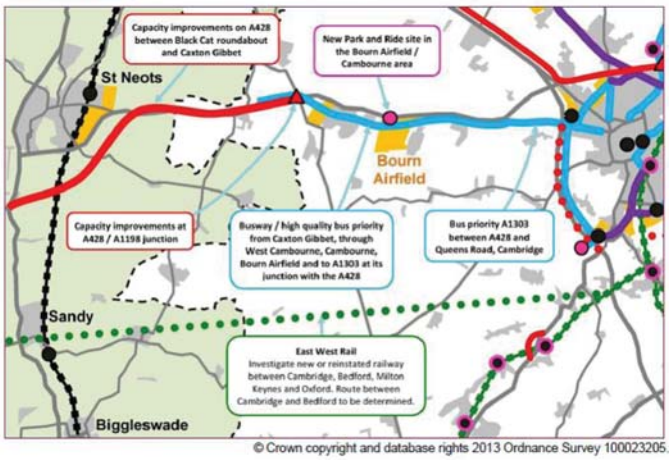
DM and DS Local Plan Long Term Transport Strategy assumptions

Figure 5.15. Major interventions in the corridor



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Prevailing Model Conditions of relevance to A428

- M11 on west side of Cambridge will be chronically congested (caused by background growth, local development pressures, A14 upgrade)
- Bourn Airfield and Cambourne have significant jobs (4,500) which leads to substantial local internalisation.
- Bourn Airfield housing growth struggles to materialise with only 85% household/dwelling ratio (the lowest target value set in the model).
- Households that do form are biased towards “employed adult” / high car ownership with very little unemployment or retired HH.

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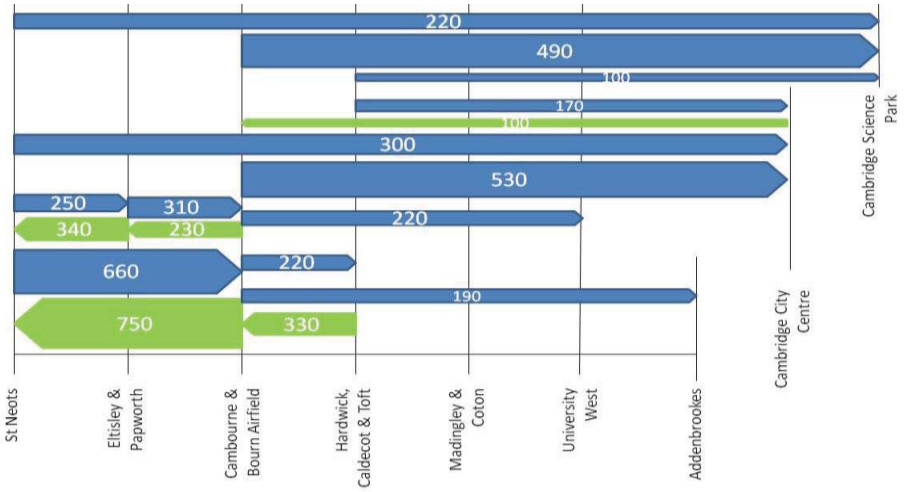
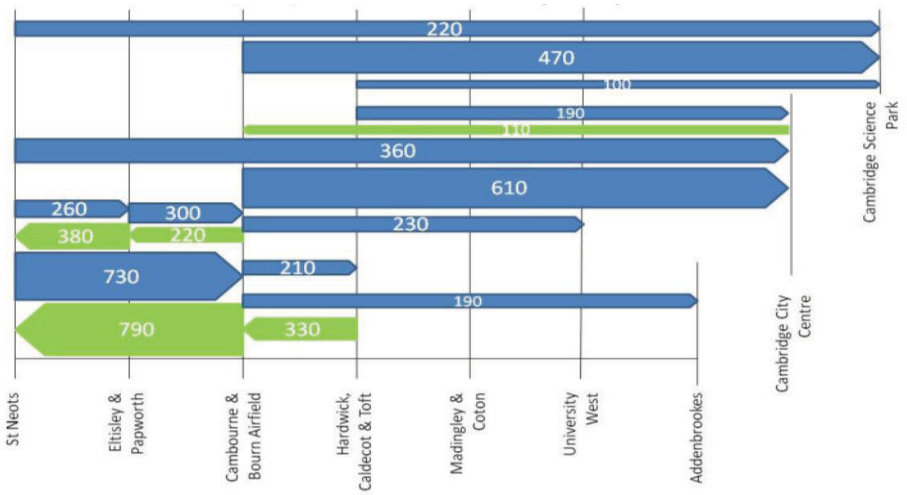
Analysis of demand

AM 3 hours, 2031 Scenario K DM, Without Transport Improvements



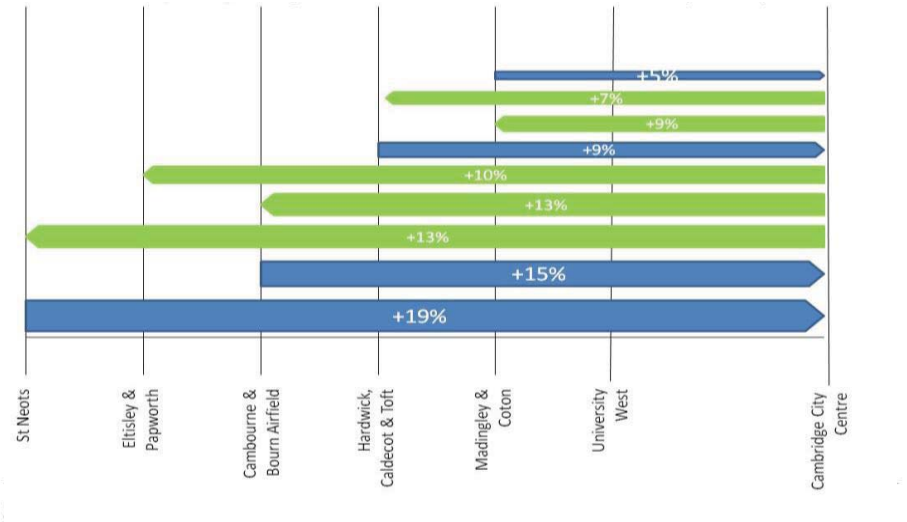
Analysis of demand

AM 3 hours, 2031 Scenario K DS, With Transport Improvements

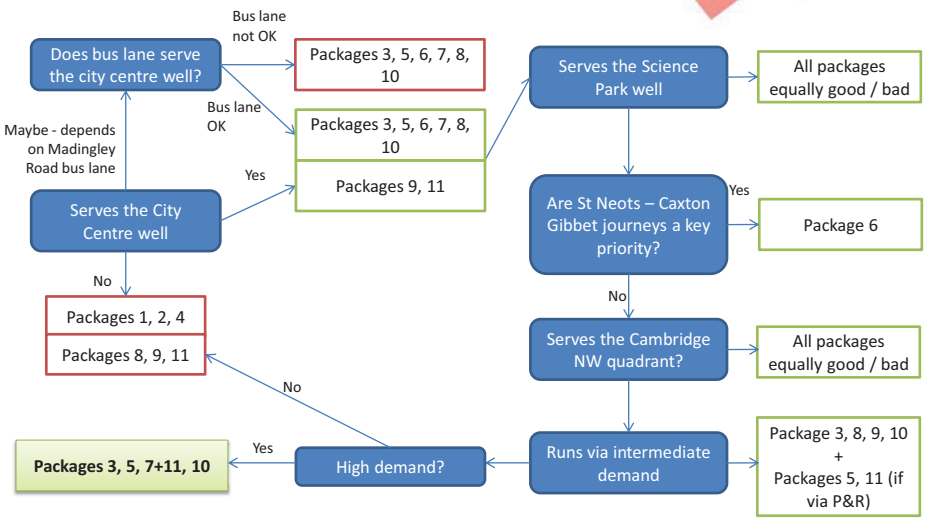


Demand analysis

AM 3 hours, 2031, change from DM to DS Scenario K



Package selection – demand based



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Process for completing the AST

- Rationale:
  - Does it provide congestion free PT in the corridor?
  - Does it service key trip generators and attractors?
- Deliverability:
  - Engineering feasibility
  - Stakeholder acceptability
  - Environmental impact
  - Affordability

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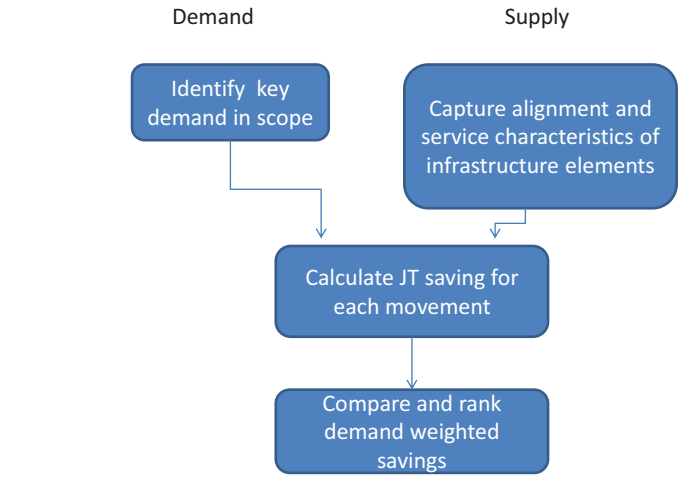
Process for completing the AST – Modelling



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Summary of Packages

Assessment Criteria	Sub-criteria	Package 1	2	3	4	5	6	7	8	9	10	11	12
Rationale	Congestion free PT serving the corridor												
	Serves key trip generators and attractors												
Deliverability	Engineering feasibility												
	Stakeholder acceptability												
	Environmental impacts												
	Commercial viability												N/A
	Affordability												
Benefits / Impacts	Journey's in scope												N/A
	Journey time savings over car												N/A
	Mode share												N/A

