MOTT MACDONALD

Cambridge South East Transport Phase 2

Outline Business Case

Appendix G: Environmental Appraisal Report

15 May 2020

Mott MacDonald
22 Station Road
Cambridge CB1 2JD
United Kingdom

T +44 (0)1223 463500
mottmac.com

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1 Introduction

1.1 Purpose of this document

This document is the Environmental Appraisal Report (EAR) produced to support the Outline Business Case (OBC) being developed for the Cambridge South East Transport (CSET) Phase 2 scheme.

The information presented here is used in developing the Economic Case of the OBC and contributes to the final Appraisal Summary Table.

The report summarises the assessments undertaken on the key environmental disciplines that broadly follow the appraisal guidance of the Department for Transport, specifically as set out in WebTAG Unit A3. This guidance focuses on the following environmental topics;

- Air quality (*)
- Biodiversity
- Greenhouse gases (*)
- Historic environment
- Landscape
- Noise (*)
- Water

Topics with an asterisk (*) can be used to develop a Net Present Value of the level of impact which can feed into the Benefit Cost Ratio. However, WebTAG requires a proportionate approach and on some projects the level of impact or the stage of scheme development may not justify a fully quantified impact appraisal.

The OBC process identifies a preferred scheme using inputs from the environmental appraisal, amongst other criteria, for decision makers to approve to be taken forward for the next stage of scheme development and planning.

It is important to note that the WebTAG process is not an environmental impact assessment, the full environmental impact assessment (EIA) is carried out on the preferred scheme once the OBC is approved. WebTAG is an options appraisal process that seeks to identify the key environmental assets that could be affected by different options in a way that contributes to identifying the best option to take forward into scheme development.

1.2 Overview of the Scheme

1.2.1 Introduction and Scheme Location

CSET Phase 2 will deliver a new dedicated public transport route between the A11/A1307/A505 and the Cambridge Biomedical Campus (CBC) via Sawston, Stapleford and Great Shelford. At the CBC, the new route is proposed to run on dedicated public transport lanes on Francis Crick Avenue, connecting to the existing Guided Busway, enabling services to continue to Cambridge Station and Cambridge City Centre via the Guided Busway. Stops on the new route would be provided at the CBC, Great Shelford, Stapleford, Sawston and the new Travel Hub site. A CBC stop would be located near to the proposed Cambridge South Station to enable easy interchange with rail services in the future and access to the CBC. All stops would have the following facilities.

- Platforms with shelter and real-time passenger information;

- Drop off facilities;
- Disabled parking; and
- Cycle parking and cycle lockers.

A new multi-user path, generally 3-4 metres wide, would also be provided along the length of the public transport route. The multi-user path will serve a range of non-motorised uses, such as cycling, walking, horse riding and for use by mobility scooters and electric bikes. The path will be hard surfaced to enable use during all weathers for both commuting and leisure.

A new Travel Hub facility will also be delivered near the A11/A1307/A505 interchange to supplement capacity and facilities at the existing Babraham Road Park & Ride site. A Travel Hub is an interchange which allows people from the surrounding areas to access sustainable transport networks, such as public transport, walking and cycling routes.

Phase 2 of the CSET scheme proposes a range of longer-term public transport improvements that build on CSET Phase 1, noting that there may be some overlap in the delivery of some Phase 1 schemes with Phase 2. However, in terms of this report it is assumed that all elements of Phase 1 are complete or committed and thus these are included as the baseline for appraising Phase 2 options.

1.3 Scheme Options

Figure 1 shows the five segregated public transport route options and the three potential Travel Hub sites. The route options provide a dedicated public transport way following the same route east between CBC and Sawston, after which they diverge to Travel Hub Site A (Purple Route), Site B (Brown and Pink Routes) and Site C (Black and Blue Routes).

1.3.1 Purple Option to Travel Hub Site A

The Purple route is the shortest of all options and crosses the River Granta only once and parallels the old railway alignment that is now a County Wildlife Site near the High Street. It stops to the west of the A11/A505 junction where it would enter Travel Hub Site A. General traffic access to the travel hub would be via a new roundabout junction to the north of the A505 slip road and require an extended access road to the site itself (necessary in order to avoid the high-pressure gas pipeline). The site would provide capacity for approximately 2,000 cars but has potential for expansion.

1.3.2 Brown Option to Travel Hub Site B

The Brown Route takes a direct route from Sawston across fields towards the A11, which includes a second crossing of the River Granta. The Brown route also ends at Travel Hub Site B which would have a layout to accommodate public transport vehicles entering the site from the west. The scheme could provide parking for up to 2,800 cars.

1.3.3 Pink Option to Travel Hub Site B

The Pink option follows the same alignment as the Purple option but goes beyond the Purple route towards the A505 before curving northwards crossing the River Granta for a second time to terminate at Travel Hub Site B to the north of the River Granta. Under this route orientation the Travel Hub would have a layout to accommodate public transport vehicles entering the site from the south. Private vehicle access would be off the A1307 on the northern edge of the Travel Hub. The scheme could provide parking for up to 2,500 cars.

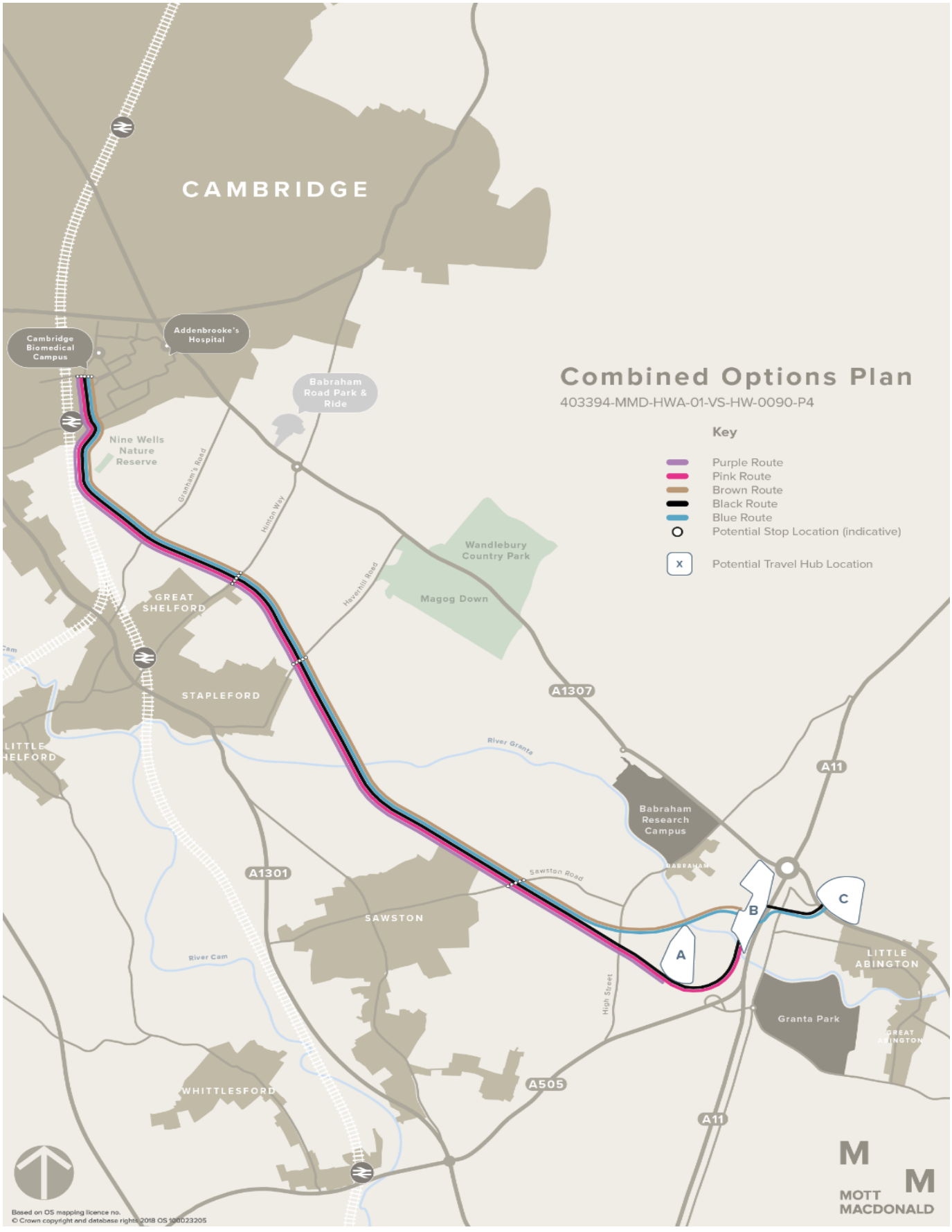
1.3.4 Black Option to Travel Hub Site C

The Black route follows the Pink route to the A11 and then follows the Blue Route option to terminate at Travel Hub Site C. The Travel Hub would have parking for up to 2,100 cars.

1.3.5 Blue Option to Travel Hub Site C

The Blue route follows the Brown route across fields from Sawston to cross the A11 via a new bridge, then it crosses Newmarket Road, runs to the south of the former Comfort Café site and crosses the A1307 via a new junction to connect with Travel Hub Site C, located on the north side of the A1307. All new junctions would be at-grade and signalised with priority for public transport vehicles. Site C would have a separate roundabout junction to provide general traffic with access into the site between the A1307 and Newmarket Road. It could provide parking for up to 2,100 cars.

Figure 1: Scheme Options - Five public transport routes and three Travel Hubs



2 Appraisal Methodology

2.1 Introduction

There are individual approaches to impact assessment that are taken through the appraisal process for each environmental topic.

The assessments for environmental topics will generally follow TAG Unit A3 and are documented in the TAG environmental impacts worksheets. However, it is important that the assessments are proportional to the stage of the process (i.e. options appraisal) and based on the availability of the data and the potential scale of the impacts.

Some topics may require a more detailed assessment (depending on the scale of change proposed from a specific development) and in such cases the assessment will follow that set out in DRMB Volume 11 (e.g. traffic related topics require output from the traffic modelling to inform the appraisal and may justify detailed modelling following the methodology set out in DRMB Volume 11 for that topic).

Each topic section in this report sets out the scale of the potential impact and the proportionate approach taken to assessing the impacts for that specific topic area.

2.2 Scoping and Proportionality

A key element of the WebTAG appraisal process is that the process should not try and replicate an EIA process at all stages of options definition and selection. The level of detail and scope should be based on the stage of the options appraisal leading to a preferred scheme being identified.

Where limited data is available then it is a requirement that the limitations are noted in the appraisal process, particularly if this could affect the conclusions being drawn. Assumptions need to be clearly stated as well and if appropriate, a precautionary approach taken in the appraisal.

The impacts assessed following the WebTAG process either arise as a direct result of changes in traffic (air quality, noise and greenhouse gases) or are those that arise in the surrounding area from the new development (landscape and townscape, biodiversity, heritage and the water environment).

In completing WebTAG appraisals it is not usual to require the impacts from construction to be taken into account. The construction effects are more appropriately assessed in the EIA of the preferred scheme.

2.3 General Assessment Assumptions and Limitations

The majority of the WebTAG assessment was based on publicly available data, data from surveys undertaken at an earlier stage of development, Cambridgeshire and Peterborough Environmental Records Centre biological records, and Cambridgeshire Historic Environment Record data. For noise, greenhouse gases and air quality, the assessments were based on appropriate traffic data. More details on the methodology followed by each of the environmental disciplines are described in the relevant sections of the report.

2.4 Mitigation and Enhancement Measures

While mitigation and enhancement measures are expected to be developed at a later stage for the preferred option only, early design concepts include the use of planting to reduce the potential impact of a new Travel Hub on the landscape. Standard design measures that would be required to meet normal design practice (e.g. drainage designed to avoid creating flood risks on or off site) are assumed to be included in all options.

As the design progresses mitigation and enhancement measures to avoid or minimise specific environmental effects will be incorporated with the design, through the detailed EIA process.

3 Air Quality

3.1 Introduction

This section presents the applicable legislation, the methodology, study area, existing baseline and results of the assessment that has been undertaken with regards to air quality.

An assessment using the marginal external costs (MEC) methodology has been undertaken for air quality to obtain the monetised impact on air quality for the preferred scheme in the Economic Case.

3.2 Legislation and Policy Context

3.2.1 National Legislation and Policy

Directive 2008/50/EC[1] on ambient air quality and cleaner air for Europe was adopted in May 2008. This Directive defines limit values, and dates by which they are to be achieved, for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

Directive 2008/50/EC sets out that the limit values apply everywhere with the exception of:

- any locations situated within areas where members of the public do not have access and there is no fixed habitation
- in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply
- on the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation.

3.2.2 Legislation

The Air Quality Standards Regulations 2010 and the Air Quality Standards Regulations (Amendment) Regulations 2016 implement the EU's Directive 2008/50/EC on ambient air quality for the UK.

Part IV of the Environment Act 1995[2] requires that every local authority shall periodically carry out a review of air quality within its area, including predictions of likely future air quality scenarios. As part of this review, the local authority must assess whether air quality objectives are being achieved, or likely to be achieved within the relevant periods. Any parts of a local authority's area where the objectives are not being achieved or are not likely to be achieved within the relevant period must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000[3] and the Air Quality (England) (Amendment) Regulations 2002[4]. In most cases, the air quality objectives are set at the same pollutant concentrations as the limit values specified in the EU Directives although compliance dates differ.

[1] European Union (April 2008) Directive on Ambient Air Quality and cleaner Air for Europe, Directive 2008/50/EC Official Journal, vol. 152, pp. 0001-0044

[2] Defra (2003). Part IV of the Environment Act 1995 Local Air Quality Management.

[3] Statutory Instrument (2000). Air Quality (England) Regulations, No. 928.

[4] Statutory Instrument (2002). Air Quality (England) (Amendment) Regulations, No. 3043.

3.2.3 Air Quality Standards

Applicable air quality standards are summarised in Table 1.

Table 1: Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date	
				Air Quality Objectives	EU Limit Values
Nitrogen dioxide (NO_2)	Annual	40 µg/m^3	-	31 December 2005[a]	1 January 2010[b]
	1 Hour	200 µg/m^3	18	31 December 2005[a]	1 January 2010[b]
Particulates (PM_{10})	Annual	40 µg/m^3	-	31 December 2004[a]	1 January 2005[b]
	24 Hour	50 µg/m^3	35	31 December 2004[a]	1 January 2005[b]
Fine particulates ($PM_{2.5}$)	Annual	25 µg/m^3	-	2020[b]	2015[b]

Notes: [a] Air Quality (England) Regulations 2000 as amended in 2002
[b] EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe and The Air Quality Standards Regulations 2010. Derogations (time extensions) have been agreed by the EU for meeting the NO_2 limit values in some zones/agglomerations;

3.3 Assessment Methodology

3.3.1 Qualitative Methodology for Options Appraisal Report

A qualitative air quality assessment for all five options has been undertaken for the Options Appraisal Report (OAR). At the time of option assessment detailed traffic information was not available, as such it was not feasible to undertake an assessment based on the air quality methodology set out in TAG Unit A3 but an assessment following the MEC process was completed (see below) for the Economic Case for the preferred scheme.

The qualitative assessment considered the likely changes in traffic flows and the number and location of the sensitive receptors with respect to the scheme option. Appendix 10.C summarises the results of the air quality assessment for each route option.

3.3.2 Quantitative Methodology for EAR

The Preferred Option has been assessed quantitatively using the TAG Unit A.5.4 MEC process, and the Net Present Value (NPV) has been calculated based upon this approach. This requires a four-step process which is detailed below.

- Step 1 - estimate the change in car kilometres
  - This will be for both the opening year and for at least one other forecast year. This will be through the implementation of diversion factors. Diversion factors for the public transport vehicles can be calculated through table A.5.4.6 in the TAG data book, this is broken down into geographical area and journey types.
- Step 2 - analyse the characteristics of the car journeys
  - The proportions of traffic can be assigned from the TAG data book using table A5.4.1. Traffic for the opening year can be estimated from linear interpolation of the data for 2010 and five-year intervals to 2035.
- Step 3 – Marginal external cost results

  - The previous steps will provide the change in car kilometres by road type, area type and congestion level for the opening year and, usually, at least one other forecast year. These can then be used with the marginal external costs given in the TAG data book table A5.4.2, disaggregated in the same way, to estimate the decongestion benefits in the opening and forecast year.
- Step 4 – Calculation of discounted external costs of car use for whole appraisal period
  - The previous steps will provide the total undiscounted external costs of changes in car use. Interpolation and extrapolation are used to derive individual values for all future years. This should take into consideration TAG Unit A1.1.

3.4 Study Area

A description of the options is presented in Section 1.3. The differences between options are minor in terms of the likely area affected, and so would not require significantly different study areas based on the likely changes in traffic flows. Therefore, the study area covers the A1307 corridor into Cambridge and the villages along the route (viz, the Abingtons, Babraham, Sawston, Stapleford and Great Shelford) and the Cambridge Biomedical Campus. All five scheme options follow the same route east between CBC and Sawston, resulting in no difference between the options along the majority of the scheme.

For all options, changes in future traffic on the local road network have the potential to decrease along the A1307 due to the increased provision of public transport compared to a “do nothing scenario”. It would be expected that there would be an increase in traffic on the local road network approaching the Travel Hub sites.

The quantitative assessment of the preferred option using the MEC approach does not define a study area based on changes in traffic flows.

3.5 Baseline Information

3.5.1 Overview

Baseline air quality information is obtained from a variety of sources including local authorities, national networks monitoring sites and other published sources. For the purpose of this EAR data was obtained from Defra’s Air Information Resource website[5], Cambridge City Council and South Cambridgeshire District Council. The most recent year of monitoring data available for Cambridge City Council and South Cambridgeshire District Council is for 2018. This data was available in the Cambridge City Council Annual Status Report 2019[6] and the South Cambridgeshire District Council Annual Status Reports 2019[7].

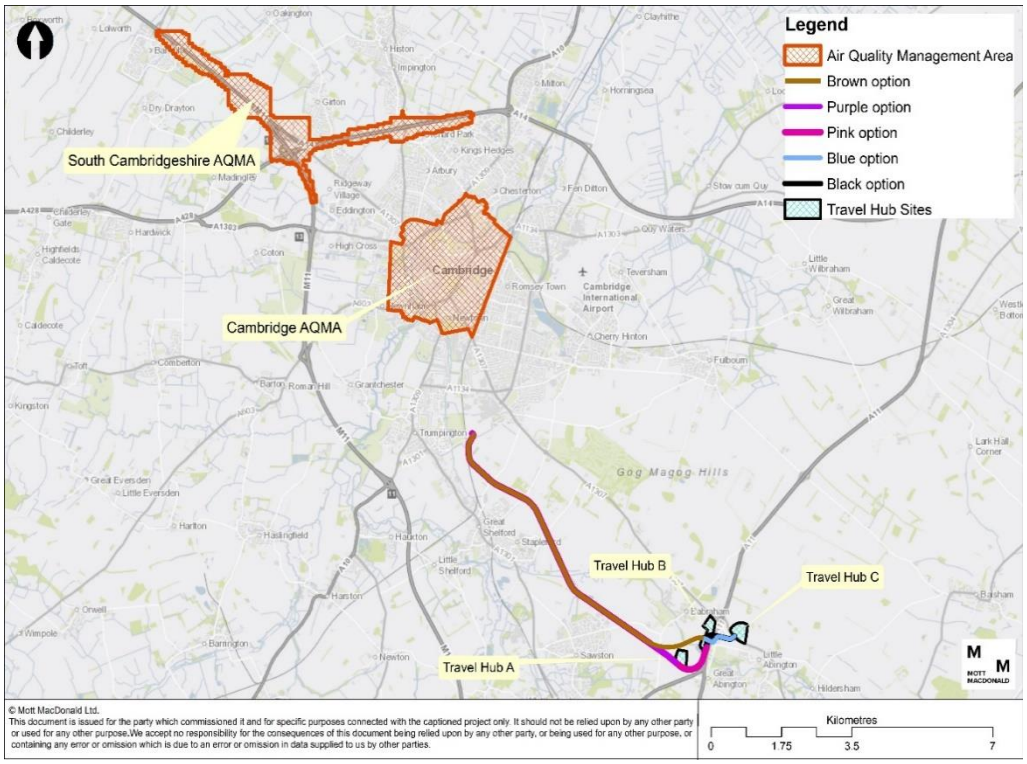
The closest AQMA to the study area is the Cambridge AQMA which is approximately 2.3km north of the Cambridge Biomedical Campus. Figure 2 shows the location of the AQMAs in relation to the options.

[5] Department for Environment Food and Rural Affairs. Air Quality Information Resource (Air) Website, available at: http://uk-air.defra.gov.uk

[6] Cambridge City Council (2019). 2019 Air Quality Annual Status Report (ASR), August 2019.

[7] South Cambridgeshire District Council (2019). 2018 Air Quality Annual Status Report (ASR), June 2019.

Figure 2 - Scheme Locations in Relation to the AQMA



3.5.2 Local Authority Review and Assessment

3.5.2.1 Overview

The Cambridge city AQMA was designated by Cambridge City Council in 2004 as a result of air quality in the city exceeding the annual mean NO_2 objective. South Cambridgeshire District Council (SCDC) has also designated an AQMA along the A14 which is located 6.6km north west of the five options, this AQMA was designated in 2008 for exceeding both the annual mean NO_2 objective and the daily mean PM_{10} objective.

The City Council undertakes automatic monitoring for NO_2 and PM_{10} at five locations within the borough, these sites are all located within Cambridge City Centre and are not considered representative of existing air quality close to the five scheme options.

SCDC undertakes automatic monitoring at three sites within the district. One of these sites is the Orchard Park Primary School, which is located approximately 7.1km north of the scheme. This site monitors NO_2, and PM_{10} and started monitoring $PM_{2.5}$ in July 2019. The site is considered representative of the conditions likely to occur in the study area. The results from this monitor are presented below. The remaining two SCDC automatic monitors are classified as a 'roadside' location adjacent to the A14 and within Girton. Given these are monitoring conditions on heavily trafficked roads, it is considered these are not representative of baseline conditions for the scheme options and are not considered further.

3.5.2.2 Nitrogen Dioxide

The monitoring results from the Orchard monitoring station shows that NO_2 concentrations were well below the annual and 1-hour mean objectives between 2016 to 2018.

Table 2: Automatic Monitoring Data for Annual Mean and 1-hour NO_2 Objectives

Site name	Site classification	Within AQMA	National grid reference		NO_2 concentration ($\mu g/m^3$)		
			X	Y	2016	2017	2018[(a)]
Orchard	Urban Background	No	544558	261579	18 (0)	18 (0)	14 (0)

Source: South Cambridgeshire District Council Annual Status Report 2019.
Note: [(a)] Annual Data Capture for 2018 is 92%. Bold indicates an exceedance of NO_2 objective (Annual Mean: 40µg/m^3; 1-Hour: 200µg/m^3 not to be exceeded for more than 18 hours per year). Values in brackets shows number of hours above 200 µg/m^3 in line with 1-hour mean objective

3.5.2.3 Particulate Matter (PM_{10})

There were no exceedances of the PM_{10} annual, or 24-hour mean objectives in 2016 to 2018, concentrations at the Orchard automatic monitoring station were below the objectives.

Table 3: Automatic Monitoring Data for Annual Mean PM_{10} Objective

Site name	Site classification	Within AQMA	National grid reference		Annual mean NO_2 concentration ($\mu g/m^3$) (number of days above 50µg/m^3)		
			X	Y	2016	2017	2018[(a)]
Orchard	Urban Background	No	544558	261579	16 (1)	14 (1)	14(1)

Source: South Cambridgeshire District Council Annual Status Report 2019.
Note: [(a)] Annual Data Capture for 2018 is 92%. Bold indicates an exceedance of the PM_{10} objective (Annual Mean: 40µg/m^3; 24-Hour Mean: 50µg/m^3 not to be exceeded for more than 35 days per year)

3.5.3 Local Authority Diffusion Tube Monitoring

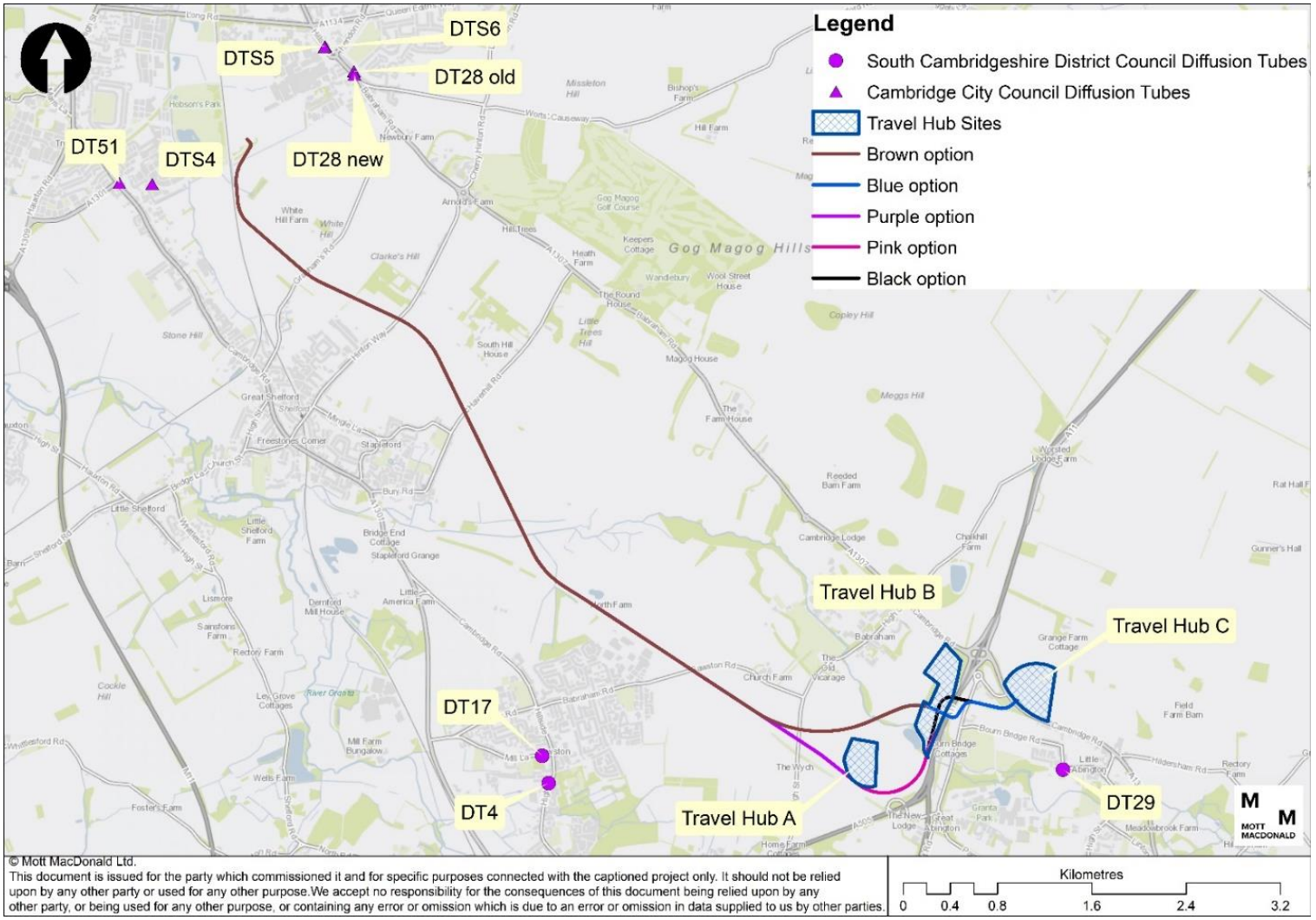
SCDC undertakes diffusion tube monitoring at 27 sites within the district. There are three diffusion tubes located within 1.6km of the proposed scheme. CCC undertook diffusion tube monitoring at 64 sites within the district in 2017 with six within 1.5km of the scheme. The monitoring data from these sites shows that NO_2 concentrations were well below the objectives between 2015 to 2018. Figure 3 shows the location of these sites.

Table 4: Non-Automatic Monitoring Data for NO_2

Site name	Site classification	Within AQMA	National grid reference		Annual mean NO_2 concentration ($\mu g/m^3$)			
			X	Y	2015	2016	2017	2018
DT29	Urban Background	No	552961	249251	11.3	12.5	11.0	10.0
DTS4	Roadside	No	545237	254212	-	22.0	18.0	17.0
DT4	Urban Background	No	548600	249136	23.8	26.6	26.1	24.7
DT17	Roadside	No	548545	249366	14.3	16.4	14.1	13.1
DT28 old	Roadside	No	546948	255169	22.0	24.0	19.0	-
DT28 new	Roadside	No	546953	255138	20.3	21.0	21.3	16.6
DTS5	Roadside	No	546702	255380	-	27.0	24.0	22.0
DTS6	Roadside	No	546700	255374	-	27.0	22.0	21.0
DT51	Roadside	No	544960	254220	27.0	27.0	24.0	22.0

Source: South Cambridgeshire District Council Annual Status Report 2018 and Cambridge City Council Annual Status Report 2019. Diffusion tube data has been bias corrected by SCDC and CCC.

Figure 3: CCC and SCDC Monitoring Locations



3.5.4 Scheme Specific Monitoring

There is no scheme specific monitoring available, although air quality monitoring will be carried out to inform the EIA baseline of an approved Preferred Option.

3.5.5 Defra Projected Background Concentrations

Defra provides estimates of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ across the UK for each one-kilometre grid square for every year from 2017 to 2030. Future year projections have been developed from the base year of the background maps, which is currently 2017. The maps include a breakdown of background concentrations by emission source, including road and industrial sources which have been calibrated against 2017 UK monitoring data.

The highest background concentrations for the 1km grid square that contain the options in 2019 is presented in Table 5 below. All five options are in close proximity to each other, and due to the background data only being available on a 1km grid square, all five options have the same background concentrations. The data shows background concentrations are all below the relevant objectives.

Table 5: Defra Projected Background Concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ for Proposed Development Site in 2019 (µg/m^3)

Grid Square	2019 Defra background			
	NO_X	NO_2	PM_{10}	$PM_{2.5}$
551_249	15.2	11.2	17.8	10.5

Source: https://uk-air.defra.gov.uk/data/laqm-background-maps
Note: Across the five options 13 different background squares contain the different options. The maximum concentration for all five options is in grid square (551500, 249500)

3.5.6 EU Limit Value Compliance

Defra's Pollution Climate Mapping (PCM) model is used to report UK compliance with the Air Quality Directive. The current published version of the PCM model is developed using a base year of 2017 and concentrations are predicted for 2019.

The nearest PCM model link to all five scheme options is located approximately 0.7km south of all five options and is a section of the A1301. The predicted NO_2 concentrations on the road for 2019 is 17.0µg/m^3, which is well below the EU limit value. There are a number of PCM links within Cambridge City Centre, they are also all well below the air quality limit value in 2019. As all PCM links in the area are below the limit values it is unlikely that the any of the five options would cause a non-compliance with the Air Quality Directive.

3.5.7 Summary

The existing pollutant concentrations along the proposed scheme are likely to all be below the relevant air quality objectives and EU limit values. All the scheme options are located in the same area and therefore the baseline for each of the options would essentially be the same.

3.6 Sensitive Resources and Receptors

In accordance with TAG Unit 3 method, the receptors included within the qualitative assessment were those where the annual mean air quality objectives are applicable for the protection of human health and are within 200m of the scheme option.

The human receptors were determined from Ordnance Survey AddressBase dataset which details the classification of receptors[8]. Receptors included residential properties, educational facilities, hospitals and prisons.

3.7 Results of Assessment

3.7.1 Receptors

A receptor count has been undertaken for each of the scheme options to identify the number of properties that could potentially be affected. The numbers of receptors within 200m of each of the scheme options are presented below in Table 6. This shows that the number of potentially affected receptors is very small (all less than 60), and the numbers are broadly the same. There are no receptors within 50 metres for three schemes (Purple, Pink and Brown), the nearest receptor is North Farm which is approximately 76m away from these routes. However, the Blue and Black schemes have seven receptors approximately 50m away located on Cambridge Road within Little Abington, these are the closest receptors for all schemes.

These receptors have the potential to experience either a benefit in air quality or a deterioration but considering the similarities in the scheme options and the likely traffic effects the changes would be broadly similar and very small.

Table 6: Scheme Option Receptor Counts

Scheme option	Receptors within 200m
Black	58
Blue	51
Brown	34
Pink	43
Purple	26

3.7.2 Results of Assessment Qualitative Methodology (OAR)

The initial qualitative assessment concluded that the proposed route alignments would not be expected to cause substantial changes to traffic flows on the surrounding road network. Traffic on the local road network has the potential to decrease along the A1307 due to the increased provision of public transport which should lead to a potential improvement in air quality. It would be expected that there would be an increase in traffic (with possible negative impact on air quality) on the local road network approaching the Travel Hub sites but considering the existing air quality, and minimal number of receptors in these areas this would not result in significant effects.

Overall, the changes in air quality from any of the scheme options is judged to be de minimis. As such air quality is not likely to influence the decision-making process for the scheme options.

3.7.3 Quantitative Methodology (Preferred Route)

The Net Present Value (NPV) of the preferred option has been calculated by the MEC method, the results of which are presented in the Economic Case.

[8] Ordnance Survey (2013). Address Base Products Classification Scheme. October 2013.

4 Biodiversity

4.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the qualitative WebTAG assessment that has been undertaken with regards to biodiversity.

4.2 Legislation and Policy Context

The construction and operational activities for proposed works must comply with European and UK nature conservation legislation, and with national and local biodiversity policies.

4.2.1 National Legislation and Policy

The main pieces of legislation in the UK are the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017. The biodiversity policies which are most relevant are the National Planning Policy Framework (NPPF, 2019) and Biodiversity 2020 (DEFRA, 2011).

Under the Natural Environment and Rural Communities (NERC) Act 2006, all public bodies are required to have regard to biodiversity conservation when carrying out their function. Section 41 (S41) of the act requires a list of habitats and species that are of principal importance for the conservation of biodiversity in England to be published. Local authorities are required to take note of habitats and species on the S41 list(s) when assessing development.

4.2.2 Local Legislation and Policy

The Cambridgeshire and Peterborough Biodiversity Group provide Biodiversity Action Plans (BAPs) for the habitats and species within Cambridgeshire.

Cambridge City Council have produced a document Biodiversity Checklist, Developers Guidance (Cambridge City Council, 2001).

4.3 Assessment Methodology

The purpose of this appraisal is to identify the significance of the impacts of the various proposed scheme options on biodiversity interests. The appraisal study follows WebTag Unit A3 environmental impact appraisal guidance using the following sources:

- Preliminary Ecological Appraisal, including a Phase 1 Habitat Survey of the study area and a desk study of the broad corridor of the potential new public transport route between the A11/A1307 and CBC (Plowman Craven 2018).
- Biological records obtained from the Cambridgeshire and Peterborough Environmental Records Centre;
- Multi-Agency Geographic Information for the Countryside;
- Joint Nature Conservation Committee; and
- Cambridgeshire and Peterborough Biodiversity Group.

4.4 Study Area

The study area encompasses the footprint of five options Black, Brown, Blue, Purple and Pink and the footprint of the three Travel Hubs.

The current guidance on ecological assessments (CIEEM, 2018) recommends that all ecological features that occur within a 'zone of influence' (ZoI) for a proposed development are investigated. The ZoI includes:

- Areas directly within the land take for the proposed development and access;
- Areas which will be temporarily affected during construction;
- Areas likely to be impacted by hydrological disruption; and
- Areas where there is a risk of pollution and noise disturbance during construction and/or operation.

The ZoI is variable depending on the ecological receptors affected. With respect to this report, it is considered to be all land within the site boundary unless stated otherwise.

4.5 Baseline Information and Receptors

4.5.1 Black, Brown, Purple and Pink Options, Travel Hub Sites A, B and C:

There is one international designated site designed for bats within 30km of the options, Eversden and Wimpole Woods Special Area of Conservation (SAC) at approximately 10.5km to the west.

There are five nationally designated sites located within 2km of the options:

- Gog Magog Golf Course Site of Special Scientific Interest (SSSI), located approximately 1.2km to the west;
- Dernford Fen SSSI, located 1.2km to the north-east;
- Roman Road SSSI, located 1.6km to 1.7km from Travel Hub Sites B and C;
- Sawston Hall Meadows SSSI, located 1.05km to the south-west; and
- Nine Wells Local Nature Reserve (LNR), located 80m to the east.

There are two non-statutory sites for nature conservation within 2km of the options:

- River Granta County Wildlife Site (CWS), within the options footprint; and
- Shelford – Haverhill Disused Railway (Pampisford) CWS, located approximately 35m to the south-west.

The following habitats have been identified within the options footprint:

- Semi-improved neutral grassland (Priority habitat on the Cambridgeshire and Peterborough Habitat Action Plan (HAP));
- Improved grassland;
- Broadleaved semi-natural woodland (Habitat of Principal Importance (HPI) and Priority habitat on the Cambridgeshire and Peterborough HAP);
- Scattered trees;
- Arable (Priority habitat on the Cambridgeshire and Peterborough HAP);
- Species rich and species poor hedgerows; (HPI and Priority habitat on the Cambridgeshire and Peterborough HAP) and;

- Standing and running water (HPI and Priority habitat on the Cambridgeshire and Peterborough HAP).

The habitats onsite have the potential to support the following protected and notable species:

- Roosting bats in nearby woodland, foraging and commuting bats along hedgerows. (seven species of bat are listed under Section 41 of the NERC Act 200 and are also listed in the Cambridgeshire and Peterborough BAP);
- Reptiles in semi-improved grassland and hedgerows (reptiles are listed under Section 41 of the NERC Act 2006 and four species of reptile are contained within the priority species list in the Cambridgeshire and Peterborough BAP);
- Great crested newts will use ponds for breeding and terrestrial habitats such as, grassland and hedgerows (listed under Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP);
- Badger, the habitat in the study area is suitable for sett construction and foraging;
- Breeding birds (including kingfishers), the habitat in the study area is suitable for nesting and foraging birds (some species are included within Section 41 of the NERC Act 2006);
- Barn owl, suitable roosting and foraging habitat has been identified within the zone of influence of the proposed scheme corridor;
- Terrestrial Invertebrates, the grassland habitat and hedgerows onsite provide suitable habitat for terrestrial invertebrates (some species are included within Section 41 of the NERC Act 2006);
- Water vole and otter, the River Granta provides suitable habitat for these species (both listed under Section 41 of the NERC Act 2006 and a priority species in the Cambridgeshire and Peterborough BAP);
- White clawed-crayfish, the River Granta provides suitable habitat for these species (listed under Section 41 of the NERC Act 2006 and are a priority species in the Cambridgeshire and Peterborough BAP);
- Other Species of Principal Importance including harvest mouse, common toad and hedgehog can be found within the grasslands and some may be found in ponds (all are listed under Section 41 of the NERC Act 2006 and are priority species in the Cambridgeshire and Peterborough BAP).

4.5.2 Blue Option, Travel Hub Site C

The baseline for the Blue option is the same as the Black, Brown, Purple and Pink options with the exception of Alder Carr SSSI, located approximately 1.5km to the south east of the Blue option.

4.6 Summary of Assessment

A summary of the assessment is presented here. More details on the assessment of the potential effects of the options can be found in the Biodiversity WebTAG worksheets in Appendix 10.D.

The Travel Hub sites are all of a similar nature being arable fields with limited biodiversity value so there is not much difference between the three Travel Hub options. As such the differences between the Travel Hub sites are not significant in biodiversity terms. The greater differences are between the routes to the hubs, although as these all have a significant proportion that is common the main differences are in the route sections that diverge between the Travel Hub sites and Sawston.

4.6.1 Purple (Travel Hub Site A), Pink (Travel Hub Site B) and Black (Travel Hub Site C) Options

Barbastella Barbastellus maternity roost. As barbastelle bats will travel 20km to foraging grounds, there is a potential that bats from the SAC could be affected by loss of habitat connectivity, severance of commuting routes and risk of impacts to individual bats. Due to this a Slight Adverse impact is anticipated upon the bats associated with the SAC.

Gog Magog Golf Course, Roman Road, Dernford Fen, Sawston Hall Meadows and Alder Carr SSSI's will not be impacted by the options or the Travel Hubs as they are all over 1km from these options, therefore a Neutral impact is anticipated.

Nine Wells LNR is located 80m from these routes, but the LNR is over 6.8km from the nearest possible Travel Hub site, therefore due to the distance of the Travel Hubs from the LNR a neutral impact on the LNR from these would occur. However, impacts arising from possible airborne pollution from the operation of non-electrified vehicles on the route may cause a slight adverse impact upon the LNR, which would reduce to neutral once zero emission vehicles were introduced.

The Shelford - Haverhill Disused Railway (Pampisford) CWS is located 35m from the Black, Purple and Pink options, 50m from Travel Hub Site A, and 500m from Travel Hub Site B. The River Granta CWS is adjacent to Travel Hub Site A and within 200m of Travel Hub Site B. All the route options cross the CWS in two locations, apart from the Purple route which only crosses the CWS in one location. The route alignments are not expected to increase risks from airborne pollutants impacting the CWS's, however traffic from the routes and Travel Hub Sites A and B are likely to cause impacts arising from changes in airborne pollutants (from the close proximity of the Travel Hubs to the CWS's), this may cause a slight adverse impact upon the CWS's. There is a very low risk of pollutants from the roads impacting the CWSs if runoff reaches the river through any SUDs design. Travel Hub Site C is located 1.5km from The Shelford - Haverhill Disused Railway (Pampisford) CWS so a neutral impact is anticipated.

There will be a slight adverse impact on the semi-improved neutral and improved grassland, arable, scattered trees, running and standing water and broadleaved semi-natural woodland due to the loss and fragmentation of habitats, with a moderate adverse impact upon hedgerows due to loss and severance from all options and Travel Hubs.

The proposed options and Travel Hubs for Phase 2 of the scheme have the potential to affect badger, birds, great crested newts, otter, water vole, white clawed crayfish, barn owl, invertebrates, reptiles and other Species of Principal Importance (SPI) through loss and severance of habitats, therefore a slight adverse impact is anticipated.

The proposals for the Phase 2 options (including Travel Hubs) will not be a major road and the hours of operation are unlikely to overlap with activity times for bats which will reduce the risk of collision with bats species and reduce light spill for sensitive species such as barbastelle. All options have therefore been assessed as slight adverse for bats species.

The habitats within the scheme footprint are largely arable land with hedgerows. In the absence of mitigation there is a risk of road collisions for species such as badger.

4.6.2 Brown (Travel Hub Site B) and Blue Options (Travel Hub Site C) – between Sawston and the Travel Hub locations

The impacts for the Blue and Brown route options between the CBC and Sawston, and up to the Travel Hub sites, are much the same as the Black, Purple and Pink options. The main exception is the Shelford – Haverhill Disused Railway (Pampisford) CWS which is located 184m south of these options (further from the routes). Due to the distance from the route options and the fact that operating vehicles will be electric in the medium term and the highest performance specification in the short term, no pollution incidents or changes in airborne pollutants are likely to arise, therefore a Neutral impact is anticipated on the Haverhill Disused Railway CWS.

The overall summary assessment score for all options is a **moderate adverse effect** due to the slight adverse impact anticipated on foraging and commuting bats and the loss and severance of hedgerows.

5 Greenhouse Gases

5.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the semi-quantitative WebTAG assessment that has been undertaken with regards to Greenhouse Gas (GHG)[9] emissions associated specifically with the operational phase of the scheme. WebTAG Unit A3 Environmental Impact Appraisal outlines the need to determine the impacts of proposed transport schemes on GHG emissions - whether emissions increase or decrease. The term of GHG emissions will also be known as carbon emissions throughout this report.

5.2 Legislation and Policy Context

5.2.1 European Union

The Commission Implementing Regulation (2014/749/EU)

Article 17 states that Member States shall report approximated GHG inventories as referred to in Article 8(1) of Regulation (EU) No 525/2013 at a level of disaggregation of source categories reflecting the activity data and methods available for the preparation of estimates for the year X-1. An explanation for the main drivers for the trends in emissions should also be reported.[10]

5.2.2 National Legislation and Policy

5.2.2.1 Legislation

National Policy Statement for National Networks

The National Policy Statement for National Networks (NPSNN)[11] contains a section on carbon emissions, particularly paragraph 5.17, which sets out how the impact of carbon will be assessed as part of the EIA process in order to meet the overarching national carbon reduction strategy as set out in the Carbon Plan (2011). Mitigation measures in both the design and construction should be presented as part of the assessment. The NPSNN is applicable to a public transport scheme as private vehicles will be using the national network first in order to reach any of the Travel Hub options.

Climate Change Act 2008

The Climate Change Act 2008 forms part of the UK government's plan to reduce GHG emissions, committing the government to a reduction of GHG by at least 80% of 1990 levels by 2050. With recent legally binding climate commitments the UK is set to change this emissions reduction target: net UK GHG emissions for the year 2050 must be 100% lower than the 1990

[9] A greenhouse gas is a gas that absorbs and emits radiant energy within the thermal infrared range. Greenhouse gases cause the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide and ozone. Greenhouse gases are measured in units of carbon dioxide equivalent (CO_2e), and are also referenced as carbon.

[10] Official Journal of the European Union (2014) Commission Implementing Regulation (2014/249/EU) [online] available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0749 (last accessed April 2019)

[11] Department for Transport (2014) National Policy Statement for National Networks (NPSNN) [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf (last accessed March 2019).

baseline[12]. The Climate Change Act creates a new approach to managing and responding to climate change in the UK, by:

- Setting ambitious, legally binding emission reduction targets;
- Taking powers to help meet those targets;
- Strengthening the institutional framework;
- Enhancing the UK's ability to adapt to the impact of climate change; and
- Establishing clear and regular accountability to the UK Parliament and to the devolved legislatures[13].

Key provisions of the Act in respect of climate change mitigation include the requirement for the government to set legally binding carbon budgets capping the amount of GHG emitted in the UK over a five-year period, as set out in Table 7.

Table 7: UK carbon reduction targets

Carbon Budget	Carbon Budget Level	Reduction Below 1990 Levels
3rd carbon budget (2018-2022)	2,544MtCO_2e	37% by 2020
4th carbon budget (2023-2027)	1,950MtCO_2e	51% by 2025
5th carbon budget (2028-2032)	1,725MtCO_2e	57% by 2030

Key provisions of the Act in respect of climate change adaptation include:

- A requirement for the government to report, at least every six years, on the risks to the UK of climate change, and to publish a programme setting out how these will be addressed. This Act also introduces powers for government to require public bodies and statutory undertakers to carry out their own risk assessment and make plans to address those risks
- The Adaptation Sub-Committee of the Committee on Climate Change will provide advice to, and scrutiny of, the government's adaptation work.

5.2.3 National Policy

The Carbon Plan 2011

The Carbon Plan was presented to UK Parliament pursuant to Sections 12 and 14 of the Climate Change Act 2008. The plan sets out how the UK will achieve decarbonisation within the framework of the energy policy. UK local authorities and regional level authorities must report on their carbon dioxide (CO_2) emissions. However, all emissions from the motorways sector have been removed and are not factored into the annual CO_2 emissions.

Infrastructure Carbon Review

The Infrastructure Carbon Review[14] sets out carbon reduction actions required by infrastructure organisations. In terms of the scheme, this means that emission reduction actions should be taken into account when developing scheme specific mitigation measures, where relevant.

PAS2080:2016

[12] The Climate Change Act 2008 (2050 Target Amendment) Order 2019 [online] available at: https://www.legislation.gov.uk/uksi/2019/1056/contents/made (last accessed September 2019)

[13] DECC (2012) Climate Change Act 2008

[14] HM Treasury (2013) Infrastructure Carbon Review [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/260710/infrastructure_carbon_review_251113.pdf (last accessed March 2019)

PAS2080[15] sets out a common approach and understanding of whole life carbon management in the provision of economic infrastructure as a result of the Infrastructure Carbon Review. It promotes reduced carbon, reduced cost infrastructure delivery, more collaborative ways of working and a culture of challenge in the infrastructure value chain.

5.2.4 Local Policy

Cambridge Local Plan 2018

Cambridge City Council (CaCC) adopted their Cambridge Local Plan[16] in 2018. GHG policies within the Local Plan include Policy 28: Carbon reduction, community energy networks, sustainable design and construction, and water use which states that "*all developments should take the available opportunities to integrate the principles of sustainable design and construction into the design of proposals… including carbon reduction.*"

South Cambridgeshire Local Plan 2018

South Cambridgeshire District Council adopted their Local Plan in 2018[17]. GHG policies within the Local Plan include Policy CC/3: Mitigation and Adaptation to Climate Change, which states that proposals should "*embed the principles of climate change mitigation and adaptation into the development.*" Policy CC/3: Renewable and Low Carbon Energy in New Developments requires developments for new dwellings or other buildings to reduce carbon emissions.

5.3 Assessment Methodology

5.3.1 Qualitative Methodology

Using the route information and maps, a qualitative assessment has been undertaken using professional judgement on the impact the options will have on traffic flows and GHG emissions.

The anticipated changes in traffic as a result of the different options are not considered likely to differ significantly, due to the scheme options running down similar routes from either Travel Hub Sites A, B or C. On this basis and remaining in line with air quality and noise assessments, the quantification of economic value (positive or negative) is not considered to have a material effect on the overall economic benefit of each options and would not have a material effect on each option's overall Benefit Cost Ratio (BCR). Additionally, the expected changes in GHG emissions as a result of the scheme (for all options assessed) are not predicted to be significant and therefore have only been calculated for the preferred route.

5.3.2 Quantitative Methodology (Preferred route)

The preferred route option has been assessed quantitatively. The greenhouse gas effects of the scheme options were assessed using TAG Unit A5-4 Marginal External Costs (MEC) and the Net Present Values (NPVs) have been calculated based upon this approach. The full details of the methodology can be found in Section 3.3.2.

[15] BSI (2016) PAS 2080: Carbon management in infrastructure [online] available at: https://shop.bsigroup.com/ProductDetail?pid=000000000030323493 (last accessed March 2019)

[16] Cambridge City Council (2018) Cambridge Local Plan [online] available at: https://www.cambridge.gov.uk/media/6890/local-plan-2018.pdf (last accessed March 2019)

[17] South Cambridgeshire District Council (2018) South Cambridgeshire Local Plan [online] available at: https://www.scambs.gov.uk/media/12740/south-cambridgeshire-adopted-local-plan-270918_sml.pdf (last accessed April 2019)

5.4 Study Area

The study area to be considered for this assessment specifically analyses the operational emissions that impact the affected road network (ARN) for road user carbon (vehicle emissions). This study area when defined in terms of lifecycle stage, is B9 – User utilisation of infrastructure as detailed in Section 7 of PAS2080:2016.

The study areas for qualitative assessment of the options have not been determined using traffic data. The qualitative assessments undertaken concluded that the scheme is not expected to cause widespread changes to traffic flows on the surrounding road network that meet the criteria for assessment as set out in TAG Unit A3.

A quantitative assessment has been undertaken for the preferred route following TAG Unit A.5.4 which does require the defining of a study area based on changes in traffic flows.

5.5 Baseline Information

The following baseline information is based on national and county-wide data because GHG emissions do not have a local receptor as, once they are emitted, they are not limited to geographic boundaries. From a UK perspective, national GHG emissions in 2018 decreased by 44% from 1990. In 2018, UK net CO_2 emissions were estimated at 364 million tonnes, a decrease of 2% in comparison to 2017 levels[18]. In 2018, 33% of UK GHG emissions were from the transport sector which is a 3% reduction in comparison to 2017[19].