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Recommendations

- Based on the methodology used we recommend the following packages are taken forward for detailed assessment under Phase 2:
  - Package 3 – Busway, links to A1303 north east of Coton, inbound bus priority
  - Package 5 – P&R at Madingley Mulch, inbound bus priority
  - Package 7+11 – on road (A428) bus, Madingley Mulch P&R, off line busway to Grange Road
  - Package 10 – Busway, linking to A1303 at M11, inbound bus priority

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Recommended Packages – Summary

Package 3:

Pros
- Segregated bus route Cambourne and Bourn Airfield will lead to JT savings
- P&R at Caxton Gibbet removes some of the Cambridge bound traffic from the A428.
- No new M11 bridge required

Cons
- Close to a SSSI site
- Inbound bus lanes will only benefit AM peak bus journeys and will not address PM peak congestion.
- Only partially addresses the public transport needs of areas west of Caxton Gibbet (i.e. St Neots).
- High green field construction

Package 5:

Pros
- P&R capacity increased
- Makes best use of existing infrastructure at a relatively low cost
- Efficient at intercepting majority demand
- Efficient at providing PT priority on links of most acute congestion

Cons
- Does not provide direct PT links to/from Cambourne, Bourn Airfield or St Neots.
- Inbound bus lanes will only benefit AM peak bus journeys and will not address PM peak congestion.
- Relies on P&R to provide accessibility to PT service

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Recommended Packages – Summary

Packages 7+11:

Pros
- Efficient at intercepting demand from Cambourne and Bourn Airfield
- P&R capacity enhancements

Cons
- New M11 overbridge required
- New A428 overbridge required at Bourn Airfield if new junction not provided by developer
- No service facility to Addenbrookes or the Science Park
- High level of green field construction needed

Package 10:

Pros
- No M11 bridge required
- P&R capacity enhancements
- P&R location tailored to meet maximum PT delays
- Efficient at intercepting demand from Cambourne and Bourn Airfield

Cons
- Significant green field construction
- Does not provide direct PT links to/from Cambourne, Bourn Airfield or St Neots

Benefits / Impacts

Metric	1	2	3	4	5	6	7	8	9	10	11
2031 Demand in Scope AM 3 hours (person demand)	4,400	5,200	6,100	4,800	1,800	3,100	2,600	3,800	6,100	3,400	2,400
2031 Demand in Scope PM 3 hours (person demand)	3,800	4,700	7,000	4,000	900	2,300	2,100	4,200	7,000	3,400	2,700
2031 Average User Demand Weighted DM Journey Time - AM (mins per person)	33.0	49.8	34.8	32.4	32.4	36.0	33.3	32.4	34.1	31.4	31.3
2031 Average Demand Weighted DS Journey Time - AM (mins per person)	28.0	44.5	32.5	31.5	22.4	27.0	27.0	28.0	30.4	24.6	23.1
2031 AM Journey Time Benefit Per Person (mins)	- 5.0	- 5.3	- 2.4	- 0.9	- 10.0	- 9.1	- 6.3	- 4.3	- 3.6	- 6.8	- 8.2
2031 Average Demand Weighted DM Journey Time - PM (mins per person)	41.7	37.7	23.9	-	24.2	24.9	24.9	20.6	23.3	24.3	25.5
2031 Average Demand Weighted DS Journey Time - PM (mins per person)	37.4	35.9	19.9	-	21.5	21.4	18.5	16.9	21.2	20.8	22.0
2031 PM Journey Time Benefit Per Person (mins)	- 4.2	- 1.8	- 4.0	-	- 2.7	- 3.5	- 6.3	- 3.7	- 2.1	- 3.5	- 3.5
2031 Indicative PT Mode Share AM (assuming no mode shift due to measures)	28%	25%	23%	24%	46%	30%	40%	32%	23%	34%	44%
2031 Indicative PT Mode Share PM (assuming no mode shift due to measures)	13%	12%	16%	11%	25%	17%	31%	22%	16%	26%	31%
2031 Indicative PT Demand Receiving Benefit AM 3 hours (person demand)	360	120	680	780	780	680	750	780	670	810	910
2031 Indicative PT Demand Receiving Benefit PM 3 hours (person demand)	30	40	-	-	210	150	320	40	190	510	740
Percentage of Demand in Scope Receiving Benefit - AM	8%	2%	11%	16%	43%	22%	29%	21%	11%	24%	38%
Percentage of Demand in Scope Receiving Benefit - PM	1%	1%	0%	0%	23%	7%	15%	1%	3%	15%	27%
Person Hour Saving - AM	- 30.1	- 10.6	- 26.9	- 11.2	- 129.6	- 102.6	- 78.4	- 56.5	- 40.6	- 91.5	- 124.3
Person Hour Saving - PM	- 2.1	- 1.2	-	-	- 9.4	- 8.8	- 33.7	- 2.5	- 6.5	- 30.0	- 42.7
Person Hour Saving - AM plus PM	- 32.3	- 11.8	- 26.9	- 11.2	- 138.9	- 111.4	- 112.1	- 59.0	- 47.2	- 121.5	- 167.0

Appendix E. Appraisal Summary Table

A428 Options Appraisal Summary

Group	AST	No.	Assessment Criteria	Package 1		Package 2		Package 3	
			New Name of Option (to match updated maps)						
			Description of Option:		A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. Southern busway route via the old Bedford to Cambridge Rail Line to Trumpington Park and Ride site. This would then connect to the existing Cambridgeshire Guided Busway to ultimately serve the rail station and City Centre areas. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre.		A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. Central busway route south of Hardwick to connect to M11 J12. On-road service along the M11 to J11 to link to Trumpington Park and Ride site. This would then connect to the existing Cambridgeshire Guided Busway to ultimately serve the rail station and City Centre areas. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre.		A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. Central busway route south of Hardwick and north of Coton, to connect to the existing bus priority measures (which would be extended westwards) immediately west of the existing Madingley Road Park and Ride site. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre.
			Key Strengths		• Segregated bus route through Cambourne and Bourn Airfield will lead to journey time savings • Connects with the Cambridgeshire Guide Busway at Trumpington which will also facilitate journeys to Addenbrooke. • Utilises disused rail line and reduces the need to acquire farmland for the construction of the busway. • P&R at Caxton Gibbet removes some of the Cambridge bound traffic from the A428. • Bus lane addresses some of the capacity issues eastbound on the A1303 in the AM peak.		• Segregated bus route through Cambourne and Bourn Airfield and busway south of Hardwick will lead to journey time savings • P&R at Caxton Gibbet removes some of the Cambridge bound traffic from the A428. • Bus lane addresses some of the capacity issues eastbound on the A1303 in the AM peak. • Ability to offer service to Hardwick/Caldecote on segregated sections • No new M11 bridge required		• Segregated bus route through Cambourne and Bourn Airfield and busway south of Hardwick will lead to journey time savings • P&R at Caxton Gibbet removes some of the Cambridge bound traffic from the A428. • Bus lane addresses some of the capacity issues eastbound on the A1303 in the AM peak. • No New M11 bridge required
			Key Weaknesses		• Only partially addresses the public transport needs of areas west of Caxton Gibbet (i.e. St Neots). • Service patterns would require 2 services - one to Addenbrookes and one to City Centre • Poor accessibility for Hardwick/Caldecote to Addenbrookes • Service pattern unchanged for Hardwick/Caldecote • Requires land acquisition south of Bourn Airfield • Travelling telescopes on rail line		• Only partially addresses the public transport needs of areas west of Caxton Gibbet (i.e. St Neots). • Needs at least 2 services to serve both Addenbrookes and Cambridge City Centre • Would require the acquisition of land for the bus only link south of Hardwick		• Only partially addresses the public transport needs of areas west of Caxton Gibbet (i.e. St Neots). • Would require the acquisition of land for the bus only link south of Hardwick
	AST	No.	Assessment Criteria	Score & summary of key impacts		Score & summary of key impacts		Score & summary of key impacts	
10	S	1	**Congestion free PT serving the corridor (including new developments) in order to avoid an increase in current congestion levels and PT journey times**	4	Southern busway will be bi-directional and segregated from general traffic through Cambourne and Bourn, and between Bourn and Trumpington, therefore free from congestion with reliable journey times. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, no bus priority measures are proposed from Caxton Gibbet to Madingley Rise and PT journey times may be impacted on. Eastbound nearside bus lane from Madingley P&R site to Northampton St will improve PT movement along this section. Likely to achieve some of the objective and have a **moderate** overall impact.	5	Busway will be bi-directional and segregated from general traffic through Cambourne and Bourn to Barton and the A603, and from Trumpington P&R, therefore free from congestion with reliable journey times. However, there is an on-road section that includes crossing over the M11 on the A603, followed by a journey south on the M11 J12 - 11 which could be subject to congestion and unreliable journey times. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, no bus priority measures are proposed from Caxton Gibbet to Madingley Rise and PT journey times may be impacted on. Eastbound nearside bus lane from Madingley P&R site to Northampton St will improve PT movement along this section. Likely to achieve some of the objective and have a **moderate** overall impact.	5	Busway will be segregated from general traffic through Cambourne and Bourn, and along busway alignment, therefore free from congestion with reliable journey times. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, no bus priority measures are proposed from Caxton Gibbet to Madingley Rise and PT journey times may be impacted on. Eastbound nearside bus land from Madingley P&R site to Northampton St will improve PT movement along this section. Madingley Rise offline bus link would also segregate buses from general traffic. Missing bus priority for short link over M11 bridge. No bus priority outbound until route joins new busway. Likely to meet the objective and have a **beneficial** impact.
	S	2	**PT serves key current/future trip generators in the A428 corridor (west of the M11), including Cambourne and Bourn.**	3	Package serves Cambourne and Bourn Airfield through the introduction of a segregated busway. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, there is no increased PT provision directly from St Neots. It is noted that PT services to the city centre would continue to use Madingley Rise. Likely to achieve some of the objective and have a **moderate** overall impact.	3	Package serves Cambourne and Bourn Airfield through the introduction of a segregated busway. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, there is no increased PT provision directly from St Neots. Additional connection to Hardwick may be possible with this package. It is noted that PT services to the city centre would continue to use Madingley rise. Likely to achieve some of the objective and have a **moderate** overall impact.	4	Package serves Cambourne and Bourn Airfield through the introduction of a segregated busway. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, there is no increased PT provision directly from St Neots. Additional connection to Hardwick and Coton may be possible with this package. Likely to achieve some of the objective and have a **beneficial** overall impact.
	S	3	**PT serves key current/future trip attractors in Cambridge – Cambridge City Centre and other employment sites (i.e. Science Park, Addenbrooke's).**	4	Package connects with the busway at Trumpington which allows access to Addenbrooke. Bus lane on A1303 serves Cambridge City Centre. Likely to meet the objective and have a **beneficial** impact.	4	The busway does not connect directly with CGB services accessing Addenbrooke. However, there is the potential to connect to the A603/M11 which would allow for services on the new busway route to connect to existing CGB services. There is also the potential to connect to the A603 and from there connect to City Centre bus routes. Bus lane on A1303 serves Cambridge City Centre. Likely to achieve some of the objective and have a **moderate** overall impact.	2	Bus lane on A1303 serves Cambridge City Centre, however there are no new connection to Addenbrooke or the Science Park. Likely to achieve some of the objective and have a **moderate** overall impact.
	S	4	**Intercept all pt trips in scope including non-car available.**	2	Package does not capture trips in Hardwick and Caldecote, but may be attractive for Toft, Kingston and Comberton residents.	3	Package has the potential to capture trips from Hardwick.	5	Package has potential to capture trips from Hardwick and Coton.
		9	**Peak journey times no more than the equivalent journey by car (and preferably less)**	1		1		2	
		10	**End to end journey time reliability better than the car alternative (as yet undefined)**	3	High level of JT reliability offered compared to car. Likely to achieve some of the objective and have a **moderate** overall impact.	2	Increased reliability issues associated with the M11 and delays at junctions 11 and 12. Likely to achieve some of the objective and have a **moderate** overall impact.	3	High level of JT reliability offered compared to car. But lack of priority across M11 could adversely impact on reliability. Likely to achieve some of the objective and have a **moderate** overall impact.
Deliverability	M	11	**Engineering feasibility**	2	Location of the travelling telescope along the old railway line prevents this land being developed for the bus route. Any change in alignment may result in additional structural elements being required due to water courses. There is a requirement for 5 minor structural works so that water courses can be crossed. There is a requirement for 5 minor junction improvements along the proposed route. A new bridge over M11 is required to provide link to Trumpington park and ride along the current proposed alignment. Potential to utilise existing farmers accesses over the M11 which would reduce costs. North east or south west park and rides preferred due to proximity to existing cycle route and Cambourne West. Potential limits and restrictions to carriageway widening along the A1303.	2	Offline bus way north of Hardwick wood may impact wildlife site and houses in Highfields Caldecote. Potential to work around issues as well as facilitate the area with a bus service. There is a requirement for 3 minor structural works so that water courses can be crossed. There is a requirement for 2 major and 2 minor junction improvements along the proposed route. North east or south west park and rides preferred due to proximity to existing cycle route and Cambourne West. Potential limits and restrictions to carriageway widening along the A1303.	2	There is a requirement for 4 minor structural works so that water courses can be crossed. There is a requirement for 3 major and 2 minor junction improvements along the proposed route. North east or south west park and rides preferred due to proximity to existing cycle route and Cambourne West. Potential accident reduction measures (straightening) to A1303 St Neots road prior to bus way link in. Potential limits and restrictions to carriageway widening along the A1303.