Within South Cambridgeshire, the carbon emissions specifically from motorways in 2017 were 142.0 ktCO_2, which represents a 3% increase since 2005, and an 0.5% decrease in overall road transport emissions[20]. There were 38.4 million vehicles licensed for use on roads in the UK at the end of March 2019. However, in 2019 Q1 registration of ultra-low emission vehicles were up by 4% on 2018 Q1. There has also been a sharp decline in the number of diesel cars being registered for the first time in 2019 Q1, down 20% compared to 2018 Q1[21].

5.6 Sensitive Resources and Receptors

GHG emissions do not have a local receptor, as once they are emitted, they are not limited to geographic boundaries, and therefore the global atmosphere is the receptor. All GHG emissions contribute to climate change. It is important to note that the country which has emitted the emissions is responsible for those emissions, and the UK is legally bound to cutting emissions to meet the carbon budgets set out in Table 7.

The NPSNN states that "*It is very unlikely that the impact of a road project will, in isolation, affect the ability of Government to meet its carbon reduction plan targets*." However, the release of GHG emissions needs to be assessed and managed to minimise emissions where possible.

[18] Department for Business, Energy and Industrial Strategy (2019): 2018 UK Provisional Greenhouse Gas Emissions [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790086/2018-provisional-emissions-statistics-one-page-summary.pdf (last accessed July 2019).

[19] Department for Business, Energy and Industrial Strategy (2019): 2018 UK Greenhouse Gas Emissions, Provisional Figures [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790626/2018-provisional-emissions-statistics-report.pdf (last accessed July 2019).

[20] Department for Business, Energy and Industrial Strategy (2019): 2005 to 2017 UK local and regional CO_2 emissions – data tables [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/812142/2005-17_UK_local_and_regional_CO2_emissions_tables.xlsx (last accessed July 2019).

[21] Department for Transport (2019): Vehicle licensing statistics: January to March 2019 report [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/812253/vehicle-licensing-statistics-january-to-march-2019.pdf (last accessed July 2019).

5.7 Results of Assessment

5.7.1 Qualitative Assessment

A summary of the results of the qualitative assessment is presented in Table 8. The overall conclusion is that none of the options has a significantly different impact on greenhouse gas. Contributions to changes in modal shift present opportunities to reduce carbon for all options, whilst the embedded carbon and slight delay in some local roads to accommodate passing public transport vehicles could increase carbon slightly. The embedded carbon is difficult to offset locally. The full description of results can be found in Appendix 10.E.

Table 8: Qualitative Summary Results

Option	Description of summary results
Purple / Travel Hub Site A	**Construction:** Diversions will be required where the off-road route from Cambridge to the Travel Hub crosses Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions (and thus carbon) temporarily. **Operation:** All new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. **Travel Hub option:** The site could provide parking for up to 2,000 cars. This option of Travel Hub will enable the smallest possible modal shift due to having the smallest capacity - but has potential for expansion if the use of the travel hub is significant.
Brown / Travel Hub Site B	**Construction:** Diversions will be required where the off-road route from Cambridge to the Travel Hub crosses Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions (and thus carbon) temporarily. **Operation:** All new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. **Travel Hub option:** As the site could provide parking for up to 2,800 cars. This option of Travel Hub will enable the greatest possible modal shift (and thus benefits to carbon) due to having the largest capacity.
Pink / Travel Hub Site B	**Construction:** Diversions will be required where the off-road route from Cambridge to the Travel Hub crosses Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions temporarily. **Operation:** All new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. **Travel Hub option:** As the site could provide parking for up to 2,500 cars. This option of Travel Hub will enable the greatest possible modal shift (and thus benefits to carbon) due to having the largest capacity.
Blue / Travel Hub Site C	**Construction**: Diversions will be required where the off-road route from Cambridge to the Travel Hub crosses Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions temporarily. **Operation**: All new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. The length of the route is the second longest, after the Black route which will contribute additional operational GHG emissions from the operating vehicles – although this will not be an issue once electric powered vehicles are introduced. **Travel Hub option**: The site could provide parking for up to 2,100 cars. This option of Travel Hub would enable a smaller shift, than Brown or Pink, in modal transport due to having the one of the smaller capacities.
Black / Travel Hub Site C	**Construction:** Diversions will be required where the off-road route from Cambridge to the Travel Hub crosses Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions temporarily. **Operation:** All new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. The length of this route is the longest of all the options which will contribute additional operational GHG emissions from the operating vehicles - although this will not be an issue once electric powered vehicles are introduced. **Travel Hub option:** The site could provide parking for up to 2,100 cars. This option of Travel Hub would enable a smaller modal shift, than Brown or Pink, in in transport due to having the one of the smaller capacities.

5.7.2 Quantitative Assessment

The Net Present Value (NPV) has been calculated by the marginal external costs (MEC) method, the results of which are presented in the Economic Case. Procurement decisions

ensuring that local materials are used for the construction of the scheme will reduce emissions from the transportation of materials to site. A limitation of the assessment is that HGVs and buses are classified together, and therefore use the same emissions factors per km driven. During operation, the intention to use low carbon or electric vehicles on the route would reduce GHG emissions throughout the operating lifetime of the public transport route and selected Travel Hub.

6 Historic Environment

6.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline, and results of the qualitative WebTAG assessment undertaken with regards to the historic environment.

6.2 Legislation and Policy Context

6.2.1 National Legislation and Policy

6.2.1.1 Legislation

The over-arching legislation in relation to the historic environment in England is provided by the Ancient Monuments and Archaeological Areas Act 1979; and Planning (Listed Buildings and Conservation Areas Act) 1990.

6.2.1.2 National Policy

The National Planning Policy Framework (NPPF) (2019) addresses the conservation and enhancement of the historic environment assets. Of pertinence to the scheme are paragraphs 184, 189, 190, 192, 193, 194, 195, 196, 197, 198 and 199, and footnote 63 (which is given equal weight to the paragraphs). These set out the local planning authority's responsibilities when dealing with planning proposals which have the potential to impact on cultural heritage assets. The policies emphasise the importance of balancing the need for the conservation of heritage assets with the desirability of new development.

6.2.2 Local Policy

The current local planning policy and guidance relevant to the historic environment is contained in the adopted (2018) South Cambridgeshire and the City of Cambridge Local Plans.

The relevant policies for South Cambridgeshire are detailed below:

- Policy NH/14: Heritage Assets

1. Development proposals will be supported when:
    a. They sustain and enhance the special character and distinctiveness of the district's historic environment including its villages and countryside and its building traditions and details;
    b. They create new high quality environments with a strong sense of place by responding to local heritage character including in innovatory ways.

2. Development proposals will be supported when they sustain and enhance the significance of heritage assets, including their settings, as appropriate to their significance and in accordance with the National Planning Policy Framework, particularly:
    c. Designated heritage assets, i.e. listed buildings, conservation areas, scheduled monuments, registered parks and gardens;

d. Non-designated heritage assets including those identified in conservation area appraisals, through the development process and through further supplementary planning documents;
e. The wider historic landscape of South Cambridgeshire including landscape and settlement patterns;
f. Designed and other landscapes including historic parks and gardens, churchyards, village greens and public parks;
g. Historic places;
h. Archaeological remains of all periods from the earliest human habitation to modern times.

The relevant policies for the City of Cambridge are detailed below:

- Policy 61: Conservation and enhancement of Cambridge's historic environment

To ensure the conservation and enhancement of Cambridge's historic environment, proposals should:

a. preserve or enhance the significance of the heritage assets of the city, their setting and the wider townscape, including views into, within and out of conservation areas;
b. retain buildings and spaces, the loss of which would cause harm to the character or appearance of the conservation area;
c. be of an appropriate scale, form, height, massing, alignment and detailed design which will contribute to local distinctiveness, complement the built form and scale of heritage assets and respect the character, appearance and setting of the locality;
d. demonstrate a clear understanding of the significance of the asset and of the wider context in which the heritage asset sits, alongside assessment of the potential impact of the development on the heritage asset and its context; and
e. provide clear justification for any works that would lead to harm or substantial harm to a heritage asset yet be of substantial public benefit, through detailed analysis of the asset and the proposal.

- Policy 62: Local heritage assets

The Council will actively seek the retention of local heritage assets, including buildings, structures, features and gardens of local interest as detailed in the Council's local list and as assessed against the criteria set out in Appendix G of the plan. Where permission is required, proposals will be permitted where they retain the significance, appearance, character or setting of a local heritage asset. Where an application for any works would lead to harm or substantial harm to a non-designated heritage asset, a balanced judgement will be made having regard to the scale of any harm or loss and the significance of the heritage asset.

6.3 Assessment Methodology

The purpose of this appraisal is to identify the significance of effects of the impacts of the various proposed scheme options on the historic environment resource and highlight which, if any, would require further study at this optioneering stage. The appraisal study follows WebTAG environmental impact appraisal guidance. This appraisal has used the following sources:

- The National Heritage List for England (NHLE) maintained by Historic England for details of nationally designated heritage assets;
- Cambridgeshire Historic Environment Record (CHER) for information on locally listed parks and gardens and conservation areas;

- The CHER for records pertaining to all non-designated heritage assets (both below and above ground), previous archaeological events, secondary sources;
- The Archaeology Data Service has been searched for relevant archaeological fieldwork grey literature reports and publications; and
- A search was undertaken on relevant planning applications (which contained historic environment information) held by Cambridge City Council and South Cambridge District Council.

6.4 Study Area

A study area of 500m for designated heritage assets and 100m for non-designated heritage assets from the extent of the proposed options was used to develop the baseline.

6.5 Assessment of limitations

The chosen study areas for the baseline are sufficient to provide an outline appraisal of the impacts of the scheme to support the Outline Business Case. A more detailed assessment including the use of a large study area will be undertaken for the assessment of the preferred scheme. The value assigned to the buried archaeological remains identified below and within the WebTAG assessment, are based on the available information. The value of these assets will be reassessed in further detail along with any physical investigation of the remains as part of any EIA. The assessment of setting for the designated assets and likely effects, are based on desk top analysis only. A more detailed assessment of setting, potential impacts and effects will be undertaken as part of the EIA of the preferred scheme.

6.6 Baseline Information and Receptors

For the purposes of this assessment the baseline for the route options (Black, Blue, Brown, Purple, and Pink) has been split in two. This is because the route of the options between the Cambridge Biomedical Campus (CBC) and east of Sawston is the same for all five options. The options split at a point west of High Street, near Babraham and there are variations in the option baselines after this point. The baselines are presented east to west.

6.6.1 Cambridge Biomedical Campus to Sawston

This covers the five route options which run along the same alignment between CBC and just to the west of High Street, near Babraham, where the route options diverge.

6.6.1.1 Black, Blue, Brown, Purple, Pink Options

The following designated heritage assets are within 500m of the common route between CBC and west of High Street, near Babraham:

There is one scheduled monument within 500m of the proposed scheme designated as ‘Cropmarks site west of White Hill Farm, Trumpington’ (NHLE 1006891). The Scheduled Monument is located on the other side of the railway line to the proposed options (approx. 25m east of the options).

There are two conservation areas within 500m of the options.

- Stapleford Conservation Area, 500m to the south of the option.
- Babraham Conservation Area, 425m to the north and west of the option.

There is one Grade II* Listed Building situated within 500m of the options. Middlefield House and Garden Wall (NHLE 1317370), located 450m north of the options.

There are four Grade II listed buildings with 500m of the options.

- Nine Wells Monument (NHLE 1127825),
- Dovecote at Granhams Farm (NHLE 133068)
- Stapleford Hall (NHLE 1331071)
- Church Farmhouse (NHLE 1331134)

There are 13 archaeological monuments and events recorded on the CHER within 100m of the options. These include the following assets identified within footprint of the options:

- A single sherd of Roman grey course ware (CHER 04791) and a post medieval clay pipe (CHER 04791A), 62m south of the option at Great Shelford.
- A findspot for a Neolithic polished axe (CHER 04886), 50m south of the option at Great Shelford.
- A prehistoric ring ditch and associated prehistoric worked flints (CHER04894) have been recorded to the south of the option at Granhams Farm.
- Prehistoric flint flake (CHER 06323), north of the option near Church Farm Babraham.
- An archaeological evaluation at Granhams Farm identified evidence of Neolithic to Bronze Age activity (CHER CB15541) close to the proposed footprint of the options.
- A cluster of worked flint found close to the route of the option at Granhams Farm (CHER MCB16140).
- At the northern end of the options, at CBC, archaeological investigations have identified: an Early Roman field system and kiln (CHER MCB26679; Iron Age/Roman enclosures (CHER 08339); late prehistoric pits, Late Bronze Age/Early Iron Age ring ditches, Late Neolithic/Early Bronze Age pit cluster, Iron Age well, Late Iron Age enclosure, recut during the Early Roman period, and Early Roman, post holes, beam slots ditches and a midden (CHER MCB19991); and a Roman ditch (CHER MCB20378). Further significant archaeology covering the late prehistoric to medieval periods has been investigated in the wider Addenbrookes development area.
- Between Stapleford and Bourn Bridge the options run parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865.

In addition, the common route crosses the channel that connects Nine Wells springs to Hobson's Conduit. Hobson's Conduit is a nationally important watercourse, that was built from 1610 to 1614 by Thomas Hobson and others to bring fresh water into the city of Cambridge.

6.6.2 Sawston to Little Abington

This covers the five route options and the three Travel Hub sites between the splitting of the options west of High Street and Little Abington. Section 1.3 describes the location of the Travel Hub sites and the routes entering/leaving the sites.

6.6.2.1 Purple Option and Travel Hub Site A

There is one Grade II* Registered Park and Garden located 250m south of the proposed Travel Hub option. Pampisford Hall (NHLE1000321) is a mid-19th century pleasure ground, arboretum and the remains of a formal garden. The garden is located on the opposite side of the dual carriageway A505 from the proposed Travel Hub site.

There are two archaeological assets recorded within 100m of the option.

- Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865.
- The Travel Hub site is partly located over an area of cropmarks to the south of Babraham which indicates the presence of enclosures (CHER 09353).

6.6.2.2 Brown Option and Travel Hub Site B

Babraham Conservation Area is located 450m to the west of the Travel Hub option.

There is one Grade II Listed Building within 500m of the option. Temple Café and Restaurant (NHLE 1331149).

There are 13 archaeological assets recorded within 100m of the option.

- Investigations for a borrow pit at Bourn Bridge revealed: Mesolithic and Neolithic activity (CHER 11317), a Bronze Age ditch monument (CHER 11317A), the findspot of a Palaeolithic handaxe (CHER 11317B), a Late Iron Age/Roman field system (CHER 11317C), a Roman settlement and droveway (CHER 11317D), a Saxon settlement (CHER 13044), a Saxon find (CHER CB14745)..
- A flint blade and waste flake (CHER CB14748) were recovered 90m to the east of the option at Bourn Bridge.
- Saxon artefacts (CHER MCB17799) have been recovered from the southern area of the proposed Travel Hub site at Bourn Bridge.
- A former post medieval cut channel ran through the Travel Hub option at Bourn Bridge (CHER MCB15995).
- Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865.
- The Travel Hub option would be located adjacent to the disused route of the Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848.
- The option crosses over an area of cropmarks to the south of Babraham which indicates the presence of enclosures (CHER 09353).

The Great and Little Abington Conservation Area is located 225m to the south east of the Travel Hub site.

6.6.2.3 Pink Option and Travel Hub Site B

There is one Grade II* Registered Park and Garden located 250m south of the proposed route of the option. Pampisford Hall (NHLE1000321) is a mid-19th century pleasure ground, arboretum and the remains of a formal garden. The garden is located on the opposite side of the dual carriageway A505 from the proposed Travel Hub site.

Babraham Conservation Area is located 450m to the west of the Travel Hub option.

There is one Grade II Listed Building within 500m of the option. The early 19th century,Temple Café and Restaurant (NHLE 1331149).

There are12 archaeological assets recorded within 100m of the option.

- Investigations for a borrow pit at Bourn Bridge revealed: Mesolithic and Neolithic activity (CHER 11317), a Bronze Age ditch monument (CHER 11317A), the findspot of a Palaeolithic handaxe (CHER 11317B), a Late Iron Age/Roman field system (CHER 11317C), a Roman settlement and droveway (CHER 11317D), a Saxon settlement (CHER 13044), a Saxon find (CHER CB14745)..

- A flint blade and waste flake (CHER CB14748) were recovered 90m to the east of the option at Bourn Bridge.
- Saxon artefacts (CHER MCB17799) have been recovered from the southern area of the proposed Travel Hub at Bourn Bridge.
- A former post medieval cut channel ran through the Travel Hub option at Bourn Bridge (CHER MCB15995).
- Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865.
- The Travel Hub option would be located adjacent to the disused route of the Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848.

6.6.2.4 Black Option and Travel Hub Site C

There is one Grade II* Registered Park and Garden located 250m south of the proposed route option. Pampisford Hall (NHLE1000321) is a mid-19th century pleasure ground, arboretum and the remains of a formal garden.

The Great and Little Abington Conservation Area is located 225m to the south east of the Travel Hub site.

There is one Grade II Listed Building within 500m of the option: The early 19th century Temple Café and Restaurant (NHLE 1331149).

There are 16 archaeological assets recorded within 100m of the option:

- Investigations for a borrow pit at Bourn Bridge revealed: Mesolithic and Neolithic activity (CHER 11317), a Bronze Age ditch monument (CHER 11317A), the findspot of a Palaeolithic handaxe (CHER 11317B), a Late Iron Age/Roman field system (CHER 11317C), a Roman settlement and droveway (CHER 11317D), a Saxon settlement (CHER 13044), a Saxon find (CHER CB14745)..
- A flint blade and waste flake (CHER CB14748) were recovered 90m to the east of the option at Bourn Bridge.
- Saxon artefacts (CHER MCB17799) have been recovered at Bourn Bridge.
- A former post medieval cut channel ran through the option at Bourn Bridge (CHER MCB15995).
- Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865.
- The option bisects the disused Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848.
- The option crosses the former route of a Roman road (CHER MCB26667), which followed the alignment of current Newmarket Street.
- The option crosses a group of round barrows (CHER 09356a, 09356) and prehistoric ditches (CHER 09356b, 09356d) identified from air photos and archaeological investigations at Fourwentways.

6.6.2.5 Blue Option and Travel Hub Site C

The Great and Little Abington Conservation Area is located 225m to the south east of the Travel Hub site.

There is one Grade II Listed Building within 500m of the option. The early 19th century Temple Café and Restaurant (NHLE 1331149).

There are 17 archaeological assets recorded within 100m of the option.

- Investigations for a borrow pit at Bourn Bridge revealed: Mesolithic and Neolithic activity (CHER 11317), a Bronze Age ditch monument (CHER 11317A), the findspot of a Palaeolithic handaxe (CHER 11317B), a Late Iron Age/Roman field system (CHER 11317C), a Roman settlement and droveway (CHER 11317D), a Saxon settlement (CHER 13044), a Saxon find (CHER CB14745)..
- A flint blade and waste flake (CHER CB14748) were recovered 90m to the east of the option at Bourn Bridge.
- Saxon artefacts (CHER MCB17799) have been recovered at Bourn Bridge.
- A former post medieval cut channel ran through the option at Bourn Bridge (CHER MCB15995).
- Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865.
- The option bisects the disused Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848.
- The option crosses the former route of a Roman Road (CHER MCB26667), which followed the alignment of current Newmarket Street.
- The option crosses a group of round barrows (CHER 09356a, 09356) and prehistoric ditches (CHER 09356b, 09356d) identified from air photos and archaeological investigations at Fourwentways.
- The option crosses over an area of cropmarks to the south of Babraham which indicates the presence of enclosures (CHER 09353).

6.7 Results of Assessment

A summary of the assessment of potential impacts is presented in the tables below. The assessment identifies the impacts on all of the known buried archaeological remains, however, there is high potential for all of the options to impact previously unidentified buried archaeological remains. The potential levels, of significant effects, have been identified as being the same across all of the options. More details on the assessment of the potential effects of the options can be found in the Historic Environment WebTAG worksheets in Appendix 10.F.

Table 9: Purple / Travel Hub Site A

Asset Type	Potential impacts	Effect
Scheduled Monument	There would be no direct physical impact on the scheduled Cropmarks site west of White Hill Farm. However, associated archaeological remains are known to extend beyond the scheduled area and into the area of the proposed route, to the south of Nine Wells. This would cause a **slight impact** on the asset from alteration to the context of the asset.	**Slight adverse**
Conservation Area	There would be **slight impact** on the asset through alteration to the setting/context of the Babraham Conservation Area, as the movement of vehicles along the route during its operation may be visible along the Babraham Avenue from Babraham Hall.	**Slight adverse**
Registered Parks and Gardens	No impact	**Neutral**

Asset Type	Potential impacts	Effect
Listed Building Grade I	No impact	**Neutral**
Listed Building Grade II*	There would be a **slight impact** on Middlefield House through alteration to its setting and context of the asset. The route and crossing of the River Granta would be visible from the asset along the garden avenue. This would slightly urbanise the rural view from the house impacting on how the asset is appreciated. The impact is only lessened by the distance from the asset. The movement along the scheme would also be visible.	**Slight adverse**
Listed Building Grade II	No impact	**Neutral**
Buried archaeology	Prehistoric and Roman remains have been recorded within or close to the corridor route between Nine Wells and Granhams Farm. The construction scheme would have a **large impact** on these remains. These remains would predominantly be of low, local or medium, regional value, however, the remains associated with Granhams Farm moated site (an asset of potential schedulable quality), may be of national significance. In addition, Hobson's Conduit, which is fed by a stream that crosses the proposed route near Nine Wells is of national significance. The construction of the scheme would cause an impact on a cropmarks complex to the south of Babraham. This would result in a large impact on assets likely to be of low to moderate value.	**Moderate/ Large adverse**

Table 10: Brown / Travel Hub Site B

Asset Type	Potential impacts	Effect
Scheduled Monument	There would be no direct physical impact on the scheduled Cropmarks site west of White Hill Farm. However, associated archaeological remains are known to extend beyond the scheduled area and into the area of the proposed route, to the south of Nine Wells. This would cause a **slight impact** on the asset from alteration to the context of the asset.	**Slight adverse**
Conservation Area	There would be **slight impact** on the asset through alteration to the setting/context of the Babraham Conservation Area, as the movement of vehicles along the route during its operation may be visible along the Babraham Avenue from Babraham Hall.	**Slight adverse**
Registered Parks and Gardens	No impact	**Neutral**
Listed Building Grade I	No impact	**Neutral**
Listed Building Grade II*	There would be a **slight impact** on Middlefield House through alteration to its setting and context of the asset. The route and crossing of the River Granta would be visible from the asset along the garden avenue. This would slightly urbanise the rural view from the house impacting on how the asset is appreciated. The impact is only lessened by the distance from the asset. The movement along the scheme would also be visible.	**Slight adverse**
Listed Building Grade II	No impact	**Neutral**
Buried archaeology	Prehistoric and Roman remains have been recorded within or close to the corridor route between Nine Wells and Granhams Farm. The construction scheme would have a **large impact** on these remains. These remains would predominantly be of low, local or medium, regional value, however, the remains associated with Granhams Farm moated site (an asset of potential schedulable quality), may be of national significance. In addition, Hobson's Conduit, which is fed by a stream that crosses the proposed route near Nine Wells is of national significance. There would be an impact on the former post medieval cut channel at Bourn Brook. This would result in a large impact on assets likely to be of low value.	**Moderate/ Large adverse**

Asset Type	Potential impacts	Effect
	The construction of the scheme would cause an impact on a cropmarks complex to the south of Babraham. This would result in a large impact on assets likely to be of low to moderate value.	

Table 11: Pink / Travel Hub Site B

Asset Type	Potential impacts	Effect
Scheduled Monument	There would be no direct physical impact on the scheduled Cropmarks site west of White Hill Farm. However, associated archaeological remains are known to extend beyond the scheduled area and into the area of the proposed route, to the south of Nine Wells. This would cause a **slight impact** on the asset from alteration to the context of the asset.	**Slight adverse**
Conservation Area	There would be **slight impact** on the asset through alteration to the setting/context of the Babraham Conservation Area, as the movement of vehicles along the route during its operation may be visible along the Babraham Avenue from Babraham Hall.	**Slight adverse**
Registered Parks and Gardens	No impact	**Neutral**
Listed Building Grade I	No impact	**Neutral**
Listed Building Grade II*	There would be a **slight impact** on Middlefield House through alteration to its setting and context of the asset. The route and crossing of the River Granta would be visible from the asset along the garden avenue. This would slightly urbanise the rural view from the house impacting on how the asset is appreciated. The impact is only lessened by the distance from the asset. The movement along the scheme would also be visible.	**Slight adverse**
Listed Building Grade II	No impact	**Neutral**
Buried archaeology	Prehistoric and Roman remains have been recorded within or close to the corridor route between Nine Wells and Granhams Farm. The construction scheme would have a **large impact** on these remains. These remains would predominantly be of low, local or medium, regional value, however, the remains associated with Granhams Farm moated site (an asset of potential schedulable quality), may be of national significance. In addition, Hobson's Conduit, which is fed by a stream that crosses the proposed route near Nine Wells is of national significance. There would be an impact on the former post medieval cut channel at Bourn Brook. This would result in a large impact on assets likely to be of low value. The construction of the scheme would cause an impact on a cropmarks complex to the south of Babraham. This would result in a large impact on assets likely to be of low to moderate value.	**Moderate/ Large adverse**

Table 12: Black / Travel Hub Site C

Asset Type	Potential impacts	Effect
Scheduled Monument	There would be no direct physical impact on the scheduled Cropmarks site west of White Hill Farm. However, associated archaeological remains are known to extend beyond the scheduled area and into the area of the proposed route, to the south of Nine Wells. This would cause a **slight impact** on the asset from alteration to the context of the asset.	**Slight adverse**
Conservation Area	There would be **slight impact** on the asset through alteration to the setting/context of the Babraham Conservation Area, as the movement of vehicles along the route during its operation may be visible along the Babraham Avenue from Babraham Hall.	**Slight adverse**
Registered Parks and Gardens	No impact	**Neutral**

Asset Type	Potential impacts	Effect
Listed Building Grade I	No impact	**Neutral**
Listed Building Grade II*	There would be a **slight impact** on Middlefield House through alteration to its setting and context of the asset. The route and crossing of the River Granta would be visible from the asset along the garden avenue. This would slightly urbanise the rural view from the house impacting on how the asset is appreciated. The impact is only lessened by the distance from the asset. The movement along the scheme would also be visible.	**Slight adverse**
Listed Building Grade II	No impact	**Neutral**
Buried archaeology	Prehistoric and Roman remains have been recorded within or close to the corridor route between Nine Wells and Granhams Farm. The construction scheme would have a **large impact** on these remains. These remains would predominantly be of low, local or medium, regional value, however, the remains associated with Granhams Farm moated site (an asset of potential schedulable quality), may be of national significance. In addition, Hobson's Conduit, which is fed by a stream that crosses the proposed route near Nine Wells is of national significance. There would be an impact on the former post medieval cut channel at Bourn Brook. This would result in a large impact on assets likely to be of low value. The construction of the options would cause a large impact on the preserved in group of round barrow and prehistoric ditches at Fourwentways. These are assets of moderate value.	**Moderate/ Large adverse**

Table 13: Blue / Travel Hub C

Asset Type	Potential impacts	Effect
Scheduled Monument	There would be no direct physical impact on the scheduled Cropmarks site west of White Hill Farm. However, associated archaeological remains are known to extend beyond the scheduled area and into the area of the proposed route, to the south of Nine Wells. This would cause a **slight impact** on the asset from alteration to the context of the asset.	**Slight adverse**
Conservation Area	There would be **slight impact** on the asset through alteration to the setting/context of the Babraham Conservation Area, as the movement of vehicles along the route during its operation may be visible along the Babraham Avenue from Babraham Hall.	**Slight adverse**
Registered Parks and Gardens	No impact	**Neutral**
Listed Building Grade I	No impact	**Neutral**
Listed Building Grade II*	There would be a **slight impact** on Middlefield House through alteration to its setting and context of the asset. The route and crossing of the River Granta would be visible from the asset along the garden avenue. This would slightly urbanise the rural view from the house impacting on how the asset is appreciated. The impact is only lessened by the distance from the asset. The movement along the scheme would also be visible.	**Slight adverse**
Listed Building Grade II	No impact	**Neutral**
Buried archaeology	Prehistoric and Roman remains have been recorded within or close to the corridor route between Nine Wells and Granhams Farm. The construction scheme would have a **large impact** on these remains. These remains would predominantly be of low, local or medium, regional value, however, the remains associated with Granhams Farm moated site (an asset of potential schedulable quality), may be of national significance. In addition, Hobson's Conduit, which is fed by a stream that crosses the proposed route near Nine Wells is of national significance. There would be an impact on the former post medieval cut channel at Bourn Brook. This would result in a large impact on assets likely to be of low value.	**Moderate/ Large adverse**

Asset Type	Potential impacts	Effect
	The construction of the scheme would cause an impact on a cropmarks complex to the south of Babraham. This would result in a large impact on assets likely to be of low to moderate value. The construction of the options would cause a large impact on the preserved in group of round barrow and prehistoric ditches at Fourwentways. These are assets of moderate value.	

In summary all the options have the same potential impact on the historic environment, which is moderate to large adverse, due to the potential impacts on buried archaeology.

7 Landscape

7.1 Introduction

This section presents the applicable legislation, methodology, study area, baseline and results of the qualitative WebTAG assessment that has been undertaken with regards to the expected landscape and visual effects of the proposed route options.

7.2 Legislation and Policy Context

7.2.1 National Legislation and Policy

7.2.1.1 National Planning Policy Framework (NPPF)

The NPPF attaches importance to the character of the environment, emphasising that developments should add to the overall quality of the area, respond to local character and history and reflect the identity of local surroundings and materials. The provisions relevant to the proposed development are included in the following sections:

- Policy 12: Achieving Well Designed Places – this states that decisions should ensure that developments are visually attractive, sympathetic to local character and history, establish or maintain a strong sense of place and with a high standard of amenity for existing and future users.
- Policy 13: Protecting Green Belt Land – emphasises the purpose of Green Belts to check the unrestricted sprawl of large built-up areas, assist in safeguarding the countryside from encroachment and preserve the setting and special character of historic towns. Once Green Belts have been defined, local planning authorities should plan positively to enhance their beneficial use, such as looking for opportunities to provide access; to provide opportunities for outdoor sport and recreation; to retain and enhance landscapes, visual amenity and biodiversity.
- Policy 15: Conserving and Enhancing the Natural Environment – the planning system should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes and soils and recognising the intrinsic character and beauty of the countryside.
- Policy 16: Conserving and Enhancing the Historic Environment – in determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting.

7.2.2 Local Planning Policy

South Cambridgeshire Local Plan 2018

- Policy NH/2: Protecting and Enhancing Landscape Character – Development must respect and aim to retain or enhance the character of the local landscape and the National Character Area in which it is located.
- Policy NH/6: Green Infrastructure – Aim to reinforce, connect, protect and create new green infrastructure where possible and promote its use by society. See Cambridgeshire Green Infrastructure Strategy.

- Policy NH/7: Ancient Woodlands and Veteran Trees – Development should avoid loss or damage to veteran trees or ancient woodland or must act to mitigate adverse effects.
- Policy NH/8: Mitigating the Impact of Development in and Adjoining the Green Belt – developments must not have detrimental impact on rurality and openness of Green Belt. Development should include careful landscaping of high-quality design. Landscaping and planting must be well-maintained.
- Policy NH/13: Important Countryside Frontage – Development must not compromise land with strong countryside character that provides important break between nearby development framework areas or acts to provide connection between urban and surrounding rural area.

7.2.3 Green Belt

The Cambridge Green Belt was created in 1954. Its purposes, as set out in the Cambridge Local Plan 2006, are to:

  - Preserve the unique character of Cambridge as a compact, dynamic city with a thriving historic centre.
  - Maintain and enhance the quality of its setting.
  - Prevent communities in the environs of Cambridge from merging into one another and with the City.

From the A11 north to Cambridge all route options and travel hub options are in the Green Belt. The only options not in the Green Belt are Travel Hub site C and the routes between that site and the A11.

7.3 Assessment Methodology

The purpose of this appraisal is to identify the significance of effects of the impacts of the proposed scheme options on landscape character. The appraisal study follows WebTAG Unit 3A guidance and was informed by the following publications:

- Guidelines for Landscape and Visual Impact Assessment (GLVIA), 3rd Edition: Landscape Institute and Institute of Environmental Management and Assessment (2013); and
- DMRB LA 107 Landscape and visual effects (this supersedes DMRB Volume 11 Section 3 Part 5 Landscape Effects and IAN 135/10).
- Cambridgeshire Green Infrastructure Strategy, LDA Design (2011);
- Cambridge Inner Green Belt Boundary Study, LDA Design (2015);
- Cambridge Landscape Character Assessment, Cambridge City Council (2003); and
- South Cambridgeshire District Design Guide Supplementary Planning Document (SPD), South Cambridgeshire District Council (2010).

Site visits were undertaken in 2019 during summer and winter to identify the landscape character and the potential visibility of scheme from the surrounding area.

7.3.1 Study Area

The study area for the appraisal includes the land within 1000m of the scheme boundary.

7.4 Baseline Information

7.4.1 Landscape Character

7.4.1.1 A detailed assessment of the national, regional and local landscape character is provided within the Landscape Appraisal found in Appendix 10.G.

7.4.1.2 National Character Assessments

The study area is located predominantly within *National Character Area (NCA) 87: East Anglian Chalk*.

A small part of the study area is located within the north-east of the *NCA 88: Bedfordshire and Cambridgeshire Claylands*.

7.4.1.3 Regional Character Assessments

The study area lies in the *Chalklands Landscape Character Area (LCA)* as described in the Cambridgeshire Landscape Guidelines (Cambridgeshire County Council, 1991) and the *Rural Lowland Mosaic: Chalklands LCA* as described in the Cambridge Landscape Character Assessment (Cambridge City Council, 2003).

7.4.1.4 Local Character Assessments

To provide a more detailed assessment of local landscape character, the study area has been broken down into six LCA. These have been identified through desk study and field surveys and are outlined in the following table, with more detail provided in Appendix 10.G

Table 14: Local Landscape Character Areas

LCA	Receptor	Sensitivity
Cambridge Southern Fringe LCA	This LCA is on the southern edge of Cambridge, between Hauxton Road and Babraham Road (A1307). It comprises the CBC, residential development and community facilities including schools, public open space and local shops. There are open views from the southern edge of the LCA across arable fields.	Medium
Gog Magog Hills Chalkland LCA	The Gog Magog Hills, key to the character of the area, are part of a distinctive chalk ridge south-east of Cambridge. The landform is gently undulating, with smooth slopes rising up to relatively high, rounded hills, often capped with beech, lime or sycamore woodland. The Gog Magog hills are one of the highest points around Cambridge and there are long views over the open landscape, framed by woodland blocks and plantations. Views to Cambridge give the area its strong sense of place. The LCA is in the Green Belt.	Medium
River Granta Valley Nucleated Villages LCA	This area includes the villages of Great Shelford, Stapleford and Sawston. They are all situated on low-lying land along branches of the River Granta. Each village has a historic core, designated as conservation area.	Medium
Babraham and the Abingtons Designed Landscapes and Research Parks LCA	Babraham, Little Abington, and Great Abington, at the eastern end of the study area, are small villages with historic centres, many listed buildings, post-war residential development and large new research parks nearby. Parts of all three villages are designated as conservation areas. The River Granta separates Little Abington from Great Abington and runs along the northern boundary of Granta Park and through the grounds of Babraham Hall.	Medium

LCA	Receptor	Sensitivity
River Granta Valley and Low-Lying Farmland LCA	The Granta Valley, south and south-east of Cambridge, has the low-lying, gentle topography typical of river valleys. Key to its character are the tree-lined river and the arable fields, pastures and water meadows on the fertile soils of the valley. The River Granta is a County Wildlife Site for much of its length. The LCA is partly in the Green Belt.	Medium
Gog Magog Hills Recreational LCA	The LCA comprises Wandlebury Country Park, Magog Down and the Gog Magog Golf Course. The LCA is on elevated land on the Gog Magog Hills with high points at Wandlebury Ring, Little Trees Hill and Telegraph Clump. The LCA is in the Green Belt.	High

7.5 Landscape Designations

7.5.1 Registered Parks and Gardens

The following registered parks and gardens are located within the study area. Their descriptions are based on the relevant listing by Historic England:

Sawston Hall, Grade II listed

The gardens at Sawston Hall are on the south front and are divided by yew hedges into small compartments. A moat borders the gardens on their southern side. Map evidence suggests that the gardens were mainly laid out during the 19th century (OS 1885); they have been much simplified and altered in the 20th century. South of the moat, the pleasure grounds comprise lawns with mature trees which blend into the southern woodland. A series of ornamental and functional watercourses drain the low-lying land and feed the moat.

The remaining land at Sawston, is no longer open parkland, but is now (1999) composed of woodland blocks and open meadows, one of which is a 7.4ha SSSI.

Pampisford Hall, Grade II* listed

The grounds of Pampisford Hall cover around 60ha. They sit in a triangle of land between the A11 (dual carriageway) and the busy A505 Royston Road. The historic park is enclosed on all sides by woodland belts and plantations. There is one key view into and out of the site, along the south-eastern cedar avenue in the pleasure grounds. This frame views out of the surrounding countryside. The pleasure grounds are enclosed by parkland fencing. The remains of a small, formal garden lie below the south-west front, comprising gravel paths and Lawson cypresses surrounding a box parterre. An arboretum of great variety in terms of the species (some rare) and age of the trees, surrounds the garden. It includes some fine mature cedars. The pleasure ground is cut through with walks, rides and avenues lined with broadleaved and coniferous species.

7.5.2 Conservation Areas

The conservation areas within the study area are listed below. Their descriptions are informed by the relevant conservation area appraisals that have been completed to date:

Babraham Village and Hall

No conservation area appraisal to date.

Great and Little Abington

No conservation area appraisal to date.

Great Shelford

This historic core of the village contains the parish church and primary school, the Kings Mill and three historic farms (Rectory Farm, De Freville Farm and The Grange), along with a number of historic pubs and shops, a chapel, former blacksmith's forge and several timber-framed and thatched dwellings. The southern part of the conservation area also includes extensive areas of flood plain, open meadow and managed recreational grounds bordering the River Cam which separates Great Shelford and Little Shelford.

Pampisford

No conservation area appraisal to date.

Sawston

The main focus of the conservation area is the junction between the High Street and Church Lane, Mill Lane and Common Lane. This historic core of the village contains the parish church, Sawston Hall, a listed tannery complex and a number of historic pubs and dwellings. The conservation area includes the meadows of the River Cam flood plain and the grounds of Sawston Hall.

Stapleford

No conservation area appraisal to date.

7.5.3 Visual Context

Representative Views

Views of the proposed scheme would be limited by the screening effects of topography, built form and woodland to a fairly narrow corridor of land within 1000m of the scheme. Views of the final route and Travel Hub sites might be possible from residential areas on the edge of Cambridge, Great Shelford, Stapleford, Sawston, Babraham and Little Abington, but these would be largely filtered through intervening vegetation. They would be possible from Magog Down and the open landscape south-west of the A1307 and from Granham's Road. Views would also be possible from the PRoW in the area and the CBC. The route would not be visible from Wandlebury Country Park or Nine Wells due to the screening effect of the intervening woodland. Desktop analysis and field survey were used to determine the representative views potentially affected by the proposed scheme.

The following visual receptors might experience views of the proposed scheme options:

- Residents in properties on the southern edge of Cambridge;
- Residents in properties on the north-eastern edge of Great Shelford;
- Residents in properties on the northern-eastern edge of Stapleford;
- Residents in properties on the eastern edge of Sawston;
- Residents in properties on the south-eastern edge of Babraham;
- Residents on the northern boundary of Little Abington;
- Visitors to Magog Down
- Users of PRoW 39/47 (Dame Mary Archer Way);
- Users of PRoW 39/8;
- Users of PRoW 198/1 and 198/2;
- Users of PRoW 212/2 and 212/3;

- Users of PRoW 196/2;
- Users of PRoW 12/4, 12/5, 12/9, 12/10 and 12/12;
- Users of PRoW 179/2; and
- Users of PRoW 4/2.

Designated Views

Appendix F: Tall Buildings and The Skyline of the Cambridge Local Plan, 2018 is intended to provide clarity over the interpretation of *Policy 60: Tall buildings and the skyline in Cambridge*. Overall, this guidance seeks to ensure the overall character and qualities of the Cambridge skyline are maintained and, where appropriate, enhanced as the city continues to grow and develop in the future. The appendix highlights four long to medium distance views towards Cambridge from the south-east:

- from the junction of Shelford Road/Wort's Causeway and the Harcamlow Way where there is a panoramic view that takes in both Addenbrooke's Hospital, the City Centre and the hangars at Cambridge Airport;
- from Little Trees Hill, Magog Down;
- from the junction of Shelford Road and Harcamlow Way; and
- from the Limekiln Road lay-by.

Of these, only the view from Little Trees Hill, Magog Down (strategic viewpoint 7) would potentially be affected by the CSET Phase 2 scheme. This viewpoint takes in a wide panorama looking north/north-west and includes part of the study area. (The other viewpoints are focused upon views towards the city and would not include the proposed scheme.) Since the guidance is intended to assess the potential impact of tall buildings upon the skyline of Cambridge, the proposed scheme is unlikely to have any impact upon the Cambridge skyline.

7.6 Results of the Assessment

7.7 Common Sections of All Route Options

All the options would result in adverse impacts due to the introduction and operation of the scheme into the farmed landscape between Cambridge and Sawston. From Sawston to the individual Travel Hubs the routes diverge and have similar but differing impacts on the landscape, these are described in the following sections.

Generally, there would be a loss of farmland and vegetation from field boundaries along the route. Vehicles moving across the rural landscape and through the River Granta valley would introduce uncharacteristic movements into views from residential properties, roads and PRoW that cross the landscape (particularly across the low lying valley associated with the river) and, to varying degrees, from Magog Down and the Gog Magog Hills, north of the scheme.

All the routes in this section would be generally at the same level as current ground surface. And so the majority of the route itself would be unobtrusive in all but close views from roads and PRoW but there would be filtered views of the operating vehicles from residential properties on the southern edge of Cambridge, the north-eastern edge of Great Shelford, the northern-eastern edge of Stapleford; the eastern edge of Sawston and on the south-eastern edge of Babraham.

7.7.1 Purple Option and Travel Hub Site A

The route of the Purple option would result in similar impacts on landscape and views as the other four options, but it is shorter, ending west of the A11.

The Travel Hub site would cover about 9ha of farmland about 450m west of the A1307/A11 junction, replacing arable fields with paving, lighting, signage and a one-storey building. This would introduce urbanising elements into a rural setting. These urbanised elements will occupy parts of two separate fields, adversely affecting the pattern of the landscape. It would be largely screened from Babraham and nearby PRoW by existing vegetation and new planting, especially in summer. The Travel Hub would be lit at night, affecting the night-time landscape character of the rural area between Babraham and the A11.

The movement and noise generated by the Travel Hub and the operating vehicles would reduce tranquillity, though this would be experienced in the context of the busy A11/A505 junction. The extensive landscape mitigation planting proposed would, in time, screen and integrate the Travel Hub into its landscape setting, however vehicles using the route would remain noticeable moving through the landscape, especially from PRoW. As the shortest of the routes, it would have fewer impacts than the other options, but the difference is small in relation to the overall length of the scheme and the proportion of the study area affected.

The Purple option and Travel Hub Site A would result in a moderate adverse effect.

7.7.2 Brown Option and Travel Hub Site B

The Brown option would follow the Purple route and then follow the field boundaries for a short stretch near the A505 and A11 before it crosses the River Granta near to the A11 crossing of the river to enter the Travel Hub site from the south.

The extensive landscape mitigation planting proposed would, in time, screen and integrate the Travel Hub into its landscape setting, however vehicles using the public transport route would remain noticeable moving through the landscape, especially from PROW. The option is shorter than the Pink option, so it would have fewer impacts than this route, but the difference is small in relation to the overall length of the scheme and the proportion of the study area affected.

The Brown option and Travel Hub Site B would result in a moderate adverse effect.

7.7.3 Pink Option and Travel Hub Site B

The route of the Pink option crosses more directly from Sawston to the Travel Hub site at the A11/A1307 junction than the Brown option. The Travel Hub would be largely the same size and layout and in the same location as in the Brown option and so the impacts would be the same.

The Travel Hub site would cover about 15.5ha of farmland south-west of the A1307/A11 junction, replacing arable fields with paving, lighting, signage and a one-storey building. This would introduce urbanising elements into a rural setting. The Travel Hub would also occupy parts of three separate fields, adversely affecting the pattern of the landscape. The Travel Hub would be clearly visible from PRoW 12/4 and in filtered views from dwellings on the south-eastern boundary of Babraham. The Travel Hub would be lit at night, affecting the night-time landscape character of the rural area between Babraham and the A11. The movement and noise generated by the Travel Hub and the operating vehicles would reduce tranquillity, though this would be experienced in the context of the busy A11/A1307 junction. The extensive landscape mitigation planting proposed would, in time, screen and integrate the Travel Hub into its landscape setting, however vehicles using the route would remain noticeable moving through the landscape, especially from PRoW.

The Pink option and Travel Hub Site B would result in a moderate adverse effect.

7.7.4 Black Option and Travel Hub Site C

The Black option would result in similar impacts on landscape and views as the Pink option up to the A11 where it would cross the A11 on a new bridge on the same alignment as the Blue option into Travel Hub Site C.

Travel Hub C has the same design and, therefore, impacts for this route option as the Blue option.

The Black option would result in a moderate adverse effect.

7.7.5 Blue Option and Travel Hub Site C

The Blue option would follow the more direct Brown route from Sawston across the River Granta towards the A11, then cross the A11 on a new bridge before crossing through the much more restrictive field pattern up to the A1307 and then crossing into Travel Hub Site C.

The arable field north east of the A11/A1307 junction would be replaced by a Travel Hub site covering about 14.2ha with paving, lighting, signage and a one-storey building, introducing urbanising elements into a rural setting. It would be visible from a stretch of PRoW 4/2 and in filtered views from dwellings along the A1307 on the northern boundary of Little Abington. The lighting, movement and noise generated by the Travel Hub and the vehicles would reduce tranquillity, though this would be experienced in the context of the busy A11/A1307 junction. The extensive landscape mitigation planting proposed would, in time, screen and integrate the Travel Hub into its landscape setting, however vehicles using the route would remain noticeable moving through the landscape, especially from PRoW.

The Blue option would result in a moderate adverse effect.

8 Noise

8.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the qualitative WebTAG assessment that has been undertaken with regards to noise.

This appraisal considers noise impacts due to health effects for each proposed scheme option during the operational phase of the scheme only. The impacts of noise from construction are not considered within the scope of this appraisal.

8.2 Legislation and Policy Context

8.2.1 National Legislation and Policy

The Land Compensation Act 1973 Part 1

The Land Compensation Act 1973 Part 1[22] includes provision for compensation for loss in property value resulting from physical agents, including noise and vibration, resulting from the use of public works, such as new or improved roads.

The Noise Insulation Regulations 1975 (amended 1988)

The Noise Insulation Regulations 1975 (amended 1988)[23] were made under Part 2 of the Land Compensation Act for the obligatory and discretionary provision of noise mitigation measures for dwellings adjacent to new highways. Among the criteria for a property to qualify for insulation in living rooms and bedrooms is the façade noise level is at least 68dB $L_{A10,18hr}$, and that noise from the new or altered highway increases by at least 1dB.

8.2.2 National Policy

The Environmental Noise (England) Regulations 2006

The Environmental Noise (England) Regulations[24] implement European legislation requiring noise action plans to be developed on a five-year rolling programme. Action plans have to be developed for the major noise sources and areas for which maps have been produced. The action plans seek to manage noise issues and effects including noise reduction, if necessary, based on the results obtained through the mapping process. As a result of the process, the "Noise Action Plan: Roads (Including Major Roads)[25]" was published, which identified 'Important Areas' for future mitigation.

The National Planning Policy Framework 2019

The National Planning Policy Framework (NPPF)[26] was revised in 2019. Paragraph 170 of the NPPF states that: "Planning policies and decisions should contribute to and enhance the natural and local environment by:…e) preventing new and existing development from contributing to,

[22] HMSO, (1973). "Land Compensation Act.

[23] HMSO, (1975). "Noise Insulation Regulations. Statutory Instruments No. 1763. Building and Buildings.

[24] Environmental Noise Regulations available online at http://www.legislation.gov.uk/uksi/2006/2238/pdfs/uksi_20062238_en.pdf

[25] Noise Action Plan: Roads (Including Major Roads) Environmental Noise (England) Regulations 2006, as amended January 2014

[26] NPPF. Available online at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728643/Revised_NPPF_2018.pdf

being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability".

Paragraph 180 of the NPPF states that planning policy and decisions should aim to:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The Noise Policy Statement for England 2010

The Noise Policy Statement for England (NPSE)[27] was issued by the Department for Environment, Food and Rural Affairs (Defra) in 2010. Its purpose is to promote, "good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development". The three main aims are to:

- Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Within the aims stated above there are several key phrases that lead to additional concepts now considered in the assessment of noise impact; these and their definitions are detailed below:

- Lowest Observed Adverse Effect Level (LOAEL): this is the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL): this is the level above which significant adverse effects on health and quality of life occur.

There are no pre-defined levels for these effect levels as it is acknowledged that they will be different for different sources, different receptors and at different times.

8.2.2.1 Planning Practice Guidance

Planning Practice Guidance (PPG)[28] is a Government web-based resource which provides guidance on how the policy set out in NPPF may be interpreted in practice for a wide range of issues. There is a subsection of PPG relating specifically to noise:

"Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved."

[27] Defra (2010). "The Noise Policy Statement for England"
[28] Department for Communities and Local Government (2019) Planning Practice Guidance.

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during construction wherever applicable) is, or would be, above or below the significant observed adverse effect level…"

Among the specific factors to consider where relevant the guidance states: "In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur".

PPG provides a noise exposure hierarchy which describes the perception and outcomes associated with increasing effect levels as shown in Table 15.

Table 15: PPG noise exposure hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
	Lowest Observed Adverse Effect Level		
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
	Significant Observed Adverse Effect Level		
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Source: Planning Practice Guidance

8.2.3 Local Policy

The current local planning policy and guidance relevant to noise and vibration is contained in the adopted (2018) South Cambridgeshire and City of Cambridge Local Plans.

The relevant policies for South Cambridgeshire are detailed below:

- Policy SC/10: Noise Pollution

1. Planning permission will not be granted for development which:
    a. Has an unacceptable adverse impact on the indoor and outdoor acoustic environment of existing or planned development;
    b. Has an unacceptable adverse impact on countryside areas of tranquillity which are important for wildlife and countryside recreation;
    c. Would be subject to unacceptable noise levels from existing noise sources, both ambient levels and having regard to noise characteristics such as impulses whether irregular or tonal.
2. Conditions may be attached to any planning permission to ensure adequate attenuation of noise emissions or to control the noise at source. Consideration will be given to the increase in road traffic that may arise due to development and conditions or Section 106 agreements may be used to minimise such noise.
3. Where a planning application for residential development is near an existing noise source, the applicant will be required to demonstrate that the proposal would not be subject to unacceptable noise levels both internally and externally.
4. The Council will seek to ensure that noise from proposed commercial, industrial, recreational or transport use does not cause any significant increase in the background noise level at nearby existing noise sensitive premises which includes dwellings, hospitals, residential institutions, nursing homes, hotels, guesthouses, and schools and other educational establishments.