	E	12	**Environment impacts**	2	Segregated bus link from Cambourne to Bourn Airfield - Constraints - Proposed Submission Local Plan - Policy SS/6: New Village at Bourn Airfield; Policy NH/12 on Local Green Space; Policy TI/7: Lord's Bridge Radio Telescope; Listed buildings in vicinity; loss of Agricultural land Grade 2, 3a, 3b. • no significant adverse effects upon SEA objectives Segregated busway on disused rail line from Trumpington to CGB services – Constraints – sparsely populated, avoiding main settlements. Unknown impact of buried heritage. • no significant adverse effects upon SEA objectives Madingley Road bus lane - Constraints - Madingley Road passes through West Cambridge Conservation Area. Protected open spaces directly to the north of Madingley Road. The western end of Madingley Road in the vicinity of the M11 is designated Green Belt (Policy 4 Cambridge Local Plan) . Various Grade II listed buildings fronting Madingley Road. Flood Zone – Low probability. AQ/Noise – inbound nearside bus lane largely unpopulated within 50m until east of Storeys Way. • no significant beneficial or adverse effects upon SEA objectives Caxton Gibbet Park & Ride - Very sparsely populated agricultural area at 3 optional locations. Constraints: loss of agricultural land. • no significant adverse effects upon SEA objectives	2	Segregated bus link from Cambourne to Bourn Airfield - Constraints - Proposed Submission Local Plan - Policy SS/6: New Village at Bourn Airfield; Policy NH/12 on Local Green Space; Policy TI/7: Lord's Bridge Radio Telescope; Listed buildings in vicinity; loss of Agricultural land Grade 2, 3a, 3b. • no significant adverse effects upon SEA objectives Segregated busway south of Highfields to M11 j12 – Constraints – sparsely populated, avoiding main settlements. Unknown impact of buried heritage. • no significant adverse effects upon SEA objectives M11 parallel section - Dedicated bus facility to run parallel to the M11 between junction 11 (Trumpington) and junction 13 (Madingley Road) - constraints - Green Belt designation (Policy S/4); Site is located within 'Lord's Bridge Restrict Area' Policy. TI/7 only permits development that would not result in any risk of interference to the Mullard Radio Astronomy Observatory at Lord's Bridge; A Schedule Monument (Settlement complex NE of Haslingfield) is located north of Junction 11 (Policy NH/14 Heritage Assets). • Significant adverse effects against SEA objectives on protection and enhancement of the landscape and countryside, protecting historic and archaeological features and their settings, and reducing vulnerability to climate change and flood risk. Madingley Road bus lane - Constraints - Madingley Road passes through West Cambridge Conservation Area. Protected open spaces directly to the north of Madingley Road. The western end of Madingley Road in the vicinity of the M11 is designated Green Belt (Policy 4 Cambridge Local Plan) . Various Grade II listed buildings fronting Madingley Road. Flood Zone – Low probability. AQ/Noise – inbound nearside bus lane largely unpopulated	1	Segregated bus link from Cambourne to Bourn Airfield - Constraints - Proposed Submission Local Plan - Policy SS/6: New Village at Bourn Airfield; Policy NH/12 on Local Green Space; Policy TI/7: Lord's Bridge Radio Telescope; Listed buildings in vicinity; loss of Agricultural land Grade 2, 3a, 3b. • no significant adverse effects upon SEA objectives Segregated busway south of Highfields to M11 j12 – Constraints – sparsely populated, avoiding main settlements. Unknown impact of buried heritage. • no significant adverse effects upon SEA objectives M11 parallel section - Dedicated bus facility to run parallel to the M11 between junction 11 (Trumpington) and junction 13 (Madingley Road) - constraints - Green Belt designation (Policy S/4); Site is located within 'Lord's Bridge Restrict Area' Policy. TI/7 only permits development that would not result in any risk of interference to the Mullard Radio Astronomy Observatory at Lord's Bridge; A Schedule Monument (Settlement complex NE of Haslingfield) is located north of Junction 11 (Policy NH/14 Heritage Assets). • Significant adverse effects against SEA objectives on protection and enhancement of the landscape and countryside, protecting historic and archaeological features and their settings, and reducing vulnerability to climate change and flood risk. High quality segregated bus priority measures between Highfields and the junction of the A428/A1303 and the M11. Constraints - Affecting: S/4: Cambridge Green Belt; NH/3 Protecting Agricultural Land; NH/4 Biodiversity; NH/5 Sites of Biodiversity or Geological Importance; NH/7 Ancient Woodlands and Veteran Trees; NH/14 Heritage Assets • significant adverse effects from the Green Belt in South Cambridgeshire (Policy S/4. • Significant adverse effects may also arise locally against the SEA objectives relating to buildings, sites and features of archaeological, historical or architectural interest and their settings (5), protection and enhancement of the countryside (6)
		13	**Land take**	1	Total land take estimated to be around **341,000m2** excluding land through developments (dashed blue line on maps). Land on which the travelling telescope is located would be difficult to obtain due to the cost associated. Large amount of arable land take required.	2	Total land take estimated to be around **254,000m2** excluding land through developments (dashed blue line on maps). Large amount of arable land take required. Some of the wildlife site land may require to be taken near Hardwick wood. Proximity of land take to ancient wood may create an issue.	2	Total land take estimated to be around **237,000m2** excluding land through developments (dashed blue line on maps). Large amount of arable land take required. Some of the wildlife site land may require to be taken near Hardwick wood. Proximity of land take to ancient wood may create an issue.
	M	14	**Stakeholder/public acceptance**	2	Ryle Telescope of Mullard Radio Astronomy Observatory occupies a 3-mile (4.8 km) length of the former Cambridge to Bedford Rail line. Any proposals to resite the telescope are likely to be met with resistance by the University. Stakeholder groups in support of reopening the line may oppose its conversion to a busway. Likely to have a **moderate** impact.	3	A new dedicated busway running adjacent to Hardwick Wood is likely to opposed by locals and environmental groups. Likely to have a **moderate** impact.	3	A new dedicated busway running adjacent to Hardwick Wood and an offline bus link at Madingley Rise is likely to opposed by locals and environmental groups. Likely to achieve some of the objective and have a **moderate** overall impact.
	S	15	**Contribution to land-use and planning policy**		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.
	F	16	**Bus service commercial viability**	3	Service would be provided by extending existing commercial routes with improved times. Would expect good market potential and no competing rail. Two separate routes required to service Addenbrookes and the City Centre.	3	Service would be provided by extending existing commercial routes with improved times. Would expect good market potential and no competing rail. Two separate routes required to service Addenbrookes and the City Centre.	4	Service would be provided by extending existing commercial routes with improved times. Would expect good market potential and no competing rail. Likely to have a beneficial impact.
	E	17	**Social and distributional impacts**	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training esp at Addenbrookes Likely to have a **moderate** distributional impact	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training. Likely to have a **moderate** distributional impact.	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training. Likely to have a **moderate** distributional impact.
	F	18	**Scale of impact**	1	Large land take required, will negatively impact land owners and wildlife. Likely to have objections from locals as will not serve many of the local areas although will affect them. New road through already developed Cambourne may affect recently built houses. Delays expected along A1303 and M11 while work is being carried out.	2	Large land take required, will negatively impact land owners and wildlife especially that near the wildlife site near Hardwick wood. Proximity of route to Highfields Caldecote and Hardwick would potentially allow pick ups here to accommodate locals. New road through already developed Cambourne may affect recently built houses. Delays expected along A1303 and Barton Road while work is being carried out.	2	Large land take required, will negatively impact land owners and wildlife especially that near the wildlife site near Hardwick wood. Proximity of route to Highfields Caldecote, Hardwick and Coton would potentially allow pick ups here to accommodate locals. New road through already developed Cambourne may affect recently built houses. Delays expected along A1303 while work is being carried out.
	F	19	**Cost**	1	Developer- £8.33million Offline Route- £29.6million Madingley Rise- £4.3million Park and ride- £3.2million New M11 bridge- £22million to £45million **Estimated cost £90.43million**	3	Developer- £8.33million Offline Route- £19.04million Madingley Rise- £4.3million Park and ride- £3.2million **Estimated cost £34.87million**	3	Developer- £8.33million Offline Route- £18.7million Madingley Rise including bus priority link- £5.11million Park and ride- £3.2million **Estimated cost £35.34million**
	S	20	**GHG (green house gas)**	4	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions. Lengthed route compared to other options, increasing bus emissions.	3	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions.	4	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions.
	S	21	**Key uncertainties**	2	Unknown how the route will link to the developers sites and how they will be connected (priced for new road). Unknown conditions for M11 bridge relates to large range in cost. Unlikely to be able to use travelling telescope route, unknown alternative route. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact	2	Unknown how the route will link to the developers sites and how they will be connected (priced for new road). Unknown proximity of route to wildlife site and size of wildlife sites near Highfields Caldecote and Hardwick. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact	2	Unknown how the route will link to the developers sites and how they will be connected (priced for new road). Unknown proximity of route to wildlife site and size of wildlife sites near Highfields Caldecote and Hardwick. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact
	C	22	**Flexibility of option**	3	**(a)** As the route runs through open land there is flexibility to change route to accommodate additional locations and nodes with the potential to divert over an existing bridge over the M11. The route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would leave links insitu that may not serve any purpose to the local area or communities. **(c)** Due to the various constraints, such as listed buildings and SSI's, there is limited capability to change the route without impacting on areas that may restrict the route or development.	2	**(a)** As the route runs through open land there is flexibility to change route to accommodate additional locations however there are restrictions around the locations such as Highfields Cladecote, Hardwick and the existing firing range, north of Barton, which will limit the amount of deviation of the route. The route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would leave links insitu that may not serve any purpose to the local area or communities. **(c)** Due to the various constraints, such as listed buildings, firing range and SSI's, there is limited capability to change the route without impacting on areas that may restrict the route or development.		**(a)** As the route runs through open land there is flexibility to change route to accommodate additional locations however there are restrictions around the locations such as Highfields Cladecote, Hardwick, Coton and the existing firing range, north of Barton, which will limit the amount of deviation of the route. The route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would leave links insitu that may not serve any purpose to the local area or communities. **(c)** Due to the various constraints, such as listed buildings, firing range and SSI's, there is limited capability to change the route without impacting on areas that may restrict the route or development.
	M	23	**Implementation Timetable**	1	Maximum estimated length of time to develop route: **35 months** Estimated duration based on concurrent construction methods: **24 months** Assumed majority of off-line route can be developed without restrictions. Operational constraints may exist on the existing live carriageway's which may extend duration of construction.	2	Maximum estimated length of time to develop route: **32 months** Concurrent construction elements: **14 months** Assumed majority of off-line route can be developed without restrictions Operational constraints may exist on the existing live carriageway's which may extend duration of construction.	2	Maximum estimated length of time to develop route: **37 months** Concurrent construction elements: **21 months** Assumed majority of off-line route can be developed without restrictions Operational constraints may exist on the existing live carriageway's which may extend duration of construction.
			Total	39		44		46	

AST	No.	Assessment Criteria	Package 4		Package 5		Package 6	
		Description of Option:		A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. Northern busway route east of Dry Drayton, sharing the existing Dry Drayton over-bridge of the A14. Passing between Oakington and Girton to connect to the existing Cambridgeshire Guided Busway west of Histon to serve the Cambridge Science Park area. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre.		A Park and Ride site located at near the A428/A1303 junction (Madingley Mulch roundabout) would feed into an online nearside eastbound bus lane along Madingley Rise to connect to the existing bus priority measures immediately west of the existing Madingley Road Park and Ride site. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre. Signalisation of Madingley Mulch roundabout to manage traffic congestion.		A Park and Ride site located to the east of St Neots. An eastbound nearside bus lane along the A428 allied to highway and bus priority improvements on the approach to Caxton Gibbet. A nearside eastbound bus lane along Madingley Rise to connect to the existing bus priority measures immediately west of the existing Madingley Road Park and Ride site. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre. Signalisation of Madingley Mulch roundabout to manage traffic congestion.
		Key Strengths		• Segregated bus route through Cambourne and Bourn Airfield and new busway north of the A428 will reduce delays caused by congestion. • Busway connects with CBG between Oakington and Histon facilitating PT trips to the City Centre and the Science Park. • P&R at Caxton Gibbet removes some of the Cambridge bound traffic from the A428.		• P&R capacity in corridor increased • No M11 Bridge • Makes best use of existing infrastructure • Low cost • Efficient at intercepting majority demand • Efficient at providing PT priority on links of most acute congestion		• Makes best use of existing infrastructure east of Caxton Gibbet • No M11 bridge • Provides continuous PT connectivity for St Neots • Addresses all known PT bottlenecks • Potential for short distance P&R service to St Neots from site to east
		Key Weaknesses		• Busway - long journey times. • Would therefore need at least 2 services to serve both the City Centre and Addenbrookes. • Would need land acquisition. • Only partially addresses the public transport needs of areas west of Caxton Gibbet (i.e. St Neots). • Does not serve Hardwick / Caldecote.		• Does not provide direct PT links to/from Cambourne, Bourn Airfield or St Neots. • Inbound bus lanes will only benefit morning peak bus journeys and will not address issues with PM peak congestion. • Relies on P&R to provide accessibility to PT service • No service facility to Addenbrookes		• No service facility to Addenbrookes • Only provides P&R capacity to long distance movements in corridor • Commercial viability of high frequency, long distance bus services • Poor direct PT accessibility for Cambourne and Bourn Airfield • Potentially abortive work if HA upgrade the A428 • Works to west of Caxton Gibbet would require HA approvals
AST	No.	Assessment Criteria	Score & summary of key impacts		Score & summary of key impacts		Score & summary of key impacts	
S	1	**Congestion free PT serving the corridor (including new developments) in order to avoid an increase in current congestion levels and PT journey times**	4	Likely to achieve some of the objective and have a **moderate** overall impact. Busway will be segregated from general traffic through Cambourne and Bourn, and along busway alignment, therefore free from congestion with reliable journey times. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, no bus priority measures are proposed from Caxton Gibbet to Madingley Rise and PT journey times may be impacted on. Eastbound nearside bus land from Madingley P&R site to Northampton St will improve PT movement along this section. Likely to meet the objective and have a **moderate**ly impact.	3	Signalisation of Madingley Mulch will improve movements through the junction Inbound bus lanes will benefit morning peak bus journeys, however, it will not address issues with outbound PM peak congestion. No additional PT provision west of Madingley Mulch. Likely to achieve some of the objective and have a **moderate** overall impact.	3	Likely to meet the objective and have a **beneficial** impact. See other version of spreadsheet. Package includes inbound measures only. M11 junction 13 overbridge lacks PT priority.
S	2	**PT serves key current/future trip generators in the A428 corridor (west of the M11), including Cambourne and Bourn.**	3	Package serves Cambourne and Bourn Airfield through the introduction of a segregated busway. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, there is no increased PT provision directly from St Neots. Likely to achieve some of the objective and have a **moderate** overall impact.	2	P&R adjacent to the A428/A1303 will capture a proportion of trips originating to the west of Cambridge. Unable to serve Cambourne and Bourn Airfield for non-car available trips. High dependence on P&R service without direct PT only option from Cambourne west and Bourn Airfield. Likely to achieve some of the objective and have a **moderate** overall impact.	2	Likely to meet the objective and have a **beneficial** impact. See other version of spreadsheet. Poor accessibility/connectivity to Cambourne, Cambourne west and Bourn Airfield. P&R site access compromised for traffic joining from A1198.
S	3	**PT serves key current/future trip attractors in Cambridge – Cambridge City Centre and other employment sites (i.e. Science Park, Addenbrooke's).**	4	Bus lane on A1303 serves Cambridge City Centre. The connection between the busway and the CGB will provide access to the Science Park, City Centre and Addenbrooke's. **However the journey time for people travelling from Cambourne to Addenbrooke's is likely to be long.** Likely to meet the objective and have a **beneficial** impact.	2	Only serves the city centre. No new connection to Addenbrookes and the Science Park. Likely to achieve some of the objective and have a **moderate** overall impact.	2	Only serves the city centre. No new connection to Addenbrookes and the Science Park. Likely to achieve some of the objective and have a **moderate** overall impact.
S	4	**Intercept all pt trips in scope including non-car available.**	3	Does not capture trips from Hardwick / Coton.	0	Does not directly capture trips from their origin along the corridor as relies on use of the P&R.	1	Captures St Neots trips, but no direct links to Cambourne, Bourn, Hardwick or Caldecote. Location of P&R would not capture trips using the A1198
	9	**Peak journey times no more than the equivalent journey by car (and preferably less)**	0		4		3	
	10	**End to end journey time reliability better than the car alternative (as yet undefined)**	3	High level of JT reliability offered compared to car. Likely to achieve some of the objective and have a **moderate** overall impact.	2	JT reliability expected to be lower than segregated route options, and could be impacted on by lack of priority over M11 bridge. In-bound improvements only. Likely to achieve some of the objective and have a **moderate** overall impact.	3	Inbound improvements only. Lack of bus priority over M11 bridge could worsen JT reliability. Likely to achieve some of the objective and have a **moderate** overall impact.
M	11	**Engineering feasibility**	2	Potential earthworks associated with existing over head cables near Dry Drayton. There is a requirement for 7 minor structural works so that water courses can be crossed. There is a requirement for 3 minor and 2 major junction improvements along the proposed route. North east or south west park and rides preferred due to proximity to existing cycle route and Cambourne West. Potential limits and restrictions to carriageway widening along the A1303.	3	Potential accident reduction measures (straightening) to A1303 St Neots road. 2 New major junctions at Madingley Mulch to accommodate park and ride. Upgrade of existing junctions along A1303 to accommodate bus priority. Potential limits and restrictions to carriageway widening along the A1303.	2	Potential accident reduction measures (straightening) to A1303 St Neots road. New signalisation of Madingley Mulch roundabout. Upgrade of existing junctions along A1303 to accommodate bus priority. Potential limits and restrictions to carriageway widening along the A1303. Major highway improvements required on approach to Caxton Gibbet. Potential impact of over head power cables on proposed St Neots park and ride sites as well as the bus lane. Initial identification suggests impact on 6 structures along single carriageway section of the A428.