- Policy TI/2: Planning for Sustainable Travel

    …3. Developers will be required to demonstrate they will make adequate provision to mitigate the likely impacts (including cumulative impacts) of their proposal including environmental impacts (such as noise and pollution) and impact on amenity and health…

- Policy SC/10 supporting text also refers to Noise Action Plans and Noise Important Areas which would be potentially impacted due to development. The policy notes that with respect to the Noise Action Plans existing management and control measures can be implemented to mitigate against increases in noise exposure due to development.

The relevant policies for the City of Cambridge are detailed below:

- Policy 35: Protection of human health and quality of life from noise and vibration

    Development will be permitted where it is demonstrated that:
    a. it will not lead to significant adverse effects and impacts, including cumulative effects and construction phase impacts wherever applicable, on health and quality of life/amenity from noise and vibration; and
    b. adverse noise effects/impacts can be minimised by appropriate reduction and/or mitigation measures secured through the use of conditions or planning obligations, as appropriate (prevention through high quality acoustic design is preferable to mitigation).

This appraisal of noise does not consider mitigation measures and therefore cannot determine the significance of effects which would be assessed during detailed design within an EIA. This appraisal considers potential noise impacts of scheme options at a preliminary stage.

8.2.4 Guidance

8.2.4.1 DMRB Volume 11, Section 3, Part 7 'Noise and Vibration 2011

The DMRB Volume 11, Section 3, Part 7, HD213/11[29] 'Noise and Vibration' describes a methodology for the assessment of road projects in the UK and best reflects Environmental

[29] Design Manual for Roads and Bridges, HD213/11 Revision 1, 2011.

Impact Assessment (EIA) methodology as applied to highways. It includes a method of the classification of magnitude of impact and assessment of both long and short-term effects.

8.2.4.2 WHO Environmental Noise Guidelines for the European Region 2018

The World Health Organisation (WHO) Environmental Noise Guidelines for the European Region[30] provide evidence-based recommendations on the health effects of noise. The guidelines complement the expert-based recommendations of the WHO 'Night Noise Guidelines' (2009) (NNG).

The new guidelines provide source specific recommendations of road traffic, railway, aircraft and wind turbine noise, and indoor as well as outdoor exposure levels for leisure noise.

Specific recommendations are made with regards to road traffic noise as follows:

- "For average noise exposure, the Guideline Development Group (GDG) strongly recommends reducing noise levels produced by road traffic below 53 decibels (dB) L_{den}, as road traffic noise above this level is associated with adverse health effects.
- For night noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic during night time below 45 dB L_{night}, as night-time road traffic noise above this level is associated with adverse effects on sleep.
- To reduce health effects, the GDG strongly recommends that policymakers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure."

The Guidelines clarify that "L_{den} and L_{night} refer to a measurement or calculation of noise exposure at the most exposed façade, outdoors, reflecting the long-term average exposure."

8.2.4.3 WHO Night Noise Guidelines for Europe

The WHO Night Noise Guidelines for Europe (NNG)[31] suggest on a very precautionary basis, that the population should not be exposed to a NNG value greater than 40dB of $L_{night,outside}$ (defined as the night noise level outside in free field conditions) during the part of the night when most people are sleeping. However, the precautionary nature of this target is fully appreciated by the WHO and a noise level of 55dB $L_{night,outside}$ is therefore recommended relating to the onset of heart disease.

8.2.4.4 British Standard (BS) 8233 2014

BS 8233 2014[32]provides guidance relating to noise levels in external amenity areas which states that it is desirable noise levels do no exceed 50 dB $L_{Aeq,T}$ with an upper guidance value of 55 dB $L_{Aeq,T}$. The upper guidance value is relevant in noisier environments.

Guidance states "however, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or

[30] WORLD HEALTH ORGANISATION, 2018. Environmental Noise Guidelines for the European Region. ISBN 978 92 890 5356 3. URL available: http://www.euro.who.int/en/health-topics/environment-and-health/noise/publications/2018/environmental-noise-guidelines-for-the-european-region-2018 (Last accessed January 2019)

[31] World Health Organization, (2009). Night Noise Guidelines for Europe.

[32] BSI 2014, BS 8233, Guidance on sound insulation and noise reduction for buildings.

making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

8.2.4.5 Calculation of Road Traffic Noise 1988

Calculation of Road Traffic Noise (CRTN)[33] provides procedures for predicting noise levels for a given flow of road traffic at sensitive receptors. These methodologies are used in the determination of entitlement under the Noise Insulation Regulations and for traffic noise change assessments undertaken in accordance with the DMRB assessment methodology.

8.2.4.6 Noise Advisory Council 1978

Noise Advisory Council (NAC) guidance[34] provides a method to predict noise levels from road traffic sources given flow, speed and percentage heavy goods vehicles using a Sound Exposure Level (SEL) based approach. This methodology provides a means to approximate noise levels for roads which fall below the CRTN lower bound flow value.

8.3 Assessment Methodology

At the time of appraisal detailed forecast traffic data was not available to complete a quantitative assessment for all scheme options. Qualitative appraisal for OAR purposes has been undertaken for scheme options to understand potential noise impacts. Full WebTAG worksheets were therefore not completed for each scheme option. This approach is considered proportionate for preliminary assessment and broadly follows the DMRB scoping stage assessment methodology.

Qualitative assessment reviewed the following aspects to appraise noise effects due to implementation of each scheme option:

- Likely changes in vehicle flows, percentage of heavy goods vehicles or speeds which have the potential to result in beneficial or adverse noise effects
- Identification of noise sensitive receptors within 50m of each scheme option that might be affected by changes in noise level due to change in traffic or new noise sources
- Review of the horizontal scheme alignments of scheme route options and nearby noise sensitive receptors
- Review of the Travel Hub site locations and proximity to nearby noise sensitive receptors
- Consideration of the existing ambient noise environment and potential ambient noise level increases due to the introduction of new road traffic and Travel Hub site noise sources.

8.4 Study Area

DMRB Volume 11 Section 3 Part 7 HD213/11 Noise and Vibration (2011) requires that the study area for operational noise is identified as an area within 1 kilometre of the physical works associated with the scheme.

8.5 Baseline Information

Baseline noise surveys have not been undertaken at this stage of the scheme assessment. Existing baseline conditions have therefore been reviewed through desktop study using the Extrium noise map (available online at: http://extrium.co.uk/). Existing ambient noise levels are

[33] Department of Transport (1988). "Calculation of Road Traffic Noise".
[34] The Noise Advisory Council (1978). "A Guide to Measurement and Prediction of the Equivalent Continuous Sound Level Leq"

indicated to be less than 55 dB $L_{Aeq,16hr}$ for the majority of properties along the scheme route which fall primarily in rural areas. Receptors near Babraham and Abington within approximately 280m of the A1307 or approximately 750m of the A11 within the study area experience noise levels that are typically between 55 - 60 dB $L_{Aeq,16hr}$.

Baseline noise levels in the immediate vicinity of the general area of the options are characterised by noise from road traffic using the A1307, A11 and the surrounding road network. As the route approaches the northern section (from Great Shelford to the CBC) there will be noise from the main railway line from London Liverpool Street to Cambridge. Noise levels reduce in more rural areas as distance increases from the road traffic noise sources. Other noise sources (including aircraft, anthropogenic and environmental sources) will contribute to ambient noise levels in these more rural areas at greater distances from road traffic noise sources.

8.6 Resources and Receptors

There are three noise important areas (NIA)[35] located within 1km of the scheme route options. The Important Areas are:

- ID 5028 and ID 5027 (located north of Addenbrooke's Hospital site),
- ID 6103 (along Cambridge Road north of Little Abington)

Noise sensitive receptors for the purposes of this assessment in accordance with DMRB and WebTAG Unit A3 guidance include residential properties. The closest noise sensitive receptors to the route sections common for all options are located at:

- Off Hinton Way, Great Shelford
- Off Haverhill Road, Stapleford
- North Farm north of Sawston
- Isolated properties off Sawston Road and High Street east of Sawston

Noise sensitive receptors for the Blue and Black route options and Travel Hub Site C also include locations at:

- Cambridge International School, south of Four Went Ways services
- Hotel at Four Went Ways services
- Residential properties South of Cambridge Road, Little Abington

8.7 Results of Assessment

8.7.1 Qualitative Assessment

Results from qualitative options appraisals are provided in the appended qualitative assessment documents (see Appendix 10.H).

In general, appraisal outcomes indicate that all scheme options would result in minor adverse impacts. Minor adverse impacts are anticipated due to the introduction of new noise sources. However, all scheme options are not expected to result in substantial changes to traffic flows on the surrounding road network and therefore impacts would be localised to areas around the scheme route which are in general sparsely populated. Where the new route passes noise sensitive receptors, such as those near Stapleford and Sawston, noise from public transport is likely to be audible at the nearest properties.

[35] NIAs are viewable online at: http://extrium.co.uk/noiseviewer.html

Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the rural road network, the A1307, A11, A505 and the railway line are likely to predominate for receptors near these locations and significant impacts arising from the scheme are unlikely to result.

The scheme options are very similar in horizontal alignment for the majority of the route, and the variance in the number of receptors affected by the different options is minimal.

Noise from new sources associated with each Travel Hub, including traffic movements within the site boundaries, is unlikely to be significant at the nearest noise sensitive properties due to the distance these are from the Travel Hub locations. Noise associated with the Travel Hub operations can be reduced through design and inclusion of mitigation (for example bunds or acoustic barriers) where necessary.

8.7.2 Quantitative Assessment

The Net Present Value (NPV) has been calculated by the marginal external costs (MEC) method, the results of which are presented in the Economic Case.

9 Water

9.1 Introduction

This section presents the applicable legislation, the methodology, study area and existing baseline and results of the qualitative WebTAG assessment that has been undertaken with regards to water.

9.2 Legislation and Policy Context

9.2.1 European legislation

9.2.1.1 Water Framework Directive 2000

The key EU legislation covering the water environment which has a bearing on this scheme is the Water Framework Directive (WFD), which establishes a framework for the management of water resources throughout the European Union. The WFD is translated into UK law through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

The key objectives of the WFD are to:

- Prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water and reduce pollution from discharges and emissions of hazardous substances.
- Protect, enhance and restore all bodies of groundwater, achieve good chemical and quantitative status of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between groundwater abstraction and replenishment.
- Preserve protected areas.

9.2.1.2 Groundwater Directive 2006

The Groundwater Directive 2006/118/EEC is aimed at the protection of groundwater from pollution and deterioration. The main requirements of the directive in relation to transport projects is the requirement to limit or avoid the discharge of hazardous substances to groundwater.

9.2.2 National Legislation

9.2.2.1 Environmental Permitting Regulations 2010

The Environmental Permitting Regulations (EPR) 2010 aim to protect groundwater and surface waters from pollution by controlling the inputs of potentially harmful and polluting substances. The Regulations implement the WFD and the Groundwater Daughter Directive 2006. The EPR replace those parts of the Water Resources Act (WRA) 1991 that relate to the regulation of discharges to controlled waters (including groundwater).

9.2.2.2 Water Resources Act 1991

Section 93 of the WRA 1991 provides for the establishment of groundwater protection zones. The requirements of Section 93 are implemented and set out in the Environment Agency's Groundwater Protection Guides covering: requirements, permissions, risk assessments and

controls (previously covered in GP3[36]). Source Protection Zones (SPZs) are defined for groundwater supplies used for human consumption. The Environment Agency's position statement relating to the use of sustainable drainage systems can be found within these guides.

9.2.2.3 Land Drainage Act 1991

The Land Drainage Act 1991 is also relevant to manage flood risk for any works within eight metres of ordinary watercourses. In these cases, land drainage consent is required for development to proceed. There are two field ditches crossing the site which are likely to be considered ordinary watercourses where development would occur within eight metres of the watercourses.

9.2.3 National Policy

9.2.3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2019[37] applies to this scheme under Chapter 14 ("Meeting the challenge of climate change, flooding and coastal change") and the supporting technical guidance, in relation to flood risk. A site-specific flood risk assessment will be required for the preferred option as part of the planning application because the proposed site for this scheme is located within Flood Zone 1 and is larger than 1 hectare in size.

9.2.4 Local Policy

The current local planning policy and guidance relevant to the water environment is contained in the adopted (2018) South Cambridgeshire and City of Cambridge Local Plans.

The South Cambridgeshire Local Plan[38] contains three policies relevant to this scheme. "Policy CC/7: Water Quality" mentions the need for proposals to have adequate water supply, sewerage and land drainage systems for the whole development. The proposal also needs to demonstrate that the quality of the ground, surface water and waterbodies will not be harmed, and that sources of pollution and Sustainable Drainage Systems (SuDS) measures are considered. "Policy CC/8: Sustainable Drainage Systems" also refers to the need for proposals to incorporate appropriate SuDS. "Policy CC/9: Managing Flood Risk" describes the need to minimise flood risk associated with the proposed development by incorporating suitable flood protection / mitigation measures to the level and nature of the flood risk and by ensuring there is no increase in flood risk. The policy also refers to the need to undertake a site-specific flood risk assessment depending on the size of the proposed development and the flood zone it is located in.

Two policies from the Cambridge Local Plan[39] are relevant to the water environment for this scheme. "Policy 31: Integrated water management and the water cycle" suggests that surface water management features are multi-functional wherever possible in their land use and measures need to be implemented to contain the run-off from all hard surfaces. It also refers to

[36] Environment Agency (2013). Groundwater protection: Principles and practice (GP3). August 2013 Version 1.1. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/598799/LIT_7660.pdf (last accessed April 2019).

[37] National Planning Policy Framework [online] available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf (last accessed April 2019).

[38] South Cambridgeshire District Council (2018). South Cambridgeshire Local Plan, Adopted September 2018. Available online at: https://www.scambs.gov.uk/media/12740/south-cambridgeshire-adopted-local-plan-270918_sml.pdf (last accessed April 2019).

[39] Cambridge City Council (2018). Cambridge Local Plan. October 2018. Available online at: https://www.cambridge.gov.uk/media/6890/local-plan-2018.pdf (last accessed April 2019).

the need for all hard surfaces to be permeable surfaces where reasonably practicable and having regard to groundwater protection. “Policy 32: Flood Risk” describes the need for proposals to address the potential flood risk following the principles of the NPPF.

9.3 Assessment Methodology

The water resources assessment has followed the process set out in WebTAG Unit 3A.

The WebTAG methodology allows the assessment of the value of water resource features that occur in the study area, based on their quality (physical condition of the feature), scale (local, regional, national), rarity (how common the feature is in the area) and substitutability (how easily can the feature be replaced in the area).

A qualitative assessment is made on the potential magnitude of any impact of the options and from the combination of importance and magnitude the significance of the effect is defined.

The resulting worksheets that haven been completed (one per scheme option) are shown in Appendix 10.I.

9.4 Study Area

9.5 Baseline Information and Receptors

The study area is up to 1km wide on either side of the common route alignment of the five options between CBC and Sawston before diverging into the five options (Purple route option to Travel Hub Site A, Pink and Brown route options to Travel Hub Site B and Black and Blue route options to Travel Hub Site C). The routes of all the options require the development of a new corridor running parallel to the A1307.

9.5.1 Surface Water

The scheme is downgradient from the springs in Nine Wells LNR, therefore the common route for all options in this area will not affect ground or surface water flowing to the reserve. The Nine Wells Springs feed into the Hobson’s Conduit (a protected heritage asset) which flows through Cambridge City.

All options cross about 32m of Flood Zone 2 and 3 connecting CBC to Hobson’s Brook flood plain but this has been already been largely built over by CBC development in the area. The scheme will have little impact on this very minor flood plain.

All route options cross the main River Granta once between Stapleford and Sawston, where the route crosses about 220m of the designated Flood Zone 2 and 3.

The Pink and Black routes cross the River Granta a second time near to the point where the A11 crosses the river, at this point Flood Zones 2 and 3 are about 220m wide.

The Brown and Blue routes cross the River Granta a second time about 500m west of the A11 (about halfway between the A11 and Babraham). At this location the Flood Zones 2 and 3 are about 170m wide.

Water from the River Granta is not abstracted for drinking water but could be used by local farmers. The River Granta is a designated as a County Wildlife Site.

Recreational access could be increased along the River Granta from the scheme NMU path and through improvements to local PRoW and permissive paths.

There are no still water ponds directly in the footprint of the scheme therefore there is not likely to be any impact on biodiversity or aesthetics of ponds.

9.5.2 Geology

The route options are all on outcropping bedrock except where they cross the River Granta, where there are superficial River Terrace Gravels and Alluvium associated with the River Granta valley.

All options are underlain by chalk – from CBC to Sawston the route is on Grey Chalk Sub-Group formations, and from Sawston to all three Travel Hub sites the area is underlain by White Chalk Sub-Group formations.

Travel Hub Site A is partly on Lowestoft Formation (sand and gravel) and River Terrace Gravels. Travel Hub Site B is largely on outcropping chalk but may have some areas of River Terrace Gravels around the edge of the site. Travel Hub Site C has no superficial deposits and is on outcropping chalk.

9.5.3 Groundwater

All options are underlain by the chalk formations described briefly above, and all form a single Principal Aquifer as defined by the Environment Agency. This aquifer provides a high level of groundwater storage and supports conveyance of good quality groundwater in the area and is used by several groundwater abstractions for public water supplies. Groundwater in the chalk flows broadly from the high topographic areas (e.g. under the Gog Magog hills) north / north westwards towards the River Granta and River Cam valleys. Any shallow groundwater in the superficial deposits is likely to be flowing under topographic control towards and along the River Granta Valley.

The River Granta has a baseflow index ranging from 0.45 to 0.57 between Linton and Stapleford (according to National River Flow Archive[40] information for gauging stations at Linton, Babraham and Stapleford). These are lower than would be anticipated for a chalk catchment where the baseflow index might be nearer 0.9.

The Environment Agency has classified the River Granta to be at moderate status in 2016[41]. One of the reasons for only achieving a moderate status is that the hydrological regime “Does Not Support Good”. The reason noted by the Environment Agency for this is the flow in the river is impacted by abstractions from the chalk aquifer in the area. This may explain the slightly lower baseflow index calculated from river flow data noted above.

9.5.4 Public Water Supplies and Source Protection Zones

Source Protection Zones (SPZ) are identified by the Environment Agency around public water supply abstractions from groundwater. SPZ have three zones as follows:

- SPZ1 – inner source protection zone indicating travel time of less than 50 days to the point of abstraction.
- SPZ2 – outer source protection zone indicating travel time of 400 days to 50 days to the point of abstraction.
- SPZ3 – total catchment zone indicating the whole groundwater catchment likely to be supplying the abstraction.

[40] https://nrfa.ceh.ac.uk/data/search

[41] https://environment.data.gov.uk/catchment-planning/WaterBody/GB105033037810

There are no surface drinking water supply abstractions within the vicinity of the five route options.

There are three abstractions and associated SPZ1 within 400m of the five routes between Sawston and Babraham. There are other SPZ1 (abstractions) further south but these are hydraulically upgradient of the scheme options.

All the route options cross the SPZ2 and SPZ3 associated with the two public abstractions near Babraham and one abstraction in Sawston.

In the vicinity of the Blue / Brown route crossing of the River Granta east of Babraham there is surface water used for agriculture.

9.6 Results of Assessment

All the options are very similar in scale and location and so the impact on water resources would be very similar as well.

None of the options would affect the conveyance of groundwater that provides drinking water in the area, or baseflow to the River Granta. The low permeability car park surface of the selected Travel Hub will not affect recharge or conveyance of groundwater as the total area of any of the options is very small in relation to the overall groundwater catchment in the area. In addition, any rainfall running off the site would be collected through the drainage system and discharged locally, thereby causing no nett loss to the catchment overall.

There are no underground structures intended for Travel Hub sites, and footings from any river crossing would only have minor impacts on groundwater flow at a very localised level.

The design of any river crossing would have to ensure there was no loss of flood storage and no increase in flood risk to adjoining land or downstream of any river crossings.

The Blue / Brown route options would have to be designed to avoid any impact on the agricultural surface water abstraction on the River Granta east of Babraham – but the route should not prevent this abstraction continuing so the effect is considered neutral.

Travel Hub Site B has a total footprint that extends into the River Granta Flood Zones 2 and 3 south east of Babraham. However, the layout would not require car park infrastructure in the flood zones (the footprint in the flood zone is likely to be used for landscape planting). A drainage strategy and design for the selected Travel Hub site would be designed to best SuDS practice.

The level of traffic along the public transport route would not be high enough to generate any significant contamination risks from the public transport vehicles. The design of Travel Hub site drainage and drainage along the preferred route will take into account the need to prevent runoff and spillages (likely to be very minor) having any significant impact on groundwater quality. The Travel Hub site drainage design will specifically include features to intercept potentially contaminating substances arising from the parking areas (e.g. from fuel and hydraulic leaks, tyre and brakes wear and tear) such as the use of vegetated drainage basins.

The impact on water resources arising from any of the options is therefore considered to be insignificant (i.e. Neutral).

10 Appendices

A. Appraisal Summary Table

This section presents a summary of the WebTAG worksheets for each option (Tables 16 to 20) which include a short description of the overall impact, an assessment of the magnitude of the potential impact and a rating. Table 21 summarises the different options based on their magnitude and rating.

Table 16: Summary of the WebTAG worksheets of the Purple Option / Travel Hub Site A

Disciplines	Overall potential impact	Overall potential effect
Air quality	This option is unlikely to result in significant changes to the baseline conditions. The changes in air quality from this option are judged to be de minimis.	Neutral
Biodiversity	In summary, there would be an overall slight adverse effect on biodiversity as a result of the Purple option and Travel Hub Site A. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriers to dispersal and severance of commuting routes. The scheme would not present any significant adverse effects on the integrity of SSSIs located within 2km of the proposed works.	Moderate adverse
Impact on Green Belt	The Purple route passes through the South Cambridgeshire Green Belt along a similar route as the other options. The Purple route goes to Travel Hub Site A which also sits within the Green Belt. This is likely to have a moderate adverse effect as arable fields will be changed into car parks.	Moderate adverse
Greenhouse Gases	During the scheme's operation, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. As this option is the shortest, associated emissions from the public transport vehicles operating from the Travel Hub will be the lowest. Vehicles driving to the Travel Hub from the A1307 would have to drive through 2 junctions before entering the Travel Hub for this option which may also increase GHG emissions. The site could provide parking for up to 2,000 cars. This combination of Travel Hub will enable the smallest possible modal shift due to having the smallest capacity - but has potential for expansion if the use of the Travel Hub is significant. However, there is a potential for increased emissions but this will be mitigated by some of the scheme elements.	Neutral
Historic Environment	In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present, they will be removed by necessary excavations. There are known archaeological remains of regional (and potentially national) significance within the footprint of the proposed option.	Major adverse
Landscape	In summary the Purple option would result in moderate adverse impacts due to the introduction of access roads into arable fields, and the operation of a Travel Hub site within an open landscape and slightly elevated location. There would be a loss of farmland across multiple fields, affecting agricultural viability and the loss of some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however vehicles using the access would remain noticeable in the landscape.	Moderate adverse

Disciplines	Overall potential impact	Overall potential effect
Noise	This option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Noise from traffic within Travel Hub Site A is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Travel Hub Site A.	Minor adverse
Water	Insignificant impact on water resources as no direct impacts on any water features other than at crossing of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.	Neutral

Table 17: Summary of the WebTAG worksheets of the Brown Option / Travel Hub Site B

Disciplines	Overall potential impact	Overall potential effect
Air quality	This option is unlikely to result in significant changes to the baseline conditions. The changes in air quality from this option are judged to be de minimis.	Neutral
Biodiversity	In summary, there would be an overall slight adverse effect on biodiversity as a result of the Brown option and Travel Hub Site B. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriers to dispersal and severance of commuting routes. The scheme would not present any significant adverse effects on the integrity of SSSIs located within 2km of the proposed works.	Moderate adverse
Impact on Green Belt	The Brown route passes through the South Cambridgeshire Green Belt along a similar route as the other options. The Brown route goes to Travel Hub Site B which also sits within the Green Belt. This is likely to have a moderate adverse effect as arable fields will be changed into car parks.	Moderate adverse
Greenhouse Gases	During the scheme's operation, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. As the site could provide parking for up to 2,800 cars this combination of Travel Hub will enable the greatest possible modal shift due to having the largest capacity. However, there is a potential for increased emissions but this will be mitigated by some of the scheme elements.	Neutral
Historic Environment	In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present, they will be removed by necessary excavations. There are known archaeological remains of regional (and potentially national) significance within the footprint of the proposed option.	Major adverse
Landscape	In summary the Brown option would result in moderate adverse impacts due to the introduction and operation of a car park and access roads into arable fields albeit adjacent to the large A1307/A11 grade separated junction. There would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The	Moderate adverse

Disciplines	Overall potential impact	Overall potential effect
	extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however vehicles using the access would remain noticeable in the landscape.	
Noise	This option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Noise from traffic within Travel Hub Site B is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Travel Hub Site B.	Minor adverse
Water	Insignificant impact on water resources as no direct impacts on any water features other than at crossings of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.	Neutral

Table 18: Summary of the WebTAG worksheets of the Pink Option / Travel Hub Site B

Disciplines	Overall potential impact	Overall potential effect
Air quality	This option is unlikely to result in significant changes to the baseline conditions. The changes in air quality from this option are judged to be de minimis.	Neutral
Biodiversity	In summary, there would be an overall slight adverse effect on biodiversity as a result of the Pink option and Travel Hub Site B. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriers to dispersal and severance of commuting routes. The scheme would not present any significant adverse effects on the integrity of SSSIs located within 2km of the proposed works.	Moderate adverse
Impact on Green Belt	The Pink route passes through the South Cambridgeshire Green Belt along a similar route to the other options. The Pink route goes to Travel Hub Site B via a slightly different route from the Brown option. Travel Hub Site B sits within the Green Belt. This is likely to have a moderate adverse effect as arable fields will be changed into car parks.	Moderate adverse
Greenhouse Gases	During the scheme's operation, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. As the site could provide parking for up to 2,500 cars this combination of Travel Hub will enable the greatest possible modal shift due to having the largest capacity. However, there is a potential for increased emissions but this will be mitigated by some of the scheme elements.	Neutral
Historic Environment	In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present, they will be removed by necessary excavations. There are known archaeological remains of regional (and potentially national) significance within the footprint of the proposed option.	Major adverse
Landscape	In summary the Pink option would result in moderate adverse impacts due to the introduction and operation of a car park and access roads into arable fields albeit adjacent to the large A1307/A11 grade separated junction. There	Moderate adverse

Disciplines	Overall potential impact	Overall potential effect
	would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however vehicles using the access would remain noticeable in the landscape.	
Noise	This option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Noise from traffic within Travel Hub Site B is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Travel Hub Site B.	Minor adverse
Water	Insignificant impact on water resources as no direct impacts on any water features other than at crossings of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.	Neutral

Table 19: Summary of the WebTAG worksheets of the Black Option/Travel Hub Site C

Disciplines	Overall potential impact	Overall potential effect
Air quality	This option is unlikely to result in significant changes to the baseline conditions. The changes in air quality from this option are judged to be de minimis.	Neutral
Biodiversity	In summary, there would be an overall slight adverse effect on biodiversity as a result of the Black option and Travel Hub Site C. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriers to dispersal and severance of commuting routes. The scheme would not present any significant adverse effects on the integrity of SSSIs located within 2km of the proposed works.	Moderate adverse
Impact on Green Belt	The Black route passes through the South Cambridgeshire Green Belt along a similar route to the other options. The Black route goes to Travel Hub Site C which is situated outside of the Green Belt. This route is therefore likely to have a minor adverse effect as the route passes through arable fields.	Minor adverse
Greenhouse Gases	During the scheme's operation, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. The length of this route is the longest of all the options which will contribute additional operational GHG emissions from the public transport vehicles. The site could provide parking for up to 2,100 cars. This combination of Travel Hub would enable a smaller modal shift in transport due to having the one of the smaller capacities. However, there is a potential for increased emissions but this will be mitigated by some of the scheme elements.	Neutral
Historic Environment	In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present, they will be	Major adverse

Disciplines	Overall potential impact	Overall potential effect
	removed by necessary excavations. There are known archaeological remains of regional (and potentially national) significance within the footprint of the proposed option.	
Landscape	In summary the Black option would result in moderate adverse impacts due to the introduction and operation of a car park and access roads into arable fields albeit near to the large A1307/A11 grade separated junction. There would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however vehicles using the access would remain noticeable in the landscape.	Moderate adverse
Noise	This option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Noise from traffic within Travel Hub Site C is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Travel Hub Site C.	Minor adverse
Water	Insignificant impact on water resources as no direct impacts on any water features other than at crossings of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.	Neutral

Table 20: Summary of the WebTAG worksheets of the Blue Option / Travel Hub Site C

Disciplines	Overall potential impact	Overall potential effect
Air quality	This option is unlikely to result in significant changes to the baseline conditions. The changes in air quality from this option are judged to be de minimis.	Neutral
Biodiversity	In summary, there would be an overall slight adverse effect on biodiversity as a result of the Blue option and Travel Hub Site C. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriers to dispersal and severance of commuting routes. The scheme would not present any significant adverse effects on the integrity of SSSIs located within 2km of the proposed works.	Moderate adverse
Impact on Green Belt	The Blue route passes through the South Cambridgeshire Green Belt along a similar route to the other options. The Blue route goes to Travel Hub Site C which is situated outside of the Green Belt. It has a slightly different route to the Black option. This route is therefore likely to have a minor adverse effect as the route passes through arable fields.	Minor adverse
Greenhouse Gases	During the scheme's operation, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. The length of the route is the second longest, after the Black route which will contribute additional operational GHG emissions from the public transport vehicles. The site could provide	Neutral

Disciplines	Overall potential impact	Overall potential effect
	parking for up to 2,100 cars. This combination of Travel Hub would enable a smaller shift in modal transport due to having the one of the smaller capacities. However, there is a potential for increased emissions but this will be mitigated by some of the scheme elements.	
Historic Environment	In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present, they will be removed by necessary excavations. There are known archaeological remains of regional (and potentially national) significance within the footprint of the proposed option.	Major adverse
Landscape	In summary the Blue option would result in moderate adverse impacts due to the introduction and operation of a car park and access roads into arable fields albeit near to the large A1307/A11 grade separated junction. There would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however vehicles using the access would remain noticeable in the landscape.	Moderate adverse
Noise	This option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Noise from traffic within Travel Hub Site C is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Travel Hub Site C.	Minor adverse
Water	Insignificant impact on water resources as no direct impacts on any water features other than at crossings of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.	Neutral

Table 21: Comparison of Options

	Purple/Travel Hub Site A	Brown/Travel Hub Site B	Pink/Travel Hub Site B	Black/Travel Hub Site C	Blue/Travel Hub Site C
Disciplines	**Overall potential effect**				
Air quality	Neutral	Neutral	Neutral	Neutral	Neutral
Biodiversity	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Impact on Green Belt	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Minor adverse
Greenhouse gases	Neutral	Neutral	Neutral	Neutral	Neutral
Historic environment	Major adverse	Major adverse	Major adverse	Major adverse	Major adverse
Landscape	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Noise	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Water	Neutral	Neutral	Neutral	Neutral	Neutral

B. Glossary

Acronym	Meaning
AADT	Annual average daily traffic
AAWT	Annual average weekly traffic
AQMA	Air Quality Management Area
ARN	Affected road network
BAP	Biodiversity Action Plan
BCR	Benefit Cost Ratio
CAP	City Access Penalty
CCC	Cambridge City Council
CHER	Cambridgeshire Historic Environment Record
CO_2	Carbon dioxide
CSRM2	Cambridge Sub Regional Model
EAR	Environmental Appraisal Report
EPR	Environmental Permitting Regulations
GCP	Greater Cambridge Partnership
GHG	Greenhouse gases
HGV	Heavy Goods Vehicles (including buses)
J10, J11, J12	Junction 10, Junction 11, Junction 12
LNR	Local Nature Reserve
NHLE	National Heritage List for England
NO_2	Nitrogen dioxide
NPPF	National Planning Policy Framework
NPV	Net Present Value
OAR	Options Appraisal Report
OBC	Outline Business Case
PCM	Pollution Climate Mapping
$PM_{2.5}$, PM_{10}	Particulate matter with an aerodynamic diameter of less than 2.5 ($PM_{2.5}$) or 10 (PM_{10}) microns
SCDC	South Cambridgeshire District Council

SPZ	Source Protection Zone
SuDS	Sustainable Drainage Systems
WRA	Water Resources Act
ZoI	Zone of influence

C.Air Quality

MOTT MACDONALD

Technical Note

Project:	CSETS A1307		
Our reference:		**Your reference:**	
Prepared by:	J Beddard	**Date:**	July 2019
Approved by:	C Mills	**Checked by:**	C Mills
Subject:	Air Quality – Phase 2 Qualitative Assessment		

1 Air Quality

1.1 Overview

This section provides a semi-quantitative air quality assessment of the five options for Phase 2 of the A1307 scheme. At the time of assessment detailed traffic information was not available, as such it was not feasible to undertake an assessment based on the air quality methodology set out in WebTAG Unit A3. It should be noted that considering the similarities between the scheme options it is also not considered proportional to undertake a full assessment of each option. Nevertheless, a semi-quantitative assessment of the following options has been undertaken to feed into the Options Appraisal Report (OAR).

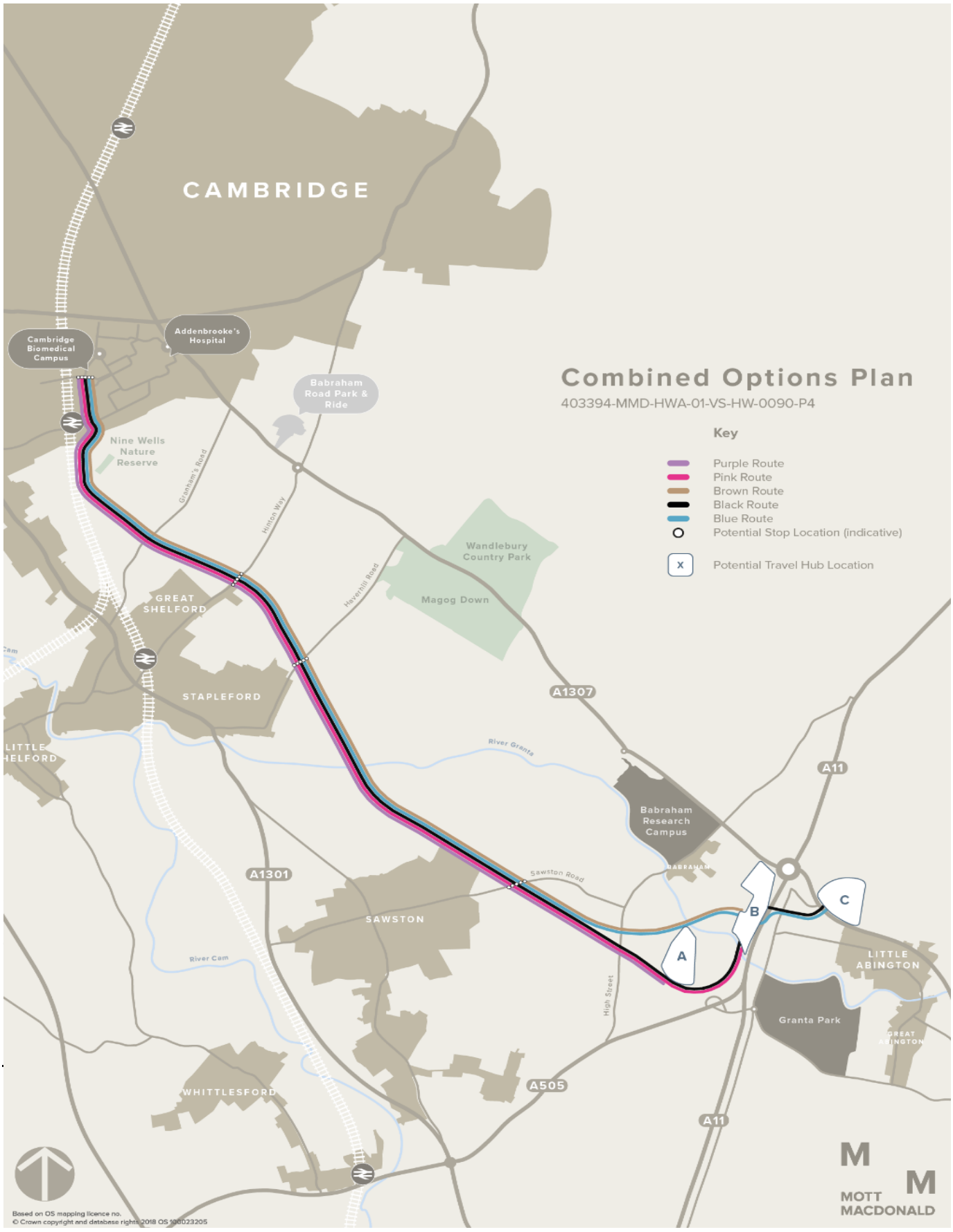
All five options follow a similar route between Cambridge Biomedical Campus (CBC) and Sawston. This section of the route runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with the railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. The route would cross each of these roads and Granham's Road, via a new at-grade junction to be signalised with priority given to public transport vehicles. Before reaching High Street, the route options diverge into the five options (Black, Blue, Brown, Pink and Purple) as shown in Figure 1:

- Black option
  - The route follows a former railway; however, as this is now designated as a county wildlife site, the proposed alignment would be to the north of this, this also avoids the need for a bridge or significant regrading works at the former High Street crossing. The route continues to the A505 junction before running parallel with the A11 and crossing the River Granta. The Black option would then cross the A11 via a new bridge, then crosses Newmarket Road at a new junction and runs through the south of the former Comfort cafe site and crosses the A1307 via a new junction to connect with Travel Hub Site C, located on the north side of the A1307.
- Blue option
  - The Blue route takes a direct route across fields towards the A11 which crosses the A11 via a new bridge, the route crosses Newmarket Road at the junction and runs through the south of the former Comfort cafe site and crosses the A1307 via a new junction to connect with Travel Hub Site C, located on the north side of the A1307. As with those junctions further north, all new junctions would be at-grade and signalised with priority for public transport vehicles. Site C would have a separate roundabout junction to provide general traffic with access into the site at the current junction between the A1307 and Newmarket Road.

- Brown option
  - The Brown route takes a direct route across fields towards the A11 which includes a second crossing of the River Granta. The Brown route ends at Travel Hub Site B, located to the south west of the junction between the A1307 and A11. General traffic would access it from the A1307 via a new junction whilst the site itself would have a linear arrangement in order to accommodate it between a high-pressure gas main, over which development is restricted, and the A11.
- Purple Route
  - The Purple route is the shortest of all options and, unlike the other options, the route only crosses the River Granta once. It follows the same route as the Pink and Black route but stops to the west of the A11/A505 junction and would serve Travel Hub Site A. This would be accessed via a new roundabout junction to the north of the A505 slip road and require an extended access road to the site itself. This would be necessary in order to avoid the high-pressure gas pipeline.
- Pink option
  - The Pink option is the same as the Black but, instead of crossing the A11, it terminates at Travel Hub site B to the north of the River Granta. This would be the same as the Brown route but the brown route has a slightly different layout in order to accommodate public transport vehicles coming from the south rather than west.

Figure 1 presents the five different schemes with focus on the area that differs due to the different Travel Hub sites.

Figure 1: Proposed options layout



Values in brackets shows number of hours above 200 µg/m^3 in line with 1-hour mean objective

1.2.3.3 Particulate matter (PM_{10})

There were no exceedances of the PM_{10} annual or 24-hour mean objectives in 2015 – 2017, concentrations at the Orchard automatic monitoring station were below the objectives.

Table 2: Automatic monitoring data for annual mean PM_{10} objective

Site name	Site classification	Within AQMA	National grid reference		Annual mean NO_2 concentration (µg/m^3) (number of days above 50µg/m^3)		
			X	Y	2015	2016	2017[(a)]
Orchard	Urban Background	No	544558	261579	16 (1)	16 (1)	14 (1)

Source: South Cambridgeshire District Council Annual Status Report 2018.
Note: [(a)] Annual Data Capture for 2017 is 96%
Bold indicates an exceedance of the PM_{10} objective (Annual Mean: 40µg/m^3; 24-Hour Mean: 50µg/m^3 not to be exceeded for more than 35 days per year)

1.2.4 Local authority diffusion tube monitoring

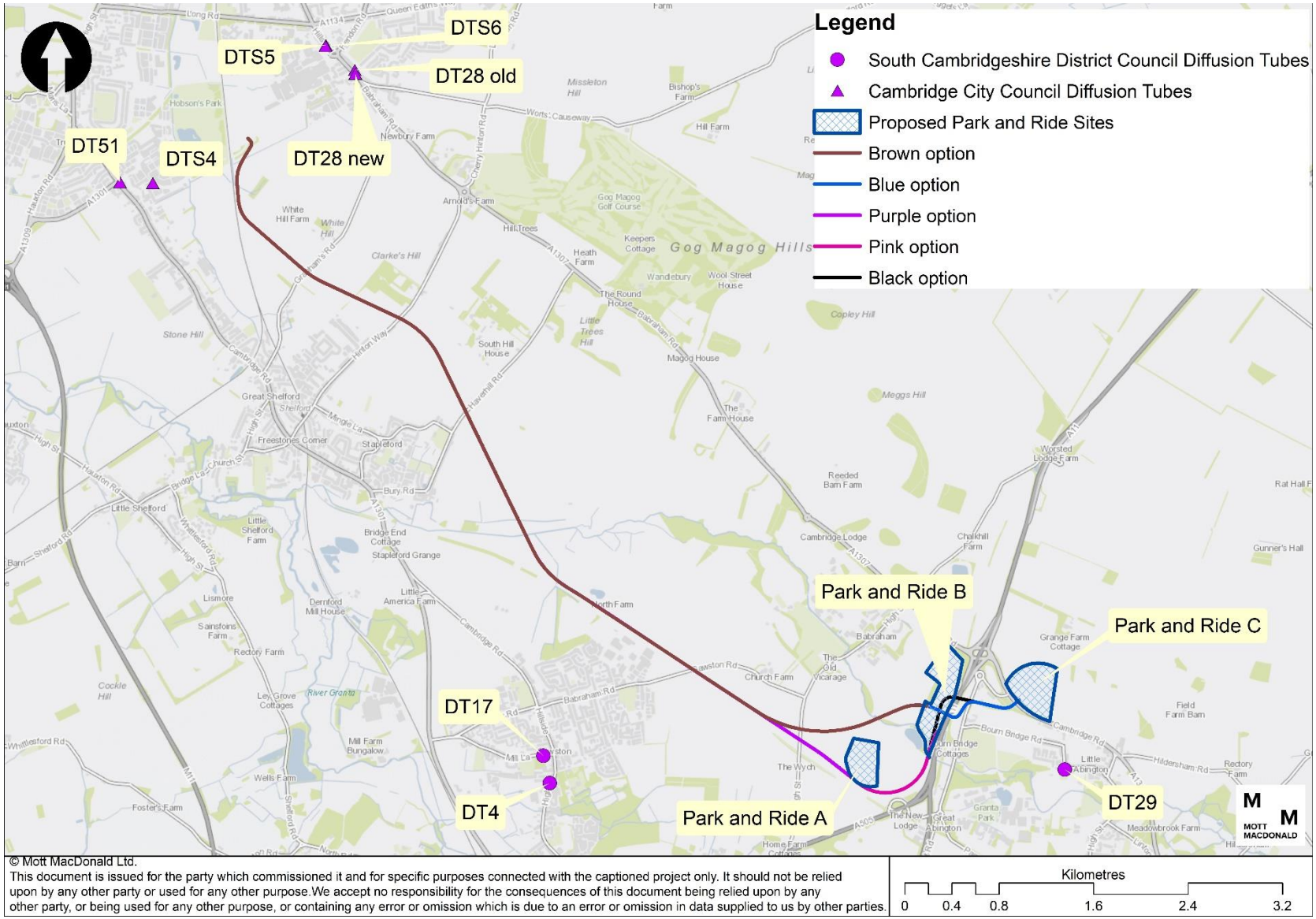
SCDC undertakes diffusion tube monitoring at 27 sites within the district. There are three diffusion tubes located within 1.6km of the proposed scheme options. CCC undertook diffusion tube monitoring at 64 sites within the district in 2017 with six within 1.5km. The monitoring data from these sites shows that NO_2 concentrations were well below the objectives in 2015, 2016, 2017 and 2018. Figure 2 shows the location of these sites.

Table 3: Non-automatic monitoring data for NO_2

Site name	Site classification	Within AQMA	National grid reference		Annual mean NO_2 concentration (µg/m^3)			
			X	Y	2015	2016	2017	2018[(a)]
DT29	Urban Background	No	552961	249251	11.3	12.5	11.0	-
DTS4	Roadside	No	545237	254212	-	22.0	18.0	17.0
DT4	Urban Background	No	548600	249136	23.8	26.6	26.1	-
DT17	Roadside	No	548545	249366	14.3	16.4	14.1	-
DT28 old	Roadside	No	546948	255169	22.0	24.0	19.0	-
DT28 new	Roadside	No	546953	255138	20.3	21.0	21.3	-
DTS5	Roadside	No	546702	255380	-	27.0	24.0	22.0
DTS6	Roadside	No	546700	255374	-	27.0	22.0	21.0
DT51	Roadside	No	544960	254220	27.0	27.0	24.0	22.0

Source: South Cambridgeshire District Council Annual Status Report 2018 and Cambridge City Council Annual Status Report 2019. Data marked with a – indicates no data for that year SCDC have not presented their 2019 Annual Status Report. Diffusion tube data has been bias corrected by SCDC and CCC.

Figure 2: CCC and SCDC monitoring locations



1.2.5 Defra projected background concentrations

Defra provides estimates of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ across the UK for each one kilometre grid square for every year from 2017 to 2030. Future year projections have been developed from the base year of the background maps, which is currently 2017. The maps include a breakdown of background concentrations by emission source, including road and industrial sources which have been calibrated against 2017 UK monitoring data.

The highest background concentrations for the 1km grid squares that contain the scheme options in 2019 are presented in Table 4 below. The data shows background concentrations are all below the relevant objectives. All five scheme options are in close proximity to each other, and due to the background data being available on a 1km grid square basis, all five schemes have the same background concentrations.

Table 4: Defra projected background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ for proposed development site in 2019 (µg/m^3)

Scheme option	2019 Defra background			
	NO_X	NO_2	PM_{10}	$PM_{2.5}$
Black	15.2	11.2	17.8	10.5
Blue	15.2	11.2	17.8	10.5
Brown	15.2	11.2	17.8	10.5
Purple	15.2	11.2	17.8	10.5
Pink	15.2	11.2	17.8	10.5

Source: https://uk-air.defra.gov.uk/data/laqm-background-maps

Note: Across the five schemes 13 different background squares contain the different options. The maximum concentration for all five schemes is in grid square (551500, 249500)

1.2.6 EU limit value compliance

Defra's Pollution Climate Mapping (PCM) model is used to report UK compliance with the Air Quality Directive. The current published version of the PCM model is developed using a base year of 2017 and concentrations are predicted for 2019.

The nearest PCM model link to all five scheme options is located approximately 0.7km south of all options, and is a section of the A1301. The predicted NO_2 concentrations on the road for 2019 is 17.0µg/m^3, which is well below the EU limit value. There are a number of PCM links within Cambridge City Centre, they are also all well below the air quality limit value in 2019. As all PCM links in the area are below the limit values it is unlikely that any of the scheme options would cause a non-compliance with the Air Quality Directive.

1.2.7 Summary

Considering the baseline review, the existing pollutant concentrations along the proposed scheme options are likely to all be below the relevant air quality objectives and EU limit values. All the scheme options are located in the same area and the effects from the scheme in traffic are also predicted to be similar and therefore the baseline for each of the options would not change.

1.3 Qualitative assessment of likely effects

1.3.1 Potential traffic changes

Detailed traffic information has not been produced for the OAR appraisal as it is not considered proportionate to produce the data required for detailed assessments as there would be minimal differences between each of the scheme options. Nevertheless, this semi-quantitative appraisal has considered the likely changes in traffic the scheme options would result in.

The scheme options encompass the provision of a public transport route from Little Abington, Sawston and Stapleford to CBC and would add additional bus movements along a new off-road bus corridor. It is not expected that the number of bus movements on the route will lead to a significant air quality change as bus movements (approximately 200 per day) would be low. The scheme would also increase the number of buses operating on some local roads located in the north of the scheme, this is along roads such as Francis Crick Avenue and the roundabout linking Francis Crick Avenue to Dame Mary Archer Way. In addition, there may be an increase in traffic flows on the local roads leading to the proposed Travel Hub sites which joint the busway. The schemes are aimed at promoting a modal shift, which is anticipated could reduce traffic flows along potential the A1307 and other roads linking to the CBC.

All five of the options would be expected to result in similar levels of change to traffic numbers on the local road network.

1.3.2 Receptors

A receptor count has been undertaken for each of the scheme options to identify the number of properties that could potentially be affected. The number of receptors within 200m of each of the scheme options are presented below in Table 5 and shows that the number of potentially affected receptor is very small (all less than 60), and the numbers are broadly the same. There are no receptors within 50 metres for three schemes (Purple, Pink and Brown), the nearest receptor is North Farm which is approximately 76m away from these routes. However, the Blue and Black schemes have seven receptors approximately 50m away located on Cambridge Road within Little Abington, these are the closest receptors for all schemes.

These receptors have the potential to experience either a benefit in air quality or a deterioration but considering the similarities in the scheme options and the likely traffic effects the changes would be broadly similar and very small.

Table 5: Scheme option receptor counts

Scheme option	Receptors within 200m
Black	58
Blue	51
Brown	34
Purple	26
Pink	43

There are a limited number of receptors that are affected with the main cause of variation between scheme options being Travel Hub C, this has 23 receptors located within 200m in Little Abington that the other two Travel Hub sites would not effect. The changes in traffic would likely lead to a small deterioration in air quality in this area.

The Brown and Purple schemes have the fewest receptors than the other three schemes. This is due to the Brown and Purple schemes not extending as far east as the other three schemes, and therefore not affecting the receptors that are present along Newmarket Road. The Purple scheme only extends as far as Travel Hub site A. The Blue and Brown scheme follow a different alignment to Travel Hub site B when compared to

the Pink and Black schemes options. The difference between the Pink and Black scheme is that the Pink scheme stops at Travel Hub site B whereas the Black scheme goes to Travel Hub site C which affects a greater number of receptors.

The Travel Hub site C slightly increase the number of receptors affected compared to the Travel Hub sites A and B. The two schemes that go to Travel Hub site C, are Blue and Black, these receptors would likely receive a small deterioration in air quality as a result of the increased traffic accessing the site. Nevertheless, the changes at these properties would be small, and would not result in significant effects as air quality in these areas is currently good.

It is likely that all five scheme options would contribute to an improvement in air quality along the A1307 and within CCC through the promotion of modal shift and reduction of cars entering the city.

The potential changes in air quality would result in a negligible Net Present Value (NPV) and therefore the air quality effects of the scheme options would have a de-minimis effect on the Benefit Cost Ratio (BCR) of the scheme.

1.4 Conclusion

Defra background concentrations and local authority monitoring data available from CCC and SCDC indicate that there are no air quality objectives being exceeded along or close to the scheme options. There are no PCM model links that overlap with the scheme options, and the closest link is on the A1301, which is 0.7km south of all five schemes and has a concentration of 17µg/m^3 in 2019 which is well below the EU limit value. It is considered unlikely that the scheme would result in exceedances of air quality objectives or limit values.

At the time of assessment, no detailed traffic information was produced as it is considered not proportionate to produce the traffic information due to the minimal changes between options and the likely changes in air quality and as such no detailed quantitative assessment was undertaken.

A receptor count was undertaken to demonstrate the number of properties affected by the scheme options. The scheme options are very similar, and the variance in the number of receptors affected by the different options is minimal. All five scheme options follow the same route east between CBC and Sawston, resulting in no difference between the options along the majority of the scheme in the number of receptors affected.

Changes in traffic on the local road network have the potential to decrease along the A1307 due to the increased provision of public transport. It would be expected that there would be an increase in traffic on the local road network approaching the Travel Hub sites but considering the existing air quality, and minimal number of receptors in these areas this would not result in significant effects.

Overall, the changes in air quality from any of the scheme options is judged to be de minimis, and therefore changes on the NPV would not be significant compared to the other elements of the appraisal which contribute to the overall BCR calculation. As such air quality should not form part of the decision-making process for the scheme options.

D. Biodiversity

TAG Biodiversity Impacts Worksheet - Purple option

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Eversden and Wimpole Woods Special Area of Conservation (SAC)	Situated 10.5km to the west. A colony of barbastelle associated with the trees in the woodland, used as summer maternity roosts.	International	High. Bats play an important role in many environments by aiding pollination and preying on insects. Some UK species are indicator species because changes to these populations can reflect changes to aspects of biodiversity.	SSSI condition assessments classed Unit 3 as unfavourable recovering and unit 4 as favourable.	Very high	Minor Negative Considered impacts: -The severance of commuting routes - Loss of habitat connectivity - Barrier to dispersal - Loss of roosting and hibernation sites	Slight adverse
Gog Magog Golf Course Site of Special Scientific Interest (SSSI)	Situated1.2km to the north-east. Lowland calcareous grassland	National	High. Calcareous grassland is a UK BAP Priority habitat. The habitats have the potential to support rare flora and invertebrates.	Favourable condition	High	Neutral due to distance from the option	Neutral
Dernford Fen SSSI	Situated 1.2km to the west. Lowland netural grassland	National	High. Lowland neutral grassland is a UK BAP Priority habitat and has the potential to support rare flora and invertebrates	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Sawston Hall Meadows SSSI	1.05km to south-west. Lowland neutral grassland with M22 and M24 plant communities	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Nine Wells Local Nature Reserve (LNR)	80m to east. Chalk springs, which form the source of the Hobson Conduit	Regional	High	Historically important, but following drought of 1976 rare freshwater invertebrates were lost	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
River Granta County Wildlife Site (CWS) - Crosses at two locations	River not grossly modified by pollution or canalisation. Additionally it supports concentrations of mature pollard willows	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Shelford - Haverhill Disused Railway (Pampisford) CWS, 30m to south-west of the route and 55m from the travel hub.	Grassland - Supports populations of a Nationally Rare vascular plant (Filago pyramidata), and supports frequent numbers of at least 6 strong calcareous grassland indicator species.	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Grassland, scattered trees and arable	Arable and semi-improved neutral grassland dominated the landscape. Pockets of scattered trees and improved grassland were also recorded throughout the surveyed area.	Local	Low	No specific information in relation to habitat types.	Low	Minor negative Considered impact: - Loss of habitats	Slight adverse
Broadleaved semi-natural woodland.	Areas of broadleaved semi-natural woodland were recorded throughout the surveyed area.	Regional	High	Lowland Britain was once entirely broadleaved woodland, but by the early twentieth century there was less than 5% tree cover.	Medium	Minor Negative Considered impact: Loss of woodland	Slight Adverse
Hedgerow HPI	Hedgerows are present throughout this route	National	Medium	Species poor and species rich hedgerows	Medium	Intermediate negative Considered impact: - Hedgerow loss and severance along the route	Moderate adverse
Standing Water	A number of water bodies have been identified with 500m.	Regional	Medium	Ponds have declined by up to 75% in the UK, with 80% of ponds eutrophic in England.	Medium	Minor Negative Considered impact: - Loss of ponds, and habitat.	Slight adverse
Running Water	A number of water bodies are present adjacent	Regional	Medium	Not known	Medium	Minor Negative Considered impact: - Pollution incidents	Slight adverse
Badger	Badgers are protected under the Protection of Badgers Act 1992.	Regional	Badgers are widespread throughout the UK.	Common and widespread	Medium	Minor Negative Considered impacts: - Loss and severance vegetation - Vegetation clearance resulting in the disturbance or direct injury/death of badger - Noise, vibration and light (if night works) disturbance during construction and operation - Damage, or permanent exclusion from setts	Slight adverse
Barn Owl	The barn owl is protected under Schedule 1 of the Wildlife and Countryside Act 1981.	National	The barn owl is widely distributed throughout the UK but has suffered declines throughout the 20th century as a result of farming practices.	Local records exist for barn owl within the surveyed area. Suitable roosting and foraging habitat has been identified within the zone of influence of the proposed scheme corridor.	High	Minor Negative Considered impacts: - Loss of foraging habitat - Loss of nesting sites - Direct mortality through vehicle collisions	Slight Adverse

Breeding birds (including Kingfisher)	All wild birds are protected under the Wildlife and Countryside Act 1981.	National	Medium	Generally woodland and farmland bird trends are in decline in England	Medium	Minor negative - loss and fragmentation of woodland, hedgerows will result in loss of suitable nesting and foraging habitats	Slight adverse
Great crested newt (GCN)	GCN are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium	Likely to have undergone steady decline and range contraction at the national level	Medium	Minor Negative Considered impacts: - Loss of terrestrial GCN habitat - Vegetation clearance resulting in the disturbance or direct injury/death of GCN - Noise, vibration and light (if night works) disturbance	Slight adverse
Bats	Barbastelle are known within the area. Other bat species of SPI have been confirmed along this option. All bat species are protected under the Conservation of Habitat and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	High	Barbastelle are a nationally rare species	High	Minor Negative Considered impacts: - Fragmentation of foraging and commuting routes, due to vegetation clearance. - Loss of foraging habitat - Disturbance, damage to or loss of bat roosts in trees	Slight adverse
Terrestrial Invertebrates	Areas of invertebrate interest are likely to be present along the route.	National	High	Not known	High	Minor negative Considered impacts: - Pollution incidents - Loss of terrestrial habitat	Slight adverse
Reptiles	Suitable habitat is present along the option. Grass snakes have been confirmed within Bourn airfield. A possible common lizard was observed approximately 230m from the option at the eastern end. All native reptile species are protected under the Wildlife and Countryside Act 1981.	Local	Low	Not known	Medium	Minor negative Considered impacts: - Noise, vibration, and light (if night works) disturbance during construction - Habitat loss and fragmentation - Killing and injuring reptiles during earthworks and vegetation clearance	Slight adverse
White-Clawed Crayfish	White-clawed crayfish are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	White-clawed crayfish are recognised as a UK BAP Priority species. A South West regional biodiversity action plan has been written for this species focussing on conserving and increasing existing populations and limiting the threat from non-native species and disease.	White-clawed crayfish numbers and range in the UK has declined by more than 25% in the last 25 years. Past records exist for white clawed crayfish within the wider study area. Surveys of affected watercourses have identified the likely absence of this species.	High	Minor Negative Considered impact: - Pollution incidents	Slight Adverse
Otters	Otters are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium. Otters are recognised as a UK BAP Priority species and are listed on the Somerset Biodiversity Action Plan.	The data search returned a large number of records for otter within a 5km radius of the survey area. This included records from 2017 of otter spraints from the River Granta CWS in Babraham and Great Abington, as well as similar records further downstream of the stretch of Hobson's Brook that encompasses the survey area.	High	Minor Negative Considered impact: - Night-time works could disturb foraging and commuting otters. .	Slight Adverse
Water Voles	Water voles are protected under the Wildlife and Countryside Act 1981 and are a UK priority species.	National	Water Vole are recognised as a UK BAP Priority species. Water Vole are important because they are a wetland flagship species. Protection of their habitat would benefit a variety of other wetland species.	The data search returned a large number of records for water vole within a 5km radius of the survey area. This included a record of two water vole sightings and field evidence within a ditch to the south of the Cambridge Biomedical Campus within the survey area in 2017.	High	Minor Negative Considered impacts: • Potential to cause noise, vibration and light (if night works) • Habitat loss and fragmentation • Potential to kill and injure water vole and damage/destroy burrows during earthworks and vegetation clearance.	Slight Adverse
Other Species of Principal Importance including harvest mouse, common toad and hedgehog	Woodland and grassland (hedgehog), freshwater ponds (common toad), rough grassland (harvest mouse)	Local	Medium	Species of Principal Importance are recognised conservation priorities in England	Medium	Minor negative Considered impacts - Habitat loss and fragmentation - Pollution incidents	Slight adverse

Reference Sources

Phase 1 information from WYG. The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance.

Summary Assessment Score

Slight Adverse

Qualitative Comments

In summary, there would be an overall slight adverse effect on biodiversity as a result of the Purple Option and Travel Hub A. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriars to dipersal and severance of communting routes.The scheme would not present any significant adverse effects on the integrity of SSSIs.

TAG Biodiversity Impacts Worksheet - Brown option

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Eversden and Wimpole Woods Special Area of Conservation (SAC)	Situated 10.5km to the west. A colony of barbastelle associated with the trees in the woodland, used as summer maternity roosts.	International	High. Bats play an important role in many environments by aiding pollination and preying on insects. Some UK species are indicator species because changes to these populations can reflect changes to aspects of biodiversity.	SSSI condition assessments classed Unit 3 as unfavourable recovering and unit 4 as favourable.	Very high	Minor Negative Considered impacts: -The severance of commuting routes - Loss of habitat connectivity - Barrier to dispersal - Loss of roosting and hibernation sites	Slight adverse
Gog Magog Golf Course Site of Special Scientific Interest (SSSI)	Situated1.2km to the north-east. Lowland calcareous grassland	National	High. Calcareous grassland is a UK BAP Priority habitat. The habitats have the potential to support rare flora and invertebrates.	Favourable condition	High	Neutral due to distance from the option	Neutral
Dernford Fen SSSI	Situated 1.2km to the west. Lowland netural grassland	National	High. Lowland neutral grassland is a UK BAP Priority habitat and has the potential to support rare flora and invertebrates	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Roman Road SSSI	Situated 1.7km to the north of Travel Hub B. Species rich calcarous grassland	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Sawston Hall Meadows SSSI	1.05km to south-west. Lowland neutral grassland with M22 and M24 plant communities	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Nine Wells Local Nature Reserve (LNR)	80m to east. Chalk springs, which form the source of the Hobson Conduit	Regional	High	Historically important, but following drought of 1976 rare freshwater invertebrates were lost	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
River Granta County Wildlife Site (CWS) - Crosses at two locations	River not grossly modified by pollution or canalisation. Additionally it supports concentrations of mature pollard willows	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Shelford - Haverhill Disused Railway (Pampisford) CWS, 30m to south-west	Grassland - Supports populations of a Nationally Rare vascular plant (Filago pyramidata), and supports frequent numbers of at least 6 strong calcareous grassland indicator species	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Grassland, scattered trees and arable	Arable and semi-improved neutral grassland dominated the landscape. Pockets of scattered trees and improved grassland were also recorded throughout the surveyed area.	Local	Low	No specific information in relation to habitat types.	Low	Minor negative Considered impact: - Loss of habitats	Slight adverse
Broadleaved semi-natural woodland.	Areas of broadleaved semi-natural woodland were recorded throughout the surveyed area.	Regional	High	Lowland Britain was once entirely broadleaved woodland, but by the early twentieth century there was less than 5% tree cover.	Medium	Minor Negative Considered impact: Loss of woodland	Slight Adverse
Hedgerow HPI	Hedgerows are present throughout this route	National	Medium	Species poor and species rich hedgerows	Medium	Intermediate negative Considered impact: - Hedgerow loss and severance along the route	Moderate adverse
Standing Water	A number of water bodies have been identified with 500m.	Regional	Medium	Ponds have declined by up to 75% in the UK, with 80% of ponds eutrophic in England.	Medium	Minor Negative Considered impact: - Loss of ponds, and habitat.	Slight adverse
Running Water	A number of water bodies are present adjacent	Regional	Medium	Not known	Medium	Minor Negative Considered impact: - Pollution incidents	Slight adverse
Badger	Badgers are protected under the Protection of Badgers Act 1992.	Regional	Badgers are widespread throughout the UK.	Common and widespread	Medium	Minor Negative Considered impacts: - Loss and severance vegetation - Vegetation clearance resulting in the disturbance or direct injury/death of badger - Noise, vibration and light (if night works) disturbance during construction and operation - Damage, or permanent exclusion from setts	Slight adverse

Barn Owl	The barn owl is protected under Schedule 1 of the Wildlife and Countryside Act 1981.	National	The barn owl is widely distributed throughout the UK but has suffered declines throughout the 20th century as a result of farming practices.	Local records exist for barn owl within the surveyed area. Suitable roosting and foraging habitat has been identified within the zone of influence of the proposed scheme corridor.	High	Minor Negative Considered impacts: - Loss of foraging habitat - Loss of nesting sites - Direct mortality through vehicle collisions	Slight Adverse
Breeding birds (including Kingfisher)	All wild birds are protected under the Wildlife and Countryside Act 1981.	National	Medium	Generally woodland and farmland bird trends are in decline in England	Medium	Minor negative - loss and fragmentation of woodland, hedgerows will result in loss of suitable nesting and foraging habitats	Slight adverse
Great crested newt (GCN)	GCN are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium	Likely to have undergone steady decline and range contraction at the national level	Medium	Minor Negative Considered impacts: - Loss of terrestrial GCN habitat - Vegetation clearance resulting in the disturbance or direct injury/death of GCN - Noise, vibration and light (if night works) disturbance	Slight adverse
Bats	Barbastelle are known within the area. Other bat species of SPI have been confirmed along this option. All bat species are protected under the Conservation of Habitat and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	High	Barbastelle are a nationally rare species	High	Minor Negative Considered impacts: - Fragmentation of foraging and commuting routes, due to vegetation clearance. - Loss of foraging habitat - Disturbance, damage to or loss of bat roosts in trees	Slight adverse
Terrestrial Invertebrates	Areas of invertebrate interest are likely to be present along the route.	National	High	Not known	High	Minor negative Considered impacts: - Pollution incidents - Loss of terrestrial habitat	Slight adverse
Reptiles	Suitable habitat is present along the option. Grass snakes have been confirmed within Bourn airfield. A possible common lizard was observed approximately 230m from the option at the eastern end. All native reptile species are protected under the Wildlife and Countryside Act 1981.	Local	Low	Not known	Medium	Minor negative Considered impacts: - Noise, vibration, and light (if night works) disturbance during construction - Habitat loss and fragmentation - Killing and injuring reptiles during earthworks and vegetation clearance	Slight adverse
White-Clawed Crayfish	White-clawed crayfish are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	White-clawed crayfish are recognised as a UK BAP Priority species. A South West regional biodiversity action plan has been written for this species focussing on conserving and increasing existing populations and limiting the threat from non-native species and disease.	White-clawed crayfish numbers and range in the UK has declined by more than 25% in the last 25 years. Past records exist for white clawed crayfish within the wider study area. Surveys of affected watercourses have identified the likely absence of this species.	High	Minor Negative Considered impact: - Pollution incidents	Slight Adverse
Otters	Otters are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium. Otters are recognised as a UK BAP Priority species and are listed on the Somerset Biodiversity Action Plan.	The data search returned a large number of records for otter within a 5km radius of the survey area. This included records from 2017 of otter spraints from the River Granta CWS in Babraham and Great Abington, as well as similar records further downstream of the stretch of Hobson's Brook that encompasses the survey area.	High	Minor Negative Considered impact: - Night-time works could disturb foraging and commuting otters. .	Slight Adverse
Water Voles	Water voles are protected under the Wildlife and Countryside Act 1981 and are a UK priority species.	National	Water Vole are recognised as a UK BAP Priority species. Water Vole are important because they are a wetland flagship species. Protection of their habitat would benefit a variety of other wetland species.	The data search returned a large number of records for water vole within a 5km radius of the survey area. This included a record of two water vole sightings and field evidence within a ditch to the south of the Cambridge Biomedical Campus within the survey area in 2017.	High	Minor Negative Considered impacts: • Potential to cause noise, vibration and light (if night works) • Habitat loss and fragmentation • Potential to kill and injure water vole and damage/destroy burrows during earthworks and vegetation clearance.	Slight Adverse

Other Species of Principal Importance including harvest mouse, common toad and hedgehog	Woodland and grassland (hedgehog), freshwater ponds (common toad), rough grassland (harvest mouse)	Local	Medium	Species of Principal Importance are recognised conservation priorities in England	Medium	Minor negative Considered impacts - Habitat loss and fragmentation - Pollution incidents	Slight adverse

Reference Sources

Phase 1 information from WYG. The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance.

Summary Assessment Score

Slight Adverse

Qualitative Comments

In summary, there would be an overall slight adverse effect on biodiversity as a result of the Brown Option and Travel Hub B. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriars to dipersal and severance of communting routes.The scheme would not present any significant adverse effects on the integrity of SSSIs.

TAG Biodiversity Impacts Worksheet - Pink option

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Eversden and Wimpole Woods Special Area of Conservation (SAC)	Situated 10.5km to the west. A colony of barbastelle associated with the trees in the woodland, used as summer maternity roosts.	International	High. Bats play an important role in many environments by aiding pollination and preying on insects. Some UK species are indicator species because changes to these populations can reflect changes to aspects of biodiversity.	SSSI condition assessments classed Unit 3 as unfavourable recovering and unit 4 as favourable.	Very high	Minor Negative Considered impacts: -The severance of commuting routes - Loss of habitat connectivity - Barrier to dispersal - Loss of roosting and hibernation sites	Slight adverse
Gog Magog Golf Course Site of Special Scientific Interest (SSSI)	Situated1.2km to the north-east. Lowland calcareous grassland	National	High. Calcareous grassland is a UK BAP Priority habitat. The habitats have the potential to support rare flora and invertebrates.	Favourable condition	High	Neutral due to distance from the option	Neutral
Dernford Fen SSSI	Situated 1.2km to the west. Lowland netural grassland	National	High. Lowland neutral grassland is a UK BAP Priority habitat and has the potential to support rare flora and invertebrates	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Sawston Hall Meadows SSSI	1.05km to south-west. Lowland neutral grassland with M22 and M24 plant communities	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Roman Road SSSI	1.7km to the north Travel Hub B. Species rich calcareous grassland.	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Nine Wells Local Nature Reserve (LNR)	80m to east. Chalk springs, which form the source of the Hobson Conduit	Regional	High	Historically important, but following drought of 1976 rare freshwater invertebrates were lost	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
River Granta County Wildlife Site (CWS) - Crosses at two locations	River not grossly modified by pollution or canalisation. Additionally it supports concentrations of mature pollard willows	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Shelford - Haverhill Disused Railway (Pampisford) CWS, 30m to south-west	Grassland - Supports populations of a Nationally Rare vascular plant (Filago pyramidata), and supports frequent numbers of at least 6 strong calcareous grassland indicator species	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Grassland, scattered trees and arable	Arable and semi-improved neutral grassland dominated the landscape. Pockets of scattered trees and improved grassland were also recorded throughout the surveyed area.	Local	Low	No specific information in relation to habitat types.	Low	Minor negative Considered impact: - Loss of habitats	Slight adverse
Broadleaved semi-natural woodland.	Areas of broadleaved semi-natural woodland were recorded throughout the surveyed area.	Regional	High	Lowland Britain was once entirely broadleaved woodland, but by the early twentieth century there was less than 5% tree cover.	Medium	Minor Negative Considered impact: Loss of woodland	Slight Adverse
Hedgerow HPI	Hedgerows are present throughout this route	National	Medium	Species poor and species rich hedgerows	Medium	Intermediate negative Considered impact: - Hedgerow loss and severance along the route	Moderate adverse
Standing Water	A number of water bodies have been identified with 500m.	Regional	Medium	Ponds have declined by up to 75% in the UK, with 80% of ponds eutrophic in England.	Medium	Minor Negative Considered impact: - Loss of ponds, and habitat.	Slight adverse
Running Water	A number of water bodies are present adjacent	Regional	Medium	Not known	Medium	Minor Negative Considered impact: - Pollution incidents	Slight adverse
Badger	Badgers are protected under the Protection of Badgers Act 1992.	Regional	Badgers are widespread throughout the UK.	Common and widespread	Medium	Minor Negative Considered impacts: - Loss and severance vegetation - Vegetation clearance resulting in the disturbance or direct injury/death of badger - Noise, vibration and light (if night works) disturbance during construction and operation - Damage, or permanent exclusion from setts	Slight adverse

Barn Owl	The barn owl is protected under Schedule 1 of the Wildlife and Countryside Act 1981.	National	The barn owl is widely distributed throughout the UK but has suffered declines throughout the 20th century as a result of farming practices.	Local records exist for barn owl within the surveyed area. Suitable roosting and foraging habitat has been identified within the zone of influence of the proposed scheme corridor.	High	Minor Negative Considered impacts: - Loss of foraging habitat - Loss of nesting sites - Direct mortality through vehicle collisions	Slight Adverse
Breeding birds (including Kingfisher)	All wild birds are protected under the Wildlife and Countryside Act 1981.	National	Medium	Generally woodland and farmland bird trends are in decline in England	Medium	Minor negative - loss and fragmentation of woodland, hedgerows will result in loss of suitable nesting and foraging habitats	Slight adverse
Great crested newt (GCN)	GCN are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium	Likely to have undergone steady decline and range contraction at the national level	Medium	Minor Negative Considered impacts: - Loss of terrestrial GCN habitat - Vegetation clearance resulting in the disturbance or direct injury/death of GCN - Noise, vibration and light (if night works) disturbance	Slight adverse
Bats	Barbastelle are known within the area. Other bat species of SPI have been confirmed along this option. All bat species are protected under the Conservation of Habitat and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	High	Barbastelle are a nationally rare species	High	Minor Negative Considered impacts: - Fragmentation of foraging and commuting routes, due to vegetation clearance. - Loss of foraging habitat - Disturbance, damage to or loss of bat roosts in trees	Slight adverse
Terrestrial Invertebrates	Areas of invertebrate interest are likely to be present along the route.	National	High	Not known	High	Minor negative Considered impacts: - Pollution incidents - Loss of terrestrial habitat	Slight adverse
Reptiles	Suitable habitat is present along the option. Grass snakes have been confirmed within Bourn airfield. A possible common lizard was observed approximately 230m from the option at the eastern end. All native reptile species are protected under the Wildlife and Countryside Act 1981.	Local	Low	Not known	Medium	Minor negative Considered impacts: - Noise, vibration, and light (if night works) disturbance during construction - Habitat loss and fragmentation - Killing and injuring reptiles during earthworks and vegetation clearance	Slight adverse
White-Clawed Crayfish	White-clawed crayfish are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	White-clawed crayfish are recognised as a UK BAP Priority species. A South West regional biodiversity action plan has been written for this species focussing on conserving and increasing existing populations and limiting the threat from non-native species and disease.	White-clawed crayfish numbers and range in the UK has declined by more than 25% in the last 25 years. Past records exist for white clawed crayfish within the wider study area. Surveys of affected watercourses have identified the likely absence of this species.	High	Minor Negative Considered impact: - Pollution incidents	Slight Adverse
Otters	Otters are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium. Otters are recognised as a UK BAP Priority species and are listed on the Somerset Biodiversity Action Plan.	The data search returned a large number of records for otter within a 5km radius of the survey area. This included records from 2017 of otter spraints from the River Granta CWS in Babraham and Great Abington, as well as similar records further downstream of the stretch of Hobson's Brook that encompasses the survey area.	High	Minor Negative Considered impact: - Night-time works could disturb foraging and commuting otters. .	Slight Adverse
Water Voles	Water voles are protected under the Wildlife and Countryside Act 1981 and are a UK priority species.	National	Water Vole are recognised as a UK BAP Priority species. Water Vole are important because they are a wetland flagship species. Protection of their habitat would benefit a variety of other wetland species.	The data search returned a large number of records for water vole within a 5km radius of the survey area. This included a record of two water vole sightings and field evidence within a ditch to the south of the Cambridge Biomedical Campus within the survey area in 2017.	High	Minor Negative Considered impacts: • Potential to cause noise, vibration and light (if night works) • Habitat loss and fragmentation • Potential to kill and injure water vole and damage/destroy burrows during earthworks and vegetation clearance.	Slight Adverse

Other Species of Principal Importance including harvest mouse, common toad and hedgehog	Woodland and grassland (hedgehog), freshwater ponds (common toad), rough grassland (harvest mouse)	Local	Medium	Species of Principal Importance are recognised conservation priorities in England	Medium	Minor negative Considered impacts - Habitat loss and fragmentation - Pollution incidents	Slight adverse

Reference Sources

Phase 1 information from WYG. The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance.

Summary Assessment Score

Slight Adverse

Qualitative Comments

In summary, there would be an overall slight adverse effect on biodiversity as a result of the Pink Option and Travel Hub B. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriars to dipersal and severance of communting routes.The scheme would not present any significant adverse effects on the integrity of SSSIs.

TAG Biodiversity Impacts Worksheet - Black option

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Eversden and Wimpole Woods Special Area of Conservation (SAC)	Situated 10.5km to the west. A colony of barbastelle associated with the trees in the woodland, used as summer maternity roosts.	International	High. Bats play an important role in many environments by aiding pollination and preying on insects. Some UK species are indicator species because changes to these populations can reflect changes to aspects of biodiversity.	SSSI condition assessments classed Unit 3 as unfavourable recovering and unit 4 as favourable.	Very high	Minor Negative Considered impacts: -The severance of commuting routes - Loss of habitat connectivity - Barrier to dispersal - Loss of roosting and hibernation sites	Slight adverse
Gog Magog Golf Course Site of Special Scientific Interest (SSSI)	Situated1.2km to the north-east. Lowland calcareous grassland	National	High. Calcareous grassland is a UK BAP Priority habitat. The habitats have the potential to support rare flora and invertebrates.	Favourable condition	High	Neutral due to distance from the option	Neutral
Dernford Fen SSSI	Situated 1.2km to the west. Lowland netural grassland	National	High. Lowland neutral grassland is a UK BAP Priority habitat and has the potential to support rare flora and invertebrates	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Romand Road SSSI	Situated 1.6km to the north of Travel Hub C. Species rich calcareous grassland.	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Sawston Hall Meadows SSSI	1.05km to south-west. Lowland neutral grassland with M22 and M24 plant communities	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Nine Wells Local Nature Reserve (LNR)	80m to east. Chalk springs, which form the source of the Hobson Conduit	Regional	High	Historically important, but following drought of 1976 rare freshwater invertebrates were lost	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
River Granta County Wildlife Site (CWS) - Crosses at two locations	River not grossly modified by pollution or canalisation. Additionally it supports concentrations of mature pollard willows	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Shelford - Haverhill Disused Railway (Pampisford) CWS, 30m to south-west	Grassland - Supports populations of a Nationally Rare vascular plant (Filago pyramidata), and supports frequent numbers of at least 6 strong calcareous grassland indicator species	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Grassland, scattered trees and arable	Arable and semi-improved neutral grassland dominated the landscape. Pockets of scattered trees and improved grassland were also recorded throughout the surveyed area.	Local	Low	No specific information in relation to habitat types.	Low	Minor negative Considered impact: - Loss of habitats	Slight adverse
Broadleaved semi-natural woodland.	Areas of broadleaved semi-natural woodland were recorded throughout the surveyed area.	Regional	High	Lowland Britain was once entirely broadleaved woodland, but by the early twentieth century there was less than 5% tree cover.	Medium	Inter Negative Considered impact: Loss of woodland	Slight Adverse
Hedgerow HPI	Hedgerows are present throughout this route	National	Medium	Species poor and species rich hedgerows	Medium	Intermediate negative Considered impact: - Hedgerow loss and severance along the route	Moderate adverse
Standing Water	A number of water bodies have been identified with 500m.	Regional	Medium	Ponds have declined by up to 75% in the UK, with 80% of ponds eutrophic in England.	Medium	Minor Negative Considered impact: - Loss of ponds, and habitat.	Slight adverse
Running Water	A number of water bodies are present adjacent	Regional	Medium	Not known	Medium	Minor Negative Considered impact: - Pollution incidents	Slight adverse
Badger	Badgers are protected under the Protection of Badgers Act 1992.	Regional	Badgers are widespread throughout the UK.	Common and widespread	Medium	Minor Negative Considered impacts: - Loss and severance vegetation - Vegetation clearance resulting in the disturbance or direct injury/death of badger - Noise, vibration and light (if night works) disturbance during construction and operation - Damage, or permanent exclusion from setts	Slight adverse

Barn Owl	The barn owl is protected under Schedule 1 of the Wildlife and Countryside Act 1981.	National	The barn owl is widely distributed throughout the UK but has suffered declines throughout the 20th century as a result of farming practices.	Local records exist for barn owl within the surveyed area. Suitable roosting and foraging habitat has been identified within the zone of influence of the proposed scheme corridor.	High	Minor Negative Considered impacts: - Loss of foraging habitat - Loss of nesting sites - Direct mortality through vehicle collisions	Slight Adverse
Breeding birds (including Kingfisher)	All wild birds are protected under the Wildlife and Countryside Act 1981.	National	Medium	Generally woodland and farmland bird trends are in decline in England	Medium	Minor negative - loss and fragmentation of woodland, hedgerows will result in loss of suitable nesting and foraging habitats	Slight adverse
Great crested newt (GCN)	GCN are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium	Likely to have undergone steady decline and range contraction at the national level	Medium	Minor Negative Considered impacts: - Loss of terrestrial GCN habitat - Vegetation clearance resulting in the disturbance or direct injury/death of GCN - Noise, vibration and light (if night works) disturbance	Slight adverse
Bats	Barbastelle are known within the area. Other bat species of SPI have been confirmed along this option. All bat species are protected under the Conservation of Habitat and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	High	Barbastelle are a nationally rare species	High	Minor Negative Considered impacts: - Fragmentation of foraging and commuting routes, due to vegetation clearance. - Loss of foraging habitat - Disturbance, damage to or loss of bat roosts in trees	Slight adverse
Terrestrial Invertebrates	Areas of invertebrate interest are likely to be present along the route.	National	High	Not known	High	Minor negative Considered impacts: - Pollution incidents - Loss of terrestrial habitat	Slight adverse
Reptiles	Suitable habitat is present along the option. Grass snakes have been confirmed within Bourn airfield. A possible common lizard was observed approximately 230m from the option at the eastern end. All native reptile species are protected under the Wildlife and Countryside Act 1981.	Local	Low	Not known	Medium	Minor negative Considered impacts: - Noise, vibration, and light (if night works) disturbance during construction - Habitat loss and fragmentation - Killing and injuring reptiles during earthworks and vegetation clearance	Slight adverse
White-Clawed Crayfish	White-clawed crayfish are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	White-clawed crayfish are recognised as a UK BAP Priority species. A South West regional biodiversity action plan has been written for this species focussing on conserving and increasing existing populations and limiting the threat from non-native species and disease.	White-clawed crayfish numbers and range in the UK has declined by more than 25% in the last 25 years. Past records exist for white clawed crayfish within the wider study area. Surveys of affected watercourses have identified the likely absence of this species.	High	Minor Negative Considered impact: - Pollution incidents	Slight Adverse
Otters	Otters are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium. Otters are recognised as a UK BAP Priority species and are listed on the Somerset Biodiversity Action Plan.	The data search returned a large number of records for otter within a 5km radius of the survey area. This included records from 2017 of otter spraints from the River Granta CWS in Babraham and Great Abington, as well as similar records further downstream of the stretch of Hobson's Brook that encompasses the survey area.	High	Minor Negative Considered impact: - Night-time works could disturb foraging and commuting otters. .	Slight Adverse
Water Voles	Water voles are protected under the Wildlife and Countryside Act 1981 and are a UK priority species.	National	Water Vole are recognised as a UK BAP Priority species. Water Vole are important because they are a wetland flagship species. Protection of their habitat would benefit a variety of other wetland species.	The data search returned a large number of records for water vole within a 5km radius of the survey area. This included a record of two water vole sightings and field evidence within a ditch to the south of the Cambridge Biomedical Campus within the survey area in 2017.	High	Minor Negative Considered impacts: • Potential to cause noise, vibration and light (if night works) • Habitat loss and fragmentation • Potential to kill and injure water vole and damage/destroy burrows during earthworks and vegetation clearance.	Slight Adverse

Other Species of Principal Importance including harvest mouse, common toad and hedgehog	Woodland and grassland (hedgehog), freshwater ponds (common toad), rough grassland (harvest mouse)	Local	Medium	Species of Principal Importance are recognised conservation priorities in England	Medium	Minor negative Considered impacts - Habitat loss and fragmentation - Pollution incidents	Slight adverse

Reference Sources

Phase 1 information from WYG. The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance.

Summary Assessment Score

Slight Adverse

Qualitative Comments

In summary, there would be an overall slight adverse effect on biodiversity as a result of the Black Option and Travel Hub C. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriars to dipersal and severance of communting routes.The scheme would not present any significant adverse effects on the integrity of SSSIs.

TAG Biodiversity Impacts Worksheet - Blue option

Step 2		Step 3				Step 4	Step 5
Area	**Description of feature/ attribute**	**Scale (at which attribute matters)**	**Importance (of attribute)**	**Trend (in relation to target)**	**Biodiversity and earth heritage value**	**Magnitude of impact**	**Assessment Score**
Eversden and Wimpole Woods Special Area of Conservation (SAC)	10.5km to west. A colony of barbastelle associated with the trees in the woodland, used as summer maternity roosts	International	High. Bats play an important role in many environments by aiding pollination and preying on insects. Some UK species are indicator species because changes to these populations can reflect changes to aspects of biodiversity.	SSSI condition assessments classed Unit 3 as unfavourable recovering and unit 4 as favourable.	Very high	Minor Negative Considered impacts: -The severance of commuting routes - Loss of habitat connectivity - Barrier to dispersal - Loss of roosting and hibernation sites	Slight adverse
Alder Carr Site of Special Scientific Interest (SSSI)	1.5km to south-east. Lowland broadleaved, mixed and yew woodland	National	High. Woodland habitats are listed as a UK BAP Priority habitat. The habitats within the SSSI have the potential to support rare flora, mammals, birds and invertebrates.	Unfavourable - no change	High	Neutral due to distance from option	Neutral
Gog Magog Golf Course SSSI	1.2km to north-east. Lowland calcareous grassland	National	High. Calcareous grassland is a UK BAP Priority habitat. The habitats have the potential to support rare flora and invertebrates.	Favourable condition	High	Neutral due to distance from option	Neutral
Dernford Fen SSSI	Situated 1.2km to the west. Lowland netural grassland	National	High. Lowland neutral grassland is a UK BAP Priority habitat and has the potential to support rare flora and invertebrates	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Roman Road SSSI	Situated 1.6km to the north. Species rich calcarous grassland.	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Sawston Hall Meadows SSSI	1.05km to south-west. Lowland neutral grassland with M22 and M24 plant communities	National	High	Unfavourable - recovering	High	Neutral due to distance from option	Neutral
Nine Wells Local Nature Reserve (LNR)	80m to east. Chalk springs, which form the source of the Hobson Conduit	Regional	High	Historically important, but following drought of 1976 rare freshwater invertebrates were lost	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
River Granta County Wildlife Site (CWS) - Crosses at two locations	River not grossly modified by pollution or canalisation. Additionally it supports concentrations of mature pollard willows	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Shelford - Haverhill Disused Railway (Pampisford) CWS, 30m to south-west	Grassland - Supports populations of a Nationally Rare vascular plant (Filago pyramidata), and supports frequent numbers of at least 6 strong calcareous grassland indicator species	Regional	High	No information was available to determine conservation status.	Medium	Neutral as no air quality or water quality impacts anticipated.	Neutral
Grassland, scattered trees and arable	Arable and semi-improved neutral grassland dominated the landscape. Pockets of scattered trees and improved grassland were also recorded throughout the surveyed area.	Local	Low	No specific information in relation to habitat types.	Low	Minor negative Considered impact: - Loss of habitats	Slight adverse
Broadleaved semi-natural woodland.	Areas of broadleaved semi-natural woodland were recorded throughout the surveyed area.	Regional	High	Lowland Britain was once entirely broadleaved woodland, but by the early twentieth century there was less than 5% tree cover.	Medium	Minor Negative Considered impact: Loss of woodland	Slight Adverse
Hedgerow HPI	Hedgerows are present throughout this route	National	Medium	Species poor and species rich hedgerows	Medium	Intermediate negative Considered impact: - Hedgerow loss and severance along the route	Moderate adverse
Standing Water	A number of water bodies have been identified with 500m.	Regional	Medium	Ponds have declined by up to 75% in the UK, with 80% of ponds eutrophic in England.	Medium	Minor Negative Considered impact: - Loss of ponds, and habitat.	Slight adverse
Running Water	A number of water bodies are present adjacent	Regional	Medium	Not known	Medium	Minor Negative Considered impact: - Pollution incidents	Slight adverse

Badger	Badgers are protected under the Protection of Badgers Act 1992.	Regional	Badgers are widespread throughout the UK.	Common and widespread	Medium	Minor Negative Considered impacts: - Loss and severance vegetation - Vegetation clearance resulting in the disturbance or direct injury/death of badger - Noise, vibration and light (if night works) disturbance during construction and operation - Damage, or permanent exclusion from setts	Slight adverse
Barn Owl	The barn owl is protected under Schedule 1 of the Wildlife and Countryside Act 1981.	National	The barn owl is widely distributed throughout the UK but has suffered declines throughout the 20th century as a result of farming practices.	Local records exist for barn owl within the surveyed area. Suitable roosting and foraging habitat has been identified within the zone of influence of the proposed scheme corridor.	High	Minor Negative Considered impacts: - Loss of foraging habitat - Loss of nesting sites - Direct mortality through vehicle collisions	Slight Adverse
Breeding birds (including Kingfisher)	All wild birds are protected under the Wildlife and Countryside Act 1981.	National	Medium	Generally woodland and farmland bird trends are in decline in England	Medium	Minor negative - loss and fragmentation of woodland, hedgerows will result in loss of suitable nesting and foraging habitats	Slight adverse
Great crested newt (GCN)	GCN are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium	Likely to have undergone steady decline and range contraction at the national level	Medium	Minor Negative Considered impacts: - Loss of terrestrial GCN habitat - Vegetation clearance resulting in the disturbance or direct injury/death of GCN - Noise, vibration and light (if night works) disturbance	Slight adverse
Bats	Barbastelle are known within the area. Other bat species of SPI have been confirmed along this option. All bat species are protected under the Conservation of Habitat and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	High	Barbastelle are a nationally rare species	High	Minor Negative Considered impacts: - Fragmentation of foraging and commuting routes, due to vegetation clearance. - Loss of foraging habitat - Disturbance, damage to or loss of bat roosts in trees	Slight adverse
Terrestrial Invertebrates	Areas of invertebrate interest are likely to be present along the route.	National	High	Not known	High	Minor negative Considered impacts: - Pollution incidents - Loss of terrestrial habitat	Slight adverse
Reptiles	Suitable habitat is present along the option. Grass snakes have been confirmed within Bourn airfield. A possible common lizard was observed approximately 230m from the option at the eastern end. All native reptile species are protected under the Wildlife and Countryside Act 1981.	Local	Low	Not known	Medium	Minor negative Considered impacts: - Noise, vibration, and light (if night works) disturbance during construction - Habitat loss and fragmentation - Killing and injuring reptiles during earthworks and vegetation clearance	Slight adverse
White-Clawed Crayfish	White-clawed crayfish are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	White-clawed crayfish are recognised as a UK BAP Priority species. A South West regional biodiversity action plan has been written for this species focussing on conserving and increasing existing populations and limiting the threat from non-native species and disease.	White-clawed crayfish numbers and range in the UK has declined by more than 25% in the last 25 years. Past records exist for white clawed crayfish within the wider study area. Surveys of affected watercourses have identified the likely absence of this species.	High	Minor Negative Considered impact: - Pollution incidents	Slight Adverse
Otters	Otters are protected under the Conservation of Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.	National	Medium. Otters are recognised as a UK BAP Priority species and are listed on the Somerset Biodiversity Action Plan.	The data search returned a large number of records for otter within a 5km radius of the survey area. This included records from 2017 of otter spraints from the River Granta CWS in Babraham and Great Abington, as well as similar records further downstream of the stretch of Hobson's Brook that encompasses the survey area.	High	Minor Negative Considered impact: - Night-time works could disturb foraging and commuting otters. .	Slight Adverse

Water Voles	Water voles are protected under the Wildlife and Countryside Act 1981 and are a UK priority species.	National	Water Vole are recognised as a UK BAP Priority species. Water Vole are important because they are a wetland flagship species. Protection of their habitat would benefit a variety of other wetland species.	The data search returned a large number of records for water vole within a 5km radius of the survey area. This included a record of two water vole sightings and field evidence within a ditch to the south of the Cambridge Biomedical Campus within the survey area in 2017.	High	Minor Negative Considered impacts: • Potential to cause noise, vibration and light (if night works) • Habitat loss and fragmentation • Potential to kill and injure water vole and damage/destroy burrows during earthworks and vegetation clearance.	Slight Adverse
Other Species of Principal Importance including harvest mouse, common toad and hedgehog	Woodland and grassland (hedgehog), freshwater ponds (common toad), rough grassland (harvest mouse)	Local	Medium	Species of Principal Importance are recognised conservation priorities in England	Medium	Minor negative Considered impacts - Habitat loss and fragmentation - Pollution incidents	Slight adverse

Reference Sources

Phase 1 information from WYG. The impacts have been assessed using the Department for Transport TAG Unit A3, Environmental Impact Appraisal guidance.

Summary Assessment Score

Slight Adverse

Qualitative Comments

In summary, there would be an overall slight adverse effect on biodiversity as a result of the Blue Option and Travel Hub C. The proposed works, without appropriate mitigation, have the potential to adversely affect bats, otters, water voles, reptiles, badgers, barn owls, white-clawed crayfish, great crested newts, invertebrates nesting birds and other species and habitats of principle importance, Nine Wells LNR, River Granta CWS and Shelford - Haverhill Disused Railway (Pampisford) CWS through the loss, fragmentation and isolation of habitats. Eversdean and Wimpole woods will be affected though potential barriars to dipersal and severance of communting routes.The scheme would not present any significant adverse effects on the integrity of SSSIs.

E. Greenhouse Gases

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSETS: Purple Option

Present Value Base Year 2010

Current Year 2019

Proposal Opening year: 0

Project (Road/Rail or Road and Rail): road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £0

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded 0

Change in carbon dioxide equivalent emissions in opening year (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £0
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	0
Non-traded sector	0	0	0	0

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. The Purple route is the shortest of all options and, unlike other options, crosses the River Granta once only. It follows the same route as the Pink and Black route but stops to the west of the A11/A505 junction and would serve Travel Hub Site A. This would be accessed via a new roundabout junction to the north of the A505 slip road and require an extended access road to the site itself. This would be necessary in order to avoid the high-pressure gas pipeline. During the construction period, diversions will be required where the off-road route from Cambridge to the Travel Hub crossing Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions temporarily. During the schemes operation, as with those junctions further north, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. As this option is the shortest associated emissions from the buses of the Travel Hub will be the lowest. Vehicles driving to the Travel Hub from the A1307 would have to drive through 2 junctions before entering the Travel Hub for this option which may also increase GHG emissions. The site could provide parking for up to 2,000 cars this combination of Travel Hub will enable the smallest possible modal shift due to having the smallest capacity - but has potential for expansion if the use of the Travel Hub is significant. However, there is a potential for increased emission but this will be mitigated by some of the scheme elements.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSETS: Brown Option

Present Value Base Year 2010

Current Year 2019

Proposal Opening year: 0

Project (Road/Rail or Road and Rail): road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £0

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded 0

Change in carbon dioxide equivalent emissions in opening year (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £0
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	0
Non-traded sector	0	0	0	0

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. The Brown option routes take a direct route towards the A11. The Brown Option ends at travel Hub Site B, located to the south west of the junction between the A1307 and A11. General traffic would access it from the A1307 via a new junction whilst the site itself would have a linear arrangement in order to accommodate it between a high-pressure gas main, over which development is restricted, and the A11. During the construction period, diversions will be required where the off-road route from Cambridge to the Travel Hub crossing Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions temporarily. During the schemes operation, as with those junctions further north, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. As the site could provide parking for up to 2,800 cars this combination of Travel Hub will enable the greatest possible modal shift due to having the largest capacity. However, there is a potential for increased emissions but this will be mitigated by some of the scheme elements.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSET: Pink Option

Present Value Base Year 2010

Current Year 2019

Proposal Opening year: 0

Project (Road/Rail or Road and Rail): road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £0

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded 0

Change in carbon dioxide equivalent emissions in opening year (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £0
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	0
Non-traded sector	0	0	0	0

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. The Pink route follows the same route as the Black route but ends at Travel Hub Site B, located to the south west of the junction between the A1307 and A11. General traffic would access it from the A1307 via a new junction whilst the site itself would have a linear arrangement in order to accommodate it between a high-pressure gas main, over which development is restricted, and the A11. During the construction period, diversions will be required where the off-road route from Cambridge to the Travel Hubs cross Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions temporarily. During the schemes operation, as with those junctions further north, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. As the site could provide parking for up to 2,500 cars this combination of Travel Hub will enable the greatest possible modal shift due to having the largest capacity. However, there is a potential for increased emission but this will be mitigated by some of the scheme elements.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSETS: Black Option

Present Value Base Year 2010

Current Year 2019

Proposal Opening year: 0

Project (Road/Rail or Road and Rail): road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £0

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded 0

Change in carbon dioxide equivalent emissions in opening year (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £0
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	0
Non-traded sector	0	0	0	0

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined. Therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. The Black route follows the similar route as the Purple and Pink options passing just north of the County Wildlife Site. This route avoids the need for a bridge or significant regrading works at the former High Street crossing. Site C would have a separate roundabout junction to provide general traffic with access into the site at the current junction between the A1307 and Newmarket Road. During the construction period, diversions will be required where the off-road route from Cambridge to the Travel Hub crossing Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions temporarily. During the schemes operation, as with those junctions further north, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. The length of this route is the longest of all the options which will contribute additional operational GHG emissions from the buses. The site could provide parking for up to 2,100 cars this combination of Travel Hub would enable a smaller modal shift in transport due to having the one of the smaller capacities. However, there is a potential for increased emissions but this will be mitigated by some of the scheme elements.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Data Sources:

Greenhouse Gases Workbook - Worksheet 1

Scheme Name: CSETS: Blue Option

Present Value Base Year 2010

Current Year 2019

Proposal Opening year: 0

Project (Road/Rail or Road and Rail): road

Overall Assessment Score:

Net Present Value of carbon dioxide equivalent emissions of proposal (£): £0

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Quantitative Assessment:

Change in carbon dioxide equivalent emissions over 60 year appraisal period (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Of which Traded 0

Change in carbon dioxide equivalent emissions in opening year (tonnes): 0
(between 'with scheme' and 'without scheme' scenarios)

Net Present Value of traded sector carbon dioxide equivalent emissions of proposal (£): £0
(N.B. this is not additional to the appraisal value in cell I17, as the cost of traded sector emissions is assumed to be internalised into market prices. See TAG Unit A3 for further details)

*positive value reflects a **net benefit** (i.e. CO2E emissions reduction)

Change in carbon dioxide equivalent emissions by carbon budget period:

	Carbon Budget 1	Carbon Budget 2	Carbon Budget 3	Carbon Budget 4
Traded sector	0	0	0	0
Non-traded sector	0	0	0	0

Qualitative Comments:

As there is no traffic data available at this stage, the extent of the ARN cannot be determined, therefore, it is not possible to comment on the likely local traded and non-traded CO2e NPV for this scheme option. The Blue route crosses the A11 via a new bridge, crosses Newmarket Road at junction and runs through the south of the former Comfort Café site and crosses the A1307 via a new junction to connect with Travel Hub Site C, located on the north side of the A1307. Site C would have a separate roundabout junction to provide general traffic with access into the site at the current junction between the A1307 and Newmarket Road. During the construction period, diversions will be required where the off-road route from Cambridge to the Travel Hub crossing Graham's Road, Hinton Way, Haverhill Road, Sawston Road and the High Street which will increase emissions temporarily. During the schemes operation, as with those junctions further north, all new junctions would be at-grade and signalised with priority for public transport vehicles which will increase local GHG emissions marginally. The length of the route is the second longest, after the Black route which will contribute additional operational GHG emissions from the buses. The site could provide parking for up to 2,100 cars this combination of Travel Hub would enable a smaller shift in modal transport due to having the one of the smaller capacities. However, there is a potential for increased emission but this will be mitigated by some of the scheme elements.

Sensitivity Analysis:

Upper Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Lower Estimate Net Present Value of Carbon dioxide Emissions of Proposal (£): £0

Data Sources:

F. Historic Environment

TAG Historic Environment Impacts Worksheet- Purple option - Buried Archeology

	Step 2	Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	A provisional search of the Cambridgeshire County Council Historic Environment Record (CHER) data has been undertaken. There are 15 archaeological assets recorded within 100m of the option. A single sherd of Roman grey course ware (CHER 04791) and a post medieval clay pipe (CHER 04791A), 62m south of the option at Great Shelford. A findspot for a Neolthic polish axe (CHER 04886), 50m south of the option at Great Shelford. A prehistoric ring ditch and assocaited prehistoric worked flints (CHER04894), have been recorded to the south of the option at Granhams Farm. Prehistoric flint flake (CHER 06323), north of the option near Church Farm Babraham. An archaeological evaluation at Granhams Farm, identied evidence of Neolthic to Bronze Age activity (CHER CB15541), in the are of the option. A cluster of worked flint found in the area of the option at Granhams Farm (CHER MCB16140). At the northern end of the option at Addebrookes, archaeological investigation have identified, an earlyRoman field system and kiln (CHER MCB26679;, Iron Age/Roman enclosures (CHER 08339); late prehistoric pits, Late Bronze Age/Early Iron Age ring ditches, Late Neolithic/Early Bronze Age pit cluster, Iron Age well, Late Iron Age enclosure which was recut during the Early Roman period and Early Roman, post holes, beam slots ditches and a midden (CHER MCB19991); and a Roman ditch (CHER MCB20378). Further significant archaeology covering the late prehistoric to medieval periods have been investigated in the wider Addenbrookes development area. The northern end of the option runs parrallel to the Cambridge/ West Anglian Main Line (CHER MCB24402), which was opened in 1845. Between Stapleford and Bourn Bridge the option runs parrallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865. The park and ride option is located adjacent to the disused Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848. The park and ride for this option is partly located over an area of cropmarks to the south west of Babraham which indicates the presence of enclosures (CHER 09353). In addition The option crosses the channel that connects Nine Wells springs to Hobson Conduit.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be low to moderate. However, there is potential for remains associated with the scheduled White Hill Farm complex (NHLE 100689) and the highly significant Granham Farm moat/Saxon burh (CHER 3918), may be located within the optiom footprint. Hobsons Conduit and the Nine Well Springs are potentialy of national significance.	It is not rare within rural England to encounter archaeological remains associated with the former landscape.	The archaeological remains within the scheme footprint at Addenbrookes have already been removed by development. However, the option will impact archaeological remains associated with the identified assets and there remains the potential for further previously unidentified remains. The potential impact is major adverse.
Survival	Unknown - where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unknown degree dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive well then they have the potential to be local to national significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-damaged.	Where archaeological remains survive there will be a major adverse impact.
Condition		Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive well then they have the potential to be local to national significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-damaged.	Where archaeological remains survive there will be a major adverse impact.
Complexity	Unknown - Should remains be present they will likely be moderately complex as they lie within a rich archaeological landscape which shows evidence of activity and settlement since the prehistoric period.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Unknown. Should archaeological remains survive their complexity will contribute to their significance.	Moderately complex archaeological remains are not rare within the agricultural landscape.	Major adverse impact - the complexity of any surviving remains will be affected by their removal or disturbance throught the construction of the option.
Context	There is a known pattern of late prehistoric/Roman occupation/settlement across the wider area, with settlment usulay occuring every 400m. The medieval/post medieval occupation focus of the area shifted towards the viallages and farmsteads (some moated).	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	The context of any archaeological remains will contribute to their significance.	Buried archaeological remains generally do not survive in an undisturbed original context. Should they be found to survive in their original context then they this will contribute to their significance.	Moderate adverse impact on the context. The wider context of the archaeological pattern will survive but will be impacted
Period	Unknown - likely prehistoric to modern.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Undesignated asset. Unknown. Prehistoric/Roman remains of good quality would be of particular significance.	It is not rare to encounter archaeological remains.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire County Council Historic Environment Record;

Step 5 - Summary Assessment Score

Major impact on a medium/high value asset during construction resulting in a large adverse effect

Qualitative Comments

In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present they will be removed by necessary excavations. There are known archaeological remains of regional (and pottentialy national) significance within the footprint of the proposed option.