E	12	**Environment impacts**	2	Segregated bus link from Cambourne to Bourn Airfield - Constraints - Proposed Submission Local Plan - Policy SS/6: New Village at Bourn Airfield; Policy NH/12 on Local Green Space; Policy TI/7: Lord's Bridge Radio Telescope; Listed buildings in vicinity; loss of Agricultural land Grade 2, 3a, 3b. • no significant adverse effects upon SEA objectives Segregated bus link from north of Bourn Airfield via Dry Drayton linking to Cambridge Guided Busway at Histon - Constraints - sparsely populated alignment until reach Histon. Unknown impact of buried heritage. Loss of agricultural land; reducing vulnerability to climate change and flood risk • some significant adverse effects upon SEA objectives Madingley Road bus lane - Constraints - Madingley Road passes through West Cambridge Conservation Area. Protected open spaces directly to the north of Madingley Road. The western end of Madingley Road in the vicinity of the M11 is designated Green Belt (Policy 4 Cambridge Local Plan) . Various Grade II listed buildings fronting Madingley Road. Flood Zone – Low probability. AQ/Noise – inbound nearside bus lane largely unpopulated within 50m until east of Storeys Way. • no significant beneficial or adverse effects upon SEA objectives Caxton Gibbet Park & Ride - Very sparsely populated agricultural area at 3 optional locations. Constraints: loss of agricultural land. • no significant adverse effects upon SEA objectives	4	Only south of A1303 has risk of impact on sensitive population receptors. Loss of agricultural land. Otherwise: • no significant adverse effects upon SEA objectives High quality online bus priority measures between Highfields and the junction of the A428/A1303 and the M11. Constraints - Along existing road (online); loss of Agricultural land grade 2, 3a & 3b; loss of Protected species and habitats along route • no significant adverse effects upon SEA objectives Madingley Road bus lane - Constraints - Madingley Road passes through West Cambridge Conservation Area. Protected open spaces directly to the north of Madingley Road. The western end of Madingley Road in the vicinity of the M11 is designated Green Belt (Policy 4 Cambridge Local Plan) . Various Grade II listed buildings fronting Madingley Road. Flood Zone – Low probability. AQ/Noise – inbound nearside bus lane largely unpopulated within 50m until east of Storeys Way. • no significant beneficial or adverse effects upon SEA objectives Signalise Madingley Mulch roundabout - Better management of queue and means of providing bus priority at junction, would have no impact on physical environment and unlikely any adverse impact on AQ and noise.	3	High quality online bus priority measures between Highfields and the junction of the A428/A1303 and the M11. Constraints - Along existing road (online); loss of Agricultural land grade 2, 3a & 3b; loss of Protected species and habitats along route • no significant adverse effects upon SEA objectives Madingley Road bus lane - Constraints - Madingley Road passes through West Cambridge Conservation Area. Protected open spaces directly to the north of Madingley Road. The western end of Madingley Road in the vicinity of the M11 is designated Green Belt (Policy 4 Cambridge Local Plan) . Various Grade II listed buildings fronting Madingley Road. Flood Zone – Low probability. AQ/Noise – inbound nearside bus lane largely unpopulated within 50m until east of Storeys Way. • no significant beneficial or adverse effects upon SEA objectives Caxton Gibbet junction improvements - Unpopulated agricultural area – widening A238 west of junction to match existing widening to east. • no significant adverse effects upon SEA objectives A428 bus lane - Insufficient details. Assuming central tidal bus lane, no impact on physical environment and unlikely any adverse impact on AQ and noise. St Neots Park & Ride 2 options for location. No sensitive population receptors. Loss of agricultural land. Otherwise: no significant adverse effects upon SEA objectives
	13	**Land take**	2	Total land take estimated to be around **284,000m2** excluding land through developments (dashed blue line on maps). Large amount of arable land take required. (Rectory Farm land)	3	Total land take estimated to be around **160,000m2.** Proximity of park and ride land take to ancient wood may create an issue.	2	Total land take estimated to be around **200,000m2.**
M	14	**Stakeholder/public acceptance**	3	A new dedicated busway connecting with the CGB is likely to opposed by locals and environmental groups. Likely to have a **moderate** impact.	4	Bus priority measures on Madingley Rise and Madingley Road require a reallocation of existing road space. This is likely to be more acceptable to stakeholders than the construction of a dedicated busway. Likely to meet the objective and have a **beneficial** impact.	4	Bus priority measures on Madingley Rise and Madingley Road require a reallocation of existing road space. This is likely to be more acceptable to stakeholders than the construction of a dedicated busway. Likely to meet the objective and have a **beneficial** impact.
S	15	**Contribution to land-use and planning policy**		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.
F	16	**Bus service commercial viability**	3	Service would be provided by extending existing commercial routes with improved times. Would expect good market potential and no competing rail. Likely to have a beneficial impact.	5	Service would be provided by extending existing commercial routes with improved times. Would expect good market potential and no competing rail. Likely to have a beneficial impact.	2	Long distance service may not be viable if it is to provide a high frequency service.
E	17	**Social and distributional impacts**	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training esp at Addenbrookes Likely to have a **moderate distributional** impact.	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training. Likely to have a **moderate** distributional impact.	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training. Likely to have a **moderate** distributional impact.
F	18	**Scale of impact**	1	Large land take required, will negatively impact land owners and wildlife. Likely to have objections from locals as will not serve many of the local areas although will affect them. Likely to negatively impact to traffic at junction 30 on the A14 due to bus priority measures. New road through already developed Cambourne may affect recently built houses. Delays expected along A1303 while work is being carried out.	3	Land take required, will negatively impact land owners and wildlife. Delays expected along A1303 while work is being carried out.	2	Land take required, will negatively impact land owners and wildlife. Delays expected along A1303 and A428 while work is being carried out.
F	19	**Cost**	1	Developer- £10.9million Developer new bridge and junction over A428- £15million to 23million Offline Route- £22.73million Madingley Rise - £4.3million Park and ride- £3.2million **Estimated cost £64.13million**	4	A1303 widening - £9.8million Park and ride- £7million Madingley Mulch signalising- £4.9million **Estimated cost £21.7million**	3	Single lane widening - £24.5million Approach to Caxton Gibbet- £5.7million Park and ride- £3.2million Madingley Mulch signalising- £4.9million **Estimated cost £38.3million**
S	20	**GHG (green house gas)**	4	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions. Lengthed route compared to other options, increasing bus emissions.	3		5	
S	21	**Key uncertainties**	2	Unknown how the route will link to the developers sites and how they will be connected (priced for new road). Unknown if a new junction at Bourn Airfield is included in the developers plans. Unknown likelihood of being able to obtain Rectory Farm land. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact	2	Uncertain of ability to use existing bridge from slip road to access/egress new park and ride at Madingley Mulch. Potential to use Church Lane. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact	5	No perceived engineering uncertainties Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact
C	22	**Flexibility of option**	2	**(a)** As the route runs through open land there is flexibility to change route to accommodate additional locations. Access around Dry Drayton may be flexible however the over head power lines may restrict the route options. The route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would leave links insitu that may not serve any purpose to the local area or communities and provide structures over the A428 they may not be utilised for any additional network requirements. The extension of the guided bus service may not be utilised if the links are not added. **(c)** There are limitations on the route due to the areas of interes, such as listed buildings, and the locations that the route could potentially cross the A428 and M11.	3	**(a)** The route is in a well defined corridor along an existing highway and has limited opportunity to scale up or down on the options. The existing roundabout from the A428 has limited scope to alter the alignment. The route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would have a lesser impact than the other routes and any works could be accommodated in the existing road network. **(c)** The nature of the route would limit any major amendments to the scheme given the direct link from the A428 to Cambridge centre along the A1303 .	2	**(a)** The route is identified to run along an existing road network which has limited availability to increase the options but could be reduced without impacting on the surrounding highway. The route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would have a lesser impact than the other routes and any works could be accommodated in the existing road network. **(c)** The nature of the route would limit any major amendments to the scheme given the direct link from the A428 to Cambridge centre along the A1303 .
M	23	**Implementation Timetable**	1	Maximum estimated length of time to develop route: **37 months** Concurrent construction elements: **23 months** Assumed majority of off-line route can be developed without restrictions Operational constraints may exist on the existing live carriageway's which may extend duration of construction.	3	Maximum estimated length of time to develop route: **19 months** Concurrent construction elements: **12 months** Operational constraints may exist on the existing live carriageway's which may extend duration of construction.	2	Maximum estimated length of time to develop route: **34 months** Concurrent construction elements: **24 months** Operational constraints may exist on the existing live carriageway's which may extend duration of construction.
		Total	40		50		46	

AST	No.	Assessment Criteria	Package 7		Package 8		Package 9	
		Description of Option:		A bus service would run on a segregated route through Cambourne and Bourn Airfield before joining the A428 (it is assumed that this junction onto the A428 would be provided as part of the Bourn Airfield development) through to the A428/A1303 junction (Madingley Mulch roundabout) which would be signalised to provide bus priority. An online nearside eastbound bus lane would be provided along both Madingley Rise and Madingley Road, utilising the existing bus priority measures at M11 J13 and would provide bus priority into Cambridge.		A bus service would run on a segregated route through Cambourne and Bourn Airfield before joining St Neots Road through to the A428/A1303 junction (Madingley Mulch roundabout) which would be signalised to provide bus priority. An online nearside eastbound bus lane would be provided along both Madingley Rise and Madingley Road, utilising the existing bus priority measures at M11 J13 would provide bus priority in to Cambridge.		A Park and Ride site located near the A1198/A428 junction would feed a segregated bus route through/around Cambourne and Bourn Airfield with stops at each. An offline busway would run south of Hardwick and north of Coton, continuing over the M11 on approximately the alignment of the Coton Footpath. An on-road connection can be provided through the West Cambridge University site to access the existing Park and Ride Site on Madingley Road. The busway would continue south of the West Cambridge University site to connect to Grange Road. Services could then run on road either north to Madingley Road or south to Sidgwick Avenue to access the City Centre.
		Key Strengths		• No M11 bridge required • Minimizes need for green field route construction • Efficient at intercepting demand from Cambourne and Bourn Airfield		• No M11 or A428 bridge required • Minimizes need for green field route construction • Efficient at intercepting demand from Cambourne and Bourn Airfield		• P&R capacity on corridor increased • Bi-directional segregated busway offers AM and PM peak congestion avoidance
		Key Weaknesses		• No P&R capacity enhancement in corridor • New A428 overbridge required at Bourn Airfield if new junction not provided by developer • P&R traffic still accesses existing P&R via Madingley rise • No service facility to Addenbrookes or the Science Park		• No P&R capacity enhancement in corridor • P&R traffic still accesses existing P&R via Madingley rise • No service facility to Addenbrookes or the Science Park		• M11 bridge required • Considerable green field construction required • No service facility to Addenbrookes or the Science Park • Requires additional link to Madingley Road P&R, or bus priority on Madingley Road
AST	No.	Assessment Criteria	Score & summary of key impacts		Score & summary of key impacts		Score & summary of key impacts	
S	1	**Congestion free PT serving the corridor (including new developments) in order to avoid an increase in current congestion levels and PT journey times**	3	Likely to meet the objective and have a **beneficial** impact. Package includes inbound measures only. Optimal route through Cambourne west, Cambourne and Bourn Airfield. The ability to link Cambourne west and Bourn Airfield directly onto the A428 strengthens reliability. P&R still reliant on existing Madingley Road site. No bus provision west of Cambourne west.	2	Likely to meet the objective and have a **beneficial** impact. Package includes inbound measures only. Optimal route through Cambourne west, Cambourne and Bourn Airfield. P&R still reliant on existing Madingley Road site. No bus provision west of Cambourne west.	5	Segregated, bi-directional PT service to Grange Road. No provision after Grange Road. P&R at Caxton Gibbet to intercept a percentage of St Neots trips. St Neots not served.
S	2	**PT serves key current/future trip generators in the A428 corridor (west of the M11), including Cambourne and Bourn.**	2	Likely to meet the objective and have a **beneficial** impact. Service patterns likely to omit trips from Hardwick. P&R still reliant on existing Madingley Road site.	2	Likely to meet the objective and have a **beneficial** impact. Route along old A428 would capture trips from Hardwick. P&R still reliant on existing Madingley Road site.	4	Package serves Cambourne and Bourn Airfield through the introduction of a segregated busway. P&R at Caxton Gibbet will capture a proportion of Cambridge bound traffic from St Neots, however, there is no increased PT provision directly from St Neots. Additional connection to Hardwick and Coton may be possible with this package. Likely to achieve some of the objective and have a **moderate** overall impact.
S	3	**PT serves key current/future trip attractors in Cambridge – Cambridge City Centre and other employment sites (i.e. Science Park, Addenbrooke's).**	2	Only serves the city centre. No new connection to Addenbrookes and the Science Park. Likely to achieve some of the objective and have a **moderate** overall impact.	2	Only serves the city centre. No new connection to Addenbrookes and the Science Park. Likely to achieve some of the objective and have a **moderate** overall impact.	2	Bus lane on A1303 serves Cambridge City Centre, however there are no new connection to Addenbrooke or the Science Park. Likely to achieve some of the objective and have a **moderate** overall impact.
S	4	**Intercept all pt trips in scope including non-car available.**	1	Captures trips from Cambourne and Bourn. Does not capture trips from Hardwick, Caldecote, or St Neots.	2	Captures trips from Cambourne and Bourn, Harwick / Caldecote.. Does not capture trips from St Neots.	5	Package has potential to capture trips from Hardwick and Coton.
	9	**Peak journey times no more than the equivalent journey by car (and preferably less)**	1		2		3	
	10	**End to end journey time reliability better than the car alternative (as yet undefined)**	2	Inbound improvements only. Lack of bus priority over M11 bridge could worsen JT reliability. Likely to achieve some of the objective and have a **moderate** overall impact.	1	Worse JT from running on the old A428 compared to new with greater potential for JT reliability impacts. Lack of bus priority over M11 could worsen JT reliability. Likely to achieve some of the objective and have a moderate overall impact.	4	High level of JT reliability offered compared to car and service is on segregated bi-directional busway to Grange Road. Likely to achieve some of the objective and have a beneficial overall impact.
M	11	**Engineering feasibility**	3	Potential accident reduction measures (straightening) to A1303 St Neots road. New signalisation of Madingley Mulch roundabout. Upgrade of existing junctions along A1303 to accommodate bus priority. Potential limits and restrictions to carriageway widening along the A1303.	3	New signalised St. Neots/Highfield Road roundabout to provide bus priority from Bourn Airfield development. Minor junction improvements at St Neots/Scotland Road. Potential accident reduction measures (straightening) to A1303 St Neots road. New signalisation of Madingley Mulch roundabout. Upgrade of existing junctions along A1303 to accommodate bus priority. Potential limits and restrictions to carriageway widening along the A1303.	2	There is a requirement for 4 minor structural works so that water courses can be crossed. There is a requirement for 4 major and 1 minor junction improvements along the proposed route. New bridge required over the M11 south of junction 11. Highway improvements through West Cambridge University site (unknown development layout). North east or south west park and rides preferred due to proximity to existing cycle route and Cambourne West.
E	12	**Environment impacts**	5	Segregated bus link from Cambourne to Bourn Airfield - Constraints - Proposed Submission Local Plan - Policy SS/6: New Village at Bourn Airfield; Policy NH/12 on Local Green Space; Policy TI/7: Lord's Bridge Radio Telescope; Listed buildings in vicinity; loss of Agricultural land Grade 2, 3a, 3b. • no significant adverse effects upon SEA objectives High quality online bus priority measures between Highfields and the junction of the A428/A1303 and the M11. Constraints - Along existing road (online); loss of Agricultural land grade 2, 3a & 3b; loss of Protected species and habitats along route • no significant adverse effects upon SEA objectives Madingley Road bus lane - Constraints - Madingley Road passes through West Cambridge Conservation Area. Protected open spaces directly to the north of Madingley Road. The western end of Madingley Road in the vicinity of the M11 is designated Green Belt (Policy 4 Cambridge Local Plan) . Various Grade II listed buildings fronting Madingley Road. Flood Zone – Low probability. AQ/Noise – inbound nearside bus lane largely unpopulated within 50m until east of Storeys Way. • no significant beneficial or adverse effects upon SEA objectives Signalise Madingley Mulch roundabout - Better management of queue and means of providing bus priority at junction, would have no impact on physical environment and unlikely any adverse impact on AQ and noise.	5	Segregated bus link from Cambourne to Bourn Airfield - Constraints - Proposed Submission Local Plan - Policy SS/6: New Village at Bourn Airfield; Policy NH/12 on Local Green Space; Policy TI/7: Lord's Bridge Radio Telescope; Listed buildings in vicinity; loss of Agricultural land Grade 2, 3a, 3b. • no significant adverse effects upon SEA objectives Madingley Road bus lane - Constraints - Madingley Road passes through West Cambridge Conservation Area. Protected open spaces directly to the north of Madingley Road. The western end of Madingley Road in the vicinity of the M11 is designated Green Belt (Policy 4 Cambridge Local Plan) . Various Grade II listed buildings fronting Madingley Road. Flood Zone – Low probability. AQ/Noise – inbound nearside bus lane largely unpopulated within 50m until east of Storeys Way. • no significant beneficial or adverse effects upon SEA objectives	1	Busway (middle route) Segregated bus link from Cambourne to Bourn Airfield - Constraints - Proposed Submission Local Plan - Policy SS/6: New Village at Bourn Airfield; Policy NH/12 on Local Green Space; Policy TI/7: Lord's Bridge Radio Telescope; Listed buildings in vicinity; loss of Agricultural land Grade 2, 3a, 3b. • no significant adverse effects upon SEA objectives Segregated busway south of Hardwick to Grange Road – Constraints – sparsely populated, avoiding main settlements. Unknown impact of buried heritage. Section east of M11 avoids Madingley Rd, so avoids impacted receptors immediately south of that link. Connection through university – most likely impact would be on heritage. • no significant adverse effects upon SEA objectives A428 bus lane Insufficient details. Assuming central tidal bus lane, no impact on physical environment and unlikely any adverse impact on AQ and noise. Caxton Gibbet Park & Ride Very sparsely populated agricultural area at 3 optional locations. Constraints: loss of agricultural land. • no significant adverse effects upon SEA objectives
	13	**Land take**	4	Total land take estimated to be around **40,000m2** excluding land through developments (dashed blue line on maps).	4	Total land take estimated to be around **40,000m2** excluding land through developments (dashed blue line on maps).	2	Total land take estimated to be around **282,000m2** excluding land through developments (dashed blue line on maps). Large amount of arable land take required. Some of the wildlife site land may require to be taken near Hardwick wood. Proximity of land take to ancient wood may create an issue. University land take required through recently developed area south of Madingley Road.
M	14	**Stakeholder/public acceptance**	5	Bus priority measures on Madingley Rise and Madingley Road require a reallocation of existing road space. This is likely to be more acceptable to stakeholders than the construction of a dedicated busway. Likely to meet the objective and have a **beneficial** impact.	5	Bus priority measures on Madingley Rise and Madingley Road require a reallocation of existing road space. This is likely to be more acceptable to stakeholders than the construction of a dedicated busway. Likely to meet the objective and have a **beneficial** impact.	2	A new dedicated busway running adjacent to Hardwick Wood is likely to opposed by locals and environmental groups. A busway running through south of the West Cambridge University site may not be acceptable to the landowners. Likely to achieve some of the objective and have a **moderate** overall impact.
S	15	**Contribution to land-use and planning policy**		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.		Package addresses: • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • HQPT demand/needs for developments between St Neots and Cambridge.
F	16	**Bus service commercial viability**	4	Likely high viability for commercial operations as captures a ready demand for trips into Cambridge, with no competing rail.	3	Viable commercially, but will be a slower service than that which uses the new A428. Likely to have a **moderate** impact.	4	Service would be provided by extending existing commercial routes with improved times. Would expect good market potential and no competing rail. Likely to have a beneficial impact.
E	17	**Social and distributional impacts**	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training. Likely to have a **moderate** distributional impact.	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training. Likely to have a **moderate** distributional impact.	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training.
F	18	**Scale of impact**	2	Land take required, will negatively impact land owners and wildlife. Delays expected along A1303 and A428 while work is being carried out. New road through already developed Cambourne may affect recently built houses.	3	Land take required, will negatively impact land owners and wildlife. Delays expected along A1303 and old A428 (St Neots) while work is being carried out. New road through already developed Cambourne may affect recently built houses. Route along existing corridor therefore will be able accommodate existing bus stop locations.	2	Large land take required, will negatively impact land owners and wildlife. Proximity of route to Highfields Caldecote, Hardwick and Coton would potentially allow pick ups here to accommodate locals. New road through already developed Cambourne may affect recently built houses. Delays expected along M11 while work is being carried out.
F	19	**Cost**	2	Developer- £9.45million Developer new bridge and junction over A428- £15million to 23million A1303 widening - £9.8million Madingley Mulch signalising- £4.9million **Estimated cost £47.15million**	4	Developer- £9.7million A1303 widening - £9.8million Madingley Mulch signalising- £4.9million Bus priority along old A428- £5million **Estimated cost £29.4million**	1	Developer- £8.33million Offline Route - £24.53million Park and Ride- £3.2million New M11 Bridge - £22million-£45million **Estimated cost £81.06million**
S	20	**GHG (green house gas)**	4	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions.	4	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions.	4	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions.
S	21	**Key uncertainties**	2	Unknown how the route will link to the developers sites and how they will be connected (priced for new road). Unknown if a new junction at Bourn Airfield is included in the developers plans. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact	3	Unknown how the route will link to the developers sites and how they will be connected (priced for new road). Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact	2	Unknown how the route will link to the developers sites and how they will be connected (priced for new road). Unknown proximity of route to wildlife site and size of wildlife sites near Highfields Caldecote and Hardwick. Unknown conditions for M11 bridge relates to large range in cost. Unknown available land through West Cambridge University site. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact
C	22	**Flexibility of option**	3	**(a)** The route is identified to run along an existing road network which has limited availability to increase the options but could be reduced without impacting on the surrounding highway. The crossing over the A428 would be required as part of the scheme to enable development of the route. The route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would have a lesser impact than the other routes and any works could be accommodated in the existing road network. If the route was stopped then the improved road network will be utilised in the existing network. **(c)** The nature of the route would limit any major amendments to the scheme given the direct link from the A428 to Cambridge centre along the A1303 .	3	**(a)** The route is identified to run along an existing road network which has limited availability to increase the options. A number of the individual elements within the option could be scaled up or down whilst utilising the existing network. The route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would have a lesser impact than some of the routes and any works could be accommodated in the existing road network. If the route was stopped then the improved road network will be utilised in the existing network. **(c)** The nature of the route would limit any major amendments to the scheme given the direct link from the A428 to Cambridge centre along the A1303 .	2	**(a)** As the route runs through open land there is flexibility to change route to accommodate additional locations and nodes. The proximity to the nearby firing range will limit the deviation of the route and the requirement to cross the M11 will also limit the overall route. **(b)** Stopping the scheme during construction would leave links insitu that may not serve any purpose to the local area or communities. **(c)** Due to the various constraints, such as listed buildings and SSI's, there is limited capability to change the route without impacting on areas that may restrict the route or development.
M	23	**Implementation Timetable**	3	Maximum estimated length of time to develop route: **15 months** Concurrent construction elements: **10 months** Operational constraints may exist on the existing live carriageway's which may extend duration of construction.	3	Maximum estimated length of time to develop route: **26 months** Concurrent construction elements: **15 months** Operational constraints may exist on the existing live carriageway's which may extend duration of construction.	1	Maximum estimated length of time to develop route: **38 months** Concurrent construction elements: **21 months** Assumed majority of off-line route can be developed without restrictions
		Total	48		51		#	