TAG Historic Environment Impacts Worksheet- Purple option - Listed Building Grade II*

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is grade II* listed buildings situated within 500m of the option. Middlefield House and Garden Wall (NHLE 1317370), 450M north of the North of the option.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2019, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plans 2018.	Grade II* listed buildings are of high significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II* listed buildings total 5.5% of all listed buildings. They are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Survival	Assumed good survival.	Grade II* listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II* listed buildings are inherently of high significance. The levels at which they survive determine their listing status and contribute to their significance. The high survival of original features, internal and external in both buildings increases their significance and contributes to their high importance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. The high survival of original features, internal and external in both buildings increases their rarity	No impact.
Condition	Assumed good condition.	The good condition of the assets contributes to their grade II* listing and its national importance.	The condition of the assets contributes to their listed status and therefore to their high significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. It is unusual to find buildings of	No impact.
Complexity	House, 1908 by Edward Lutyens for the legal scholar Henry Bond. The red-brick house is characterised by a symmetrical frontage, three large chimney blocks, and large tiled hipped roofs with low flanking eaves.	The complexity of the structures contributes to their grade II* listed status.	The complexity of the structures contributes to their grade II* listed status. The majority of these structures are of limited complexity but are good examples of particular architectural and aesthetic practices.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. The complexity of the structures	No impact.
Context	The house and garden are located on the south facing side of Fox Hill. Surrounded by woodland on three side, with a view south west along a modern avenue across the River Granta/Cam valley. The house was partly listed due to its assocaition with its architect Edwin Lutyns. A well known early 20th century architect, known for designing New Dehli and the Cenetaph in London.	The preservation of the context of these assets contributes to their national importance.	The preservation of the context of these assets contributes to their national importance due to the retained, largely unchanged, immediate surroundings.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	Slight impact. The option may be visable from the asset along the avenue. The crossing of the Granta is likely to be visable from the asset. The operation movement of vehicles may also be visable.
Period	1908	The nature of the stuctures rather than there age of the structures identifies them as nationally important.	The nature of the stuctures rather than there age of the structures identifies them as nationally important.	The period adds to its importance.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight Adverse Effect.

Qualitative Comments

There is potential for the constructed option to be visable from the asset. The option will be some distance away, but the development will have the effect of slightly urbanising the rural view from the asset. The operational movement may also be visible (but at some distance) from the asset.

TAG Historic Environment Impacts Worksheet- Purple option - Listed Building Grade II

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are four Grade II listed buildings with 500m of the option. Nine Well Monument (NHLE 1127825), Dovecote at Granhams Farm (NHLE 133068) Stapleford Hall (NHLE 1331071) Church Farmhouse (NHLE 1331134)	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) (2018), National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018)	Grade II listed buildings are of medium national significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II listed buildings total 92% of all listed buildings and though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level.	No impact
Survival	Assumed good survival	Grade II listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II listed buildings are inherently of medium national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 18th/19th buildings tend to survive better than earlier structures due to changes in construction and fabric, particularly the wider availability of brick. This contributes to the structures' good survival.	No impact
Condition	The structures are assumed to be in generally good condition,	The good condition of the assets contributes to their grade II listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their medium national significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 17th to 19th century buildings tend to survive in better condition than earlier structures due to changes in construction and fabric	No impact
Complexity	The monument is a farily simple single phase structure. The other assets have been subject to later alterations and additions.	The limited complexity of these structures contributes to their grade II listed status.	The limited complexity of these structures contributes to their significance and grade II listed status.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. The majority of these structures are of limited complexity and are therefore not particularly rare but are good examples of	No impact
Context	The monument is located in a small woodland (Nine Wells Wood) at the source of Hobsons Conduit. The dovecote is located on the edge of the Granhams Farm complex. The farm has seen many modern alterations but retains is post medieval agricultural character. The farm complex sits on a large moated sitre which may have earlier foundations. Stapleford Hall, is located within an area of Stapleford Village, which has seen modern residential development. Church Farmhouse is located within an enclosed tree lined garden, adjacent to Babraham Hall's park tree lined avenue. Temple Cafe is set back from the Newmarket Road/Bourn Bridge Junction. The cafe was located at this point to pick up trade using the historic Newmarket Road routeway.	The preservation of the context of these buildings contributes to their national importance and Grade II listed status.	The preservation of the context of these buildings contributes to their medium national significance.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	No impact.
Period	All the assets are 19th century in dates except Stapeford Hall, which is 17th/18th century.	The period the structures were built identifies them as nationally important.	The age of the structures identifies them as of medium national significance. They were likely selected as they are good examples of that period and building type.	The majority of grade II listed buildings date to this broad period, within this category they are therefore not rare. However, buildings of this date comprise a generally small percentage nationwide.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

No impact.

Qualitative Comments

The identified assets are either to far away or are screened by existing vegitation/development.

TAG Historic Environment Impacts Worksheet- Purple option - Registered Parks and Gardens

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one Grade II* Registered Park and Garden located 250m south of the proposed option. Pampisford Hall (NHLE 1000321) is a mid 19th century pleasure ground, arboretum and the remains of a formal garden, laid out from 1840 onwards to original designs by R Marnock.	Designated asset, nationally important. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (NPPF) 2019; South Cambridgshire District Council Local Plan (2018); City of Cambridge Local Plan (2018).	Grade II* registered parks and gardens are of high national significance.	Grade II* registered parks and gardens are all rare; each asset is unique, they all have different histories, forms, landscape architects, owners etc, which contribute to their importance in varying degrees.	No impact.
Survival	Good survival.	Registered parks and gardens are nationally important areas, their level of survival contributes to their listing status and therefore their national importance.	Grade II* registered parks and gardens are inherently of high national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II* registered parks and gardens are all rare, and the majority do not have all their historic features surviving fully.	No impact.
Condition	The registered park and garden is not included in the Historic England Heritage at Risk Register.The registered park and garden identified for potential impact is assumed to be in good condition.	The good condition of the asset contributes to its listing and its national importance.	The condition of the asset contributes to its registered status and therefore to their medium significance.	It is not rare for a registered historic park and garden of this date to be in good condition, as they often remain well-managed.	No impact.
Complexity	Registered parks and gardens are often fairly complex heritage assets, displaying evidence of several phases of park creation and alteration.	The complexity of the area contributes to its registered status.	The complexity of the park contributes to its registered status.	It is rare for an historic park and garden of this date to be as complex as the American Cemetery due, to its size and internal signficance.	No impact.
Context	It is situated within its original context, with later alterations.	The preservation of the context of the registered park and garden contributes to its national importance.	The preservation of the context of the registered park and garden contributes to its high national significance.	The rarity of the registered parks and gardens context adds to its value.	No impact. The park is seperated from the scheme by the A505. A busy road which is tree lined in the area where the scheme is located close to the parkland.
Period	The pleasure garden, walled garden, arborituim and the remains of the formal garden date to the mid 19th century (1840s onwards), with some later alterations.	The age of the registered park and garden contributes to its value.	The age of the registered park and garden contributes to its significance.	There are nationally a number of registered parks and gardens of this period.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Neutral

Qualitative Comments

It is considered that there will be no impact on the Grade II* registered park and garden.

TAG Historic Environment Impacts Worksheet- Purple option - Scheduled Monument

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one scheduled monument within 500m of the proposed scheme. Cropmark site west of White Hill Farm, Great Shelford (NHLE 1006891). The cropmarks have been interpreted as representing an Iron Age/Roman settlement. The scheduled monument is located on the other side of the railway line to the proposed option (approx 25m).	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): City of Cambridge Local Plan (2018).	Scheduled Monuments are of national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact. The asset is seperated from the option by the railway line.
Survival	The cropmark evidence suggest good survival. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact. The asset is seperated from the option by the railway line.
Condition	The cropmark evidence suggest good condition. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. Condition of monument makes a significant contribution to the evidential value of the asset.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact. The asset is seperated from the option by the railway line.
Complexity	The cropmark evidence indicates that the site has a significant level of complexity, which is not unusal for Iron Age/Roman settlement site.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. The complexity of the monument adds value because of the evidence it provides for past cultures and land use.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact. The asset is seperated from the option by the railway line.
Context	The asset is part of a wider landscape of Iron Age/Roman of land divison, agrcultural activity and occupation. Settlements from this period are not uncommon in Cambridgshire.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. The relationship with the landscape is essential to the understanding of the monument and its history and therefore of high significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	Slight impact. Associated remains may extend into the option corridor.
Period	Roman/Iron Age settlement. Earlier and later activity evidence may also be present.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monuments increases there rarity.	No impact. The asset is seperated from the option by the railway line.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse negative effect on context, otherwise neutral.

Qualitative Comments

sically impacted by the construction of the scheme and the setting are unlikely to be harmed. However, there is potential to impact associated archaeological remains, as the archaeological remains form part of a large late prehist

TAG Historic Environment Impacts Worksheet- Brown option - Buried Archaeology

	Step 2	Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	A provisional search of the Cambridgeshire County Council Historic Environment Record (CHER) data has been undertaken. There are 31 archaeological assets recorded within 100m of the option. A single sherd of Roman grey course ware (CHER 04791) and a post medieval clay pipe (CHER 04791A), 62m south of the option at Great Shelford. A findspot for a Neolithic polished axe (CHER 04886), 50m south of the option at Great Shelford. A prehistoric ring ditch and associated prehistoric worked flints (CHER04894), have been recorded to the south of the option at Granhams Farm. Prehistoric flint flake (CHER 06323), north of the option near Church Farm Babraham. Mesolithic and Neolithic activity (CHER 11317), a Bronze Age ditch monument (CHER 11317A), the findspot of a Palaeolithic handaxe (CHER 11317B), a Late Iron Age/Roman field system (CHER 11317C), a Roman settlement and droveway (CHER 11317D), Saxon settlement (CHER 13044), Saxon find (CHER CB14745), recorded during investigations for a borrow pit at Bourn Bridge on the southern edge of the proposed park and ride site. A flint blade and waste flake (CHER CB14748) was recovered 90m to the east of the option at Bourn Bridge. An archaeological evaluation at Granhams Farm, identified evidence of Neolithic to Bronze Age activity (CHER CB15541) in the area of the option. A cluster of worked flint found in the area of the option at Granhams Farm (CHER MCB16140). Saxon artefacts (CHER MCB17799) have been recovered from the southern area of the proposed park and ride at Bourn Bridge. A former post medieval cut channel ran through the park and ride option near Bourn Bridge (CHER MCB15995). At the northern end of the option at Addenbrookes, archaeological investigations have identified: an early Roman field system and kiln (CHER MCB26679; Iron Age/Roman enclosures (CHER 08339); late prehistoric pits, Late Bronze Age/Early Iron Age ring ditches, Late Neolithic/Early Bronze Age pit cluster, Iron Age well, Late Iron Age enclosure which was recut during the Early Roman period and Early Roman, post holes, beam slots ditches and a midden (CHER MCB19991); and a Roman ditch (CHER MCB20378). Further significant archaeology covering the late prehistoric to medieval periods has been investigated in the wider Addenbrookes development area. The northern end of the option runs parrallel to the Cambridge/ West Anglian Main Line (CHER MCB24402), which was opened in 1845. Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865. The park and ride option is located adjacent to the disused Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848. The option crosses over an area of cropmarks to the south west of Babraham which indicates the presence of enclosures (CHER 09353). Just outside of the 100m study area, to the east of the park and ride option, the former route of a Roman road has been identified (CHER MCB26667), which followed the alignment of current Newmarket Street. In addition, the option crosses the channel that connects Nine Well springs to Hobson Conduit. There is potential for previously unrecorded archaeological remains to be recorded within the scheme footprint. These could be associated with the archaeological sites referenced above, or they could represent previously unknown archaeological sites.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be low to moderate. However, there is potential for remains associated with the scheduled White Hill Farm complex (NHLE 100689) and the highly significant Granham Farm moat/Saxon burh (CHER 3918), may be located within the optiom footprint. Hobsons Conduit and the Nine Well Springs are potentialy of national significance.	It is not rare within rural England to encounter archaeological remains associated with the former landscape.	The archaeological remains within the scheme footprint at Addenbrookes and Bourn Bridge have already been removed by development. However, the option will impact archaeological remains associated with the identiied assets and there remians the potential for further previously unidentified remains. The potential impact is major adverse.
Survival	Unknown - where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unknown degree, dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive well then they have the potential to be locally to nationally significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-	Where archaeological remains survive there will be a major adverse impact.
Condition	Unknown. Where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unkown degree, dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive in good condition then they have the potential to be locally to nationally significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-	Where archaeological remains survive there will be a major adverse impact.
Complexity	Unknown - Should remains be present they will likely be moderately complex as they lie within a rich archaeological landscape which shows evidence of activity and settlement since the prehistoric period.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local	Unknown. Should archaeological remains survive their complexity will contribute to their significance.	Moderately complex archaeological remains are not rare within the agricultural landscape.	Major adverse impact - the complexity of any surviving remains will be affected by their removal or disturbance throught the construction of
Context	There is a known pattern of late prehistoric/Roman occupation/settlement across the wider area, with settlment, usually occuring every 400m. The medieval/post medieval occupation focus of the area shifted towards the villages and farmsteads (some moated).	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and	The context of any archaeological remains will contribute to their significance.	Buried archaeological remains generally do not survive in an undisturbed original context. Should they be found to survive in their original context then they this will contribute to their significance.	Moderate adverse impact on the context. The wider context of the archaeological pattern will survive
Period	Unknown - likely prehistoric to modern.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and	Undesignated asset. Unknown. Prehistoric/Roman remains of good quality would be of particular significance.	It is not rare to encounter archaeological remains.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire County Council Historic Environment Record;

Step 5 - Summary Assessment Score

Major impact on a medium/high value asset during construction resulting in a large adverse effect

Qualitative Comments

In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present they will be removed by necessary excavations. There are known archaeological remains of regional (and potentialy national) significance within the footprint of the proposed option.

TAG Historic Environment Impacts Worksheet - Brown option - Conservation Area

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are two conservation areas within 500m of the scheme. Stapleford Conservation Area, 500m to the south of the option. Babraham Conservation Area, 425m to the north and west of the option.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990; National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Conservation areas are considered to be of high significance. The form of each conservation area is unique and reflects a unique set of circumstances resulting in the development of the area into one that warrants special protection.	Each conservation area is unique and as such, the assets are very rare.	No impact.
Survival	The conservation areas survive in good condition.	Conservation areas are nationally important, their level of survival contributes to their significance and therefore their national importance.	The survival of the conservation areas contributes to their high significance.	The survival of the assets contributes to their rarity.	No impact
Condition	The conservation areas are in good condition.	The good condition of the assets contributes to their high national importance.	The condition of the assets contributes to their high significance.	The condition of the assets contributes to their rarity.	No impact
Complexity	The assets are complex as they incorporates a variety of structures built over a number of years. Stapleford Conservation Area represents the historic core of of the village. Babbraham Conservation Area includes the historic core of the village and the former 19th century parkland of the Grade II Babraham Hall (NHLE 1127745)	The complexity of the assets contributes to their national importance.	The complexity of the assets contributes to their high significance.	The complexity of the assets contributes to their rarity.	No impact
Context	The Stapleford Conservation Area is surrounded by modern development but retains some of its earlier context. The village core of Babraham retains much of its historic context and has been subject to very little modern development, in and around the village. However, the parkland around the Hall has seen development in the late 20th early 21st century with the development of a business/science park. However, the main tree lined avenue, which runs south of the park remains intact and in good condition. The area around the conservation is still in agricultural use.	The preservation of the context of the assets contributes to their national importance.	The context of the assets contributes to their significance.	The context of the assets contributes to their rarity.	There will be no impact on the context of Stapleford Conservation Area. There is potential for an impact on the view from the Hall along the avenue, from the movement of vehicles along the proposed scheme. This impact may reduced by mitigation planting.
Period	Babraham and Stapleford viallge halls date to the medieval period (archaeological remains from an earlier date have been recorded within both conservation areas). The former parkland within the Babraham conservation area dates to the mid-19th century, although the hall has earlier origins.	The age of the assets identifies them as important.	The age of the assets contributes to their significance.	It is not unusual for conservation areas to be dated to these periods.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse effect on Babraham.
Neutral on Stapleford.

Qualitative Comments

The operational movement of vehicles along the scheme may impact on the key view out of the conservation area from Babraham Hall.

TAG Historic Environment Impacts Worksheet- Brown option - Listed Building Grade II*

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one grade II* listed building situated within 500m of the option. Middlefield House and Garden Wall (NHLE 1317370), 450m north of the North of the option. C4:G7C7C4:G8C4:G8C4:G9+C7+C4:G8+C7+C4:G8+C7+C4:G8+C7+C4+C4:G8	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plans 2018.	Grade II* listed buildings are of high significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II* listed buildings total 5.5% of all listed buildings. They are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Survival	Assumed good survival.	Grade II* listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II* listed buildings are inherently of high significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Condition	Assumed good condition.	The good condition of the asset contributes to its grade II* listing and its national importance.	The condition of the asset contributes to its listed status and therefore to its high significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. It is unusual to find buildings of this age in good condition, therefore good condition would contribute to its rarity.	No impact.
Complexity	House, 1908 by Edward Lutyens for the legal scholar Henry Bond. The red-brick house is characterised by a symmetrical frontage, three large chimney blocks, and large tiled hipped roofs with low flanking eaves.	The complexity of the structures contributes to their grade II* listed status.	The complexity of the structures contributes to their grade II* listed status.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. The complexity of the asset adds to its rarity and therefore contributes to its overall importance.	No impact.
Context	The house and garden are located on the south facing side of Fox Hill. Surrounded by woodland on three sides, with a view south west along a modern avenue across the River Granta/Cam valley. The house was partly listed due to its assocaition with its architect Edwin Lutyns. A well known early 20th century architect, known for designing New Dehli and the Cenetaph in London.	The preservation of the context of the asset contributes to its national importance.	The preservation of the context of the asset contributes to its national importance due to the retained, largely unchanged, immediate surroundings.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	Slight impact through alterations to the asset's context. The option may be visible from the asset along the avenue. The crossing of the Granta is likely to be visible from the asset. The operational movement of vehicles may also be visible.
Period	1908	The nature of the stucture, rather than the age of the structure, identifies it as nationally important.	The nature of the stuctures rather than the age of the structures identifies them as nationally important.	The age of the asset does not add to its importance.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight Adverse Effect.

Qualitative Comments

There is potential for the constructed option to be visible from the asset. The option will be some distance away, but the development will have the effect of slightly urbanising the rural view from the asset. This would alter the seting of the asset and would therefore impact the asset. The operational movement may also be visible (but at some distance) from the asset.

TAG Historic Environment Impacts Worksheet- Brown option - Listed Building Grade II

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are five Grade II listed buildings with 500m of the option: Nine Well Monument (NHLE 1127825), Dovecote at Granhams Farm (NHLE 133068) Stapleford Hall (NHLE 1331071) Church Farmhouse (NHLE 1331134) Temple Café and Restaurant (NHLE 1331149)	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) (2019); South Cambridgeshire and City of Cambridge Local Plan (2018).	Grade II listed buildings are of medium national significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II listed buildings total 92% of all listed buildings and though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level.	No impact
Survival	Assumed good survival	Grade II listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II listed buildings are inherently of medium national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 18th/19th buildings tend to survive better than earlier structures due to changes in construction and fabric, particularly the wider availability of brick. This contributes to the structures' good survival.	No impact
Condition	The structures are assumed to be in generally good condition,	The good condition of the assets contributes to their grade II listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their medium national significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 17th to 19th century buildings tend to survive in better condition than earlier structures due to changes in construction and fabric during the period, particularly the wider availability of brick.	No impact
Complexity	The monument is a farily simple single phase structure. The other assets have been subject to later alterations and additions.	The limited complexity of these structures contributes to their grade II listed status.	The limited complexity of these structures contributes to their significance and grade II listed status.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. The majority of these structures are of limited complexity and are therefore not particularly rare but are good examples of particular architectural practices.	No impact
Context	The monument is located in a small woodland (Nine Wells Wood) at the source of Hobsons Conduit. The dovecote is located on the edge of the Granhams Farm complex. The farm has seen many modern alterations but retains its post medieval agricultural character. The farm complex sits on a large moated site which may have earlier foundations. Stapleford Hall, is located within an area of Stapleford Village, which has seen modern residential development. Church Farmhouse is located within an enclosed tree lined garden, adjacent to Babraham Hall's park tree lined avenue. Temple Cafe is set back from the Newmarket Road/Bourn Bridge Junction. The cafe was located at this point to pick up trade using the historic Newmarket Road routeway.	The preservation of the context of these buildings contributes to their national importance and Grade II listed status.	The preservation of the context of these buildings contributes to their medium national significance.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	No impact.
Period	All the assets are 19th century in dates except Stapleford Hall, which is 17th/18th century.	The period the structures were built identifies them as nationally important.	The age of the structures identifies them as of medium national significance. They were likely selected as they are good examples of that period and building type.	The majority of grade II listed buildings date to this broad period, within this category they are therefore not rare. However, buildings of this date comprise a generally small percentage nationwide.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

No impact.

Qualitative Comments

The identified assets are either to far away or are screened by existing vegitation/development.

TAG Historic Environment Impacts Worksheet - Brown option - Registered Park and Gardens

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one Grade II* Registered Park and Garden located 250m south of the proposed option. Pampisford Hall (NHLE 1000321) is a mid 19th century pleasure ground, arboretum and the remains of a formal garden, laid out from 1840 onwards to original designs by R Marnock.	Designated asset, nationally important. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (NPPF) 2019; South Cambridgshire District Council Local Plan (2018); City of Cambridge Local Plan (2018).	Grade II* registered parks and gardens are of high national significance.	Grade II* registered parks and gardens are all rare; the form of the asset is unique.	No impact.
Survival	Good survival.	Registered parks and gardens are nationally important areas, their level of survival contributes to their listing status and therefore their national importance.	Grade II* registered parks and gardens are inherently of high national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II* registered parks and gardens are all rare, and the majority do not have all their historic features surviving fully.	No impact.
Condition	The registered park and garden is not included in the Historic England Heritage at Risk Register. The registered park and garden is assumed to be in good condition.	The good condition of the asset contributes to its listing and its national importance.	The condition of the asset contributes to its registered status and therefore to its high significance.	It is not rare for a registered historic park and garden of this date to be in good condition, as they often remain well-managed.	No impact.
Complexity	Registered parks and gardens are often fairly complex heritage assets, displaying evidence of several phases of park creation and alteration.	The complexity of the area contributes to its registered status.	The complexity of the park contributes to its registered status.	The complexity of the park adds to its significance.	No impact.
Context	It is situated within its original context, with later alterations.	The preservation of the context of the registered park and garden contributes to its national importance.	The preservation of the context of the registered park and garden contributes to its high national significance.	The rarity of the registered parks and gardens context adds to its value.	No impact. The park is separated from the scheme by the A505. A busy road is located close to the parkland. The road is tree-lined in the area closest to the scheme.
Period	The pleasure garden, walled garden, arborituim and the remains of the formal garden date to the mid 19th century (1840s onwards), with some later alterations.	The age of the registered park and garden contributes to its value.	The age of the registered park and garden contributes to its significance.	There are nationally a number of registered parks and gardens of this period.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Neutral

Qualitative Comments

It is considered that there will be no impact on the Grade II* registered park and garden.

TAG Historic Environment Impacts Worksheet - Brown option - Scheduled Monument

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one scheduled monument within 500m of the proposed scheme. Cropmark site west of White Hill Farm, GreaC4:G9t Shelford (NHLE 1006891). The cropmarks have been interpreted as representing an Iron Age/Roman settlement. The scheduled monument is located on the other side of the railway line to the proposed option (approx 25m)	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): City of Cambridge Local Plan (2018).	Scheduled monuments are of national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. The form of the Iron Age/Roman settlement cropmarks appears to follow the antcipated pattern, however localised alteratations to the form of the settlement might be present which would increase the rarity of the asset.	No impact. The asset is separated from the option by the railway line.
Survival	The cropmark evidence suggest good survival. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The good survival level of the asset contributes to its significance.	Roman settlements and Iron Age settlement sites with good levels of survival are not uncommon in Cambridgeshire.	No impact. The asset is seperated from the option by the railway line.
Condition	The cropmark evidence suggest good condition. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. Condition of monument makes a significant contribution to the evidential value of the asset.	Roman settlements and Iron Age settlement sites in apparent good condition are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.
Complexity	The cropmark evidence indicates that the site has a significant level of complexity, which is not unusal for an Iron Age/Roman settlement site.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The complexity of the monument adds value because of the evidence it provides for past cultures and land use.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monument increases its rarity.	No impact. The asset is seperated from the option by the railway line.
Context	The asset is part of a wider landscape of Iron Age/Roman land divison, agricultural activity and occupation. Settlements from this period are not uncommon in Cambridgeshire.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The relationship with the landscape is essential to the understanding of the monument and its history and therefore of high significance.	Roman settlements and Iron Age settlement sites are not uncommon in similar contexts throughout Cambridgeshire.	Slight impact. Associated remains may extend into the option corridor.
Period	Iron Age/Roman settlement. Earlier and later activity evidence may also be present.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The age of the asset contributes to its national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse negative effect on context, otherwise neutral.

Qualitative Comments

The scheduled monument will not be physically impacted by the construction of the scheme and the setting is unlikely to be harmed. However, there is potential for construction activities to impact associated archaeological remains, as the archaeological remains form part of a large late prehistoric/Roman occupation/settlement pattern.

TAG Historic Environment Impacts Worksheet - Pink option - Buried Archaeology

	Step 2	Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	A provisional search of the Cambridgeshire County Council Historic Environment Record (CHER) data has been undertaken. There are 30 archaeological assets recorded within 100m of the option. A single sherd of Roman grey course ware (CHER 04791) and a post medieval clay pipe (CHER 04791A), 62m south of the option at Great Shelford. A findspot for a Neolithic polished axe (CHER 04886), 50m south of the option at Great Shelford. A prehistoric ring ditch and associated prehistoric worked flints (CHER04894) have been recorded to the south of the option, at Granhams Farm. Prehistoric flint flake (CHER 06323), north of the option near Church Farm Babraham. Mesolithic and Neolithic activity (CHER 11317), a Bronze Age ditch monument (CHER 11317A), the findspot of a Palaeolithic handaxe (CHER 11317B), a Late Iron Age/Roman field system (CHER 11317C), a Roman settlement and droveway (CHER 11317D), Saxon settlement (CHER 13044), and a Saxon find (CHER CB14745), recorded during investigations for a borrow pit at Bourn Bridge on the southern edge of the proposed park and ride site. A flint blade and waste flake (CHER CB14748), was recovered 90m to the east of the option at Bourn Bridge. An archaeological evaluation at Granhams Farm, identified evidence of Neolithic to Bronze Age activity (CHER CB15541) in the area of the option. A cluster of worked flint found in the area of the option at Granhams Farm (CHER MCB16140). Saxon artefacts (CHER MCB17799) have been recorved from the southern area of the proposed park and ride at Bourn Bridge. A former post medieval cut channel ran through the park and ride option at Bourn Bridge (CHER MCB15995). At the northern end of the option at Addenbrookes, archaeological investigations have identified: an early Roman field system and kiln (CHER MCB26679; Iron Age/Roman enclosures (CHER 08339); late prehistoric pits, Late Bronze Age/Early Iron Age ring ditches, Late Neolithic/Early Bronze Age pit cluster, Iron Age well, Late Iron Age enclosure which was recut during the Early Roman period and Early Roman, post holes, beam slots ditches and a midden (CHER MCB19991); and a Roman ditch (CHER MCB20378). Further significant archaeology covering the late prehistoric to medieval periods have been investigated in the wider Addenbrookes development area. The northern end of the option runs parallel to the Cambridge/ West Anglian Main Line (CHER MCB24402), which was opened in 1845. Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865. The park and ride option is located adjacent to the disused Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848. Just outside of the 100m study area to the east of the park and ride option, the former route of a Roman road has been identified (CHER MCB26667), which followed the alignment of current Newmarket Street. In addition, the option crosses the channel that connects Nine Wells springs to Hobson Conduit. There is potential for previously unrecorded archaeological remains to be recorded within the scheme footprint. These could be associated with the archaeological sites referenced above, or they could represent previously unknown archaeological sites.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be low to moderate. However, there is potential for remains associated with the scheduled White Hill Farm complex (NHLE 100689) and the highly significant Granham Farm moat/Saxon burh (CHER 3918), may be located within the optiom footprint. Hobsons Conduit and the Nine Well Springs are potentialy of national significance.	It is not rare within rural England to encounter archaeological remains associated with the former landscape.	The archaeological remains within the scheme footprint at Addenbrookes and Bourn Bridge have already been removed by development. However, the option will impact archaeological remains associated with the identiied assets and there remians the potential for further previously unidentified remains. The potential impact is major adverse.
Survival	Unknown - where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unknown degree, dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive well then they have the potential to be locally to nationally significant.	Unknown. Where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unkown degree, dependent upon the depth of the remains and the depth of the plough.	Where archaeological remains survive there will be a major adverse impact.
Condition	Unknown. Where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unkown degree, dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive in good condition then they have the potential to be locally to nationally significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-damaged.	Where archaeological remains survive there will be a major adverse impact.
Complexity	Unknown - Should remains be present they will likely be moderately complex as they lie within a rich archaeological landscape which shows evidence of activity and settlement since the prehistoric period.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Unknown. Should archaeological remains survive their complexity will contribute to their significance.	Moderately complex archaeological remains are not rare within the agricultural landscape.	Major adverse impact - the complexity of any surviving remains will be affected by their removal or disturbance throught the construction of the option.
Context	There is a known pattern of late prehistoric/Roman occupation/settlement across the wider area, with settlement, usually occuring every 400m. The medieval/post medieval occupation focus of the area shifted towards the villages and farmsteads (some moated).	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	The context of any archaeological remains will contribute to their significance.	Buried archaeological remains generally do not survive in an undisturbed original context. Should they be found to survive in their original context then they this will contribute to their significance.	Moderate adverse impact on the context. The wider context of the archaeological pattern will survive but will be impacted.
Period	Unknown - likely prehistoric to modern.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Undesignated asset. Unknown. Prehistoric/Roman remains of good quality would be of particular significance.	It is not rare to encounter archaeological remains.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire County Council Historic Environment Record;

Step 5 - Summary Assessment Score

Major impact on a medium/high value asset during construction resulting in a large adverse effect

Qualitative Comments

In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present they will be removed by necessary excavations. There are known archaeological remains of regional (and potentialy national) significance within the footprint of the proposed option.

TAG Historic Environment Impacts Worksheet - Pink option - Conservation Area

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are two conservation areas within 500m of the scheme. Stapleford Conservation Area, 500m to the south of the option. Babraham Conservation Area, 425m to the north and west of the option.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990; National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Conservation areas are considered to be of high significance. The form of each conservation area is unique and reflects a unique set of circumstances resulting in the development of the area into one that warrants special protection.	Each conservation area is unique and as such, the assets are very rare.	No impact.
Survival	The conservation areas survive in good condition.	Conservation areas are nationally important, their level of survival contributes to their significance and therefore their national importance.	The survival of the conservation areas contributes to their high significance.	The survival of the assets contributes to their rarity.	No impact
Condition	The conservation areas are in good condition.	The good condition of the assets contributes to their high national importance.	The condition of the assets contributes to their high significance.	The condition of the assets contributes to their rarity.	No impact
Complexity	The assets are complex as they incorporates a variety of structures built over a number of years. Stapleford Conservation Area represents the historic core of of the village. Babbraham Conservation Area includes the historic core of the village and the former 19th century parkland of the Grade II Babraham Hall (NHLE 1127745)	The complexity of the assets contributes to their national importance.	The complexity of the assets contributes to their high significance.	The complexity of the assets contributes to their rarity.	No impact
Context	The Stapleford Conservation Area is surrounded by modern development but retains some of its earlier context. The village core of Babraham retains much of its historic context and has been subject to very little modern development, in and around the village. However, the parkland around the Hall has seen development in the late 20th early 21st century with the development of a business/science park. However, the main tree lined avenue, which runs south of the park remains intact and in good condition. The area around the conservation is still in agricultural use.	The preservation of the context of the assets contributes to their national importance.	The context of the assets contributes to their significance.	The context of the assets contributes to their rarity.	There will be no impact on the context of Stapleford Conservation Area. There is potential for an impact on the view from the Hall along the avenue, from the movement of vehicles along the proposed scheme. This impact may reduced by mitigation planting.
Period	Babraham and Stapleford viallge halls date to the medieval period (archaeological remains from an earlier date have been recorded within both conservation areas). The former parkland within the Babraham conservation area dates to the mid-19th century, although the hall has earlier origins.	The age of the assets identifies them as important.	The age of the assets contributes to their significance.	It is not unusual for conservation areas to be dated to these periods.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse effect on Babraham.
Neutral on Stapleford.

Qualitative Comments

The operational movement of vehicles along the scheme may impact on the key view out of the conservation area from Babraham Hall.

TAG Historic Environment Impacts Worksheet - Pink Option - Listed Building Grade II*

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one grade II* listed building situated within 500m of the option. Middlefield House and Garden Wall (NHLE 1317370), 450m north of the North of the option.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plans 2018.	Grade II* listed buildings are of high significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II* listed buildings total 5.5% of all listed buildings. They are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Survival	Assumed good survival.	Grade II* listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II* listed buildings are inherently of high significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Condition	Assumed good condition.	The good condition of the asset contributes to its grade II* listing and its national importance.	The condition of the asset contributes to its listed status and therefore to its high significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. It is unusual to find buildings of this age in good condition, therefore good condition would contribute to its rarity.	No impact.
Complexity	House, 1908 by Edward Lutyens for the legal scholar Henry Bond. The red-brick house is characterised by a symmetrical frontage, three large chimney blocks, and large tiled hipped roofs with low flanking eaves.	The complexity of the asset contributes to its grade II* listed status.	The complexity of the structure contributes to its grade II* listed status.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. The complexity of the asset adds to its rarity and therefore contributes to its overall importance.	No impact.
Context	The house and garden are located on the south facing side of Fox Hill. Surrounded by woodland on three sides, with a view south west along a modern avenue across the River Granta/Cam valley. The house was partly listed due to its assocaition with its architect Edwin Lutyns. A well known early 20th century architect, known for designing New Dehli and the Cenetaph in London.	The preservation of the context of the asset contributes to its national importance.	The preservation of the context of the asset contributes to its national importance due to the retained, largely unchanged, immediate surroundings.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	Slight impact through alterations to the asset's context. The option may be visible from the asset along the avenue. The crossing of the Granta is likely to be visible from the asset. The operational movement of vehicles may also be visible.
Period	1908	The nature of the stuctures rather than there age of the structures identifies them as nationally important.	The nature of the stuctures rather than there age of the structures identifies them as nationally important.	The age of the asset does not add to its importance.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight Adverse Effect.

Qualitative Comments

There is potential for the constructed option to be visable from the asset. The option will be some distance away, but the development will have the effect of slightly urbanising the rural view from the asset. This would alter the seting of the asset and would therefore impact the asset. The operational movement may also be visible (but at some distance) from the asset.

TAG Historic Environment Impacts Worksheet - Pink option - Listed Building Grade II

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are five Grade II listed buildings with 500m of the option: Nine Well Monument (NHLE 1127825), Dovecote at Granhams Farm (NHLE 133068) Stapleford Hall (NHLE 1331071) Church Farmhouse (NHLE 1331134) Temple Café and Restaurant (NHLE 1331149)	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) (2019); South Cambridgeshire and City of Cambridge Local Plan (2018).	Grade II listed buildings are of medium national significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II listed buildings total 92% of all listed buildings and though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level.	No impact
Survival	Assumed good survival	Grade II listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II listed buildings are inherently of medium national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 18th/19th buildings tend to survive better than earlier structures due to changes in construction and fabric, particularly the wider availability of brick. This contributes to the structures' good survival.	No impact
Condition	The structures are assumed to be in generally good condition,	The good condition of the assets contributes to their grade II listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their medium national significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 17th to 19th century buildings tend to survive in better condition than earlier structures due to changes in construction and fabric during the period, particularly the wider availability of brick.	No impact
Complexity	The monument is a farily simple single phase structure. The other assets have been subject to later alterations and additions.	The limited complexity of these structures contributes to their grade II listed status.	The limited complexity of these structures contributes to their significance and grade II listed status.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. The majority of these structures are of limited complexity and are therefore not particularly rare but are good examples of particular architectural practices.	No impact
Context	The monument is located in a small woodland (Nine Wells Wood) at the source of Hobsons Conduit. The dovecote is located on the edge of the Granhams Farm complex. The farm has seen many modern alterations but retains its post medieval agricultural character. The farm complex sits on a large moated site which may have earlier foundations. Stapleford Hall, is located within an area of Stapleford Village, which has seen modern residential development. Church Farmhouse is located within an enclosed tree lined garden, adjacent to Babraham Hall's park tree lined avenue. Temple Cafe is set back from the Newmarket Road/Bourn Bridge Junction. The cafe was located at this point to pick up trade using the historic Newmarket Road routeway.	The preservation of the context of these buildings contributes to their national importance and Grade II listed status.	The preservation of the context of these buildings contributes to their medium national significance.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	No impact.
Period	All the assets are 19th century in dates except Stapeford Hall, which is 17th/18th century.	The period the structures were built identifies them as nationally important.	The age of the structures identifies them as of medium national significance. They were likely selected as they are good examples of that period and building type.	The majority of grade II listed buildings date to this broad period, within this category they are therefore not rare. However, buildings of this date comprise a generally small percentage nationwide.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

No impact.

Qualitative Comments

The identified assets are either to far away or are screened by existing vegitation/development.

TAG Historic Environment Impacts Worksheet - Pink option - Registered Parks and Gardens

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one Grade II* Registered Park and Garden located 250m south of the proposed option. Pampisford Hall (NHLE 1000321) is a mid 19th century pleasure ground, arboretum and the remains of a formal garden, laid out from 1840 onwards to original designs by R Marnock.	Designated asset, nationally important. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (NPPF) 2019; South Cambridgshire District Council Local Plan (2018); City of Cambridge Local Plan (2018).	Grade II* registered parks and gardens are of high national significance.	Grade II* registered parks and gardens are all rare. the form of the asset is unique.	No impact.
Survival	Good survival.	Registered parks and gardens are nationally important areas, their level of survival contributes to their listing status and therefore their national importance.	Grade II* registered parks and gardens are inherently of high national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II* registered parks and gardens are all rare, and the majority do not have all their historic features surviving fully.	No impact.
Condition	The registered park and garden is not included in the Historic England Heritage at Risk Register.The registered park and garden is assumed to be in good condition.	The good condition of the asset contributes to its listing and its national importance.	The condition of the asset contributes to its registered status and therefore to their high significance.	It is not rare for a registered historic park and garden of this date to be in good condition, as they often remain well-managed.	No impact.
Complexity	Registered parks and gardens are often fairly complex heritage assets, displaying evidence of several phases of park creation and alteration.	The complexity of the area contributes to its registered status.	The complexity of the park contributes to its registered status.	The complexity of the park adds to its significance.	No impact.
Context	It is situated within its original context, with later alterations.	The preservation of the context of the registered park and garden contributes to its national importance.	The preservation of the context of the registered park and garden contributes to its high national significance.	The rarity of the registered parks and gardens context adds to its value.	No impact. The park is separated from the scheme by the A505. A busy road is located close to the parkland. The road is tree-lined in the area closest to the scheme.
Period	The pleasure garden, walled garden, arborituim and the remains of the formal garden date to the mid 19th century (1840s onwards), with some later alterations.	The age of the registered park and garden contributes to its value.	The age of the registered park and garden contributes to its significance.	There are nationally a number of registered parks and gardens of this period.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Neutral

Qualitative Comments

It is considered that there will be no impact on the Grade II* registered park and garden.

TAG Historic Environment Impacts Worksheet - Pink option - Scheduled Monument

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one scheduled monument within 500m of the proposed scheme. Cropmark site west of White Hill Farm, Great Shelford (NHLE 1006891). The cropmarks have been interpreted as representing an Iron Age/Roman settlement. The scheduled monument is located on the other side of the railway line to the proposed option (approx 25m).	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): City of Cambridge Local Plan (2018).	Scheduled monuments are of national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. The form of the Iron Age/Roman settlement cropmarks appears to follow the antcipated pattern, however localised alteratations to the form of the settlement might be present which would increase the rarity of the asset.	No impact. The asset is separated from the option by the railway line.
Survival	The cropmark evidence suggest good survival. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The good survival level of the asset contributes to its significance.	Roman settlements and Iron Age settlement sites with good levels of survival are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.
Condition	The cropmark evidence suggest good condition. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled Monument of national significance. Condition of monument makes a significant contribution to the evidential value of the asset.	Roman settlements and Iron Age settlement sites in apparent good condition are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.
Complexity	The cropmark evidence indicates that the site has a significant level of complexity, which is not unusal for Iron Age/Roman settlement site.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The complexity of the monument adds value because of the evidence it provides for past cultures and land use.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monument increases its rarity.	No impact. The asset is separated from the option by the railway line.
Context	The asset is part of a wider landscape of Iron Age/Roman of land divison, agricultural activity and occupation. Settlements from this period are not uncommon in Cambridgshire.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The relationship with the landscape is essential to the understanding of the monument and its history and therefore of high significance.	Roman settlements and Iron Age settlement sites are not uncommon in similar contexts in Cambridgeshire.	Slight impact. Associated remains may extend into the option corridor.
Period	Iron Age/Roman settlement. Earlier and later activity evidence may also be present.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The age of the asset contributes to its national significance	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse negative effect on context, otherwise neutral.

Qualitative Comments

construction of the scheme and the settings are unlikely to be harmed. However, there is potential for construction activities to impact associated archaeological remains, as the archaeological remains form pa

TAG Historic Environment Impacts Worksheet - Black option - Buried Archaeology

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	A provisional search of the Cambridgeshire County Council Historic Environment Record (CHER) data has been undertaken. There are 35 archaeological assets recorded within 100m of the option. A single sherd of Roman grey course ware (CHER 04791) and a post medieval clay pipe (CHER 04791A), 62m south of the option at Great Shelford. A findspot for a Neolithic polished axe (CHER 04886), 50m south of the option at Great Shelford. A prehistoric ring ditch and associated prehistoric worked flints (CHER04894), have been recorded to the south of the option at Granhams Farm. Prehistoric flint flake (CHER 06323), north of the option near Church Farm Babraham. Mesolithic and Neolthic activity (CHER 11317), a Bronze Age ditch monument (CHER 11317A), the findspot of a Palaeolithic handaxe (CHER 11317B), a Late Iron Age/Roman field system (CHER 11317C), A Roman settlement and droveway (CHER 11317D), Saxon settlement (CHER 13044), Saxon find (CHER CB14745), recorded during investigations for a borrow pit at Bourn Bridge on the southern edge of the proposed park and ride site. A flint blade and waste flake (CHER CB14748), was recovered 90m to the east of the option at Bourn Bridge. An archaeological evaluation at Granhams Farm, identified evidence of Neolithic to Bronze Age activity (CHER CB15541), in the area of the option. A cluster of worked flint found in the area of the option at Granhams Farm (CHER MCB16140). Saxon artefacts (CHER MCB17799) have been recovered from the southern area of the proposed park and ride at Bourn Bridge. A former post medieval cut channel ran through the park and ride option at Bourn Bridge (MCB 15995). At the northern end of the option at Addenbrookes, archaeological investigations have identified: an early Roman field system and kiln (CHER MCB26679; Iron Age/Roman enclosures (CHER 08339); late prehistoric pits, Late Bronze Age/Early Iron Age ring ditches, Late Neolithic/Early Bronze Age pit cluster, Iron Age well, Late Iron Age enclosure which was recut during the Early Roman period and Early Roman, post holes, beam slots ditches and a midden (CHER MCB19991); and a Roman ditch (CHER MCB20378). Further significant archaeology covering the late prehistoric to medieval periods have been investigated in the wider Addenbrookes development area. The northern end of the option runs parallel to the Cambridge/ West Anglian Main Line (CHER MCB24402), which was opened in 1845. Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865. The option will bisect the disused Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848. The option crosses the former route of a Roman road (CHER MCB26667), which followed the alignment of current Newmarket Street. The option crosses a group of round barrows (CHER 09356a, 09356) and prehistoric ditches (CHER 09356b, 09356d) identified from air photos and archaeological investigations at Fourwentways. In addition the option crosses the channel that connects Nine Wells springs to Hobson Conduit. There is potential for previously unrecorded archaeological remains to be recorded within the scheme footprint. These could be associated with the archaeological sites referenced above, or they could represent previously unknown archaeological sites.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be low to moderate. However, there is potential for remains associated with the scheduled White Hill Farm complex (NHLE 100689) and the highly significant Granham Farm moat/Saxon burh (CHER 3918) to be located within the option footprint. Hobsons Conduit and the Nine Well Springs are potentially of national significance.	It is not rare within rural England to encounter archaeological remains associated with the former landscape.	The archaeological remains within the scheme footprint at Addenbrookes and Bourn Bridge have already been removed by development. However, the construction of the option would impact archaeological remains associated with the identified assets and there remains the potential for further previously unidentified remains. The potential impact is major adverse.
Survival	Unknown - where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unknown degree dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive well then they have the potential to be local to national significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-	Where archaeological remains survive there would be a major adverse impact through the construction of the proposed option.
Condition	Unknown. Where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unkown degree dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive in good condition then they have the potential to be local to national significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-	Where archaeological remains survive there would be a major adverse impact.
Complexity	Unknown - Should remains be present they will likely be moderately complex as they lie within a rich archaeological landscape which shows evidence of activity and settlement since the prehistoric period.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Unknown. Should archaeological remains survive their complexity will contribute to their significance.	Moderately complex archaeological remains are not rare within the agricultural landscape.	Major adverse impact - the complexity of any surviving remains would be affected by their removal or disturbance throught the construction of
Context	There is a known pattern of late prehistoric/Roman occupation/settlement across the wider area, with settlement usually occuring every 400m. The medieval/post medieval occupation focus of the area shifted towards the villages and farmsteads (some moated).	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	The context of any archaeological remains will contribute to their significance.	Buried archaeological remains generally do not survive in an undisturbed original context. Should they be found to survive in their original context then this would contribute to their significance.	Moderate adverse impact on the context. The wider context of the archaeological pattern would survive but would be impacted through visual and aural alterations to the setting of the landscape during construction and
Period	Unknown - likely prehistoric to modern.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Undesignated asset. Unknown. Prehistoric/Roman remains of good quality would be of particular significance.	It is not rare to encounter archaeological remains.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire County Council Historic Environment Record;
https://archaeologydataservice.ac.uk/

Step 5 - Summary Assessment

Score

Major impact on a medium/high value asset during construction resulting in a large adverse effect

Qualitative Comments

In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present they would be removed by necessary excavations. There are known archaeological remains of regional (and potentially national) significance within the footprint of the proposed option.

TAG Historic Environment Impacts Worksheet- Black option - Conservation Area

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are three conservation areas within 500m of the scheme. Stapleford Conservation Area, 500m to the south of the option. Babraham Conservation Area, 425m to the north and west of the option. Great and Little Abington Conservation Area, 220m south-east of the most easterly proposed park and ride option.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990; National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Conservation areas are considered to be of medium significance. The form of each conservation area is unique and reflects a unique set of circumstances resulting in the development of the area into one that warrants special protection.	Each conservation area is unique and as such, the assets are very rare.	No impact.
Survival	The conservation areas survive in good condition.	Conservation areas are nationally important, their level of survival contributes to their significance and therefore their national importance.	The survival of the conservation areas contributes to their high significance.	The survival of the assets contributes to their rarity.	No impact
Condition	The conservation areas are in good condition.	The good condition of the assets contributes to their high national importance.	The condition of the assets contributes to their high significance.	The condition of the assets contributes to their rarity.	No impact
Complexity	The assets are complex as they incorporate a variety of structures built over a number of years. Stapleford Conservation Area represents the historic core of of the village. Babraham Conservation Area includes the historic core of the village and the former 19th century parkland of the Grade II Babraham Hall (NHLE 1127745). Great and Little Abington Conservation Area includes the historic core of the two villages and the surviving parkland around Abington Hall (NHLE 1127722).	The complexity of the assets contributes to their national importance.	The complexity of the assets contributes to their high significance.	The complexity of the assets contributes to their rarity.	No impact
Context	The Stapleford Conservation Area is surrounded by modern development but retains some of its earlier context. The village core of Babraham retains much of its historic context and has been subject to very little modern development, in and around the village. However, the parkland around the Hall has seen development in the late 20th early 21st century with the development of a business/science park. However, the main tree lined avenue, which runs south of the park remains intact and in good condition. The area around the conservation is still in agricultural use. The cores of Great and Little Abington retain much of their historic context. Modern infilling is present in the areas outside the conservation area. Much of the parkland of Abington Hall retains its original context, with some change of use in parts (local recreation area and what appears to be a covered reservoir) and some modern development in the south-western part of the parkland, not included within the conservation area. The parkland surrounding Abington Lodge (NHLE 1127710) also retains much of its original context adjacent to the A1307.	The preservation of the context of the assets contributes to their national importance.	The context of the assets contributes to their significance.	The context of the assets contributes to their rarity.	There will be no impact on the context of Stapleford Conservation Area or Great and Little Abington Conservation Area. There is potential for an impact on the view from the Hall along the avenue, from the movement of vehicles along the proposed scheme. This impact may reduced by mitigation planting.
Period	Babraham and Stapleford village halls date to the medieval period (archaeological remains from an earlier date have been recorded within both conservation areas). The former parkland within the Babraham conservation area dates to the mid-19th century, although the hall has earlier origins. Buildings within Great and Little Abington Conservation Area range in date from the 11th century onwards. Abington Hall date to 1711-1713 and the grounds were laid out by Humprhy Reption c. 1800.	The age of the assets identifies them as important.	The age of the assets contributes to their significance.	It is not unusual for conservation areas to be dated to these periods.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse effect on Babraham.
Neutral on Stapleford and Great and Little Abington.

Qualitative Comments

The operational movement of vehicles along the scheme may impact on the key view out of the conservation area from Babraham Hall.

TAG Historic Environment Impacts Worksheet- Black option - Listed Building Grade II*

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one grade II* listed building situated within 500m of the option. Middlefield House and Garden Wall (NHLE 1317370), 450m north of the North of the option.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plans 2018.	Grade II* listed buildings are of high significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II* listed buildings total 5.5% of all listed buildings. They are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Survival	Assumed good survival.	Grade II* listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II* listed buildings are inherently of high significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Condition	Assumed good condition.	The good condition of the assets contributes to their grade II* listing and its national importance.	The condition of the assets contributes to their listed status and therefore to their high significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. It is unusual to find buildings of this age in good condition, therefore their condition contributes to their rarity.	No impact.
Complexity	House, 1908 by Edward Lutyens for the legal scholar Henry Bond. The red-brick house is characterised by a symmetrical frontage, three large chimney blocks, and large tiled hipped roofs with low flanking eaves.	The complexity of the structures contributes to their grade II* listed status.	The complexity of the structures contributes to their grade II* listed status. The majority of grade II* structures are of limited complexity but are good examples of particular architectural and aesthetic practices.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. The complexity of the structures adds to their rarity and therefore contributes to their overall importance.	No impact.
Context	The house and garden are located on the south facing side of Fox Hill. Surrounded by woodland on three sides, with a view south west along a modern avenue across the River Granta/Cam valley. The house was partly listed due to its assocaition with its architect Edwin Lutyns. A well known early 20th century architect, known for designing New Dehli and the Cenetaph in London.	The preservation of the context of the asset contributes to its national importance.	The preservation of the context of the asset contributes to its national importance due to the retained, largely unchanged, immediate surroundings.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	Slight impact through alterations to the asset's context. The option may be visible from the asset along the avenue. The crossing of the Granta is likely to be visible from the asset. The operational movement of vehicles may also be visible.
Period	Dated to 1908	The nature of the stuctures rather than the age of the structures identifies them as nationally important.	The nature of the stuctures rather than there age of the structures identifies them as nationally important.	The age of the asset does not add to its importance.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight Adverse Effect.

Qualitative Comments

There is potential for the constructed option to be visible from the asset. The option will be some distance away, but the development will have the effect of slightly urbanising the rural view from the asset. This would alter the seting of the asset and would therefore impact the asset. The operational movement may also be visible (but at some distance) from the asset.

TAG Historic Environment Impacts Worksheet- Black option - Listed Building Grade II

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are five Grade II listed buildings with 500m of the option: Nine Well Monument (NHLE 1127825), Dovecote at Granhams Farm (NHLE 133068) Stapleford Hall (NHLE 1331071) Church Farmhouse (NHLE 1331134) Temple Café and Restaurant (NHLE 1331149)	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) (2019); South Cambridgeshire and City of Cambridge Local Plan (2018).	Grade II listed buildings are of medium national significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II listed buildings total 92% of all listed buildings and though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level.	No impact
Survival	Assumed good survival	Grade II listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II listed buildings are inherently of medium national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 18th/19th buildings tend to survive better than earlier structures due to changes in construction and fabric, particularly the wider availability of brick. This contributes to the structures' good survival.	No impact
Condition	The structures are assumed to be in generally good condition,	The good condition of the assets contributes to their grade II listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their medium national significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 17th to 19th century buildings tend to survive in better condition than earlier structures due to changes in construction and fabric during the period, particularly the wider availability of brick.	No impact
Complexity	The Nine Well Monument is a farily simple single phase structure. The other assets have been subject to later alterations and additions.	The limited complexity of these structures contributes to their grade II listed status.	The limited complexity of these structures contributes to their significance and grade II listed status.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. The majority of these structures are of limited complexity and are therefore not particularly rare but are good examples of particular architectural practices.	No impact
Context	The monument is located in a small woodland (Nine Wells Wood) at the source of Hobsons Conduit. The dovecote is located on the edge of the Granhams Farm complex. The farm has seen many modern alterations but retains its post medieval agricultural character. The farm complex sits on a large moated site which may have earlier foundations. Stapleford Hall is located within an area of Stapleford Village, which has seen modern residential development. Church Farmhouse is located within an enclosed tree lined garden, adjacent to Babraham Hall's park and tree lined avenue. Temple Cafe is set back from the Newmarket Road/Bourn Bridge Junction. The cafe was located at this point to pick up trade using the historic Newmarket Road routeway.	The preservation of the context of these buildings contributes to their national importance and Grade II listed status.	The preservation of the context of these buildings contributes to their medium national significance.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	No impact.
Period	All the assets are 19th century in date except Stapleford Hall, which is 17th/18th century.	The period the structures were built identifies them as nationally important.	The age of the structures identifies them as of medium national significance. They were likely selected as they are good examples of that period and building type.	The majority of grade II listed buildings date to this broad period, within this category they are therefore not rare. However, buildings of this date comprise a generally small percentage nationwide.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

No impact.

Qualitative Comments

The identified assets are either to far away or are screened by existing vegitation/development.

TAG Historic Environment Impacts Worksheet- Black option - Registered Parks and Gardens

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one Grade II* Registered Park and Garden located 250m south of the proposed option. Pampisford Hall (NHLE 1000321) is a mid 19th century pleasure ground, arboretum and the remains of a formal garden, laid out from 1840 onwards to original designs by R Marnock.	Designated asset, nationally important. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (NPPF) 2019; South Cambridgshire District Council Local Plan (2018); City of Cambridge Local Plan (2018).	Grade II* registered parks and gardens are of high national significance.	Grade II* registered parks and gardens are all rare; the form of the asset is unique.	No impact.
Survival	Good survival.	Registered parks and gardens are nationally important areas, their level of survival contributes to their listing status and therefore their national importance.	Grade II* registered parks and gardens are inherently of high national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II* registered parks and gardens are all rare, and the majority do not have all their historic features surviving fully.	No impact.
Condition	The registered park and garden is not included in the Historic England Heritage at Risk Register.The registered park and garden is assumed to be in good condition.	The good condition of the asset contributes to its listing and its national importance.	The condition of the asset contributes to its registered status and therefore to its high significance.	It is not rare for a registered historic park and garden of this date to be in good condition, as they often remain well-managed.	No impact.
Complexity	Registered parks and gardens are often fairly complex heritage assets, displaying evidence of several phases of park creation and alteration.	The complexity of the asset contributes to its registered status.	The complexity of the park contributes to its registered status.	The complexity of the park adds to its significance.	No impact.
Context	It is situated within its original context, with later alterations.	The preservation of the context of the registered park and garden contributes to its national importance.	The preservation of the context of the registered park and garden contributes to its high national significance.	The rarity of the registered parks and gardens context adds to its value.	No impact. The park is separated from the scheme by the A505. A busy road is located close to the parkland. The road is tree-lined in the area closest to the scheme.
Period	The pleasure garden, walled garden, arborituim and the remains of the formal garden date to the mid 19th century (1840s onwards), with some later alterations.	The age of the registered park and garden contributes to its value.	The age of the registered park and garden contributes to its significance.	There are nationally a number of registered parks and gardens of this period.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Neutral

Qualitative Comments

It is considered that there will be no impact on the Grade II* registered park and garden.

TAG Historic Environment Impacts Worksheet - Black option- Scheduled Monument

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one scheduled monument within 500m of the proposed scheme. Cropmark site west of White Hill Farm, Great Shelford (NHLE 1006891). The cropmarks have been interpreted as representing an Iron Age/Roman settlement. The scheduled monument is located on the other side of the railway line to the proposed option (approx 25m).	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): City of Cambridge Local Plan (2018).	Scheduled monuments are of national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. The form of the Iron Age/Roman settlement cropmarks appears to follow the antcipated pattern, however localised alteratations to the form of the settlement might be present which would increase the rarity of the asset.	No impact. The asset is separated from the option by the railway line.
Survival	The cropmark evidence suggests good survival. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The good survival level of the asset contributes to its significance.	Roman settlements and Iron Age settlement sites with good levels of survival are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.
Condition	The cropmark evidence suggests the remains within the asset are in a good condition. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. Condition of monument makes a significant contribution to the evidential value of the asset.	Roman settlements and Iron Age settlement sites in good condition are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.
Complexity	The cropmark evidence indicates that the site has a significant level of complexity, which is not unusal for an Iron Age/Roman settlement site.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The complexity of the monument adds value because of the evidence it provides for past cultures and land use.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monument increases its rarity.	No impact. The asset is separated from the option by the railway line.
Context	The asset is part of a wider landscape of Iron Age/Roman land divison, agricultural activity and occupation. Settlements from this period are not uncommon in Cambridgeshire.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The relationship with the landscape is essential to the understanding of the monument and its history and therefore of high significance.	Roman settlements and Iron Age settlement sites are not uncommon in similar contexts throughout Cambridgeshire.	Slight impact. Associated remains may extend into the option corridor.
Period	Iron Age/Roman settlement. Earlier and later activity evidence may also be present.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The age of the asset contributes to its national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse negative effect

Qualitative Comments

e construction of the scheme and the setting is unlikely to be harmed. However, there is potential for construction activities to impact associated archaeological remains, as the archaeological remains form part

TAG Historic Environment Impacts Worksheet- Blue option - Buried Archaeology

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	A provisional search of the Cambridgeshire County Council Historic Environment Record (CHER) data has been undertaken. There are 22 archaeological assets recorded within 100m of the option. A single sherd of Roman grey course ware (CHER 04791) and a post medieval clay pipe (CHER 04791A), 62m south of the option at Great Shelford. A findspot for a Neolithic polished axe (CHER 04886), 50m south of the option at Great Shelford. A prehistoric ring ditch and associated prehistoric worked flints (CHER04894), have been recorded to the south of the option at Granhams Farm. Prehistoric flint flake (CHER 06323), north of the option near Church Farm Babraham. A flint blade and waste flake (CHER CB14748), was recovered 90m to the east of the option at Bourn Bridge. An archaeological evaluation at Granhams Farm, identified evidence of Neolithic to Bronze Age activity (CHER CB15541), in the area of the option. A cluster of worked flint found in the area of the option at Granhams Farm (CHER MCB16140). A former post medieval cut channel runs through the option near Bourn Bridge (MCB 15995). At the northern end of the option at Addenbrookes, archaeological investigations have identified: an early Roman field system and kiln (CHER MCB26679; Iron Age/Roman enclosures (CHER 08339); late prehistoric pits, Late Bronze Age/Early Iron Age ring ditches, Late Neolithic/Early Bronze Age pit cluster, Iron Age well, Late Iron Age enclosure which was recut during the Early Roman period and Early Roman, post holes, beam slots ditches and a midden (CHER MCB19991); and a Roman ditch (CHER MCB20378). Further significant archaeology covering the late prehistoric to medieval periods has been investigated in the wider Addenbrookes development area. The northern end of the option runs parallel to the Cambridge/ West Anglian Main Line (CHER MCB24402), which was opened in 1845. Between Stapleford and Bourn Bridge the option runs parallel to the disused Sawston - Haverhill Line (CHER 06326), which opened in 1865. The option will bisect the disused Chesterfield - Newmarket Railway (CHER 06327), which opened in 1848. The option crosses the former route of a Roman road (CHER MCB26667), which followed the alignment of current Newmarket Street. The option crosses a group of round barrows (CHER 09356a, 09356) and prehistoric ditches (CHER 09356b, 09356d) identified from air photos and archaeological investigations at Fourwentways. The option crossess over an area of cropmarks to the south west of Babraham which indicates the presence of enclosures (CHER 09353). In addition the option crosses the channel that connects Nine Wells springs to Hobson Conduit. There is potential for previously unrecorded archaeological remains to be recorded within the scheme footprint. These could be associated with the archaeological sites referenced above, or they could represent previously unknown archaeological sites.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	The predicted significance of the potential remains is considered to be low to moderate. However, there is potential for remains associated with the scheduled White Hill Farm complex (NHLE 100689) and the highly significant Granham Farm moat/Saxon burh (CHER 3918) to be located within the option footprint. Hobsons Conduit and the Nine Well Springs are potentially of national significance.	It is not rare within rural England to encounter archaeological remains associated with the former landscape.	The archaeological remains within the scheme footprint at Addenbrookes have already been removed by development. However, the option will impact archaeological remains associated with the identified assets and there remains the potential for further previously unidentified remains. The potential impact is major adverse.
Survival	Unknown - where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unknown degree dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive well then they have the potential to be local to national significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-	Where archaeological remains survive there would be a major adverse impact through the construction of the proposed option.
Condition	Unknown. Where the proposed option is located at Addenbrookes, the below ground remains will have been removed. It is probable that the majority of the previously undeveloped landtake will have been ploughed which is likely to have disturbed archaeological remains to an unkown degree dependent upon the depth of the remains and the depth of the plough.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Should archaeological remains survive in good condition then they have the potential to be local to national significant.	Undisturbed archaeological remains are extremely rare. It is likely that any remains within the footprint of the proposed option would have been subjected to a limited degree of disturbance through use of plough machinery. It is not rare for archaeological remains to be plough-	Where archaeological remains survive there would be a major adverse impact through the construction of the proposed option.
Complexity	Unknown - Should remains be present they will likely be moderately complex as they lie within a rich archaeological landscape which shows evidence of activity and settlement since the prehistoric period.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Unknown. Should archaeological remains survive their complexity will contribute to their significance.	Moderately complex archaeological remains are not rare within the agricultural landscape.	Major adverse impact - the complexity of any surviving remains will be affected by their removal or disturbance throught the construction of
Context	There is a known pattern of late prehistoric/Roman occupation/settlement across the wider area, with settlment usually occuring every 400m. The medieval/post medieval occupation focus of the area shifted towards the villages and farmsteads (some moated).	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	The context of any archaeological remains will contribute to their significance.	Buried archaeological remains generally do not survive in an undisturbed original context. Should they be found to survive in their original context then they this will contribute to their significance.	Moderate adverse impact on the context. The wider context of the archaeological pattern would survive but would be impacted through visual and aural alterations to the setting of the landscape during construction and
Period	Unknown - likely prehistoric to modern.	Non-designated asset, regionally important, with potential for previously unrecorded archaeological remains to be of national significance. Relevant planning policy includes: National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plan (2018).	Undesignated asset. Unknown. Prehistoric/Roman remains of good quality would be of particular significance.	It is not rare to encounter archaeological remains.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire County Council Historic Environment Record;

Step 5 - Summary Assessment
Score

Major impact on a medium/high value asset during construction resulting in a large adverse effect

Qualitative Comments

In summary a major adverse impact is predicted to unknown archaeological remains within the proposed option area through the construction of the option. Where remains are present they will be removed by necessary excavations. There are known archaeological remains of regional (and pottentialy national) significance within the footprint of the proposed option.

TAG Historic Environment Impacts Worksheet- Blue option - Conservation Area

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are three conservation areas within 500m of the scheme. Stapleford Conservation Area, 500m to the south of the option. Babraham Conservation Area, 425m to the north and west of the option. Great and Little Abington Conservation Area, 220m south-east of the most easterly proposed park and ride option.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2018, National Policy Statement for National Networks (NPSNN) 2014; South Cambridgeshire and City of Cambridge Local Plan (2018).	Conservation areas are considered to be of high significance. The form of each conservation area is unique and reflects a unique set of circumstances resulting in the development of the area into one that warrants special protection.	Each conservation area is unique and as such, the assets are very rare.	No impact.
Survival	The conservation areas survive in good condition.	Conservation areas are nationally important, their level of survival contributes to their significance and therefore their national importance.	The survival of the conservation areas contributes to their high significance.	The survival of the assets contributes to their rarity.	No impact
Condition	The conservation areas are in good condition.	The good condition of the assets contributes to their high national importance.	The condition of the assets contributes to their high significance.	The condition of the assets contributes to their rarity.	No impact
Complexity	The assets are complex as they incorporate a variety of structures built over a number of years. Stapleford Conservation Area represents the historic core of of the village. Babraham Conservation Area includes the historic core of the village and the former 19th century parkland of the Grade II Babraham Hall (NHLE 1127745). Great and Little Abington Conservation Area includes the historic core of the two villages	The complexity of the assets contributes to their national importance.	The complexity of the assets contributes to their high significance.	The complexity of the assets contributes to their rarity.	No impact
Context	The Stapleford Conservation Area is surrounded by modern development but retains some of its earlier context. The village core of Babraham retains much of its historic context and has been subject to very little modern development, in and around the village. However, the parkland around the Hall has seen development in the late 20th early 21st century with the development of a business/science park. However, the main tree lined avenue, which runs south of the park remains intact and in good condition. The area around the conservation is still in agricultural use. The cores of Great and Little Abington retain much of their historic context. Modern infilling is present in the areas outside the conservation area. Much of the parkland of Abington Hall retains its original context, with some change of use in parts (local recreation area and what appears to be a covered reservoir) and some modern development in the south-western part of the parkland, not included within the conservation area. The parkland surrounding Abington Lodge (NHLE 1127710) also retains much of its original context adjacent to the A1307.	The preservation of the context of the assets contributes to their national importance.	The context of the assets contributes to their significance.	The context of the assets contributes to their rarity.	There will be no impact on the context of Stapleford Conservation Area or Great and Little Abington Conservation Area. There is potential for an impact on the view from the Hall along the avenue, from the movement of vehicles along the proposed scheme. This impact may reduced by mitigation planting.
Period	Babraham and Stapleford village halls date to the medieval period (archaeological remains from an earlier date have been recorded within both conservation areas). The former parkland within the Babraham conservation area dates to the mid-19th century, although the hall has earlier origins. Buildings within Great and Little Abington Conservation Area range in date from the 11th century onwards. Abington Hall date to 1711-1713 and the grounds were laid out by Humprhy Reption c. 1800.	The age of the assets identifies them as important.	The age of the assets contributes to their significance.	It is not unusual for conservation areas to be dated to these periods.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse effect on Babraham.
Neutral on Stapleford.

Qualitative Comments

The operation movement of vehicles along the scheme, may impact on the key view out of the conservation area from Babraham Hall.

TAG Historic Environment Impacts Worksheet - Blue option - Listed Building Grade II*

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one grade II* listed building situated within 500m of the option. Middlefield House and Garden Wall (NHLE 1317370), 450m north of the North of the option.	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) 2019; South Cambridgeshire and City of Cambridge Local Plans 2018.	Grade II* listed buildings are of high significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II* listed buildings total 5.5% of all listed buildings. They are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Survival	Assumed good survival.	Grade II* listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II* listed buildings are inherently of high significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level.	No impact.
Condition	Assumed good condition.	The good condition of the asset contributes to its grade II* listing and its national importance.	The condition of the asset contributes to its listed status and therefore to its high significance.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. It is unusual to find buildings of this age in good condition, therefore good condition would contribute to its rarity.	No impact.
Complexity	House, 1908 by Edward Lutyens for the legal scholar Henry Bond. The red-brick house is characterised by a symmetrical frontage, three large chimney blocks, and large tiled hipped roofs with low flanking eaves. Is the wall contemporary?	The complexity of the structures contributes to their grade II* listed status.	The complexity of the structures contributes to their grade II* listed status. The majority of grade II* structures are of limited complexity but are good examples of particular architectural and aesthetic practices.	Grade II* listed buildings total 5.5% of all listed buildings and are rare within the listing categories of the entire building stock of England and Wales, and are therefore rare at a national level. The complexity of the structures adds to their rarity and therefore contributes to their overall importance.	No impact.
Context	The house and garden are located on the south facing side of Fox Hill. Surrounded by woodland on three sides, with a view south west along a modern avenue across the River Granta/Cam valley. The house was partly listed due to its assocaition with its architect Edwin Lutyns. A well known early 20th century architect, known for designing New Dehli and the Cenetaph in London.	The preservation of the context of the asset contributes to its national importance.	The preservation of the context of the asset contributes to its national importance due to the retained, largely unchanged, immediate surroundings.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	Slight impact through alterations to the asset's context. The option may be visible from the asset along the avenue. The crossing of the Granta is likely to be visible from the asset. The operational movement of vehicles may also be visible.
Period	1908	The nature of the stuctures rather than there age of the structures identifies them as nationally important.	The nature of the stuctures rather than there age of the structures identifies them as nationally important.	The age of the asset does not add to its importance.	No impact.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight Adverse Effect.

Qualitative Comments

There is potential for the constructed option to be visible from the asset. The option will be some distance away, but the development will have the effect of slightly urbanising the rural view from the asset. This would alter the seting of the asset and would therefore impact the asset. The operational movement may also be visible (but at some distance) from the asset.

TAG Historic Environment Impacts Worksheet- Blue option - Grade II

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There are five Grade II listed buildings with 500m of the option: Nine Well Monument (NHLE 1127825), Dovecote at Granhams Farm (NHLE 133068) Stapleford Hall (NHLE 1331071) Church Farmhouse (NHLE 1331134) Temple Café and Restaurant (NHLE 1331149)	Designated asset, nationally important. Relevant legislation and planning policy includes: Planning (Listed Buildings and Conservation Areas) Act 1990 ; National Planning Policy Framework (NPPF) (2019); South Cambridgeshire and City of Cambridge Local Plan (2018)	Grade II listed buildings are of medium national significance. Each asset is significant for its aesthetic, historic and evidential value.	Grade II listed buildings total 92% of all listed buildings and though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level.	No impact
Survival	Assumed good survival	Grade II listed buildings are nationally important structures, their level of survival contributes to their listing status and therefore their national importance.	Grade II listed buildings are inherently of medium national significance. The levels at which they survive determine their listing status and contribute to their significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 18th/19th buildings tend to survive better than earlier structures due to changes in construction and fabric, particularly the wider availability of brick. This contributes to the structures' good survival.	No impact
Condition	The structures are assumed to be in generally good condition,	The good condition of the assets contributes to their grade II listing and their national importance.	The condition of the assets contributes to their listed status and therefore to their medium national significance.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. 17th to 19th century buildings tend to survive in better condition than earlier structures due to changes in construction and fabric during the period, particularly the wider availability of brick.	No impact
Complexity	The Nine Well Monument is a farily simple single phase structure. The other assets have been subject to later alterations and additions.	The limited complexity of these structures contributes to their grade II listed status.	The limited complexity of these structures contributes to their significance and grade II listed status.	Grade II listed buildings total 92% of all listed buildings. Though not rare within the listing categories, they make up a small percentage of the entire building stock of England and Wales, and are therefore moderately rare at a national level. The majority of these structures are of limited complexity and are therefore not particularly rare but are good examples of particular architectural practices.	No impact
Context	The monument is located in a small woodland (Nine Wells Wood) at the source of Hobsons Conduit. The dovecote is located on the edge of the Granhams Farm complex. The farm has seen many modern alterations but retains its post medieval agricultural character. The farm complex sits on a large moated site which may have earlier foundations. Stapleford Hall, is located within an area of Stapleford Village, which has seen modern residential development. Church Farmhouse is located within an enclosed tree lined garden, adjacent to Babraham Hall's park tree lined avenue. Temple Cafe is set back from the Newmarket Road/Bourn Bridge Junction. The cafe was located at this point to pick up trade using the historic Newmarket Road routeway.	The preservation of the context of these buildings contributes to their national importance and Grade II listed status.	The preservation of the context of these buildings contributes to their medium national significance.	It is not rare for surviving buildings of this date to be set within their original context. However their contexts are gradually being eroded with modern development.	No impact.
Period	All the assets are 19th century in dates except Stapleford Hall, which is 17th/18th century.	The period the structures were built identifies them as nationally important.	The age of the structures identifies them as of medium national significance. They were likely selected as they are good examples of that period and building type.	The majority of grade II listed buildings date to this broad period, within this category they are therefore not rare. However, buildings of this date comprise a generally small percentage nationwide.	No impact

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

No impact.

Qualitative Comments

The identified assets are either to far away or are screened by existing vegitation/development.

TAG Historic Environment Impacts Worksheet- Blue option - Scheduled Monument

Step 2		Step 3			Step 4
Feature	**Description**	**Scale it matters**	**Significance**	**Rarity**	**Impact**
Form	There is one scheduled monument within 500m of the proposed scheme. Cropmark site west of White Hill Farm, Great Shelford (NHLE 1006891). The cropmarks have been interpreted as representing an Iron Age/Roman settlement. The scheduled monument is located on the other side of the railway line to the proposed option (approx 25m).	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): City of Cambridge Local Plan (2018).	Scheduled monuments are of national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. The form of the Iron Age/Roman settlement cropmarks appears to follow the antcipated pattern, however localised alteratations to the form of the settlement might be present which would increase the rarity of the asset.	No impact. The asset is separated from the option by the railway line.
Survival	The cropmark evidence suggests good survival. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The good survival level of the asset contributes to its significance.	Roman settlements and Iron Age settlement sites with good levels of survival are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.
Condition	The cropmark evidence suggest good condition. However, modern agricultural activity (ploughing) will have had an impact on the asset.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2018); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. Condition of monument makes a significant contribution to the evidential value of the asset.	Roman settlements and Iron Age settlement sites in good condition are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.
Complexity	The cropmark evidence indicates that the site has a significant level of complexity, which is not unusal for an Iron Age/Roman settlement site.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The complexity of the monument adds value because of the evidence it provides for past cultures and land use.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire. However, the potential complexity of the scheduled monument increases its rarity.	No impact. The asset is separated from the option by the railway line.
Context	The asset is part of a wider landscape of Iron Age/Roman land divison, agricultural activity and occupation. Settlements from this period are not uncommon in Cambridgeshire.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The relationship with the landscape is essential to the understanding of the monument and its history and therefore of high significance.	Roman settlements and Iron Age settlement sites are not uncommon in similar contexts throughout Cambridgeshire.	Slight impact. Associated remains may extend into the option corridor.
Period	Iron Age/Roman settlement. Earlier and later activity evidence may also be present.	Important nationally. Relevant legislation and planning policy includes: Ancient Monuments and Archaeological Areas Act 1979; National Planning Policy Framework (2019); South Cambridgeshire Local Plan (2018): Policy NH/14: Heritage Assets	Scheduled monument of national significance. The age of the asset contributes to its national significance.	Roman settlements and Iron Age settlement sites are not uncommon in Cambridgeshire.	No impact. The asset is separated from the option by the railway line.

Reference Sources

South Cambridgeshire and City of Cambridge Local Plan (2018);
https://historicengland.org.uk/listing/the-list/; Cambridgeshire Historic Environment Record

Step 5 - Summary Assessment Score

Slight adverse negative effect on context.

Qualitative Comments

e construction of the scheme and the setting is unlikely to be harmed. However, there is potential for construction activities to impact associated archaeological remains, as the archaeological remains form part

G. Landscape

TAG Landscape Impacts Worksheet - Purple option

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The transport route runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. The route then follows the route of a disused railway before terminating at Travel Hub Site A to the west of the A11/A505 junction. This would be accessed via a new roundabout junction to the north of the A505 slip road and require an extended access road to the site itself. The pattern of the landscape transitions from the rural-urban fringe location, adjacent to Addenbrooke's Hospital and residential development, to the open arable farmland typical of this area. Fields are medium to large scale, with occasional hedgerows. Woodland cover is limited, but provides important features in the landscape where present. Woodland and tree cover is notably associated with the River Granta. The topography is generally level, with high points at White Hill, Clarke's Hill and Fox Hill creating undulations within the landscape. The villages of Great Shelford, Stapleford, Sawston are located to the southwest of the route and Babraham to the northeast. The area is crossed by a number of roads, with the A1307 and A11 severing the landscape. The Travel Hub site is set within an open landscape, albeit partially screened by the vegetation along the A11 and hedgerows along local roads.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of a public transport access route in cutting and on embankment into the flat, open arable landscape. Some land isolated by the new access route would no longer be suitable for agriculture. These fragmented fields could be planted with new woodland to help integrate the new infrastructure into the existing landscape. The new park and ride site access from the A505 would result in a loss of road side vegetation. The Travel Hub site would be located within open landscape across multiple field boundaries, fragmenting and impacting upon the viability of these fields. Existing field boundaries would be strengthened with mitigation planting. The impact would be major adverse due to the introduction of new uncharacteristic elements, including the infrastructure of the park and ride site within a slightly elevated location across multiple fieldsinto an open rural landscape.
Tranquillity	The tranquillity of the study area is medium due to the influence of the urban areas of Cambridge and the surrounding villages as well as the ongoing construction at the Cambridge Biomedical Park. A number of busy major roads cross the area including the A11 and A1307. Fourwentways roundabout is lit at night, as is the wider Addenbrookes site. The street lights of Cambridge contribute to general night time sky glow in the area. The landscape becomes darker between the edge of Cambridge and Fourwentways roundabout to the south and west, where street lighting is restricted to village streets and light spill is largely contained by existing vegetation.	Local	Locally common	Local	Tranquillity cannot easily be recreated.	The existing medium tranquillity would be reduced in operation by the introduction of additional road infrastructure and vehicles passing through a predominantly rural landscape. Existing vegetation is likely to partially screen the Travel Hub site. At night, the park and ride lighting would be visible. Mitigation planting would, in time, screen much of the Travel Hub site from the surrounding area. The presence of new infrastructure and movement of vehicles in an open arable landscape would result in a notable loss to existing character and the impact would be moderate adverse.
Cultural	Pampisford Hall and Sawston Hall, Registered Parks and Gardens, are located within the study area. There are a number of Scheduled Monuments locally, including notably Wandlebury Camp (a multivallate hillfort, earlier univallate hillfort, Iron Age cemetery and 17th century formal garden remains). Magog Down is significant recreation facility comprising woodland and chalk grassland, with views down towards the route. A number of PRoWs cross the study area and National Cycle Route 11 runs to the east.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The scheme will not affect any sensitive cultural areas. The route will sever some PRoW, however, there is the opportunity to provide crossing points for PRoW users. The impact would be neutral.
Landcover	The majority of the land cover within the study area is currently large to medium sized fields largely under arable land use. There are some hedgerows along field boundaries and there is woodland cover associated with isolated properties, occasional copses and along the River Granta with trees lining sections of the river corridor. More extensive woodland is found around the Wandlebury Camp, Magog Down and in the parkland associated with Babraham Institute, Sawston Hall and Pampisford Hall. To the north of the study area are urban influences of the Cambridge fringe, including Addenbrookes Hospital.	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the Travel Hub site would be replaced by a car park with paving, lighting and moving vehicles. Farmland and some small areas of woodland would be lost from the study area due to the construction of a dedicated public transport route from Cambridge to the Travel Hub site, including vegetation running along the River Granta. Existing hedgerows and boundary vegetation would be restored or replaced along the new boundaries created by the scheme option. The impact would be slight adverse.
Summary of character	The proposed scheme is in the Rural Lowland Mosaic Chalklands landscape character area. The landscape is a combination of flat open fields and gently undulating topography rising up to local high points. There is woodland on highpoints and around Babraham Institute, Sawston Hall and Pampisford Hall and along the river Granta, but overall woodland cover is low. Where it is present, woodland blocks forms important features in the landscape. The presence of the urban edge of Cambridge to the northwest reduces overall tranquility but there are distinct boundaries between the urban development and the open arable landscape of the majority of the study area with limited urban fringe influences. The Babraham Park and associated development are isolated urbanising elements in the wider landscape of the study area. There are long and open views from Magog Down looking southwest across the route and view from Bury Farm bridleway, looking north towards the route. The route crosses a number of PRoWs and recreation access to the Magog Downs and Wandlebury Country Park. Roads cross the study area, but with the exception of the A11 and A1307 are relatively small scale.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	There would be a loss of arable land and some vegetation as a result of the introduction of the new infrastructure. The presence of a new access route will cut across the existing landscape pattern disrupting existing landuse. Although the landscape is open in places, the access route will cut across minor roads, footpaths and bridleways as well as crossing the River Granta, and floodplain. Hedgerows and woodland/tree belts will be directly affected by the route alignment. Mitigation planting would be incorporated into the scheme proposals to strengthen the existing landscape structure and enhance Green Infrastructure along the access route but larger vehicles using the route would remain noticeable in views. Substantial areas of the site would be seeded with a species-rich grassland mix to create new habitat and provide a biodiversity net gain. The arable field west of the A11/A505 junction would be replaced by a car park with paving, lighting, signage and a one-storey building, introducing urbanising elements into a rural setting and would be uncharacteristic of the landscape. Although the A11 and A1307 are busy roads, tranquillity would be reduced due to the presence of the Travel Hub, associated traffic movements and artificial lighting. The introduction of the access route into a rural landscape would also serve to reduce tranquillity. A wide belt of mitigation planting around Travel Hub linking to the existing tree belts would help to intergrate the scheme into the landscape. The impact would be moderate adverse in operation.

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, 2003

Step 5 - Summary Assessment Score

The Purple Option would result in a moderate adverse (negative) effect

Qualitative Comments

In conclusion, the Purple Option would result in moderate adverse impacts due to the introduction of access roads into arable fields, and the operation of a Travel Hub site within an open landscape and slightly elevated location. There would be a loss of farmland across multiple fields, affecting agricultural viability and the loss of some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however buses using the access would remain noticeable in the landscape.

TAG Landscape Impacts Worksheet - Brown option

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The transport route runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. The route then takes a direct route across fields towards the A11, which includes a second crossing of the River Granta, ending at Travel Hub Site B. The Travel Hub site is located adjacent to the A11 and A1307 at the Fourwentways roundabout. The pattern of the landscape transitions from the rural-urban fringe location, adjacent to Addenbrooke's Hospital and residential development, to the open arable farmland typical of this area. Fields are medium to large scale, with occasional hedgerows. Woodland cover is limited, but provides important features in the landscape where present. Woodland and tree cover is notably associated with the River Granta. The topography is generally level, with high points at White Hill, Clarke's Hill and Fox Hill creating undulations within the landscape. The villages of Great Shelford, Stapleford, Sawston are located to the southwest of the route and Babraham to the northeast. The area is crossed by a number of roads, with the A1307 and A11 severing the landscape. The travel Hub site is partially screened by the vegetation along the A1307 and A11 which rise to meet the roundabout over the M11.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of a public transport access route in cutting and on embankment into the flat, open arable landscape. Some land isolated by the new access route would no longer be suitable for agriculture. These fragmented fields could be planted with new woodland to help integrate the new infrastructure into the existing landscape. The new Travel Hub site access from the A1307 would result in a loss of road side vegetation. Existing field boundaries would be strengthened with mitigation planting. The impact would be moderate adverse due to the introduction of new uncharacteristic elements into an open rural landscape.
Tranquillity	The tranquillity of the study area is medium due to the influence of the urban areas of Cambridge and the surrounding villages as well as the ongoing construction at the Cambridge Biomedical Park. A number of busy major roads cross the area including the A11 and A1307. Fourwentways roundabout is lit at night, as is the wider Addenbrookes site. The street lights of Cambridge contribute to general night time sky glow in the area. The landscape becomes darker between the edge of Cambridge and Fourwentways roundabout to the south and west, where street lighting is restricted to village streets and light spill is largely contained by existing vegetation.	Local	Locally common	Local	Tranquillity cannot easily be recreated.	The existing medium tranquillity would be reduced in operation by the introduction of additional road infrastructure and vehicles passing through a predominantly rural landscape. Existing vegetation is likely to screen much of the Travel Hub site. However, at night, the Travel Hub lighting would be visible but viewed in the context of the already lit Fourwentways roundabout. Mitigation planting would, in time, screen much of the Travel Hub site from the surrounding area. The presence of new infrastructure and movement of vehicles in an open arable landscape would result in a slight loss to existing character and the impact would be slight adverse.
Cultural	Pampisford Hall and Sawston Hall, Registered Parks and Gardens, are located within the study area. There are a number of Scheduled Monuments locally, including notably Wandlebury Camp (a multivallate hillfort, earlier univallate hillfort, Iron Age cemetery and 17th century formal garden remains). Magog Down is significant recreation facility comprising woodland and chalk grassland, with views down towards the route. A number of PRoWs cross the study area and National Cycle Route 11 runs to the east.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The scheme will not affect any sensitive cultural areas. The route will sever some PRoW, however, there is the opportunity to provide crossing points for PRoW users. The impact would be neutral.
Landcover	The majority of the land cover within the study area is currently large to medium sized fields largely under arable land use. There are some hedgerows along field boundaries and there is woodland cover associated with isolated properties, occasional copses and along the River Granta with trees lining sections of the river corridor. More extensive woodland is found around the Wandlebury Camp, Magog Down and in the parkland associated with Babraham Institute, Sawston Hall and Pampisford Hall. To the north of the study area are urban influences of the Cambridge fringe, including Addenbrookes Hospital.	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the Travel Hub site would be replaced by a car park with paving, lighting and moving vehicles. Farmland and some small areas of woodland would be lost from the study area due to the construction of a dedicated public transport route from Cambridge to the Travel Hub site, including vegetation running along the River Granta. Existing hedgerows and boundary vegetation would be restored or replaced along the new boundaries created by the scheme option. The impact would be slight adverse.
Summary of character	The proposed scheme is in the Rural Lowland Mosaic Chalklands landscape character area. The landscape is a combination of flat open fields and gently undulating topography rising up to local high points. There is woodland on highpoints and around Babraham Institute, Sawston Hall and Pampisford Hall and along the river Granta, but overall woodland cover is low. Where it is present, woodland blocks forms important features in the landscape. The presence of the urban edge of Cambridge to the northwest reduces overall tranquility but there are distinct boundaries between the urban development and the open arable landscape of the majority of the study area with limited urban fringe influences. The Babraham Park and associated development are isolated urbanising elements in the wider landscape of the study area. There are long and open views from Magog Down looking southwest across the route and view from Bury Farm bridleway, looking north towards the route. The route crosses a number of PRoWs and recreation access to the Magog Downs and Wandlebury Country Park. Roads cross the study area, but with the exception of the A11 and A1307 are relatively small scale.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	There would be a loss of arable land and some vegetation as a result of the introduction of the new infrastructure. The presence of a new access route will cut across the existing landscape pattern disrupting existing landuse. Although the landscape is open in places, the access route will cut across minor roads, footpaths and bridleways as well as crossing the River Granta and floodplain. Hedgerows and woodland/tree belts will be directly affected by the route alignment. Mitigation planting would be incorporated into the scheme proposals to strengthen the existing landscape structure and enhance Green Infrastructure along the access route but larger vehicles using the route would remain noticeable in views. Substantial areas of the site would be seeded with a species-rich grassland mix to create new habitat and provide a biodiversity net gain. The arable field southwest of the Fourwentways roundabout would be replaced by a car park with paving, lighting, signage and a one-storey building, introducing urbanising elements into a rural setting. However, a car park in this location would not be wholly uncharacteristic of the landscape as it would be seen in the context of the A11 and A1307. Although the A11 and A1307 are busy roads, tranquillity would be reduced due to the presence of the Travel Hub, associated traffic movements and artificial lighting. The introduction of the access route into a rural landscape would also serve to reduce tranquillity. A wide belt of mitigation planting around Travel Hub linking to the existing tree belts would help to integrate the scheme into the landscape. The impact would be moderate adverse in operation.

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, 2003

Step 5 - Summary Assessment Score

The Brown Option would result in a moderate adverse (negative) effect

Qualitative Comments

In conclusion, the Brown Option would result in moderate adverse impacts due to the introduction and operation of a Travel Hub and access roads into arable fields albeit adjacent to the A1307/A11 grade seperated junction. There would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however buses using the access would remain noticeable in the landscape.

TAG Landscape Impacts Worksheet - Pink option

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The transport route runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. The route then follows the route of a disused railway, albeit slightly to the north of it, continuing to the A505 junction before running parallel with the A11 and terminating at Travel Hub Site B. The Travel Hub site is located adjacent to the A11 and A1307 at the Fourwentways roundabout. The pattern of the landscape transitions from the rural-urban fringe location, adjacent to Addenbrooke's Hospital and residential development, to the open arable farmland typical of this area. Fields are medium to large scale, with occasional hedgerows. Woodland cover is limited, but provides important features in the landscape where present. Woodland and tree cover is notably associated with the River Granta. The topography is generally level, with high points at White Hill, Clarke's Hill and Fox Hill creating undulations within the landscape. The villages of Great Shelford, Stapleford, Sawston are located to the southwest of the route and Babraham to the northeast. The area is crossed by a number of roads, with the A1307 and A11 severing the landscape. The Travel Hub site is partially screened by the vegetation along the A1307 and A11 which rise to meet the roundabout over the M11.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of a public transport access route in cutting and on embankment into the flat, open arable landscape. Some land isolated by the new access route would no longer be suitable for agriculture. These fragmented fields could be planted with new woodland to help integrate the new infrastructure into the existing landscape. The new Travel Hub site access from the A1307 would result in a loss of road side vegetation. Existing field boundaries would be strengthened with mitigation planting. The impact would be moderate adverse due to the introduction of new uncharacteristic elements into an open rural landscape.
Tranquillity	The tranquillity of the study area is medium due to the influence of the urban areas of Cambridge and the surrounding villages as well as the ongoing construction at the Cambridge Biomedical Park. A number of busy major roads cross the area including the A11 and A1307. Fourwentways roundabout is lit at night, as is the wider Addenbrookes site. The street lights of Cambridge contribute to general night time sky glow in the area. The landscape becomes darker between the edge of Cambridge and Fourwentways roundabout to the south and west, where street lighting is restricted to village streets and light spill is largely contained by existing vegetation.	Local	Locally common	Local	Tranquillity cannot easily be recreated.	The existing medium tranquillity would be reduced in operation by the introduction of additional road infrastructure and vehicles passing through a predominantly rural landscape. Existing vegetation is likely to screen much of the Travel Hub site. However, at night, the Travel Hub lighting would be visible but viewed in the context of the already lit Fourwentways roundabout. Mitigation planting would, in time, screen much of the Travel Hub site from the surrounding area. The presence of new infrastructure and movement of vehicles in an open arable landscape would result in a slight loss to existing character and the impact would be slight adverse.
Cultural	Pampisford Hall and Sawston Hall, Registered Parks and Gardens, are located within the study area. There are a number of Scheduled Monuments locally, including notably Wandlebury Camp (a multivallate hillfort, earlier univallate hillfort, Iron Age cemetery and 17th century formal garden remains). Magog Down is significant recreation facility comprising woodland and chalk grassland, with views down towards the route. A number of PRoWs cross the study area and National Cycle Route 11 runs to the east.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The scheme will not affect any sensitive cultural areas. The route will sever some PRoW, however, there is the opportunity to provide crossing points for PRoW users. The impact would be neutral.
Landcover	The majority of the land cover within the study area is currently large to medium sized fields largely under arable land use. There are some hedgerows along field boundaries and there is woodland cover associated with isolated properties, occasional copses and along the River Granta with trees lining sections of the river corridor. More extensive woodland is found around the Wandlebury Camp, Magog Down and in the parkland associated with Babraham Institute, Sawston Hall and Pampisford Hall. To the north of the study area are urban influences of the Cambridge fringe, including Addenbrookes Hospital.	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the Travel Hub site would be replaced by a car park with paving, lighting and moving vehicles. Farmland and some small areas of woodland would be lost from the study area due to the construction of a dedicated public transport route from Cambridge to the Travel Hub site, including vegetation running along the River Granta. Existing hedgerows and boundary vegetation would be restored or replaced along the new boundaries created by the scheme option. The impact would be slight adverse.
Summary of character	The proposed scheme is in the Rural Lowland Mosaic Chalklands landscape character area. The landscape is a combination of flat open fields and gently undulating topography rising up to local high points. There is woodland on highpoints and around Babraham Institute, Sawston Hall and Pampisford Hall and along the river Granta, but overall woodland cover is low. Where it is present, woodland blocks forms important features in the landscape. The presence of the urban edge of Cambridge to the northwest reduces overall tranquility but there are distinct boundaries between the urban development and the open arable landscape of the majority of the study area with limited urban fringe influences. The Babraham Park and associated development are isolated urbanising elements in the wider landscape of the study area. There are long and open views from Magog Down looking southwest across the route and view from Bury Farm bridleway, looking north towards the route. The route crosses a number of PRoWs and recreation access to the Magog Downs and Wandlebury Country Park. Roads cross the study area, but with the exception of the A11 and A1307 are relatively small scale.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	There would be a loss of arable land and some vegetation as a result of the introduction of the new infrastructure. The presence of a new access route will cut across the existing landscape pattern disrupting existing landuse. Although the landscape is open in places, the access route will cut across minor roads, footpaths and bridleways as well as crossing the River Granta, and floodplain. Hedgerows and woodland/tree belts will be directly affected by the route alignment. Mitigation planting would be incorporated into the scheme proposals to strengthen the existing landscape structure and enhance Green Infrastructure along the access route but larger vehicles using the route would remain noticeable in views. Substantial areas of the site would be seeded with a species-rich grassland mix to create new habitat and provide a biodiversity net gain. The arable field southwest of the Fourwentways roundabout would be replaced by a car park with paving, lighting, signage and a one-storey building, introducing urbanising elements into a rural setting. However, a car park in this location would not be wholly uncharacteristic of the landscape as it would be seen in the context of the A11 and A1307. Although the A11 and A1307 are busy roads, tranquillity would be reduced due to the presence of the Travel Hub, associated traffic movements and artificial lighting. The introduction of the access route into a rural landscape would also serve to reduce tranquillity. A wide belt of mitigation planting around Travel Hub linking to the existing tree belts would help to intergrate the scheme into the landscape. The impact would be moderate adverse in operation.

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, 2003

Step 5 - Summary Assessment Score

The Pink Option would result in a moderate adverse (negative) effect

Qualitative Comments

In conclusion, the Pink Option would result in adverse impacts due to the introduction and operation of a Travel Hub and access roads into arable fields albeit adjacent to the A1307/A11 grade separated junction. There would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however buses using the access would remain noticeable in the landscape.

TAG Landscape Impacts Worksheet - Black option

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The transport route runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. The route then follows the route of a disused railway, albeit slightly to the north of it, continuing to the A505 junction before running parallel with the A11 and crossing the River Granta. It then crosses the A11 via a new bridge, crosses Newmarket Road at junction and then crosses the A1307 via a new junction to connect with Travel Hub Site C. The Travel Hub site is located adjacent to the A11 and A1307 at the Fourwentways roundabout. The pattern of the landscape transitions from the rural-urban fringe location, adjacent to Addenbrooke's Hospital and residential development, to the open arable farmland typical of this area. Fields are medium to large scale, with occasional hedgerows. Woodland cover is limited, but provides important features in the landscape where present. Woodland and tree cover is notably associated with the River Granta. The topography is generally level, with high points at White Hill, Clarke's Hill and Fox Hill creating undulations within the landscape, then rising up from the river Granta to The Grange northeast of Fourwentways roundabout. The villages of Great Shelford, Stapleford, Sawston are located to the southwest of the route and Babraham to the northeast. Little Abington is located to the southeast of the Travel Hub site. The area is crossed by a number of roads, with the A1307 and A11 severing the landscape. The Travel Hub site is partially screened by the vegetation along the A1307 and A11.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of a public transport access route in cutting and on embankment into the flat, open arable landscape. Some land isolated by the new access route would no longer be suitable for agriculture. These fragmented fields could be planted with new woodland to help integrate the new infrastructure into the existing landscape. The new Travel Hub site access from the A1307 and where the route crosses the A11 and Newmarket Road would result in a loss of road side vegetation. Existing field boundaries would be strengthened with mitigation planting. The impact would be moderate adverse due to the loss of vegetation and introduction of new uncharacteristic elements into an open rural landscape.
Tranquillity	The tranquillity of the study area is medium due to the influence of the urban areas of Cambridge and the surrounding villages as well as the ongoing construction at the Cambridge Biomedical Park. A number of busy major roads cross the area including the A11 and A1307. Fourwentways roundabout is lit at night, as is the wider Addenbrookes site. The street lights of Cambridge contribute to general night time sky glow in the area. The landscape becomes darker between the edge of Cambridge and Fourwentways roundabout to the south and west, and to the northeast of the roundabout, where street lighting is restricted to village streets and light spill is largely contained by existing vegetation.	Local	Locally common	Local	Tranquillity cannot easily be recreated.	The existing medium tranquillity would be reduced in operation by the introduction of additional road infrastructure and vehicles passing through a predominantly rural landscape. Although vegetation adjacent to the Fourwentways Roundabout is likely to screen much of the Travel Hub site, vegetation becomes more disparate running east along the A1307 and views of the Travel Hub site open up. At night, the Travel Hub lighting would be visible albeit viewed from the west in the context of the already lit Fourwentways roundabout. Mitigation planting would, in time, partially screen the Travel Hub site from the surrounding area. The presence of new infrastructure and movement of vehicles in an open arable landscape would result in a notable loss to existing character and the impact would be moderate adverse.
Cultural	Pampisford Hall and Sawston Hall, Registered Parks and Gardens, are located within the study area. There are a number of Scheduled Monuments locally, including notably Wandlebury Camp (a multivallate hillfort, earlier univallate hillfort, Iron Age cemetery and 17th century formal garden remains). Magog Down is significant recreation facility comprising woodland and chalk grassland, with views down towards the route. A number of PRoWs cross the study area and National Cycle Route 11 runs to the east.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The scheme will not affect any sensitive cultural areas. The route will sever some PRoW, however, there is the opportunity to provide crossing points for PRoW users. The impact would be neutral.
Landcover	The majority of the land cover within the study area is currently large to medium sized fields largely under arable land use. There are some hedgerows along field boundaries and there is woodland cover associated with isolated properties, occasional copses and along the River Granta with trees lining sections of the river corridor. More extensive woodland is found around the Wandlebury Camp, Magog Down and in the parkland associated with Babraham Institute, Sawston Hall and Pampisford Hall. There are significant amounts of vegetation associated with the A11 and Fourwentways Roundabout assisting in reducing the impact of the roundabout within the landscape Newmarket Road is well-vegetated where it is crossed. To the north of the study area are urban influences of the Cambridge fringe, including Addenbrookes Hospital.	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the Travel Hub site would be replaced by a car park with paving, lighting and moving vehicles. Farmland and some small areas of woodland would be lost from the study area due to the construction of a dedicated public transport route from Cambridge to the Travel Hub site, including vegetation running along the River Granta, the A11, A1307 and Newmarket Road. Existing hedgerows and boundary vegetation would be restored or replaced along the new boundaries created by the scheme option. The impact would be slight adverse.
Summary of character	The proposed scheme is in the Rural Lowland Mosaic Chalklands landscape character area. The landscape is a combination of flat open fields and gently undulating topography rising up to local high points. There is woodland on highpoints and around Babraham Institute, Sawston Hall and Pampisford Hall and along the river Granta, but overall woodland cover is low. Where it is present, woodland blocks forms important features in the landscape. The presence of the urban edge of Cambridge to the northwest reduces overall tranquility but there are distinct boundaries between the urban development and the open arable landscape of the majority of the study area with limited urban fringe influences. The Babraham Park and associated development are isolated urbanising elements in the wider landscape of the study area. There are long and open views from Magog Down looking southwest across the route and view from Bury Farm bridleway, looking north towards the route. The route crosses a number of PRoWs and recreation access to the Magog Downs and Wandlebury Country Park. Roads cross the study area, but with the exception of the A11 and A1307 are relatively small scale.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	There would be a loss of arable land and some vegetation as a result of the introduction of the new infrastructure. The presence of a new access route will cut across the existing landscape pattern disrupting existing landuse. Although the landscape is open in places, the access route will cut across the A11, minor roads, footpaths and bridleways as well as crossing the River Granta and floodplain. Hedgerows and woodland/tree belts will be directly affected by the route alignment. Mitigation planting would be incorporated into the scheme proposals to strengthen the existing landscape structure and enhance Green Infrastructure along the access route but larger vehicles using the route would remain noticeable in views. Substantial areas of the site would be seeded with a species-rich grassland mix to create new habitat and provide a biodiversity net gain. The arable field northeast of the Fourwentways roundabout would be replaced by a car park with paving, lighting, signage and a one-storey building, introducing urbanising elements into a rural setting. However, a car park in this location would not be wholly uncharacteristic of the landscape as it would be seen in the context of the A11 and A1307. Although the A11 and A1307 are busy roads, tranquillity would be reduced due to the presence of the Travel Hub, associated traffic movements and artificial lighting. The introduction of the access route into a rural landscape would also serve to reduce tranquillity. A wide belt of mitigation planting around Travel Hub linking to the existing tree belts would help to integrate the scheme into the landscape. The impact would be moderate adverse in operation.