AST	No.	Assessment Criteria	Package 10		Package 11	
		Description of Option:		A segregated bus route would run through/around Cambourne and Bourn Airfield with stops at each. Central busway route south of Hardwick then heading north to a Park and Ride site located at near the A428/A1303 junction. An offline busway then continues north crossing Cambridge Road and the M11 to connect in to the existing Park and Ride site on Madingley Road. An online nearside eastbound only bus lane improvement along Madingley Road will help to benefit the existing Park and Ride site at Madingley to help serve the western side of the City Centre.		A Park and Ride site located at near the A428/A1303 junction would feed into an offline busway running between Coton and Madingley Rise, across the M11 and south of the West Cambridge University site to connect to Grange Road. A connection can be provided through the West Cambridge University site to access the existing Park and Ride Site on Madingley Road. Services could then run either north via Madingley Road or south via Sidgwick Avenue to access the City Centre.
		Key Strengths		• P&R capacity enhancements • P&R location tailored to meet maximum PT delays • Efficient at intercepting demand from Cambourne and Bourn Airfield • Route passes adjacent to P&R		• P&R capacity enhancements • P&R location tailored to meet maximum PT delays • Segregated bi-directional busway offers AM and PM peak congestion avoidance
		Key Weaknesses		• New M11 overbridge required • Does not serve Addenbrookes or the Science Park • Significant green field construction		• New M11 overbridge required • Does not serve Addenbrookes or the Science Park • High level of green field construction needed
AST	No.	Assessment Criteria	Score & summary of key impacts		Score & summary of key impacts	
S	1	**Congestion free PT serving the corridor (including new developments) in order to avoid an increase in current congestion levels and PT journey times**	4	Segregated, bi-directional PT service to Grange Road. No provision after Grange Road. P&R at Madingley Mulch to intercept a percentage of St Neots trips. St Neots not served.	5	Segregated, bi-directional PT route from Madingley Mulch to Grange Road. No provision after Grange Road. No additional PT provision west of Madingley Mulch. Likely to achieve some of the objective and have a **moderate** overall impact.
S	2	**PT serves key current/future trip generators in the A428 corridor (west of the M11), including Cambourne and Bourn.**	4	Package serves Cambourne and Bourn Airfield through the introduction of a segregated busway. P&R at Madingley Mulch will capture a proportion of Cambridge bound traffic from St Neots, however, there is no increased PT provision directly from St Neots. Additional connection to Hardwick and Coton may be possible with this package. Likely to achieve some of the objective and have a **moderate** overall impact.	2	P&R adjacent to the A428/A1303 will capture a proportion of trips originating to the west of Cambridge. Unable to serve Cambourne and Bourn Airfield for non-car available trips. High dependence on P&R service without direct PT only option from Cambourne west and Bourn Airfield. Likely to achieve some of the objective and have a **moderate** overall impact.
S	3	**PT serves key current/future trip attractors in Cambridge – Cambridge City Centre and other employment sites (i.e. Science Park, Addenbrooke's).**	2	Bus lane on A1303 serves Cambridge City Centre, however there are no new connection to Addenbrooke or the Science Park. Likely to achieve some of the objective and have a **moderate** overall impact.	2	Only serves the city centre. No new connection to Addenbrookes and the Science Park. Likely to achieve some of the objective and have a **moderate** overall impact.
S	4	**Intercept all pt trips in scope including non-car available.**	1	Package has potential to capture trips from Hardwick and Coton.	1	Relies on residents making use of the P&R only. No direct pick up in the key trip generators.
	9	**Peak journey times no more than the equivalent journey by car (and preferably less)**	5		3	
	10	**End to end journey time reliability better than the car alternative (as yet undefined)**	4	High level of JT reliability offered compared to car and service is on segregated bi-directional busway to Grange Road. Likely to achieve some of the objective and have a beneficial overall impact.	3	JT reliability along segregated bi-directional busway is expected to be high. Likely to achieve some of the objective and have a beneficial overall impact.
M	11	**Engineering feasibility**	2	There is a requirement for 4 minor structural works so that water courses can be crossed. There is a requirement for 5 major and 2 minor junction improvements along the proposed route. New bridge over M11 north of junction 11. Potential accident reduction measures (straightening) to A1303 St Neots road. Upgrade of existing junctions along A1303 to accommodate bus priority. Potential limits and restrictions to carriageway widening along the A1303.	2	There is a requirement for 4 major junction improvements along the proposed route. New bridge required over the M11 south of junction 11. Highway improvements through West Cambridge University site (unknown development layout).
E	12	**Environment impacts**	1	Busway (middle route) Segregated bus link from Cambourne to Bourn Airfield - Constraints - Proposed Submission Local Plan - Policy SS/6: New Village at Bourn Airfield; Policy NH/12 on Local Green Space; Policy TI/7: Lord's Bridge Radio Telescope; Listed buildings in vicinity; loss of Agricultural land Grade 2, 3a, 3b. • no significant adverse effects upon SEA objectives Segregated busway south of Hardwick to Madingely PnR via American Cemetery – Constraints – sparsely populated, avoiding main settlements. Unknown impact of buried heritage. Section east of Hardwick avoids Cotton completely. • no significant adverse effects upon SEA objectives Madingley Mulch P&R 3 options for location. Only south of A1303 has risk of impact on sensitive population receptors. Loss of agricultural land. Otherwise: • no significant adverse effects upon SEA objectives Madingley Road bus lane Constraints - Madingley Road passes through West Cambridge Conservation Area. Protected open spaces directly to the north of Madingley Road. The western end of Madingley Road in the vicinity of the M11 is designated Green Belt (Policy 4 Cambridge Local Plan) . Various Grade II listed buildings fronting Madingley Road. Flood Zone – Low probability. AQ/Noise – inbound nearside bus lane largely unpopulated within 50m until east of Storeys Way. • no significant beneficial or adverse effects upon SEA objectives	2	Madingley Mulch P&R 3 options for location. Only south of A1303 has risk of impact on sensitive population receptors. Loss of agricultural land. Otherwise: • no significant adverse effects upon SEA objectives Busway (partial route) Segregated busway south of Hardwick to Grange Road – Constraints – sparsely populated, avoiding main settlements. Unknown impact of buried heritage. Section east of M11 avoids Madingley Rd, so avoids impacted receptors immediately south of that link. Connection through university – most likely impact would be on heritage. • no significant adverse effects upon SEA objectives
	13	**Land take**	2	Total land take estimated to be around **296,000m2** excluding land through developments (dashed blue line on maps). Large amount of arable land take required. Some of the wildlife site land may require to be taken near Hardwick wood. Proximity of land take to ancients wood (Hardwick and Madingley) may create an issue.	3	Total land take estimated to be around 2**30,000m2.** University land take required through recently developed area south of Madingley Road.
M	14	**Stakeholder/public acceptance**	2	A new dedicated busway running adjacent to Madingley Wood and the American Cemetery is likely to opposed by locals and environmental groups. Likely to have a **moderate** overall impact.	3	A busway running through south of the West Cambridge University site may not be acceptable to the landowners. Likely to have a moderate overall impact.
S	15	**Contribution to land-use and planning policy**		Package addresses: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • HQPT demand/needs for developments between St Neots and Cambridge.		Package addresses: • bus priority and guided bus measures on radial routes into Cambridge. Package does not fully address: • objective for high quality segregated bus priority measures on the A1303 between its junction with the A428 and Queens Road, Cambridge. • HQPT demand/needs for developments between St Neots and Cambridge.
F	16	**Bus service commercial viability**	4	Service would be provided by extending existing commercial routes with improved times. Would expect good market potential and no competing rail. Likely to have a beneficial impact.	5	Service would be provided by extending existing commercial routes with improved times. Would expect good market potential and no competing rail. Likely to have a beneficial impact.
E	17	**Social and distributional impacts**	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training. Likely to have a **moderate** distributional impact.	NA	There are very few vulnerable groups living in proximity to the A428 corridor and many areas are amongst the 20% least deprived in England. The proposed improved journey reliability and accessibility may provide new opportunities to access employment, education or training. Likely to have a **moderate** distributional impact.
F	18	**Scale of impact**	2	Large land take required, will negatively impact land owners and wildlife. Proximity of route to Highfields Caldecote and Hardwick would potentially allow pick ups here to accommodate locals. New road through already developed Cambourne may affect recently built houses. Delays expected along A1303 and M11 while work is being carried out.	3	Land take required, will negatively impact land owners and wildlife. Delays expected along A1303 and M11 while work is being carried out.
F	19	**Cost**	1	Developer- £8.33million Offline Route - £21.4million Park and Ride- £7million New M11 Bridge - £22million-£45million **Estimated cost £81.73million**	1	Offline Route - £11.1million Park and Ride- £7million Optional Madingley link- £2.25million New M11 bridge- £22million to £45million **Estimated cost £65.35million**
S	20	**GHG (green house gas)**	4	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions.	3	The introduction of a bus priority measure should reduce the need to travel by car, thus reducing congestion and greenhouse gas emissions.
S	21	**Key uncertainties**	2	Unknown how the route will link to the developers sites and how they will be connected (priced for new road). Unknown proximity of route to wildlife site and size of wildlife sites near Highfields Caldecote and Hardwick. Unknown conditions for M11 bridge relates to large range in cost. Uncertain of ability to use existing bridge from slip road to access/egress new park and ride at Madingley Mulch. Potential to use Church Lane. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact	2	Unknown conditions for M11 bridge relates to large range in cost. Uncertain of ability to use existing bridge from slip road to access/egress new park and ride at Madingley Mulch. Potential to use Church Lane. Unknown available land through West Cambridge University site. Lack of fixed route alignment prevents certainty on environmental impact Lack of scale of traffic change prevents certainty on environmental impact
C	22	**Flexibility of option**	2	**(a)** As the route runs through open land there is flexibility to change route to accommodate additional locations and nodes. The option does have potential to develop the areas around the A428 Madingley junction for additional options. Although the route along Madingley is potentially restricted by the extent of the corridor available for construction. **(b)** Stopping the scheme during construction would leave some links insitu that may not serve any purpose to the local area or communities. The route beyond the A428 has the potential to deliver a route into Cambridge linking with the existing park and ride site. **(c)** Due to the various constraints, such as listed buildings and SSI's, there is limited capability to change the route without impacting on areas that may restrict the route or development.	2	**(a)** The route runs mainly through open land and there is flexibility to alter the route in this area. With the University development in on the eastern side of the M11 the route may be limited in terms of alignment and diversion. Access over the M11 is limited to localised areas to accommodate the proposed route. **(b)** Stopping the scheme during construction would leave some links insitu that may not serve any purpose to the local area or communities. Failure to complete the crossing over the M11 will severe the proposed link into Cambridge. **(c)** The constrain of the M11 and nearby Coton and the University limit any revisions that may be required to the route.
M	23	**Implementation Timetable**	1	Maximum estimated length of time to develop route: **34 months** Concurrent construction elements: **23 months** Assumed majority of off-line route can be developed without restrictions Operational constraints may exist on the existing live carriageway's which may extend duration of construction.	1	Maximum estimated length of time to develop route: **32 months** Concurrent construction elements: **22 months** Operational constraints may exist on the existing live carriageway's which may extend duration of construction.
		Total	43		43	

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