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, 2003

Step 5 - Summary Assessment Score

The Black Option would result in a moderate adverse (negative) effect

Qualitative Comments

In conclusion, the Black Option would result in moderate adverse impacts due to the introduction and operation of a Travel Hub and access roads into arable fields albeit near to the A1307 / A11 grade separated junction. There would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however buses using the access would remain noticeable in the landscape.

TAG Landscape Impacts Worksheet - Blue option

	Step 2	Step 3				Step 4
Features	**Description**	**Scale it matters**	**Rarity**	**Importance**	**Substitutability**	**Impact**
Pattern	The transport route runs along Francis Crick Avenue before exiting on the southern side of the CBC and running parallel with railway. It then diverts to the east of Great Shelford and Stapleford before crossing the River Granta and running to the east of Sawston. The route then takes a direct route across fields crossing the A11 via a new bridge, crosses Newmarket Road at junction and then crosses the A1307 via a new junction to connect with Travel Hub Site C. The Travel Hub site is located adjacent to the A11 and A1307 at the Fourwentways roundabout. The pattern of the landscape transitions from the rural-urban fringe location, adjacent to Addenbrooke's Hospital and residential development, to the open arable farmland typical of this area. Fields are medium to large scale, with occasional hedgerows. Woodland cover is limited, but provides important features in the landscape where present. Woodland and tree cover is notably associated with the River Granta. The topography is generally level, with high points at White Hill, Clarke's Hill and Fox Hill creating undulations within the landscape, then rising up from the river Granta to The Grange northeast of Fourwentways roundabout. The villages of Great Shelford, Stapleford, Sawston are located to the southwest of the route and Babraham to the northeast. Little Abington is located to the southeast of the Travel Hub site. The area is crossed by a number of roads, with the A1307 and A11 severing the landscape. The Travel Hub site is partially screened by the vegetation along the A1307 and A11.	Local	Locally common	Local	The pattern can be substituted or recreated.	The pattern of the landscape would be altered by the introduction of a public transport access route in cutting and on embankment into the flat, open arable landscape. Some land isolated by the new access route would no longer be suitable for agriculture. These fragmented fields could be planted with new woodland to help integrate the new infrastructure into the existing landscape. The new Travel Hub site access from the A1307 and where the route crosses the A11 and Newmarket Road would result in a loss of road side vegetation. Existing field boundaries would be strengthened with mitigation planting. The impact would be moderate adverse due to the loss of vegetation and introduction of new uncharacteristic elements into an open rural landscape.
Tranquillity	The tranquillity of the study area is medium due to the influence of the urban areas of Cambridge and the surrounding villages as well as the ongoing construction at the Cambridge Biomedical Park. A number of busy major roads cross the area including the A11 and A1307. Fourwentways roundabout is lit at night, as is the wider Addenbrookes site. The street lights of Cambridge contribute to general night time sky glow in the area. The landscape becomes darker between the edge of Cambridge and Fourwentways roundabout to the south and west, and to the northeast of the roundabout, where street lighting is restricted to village streets and light spill is largely contained by existing vegetation.	Local	Locally common	Local	Tranquillity cannot easily be recreated.	The existing medium tranquillity would be reduced in operation by the introduction of additional road infrastructure and vehicles passing through a predominantly rural landscape. Although vegetation adjacent ot the Fourwentways Roundabout is likely to screen much of the Travel Hub site, vegetation becomes more disparate running east along the A1307 and views of the Travel Hub site open up. At night, the Travel Hub lighting would be visible albeit viewed from the west in the context of the already lit Fourwentways roundabout. Mitigation planting would, in time, partially screen the Travel Hub site from the surrounding area. The presence of new infrastructure and movement of vehicles in an open arable landscape would result in a notable loss to existing character and the impact would be moderate adverse.
Cultural	Pampisford Hall and Sawston Hall, Registered Parks and Gardens, are located within the study area. There are a number of Scheduled Monuments locally, including notably Wandlebury Camp (a multivallate hillfort, earlier univallate hillfort, Iron Age cemetery and 17th century formal garden remains). Magog Down is significant recreation facility comprising woodland and chalk grassland, with views down towards the route. A number of PRoWs cross the study area and National Cycle Route 11 runs to the east.	Local	Locally common	Local	Cultural elements will not be directly affected, but cannot easily be substituted.	The scheme will not affect any sensitive cultural areas. The route will sever some PRoW, however, there is the opportunity to provide crossing points for PRoW users. The impact would be neutral.
Landcover	The majority of the land cover within the study area is currently large to medium sized fields largely under arable land use. There are some hedgerows along field boundaries and there is woodland cover associated with isolated properties, occasional copses and along the River Granta with trees lining sections of the river corridor. More extensive woodland is found around the Wandlebury Camp, Magog Down and in the parkland associated with Babraham Institute, Sawston Hall and Pampisford Hall. There are significant amounts of vegetation associated with the A11 and Fourwentways Roundabout assisting in reducing the impact of the roundabout within the landscape Newmarket Road is well-vegetated where it is crossed. To the north of the study area are urban influences of the Cambridge fringe, including Addenbrookes Hospital.	Local	Locally common	Local	The landcover can be recreated or substituted.	The arable field of the Travel Hub site would be replaced by a car park with paving, lighting and moving vehicles. Farmland and some small areas of woodland would be lost from the study area due to the construction of a dedicated public transport route from Cambridge to the Travel Hub site, including vegetation running along the River Granta, the A11, A1307 and Newmarket Road. Existing hedgerows and boundary vegetation would be restored or replaced along the new boundaries created by the scheme option. The impact would be slight adverse.
Summary of character	The proposed scheme is in the Rural Lowland Mosaic Chalklands landscape character area. The landscape is a combination of flat open fields and gently undulating topography rising up to local high points. There is woodland on highpoints and around Babraham Institute, Sawston Hall and Pampisford Hall and along the river Granta, but overall woodland cover is low. Where it is present, woodland blocks forms important features in the landscape. The presence of the urban edge of Cambridge to the northwest reduces overall tranquility but there are distinct boundaries between the urban development and the open arable landscape of the majority of the study area with limited urban fringe influences. The Babraham Park and associated development are isolated urbanising elements in the wider landscape of the study area. There are long and open views from Magog Down looking southwest across the route and view from Bury Farm bridleway, looking north towards the route. The route crosses a number of PRoWs and recreation access to the Magog Downs and Wandlebury Country Park. Roads cross the study area, but with the exception of the A11 and A1307 are relatively small scale.	Local	Locally common	Local	The landscape contains few features which cannot be substituted or recreated elsewhere.	There would be a loss of arable land and some vegetation as a result of the introduction of the new infrastructure. The presence of a new access route will cut across the existing landscape pattern disrupting existing landuse. Although the landscape is open in places, the access route will cut across the A11, minor roads, footpaths and bridleways as well as crossing the River Granta and floodplain. Hedgerows and woodland/tree belts will be directly affected by the route alignment. Mitigation planting would be incorporated into the scheme proposals to strengthen the existing landscape structure and enhance Green Infrastructure along the access route but larger vehicles using the route would remain noticeable in views. Substantial areas of the site would be seeded with a species-rich grassland mix to create new habitat and provide a biodiversity net gain. The arable field northeast of the Fourwentways roundabout would be replaced by a car park with paving, lighting, signage and a one-storey building, introducing urbanising elements into a rural setting. However, a car park in this location would not be wholly uncharacteristic of the landscape as it would be seen in the context of the A11 and A1307. Although the A11 and A1307 are busy roads, tranquillity would be reduced due to the presence of the Travel Hub, associated traffic movements and artificial lighting. The introduction of the access route into a rural landscape would also serve to reduce tranquillity. A wide belt of mitigation planting around Travel Hub linking to the existing tree belts would help to integrate the scheme into the landscape. The impact would be moderate adverse in operation.

Reference Sources

Cambridge Landscape Character Assessment, Landscape Design Associates, 2003

Step 5 - Summary Assessment Score

The Blue Option would result in a moderate adverse (negative) effect

Qualitative Comments

In conclusion, the Blue Option would result in moderate adverse impacts due to the introduction and operation of a Travel Hub and access roads into arable fields near the A1307/A11 grade seperated junction. There would be a loss of farmland and some vegetation. Street lighting and vehicles would be introduced into an unlit area on the rural-urban fringe. The extensive proposed landscape mitigation would, in time, screen and integrate the car park and access roads into their landscape setting, however buses using the access would remain noticeable in the landscape.

MOTT MACDONALD

A1307 CSETS Phase 2

Landscape Appraisal

25 June 2019

Mott MacDonald
East Wing
69-75 Thorpe Road
Norwich NR1 1UA
United Kingdom

T +44 (0)1603 767530
mottmac.com

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Landscape Appraisal

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Contents

1 Introduction

The purpose of this document is to provide a high-level landscape appraisal of the landscape sensitivities of the area potentially affected by the CSETS Phase 2 scheme (including the options for the bus route and travel hub sites) to inform the assessment of the options. The landscape appraisal covers:

- Design guidance.
- Landscape and other relevant designations such as Registered Parks and Gardens and Green Belt;
- Landscape character;
- Topography;
- Potential visibility from key receptors; and

The document provides an overview of key design guidance, principally from Cambridgeshire and South Cambridgeshire, and *Design Manual for Roads and Bridges (DMRB)* Volume 10, Section 1 New Roads (this guidance is intended for use to inform road design and so is considered applicable to linear developments such as the proposed public transport route).

In addition, an overview of the landscape context is provided to outline the sensitivities, opportunities and constraints within the landscape, and an overview of the visual amenity to highlight the potential impacts upon local receptors.

Assessing the landscape context and visual amenity has been undertaken using a methodology that follows current best practice and guidance including:

- *Guidelines for Landscape and Visual Impact Assessment (GLVIA), 3rd Edition: Landscape Institute and Institute of Environmental Management and Assessment (2013); and*
- *DMRB LA 107 Landscape and visual effects* (this supersedes *DMRB Volume 11 Section 3 Part 5 Landscape Effects* and *IAN 135/10*).

The study area for the appraisal includes the land within 1000m of the scheme boundary.

2 Design Guidance

2.1 Cambridgeshire Landscape Guidelines – A Manual for Management and Change in the Rural Landscape (Cambridgeshire County Council, 1991)

This document provides a landscape character assessment of the county and sets out a vision for the protection and renewal of the Cambridgeshire countryside. The guidelines highlight the potential for roads and other linear infrastructure to be attractive routes through the landscape, with roadside trees, woodland, hedges and verges adding to the richness, diversity and special character of the landscape. They recommend:

- collaboration between engineers and landscape designer at an early stage of the project to achieve high quality new landscapes in the countryside;
- selection of road alignments to minimise impacts on the immediate road corridor and the wider landscape;
- viewing the route as a corridor of integrated features (road, car park, landform, earthworks, drainage, wildlife habitats, trees, woodland, hedges and views); and
- ensuring that the new structures and materials are sensitive to local landscape character.

CSET Phase 2 lies within Area 2: Chalklands Landscape Character Area (LCA). The principles for landscape improvement and management in the LCA include:

- planting new beech hangers to form focal points within the local landscape;
- management and creation of chalk grasslands to promote species-rich grassland;
- management of existing shelter belts;
- planting new mixed woodlands and shelter belts;
- creation of landscape corridors along river valleys, supplementing with copses, lines of willows and areas of marginal and aquatic vegetation;
- management and reinforcement of selected hedgerows to enhance their visual and wildlife potential; and
- route and footpath corridor improvements to enhance the route, with new native tree and shrub planting.

2.2 Cambridgeshire Green Infrastructure Strategy (Cambridgeshire County Council, 2011)

Green Infrastructure (GI) is a strategic, multi-functional network of public green spaces and routes, landscapes, habitats and heritage assets. It includes country parks, commons, greens, nature reserves, waterbodies and historic landscapes. The network comprises rural and urban green infrastructure and the connections between them. It includes land that is/can be publicly accessible and areas that are not open to the public. The Green Infrastructure Strategy aims to:

- support the protection, management and enhancement of existing GI and the creation of new GI at a county scale;
- link urban and rural areas, join up wildlife habitats and give people access to nature;
- identify the benefits of coordinating GI planning and investment at community, local and ‘sub-regional’ scale;

- identify GI opportunities at a strategic level to provide wider benefits including health, climate change mitigation and adaptation, economic development and biodiversity enhancement.

2.3 Cambridge Inner Green Belt Boundary Study (Cambridge City Council and South Cambridgeshire District Council, 2015)

The Cambridge Inner Green Belt Boundary Study identifies the particular qualities of Cambridge and its surrounding landscape that contribute to the performance of Green Belt purposes. CSET Phase 2 falls within Sector 10, to the south of Addenbrooke's Hospital and importance of this sector to Green Belt Purposes is described as follows:

This sector plays a key role in the setting of the south of Cambridge, forming the most westerly extent of the foothills of the Gog Magog Hills, which form the backdrop to all views out from and across Cambridge in this direction. The sector also prevents the continued sprawl of Cambridge to the south, halting expansion in this direction and ensuring that the distance between the historic core and the edge of Cambridge does not extend further than it is at present, as well as ensuring that Cambridge and Great Shelford do not further coalesce. The sector is also important to the green approaches to the city from the south, along the railway and Babraham Road, and the rural setting of Great Shelford.

2.4 South Cambridgeshire District Council District Design Guide Supplementary Planning Document

The South Cambridgeshire District Council (SCDC) District Design Guide Supplementary Planning Document (SPD) forms part of the South Cambridgeshire Local Development Framework (LDF). The document sets out the key requirements that will be taken into account when considering planning proposals. These include:

2.4.1 Design Principles

Urban Design -

- developments respect the existing landscape and biodiversity and enhance them through the implementation of the proposals;
- GI is an integral part of any new development and its surroundings and will link into the wider network;

Landscape Setting -

- variations in landform are harnessed to accentuate the local landscape character and not obscure distinctive landform characteristics with development;
- new developments sit comfortably in the landscape, taking account of the topography and natural or man-made features;

The Elements of Design -

- materials are appropriate to the character of the development and its context and in rural areas the character of simple gravel or grass finishes is preserved;
- the location, amount, design and materials of street furniture is controlled to avoid visual and physical clutter;
- lighting does not cause light spillage and light pollution in adjacent landholdings;

Environmental Sustainability -

- Sustainable drainage systems (SuDS) are included in road transport corridors using filter strips or drains, swales, rain gardens, canals and rills; and
- SUDS basins and ponds will appear as natural as possible (with contours blending into the landscape, varying depths and margin profiles to enhance habitat value) and other multi-functional uses such as the provision of GI for public access.

2.4.2 Design Documentation

Design Concept -

- The design concept should identify the underlying ethos of the scheme in relation to the social, commercial and/or educational purpose, the visual and aesthetic intent and the environmental performance.

Landscape Design -

- This should be read in the context of the South Cambridgeshire Council's Landscape in New Developments SPD, March 2010, where full details of the documentation required are set out.

2.5 South Cambridgeshire District Council Trees and Development SPD

Consideration will be given, wherever possible, to the retention of suitable trees within development, or to incorporating new planting into the design. Trees are a valuable addition to any development, helping to enhance biodiversity and achieve a high quality development in the local landscape or townscape.

2.6 Design Manual for Roads and Bridges, Volume 10, Section 1 New Roads

2.6.1 Part 1 – New Roads Landform and Alignment

This document provided within Design Manual for Roads and Bridges (DMRB) gives guidance on the environmental design of landform and alignment for roads. The key design objectives are detailed below:

- To choose the route least damaging to the landscape; this will be the one that respects existing landform best and avoids disruption of major topographical features.
- To find an alignment which uses the existing landform to good effect and which minimises the scale of earthworks.
- To design profiles which reflect existing natural slopes.
- To retain the least highway land, by the return of land to its former use where this does not conflict with the need to provide mitigation by planting.
- To use existing landform to minimise noise and visual intrusion: for example, placing a road in a cutting or behind rising ground to protect settlement.
- To develop new landforms, including mounds and false cuttings, to screen the road from settlement.
- To achieve a balance between horizontal and vertical alignment which minimises earthworks but provides the best integration with natural landform and the best screening for settlement.

2.6.2 Part 2 – New Roads Planting, Vegetation and Soils

This document provided within DMRB gives guidance on the environmental design of planting, and vegetation, and soil treatment for new roads. The key design objectives are detailed below:

- To define areas needed for effective mitigation by planting.
- To restore as much of the pre-existing pattern of field boundaries, woodland, heathland and moorland, as possible. Retaining land adjacent to the highway should always be considered, in order to provide integration with the landscape.
- To establish a clear design objective and maintenance regime for each area of vegetation established.
- To reinstate soil to the highest possible standard by stripping, storing and reinstating it in line with current best practice.
- To ensure soil restoration using matching soil types wherever possible.
- To mitigate secondary impacts on retained vegetation.

2.6.3 Part 3 – New Roads Integration with Rural Landscapes

This document provided within DMRB gives guidance on the environmental design and integration of new roads with rural landscapes. The key design objectives are detailed below:

- To recognise and understand the landscape types through which the road passes and to integrate the whole of the roadside landscape from the kerb outwards into its landscape setting.
- Where appropriate, to restore and enlarge the distinctive landscape character of areas adjacent to the road.
- To use fencing and walling types marrying in with adjacent ones and to plant and seed species and mixes that integrate visually and in their nature conservation interest with the existing vegetation.

2.6.4 Part 4 – The Road Corridor

This document provided within DMRB gives guidance on the environmental design of the road corridor for new roads. The key design objectives are detailed below:

- Walls, fences, environmental barriers, overbridges and other roadside features should reflect the landscape through which they pass and provide a sense of place for the driver.
- Site-specific designs, using local materials and styles, should be used wherever possible.
- Design elements should be simple and clear, reducing visual confusion.
- Views out, landmarks and other design features should be used to give a sense of place and help driver orientation.

3 Landscape Context

3.1 Landscape Character

3.1.1 National character assessments

There are two national character areas (NCA) that cross the scheme area. These are :

- NCA 87 – East Anglian Chalk
- NCA 88 – Befordshire and Cambridgeshire Claylands

The majority of the study area is located within *National Character Area 87: East Anglian Chalk*. The NCA is characterised by the narrow continuation of the chalk ridge that runs south-west/north-east across southern England. This creates a visually simple and uninterrupted landscape of smooth, rolling chalkland hills with large regular fields enclosed by low hawthorn hedges, with few trees, straight roads and expansive views to the north. The vast majority of its landscape is open countryside, under cereal production. Sustainable farming practices are required to help to manage the thin chalk soils and support wildlife in the wider countryside.

A small part of the study area north of Nine Wells Nature Reserve in the Cambridge Biomedical Campus is located within the *NCA 88: Bedfordshire and Cambridgeshire Claylands*. The NCA is a broad, gently undulating, lowland plateau dissected by shallow river valleys that gradually widen as they approach *NCA 46: The Fens* in the east. Within it, but distinct from it, is the Bedfordshire Greensand Ridge, a contrasting narrow and elevated outcrop of Greensand, with its associated habitats on acidic soils such as grassland, heathland and woodland. The NCA is rich in archaeological history evident in fossils, medieval earthworks, deserted villages and Roman roads. Major transport routes cross the area. Views of the NCA and its large-scale arable farmland can be seen in most directions from the elevated ground of the surrounding area.

3.1.2 Regional character assessments

The study area lies in the *Chalklands LCA* as described in the Cambridgeshire Landscape Guidelines (Cambridgeshire County Council, 1991) and the *Rural Lowland Mosaic: Chalklands LCA* as described in the Cambridge Landscape Character Assessment (Cambridge City Council, 2003). The Cambridge assessment describes the area as follows:

- the East Anglian Heights, between Cambridge and Newmarket are gently rounded, reaching 74m above ordnance datum (AOD) at Wandlebury;
- the dry valleys of the chalk are important landscape feature;
- springs occur at the junction of the chalk and clay;
- fields are large, sometimes enclosed by closely maintained low thorn hedges, but with few hedgerow trees. Shelter belts, often of beech, and hill top copses are an important feature of this landscape;
- roads towards Cambridge tend to be straight, run across the contours and may command panoramic views of the city; and
- an area rich in archaeological features and recreational and ecological sites.

3.1.3 Local character assessments

To provide a more detailed assessment of local landscape character, the study area has been broken down into six LCA. These have been identified through desk study and field surveys and are described in the following table, and which are shown in Appendix C.

Table 1: Local landscape character areas

LCA	Receptor	Sensitivity
Cambridge Southern Fringe LCA	This LCA is on the southern edge of Cambridge, between Hauxton Road and Babraham Road (A1307). It comprises the Cambridge Biomedical Campus, residential development and community facilities including schools, public open space and local shops. The hospital and campus are dominant features in the landscape, characterised by multi-storey laboratories, offices and car parks, in a variety of architectural styles and materials. The campus lacks coherence in form, scale and appearance, and the complex network of roads and large blocks results in poor legibility and permeability for cyclists and pedestrians. Housing dates mainly from the post-war period, with flats, detached and semi-detached houses in generous gardens. Recent residential developments around Trumpington and Addenbrookes comprise three and four storey townhouses and apartment blocks, arranged around green, open space. Streets are generally tree-lined and planting is generous, creating an attractive landscape framework. Tranquillity within the housing areas is higher away from main roads but lower on Trumpington Road and Addenbrooke's Road which are busy through routes. There are open views from the southern edge of the LCA across arable fields. The landscape includes part of the Trumpington Conservation Area but most of it is undesignated and the landscape value is medium. The susceptibility of the landscape to change resulting from a transport scheme is medium due to the existing presence of transport infrastructure in the LCA. Overall, the sensitivity of the landscape is medium.	Medium
Gog Magog Hills Chalkland LCA	The Gog Magog Hills, key to the character of the area, are part of a distinctive chalk ridge south-east of Cambridge. The landform is gently undulating, with smooth slopes rising up to relatively high, rounded hills, often capped with beech, lime or sycamore woodland. The Gog Magog hills are one of the highest points around Cambridge and there are long views over the open landscape, framed by woodland blocks and plantations. Views to Cambridge give the area its strong sense of place. The predominant land use is farmland and there is relatively little settlement. Arable fields, some enclosed by hedgerow, are generally medium to large and regular in shape. Woodland belts screen the isolated cottages and farmhouses in the LCA, especially along Granham's Road, Hinton Way and Haverhill Road. There is a small number of number of public rights of way (PRoW), including a footpath to the chalk springs of Nine Wells (the source of Hobson's Conduit) and byways leading to and along the Roman Road (E2 European Long	Medium

LCA	Receptor	Sensitivity
	Distance Route). A railway line crosses the western end of the LCA between Cambridge and Great Shelford and Sustrans Route 11 runs along the line for part of its route. Noise and activity generated by traffic on the A1307 Cambridge Road and the A11 detract from the otherwise rural character of the area and reduce tranquillity. The LCA is in the Green Belt. The landscape is undesignated, but the heritage and recreational value of Nine Wells and the Roman Road means that the value of the landscape is medium. The susceptibility of the landscape to change resulting from a transport scheme is medium due to the existing presence of transport infrastructure in the LCA. Overall, the sensitivity of the landscape is medium.	
River Granta Valley Nucleated Villages LCA	This area includes the villages of Great Shelford, Stapleford and Sawston. They are all situated on low-lying land along branches of the River Granta. Each village has a historic core, designated as conservation area. The 16th century and listed Sawston Hall (grade I) is in the heart of Sawston, but the perimeter woodland of the park screens it entirely from the village. Much of the planting in the grounds (registered park and garden, grade II) dates from the 19th century. Sawston Meadows are a site of special scientific interest. Great Shelford and Sawston have been developed substantially since the second world war in a mixture of often contrasting architectural styles and building materials. Stapleford is less developed. Expansion has been gradual, with small estates or groups of houses arranged around narrow, residential roads and cul-de sacs. In Sawston, post-war housing is laid out in a uniform grid across much of the village. The streets are tree-lined and gardens and open spaces are well vegetated, giving the villages a verdant character. Community resources in the villages include shops, schools, recreational green spaces and public houses. Tranquillity is reduced in Great Shelford by the noise and activity generated by traffic on the A1303 and the railway line and station. It is higher in the other villages, especially away from through roads. The wider landscape is largely screened from view by planting on the village edges, although there are more open views from the eastern edge of Stapleford and the northern edge of Great Shelford. There is street lighting in the villages and villages are lit with street The conservation area status of the historic core in each of the villages gives the LCA a medium value. The susceptibility of the landscape to change resulting from a transport scheme is medium due to the existing presence of transport infrastructure in the LCA. Overall, the sensitivity of the landscape is medium.	Medium

LCA	Receptor	Sensitivity
Babraham and the Abingtons Designed Landscapes and Research Parks LCA	Babraham, Little Abington, and Great Abington, at the eastern end of the study area, are small villages with historic centres, many listed buildings, post-war residential development and large new research parks nearby. Parts of all three villages are designated as conservation areas. The River Granta separates Little Abington from Great Abington and runs along the northern boundary of Granta Park and through the grounds of Babraham Hall. The research parks are constructed on land associated with the historic houses of Babraham Hall and Abington Hall. Babraham Hall (grade II listed), was built in the early 19th century and is now occupied by the Babraham Institute. The character of the designed parkland landscape around the hall has been eroded by the development of the life sciences research campus on part of the estate. The campus comprises large laboratory buildings, housing and car parks in a landscape setting. Woodland around the perimeter of the estate and the along the River Granta corridor screens the campus from the surrounding landscape. The setting of Abington Hall (grade 2*), built in the early 18th century, with grounds laid out by Humphry Repton in around 1800, has been much altered with the development of the Welding Institute (TWI) and Granta Park, a pharmaceutical research park, south and west of the hall. Perimeter woodland and 21st century screen planting on Granta Park effectively screen the large laboratory buildings, car parks, designed landscape of the research park from the wider area, though part of TWI and Abington Hall (occupied by TWI) are visible in framed views from the churchyard of the parish church (grade 2*) in Little Abington. The LCA has a wooded and secluded character due to the substantial woodland cover of the area. Tranquillity is affected by the noise and activity generated by the Babraham Institute, TWI, the laboratories on Granta Park and the A11 dual carriageway, which separates Babraham from Abington. The villages and research parks are lit at night, but the surrounding landscape is relatively dark. The conservation area status of the villages, the listed historic houses gives the LCA a high value. The susceptibility of the landscape to change resulting from a transport scheme is medium due to the existing presence of transport infrastructure in the LCA. Overall, the sensitivity of the landscape is medium.	Medium
River Granta Valley LCA	The Granta Valley, south and south-east of Cambridge, has the low-lying, gentle topography typical of river valleys. Key to its character are the tree-lined river and the arable fields, pastures and water meadows on the fertile soils of the valley. The extensive woodland within the landscape gives it a relatively enclosed, verdant character and screens views of settlement and transport infrastructure. Fields are generally medium to large and regular in shape, becoming more irregular along	Medium

LCA	Receptor	Sensitivity
	the River Granta. The River Granta is a County Wildlife Site for much of its length. Pampisford Hall (grade II*) is set in a grade II* Registered Park and Garden. It comprises a 19th century pleasure ground, an arboretum and the remains of a formal garden laid out to original designs by Robert Marnock. An avenue of conifers lines the drive to the hall. Pampisford village is a small settlement, separated from Sawston by woodland belts and farmland. The centre of the village is a conservation area. There is a good PRoW network in the area and Sustrans Route 11 runs along the railway line north of Great Shelford. Noise and activity generated by traffic on the A1307, the A10, the A11 and the villages in the Granta Valley detract from the otherwise rural character of the area and reduce tranquillity. The LCA is partly in the Green Belt. The Registered Park and Garden at Pampisford Hall and the Pampisford Conservation Area give the LCA a high value. The susceptibility of the landscape to change resulting from a transport scheme is medium due to the existing presence of transport infrastructure in the LCA. Overall, the sensitivity of the landscape is medium.	
Gog Magog Hills Recreational LCA	The LCA comprises Wandlebury Country Park, Magog Down and the Gog Magog Golf Course. The LCA is on elevated land on the Gog Magog Hills with high points at Wandlebury Ring, Little Trees Hill and Telegraph Clump. Wandlebury Ring is an Iron Age hill fort. A listed stables, coach house and service block (grade II), built in the mid-18th century in the classical style is all that remains of Wandlebury House. Magog Down is an area of chalk downland, surrounded by scrub vegetation and woodland and open to the public. The golf course was first laid out in 1899. The extensive belts of woodland and scrub in the country park and on the golf course screen views of the wider landscape south from both sites and add to the secluded and verdant quality of much of the area. There are open views south from Magog Down. Noise and activity generated by traffic on the A1307 detract from the otherwise rural character of the area and reduce tranquillity, but the road is well screened from all three recreational areas. The LCA is in the Green Belt. The historic importance of Wandlebury Rings and the high recreational value of the country park, golf course and Magog Down give the LCA a high value. The susceptibility of the landscape to change resulting from a transport scheme is high. Overall, the sensitivity of the landscape is high.	High

3.2 Landscape Designations

3.2.1 Green Belt

The Cambridge Green Belt was created in 1954. Its purposes, as set out in the Cambridge Local Plan 2006, are to:

- Preserve the unique character of Cambridge as a compact, dynamic city with a thriving historic centre.
- Maintain and enhance the quality of its setting.
- Prevent communities in the environs of Cambridge from merging into one another and with the City.

3.2.2 Registered Parks and Gardens

The following registered parks and gardens are located within the study area. Their descriptions are based on the relevant listing by Historic England:

Sawston Hall, Grade I listed

The gardens at Sawston Hall are on the south front and are divided by yew hedges into small compartments. A moat borders the gardens on their southern side. Map evidence suggests that the gardens were mainly laid out during the 19th century (OS 1885); they have been much simplified and altered in the 20th century. South of the moat, the pleasure grounds comprise lawns with mature trees which blend into the southern woodland. A series of ornamental and functional watercourses drain the low-lying land and feed the moat.

The remaining land at Sawston, is no longer open parkland, but is now (1999) composed of woodland blocks and open meadows, one of which is a 7.4ha SSSI.

Pampisford Hall, Grade II* listed

The grounds of Pampisford Hall cover around 60ha. They sit in a triangle of land between the A11 (dual carriageway) and the busy A505 Royston Road. The historic park is enclosed on all sides by woodland belts and plantations. There is one key view into and out of the site, along the south-eastern cedar avenue in the pleasure grounds. This frames views out of the surrounding countryside. The pleasure grounds are enclosed by parkland fencing. The remains of a small, formal garden lie below the south-west front, comprising gravel paths and Lawson cypresses surrounding a box parterre. An arboretum of great variety in terms of the species (some rare) and age of the trees, surrounds the garden. It includes some fine mature cedars. The pleasure ground is cut through with walks, rides and avenues lined with broadleaved and coniferous species.

3.2.3 Conservation Areas

The conservation areas within the study area are listed below and shown in Appendix C. Their descriptions are informed by the relevant conservation area appraisals that have been completed to date:

Babraham Village and Hall

No conservation area appraisal to date.

Great and Little Abington

No conservation area appraisal to date.

Great Shelford

This historic core of the village contains the parish church and primary school, the Kings Mill and three historic farms (Rectory Farm, De Freville Farm and The Grange), along with a number of historic pubs and shops, a chapel, former blacksmith's forge and several timber-framed and thatched dwellings. The southern part of the conservation area also includes extensive areas of flood plain, open meadow and managed recreational grounds bordering the Cam which separates Great Shelford and Little Shelford.

Pampisford

No conservation area appraisal to date.

Sawston

The main focus of the conservation area is the junction between the High Street and Church Lane, Mill Lane and Common Lane. This historic core of the village contains the parish church, Sawston Hall, a listed tannery complex and a number of historic pubs and dwellings. The conservation area includes the meadows of the Cam flood plain and the grounds of Sawston Hall.

Stapleford

No conservation area appraisal to date.

3.2.4 Scheduled Monuments

Scheduled monuments are in the study area include:

- a site west of White Hill Farm;
- a causewayed enclosure and bowl barrow at Little Trees Hill;
- two moated sites 150m east of College Farm;
- long barrow and enclosure 870m near Copley Hill Farm;
- bowl barrow on Copley Hill;
- Wormwood Hill tumulus;
- Wandlebury Camp: a multivallate hillfort, earlier univallate hillfort, Iron Age cemetery and 17th century formal garden remains; and
- Worstead Street (Via Devana) near Cambridge.

3.2.5 Sites of Special Scientific Interest (SSSI)

The SSSIs in the study area include:

- Sawston Hall Meadows;
- Gog Magog Golf Course; and
- Roman Road.

3.3 Topography

The topography of the study area is mainly low lying along the River Granta and its tributaries. The land rises to the east towards the Gog Magog Hills, with high points at Wandlebury Country Park, White Hill, Clark's Hill, Fox Hill, Little Trees Hill, Signal Hill Plantation and higher land north of the Abingtons.

4 Visual Amenity

4.1 Key Viewpoints

Designated views

Appendix F: Tall Buildings and The Skyline of the Cambridge Local Plan, 2018 is intended to provide clarity over the interpretation of *Policy 60: Tall buildings and the skyline in Cambridge*. Overall, this guidance to ensure the overall character and qualities of the Cambridge skyline are maintained and, where appropriate, enhanced as the city continues to grow and develop in the future. The generally level topography of the city and its environs results in limited vantage points to enable views of the whole city skyline. However, there are still some good vantage points around the city. Appendix F in the local plan highlights three long to medium distances view towards Cambridge from the southeast:

- Strategic Viewpoint 7 : from Little Trees Hill, Magog Down;
- Strategic Viewpoint 8 : from the Limekiln Road lay-by.
- Strategic Viewpoint 9 : from the junction of Shelford Road/Wort's Causeway and the Harcamlow Way where there is a panoramic view that takes in both Addenbrooke's Hospital, the City Centre and the hangars at Cambridge Airport;

The majority of the strategic viewpoints are focused upon views towards the city and would not include the proposed scheme. Only the view from Little Trees Hill, Magog Down (strategic viewpoint 7) would potentially be affected by the CSET Phase 2 scheme. This viewpoint takes in a wide panorama looking north/north-west and includes part of the study area, however, views towards the proposed scheme from this location are screened by intervening vegetation and topography and has therefore not been included in the assessment.

The purpose of the guidance is to assess the potential impact of tall buildings upon the skyline of Cambridge and since proposed scheme comprises a ground level busway and buses moving through the landscape, it would be unlikely to have any impact upon the Cambridge skyline.

Representative views

Views of the proposed scheme would be limited by the screening effects of topography, built form and woodland to a fairly narrow corridor of land within 1000m of the scheme. Views of the busway might be possible from residential areas on the edge of Cambridge, Great Shelford, Stapleford, Sawston, Babraham and Little Abington, but these would be largely filtered through intervening vegetation. Views would also be possible from the PRoW in the area and the Cambridge Biomedical Campus. Desktop analysis and field survey were used to determine the representative views potentially affected by the proposed scheme.

Key views highlighted within the draft Stapleford and Great Shelford Neighbourhood Plan were also reviewed and incorporated in the appraisal if likely to be affected by the proposed scheme.

The below table provides a description of visual receptors, their location, sensitivity and distance from the proposed scheme (including the three travel hub site options).

Table 2: Visual receptors (viewpoint locations and photographs illustrating receptors' views are in Figures 6 to 14, Appendix B)

Receptor	Existing View	Sensitivity	Distance
Viewpoint (VP)1 Residents in properties on the southern edge of Cambridge, along the A1307 Babraham Road, looking south.	View looking along the A1307, Babraham Road and beyond, with a hedgerow in the foreground and undulating arable fields beyond. Areas of woodland form landmarks upon the crest of distant hills. The hedgerow partially screens views from ground level towards the route of the proposed scheme. Most properties along this section of Babraham Road have vegetated front boundaries which will further screen views. There may be glimpsed long distant views of the proposed scheme from upper storeys of properties.	High	1.3km
VP2 - Residents in properties on Hinton Way, Great Shelford looking south and east.	View looking along Hinton Way and across open arable fields in the foreground. In the background of the view the landform rises to woodland on hill tops. Intervening hedgerows and woodland screen views of the route of the proposed scheme from this location.	High	0.85km
VP3 - Residents in properties on the northern edge of Stapleford on Haverhill Road looking north-east.	View looking along Haverhill Road and across open arable fields in the foreground. The landform rises to screen some middle-ground views of the route of the proposed scheme. Gog Magog Cottages and Magog Down are visible in the background of the view.	High	0.15km
VP4 - Residents in properties on the eastern edge of Pampisford looking north-east.	The view is open in the foreground across a neighbouring arable field. In the middle-ground and background, vegetation screens the majority of long views. None of the proposed options would be visible from this location, due to intervening vegetation.	High	1.7km
VP5 - Residents in properties on the southern edge of Cambridge on Southwell Drive looking south-east.	The view is largely open in the foreground, across fencing and immature planting, with views of arable fields. In the middle-ground, hedging and a small area of woodland are notable. The landform rises to the south-east in the background of the view, with woodland forming a landmark on the crest of the hill and limiting views beyond. The Propose Scheme would be visible in the middle-ground, but partially screened by the hedgerow bordering the railway line.	High	0.42km
VP6 – Recreational users of Dame Mary Archer Way looking south-east.	The view is open across arable fields in the foreground. Hedging and woodland partially screens views in the middle-ground. Beyond the hedging, the landform rises towards the woodland upon Magog Down. The hedgerow in the middle-ground would screen the route of the proposed scheme from this location.	Medium	1km
VP7 – Users of Footpath 39/8 looking south.	View along Granham's Road and across open neighbouring fields in the foreground and middle ground. The landform rises to the south-east with - woodland in the background. The route of the proposed scheme would be screened from this location.	High	1km
VP8 - Users of Footpath 198/1 looking north from an elevated location.	View from pedestrian overbridge looking across open arable fields in the foreground. Woodland and tree planting associated with nearby housing partially screens views in the middle-ground. In the background a ridgeline is visible together with woodland planting along part of the ridgeline. The route of the proposed scheme would be partially visible in the background of the view.	High	0.6km

Receptor	Existing View	Sensitivity	Distance
VP9 - Users of Bridleway 212/2 looking northeast.	The view is open in the foreground and middle ground along the bridleway and across neighbouring arable fields. In the background of the view, the undulating topography and vegetation of Magog Down are notable. The route of the proposed scheme would be visible in the middle-ground.	High	0.5km
VP10 – Visitors to Magog Down and users of Footpath 212/3 looking south-west.	The view is open in the foreground framed by vegetation to the east and west of the view. In the middle-ground the view is open across arable fields and boundary hedgerows. In the background of the view the edge of Great Shelford and Stapleford are notable, together with associated vegetation within and beyond the villages. The route of the proposed scheme would be visible in the middle-ground.	High	1.1km
VP11 - Users of Footpath 196/2 looking north-east.	View from the point where the footpath meets Cambridge Road. There is a view across open fields beyond partially filtered in by trees and shrubs in the foreground. Magog Down and the Gog Magog Hills are visible in the background. There might be glimpsed views of the route of the proposed scheme, partially screened by intervening vegetation.	High	0.8km
VP12 - Users of Footpath 12/5 looking south-west.	The view is open in the foreground across an arable field, which slopes up to a ridgeline, screening views beyond. The background of the view is framed to the east and west by woodland, with intermittent trees running along the ridgeline. The route of the proposed scheme would be screened form this location.	High	1.0km
VP13 - Users of Footpath 12/4 looking south-east.	The view is open in the foreground and middle ground looking along a farm track and across arable fields. In the background, woodland and hedgerows along field boundaries screen the majority of views beyond. There might be distant glimpsed views of the route of the proposed scheme (brown option), beyond the hedgerow, in the background.	High	0.5km
VP14 - Users of Footpath 12/9 looking east.	The view is open in the foreground and middle ground looking across arable fields and adjacent cycleway, with telegraph poles forming a detracting element in the view. The background of the view comprises woodland planting and hedgerows along field boundaries. The Proposed Scheme would be visible in the middle-ground of the view.	High	0.25km
VP15 – Residents on the eastern edge of Sawston and users of Restricted Byway 12/10 looking east.	The view is largely open in the foreground and middle ground, albeit partially screened by the hedgerow running along the southern side of Sawston Road and property in the foreground of the view. In the background of the view, vegetation associated with the River Granta is notable, with vegetated highpoints including Meggs Hill and Signal Hill Plantation beyond.	High	0.35km
VP16 - Users of Footpath 179/2 looking east.	The view is open in the foreground across arable fields. Intermittent hedgerows partially screen views in the middle ground, with telegraph poles crossing the field forming a detracting element. In the background woodland planting is notable, forming the backdrop to the view. The route of the proposed scheme would be visible in the middle ground of the view.	High	0.4km
VP17 - Users of Footpath 179/4 looking north-east.	The view is open in the foreground and middle-ground across arable fields, which rise up to the ridgeline of the	High	0.6

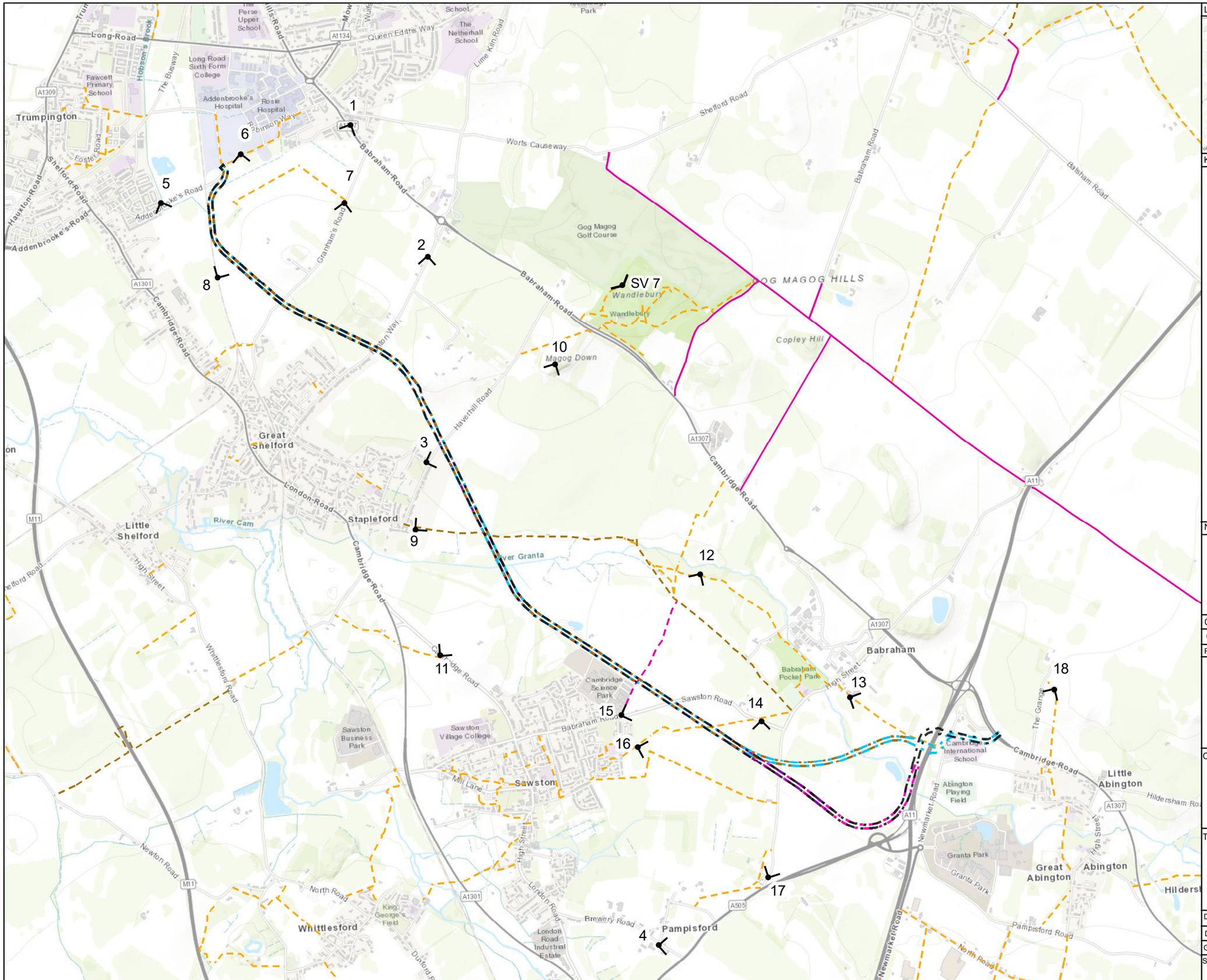
Receptor	Existing View	Sensitivity	Distance
	hill forming the background of the view. To the east and west of the view, vegetation along the A505 and along field boundaries frames and partially screens the view beyond. The route of the proposed scheme would not be not visible, due to the sloping topography.		
VP18 - Users of Footpath 4/2 looking south-west.	The view is open in the foreground and middle-ground across arable fields. A hedgerow running along a farm track and trees within the hedgerow filter parts of the view. In the background, woodland screens the majority of views, although there are glimpses of the top of buildings within Granta Park. The proposed scheme (Blue Option) would be visible in the middle ground of the view, beyond the hedgerow.	High	0.25km

5 Recommendations

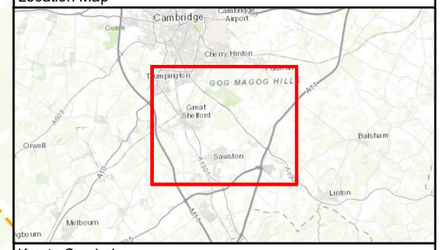
Based on the field survey, initial landscape appraisal and assessment of the design guidance highlighted within this report, the following will be undertaken as part of the OBC sifting, and for the Environmental Impact Assessment once the preferred scheme has been determined. It should be noted that these may change following consultation with the Local Planning Authority and local stakeholders.

- A tree survey of the areas required for construction of the proposed route and the travel hubs would be undertaken to determine the important trees to be protected and retained and to assess potential impacts on trees and woodland. This will include an Arboricultural Impact Assessment and associated plans.
- Liaison with the engineering and environmental team to develop the route and travel hub location that takes into account the environmental constraints identified such as important landscape and heritage features, drainage and wildlife habitats. A process of iterative design would minimise impacts on these valued features.
- A Landscape and Visual Impact Assessment (LVIA) would be undertaken of the preferred option as part of the EIA.
- A Landscape Masterplan would be developed for the preferred option to illustrate the spatial framework, the relationship between the landscape and engineering elements and ensure a strong green infrastructure forms part of the scheme.
- A design guide would be prepared for the scheme to ensure the landscape integration of the busway and travel hub into the landscape setting of the route corridor. This would include typical cross-sections and recommendations for materials and plant species.

A. Viewpoint Location Plan



Location Map



Key to Symbols

- Viewpoint Locations
- Route - Phase 2 - Black Option Boundary
- Route - Phase 2 - Blue Option Boundary
- Route - Phase 2 - Brown Option Boundary
- Route - Phase 2 - Purple Option Boundary
- Route - Phase 2 - Pink Option Boundary
- Bridleway
- Footpath
- Byway
- Restricted Byway

Notes

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Rev	Date	Drawn	Description	Ch'k'd	App'd
02	30/10/19	KV	Additional Viewpoint	JM	JM
01	15/06/19	KV	First Draft	CC	MS

MOTT MACDONALD

Mott MacDonald
22 Station Road
Cambridge, CB1 2JD
United Kingdom
T +44 (0)20 8774 2000
F +44 (0)20 8681 5706
W mottmac.com

Client

GREATER CAMBRIDGE CITY DEAL
Securing future prosperity

Greater Cambridge Partnership
Shire Hall
SH1317
Cambridge, CB3 0AP

Title

CSETS Phase 2: Viewpoint Location Plan

Designed	C Coupland		Eng Check	J Morrison	
Drawn	K Vahakuopus		Coordination	J Morrison	
GIS Check	J Morrison		Approved	J Montgomery	

Scale at A3	Status	Rev	Security
1:30,000	PRE	P2	STD

Drawing Number: 403394-MMD-02-LAND-GIS-Y-0004

0 0.5 1 1.5 2 Kilometres

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B. Viewpoint Photographs

VIEWPOINT 1: LOOKING SOUTH FROM BABRAHAM ROAD, CAMBRIDGE

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
1	17/09/2019	09.53	TL47215 54777	20m AOD	1.6	CANON EOS 6D

VIEWPOINT 2: LOOKING SOUTH AND EAST FROM HINTON WAY, GREAT SHELFORD

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
2	17/09/2019	10.49	TL47758 53799	28m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
W mottmac.com

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Phase 2
Landscape Appraisal

Viewpoints

Drawn	C Coupland	CEC
Checked	J Morrison	JVM
Approved	J Montgomery	JM

Scale at A3
N/A

Drawing Number
Figure 6

Security	Status	Rev
STD	PRE	P1

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VIEWPOINT 3: LOOKING NORTHEAST FROM HAVERHILL ROAD, STAPLEFORD

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
3	17/09/2019	11.19	TL47779 52094	20m AOD	1.6	CANON EOS 6D

VIEWPOINT 4: LOOKING NORTHEAST FROM EASTERN EDGE OF PAMPISFORD

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
4	17/09/2019	13.33	TL49803 48018	20m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
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Approved	J Montgomery	JM

Scale at A3
N/A

Drawing Number
Figure 7

Security	Status	Rev
STD	PRE	P1

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VIEWPOINT 5: LOOKING SOUTHEAST FROM SOUTHWELL DRIVE

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
5	17/09/2019	10.12	TL45565 54260	15m AOD	1.6	CANON EOS 6D

VIEWPOINT 6: LOOKING SOUTHEAST FROM DAME MARY ARCHER WAY

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
6	17/09/2019	10.08	TL46266 54699	15m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
W mottmac.com

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Drawn	C Coupland	CEC
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Approved	J Montgomery	JM

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N/A

Drawing Number
Figure 8

Security	Status	Rev
STD	PRE	P1

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VIEWPOINT 7: LOOKING SOUTH FROM PROW 39/8

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
7	17/09/2019	09.46	TL47086 54326	27m AOD	1.6	CANON EOS 6D

VIEWPOINT 8: LOOKING NORTH FROM NATIONAL CYCLE NETWORK ROUTE 11

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
8	17/09/2019	10.34	TL46069 53439	35m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
W mottmac.com

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Landscape Appraisal

Viewpoints

Drawn	C Coupland	CEC
Checked	J Morrison	JVM
Approved	J Montgomery	JM

Scale at A3
N/A

Drawing Number
Figure 9

Security	Status	Rev
STD	PRE	P1

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VIEWPOINT 9: LOOKING NORTHEAST FROM PROW 212/2

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
9	17/09/2019	11.27	TL47710 51562	12m AOD	1.6	CANON EOS 6D

VIEWPOINT 10: LOOKING SOUTHWEST FROM PROW 212/3

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
10	17/09/2019	11.06	TL48820 52938	74m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
W mottmac.com

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Drawn	C Coupland	CEC
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Approved	J Montgomery	JM

Scale at A3
N/A

Drawing Number
Figure 10

Security	Status	Rev
STD	PRE	P1

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VIEWPOINT 11: LOOKING NORTHEAST FROM PROW 196/2

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
11	17/09/2019	12.04	TL47893 50472	29m AOD	1.6	CANON EOS 6D

VIEWPOINT 12: LOOKING SOUTHWEST FROM PROW 12/5

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
12	17/09/2019	13.04	TL50171 51135	20m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
W mottmac.com

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Approved	J Montgomery	JM

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Figure 11

Security	Status	Rev
STD	PRE	P1

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VIEWPOINT 13: LOOKING SOUTHEAST FROM PROW 12/4

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
13	17/09/2019	10.35	TL51366 50109	28m AOD	1.6	CANON EOS 6D

VIEWPOINT 14: LOOKING SOUTH EAST FROM PROW 12/9

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
14	17/09/2019	12.31	TL50487 49954	32m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
W mottmac.com

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Drawn	C Coupland	CEC
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Approved	J Montgomery	JM

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Drawing Number
Figure 12

Security	Status	Rev
STD	PRE	P1

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VIEWPOINT 15: LOOKING EAST FROM RESTRICTED BYWAY 12/10

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
15	17/09/2019	12.16	TL49638 49982	24m AOD	1.6	CANON EOS 6D

VIEWPOINT 16: LOOKING NORTHEAST FROM PROW 179/2

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
16	17/09/2019	12.22	TL49622 49594	26m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
W mottmac.com

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Title

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Drawn	C Coupland	CEC
Checked	J Morrison	JVM
Approved	J Montgomery	JM

Scale at A3
N/A

Drawing Number
Figure 13

Security	Status	Rev
STD	PRE	P1

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VIEWPOINT 17: LOOKING NORTH EAST FROM HIGH STREET, PAMPISFORD

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
17	17/09/2019	13.28	TL50646 48648	27m AOD	1.6	CANON EOS 6D

VIEWPOINT 18: LOOKING SOUTHWEST FROM PROW 4/2

VIEWPOINT	DATE	TIME	OS GRID REF.	ELEVATION	EYE LEVEL	CAMERA
18	17/09/2019	13.52	TL53128 50090	48m AOD	1.6	CANON EOS 6D

MOTT MACDONALD

1st Floor
East Wing, 69-75 Thorpe Road
Norwich, NR1 1UA
United Kingdom

T +44 (0)1603 767530
F +44 (0)1603 619365
W mottmac.com

Client

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Drawn	C Coupland	CEC
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Approved	J Montgomery	JM

Scale at A3
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Drawing Number
Figure 14

Security	Status	Rev
STD	PRE	P1

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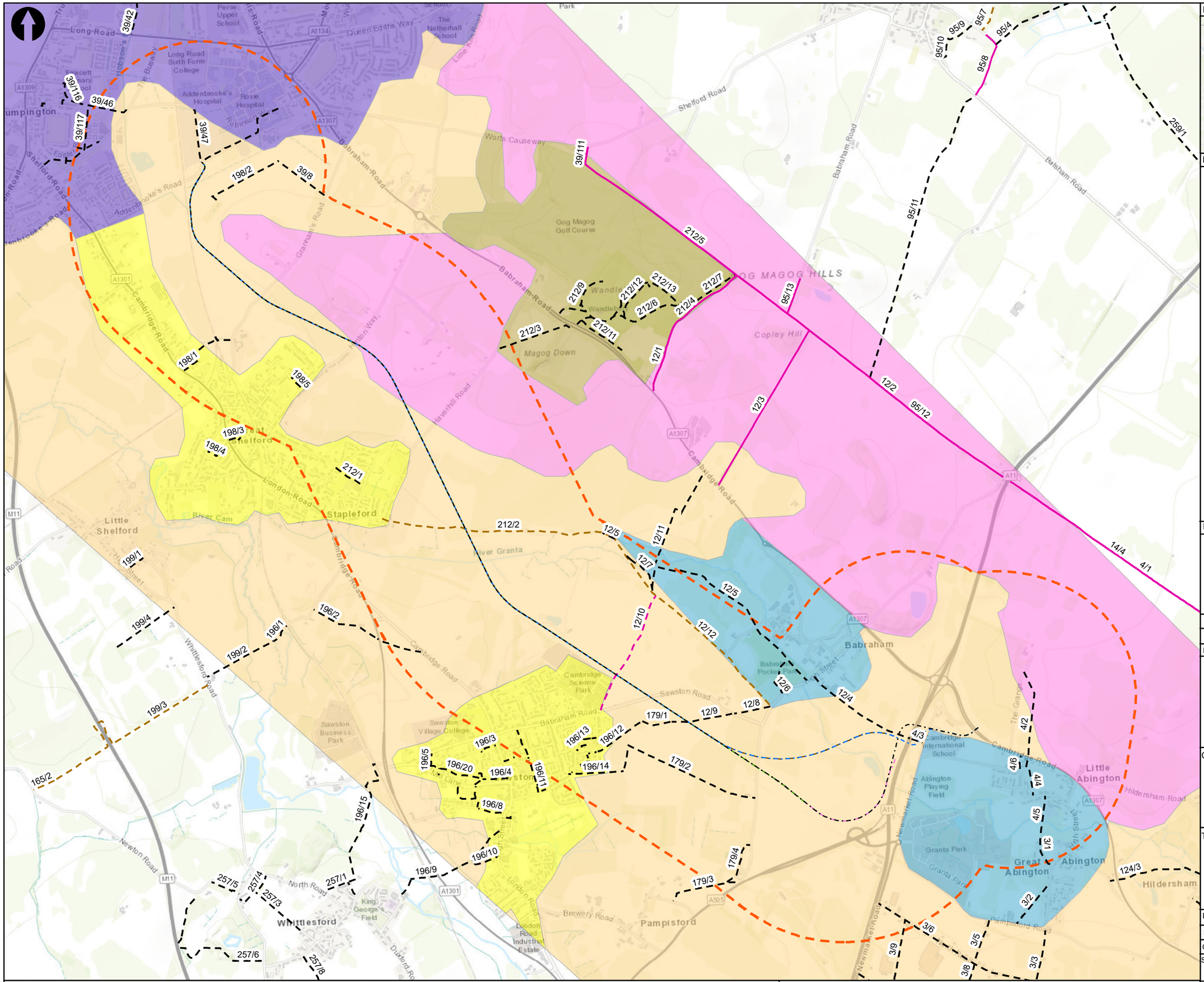
C. Landscape Character



Notes

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Rev	Date	Drawn	Description	Ch'k'd	App'd
02	24/10/19	KV	LCA updated	JM	JM
01	16/09/19	WJG	First Draft	CC	JM

Mott MacDonald
22 Station Road
Cambridge, CB1 2JD
United Kingdom
T +44 (0)20 8774 2000
F +44 (0)20 8681 5706
W mottmac.com

Client

GREATER CAMBRIDGE PARTNERSHIP

Title

Figure C.1 CSETS – Phase 2 Local Landscape Character Areas

Designed	WJ Goh		Eng Check	J Morrison	
Drawn	K Vahakuopus		Coordination	J Morrison	
GIS Check	WJ Goh		Approved	J Montgomery	

Scale at A3	Status	Rev	Security
1:30,000	PRE	P2	STD

Drawing Number

401986-MMD-02-LAND-0007

0 500 1,000 1,500 2,000 Meters

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H. Noise

MOTT MACDONALD

Technical Note

Project:	CSET Phase 2 (A1307)		
Our reference:	N/A	**Your reference:**	N/A
Prepared by:	John Edhouse	**Date:**	15 July 2019
Approved by:	Max Forni	**Checked by:**	Stuart Dyne
Subject:	OAR – Noise		

1 Introduction

This technical note summarises outcomes from a qualitative WebTAG assessment of the Cambridge South East Transport (CSET) Phase 2 improvement options.

CSET Phase 2 (A1307) includes proposals to construct a new travel hub and bus route connecting Cambridge and the A1307-A11 junction. Five scheme options are proposed for WebTAG appraisal.

Preliminary review of the five scheme options has been completed to understand potential noise impacts. Noise effects associated with the scheme are expected to arise from; vehicles using the new bus route, changes in traffic using the existing road network and activities associated with use of the new travel hub.

This assessment considers noise impacts during operation of the scheme only. Vibration during operation and noise and vibration during construction are scoped out for this assessment.

2 Methodology

Changes in road traffic noise are calculated and assessed in England using guidance provided by the Design Manual for Roads and Bridges (DMRB) HD 213/11 and Calculation of Road Traffic Noise (CRTN). Traffic noise at source is a function of gradient, road surface, traffic volume, speed and percentage HGVs. The methodology assesses traffic noise over an 18-hour period (06:00 – 24:00) and the index conventionally used to calculate it is the $L_{A10,18\text{-hour}}$. For WebTAG this value is converted into an $L_{Aeq,16\text{-hour}}$.

In broad terms, in order to achieve a change of 1dB (the smallest change that would be classified as non-negligible in DMRB) a traffic increase of 25% or decrease of 20% would be necessary. Alternatively, noise changes could also occur as a result of significant changes in flow parameters such as speed and percentage HGV etc.

Forecast traffic information was unavailable at the time of this assessment and therefore a qualitative appraisal has been undertaken to enable comparison of each option at a preliminary stage.

It is expected that the new bus route would not contribute significant additional numbers of vehicles compared to volumes currently using the existing road network and therefore the noise impact would be low, however, for noise sensitive receptors immediately adjacent new bus routes there is potential for adverse

impacts due to the implementation of new noise sources to the existing noise environment. Adverse noise impacts may also occur due to traffic associated with a new travel hub.

This qualitative assessment has therefore considered the following for each route option;

- Identification of noise sensitive receptors within 50m of the route that may be affected by changes in noise levels (increases or decreases) due to changes in traffic or new noise sources;
- Identification of Noise Important Areas within 50m of the route (Noise Action Planning Important Areas Round 3 England, www.gov.uk);
- Review of baseline noise conditions using Extrium noise map (http://extrium.co.uk/noiseviewer.html) in the areas surrounding the route and travel hub;
- Review the location of the travel hub and potential associated noise impacts.

All options share a common route between Cambridge Biomedical Campus and Sawston. The options diverge at Sawston to one of three travel hubs referred to as Option A, Option B and Option C. The five route options and three travel hub options assessed within this technical note are shown in Appendix A.

3 Assessment

The closest receptors to the route sections common for all options are located at:

- Off Hinton Way, Great Shelford
- Off Haverhill Road, Stapleford
- North Farm north of Sawston
- Isolated properties off Sawston Road and High Street east of Sawston

Noise sensitive receptors for the Blue and Black route options and Travel Hub Option C also include locations at:

- Cambridge International School, south of Four Went Ways services
- Hotel at Four Went Ways services
- Residential properties South of Cambridge Road, Little Abington

Noise impacts are assessed to be similar due to the significant similarities and common route sections between all options. Table 1 summarises qualitative noise assessment results for each scheme option.

Table 1: CSET Phase 2, OAR WebTAG Summary, Noise and Vibration

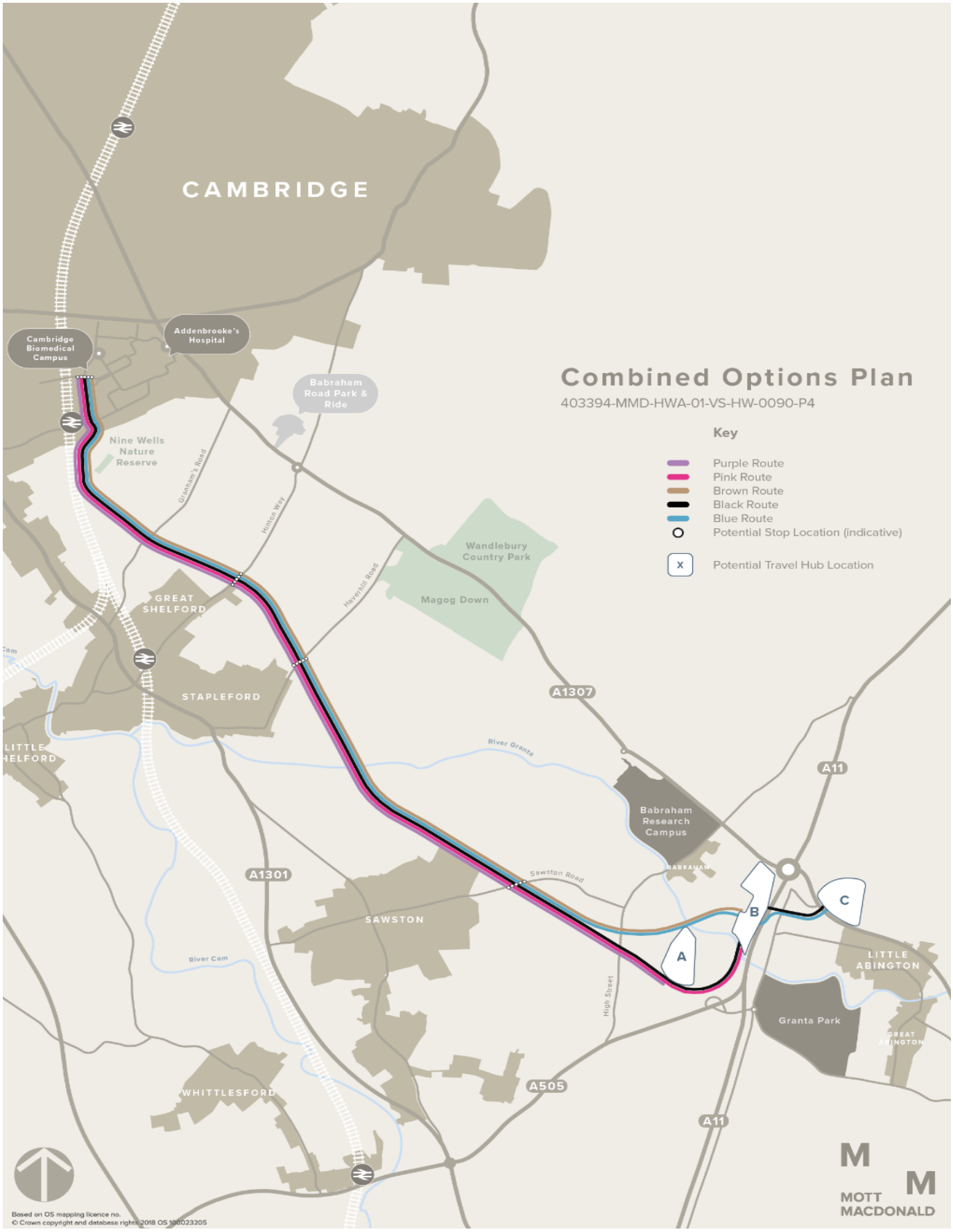
Option	Assessment	Significance
Purple	This Option comprises a new off-road public transport route. The alignment is located in a primarily rural setting however intersects several existing roads near Great Shelford and Sawston. There are very few nearby residential receptors in close proximity along the route. There are fewer than 5 noise sensitive receptors located within 50m of this option route. No Noise Important Areas are located within 50m of this scheme option. Ambient noise levels from major road traffic and rail noise sources during daytime periods are typically less than 55 dB $L_{Aeq,16hr.}$ Ambient noise levels for areas close to the A11 near the travel hub, and Cambridge Biomedical Campus are understood to be between 55-60dB $L_{Aeq,16hr}$. This Option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Where this Option route passes noise sensitive receptors, such as those near Stapleford and Sawston, noise from public transport is likely to be audible at nearest properties. Noise from traffic within the Option A Travel hub is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this Option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Option A Travel Hub.	Minor Adverse
Pink	This Option comprises a new off-road public transport route. The alignment is located in a primarily rural setting however intersects several existing roads near Great Shelford and Sawston. There are very few nearby residential receptors in close proximity along the route. There are fewer than 5 noise sensitive receptors located within 50m of this option route. No Noise Important Areas are located within 50m of this scheme option. Ambient noise levels from major road traffic and rail noise sources during daytime periods are typically less than 55 dB $L_{Aeq,16hr.}$ Ambient noise levels for areas close to the A11 near the travel hub, and Cambridge Biomedical Campus are understood to be between 55-60dB $L_{Aeq,16hr}$. This Option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Where this Option route passes noise sensitive receptors, such as those near Stapleford and Sawston, noise from public transport is likely to be audible at nearest properties. Noise from traffic within the Option B Travel hub is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this Option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Option B Travel Hub.	Minor Adverse

Option	Assessment	Significance
Black	This Option comprises a new off-road public transport route. The alignment is located in a primarily rural setting however intersects several existing roads near Great Shelford and Sawston. There are very few nearby residential receptors in close proximity along the route. There are approximately 12 noise sensitive receptors are located within 50m of this option route. Noise Important Area ID:11061 is located within 50m of this scheme option on the A1307 east of the A11 bounding the north of Little Abington. Ambient noise levels from major road traffic and rail noise sources during daytime periods are typically less than 55 dB $L_{Aeq,16hr.}$ Ambient noise levels for areas close to the A11 near the travel hub, and Cambridge Biomedical Campus are understood to be between 55-60dB $L_{Aeq,16hr}$. This Option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Where this Option route passes noise sensitive receptors, such as those near Stapleford and Sawston, noise from public transport is likely to be audible at nearest properties. Noise from traffic within the Option C Travel hub is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this Option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Option C Travel Hub.	Minor Adverse
Blue	This Option comprises a new off-road public transport route. The alignment is located in a primarily rural setting however intersects several existing roads near Great Shelford and Sawston. There are very few nearby residential receptors in close proximity along the route. There are approximately 12 noise sensitive receptors are located within 50m of this option route. Noise Important Area ID:11061 is located within 50m of this scheme option on the A1307 east of the A11 bounding the north of Little Abington. Ambient noise levels from major road traffic and rail noise sources during daytime periods are typically less than 55 dB $L_{Aeq,16hr.}$ Ambient noise levels for areas close to the A11 near the travel hub, and Cambridge Biomedical Campus are understood to be between 55-60dB $L_{Aeq,16hr}$. This Option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Where this Option route passes noise sensitive receptors, such as those near Stapleford and Sawston, noise from public transport is likely to be audible at nearest properties. Noise from traffic within the Option C Travel hub is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this Option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Option C Travel Hub.	Minor Adverse

Option	Assessment	Significance
Brown	This Option comprises a new off-road public transport route. The alignment is located in a primarily rural setting however intersects several existing roads near Great Shelford and Sawston. There are very few nearby residential receptors in close proximity along the route. There are fewer than 5 noise sensitive receptors located within 50m of this option route. No Noise Important Areas are located within 50m of this scheme option. Ambient noise levels from major road traffic and rail noise sources during daytime periods are typically less than 55 dB $L_{Aeq,16hr.}$ Ambient noise levels for areas close to the A11 near the travel hub, and Cambridge Biomedical Campus are understood to be between 55-60dB $L_{Aeq,16hr}$. This Option is unlikely to result in significant changes in traffic and associated noise using the existing road network. Noise effects will likely be most apparent in the rural areas where existing ambient noise levels are low. Existing noise sources such as the A11 and railway line are likely to predominate for receptors in these locations and significant impacts are unlikely to result. Where this Option route passes noise sensitive receptors, such as those near Stapleford and Sawston, noise from public transport is likely to be audible at nearest properties. Noise from traffic within the Option B Travel hub is unlikely to be significant at the nearest noise sensitive properties although can be reduced through design and inclusion of mitigation where necessary. With this Option there is scope to provide mitigation to reduce noise effects from new noise sources along the route and at Option B Travel Hub.	Minor Adverse

Source: Mott MacDonald

A. Route Options



I. Water

TAG Water Environment Impacts Worksheet - Purple option

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The area around Travel Hub Site A and along the GREEN alignment to Cambridge Biomedical Campus (CBC).									
change to surface water runoff quantity and quality	River Granta	Water supply	No drinking water supply abstraction in vicinity of scheme from the river	Local (not used for public water supply - could be local farmer abstractions)	Commonplace	Not substitutable	Local for farmers if used for irrigation	Negligible - scheme would not affect any abstraction from River Granta	Insignificant
		Biodiversity	Route crosses River Granta which is designated as County Wildlife Site for entire length of Granta from Bartlow to Little Shelford	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme design will ensure crossing is designed to minimise impact on river itself and would not exceed 20m width, and thus on biodiversity at scale of length of river designated which is just over 18kms.	Insignificant
		Biodiversity	Nine Wells LNR - spring fed nature reserve	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme is downgradient from the springs in the Nature Reserve and there is no intention for design to intercept groundwater or surface water which might feed the springs	Insignificant
		Cultural Heritage	Nine Wells - springs feeding Hobsons Conduit	Local	Scarce	Not substitutable	Medium	Negligible - Hobsons Conduit flows through into Cambridge - it was one of the original sources of water for the city. It does not flow much now due to lowering of the groundwater in the area. Design from the scheme could feed into the feeder to the conduit but this needs resolving as part of EIA	Insignificant
		Recreation and value to economy	Route crosses River Granta which is in an area where residents would like improved access along the river for recretational purposes (walking etc)	Local	Commonplace	Substitutable	Low	Slight benefit - the scheme would have NMU access that increases access to countryside and River Granta - scheme could facilitate other improvements to local PROW and Permissive Paths	Insignificant
Potential impact on flood plain	River Granta flood plain	Conveyance of flood flows -Flood Zones 2 and 3	Around 220m of Flood Zone 2 and Flood Zone 3 are crossed once by the Purple Route east of Stapleford. The P&R is located no closer than 120m from the flood zones south of Babraham.	Regional	Commonplace	Substitutable if compensatory flood storage provided if development intrudes into flood plain	Medium	Negligible - scheme design for river crossing would have to ensure there was no loss of flood plain. Route will be aligned to minimise the length of the flood plain crossed. Drainage stategy and design for the P&R site would have to ensure SuDS and no impact on conveyance of flood flows during storm events.	Insignificant
Potential impact on flood plain	Hobsons Brook flood plain	Conveyance of flood flows -Flood Zones 2 and 3	The route crosses about 32 metres of FZ2 nd FZ3 where it connects to the roundabout between Dame Mary Archer Way and Addenbrookes Road in the CMBC. This flood plain is associated with the very headwaters of minor tributory to the River and has been largely built over by CBC development.	Local	Commonplace	Substituable as most of the tributary is already culverted	Low	Negligible impact on the flood zones as the area is largely developed and the stream culverted.	Insignificant
quality impacts on surface water runoff quality and quantity	Stillwater Ponds	Biodiversity	No ponds are directly in footprint but initial high level screening has identified ponds in the vicinity of the route.	Regional potential for GCN in the ponds - HSI assessment underway (2019/20)	Commonplace in Cambridgeshire	Substituable if compensatory habitat is required within scheme footprint	Medium	Negligible impact on ponds themselves as none in the footprint of the scheme. So no impact on GCN habitat likely - may increase potential habitat as part of SUDS scheme.	Insignificant
		Aesthetics - contribution to landscape character	No ponds are direc+E14ty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Local	Commonplace in Cambridgeshire	Substitutable	Low	Negligible - not likely to impact any of the ponds.	Insignificant
contaminantion of groundwater	Groundwater	Water supply	High quality as the groundwater is source of drinking water for public consumption in area of the scheme. Scheme crosses SPZ2 designated in the area which is common for all three abstraction sites, and a small area of SPZ3. No SPZ1 crossed by Scheme.	Regional - There are three groundwater public water supply abstractions in vicinity of this option. The closes is in Babraham, there is another abstraction in Sawston and a third is 1km NW of Babraham research park and west of the A1307.	Locally scarce as the chalk aquifer is not present to the north of the scheme.	Not substitutable	Medium	Negligible. The public transport route has very low risk of contamination from spillages or vehicles due to low number of vehicles and limited volume of contaminants present in the vehicles. At no point is the route wihtin 400m of any SPZ1 boundary, but it does cross about 2.2km of SPZ2 (which provides increased protection in terms of travel time from point of contamination to abstraction site). P&R design will include provision for collection of any spillages in drainage. P&R location is about 47m from the SPZ1 boundary. Construction will be in accordance with EA Pollution Prevention requirements.	Insignificant
reduction in flow in groundwater	Groundwater	Chalk aquifer - conveyance of good quality groundwater	From River Granta crossing near Stapleford, south to P&R site the outcropping aquifer is White Chalk subgroup- with some superficial RTG and ALL along the River Granta valley. From River Granta crossing north to CBC the outcroppinging bedrock is the Grey Chalk subgroup - BGS data	Regional	Commonplace	Not substitutable	Medium	Negligible as scheme will not affect conveyance. The low permeabilty car park surface will lead to change in recharge but on a very small percentage area of aquifer outcrop. There are not intended to be any below ground structures that would impact groundwater flow. Footings for any River Granta crossing would have very minor impact on groundwater flow around the footings - diverting flow around the footings.	Insignificant

Reference Sources

Public data sources - Defra Magic website, EA website (flood zone information), BGS data sources. SCDC Local Plan
GIS Layer showing location of River Granta County Wildlife Site and also Groundwater Protection Zones.
GIS layers showing the route centreline, and preliminary scheme footprint.
GIS layers showing CSET PH2 Habitat areas.

Summary Assessment Score

Insignificant impact on water resources as no direct impacts on any water features other than crossing of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.

Qualitative Comments

TAG Water Environment Impacts Worksheet - Brown option

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The area around Travel Hub Site B and along the BROWN alignment to Cambridge Biomedical Campus (CBC).									
change to surface water runoff quantity and quality	River Granta	Water supply	No drinking water supply abstraction in vicinity of scheme from the river	Local (not used for public water supply - could be local farmer abstractions)	Commonplace	Not substitutable	Local for farmers if used for irrigation	Negligible - scheme would not affect any abstraction from River Granta	Insignificant
		Biodiversity	Route crosses River Granta twice which is designated as County Wildlife Site for entire length of Granta from Bartlow to Little Shelford	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme design will ensure crossing is designed to minimise impact on river itself and would not exceed 20m width at each of two crossings, and thus on biodiversity at scale of length of river designated which is just over 18kms.	Insignificant
		Biodiversity	Nine Wells LNR - spring fed nature reserve	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme is downgradient from the springs in the Nature Reserve and there is no intention for design to intercept groundwater or surface water which might feed the springs	Insignificant
		Cultural Heritage	Nine Wells - springs feeding Hobsons Conduit	Local	Scarce	Not substitutable	Medium	Negligible - Hobsons Conduit flows through into Cambridge - it was one of the original sources of water for the city. It does not flow much now due to lowering of the groundwater in the area. Design from the scheme could feed into the feeder to the conduit but this needs resolving as part of EIA	Insignificant
		Recreation and value to economy	Route crosses River Granta which is in an area where residents would like improved access along the river for recretational purposes (walking etc)	Local	Commonplace	Substitutable	Low	Slight benefit - the scheme would have NMU access that increases access to countryside and River Granta - scheme could facilitate other improvements to local PROW and Permissive Paths	Insignificant
Potential impact on flood plain	River Granta flood plain	Conveyance of flood flows - Flood Zones 2 and 3	This route crosses R Granta twice. Around 220m of Flood Zone 2 and Flood Zone 3 are crossed once by the Brown Route east of Stapleford. Then the route crosses again (south to north) to the south of Babraham just prior to entering the P&R site - it crosses around 170m of FZ2 and 3. The P&R footprint is shown extending into FZ 2 and 3on southern edge of site.	Regional	Commonplace	Substitutable if compensatory flood storage provided if development intrudes into flood plain	Medium	Negligible - scheme design for river crossing would have to ensure there was no loss of flood plain. Route will be aligned to minimise the length of the flood plain crossed. Layout would ensure no car parking , access roads or other infrastructure would be constructed in the demarcated Flood Zones. Drainage stategy and design for the P&R site would have to ensure SuDS and no impact on conveyance of flood flows during storm events.	Insignificant
Potential impact on flood plain	Hobsons Brook flood plain	Conveyance of flood flows - Flood Zones 2 and 3	The route crosses about 32 metres of FZ2 nd FZ3 where it connects to the roundabout between Dame Mary Archer Way and Addenbrookes Road in the CMBC. This flood plain is associated with the very headwaters of minor tributory to the River and has been largely built over by CBC development.	Local	Commonplace	Substituable as most of the tributary is already culverted	Low	Negligible impact on the flood zones as the area is largely developed and the stream culverted.	Insignificant
quality impacts on surface water runoff quality and quantity	Stillwater Ponds	Biodiversity	No ponds are direclty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Regional potential for GCN in the ponds - HSI assessment underway (2019/20)	Commonplace in Cambridgeshire	Substituable if compensatory habitat is required within scheme footprint	Medium	Negligible impact on ponds themselves as none in the footprting of the scheme. So no impact on GCN habitat likely - may increase potential habitat as part of SUDS scheme.	Insignificant
		Aesthetics - contribution to landscape character	No ponds are direclty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Local	Commonplace in Cambridgeshire	Substitutable	Low	Negligible - not likely to impact any of the ponds.	Insignificant
contaminantion of groundwater	Groundwater	Water supply	High quality as the groundwater is source of drinking water for public consumption in area of the scheme. Scheme crosses SPZ2 designated in the area which is common for all three abstraction sites, and a small area of SPZ3. No SPZ1 crossed by Scheme.	Regional - There are three groundwater public water supply abstractions in vicinity of this option. The closest is in Babraham, there is another abstraction in Sawston and a third is 1km NW of Babraham research park and west of the A1307.	Locally scarce as the chalk aquifer is not present to the north of the scheme.	Not substitutable	Medium	Negligible. The public transport route has very low risk of contamination from spillages or vehicles due to low number of vehicles and limited volume of contaminants present in the vehicles. At no point is the route wihtin 400m of any SPZ1 boundary, but it does cross about 2.8km of SPZ2 (which provides increased protection in terms of travel time from point of contamination to abstraction site). P&R design will include provision for collection of any spillages in drainage. P&R is about 400m from nearest SPZ1 boundary. Construction will be in accordance with EA Pollution Prevention requirements.	Insignificant
reduction in flow in groundwater	Groundwater	Chalk aquifer - conveyance of good quality groundwater	From River Granta crossing near Stapleford, south to P&R site the outcropping aquifer is White Chalk subgroup- with some superficial RTG and ALL along the River Granta valley. From River Granta crossing north to CBC the outcroppinging bedrock is the Grey Chalk subgroup - BGS data	Regional	Commonplace	Not substitutable	Medium	Negligible as scheme will not affect conveyance. The low permeabilty car park surface will lead to change in recharge but on a very small percentage area of aquifer outcrop. There are not intended to be any below ground structures that would impact groundwater flow. Footings for any River Granta crossing would have very minor impact on groundwater flow around the footings - diverting flow around the footings.	Insignificant

Reference Sources

Public data sources - Defra Magic website, EA website (flood zone information), BGS data sources. SCDC Local Plan
GIS Layer showing location of River Granta County Wildlife Site and also Groundwater Protection Zones.
GIS layers showing the route centreline, and preliminary scheme footprint.
GIS layers showing CSET PH2 Habitat areas.

Summary Assessment Score

Insignificant impact on water resources as no direct impacts on any water features other than crossing of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.

Qualitative Comments

TAG Water Environment Impacts Worksheet - Pink option

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The area around Travel Hub Site B and along the PINK alignment to Cambridge Biomedical Campus (CBC).									
change to surface water runoff quantity and quality	River Granta	Water supply	No drinking water supply abstraction in vicinity of scheme from the river	Local (not used for public water supply - could be local farmer abstractions)	Commonplace	Not substitutable	Local for farmers if used for irrigation	Negligible - scheme would not affect any abstraction from River Granta	Insignificant
		Biodiversity	Route crosses River Granta twice which is designated as County Wildlife Site for entire length of Granta from Bartlow to Little Shelford	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme design will ensure crossing is designed to minimise impact on river itself and would not exceed 20m width at each of two crossings, and thus on biodiversity at scale of length of river designated which is just over 18kms.	Insignificant
		Biodiversity	Nine Wells LNR - spring fed nature reserve	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme is downgradient from the springs in the Nature Reserve and there is no intention for design to intercept groundwater or surface water which might feed the springs	Insignificant
		Cultural Heritage	Nine Wells - springs feeding Hobsons Conduit	Local	Scarce	Not substitutable	Medium	Negligible - Hobsons Conduit flows through into Cambridge - it was one of the original sources of water for the city. It does not flow much now due to lowering of the groundwater in the area. Design from the scheme could feed into the feeder to the conduit but this needs resolving as part of EIA	Insignificant
		Recreation and value to economy	Route crosses River Granta which is in an area where residents would like improved access along the river for recretational purposes (walking etc)	Local	Commonplace	Substitutable	Low	Slight benefit - the scheme would have NMU access that increases access to countryside and River Granta - scheme could facilitate other improvements to local PROW and Permissive Paths	Insignificant
Potential impact on flood plain	River Granta flood plain	Conveyance of flood flows - Flood Zones 2 and 3	This route crosses R Granta twice. Around 220m of Flood Zone 2 and Flood Zone 3 are crossed once by the Pink Route east of Stapleford. Then the route crosses again (south to north) adjacent to A11 just prior to entering the P&R site from the south - it crosses aroudn 230m of FZ2 and 3. The P&R footprint is shown extending into FZ 2 and 3 on southern edge of site.	Regional	Commonplace	Substitutable if compensatory flood storage provided if development intrudes into flood plain	Medium	Negligible - scheme design for river crossing would have to ensure there was no loss of flood plain. Route will be aligned to minimise the length of the flood plain crossed. Layout would ensure no car parking , access roads or other infrastructure would be constructed in the demarcated Flood Zones. Drainage stategy and design for the P&R site would have to ensure SuDS and no impact on conveyance of flood flows during storm events.	Insignificant
Potential impact on flood plain	Hobsons Brook flood plain	Conveyance of flood flows - Flood Zones 2 and 3	The route crosses about 32 metres of FZ2 and FZ3 where it connects to the roundabout between Dame Mary Archer Way and Addenbrookes Road in the CMBC. This flood plain is associated with the very headwaters of minor tributory to the River and has been largely built over by CBC development.	Local	Commonplace	Substituable as most of the tributary is already culverted	Low	Negligible impact on the flood zones as the area is largely developed and the stream culverted.	Insignificant
quality impacts on surface water runoff quality and quantity	Stillwater Ponds	Biodiversity	No ponds are direclty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Regional potential for GCN in the ponds - HSI assessment underway (2019/20)	Commonplace in Cambridgeshire	Substituable if compensatory habitat is required within scheme footprint	Medium	Negligible impact on ponds themselves as none in the footprting of the scheme. So no impact on GCN habitat likely - may increase potential habitat as part of SUDS scheme.	Insignificant
		Aesthetics - contribution to landscape character	No ponds are direclty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Local	Commonplace in Cambridgeshire	Substitutable	Low	Negligible - not likely to impact any of the ponds.	Insignificant

contaminantion of groundwater	Groundwater	Water supply	High quality as the groundwater is source of drinking water for public consumption in area of the scheme. Scheme crosses SPZ2 designated in the area which is common for all three abstraction sites, and a small area of SPZ3. No SPZ1 crossed by Scheme.	Regional - There are three groundwater public water supply abstractions in vicinity of this option. The closest is in Babraham, there is another abstraction in Sawston and a third is 1km NW of Babraham research park and west of the A1307.	Locally scarce as the chalk aquifer is not present to the north of the scheme.	Not substitutable	Medium	Negligible. The public transport route has very low risk of contamination from spillages or vehicles due to low number of vehicles and limited volume of contaminants present in the vehicles. At no point is the route within 400m of any SPZ1 boundary, but it does cross about 2.8km of SPZ2 (which provides increased protection in terms of travel time from point of contamination to abstraction site). P&R design will include provision for collection of any spillages in drainage. P&R is about 400m from nearest SPZ1 boundary. Construction will be in accordance with EA Pollution Prevention requirements.	Insignificant
reduction in flow in groundwater	Groundwater	Chalk aquifer - conveyance of good quality groundwater	From River Granta crossing near Stapleford, south to P&R site the outcropping aquifer is White Chalk subgroup- with some superficial RTG and ALL along the River Granta valley. From River Granta crossing north to CBC the outcroppinging bedrock is the Grey Chalk subgroup - BGS data	Regional	Commonplace	Not substitutable	Medium	Negligible as scheme will not affect conveyance. The low permeabilty car park surface will lead to change in recharge but on a very small percentage area of aquifer outcrop. There are not intended to be any below ground structures that would impact groundwater flow. Footings for any River Granta crossing would have very minor impact on groundwater flow around the footings - diverting flow around the footings.	Insignificant

Reference Sources

Public data sources - Defra Magic website, EA website (flood zone information), BGS data sources. SCDC Local Plan
GIS Layer showing location of River Granta County Wildlife Site and also Groundwater Protection Zones.
GIS layers showing the route centreline, and preliminary scheme footprint.
GIS layers showing CSET PH2 Habitat areas.

Summary Assessment Score

Insignificant impact on water resources as no direct impacts on any water features other than crossing of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.

Qualitative Comments

TAG Water Environment Impacts Worksheet - Black option

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The area around Travel Hub Site C and along the BLACK alignment to Cambridge Biomedical Campus									
change to surface water runoff quantity and quality	River Granta	Water supply	No drinking water supply abstraction in vicinity of scheme from the river	Local (not used for public water supply - could be local farmer abstractions)	Commonplace	Not substitutable	Local for farmers if used for irrigation	Negligible - scheme would not affect any abstraction from River Granta	Insignificant
		Biodiversity	Route crosses River Granta which is designated as County Wildlife Site for entire length of Granta from Bartlow to Little Shelford	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme design will ensure crossing is designed to minimise impact on river itself and would not exceed 20m width, and thus on biodiversity at scale of length of river designated which is just over 18kms.	Insignificant
		Recreation and value to economy	Route crosses River Granta which is in an area where residents would like improved access along the river for recretational purposes (walking etc)	Local	Commonplace	Substitutable	Low	Slight benefit - the scheme would have NMU access that increases access to countryside and River Granta - scheme could facilitate other improvements to local PROW and Permissive Paths	Insignificant
Potential impact on flood plain	River Granta Floodplain	Conveyance of flood flows - Flood Zones 2 and 3	Around 220m of Flood Zone 2 and Flood Zone 3 are crossed once by the Black Route east of Stapleford. The P&R is located no closer than 120m from the flood zones south of Babraham.	Regional	Commonplace	Substitutable if compensatory flood storage provided if development intrudes into flood plain	Medium	Negligible - scheme design for river crossing would have to ensure there was no loss of flood plain. Route will be aligned to minimise the length of the flood plain crossed. Drainage stategy and design for the P&R site would have to ensure SuDS and no impact on conveyance of flood flows during storm events.	Insignificant
quality impacts on surface water runoff quality and quantity	Stillwater Ponds	Biodiversity	No ponds are direclty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Regional potential for GCN in the ponds - HSI assessment underway (2019/20)	Commonplace in Cambridgeshire	Substituable if compensatory habitat is required within scheme footprint	Medium	Negligible impact on ponds themselves as none in the footprting of the scheme. So no impact on GCN habitat likely - may increase potential habitat as part of SUDS scheme.	Insignificant
		Aesthetics - contribution to landscape character	No ponds are direclty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Local	Commonplace in Cambridgeshire	Substitutable	Low	Negligible - not likely to impact any of the ponds.	Insignificant
contaminantion of groundwater	Groundwater	Water supply	High quality as the groundwater is source of drinking water for public consumption in area of the scheme. Scheme crosses SPZ2 designated in the area which is common for all three abstraction sites, and a small area of SPZ3. No SPZ1 crossed by Scheme.	Regional - There are three groundwater public water supply abstractions in vicinity of this option. The closest is in Babraham, there is another abstraction in Sawston and a third is 1km NW of Babraham research park and west of the A1307.	Locally scarce as the chalk aquifer is not present to the north of the scheme.	Not substitutable	Medium	Negligible. The public transport route has very low risk of contamination from spillages or vehicles due to low number of vehicles and limited volume of contaminants present in the vehicles. At no point is the route within 400m of any SPZ1 boundary, but it does cross about 3.6km of SPZ2 (which provides increased protection in terms of travel time from point of contamination to abstraction site). P&R design will include provision for collection of any spillages in drainage. P&R is about 900m from nearest SPZ1 boundary. Construction will be in accordance with EA Pollution Prevention requirements.	Insignificant
reduction in flow in groundwater	Groundwater	Chalk aquifer - conveyance of good quality groundwater	Aquifer is principal aquifer (outcropping Grey Chalk - no superficial cover) - BGS data Soils are thin (aerial imagery shows chalk presence below soils) so groundwater will have high vulnerability	Regional	Commonplace	Not substitutable	Medium	Negligible as scheme will not affect conveyance. The low permeabilty car park surface will lead to change in recharge but on a very small percentage area of aquifer outcrop, and much of the runoff will be collected and discharged to SUDS draining to ground.	Insignificant

Reference Sources

Public data sources - Defra Magic website, EA website (flood zone information), BGS data sources
Mott MacDonald "CSWT Preliminary Ecological Report" (January 2019) - doc ref 93699-MMD-ENV-XX-RP-EN-0037.
Cambridge South West Park and Ride consultation brochure - 26 November 2018
Option layout drawings provided by Skanska. (H17273-STS-00-XX-M2-C-YELLOW)

Summary Assessment Score

Insignificant impact on water resources as no direct impacts on any water features other than crossing of River Granta which will require design to be compliant with requirements to have zero increase in flood risk. SPZ2 and SPZ3 are crossed by route but traffic load is light and not a risk to groundwater quality.

Qualitative Comments

TAG Water Environment Impacts Worksheet - Blue option

Description of study area/ summary of potential impacts	Key environmental resource	Features	Quality	Scale	Rarity	Substitutability	Importance	Magnitude	Significance
Study area: The area around Travel Hub Site C and along the BLUE alignment to Cambridge Biomedical Campus (CBC).									
change to surface water runoff quantity and quality	River Granta	Water supply	No drinking water supply abstraction in vicinity of scheme from the river	Local (not used for public water supply - could be local farmer abstractions)	Commonplace	Not substitutable	Local for farmers if used for irrigation	Negligible - scheme would not affect any abstraction from River Granta	Insignificant
		Biodiversity	Route crosses River Granta twice which is designated as County Wildlife Site for entire length of Granta from Bartlow to Little Shelford	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme design will ensure crossing is designed to minimise impact on river itself and would not exceed 20m width at each of two crossings, and thus on biodiversity at scale of length of river designated which is just over 18kms.	Insignificant
		Biodiversity	Nine Wells LNR - spring fed nature reserve	Local	Scarce locally	Not substitutable	Medium	Negligible - scheme is downgradient from the springs in the Nature Reserve and there is no intention for design to intercept groundwater or surface water which might feed the springs	Insignificant
		Cultural Heritage	Nine Wells - springs feeding Hobsons Conduit	Local	Scarce	Not substitutable	Medium	Negligible - Hobsons Conduit flows through into Cambridge - it was one of the original sources of water for the city. It does not flow much now due to lowering of the groundwater in the area. Design from the scheme could feed into the feeder to the conduit but this needs resolving as part of EIA	Insignificant
		Recreation and value to economy	Route crosses River Granta which is in an area where residents would like improved access along the river for recretational purposes (walking etc)	Local	Commonplace	Substitutable	Low	Slight benefit - the scheme would have NMU access that increases access to countryside and River Granta - scheme could facilitate other improvements to local PROW and Permissive Paths	Insignificant
Potential impact on flood plain	River Granta flood plain	Conveyance of flood flows - Flood Zones 2 and 3	This route crosses R Granta twice. Around 220m of Flood Zone 2 and Flood Zone 3 are crossed once by the Blue Route east of Stapleford. Then the route crosses again (south to north) adjacent to A11 just prior to entering the P&R site from the south - it crosses aroudn 230m of FZ2 and 3. The P&R footprint is shown extending into FZ 2 and 3 on southern edge of site.	Regional	Commonplace	Substitutable if compensatory flood storage provided if development intrudes into flood plain	Medium	Negligible - scheme design for river crossing would have to ensure there was no loss of flood plain. Route will be aligned to minimise the length of the flood plain crossed. Layout would ensure no car parking , access roads or other infrastructure would be constructed in the demarcated Flood Zones. Drainage stategy and design for the P&R site would have to ensure SuDS and no impact on conveyance of flood flows during storm events.	Insignificant
Potential impact on flood plain	Hobsons Brook flood plain	Conveyance of flood flows - Flood Zones 2 and 3	The route crosses about 32 metres of FZ2 and FZ3 where it connects to the roundabout between Dame Mary Archer Way and Addenbrookes Road in the CMBC. This flood plain is associated with the very headwaters of minor tributory to the River and has been largely built over by CBC development.	Local	Commonplace	Substituable as most of the tributary is already culverted	Low	Negligible impact on the flood zones as the area is largely developed and the stream culverted.	Insignificant
quality impacts on surface water runoff quality and quantity	Stillwater Ponds	Biodiversity	No ponds are direclty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Regional potential for GCN in the ponds - HSI assessment underway (2019/20)	Commonplace in Cambridgeshire	Substituable if compensatory habitat is required within scheme footprint	Medium	Negligible impact on ponds themselves as none in the footprting of the scheme. So no impact on GCN habitat likely - may increase potential habitat as part of SUDS scheme.	Insignificant
		Aesthetics - contribution to landscape character	No ponds are direclty in footprint but initial high level screeing has identified ponds in the vicinity of the route.	Local	Commonplace in Cambridgeshire	Substitutable	Low	Negligible - not likely to impact any of the ponds.	Insignificant

contaminantion of groundwater	Groundwater	Water supply	High quality as the groundwater is source of drinking water for public consumption in area of the scheme. Scheme crosses SPZ2 designated in the area which is common for all three abstraction sites, and a small area of SPZ3. No SPZ1 crossed by Scheme.	Regional - There are three groundwater public water supply abstractions in vicinity of this option. The closest is in Babraham, there is another abstraction in Sawston and a third is 1km NW of Babraham research park and west of the A1307.	Locally scarce as the chalk aquifer is not present to the north of the scheme.	Not substitutable	Medium	Negligible. The public transport route has very low risk of contamination from spillages or vehicles due to low number of vehicles and limited volume of contaminants present in the vehicles. At no point is the route within 400m of any SPZ1 boundary, but it does cross about 3.6km of SPZ2 (which provides increased protection in terms of travel time from point of contamination to abstraction site). P&R design will include provision for collection of any spillages in drainage. P&R is about 900m from nearest SPZ1 boundary. Construction will be in accordance with EA Pollution Prevention requirements.	Insignificant
reduction in flow in groundwater	Groundwater	Chalk aquifer - conveyance of good quality groundwater	From River Granta crossing near Stapleford, south to P&R site the outcropping aquifer is White Chalk subgroup- with some superficial RTG and ALL along the River Granta valley. From River Granta crossing north to CBC the outcroppinging bedrock is the Grey Chalk subgroup - BGS data	Regional	Commonplace	Not substitutable	Medium	Negligible as scheme will not affect conveyance. The low permeabilty car park surface will lead to change in recharge but on a very small percentage area of aquifer outcrop. There are not intended to be any below ground structures that would impact groundwater flow. Footings for any River Granta crossing would have very minor impact on groundwater flow around the footings - diverting flow around the footings.	Insignificant

Reference Sources

Public data sources - Defra Magic website, EA website (flood zone information), BGS data sources. SCDC Local Plan
GIS Layer showing location of River Granta County Wildlife Site and also Groundwater Protection Zones.
GIS layers showing the route centreline, and preliminary scheme footprint.
GIS layers showing CSET PH2 Habitat areas.

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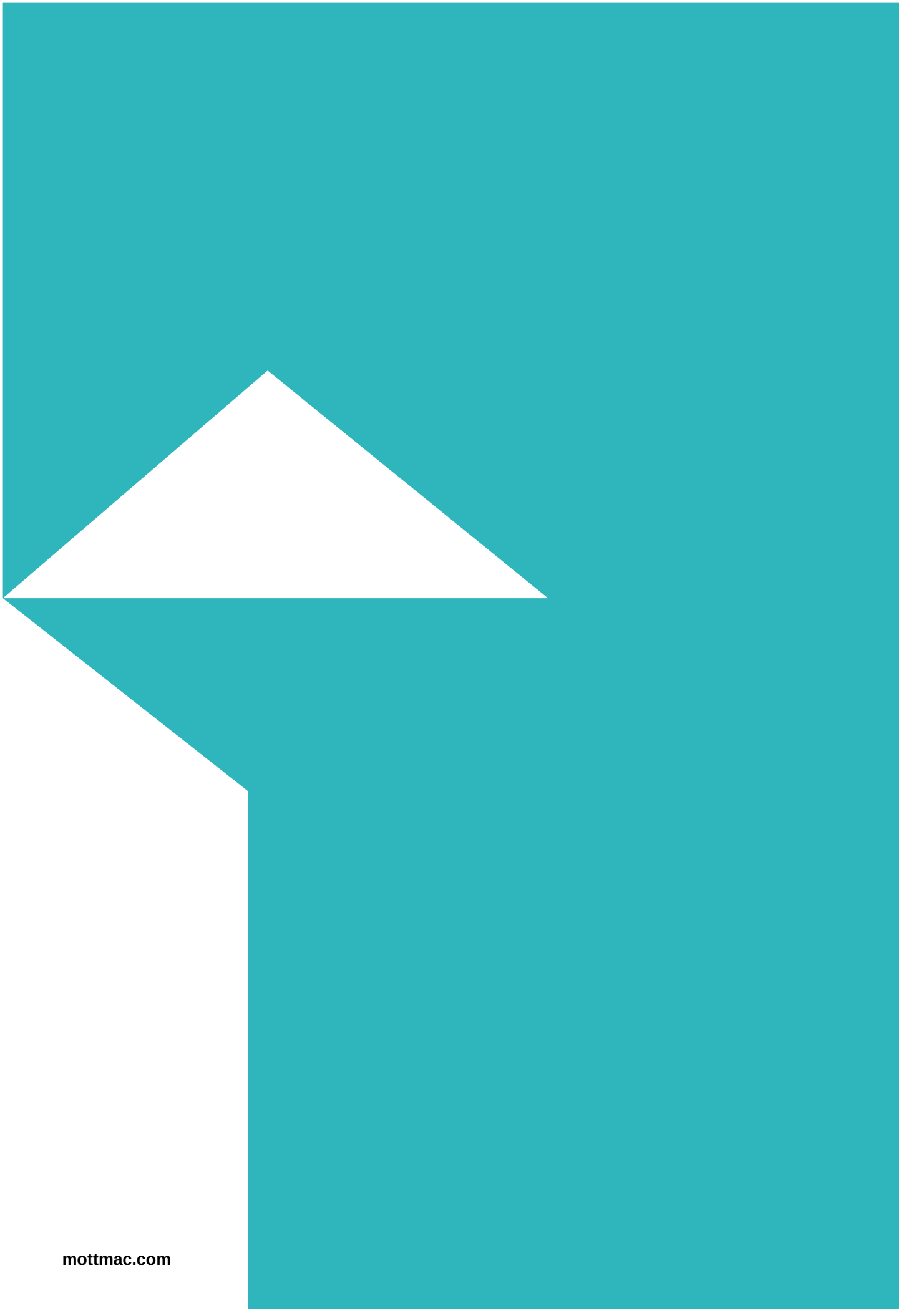

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